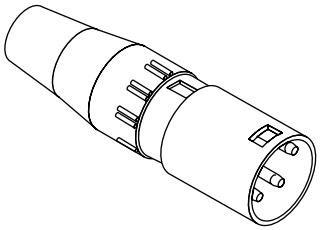
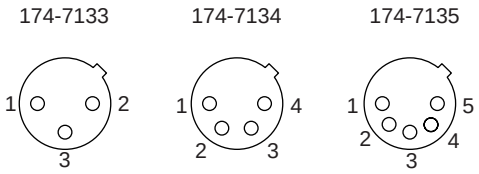
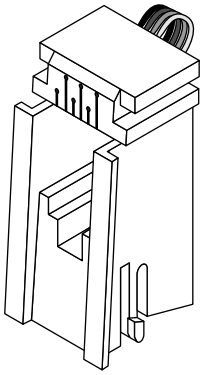


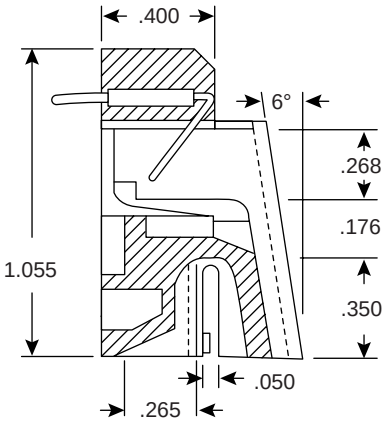


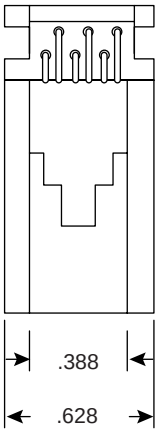
Specifications:

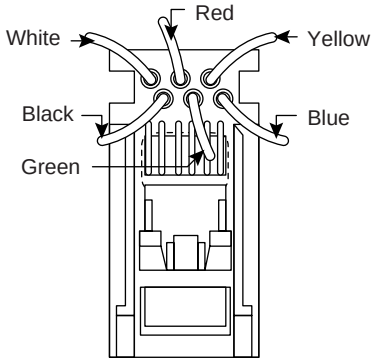
- Type: male
- Housing: zinc high pressure diecast
- Finish: non-reflective nickel
- Contacts: gold plated solid brass
- Pin base moldings: noryl (UL94V-1)
- Grommets: santoprene
- Collets: acetal
- Working voltage: 250VDC or AC peak
- Test voltage: 1500VAC
- Current rating: 3mΩ max.
- Temperature range: -30°C ~ +80°C

Mouser Stock No.	No. of Pins	Current Rating	Maximum Wire Gauge
174-7133	3	16A	12AWG
174-7134	4	10A	16AWG
174-7135	5	7.5A	18AWG



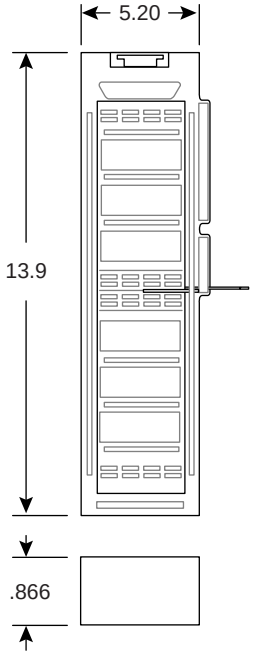






Specifications:

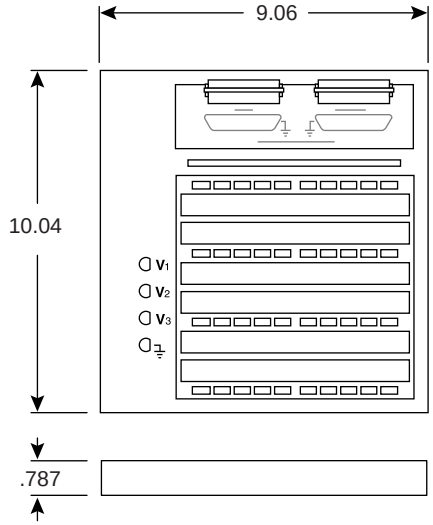
- USOC type: RJ12
- Western electric type: 623D6
- Positions-contacts: 6-6
- Color: gray
- Housing: ABS molding compound; UL-94V-0, UL-94V-1
- Contacts: 6 micron gold plate
- Wire: phosphor bronze alloy; 0.45mm
- Wire style: UL-1061 AWM 80°C VW-1 300V 26AWG with PVC insulation
- Terminal: 0.4 thickness; 3/4 hard brass alloy



Dimensions (In.)

Specifications:

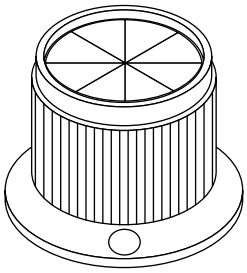
- Type: UP-604A AT-PC compatible interface breadboard
- Back Plate: fiber glass PBC
- External body: ABS polymer
- Internal contact terminal: silver alloy and nickel
- Resistance: <10mΩ (ø0.6mm lead @ 1KHz)
- Capacitance: <15pF (ø0.6mm lead @ 1KHz)
- Insulation: >10TΩ (500VDC for 1 minute)
- Hi-Pot test: 1500VDC for 1 minute
- Breakdown current: 30mA
- Contact current: 3A (ø0.6mm lead)
- Wire size acceptability: ø0.3mm ~ 0.8mm
- Warning: do not use high voltage (AC>50V, DC>75V)
- Tie point: 6 point x 60 row (360) x 6 pcs. (base socket); 6 point x 8 row (48) x 4 pcs. (bus strip); 2352 total
- Adapter: 25 pins D-sub female connector/25 pins wire socket; 98 pins golden finger (ISA bus)/98 pins wire socket
- Weight: 370gm



Dimensions (In.)

Specifications:

- Type: UIB-34 universal interface breadboard
- External body & back plate: ABS polymer
- Internal contact terminal: silver alloy and nickel
- Resistance: <10mΩ (ø0.6mm lead @ 1KHz)
- Capacitance: <10pF (ø0.6mm lead @ 1KHz)
- Insulation: >10TΩ (500VDC for 1 minute)
- Hi-Pot test: 1500VDC for 1 minute
- Breakdown current: 30mA
- Contact current: 3A (ø0.6mm lead)
- Wire size acceptability: ø0.3mm ~ 0.8mm
- Warning: do not use high voltage (AC>50V, DC>75V)
- Tie point: 5 point x 128 row (640) x 3 pcs. (base socket); 5 point x 20 row (100) x 4 pcs. (bus strip); 2320 total
- Weight: 600gm
- Height with UC-02: 1.18”
- Accessories: 1 edge plate (EP-3), 1 universal connector, & 4 bind posts



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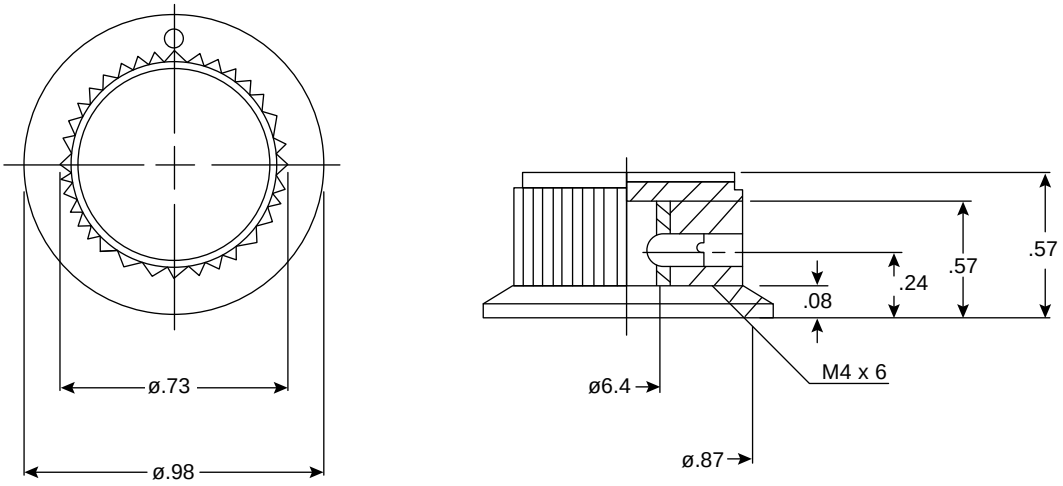
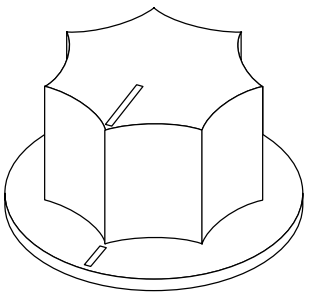
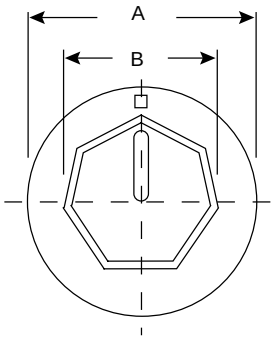
Dimensions (In.)



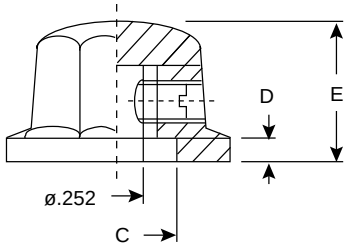
Specifications:

- Material: phenolic resin
- Color: black
- Indicator: painted dot (white)
- Shafthole: 1/4"
- Fitting: screw (M4)



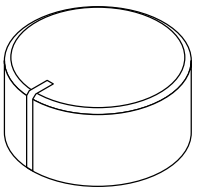


Dimensions (In.)

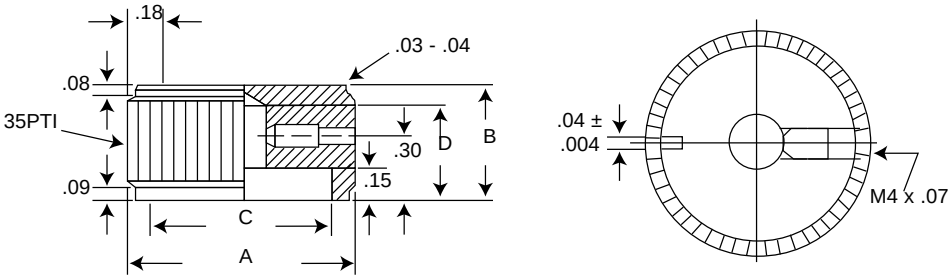


Mouser Stock No.	A	B	C	D	E	Screw Type
45KN013	.937	.728	.551	.106	.591	M4x0.7
45KN014	1.319	1.087	.878	.106	.689	M4x0.7

Specifications:
- Body material: phenolic resin
- Body color: black
- Indicator type: painted line
- Indicator color: white



Dimensions (In.)

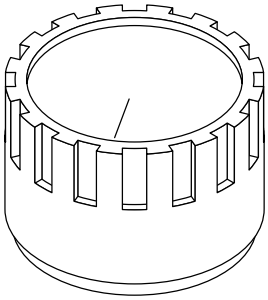


Material Specifications:
- Material: aluminum 997
- Finish: A-clear anodize
  B-black anodize

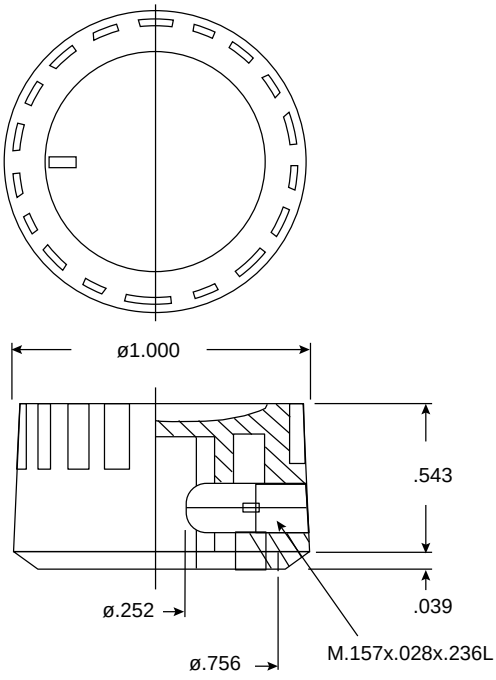
Mouser Stock No.	Dia. (In.)	Height (In.)	Color	A	B	C	D	Shaft Hole	Finish
450-6015	.625	.56	Aluminum	.63	.55	.43	.41		A
450-6016	.875	.56	Aluminum	.87	.55	.63	.41		A
450-6017	1.125	.56	Aluminum	1.10	.55	.87	.41	.25±.05	A
450-7015	.625	.56	Black	.63	.55	.43	.41		B
450-7016	.875	.56	Black	.87	.55	.63	.41		B

MOUSER® ELECTRONICS

45KN019 Rotary Knob

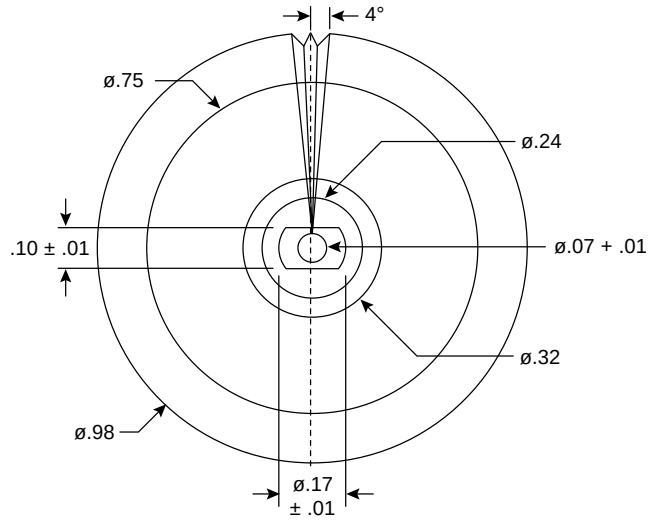


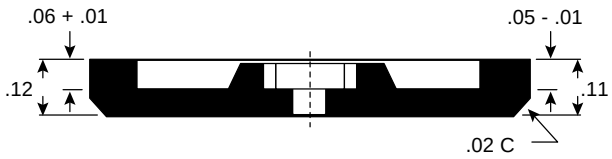
Dimensions (In.)



Specifications:

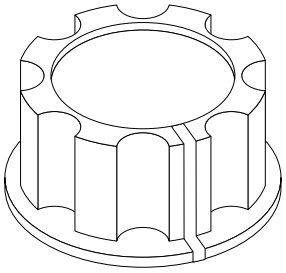
- Material of body: phenolic resin
- Color of body: black
- Indicator type: painted line
- Indicator color: black
- Shaft hole: ø.252
- Fitting: screw type



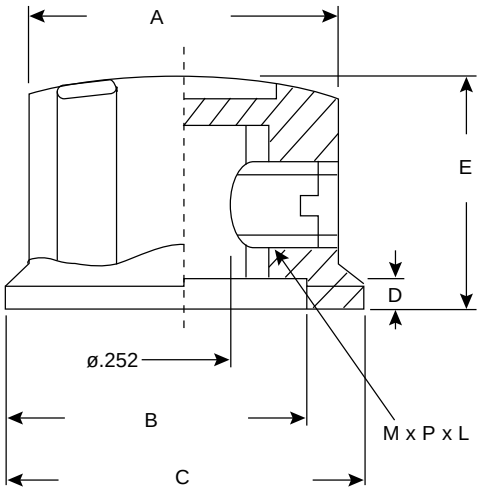


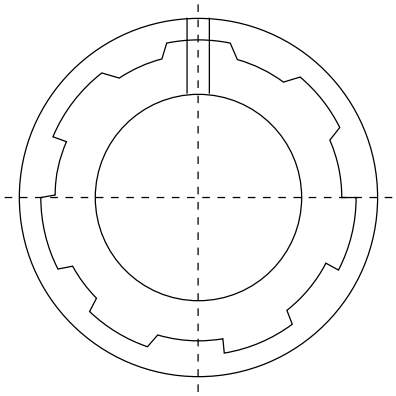
Sectioned View

Specifications:
- Material: molded plastic
- Color: black



Dimensions (In.)

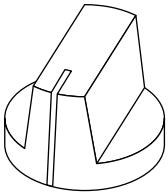


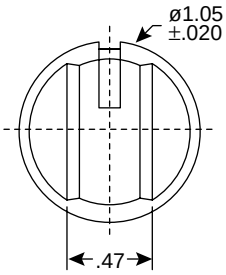


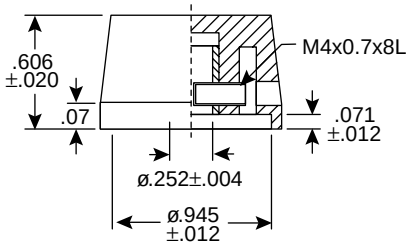
Specification:

- Body material: phenolic resin
- Color of body: black
- Indicator type: painted line
- Indicator color: white
- Shaft hole: ø.252
- Fitting: screw type

	45KN016	45KN017	45KN018
A	ø1.165	ø.945	ø.618
B	ø1.035	ø.866	ø.472
C	ø1.300	ø1.047	ø.772
D	.165	.142	.067
E	.622	.598	.453
MxPxL	.157x.028x.315	.157x.028x.236	.118x.020x.157



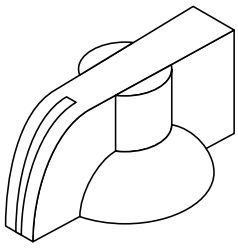




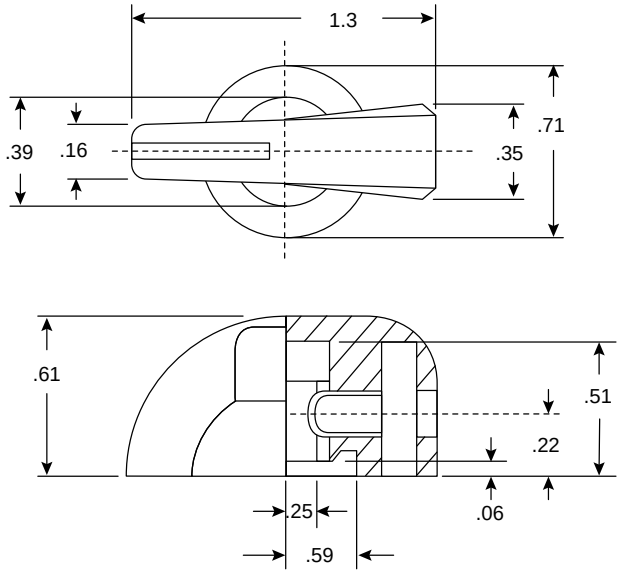
Dimensions (In.)

Specifications:

- Type: control & instrument
- Color: black
- Body material: phenolic resin
- Indicator: painted white line
- Shaft hole: .25 inches
- Hardware: fitted with brass inserts & set screws



Dimensions (In.)

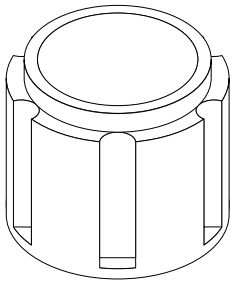


Specifications:

- Standard screw size: M4 x P0.7
- Standard color: black
- Standard shaft size: .25

MOUSER® ELECTRONICS

45KN026 Knob (ø.781)



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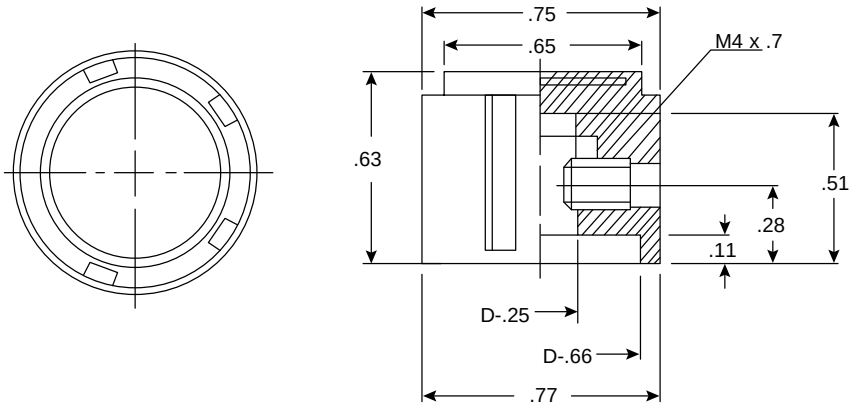
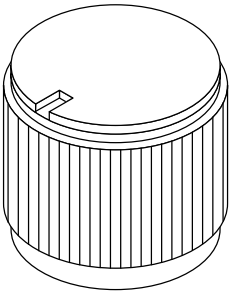
Dimensions (In.)

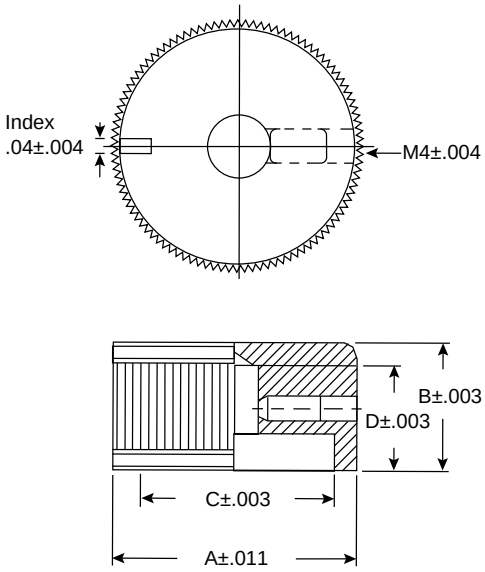


Specifications:

- Body: phenolic resin
- Color: black
- Shaft hole dia.: 1/4"
- Fitting: screw type



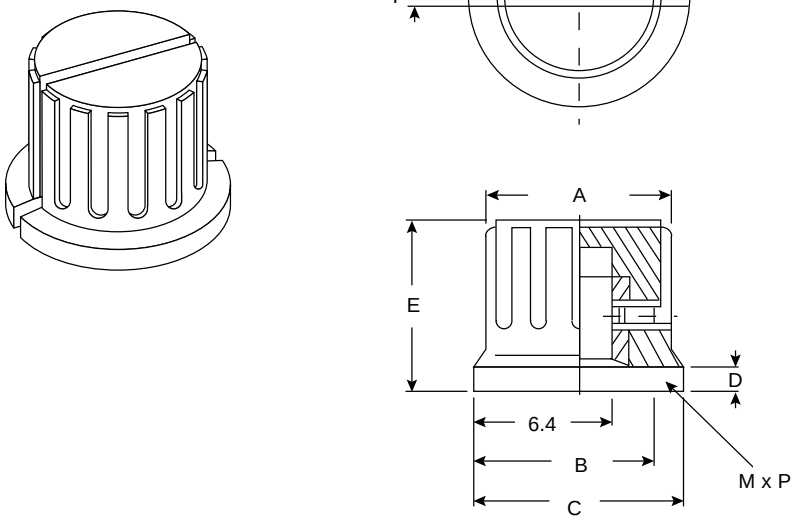
Dimensions (In.)



Material Specification:
- Aluminum: 997
- Finish: A-Clear anodize
  B-Black anodize

Mouser Stock No.	Color	A	B	C	D	Finish	Shaft Size
450-6003	Aluminum	.500	.622	.374	.512	A	.25±.05
450-6005	Aluminum	.748	.622	.591	.512	A	.25±.05
450-6006	Aluminum	.937	.622	.709	.512	A	.25±.05
450-6007	Aluminum	1.252	.622	.984	.512	A	.25±.05
450-6008	Black	1.252	.622	.984	.512	B	.25±.05
450-7005	Black	.748	.622	.591	.512	B	.25±.05

Dimensions (In.)



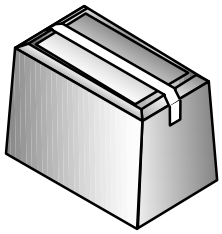
Material Specification:

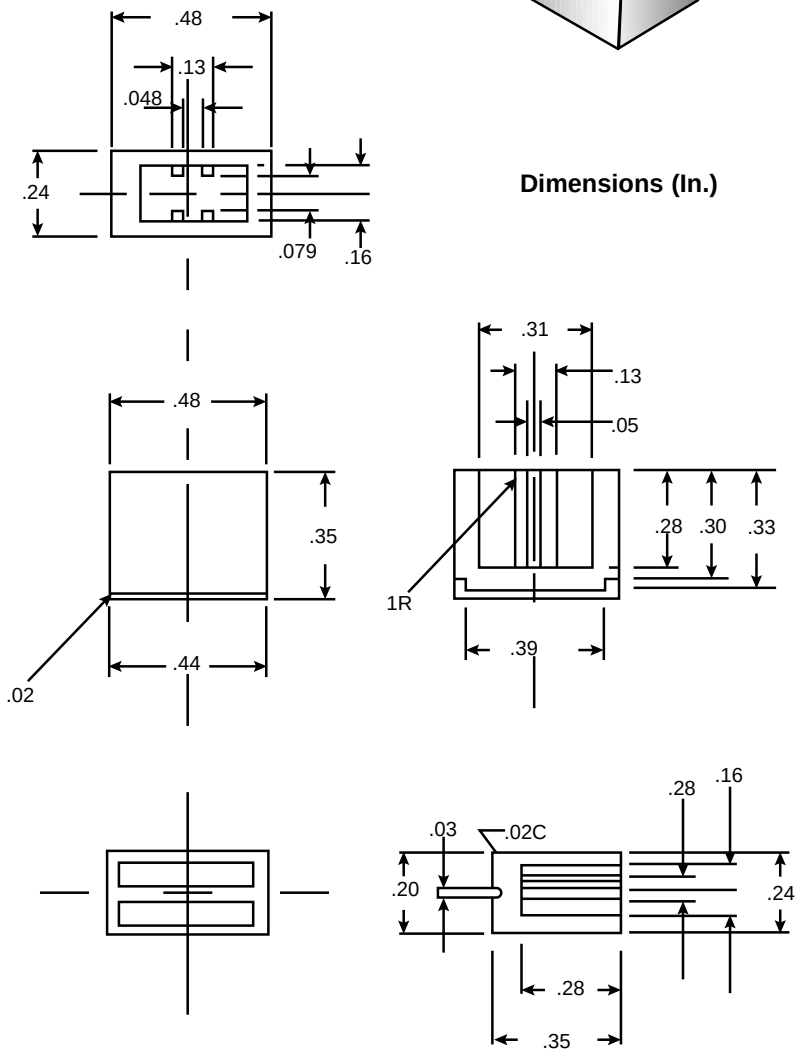
- Body material: phenolic resin
- Color: black
- Indicator type: painted, an S.Q. point
- Indicator color: white
- Shaft hole: (1/4")
- Fitting: screw type

Mouser Stock No.	A	B	C	D	E	F	Screw Type
450-2034	.472	.354	.591	.098	.551	.059	M3x0.5
450-2035	.630	.472	.772	.079	.591	.071	M3x0.5
450-2036	.787	.441	.945	.177	.780	.071	M4x0.7
450-2039	1.142	.925	1.394	.098	.709	.118	M4x0.7

MOUSER® ELECTRONICS

450-0154 Slide Knob





Dimensions (In.)

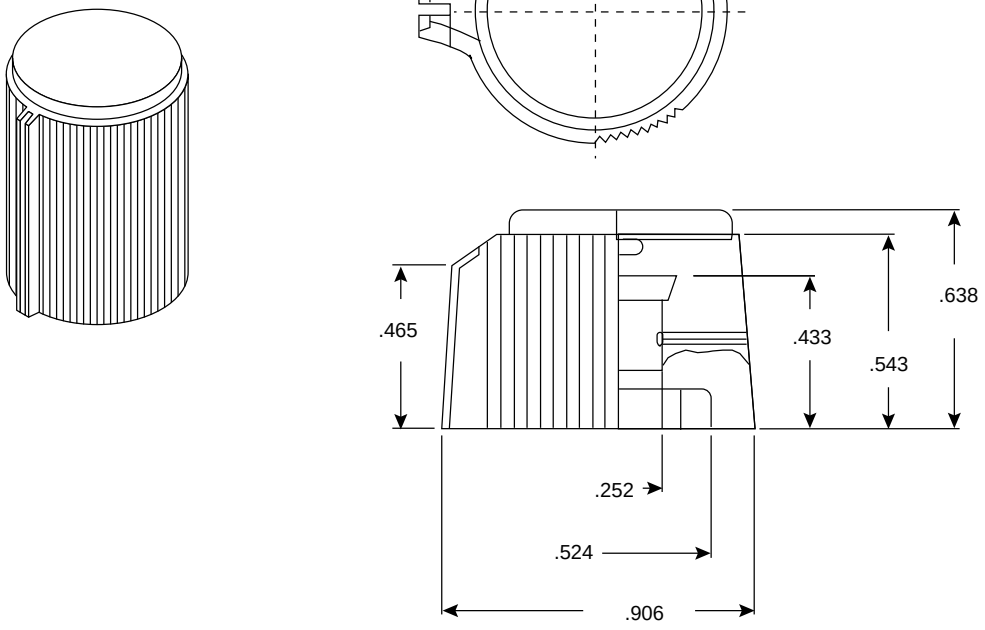
Mouser Stock No.	Dimensions (In.)		
	H	W	L
450-0154	.35	.24	.48

MOUSER® ELECTRONICS

450-3180
450-3181
450-3182
450-3183

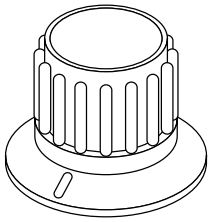
High Visibility Color Knobs

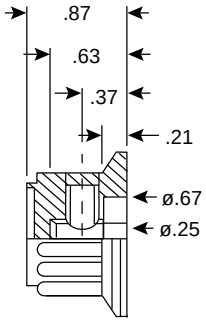
Dimensions (In.)

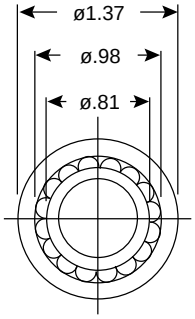


Material Specification:

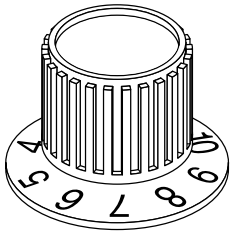
- Body material: phenolic resin
- Brass insert with screw fittings
- Color: black
- Indicator type: painted line
- Indicator color: white
- Knob fits: .25" shaft
- Colors: 450-3180 green
  450-3181 red
  450-3182 yellow
  450-3183 blue

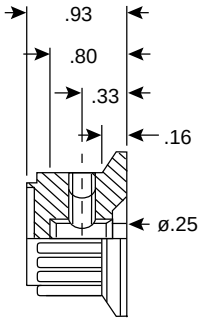


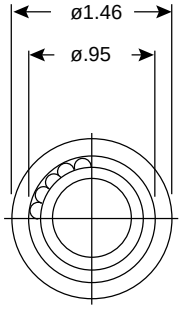




Dimensions (In.)

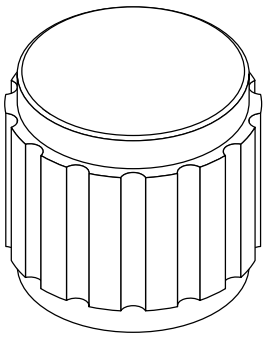




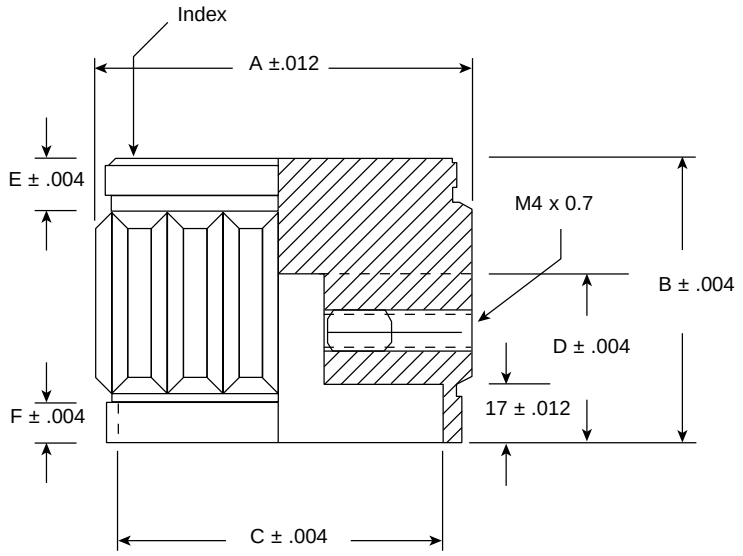


MOUSER® ELECTRONICS

45KN030
45KN031 450-7030
45KN032 450-7031 Aluminum Knobs
45KN033 450-7032



Dimensions (In.)

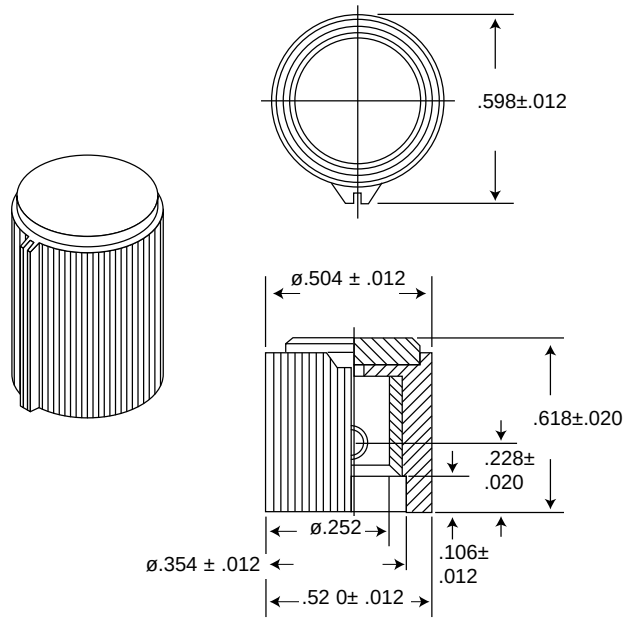


Specifications:

- Material: aluminum 997
- Shaft hole: .25 +.002
- Dia. (In.): A dimension
- Height (In.): B dimension

Mouser Stock No.	Color	A	B	C	D	E	F	Knob Finish
45KN030	Aluminum	.787	.768	.591	.591	.142	.126	Clear Anodize
45KN031	Aluminum	.610	.650	.433	.571	.102	.102	Clear Anodize
45KN032	Aluminum	.874	.748	.591	.535	.150	.150	Clear Anodize
45KN033	Aluminum	1.181	.866	.984	.457	.169	.169	Clear Anodize
450-7030	Black	.787	.768	.591	.591	.142	.126	Black Anodize
450-7031	Black	.610	.650	.433	.571	.102	.102	Black Anodize
450-7032	Black	.874	.748	.591	.535	.150	.150	Black Anodize

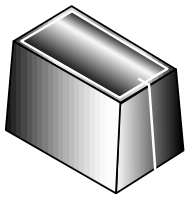
Dimensions (In.)



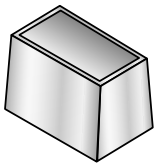
Specifications:

- Body: phenolic
- Color of body: black
- Indicator type: painted line
- Indicator color: white
- Plastic knob: brass insert

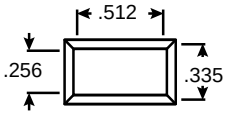
Mouser Stock No.	Dia. (In.)	Height (In.)	Color Top	Shaft Size (In.)
450-2040	.520	.618	Red	.25
450-2050	.520	.618	Yellow	.25
450-2060	.520	.618	Green	.25
450-2070	.520	.618	Blue	.25

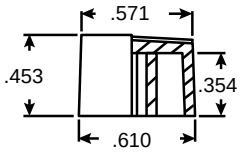


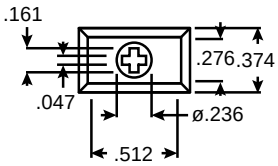
45KN151



45KN152



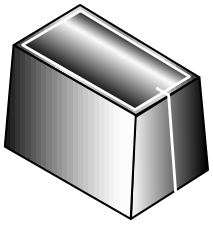


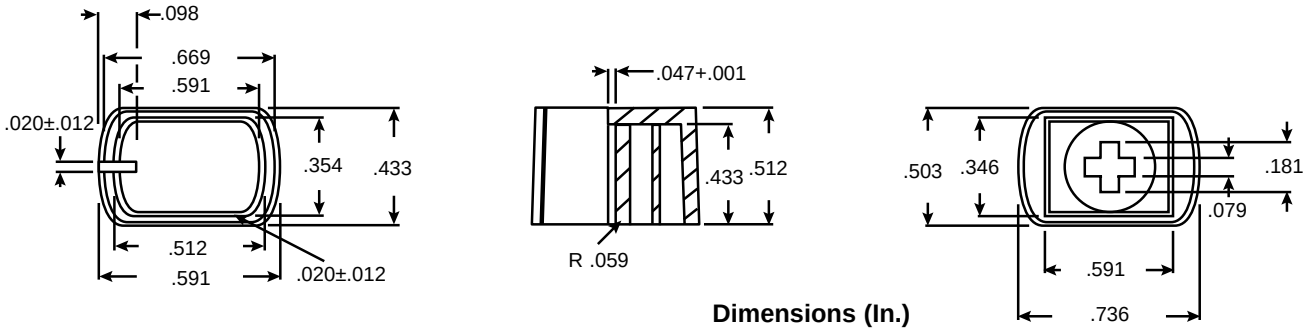


Dimensions (In.)

Specifications:

- Material: ABS plastic resin
- Finish: Black with chrome inlay-45KN151
  Chrome-45KN152
- Fits slide potentiometers: 321-9000, 321-9100, 321-9201, 321-9300, 321-9400, and 312-9301 & 9302 series





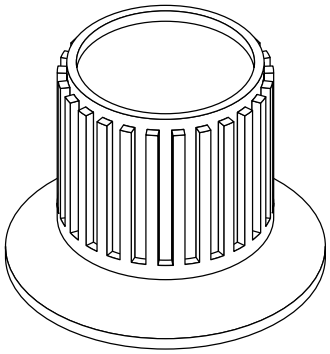
Dimensions (In.)

Specifications:

- Material: ABS plastic resin
- Finish: Black
- Fits slide potentiometers: 321-9000, 321-9100, 321-9200, 321-9201, 321-9300, 321-9400, and 312-9301 & 9302 series

MOUSER® ELECTRONICS

45KN022 Rotary Knob

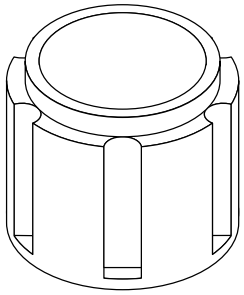


Specifications:

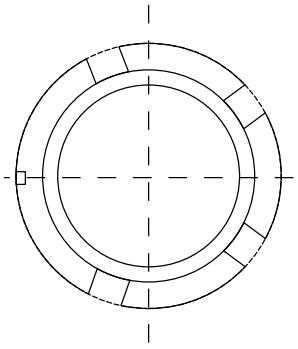
- Material of body: phenolic
- Color of body: black
- Shaft hole: ø.252
- Fitting: screw type

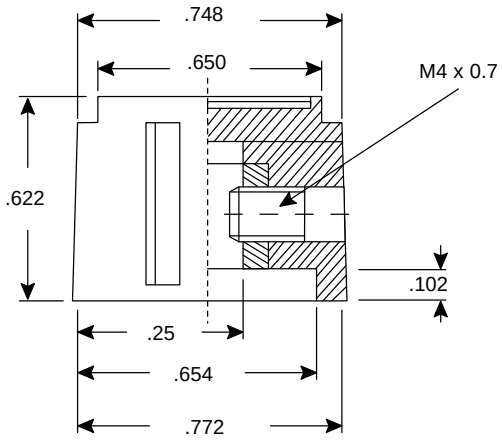
MOUSER® ELECTRONICS

45KN023 Control Knob



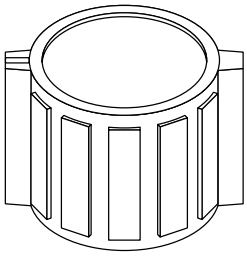
Dimensions (In.)

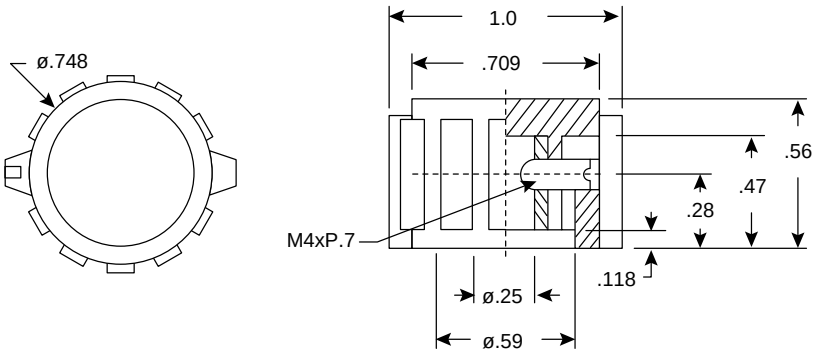




Specifications:

- Phenolic resin
- Color: black
- Indicator: painted white line
- Shaft size: 1/4 w/set screw

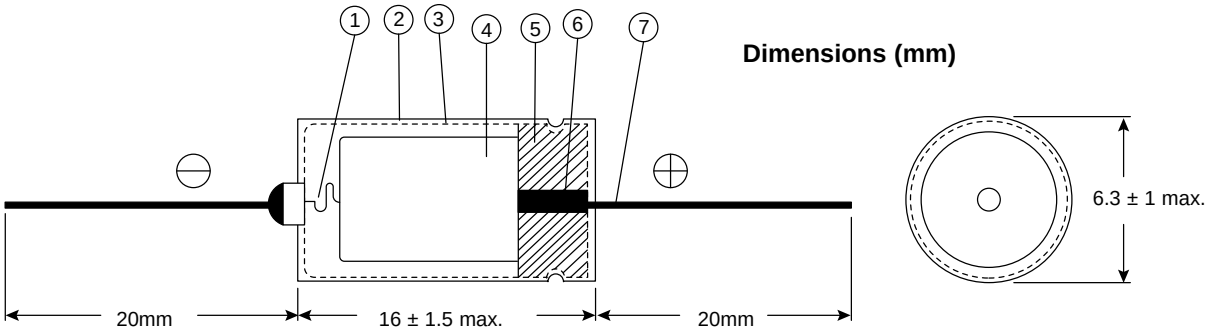




Knobs are fitted with brass inserts and set screws for added strength and durability.

Specifications:

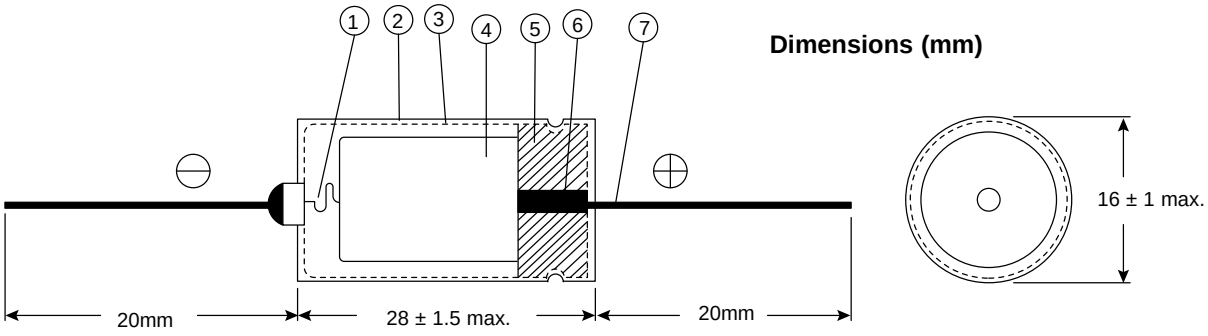
- Type: pointer
- Body: phenolic plastic
- Color: black
- Indicator: white (line)
- Shaft hole: .25”
- Fitting: screw type



Pin	
1	Plain foil
2	Insulation sleeve
3	Aluminum case
4	Capacitor element
5	Sealing rubber
6	Aluminum lead wire
7	Lead wire

Specifications:

- Capacitance: 100µF
- Rated voltage: 16V
- Capacitance tolerance: -10 to +50%
- Operating temperature range: -10 to +85C
- Leakage current: I=0.02CV or 3µA whichever is greater after 5 minutes applying rated working voltage @ 20C
  where: C=rated capacitance in µF
  V=rated DC working voltage in volts
- Dissipation factor: .16

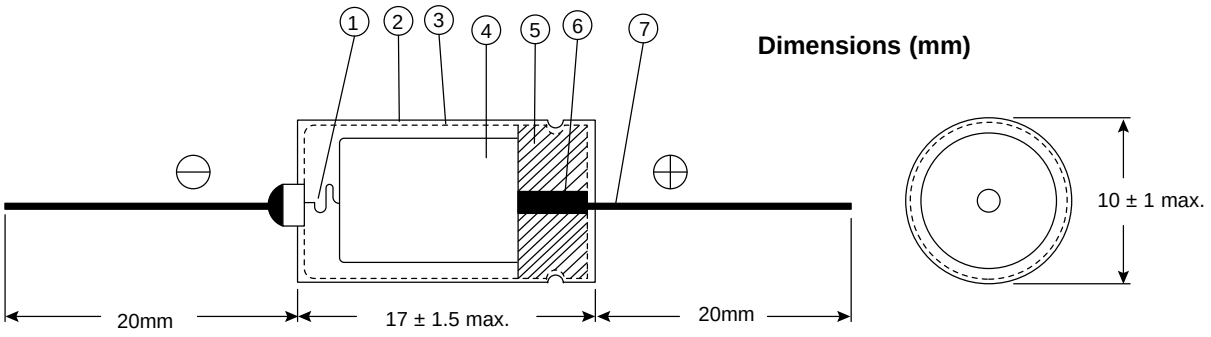


Dimensions (mm)

Pin	
1	Plain foil
2	Insulation sleeve
3	Aluminum case
4	Capacitor element
5	Sealing rubber
6	Aluminum lead wire
7	Lead wire

Specifications:

- Capacitance: 2200µF
- Rated voltage: 25V
- Capactiance tolerance: -10 to +50%
- Operating temperature range: -40 to +85C
- Leakage current: I=0.02CV or 3µA whichever is greater after 5 minutes applying rated DC working voltage @ 20°C
  where: C = rated capacitance in µF
  V = rated DC working voltage in Volts
- Dissipation factor: .14

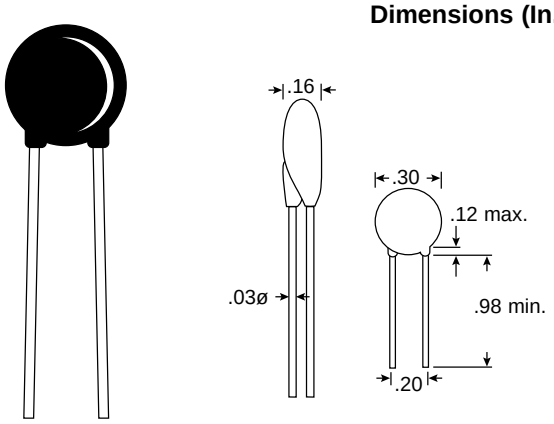


Dimensions (mm)

Pin	
1	Plain foil
2	Insulation sleeve
3	Aluminum case
4	Capacitor element
5	Sealing rubber
6	Aluminum lead wire
7	Lead wire

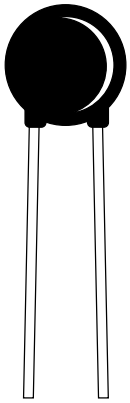
Specifications:

- Capacitance: 100µF
- Rated voltage: 50V
- Capactiance tolerance: -10 to +50%
- Operating temperature range: -40 to +85C
- Leakage current: I=0.02CV or 3µA whichever is greater after 5 minutes applying rated DC working voltage @ 20°C
  where: C = rated capacitance in µF
  V = rated DC working voltage in volts
- Dissipation factor: .10

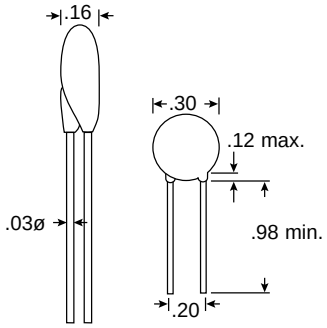


Specifications:

- Capacitance: 47pF
- Temperature coefficient: SL
- Tolerance: 10%
- Working voltage: 1KV
- Temperature range: -25 + 85°C
- Insulation resistance: 10,000MΩ min. (500VDC)

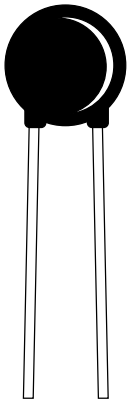


Dimensions (In.)

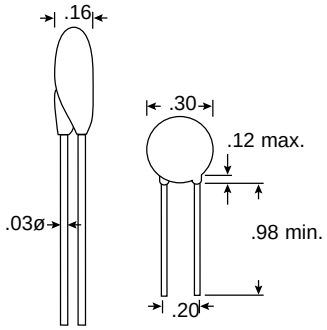


Specifications:

- Capacitance: 22pF
- Temperature coefficient: SL
- Tolerance: 10%
- Working voltage: 1KV
- Temperature range: -25 + 85°C
- Insulation resistance: 10,000MΩ min. (500VDC)

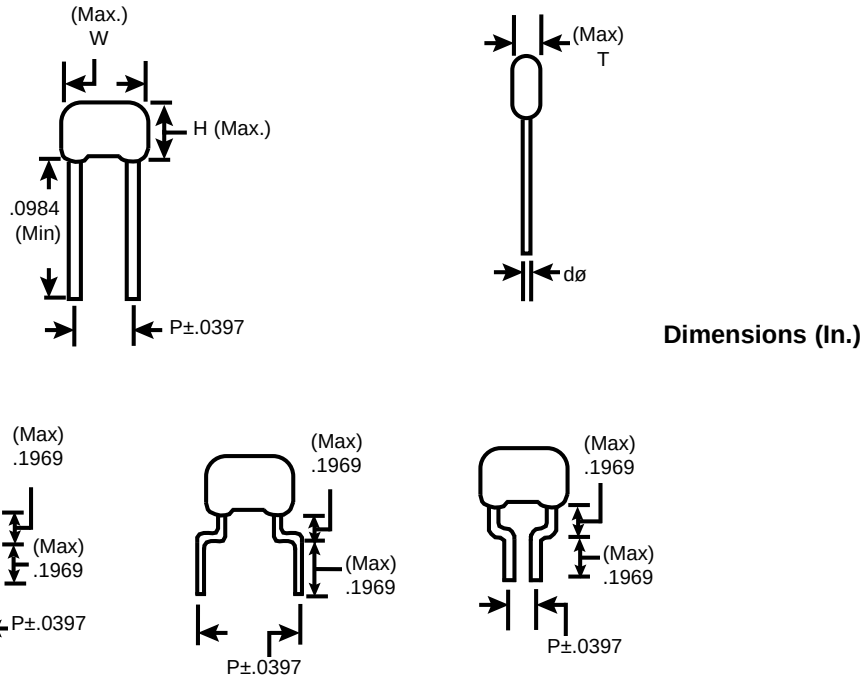


Dimensions (In.)



Specifications:

- Capacitance: 10pF
- Temperature coefficient: SL
- Tolerance: 5%
- Working voltage: 1KV
- Temperature range: -25 + 85°C
- Insulation resistance: 10,000MΩ min. (500VDC)



Dimensions (In.)

1431-Series are non-inductively wound with Polypropylene film dielectric and aluminum foil electrode with copper-clad steel leads and are epoxy resin coated. They are suitable for blocking, by-pass coupling and temperature compensation for applications in telecommunication, data processing, industrial instrumentation and automatic control system equipment.

Features:

- Low dissipation factor and high insulation resistance.
- High stability of capacitance and DF versus temperature and frequency.
- Low ESR
- Non-inductive construction

Specifications:

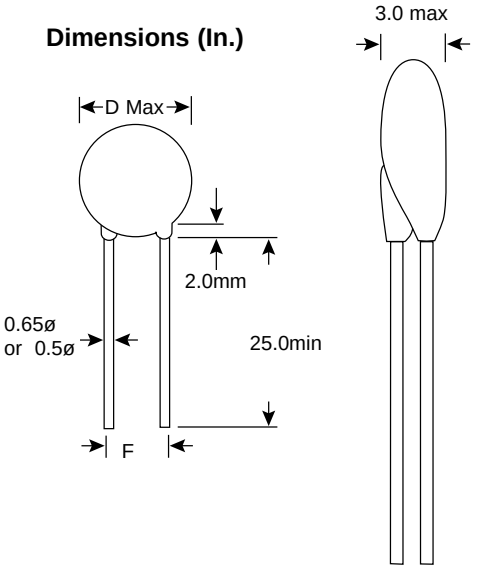
- Operating temperature: -40 ~ -85°C
- Capacitance range: .001 ~ .47µF
- Capacitance tolerance: ±5%(J), ±10%(K)
- Rated Voltage: 250VDC, 400VDC, 630VDC
- Dissipation factor: 0.1% Max at 1KHz, 25°C
- Insulation resistance: >30,000 MΩ (C>.1µF)
  >3,000 MΩ (C>.1µF)

Value UF	WVDC	Dimensions (In)				
		W	H	T	P±1	dØ
.001	250	.41	.37	.20	.28	.02
.0015	250	.41	.37	.22	.28	.02
.0022	250	.41	.37	.22	.28	.02
.0033	250	.41	.37	.22	.28	.02
.0047	250	.41	.37	.22	.28	.02
.0068	250	.41	.37	.22	.28	.02
.01	250	.41	.39	.26	.28	.02
.015	250	.55	.39	.26	.39	.02
.022	250	.55	.47	.28	.39	.02
.033	250	.75	.45	.26	.59	.02
.047	250	.75	.51	.30	.59	.02
.056	250	.75	.46	.26	.59	.02
.068	250	.75	.55	.35	.59	.03
.1	250	.79	.63	.39	.59	.03
.15	250	1.02	.71	.41	.83	.02
.22	250	1.02	.83	.51	.87	.03
.33	250	1.22	.83	.51	1.08	.03
.47	250	1.22	.93	.61	1.08	.02
.001	400	.55	.33	.22	.39	.02
.0015	400	.55	.37	.24	.39	.02
.0022	400	.55	.37	.24	.39	.02
.0033	400	.55	.37	.24	.39	.02
.0047	400	.55	.37	.24	.39	.02
.0068	400	.55	.39	.26	.39	.02
.01	400	.55	.47	.30	.39	.02
.015	400	.55	.53	.31	.39	.02
.022	400	.75	.47	.30	.59	.02
.033	400	.75	.47	.33	.59	.02
.047	400	.79	.61	.37	.59	.03
.068	400	1.02	.65	.35	.83	.03
.1	400	1.02	.73	.43	.87	.03
.15	400	1.02	.83	.55	.87	.03
.22	400	1.22	.87	.57	1.08	.03
.33	400	1.22	1.02	.73	1.08	.03
.47	400	1.22	1.10	.81	1.08	.03
.001	630	.55	.33	.22	.39	.02
.0015	630	.55	.37	.24	.39	.02
.0022	630	.55	.39	.26	.39	.02
.0033	630	.55	.41	.26	.39	.02
.0047	630	.55	.47	.26	.39	.02
.0068	630	.75	.51	.30	.59	.03
.01	630	.79	.49	.30	.59	.03
.015	630	.79	.57	.31	.59	.03
.022	630	.83	.65	.36	.59	.03
.033	630	.83	.75	.43	.59	.03
.047	630	1.02	.71	.45	.87	.03
.068	630	1.22	.75	.43	1.08	.03
.1	630	1.22	.87	.49	1.08	.03
.15	630	1.22	1.00	.61	1.08	.03
.22	630	1.22	1.00	.63	1.08	.03

MOUSER® ELECTRONICS

140-CD602S9-470K
140-CD602S9-101K Ceramic Capacitor Class II
140-CD103S9-101K

Dimensions (In.)



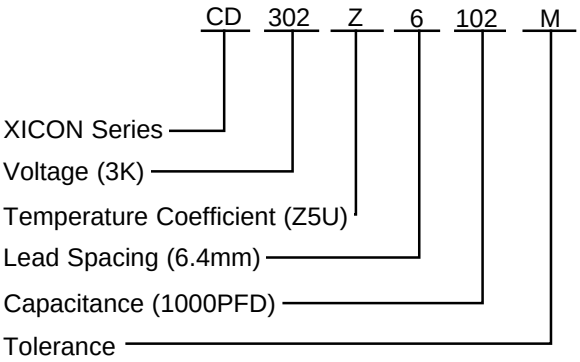
Feature:
1. High reliability
2. Small size with high dielectric constant
3. Low inductance due to simplified electrode structure
4. Popular temperature coefficients available
5. Wide operating temperature range
6. High insulation resistance

Specifications:
- Power factor: 2.5% max at 1KH d25°C
- Life test: 2 times working voltage at 85°C for 250 hours
- Lead wire: #24 or #22 AWG tinned copper wire
- Insulation: Dipped epoxy
- Coating on lead: 2.0mm max below the target fine of disc.
- Lead spacing tolerance: ±0.8mm
- Test voltage: 2.5 times rated voltage for 1.5 sec.
- Insulation resistance: 7500mΩ min at WVDC

140-CD602S9-470K:
- Voltage: 6000V
- Capacitance: 47pf
- Lead space: 9.5mm
- Diameter: 6mm
- Temperature coefficient: SL (+350 to -1000) PPM/°C

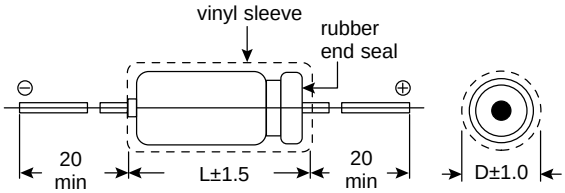
140-CD602S9-101K:
- Voltage: 6000V
- Capacitance: 100pf
- Leadspace: 9.5mm
- Diameter: 8mm
- Temperature coefficient: SL (+350 to -1000) PPM/°C

140-CD103S9-101K:
- Voltage: 10000V
- Capacitance: 100pf
- Leadspace: 9.5mm
- Diameter: 11mm
- Temperature coefficient: SL (+350 to -1000) PPM/°C



Specifications:

- Rated working voltage range & operating temperature range: 10V~100V= -40˚C~ +85˚C; 160V~450V= -25˚C~ +85˚C
- Tolerance: ±20%
- Shelf test: capacitance change= ≤ ±20%, tan.δ= ≤150%, leakage current= ≤ 200% after 500 hrs application of working voltage @ +85˚C
- Load test: capacitance change= ≤ ±20%, tan.δ= ≤150%, leakage current= ≤ initial value after 1,000 hrs application of working voltage @ +85˚C



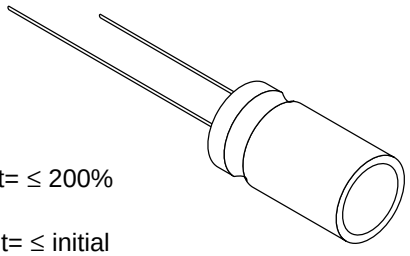
Dimensions (mm)

Characteristics

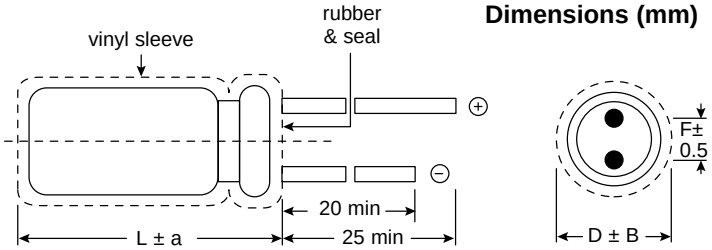
WVDC	10	16	25	35	50	63	100	160	200	250	350	400	450
Surge Voltage (25˚C)	13	20	32	44	63	79	125	200	250	300	400	450	500
DF (tanδ) (120Hz, 25˚C)	0.20	0.17	0.17	0.15	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.24	0.24
Temperature Characteristics													
-25˚C/+25˚C	4	3	3	2	2	2	2	8	8	8	12	15	16
-40˚C/+25˚C (Impedance ratio @120Hz)	8	6	4	3	3	3	3	6	8	10	---	---	---
µF	Permissible Ripple Current (mA (rms) @ 120Hz 85˚C)												
0.47					5	5	10	9	9	9	10	10	10
1					10	10	19	11	11	11	12	12	12
2.2					19	28	29	18	18	20	20	20	20
3.3					33	38	38	24	24	24	26	26	28
4.7				33	43	43	48	28	28	30	30	30	33
10				57	62	67	67	45	45	48	53	53	58
22		71	86	90	95	100	109	76	76	90	93	93	98
33	57	105	105	109	105	124	138	105	105	103	116	116	124
47	86	124	124	124	124	152	171	124	124	143	152	152	171
100	171	171	171	200	238	257	333	204	204	233	247		
220	238	238	295	333	380	428	523	347	356				
330	314	333	371	418	475	523	664	523					
470	380	418	456	523	617	713	855						
1000	599	646	808	855	998	1045							
2200	874	950	1140	1188	1235								
3300	1034	1045	1235	1330									
4700	1140	1292	1425										
10000	1520												

Specifications:

- Type: radial aluminum electrolytic
- Rated working voltage range & operating temperature range: 10V~100V: -40˚C~ +85˚C; 160V~450V: -25˚C~ +85˚C
- Tolerance: ±20%
- Shelf test: capacitance change= ≤ ±20%, tan.δ= ≤150%, leakage current= ≤ 200% after 500 hrs application of working voltage @ +85˚C
- Load test: capacitance change= ≤ ±20%, tan.δ= ≤150%, leakage current= ≤ initial value after 1,000 hrs application of working voltage @ +85˚C



D	5	6	8	10	13	16	18	20	22	25
F	2.0	2.5	3.5	5.0		7.5		10.5		12.5
d	0.5		0.6			0.8				1.0
a	1.0			1.5				2.0		
B	0.5				1.0					



Dimensions (mm)

Dimensions: D x L (mm)

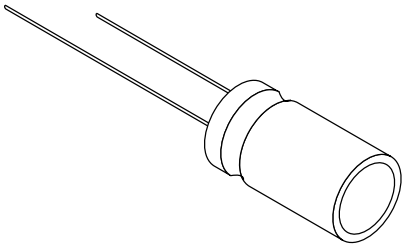
All blank voltage on sleeve marking is same voltage ">" point to

	WVDC												
µF	10	16	25	35	50	63	100	160	200	250	350	400	450
0.47				>	5x11	5x11	5x11	5x11	5x11	5x11	5x11	8x12	8x12
1				>	5x11	5x11	5x11	6x11	6x11	6x11	8x12	8x12	8x12
2.2				>	5x11	5x11	5x11	6x11	8x12	8x12	8x14	10x17	10x17
3.3				>	5x11	5x11	5x11	8x12	8x14	8x14	10x17	10x17	10x17
4.7				5x11	5x11	5x11	5x11	8x14	10x17	10x17	10x17	10x21	10x21
10	>	5x11	5x11	5x11	5x11	5x11	6x11	10x17	10x17	10x17	13x21	13x24	13x24
22	>	5x11	5x11	5x11	6x11	6x11	8x12	10x21	13x21	13x21	16x26	16x26	16x26
33	5x11	5x11	5x11	5x11	6x12	8x12	8x14	13x21	13x21	13x24	16x28	16x33	16x33
47	5x11	5x11	5x11	6x12	6x12	8x12	10x17	13x21	16x26	16x26	16x33	18x36	18x36
100	5x11	5x11	6x12	8x12	8x14	10x17	13x21	16x26	16x36	18x36	20x36	22x41	22x41
220	6x11	6x11	8x12	8x16	10x17	10x21	16x261	18x36	18x36	22x36			
330	6x12	8x14	8x16	8x16	10x21	13x21	16x33						
470	8x12	8x14	8x16	10x21	13x21	13x24	18x36						
1000	8x16	10x17	10x 21	13x26	16x26	16x36	22x36						
2200	10x21	13x21	13x26	16x31	18x36	22x36	25x56						
3300	13x21	13x26	16x31	18x36	20x36	22x42							
4700	13x26	16x31	18x36	22x42	22x42	25x56							
10000	18x36	20x36	22x42										

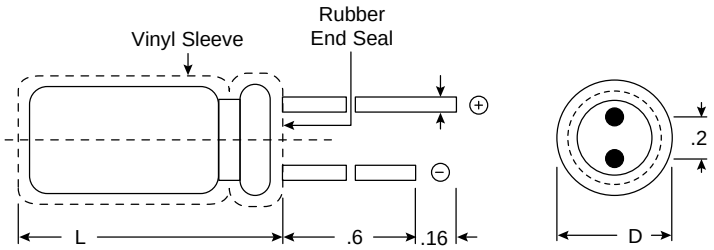
Characteristics

WVDC	10	16	25	35	50	63	100	160	200	250	350	400	450
Surge Voltage (25˚C)	13	20	32	44	63	79	125	200	250	300	400	450	500
DF (tanδ) (120Hz, 25˚C)	0.20	0.17	0.17	0.15	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.24	0.24
Temperature Characteristics													
-25˚C/+25˚C	4	3	3	2	2	2	2	8	8	8	12	15	16
-40˚C/+25˚C (Impedance ratio @120Hz)	8	6	4	3	3	3	3	6	8	10	---	---	---
µF	Permissible Ripple Current (mA (rms) @ 120Hz 85˚C)												
0.47	4.7				5	5	10	9	9	9	10	10	10
1	10				10	10	19	11	11	11	12	12	12
2.2	22				19	28	29	18	18	20	20	20	20
3.3	33				33	38	38	24	24	24	26	26	28
4.7	47			33	43	43	48	28	28	30	30	30	33
10	100			57	62	67	67	45	45	48	53	53	58
22	220	71	86	90	95	100	109	76	76	90	93	93	98
33	57	105	105	109	105	124	138	105	105	103	116	116	124
47	86	124	124	124	124	152	171	124	124	143	152	152	171
100	171	171	171	200	238	257	333	204	204	233	247		
220	238	238	295	333	380	428	523	347	356				
330	314	333	371	418	475	523	664	523					
470	380	418	456	523	617	713	855						
1000	599	646	808	855	998	1045							
2200	874	950	1140	1188	1235								
3300	1034	1045	1235	1330									
4700	1140	1292	1425										
10000	1520												

Mouser Stock No.	Value	Dimensions D x L (In.)
19FF001	1.0	.39 x .49
19FF002	2.2	.39 x .79
19FF005	4.7	.39 x .98
19FF010	10.0	.49 x 1.24

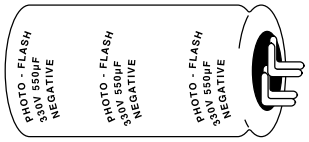


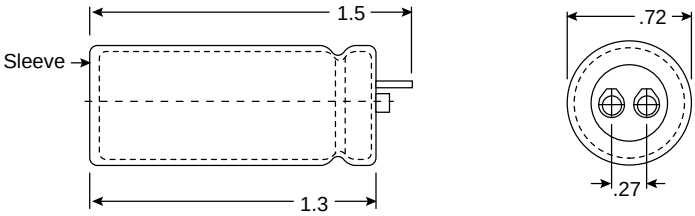
Dimensions (In.)



Specifications:

- Operating temperature: -25°C ~ +85°C
- Rated voltage range: 160 ~ 450VDC
- Capacitance tolerance: -20 ~ +20% (120Hz)
- Leakage current (apply rated voltage for 5 minutes before test): CV≤1000 (I= 0.03CV +15)
  CV>1000 (I= 0.02CV +25)
- Dissipation factor (max. @ 120 Hz): rated voltage= 450
  DF (tan δ)=0.24
- Life test @85 &@ rated voltage (1000 hrs):
  leakage current = < value of leakage current given above
  capacitance change = within ± 25% of the intial value
  DF (tan δ) = < 200% of 0.24
- Comply with JIS-C-5141 W character



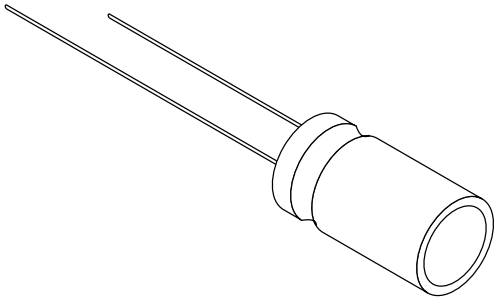


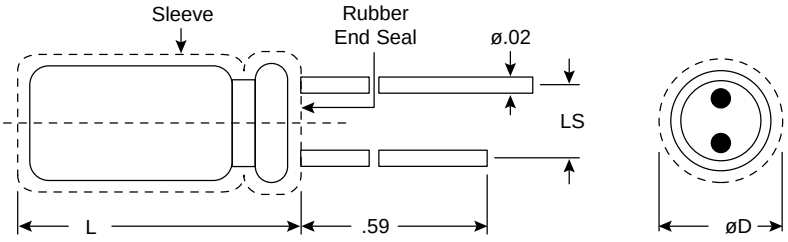
Dimensions (In.)

Specifications:
- Operating temperature: -20°C ~ +55°C
- Maximum leakage current (µA): I=1XC
- Tolerance: -10% ~ +20%
- Dissipation factor: .07 (max.)
- Value: 200µF
- Terminal type: 19FL200 (solder), 19FL201 (PCB)
- Rated voltage: 330VDC
- Surge voltage: 350VDC
- Comply with EIAJ-RC-801

Charge/Discharge Test:
- Test Condition: charge/discharge @ rated voltage & @ 5~35°C with a switch sequence of 30 sec. for 5,000 times via Xe flash tube of discharge resistance of 1Ω or for 1,000 times via a quench tube of discharge resistance of 0.1Ω
- Capacitance change: within ±15% of the initial value
- DF (tan δ): <150% of .07
- Leakage current: <150% of max. leakage current

Shelf Life Test:
- Test Condition: storage without voltage applied @ 70°C for 500 hrs & measured @ 25°C ± 5°C
- Capacitance change: within ±10% of the initial value
- DF (tan δ): <150% of .07
- Leakage current: <300% of max. leakage current



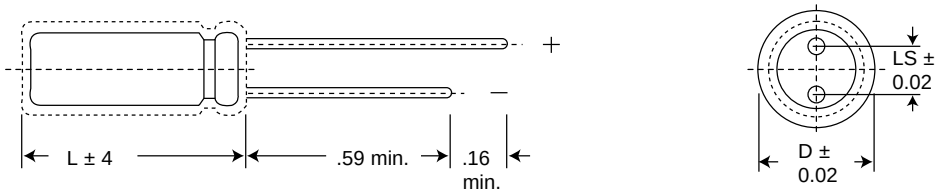


Dimensions (In.)

Mouser Stock No.	Value (µF)	Case DxL (In.)	LS
19NT001	1.0	.248x.433	.098
19NT002	2.2	.315x.453	.138
19NT005	4.7	.315x.453	.138
19NT010	10.0	.394x.630	.197
19NT047	47.0	.630x.984	.295

Specifications:

- Operating temperature range: -40°C ~ +85°C
- Rated voltage range: 50VDC
- Capacitance tolerance (1kHz) (20°C): -20% ~ +20%
- Leakage current (µA max.): (apply rated voltage for 5 minutes before test) I=0.03CV+4
- Dissipation factor (tan δ): shall not exceed 0.15v (1kHz), shall not exceed 0.50v (10kHz)
- Life test @ 85°C & rated voltage: test hrs.: 500+500 turn over polarity, leakage current: <leakage current value, capacitance change: within ±20% of the intial value, DF (tan δ): shall not exceed 200% of the dissipation factor
- Others: comply with EIAJ-RC-3803



Dimensions (In.)

Specifications:

- Type: micro-miniature
- Capacitance tolerance: -20 ~ +20%
- Leakage current: 0.01CV or 3µA, whichever is greater
- Operating temperature range: -40°C ~ +85°C
- Others: comply with JIS-C-5141 W character
- Life test @ 85°C & @ rated voltage: 1,000 hrs, < 0.01CV, within ±25% of initial value, DF < 200% of the dissipation factor
- Low temperature stability: (see chart below)

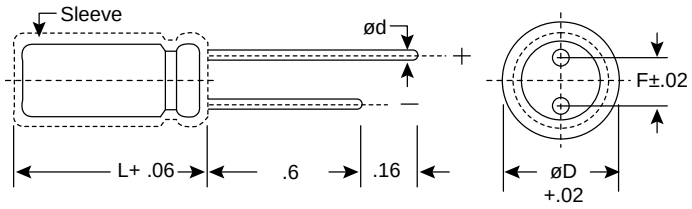
Rated Voltage	6.3	10	16	25	35	50
Z(-25)/Z(+20)	4	3	3	2	2	2
Z(-40)/Z(+20)	10	8	6	4	4	4

Mouser Stock No.	Rated Voltage	Surge Voltage	Nom. Cap. (µF)	@ 120Hz 25°C		RC (mA) @ 85°C	Leakage Current	Dimensions (In.)	
				DF (tan δ)	ESR (Ω)			DxL	LS
202-6.3V47	6.3	8	6.3	0.24	6.77	50	6.0µA	.20x.28	2.0
202-6.3V100	6.3	8	6.3	0.24	3.18	85	9.3µA	.20x.28	2.5
202-16V10	16	20	16	0.17	22.5	25	4.6µA	.16x.28	1.5
202-16V22	16	20	16	0.17	10.2	40	6.5µA	.20x.28	2.0
202-16V47	16	20	16	0.17	4.80	75	10.5µA	.25x.28	2.5
202-25V4.7	25	32	25	0.15	42.3	18	4.1µA	.16x.28	1.5
202-35V22	35	44	35	0.13	7.84	55	10.7µA	.25x.28	2.5
202-35V33	35	44	35	0.13	5.22	65	14.5µA	.25x.28	2.5
202-50V1.0	50	63	50	0.10	13.2	12	3.5µA	.16x.28	1.5
202-50V2.2	50	63	50	0.10	60.2	16	4.1µA	.16x.28	1.5

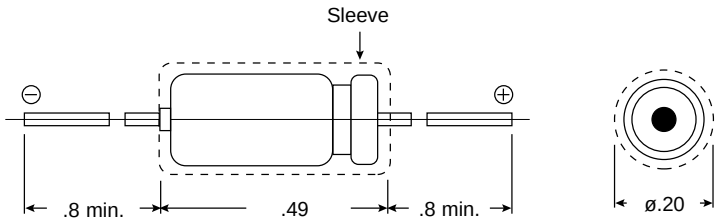
Specifications:

- Type: high voltage electrolytic
- Temperature range: -40°C~ +85°C
- Capacitance tolerance (120Hz): -20~ +20%
- Life test @ 85°C & @ VDC for 2000 hrs:
  Leakage current: <0.01CV or 3
  Capacitance change: ±30% of initial value
  DF (tan δ): <200% of value (see chart)
- Others: comply with JIS-C-5141 W character

Dimensions (In.)



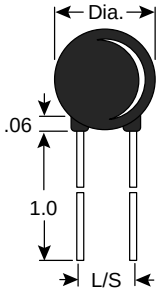
DF (tan δ) @ 20Hz 25°C	Nominal Cap. (µF)	ESR (Ω max) @ 120Hz 25°C	Leakage Current (µA max) @ 5 minutes	Ripple Current (mA max) @ 120Hz 85°C	Dimensions (In.)			
					øD	L	F	ød
Rated Voltage / Surge Voltage								
10VDC / 13VDC								
.22	100	2.92	10.0	140	.20	.43	.08	.02
.22	220	1.33	22.0	230	.25	.43	.09	.02
.22	470	0.62	47.0	400	.31	.49	.14	.02
.22	1000	0.29	100	660	.39	.59	.19	.02
.24	2200	0.14	220	1050	.49	.79	.19	.02
.26	3300	0.10	330	1300	.49	.98	.19	.02
.28	4700	0.08	470	1550	.63	.98	.29	.03
.32	6800	0.06	680	1900	.63	1.24	.29	.03
16VDC / 20VDC								
.18	47	5.08	7.5	110	.19	.43	.08	.02
.18	100	2.39	16.0	175	.25	.43	.09	.02
.18	220	1.09	35.2	280	.31	.43	.14	.02
.18	330	0.72	52.8	360	.31	.49	.14	.02
.18	470	0.51	75.2	460	.39	.49	.19	.02
.18	1000	0.24	160	760	.39	.79	.19	.02
.20	2200	0.12	352	1200	.49	.98	.19	.02
.22	3300	0.09	528	1450	.63	.98	.29	.03
.24	4700	0.07	752	1700	.63	1.24	.29	.03
25VDC / 32VDC								
.16	33	6.43	8.3	98	.19	.43	.08	.02
.16	47	4.52	11.8	120	.02	.43	.08	.02
.16	100	2.12	25.0	185	.25	.43	.09	.02
.16	220	0.97	55.0	310	.31	.49	.14	.02
.16	330	0.64	82.5	410	.39	.49	.19	.02
.16	470	0.45	117	530	.39	.59	.19	.02
.16	1000	0.21	250	900	.49	.79	.19	.02
.18	2200	0.11	550	1350	.63	.98	.09	.03
35VDC / 44VDC								
.14	33	5.63	11.5	110	.19	.43	.08	.02
.14	47	3.95	16.4	130	.25	.43	.09	.02
.14	100	1.86	35.0	210	.31	.43	.14	.02
.14	220	0.84	77.0	370	.39	.49	.19	.02
.14	330	0.56	115	480	.39	.59	.19	.02
.14	470	0.40	164	600	.39	.79	.19	.02
.14	1000	0.19	350	1000	.49	.98	.19	.02
.16	2200	0.10	770	1400	.63	1.24	.29	.03
50VDC / 63VDC								
.12	0.47	338.63	3.0	7	.19	.43	.08	.02
.12	1.0	159.15	3.0	12	.19	.43	.08	.02
.12	2.2	72.34	3.0	21	.19	.43	.08	.02
.12	3.3	48.23	3.0	28	.19	.43	.08	.02
.12	4.7	33.86	3.0	35	.19	.43	.08	.02
.12	10	15.92	5.0	60	.19	.43	.08	.02
.12	22	7.23	11.0	95	.19	.43	.08	.02



Dimensions (In.)

Specifications:

- Surge voltage: 63VDC
- Capacitance tolerance: ±20% @ 120Hz 25°C
- DF: .10 @ 120Hz 25°C
- ESR: 60.29 (max.) @ 120Hz 25°C
- Leakage current: 3.0µA (max.) for 5 minutes
- Ripple current: 31mA (max.) @ 120Hz 25°C



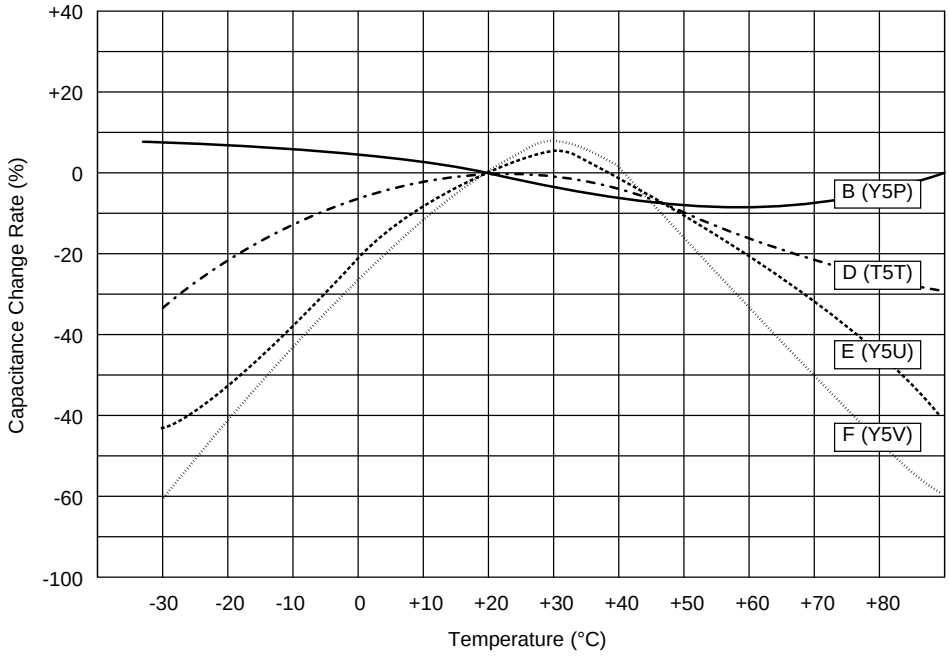
Dimensions (In.)

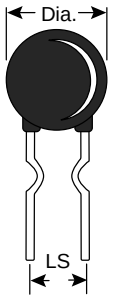
Specifications:

- Leads: ø.02, soldered copper wire
- Capacitance tolerance: ±10%
- Temperature characteristic: B (Y5P)
- Temperature range: -25°C~+85°C
- Voltage rating: 50VDC
- Moisture proof: 500 hr.
- Shock proof: 10~55c/s for 2 hr.
- Durability: wet load/500 hr., hot load/1000 hr.

Mouser Stock Number	PFD	Dia. Max.	L/S
212-2112-101K	100	.16	.10
212-2112-121K	120	.16	.10
212-2112-151K	150	.16	.10
212-2112-201K	200	.16	.10
212-2112-221K	220	.16	.10
212-2112-271K	270	.16	.10
212-2112-301K	300	.16	.10
212-2112-331K	330	.16	.10
212-2112-471K	470	.16	.10
212-2115-102K	1000	.20	.10
212-2115-202K	2000	.29	.20
212-2115-103K	10000	.54	.20

Temperature Characteristics



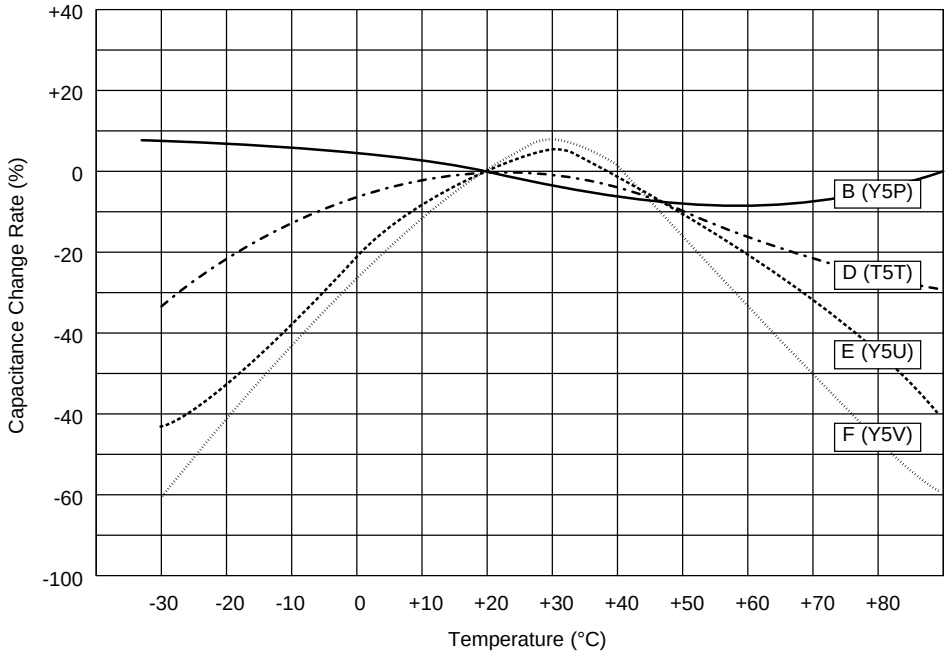


Mouser Stock Number	PFD	Dia. Max.	L/S
212-2142-102Z	.001	.16	.10
212-2142-202Z	.002	.16	.10
212-2142-472Z	.0047	.20	.10
212-2142-103Z	.01	.24	.20
212-2142-473Z	.047	.54	.20
212-2142-503Z	.05	.54	.20
212-2142-104Z	.10	.69	.40

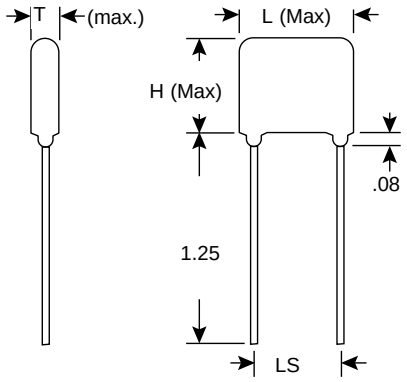
Specifications:

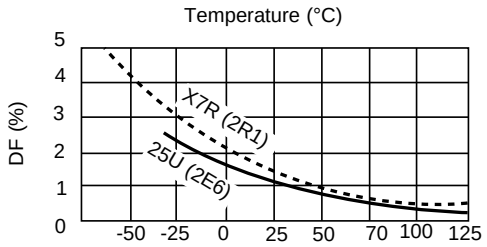
- Capacitance tolerance: 80% ~ -20%
- Temperature characteristic: F (Y5V)
- Temperature range: -25°C~+85°C
- Voltage rating: 50VDC
- Moisture proof: 500 hr.
- Shock proof: 10~55c/s for 2 hr.
- Durability: wet load/500 hr., hot load/1000 hr.

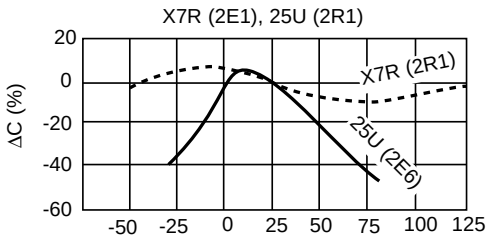
Temperature Characteristics



Dimensions (In.)







X7R Temperature Stable 50 Volts ±10%

Mouser Stock No.	Value (µF)	Dimensions (In.) L	H	T	LS
21RX510	.001	.15	.15	.10	.10
21RX410	.01	.20	.20	.125	.10
21RX420	.02	.20	.20	.125	.10
21RX310	.1	.20	.20	.15	.10
21RX320	.2	.30	.30	.15	.20

Z5U General Purpose 50 Volts ±20%

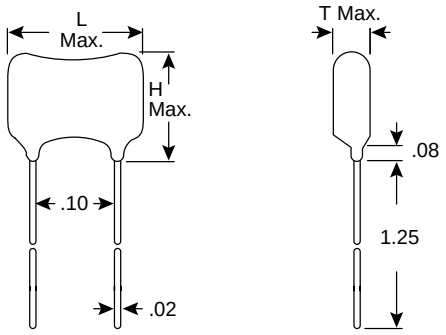
21RX510	.001	.15	.15	.10	.10
21RX410	.01	.20	.20	.125	.10
21RX420	.02	.20	.20	.125	.10
21RX310	.1	.20	.20	.15	.10
21RX320	.2	.30	.30	.15	.20

Performance Specifications

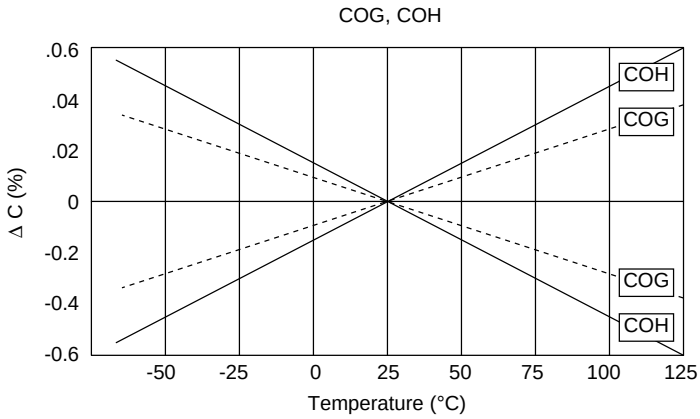
Dielectric Code	EIA / IEC	COG / IB/CG	X7R / 2R1	Z5U / 2E6
Temperature Characteristic		0±30ppm/°C, C > 20pF 0+120ppm/°C, C ≤ 20pF -40	ΔC ±15% maximum over -55°C to +125°C	ΔC ±22%, -56% maximum over +10°C to +85°C
Category (Operating) Temperature Range		-55°C to +125°C	-55°C to +125°C	-25°C to +85°C
Measuring Conditions for Capacitance and DF		1MHz, 1Vrms, C≤1000pF 1KHz, 1Vrms, C>1000pF	1KHz, 1Vrms	1KHz, 0.3Vrms
Dissipation Factor (DF) and Tangent of Loss Angle (tan 8)		≤0.001 for C ≤50pF ≤1.5 (150/C + 7) x 10^4 for C>50pF	≤ 0.025	≤ 0.030
Insulation resistance (IR) after 60 secs charging at rated Voltage 25°C		≥ 100GΩ or ≥ 1000MΩ • µF whichever is less	≥ 100GΩ or ≥ 1000MΩ • µF whichever is less	≥ 10GΩ or ≥ 1000MΩ • µF whichever is less
Voltage Proof. 25°C		2.5 x rated voltage	2.5 x rated voltage	2.5 x rated voltage
Capacitance Aging		0	=1.5% per decade hour	=5% per decade hour

Tolerance Code: 21RX = K(±10%), 21RZ = M(±20%)

Test	Test Condition	Post-Test Inspection Requires
Solderability	235±5°C, Immersion 2±0.5 sec Depth of Immersion, 1.5-2.0mm	At least 95% of leads should be well tinned
Resistance to Soldering Heat	Immersion in solder bath at 260±5°C for 10±1 secs. Recovery: 24±2 hrs	No Visible Damage ΔC/C: COG (IB/CG) ≤ ±0.5% or ±0.5pF; X7R (2R1) ≤+10% -5; Z5U (2E6) ≤+20% -10
Rapid change to Temperature	-55 to +125°C (COG, X7R) -25 to +85°C, (25U) 5 cycles, duration: 30 min. Recovery: 24±2 hrs	No Visible Damage
Vibration	10Hz - 2000KHz, Amplitude 0.75mm or 98m/sec. Total duration: 6 hrs	No Visible Damage
Endurance (Life Test)	1000 hrs at maximum temperature with 1.5 x rated voltage applied Recovery: 24±2 hrs	No Visible Damage ΔC/C: COG (IB/CG) ≤ ±0.5% or ±0.5pF; X7R (2R1) ≤+10%; Z5U (2E6) ≤+20% DF: ≤1.5 x Initial Requirement IR: ≤0.25 x Initial Requirement
Robustness of Termination	Visual Inspection Test Val 10N Test Vb = 5N	No Visible Damage



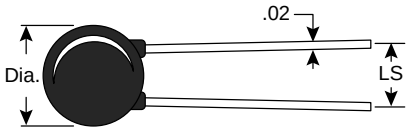
Dimensions (In.)



Specifications:

- Temperature characteristic: COG; 0 ± 30ppm/°C
- Operating temperature: -55°C ~ 125°C
- Dissipation factor: .15% max. @ 1Vrms @ 25°C
  1MHz for ≤ 1,000pF @ 1KHz
- Insulation withstand voltage: 250%VAC @ 50mA for 1 minute
- Life test: 250% of rated voltage @ 125°C for 1,000 hr.
- Tolerance code: K (±10%)
- Terminals: solder, copper clad steel

Mouser Stock No.	PFD	Dimensions (In.)		
		L	H	T
50 Volt ±10%				
21RD710	10	.15	.15	.10
21RD722	22	.15	.15	.10
21RD739	39	.15	.15	.10
21RD747	47	.15	.15	.10
21RD610	100	.15	.15	.10
21RR612	120	.15	.15	.10
21RD622	220	.15	.15	.10
21RR627	270	.15	.15	.10
21RR633	330	.15	.15	.10
21RD647	470	.20	.20	.128
21RR510	1000	.20	.20	.128
100 Volt ±10%				
21RR612	120	.15	.15	.10
21RR627	270	.15	.15	.10
21RR633	330	.15	.15	.10
21RR510	1000	.20	.20	.128

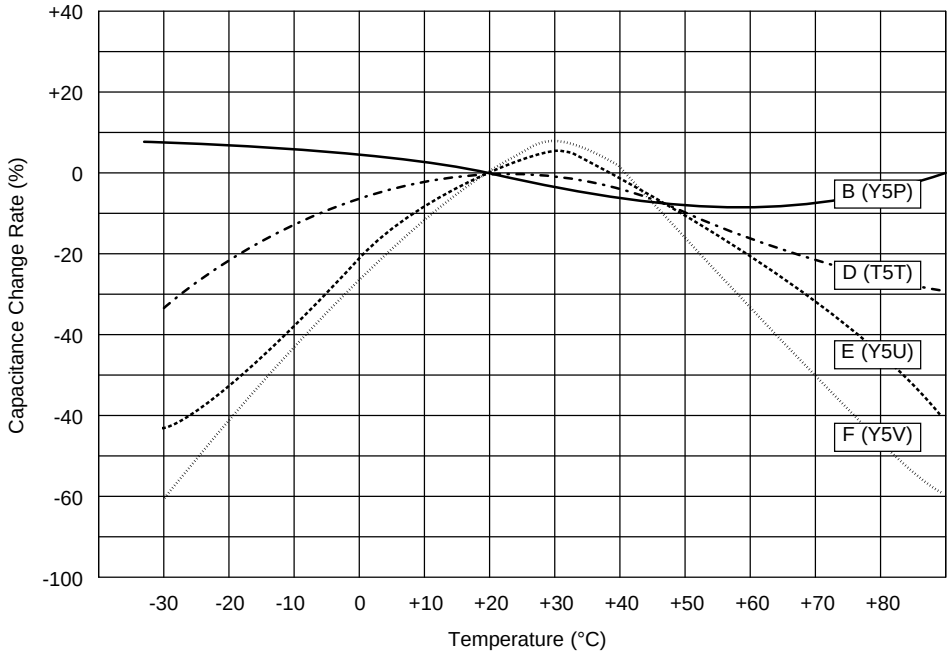


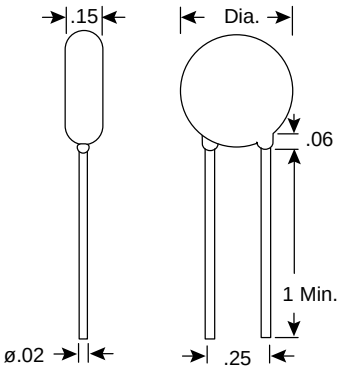
Mouser Stock Number	PFD	Dia. Max.	L/S
212-6115-101K	100	.30	.20
212-6115-221K	220	.30	.20
212-6115-331K	330	.30	.20
212-6115-391K	390	.30	.20
212-6115-471K	470	.38	.20
212-6115-102K	1000	.45	.20
212-6115-202K	2000	.61	.40

Specifications:

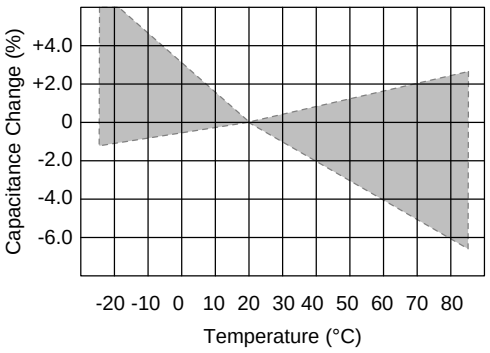
- Capacitance tolerance: ±10% (K)
- Temperature characteristic: B(Y5P)
- Temperature range: -25°C~+85°C
- Dissipation factor: tan δ 2.5% (max.)
- Voltage rating: 2KVDC
- Insulation resistance: 10,000MΩ @ 500VDC
- Testing condition: 1KHz (0.5-5Vrms) @ 25°C

Temperature Characteristics





Dimensions (In.)

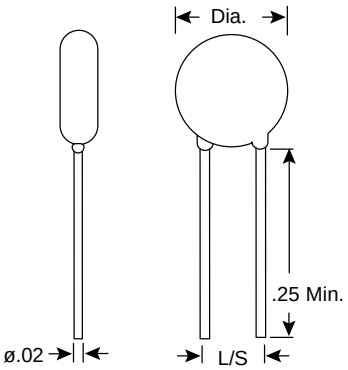


The SL temperature characteristic is not defined by any single curve or line. It is defined by an area which is bounded by the P350 and N1000 curves (cross hatched area on graph). The temperature characteristic of an SL rated capacitor will lie in the shaded area shown in the graph above.

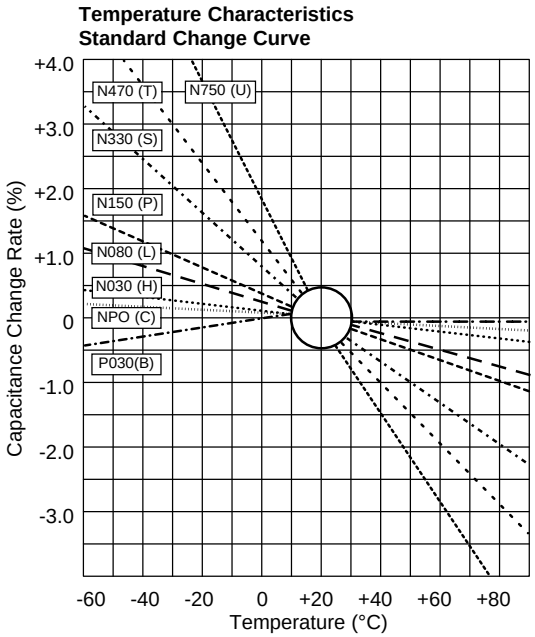
Mouser Stock No.	PFD	Dia. Max.
21FL005	5	.20
21FL007	6.8	.26
21FL010	10	.26
21FL012	12	.26
21FL015	15	.20
21FL018	18	.20
21FL020	20	.20
21FL022	22	.28
21FL027	27	.20
21FL030	30	.29
21FL033	33	.25
21FL039	39	.20
21FL043	43	.32
21FL047	47	.20
21FL050	50	.29
21FL051	51	.20
21FL056	56	.29
21FL068	68	.25
21FL075	75	.29
21FL100	100	.25
21FL150	150	.22
21FL200	200	.32
21FL220	220	.30
21FL250	250	.31
21FL270	270	.28
21FL300	300	.39
21FL330	330	.32
21FL390	390	.32
21FL470	470	.35
21FL500	500	.39

Specifications:

- Capacitance tolerance: ±20% (M)
- Capacitance measured:
  Q factor / C=Capacitance “pF”
  C ≤ 30pF, Q ≥ 400 + 20C
  C > 30pF, Q > 1,000
  } measured @ 1Vrms, 1MHz, & 25°C
- Temperature coefficient: S/L (+350~ -1,000 ppm/°C)
- Dissipation factor: capacitance over 1,000pF @ 1KHz, DF 0.2% (max.)
- Insulation resistance: 10,000MΩ (min.) @ the rated voltage for 2 seconds
- Dielectric test voltage: WV x 2.5 for 1~5 seconds
- Working voltage: 50VDC



Dimensions (In.)

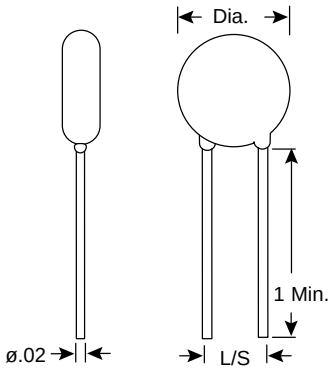


Specifications:

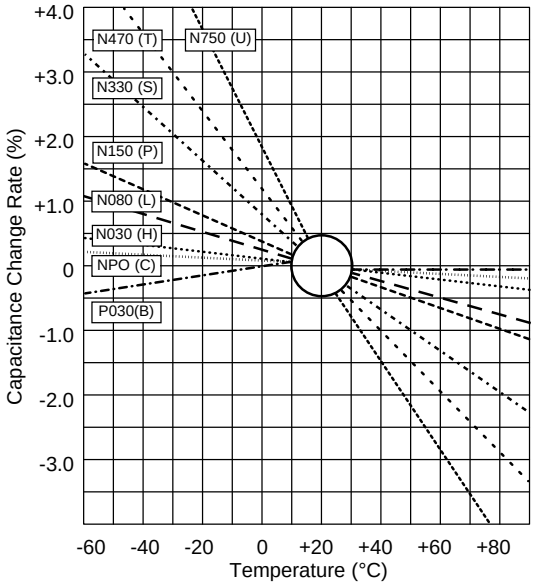
- Capacitance tolerance: ±5%
- Temperature characteristic: NPO
- Temperature range: -25°C~+85°C
- Temperature coefficient: S/L (+350~ -1000 10^{-6}/°C)
- Voltage rating 50VDC
- Leads: soldered copper wire

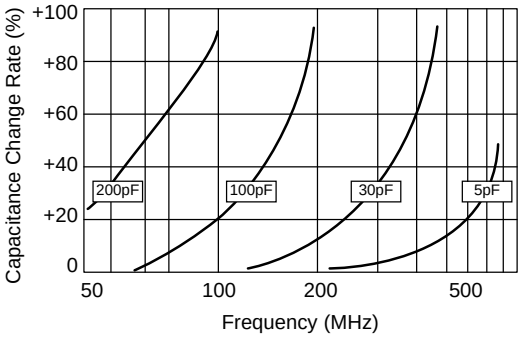
Mouser Stock No.	PFD	Dia. Max.	L/S
21CB005	5	.16	.10
21CB007	6.8	.16	.10
21CB008	7.5	.16	.10
21CB010	10	.16	.10
21CB012	12	.16	.10
21CB015	15	.16	.10
21CB018	18	.16	.10
21CB020	20	.16	.10
21CB022	22	.16	.10
21CB024	24	.16	.10
21CB027	27	.16	.10
21CB030	30	.16	.10
21CB033	33	.16	.10
21CB036	36	.16	.10
21CB039	39	.16	.10
21CB043	43	.16	.10
21CB047	47	.16	.10
21CB051	51	.16	.10
21CB056	56	.16	.10
21CB062	62	.16	.10
21CB068	68	.16	.10

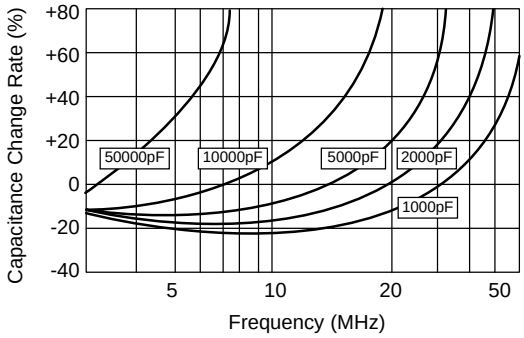
Mouser Stock No.	PFD	Dia. Max.	L/S
21CB075	75	.20.	.10
21CB082	82	20	.10
21CB091	91	.20	.10
21CB100	100	.20	.10
21CB110	110	.20	.10
21CB120	120	.20	.10
21CB130	130	.32	.20
21CB150	150	.23	.20
21CB160	160	.23	.20
21CB180	180	.23	.20
21CB200	200	.25	.20
21CB220	220	.27	.20
21CB240	240	.36	.20
21CB270	270	.26	.20
21CB300	300	.28	.20
21CB330	330	.32	.20
21CB360	360	.40	.20
21CB390	390	.32	.20
21CB430	430	.33	.20
21CB470	470	.35	.20
21CB510	510	.35	.20



Temperature Characteristics
Standard Change Curve



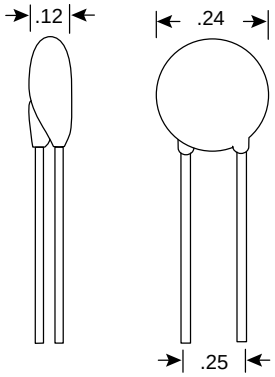




Specifications:

- Capacitance tolerance: ±10%
- Temperature characteristic: NPO
- Temperature range: -25°C~+85°C
- Shock proof: 10~55c/s, 2 hr.
- Moisture proof: 500 hr.
- Durability: against wet load - 500 hr.
  against hot load - 1000 hr.

Mouser Stock No.	PFD	Dia. Max.	L/S
21FK001	1	.15	.25
21FK005	5	.22	.25
21FK010	10	.20	.25
21FK012	12	.22	.10
21FK020	20	.20	.25
21FK022	22	.20	.25
21FK030	30	.26	.25
21FK033	33	.26	.25
21FK047	47	.23	.25
21FK051	51	.26	.25
21FK100	100	.33	.25
21FK120	120	.30	.20
21FK150	150	.39	.25
21FK200	200	.37	.375
21FK330	330	.32	.20

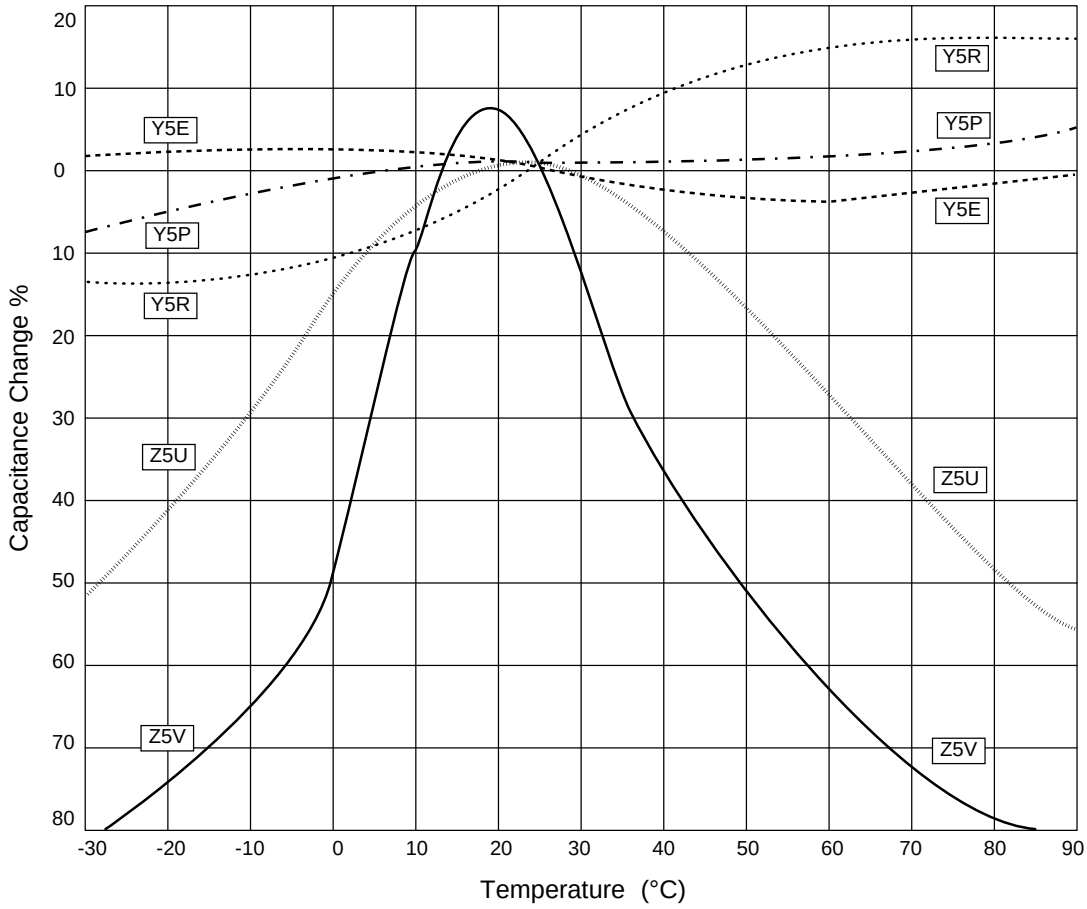


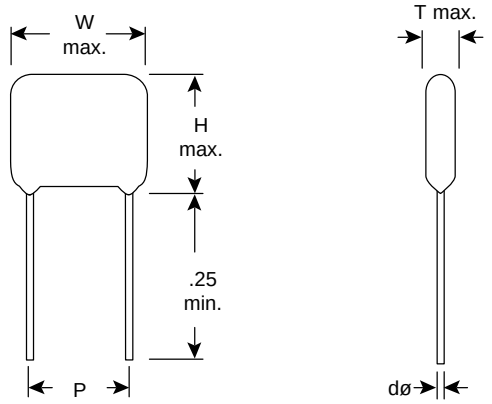
Dimensions (In.)

Specifications:

- Operating temperature range: -30 ~ 85°C
- Capacitance: within tolerance @ 1KHz & 25°C
- Minimum capacitance tolerance: ±20%
- Rated voltage: 12VDC
- Test voltage: 2 times rated voltage for 1.5 seconds
- Temperature characteristics: Y5R
- Power factor: 7% max. @ 1KHz
- Life test: apply rated voltage @ 85°C for 250 hrs.
- Lead wire: #24 or #22 AWG tinned copper wire
- Lead spacing tolerance: .03 inches

Temperature Characteristics





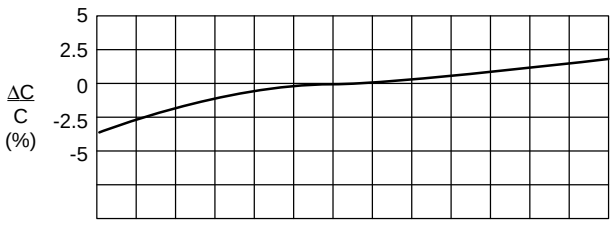
Dimensions (In.)

Mouser Stock No.	Value (µF)	Dimensions (In.)				
		W	H	T	P	dø
23AB210	.001	.354	.330	.196	.255±.039	.023
23AB220	.002	.354	.330	.196	.255±.039	.023
23AB222	.0022	.354	.330	.196	.255±.039	.023
23AB233	.0033	.354	.330	.196	.255±.039	.023
23AB247	.0047	.354	.330	.196	.255±.039	.023
23AB250	.005	.354	.330	.196	.255±.039	.023
23AB310	.01	.354	.330	.196	.255±.039	.023
23AB320	.02	.354	.330	.196	.255±.039	.023
23AB322	.022	.433	.330	.196	.255±.039	.023
23AB333	.033	.531	.330	.196	.334±.039	.023
23AB347	.047	.531	.354	.216	.433±.059	.023
23AB350	.05	.531	.433	.216	.433±.059	.023
23AB368	.068	.551	.492	.255	.433±.059	.023
23AB410	.1	.758	.551	.275	.649±.059	.031
23AB422	.22	.748	.629	.314	.649±.059	.031
23AB433	.33	.748	.708	.354	.649±.059	.031
23AB447	.47	.787	.826	.433	.669±.059	.031

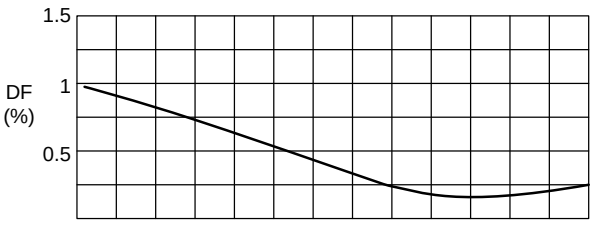
Specifications:

- Operating temperature: -40°C ~ +85°C
- Capacitance range: .011µf (nominal in E-6 series)
- Rated voltage: 50VDC, 100VDC, 200VDC
- Dielectric strength test: 200% of rated voltage for 1 minute
- Dissipation factor (DF): shall not be greater than 0.8% @ 1KHz between 25°C & 85°C
- Insulation resistance: 500VAC @ 25°C for 1 minute, C ≤ .1µF IR ≥ 20,000MΩ, C > .1µF IRXC ≥ 2,000ΩF
- Capacitance drift: 2% max.
- Load life test: 150% of rated voltage @ 85°C for 1,000 hrs: capacitance drift: < 5%, DF: <1.2%, IR: >10,000MΩ
- Humidity test: RH 95% @ 40°C for 100 hrs: capacitance drift: ≤3%, DF: ≤1.0%, IR: ≥400MΩ µF or 4,000MΩ whichever is smaller

Capacitance Change vs. Temperature

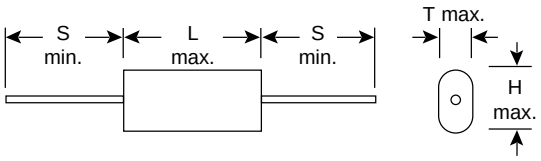


DF vs. Temperature



Specifications:

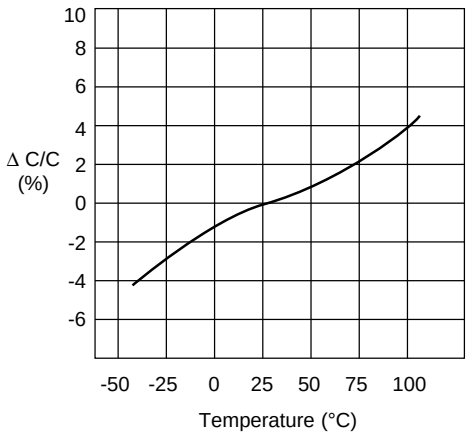
- Operating temperature: -40°C ~ +85°C
- Dissipation factor: 1.0% max. @ 1KHz 20°
- Dielectric strength: 150% of W.V. for 1 minute
- Working voltage range: 100, 250, 400, 630VDC
- Capacitance range: .047 ~ 47.0MFD
- Capacitance tolerance: J ± 5%, K ± 10%, M ± 20%
- Insulation resistance: C<.33MFD, R>15,000MΩ, C>.33MFD, >5,000MΩ MFD



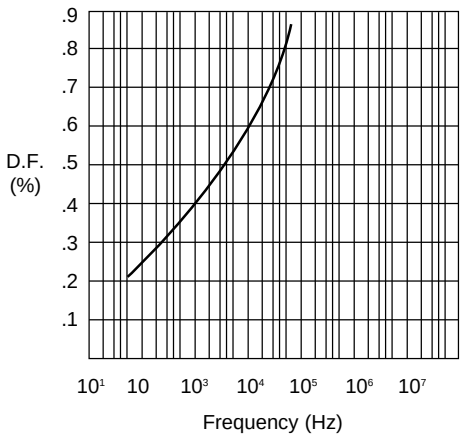
Dimensions (In.)

Cap. (µF)	Dimensions (In.) L x H x T			
	100VDC	250VDC	400VDC	630VDC
.047			14x8.5x4.5	19x11x6
.056			14x8.5x4.5	19x11x6
.068			19x9x5	19x11x6
.082			19x10x5.5	19x12x6.5
.1	10.5x8.5x4.5	14x8.5x4.5	19x10x5.5	19x12x6.5
.12	10.5x8.5x4.5	14x8.5x4.5	19x11x6	19x13x7
.15	10.5x8.5x4.5	14x9x5	19x12x6.5	19x14x7.5
.18	10.5x8.5x4.5	14x9.5x5.5	19x13x7	25x14x7.5
.22	14x8.5x4.5	14x10x6	19x14x7.5	25x13x7
.27	14x8.5x4.5	19x11x6	25x13x7	25x14x7.5
.33	14x9x5	19x12x6.5	25x14x7.5	25x15x8.5
.39	14x9x5	19x13x7	25x15x8	32x16x7
.47	14x9x5	19x13x7	25x16x9	32x17x8
.56	14x9.5x5.5	25x12x6	25x17x10	32x18x9
.68	19x10.5x5.5	25x12.5x6.5	32x17x9	32x19x10
.82	19x11x6	25x13x7	32x18x9.5	32x19x10
1.0	19x12x6.5	25x14x7.5	32x19x10	32x20x11
1.2	19x13x7	25x15x8	32x20x11.5	47x22x12
1.5	25x13x7	32x16x8.5	32x22x15	47x24x14
1.8	25x14x4.5	32x17x9	32x24.5x15.5	47x25x15
2.2	25x15x8	32x18x9.5	32x26x17	47x26.5x16.5
2.7	25x15.5x8.5	32x19x10	47x23x13	47x29x19
3.3	25x16x9	32x20x11	47x25x15	47x32x22
3.9	32x17x10	32x21x12	47x27x17	47x34x24
4.7	32x18x11	47x21x11	47x29x19	47x36x26
5.6	32x19.5x12.5	47x22x12	47x31x21	58x35x25
6.8	32x21x14	47x23x13	47x33x23	58x37x27
8.2	32x23x16	47x25x15	58x34x24	
10.0	47x21x12	47x26.5x16.5	58x36x26	
12.0	47x22x13	47x28x18		
15.0	47x24x15	47x30x20		
18.0	47x26x17	58x31x21		
20.0	47x28x18	58x32x22		
22.0	47x29x19	58x33x23		
25.0	47x30x20	58x35x25		
27.0	47x31x21	58x36x26		
30.0	47x33x23	58x38x28		
33.0	47x35x25	58x40x30		
39.0	47x37x27			
47.0	47x40x30			

Δ C/C vs. Temperature @ 1KHz



D.F. vs. Frequency @ 20°C



Mouser Stock No.	Value (pF)	Case Type
ME232-1000-001	1	DM10
ME232-1000-005	5	DM10
ME232-1000-010	10	DM10
ME232-1000-012	12	DM10
ME232-1000-015	15	DM10
ME232-1000-018	18	DM10
ME232-1000-022	22	DM10
ME232-1000-027	27	DM10
ME232-1000-030	30	DM10
ME232-1000-033	33	DM10
ME232-1000-039	39	DM10
ME232-1500-047	47	DM15
ME232-1500-050	50	DM15
ME232-1500-056	56	DM15
ME232-1500-068	68	DM15
ME232-1500-075	75	DM15
ME232-1500-082	82	DM15
ME232-1500-100	100	DM15
ME232-1500-120	120	DM15
ME232-1500-150	150	DM15
ME232-1500-180	180	DM15
ME232-1500-220	220	DM15
ME232-1500-250	250	DM15
ME232-1900-270	270	DM19
ME232-1900-300	300	DM19
ME232-1900-330	330	DM19
ME232-1900-390	390	DM19
ME232-1900-470	470	DM19
ME232-1900-500	500	DM19
ME232-1900-560	560	DM19
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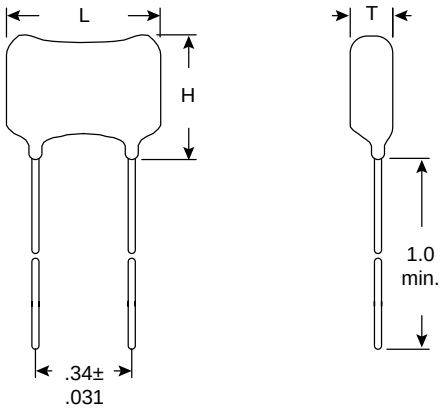
ME232-1900-820	820	DM19
ME232-1900-910	910	DM19
ME232-1900-1000	1000	DM19



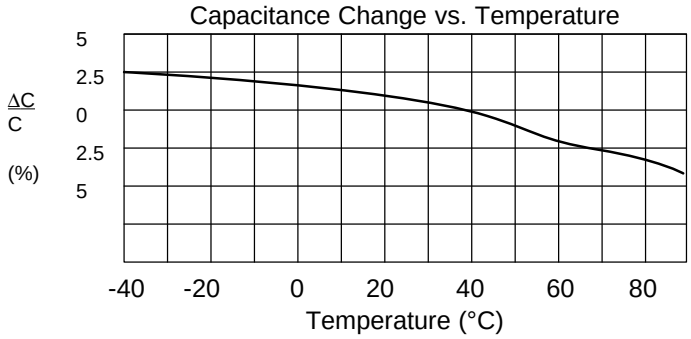
Dimensions (In.)

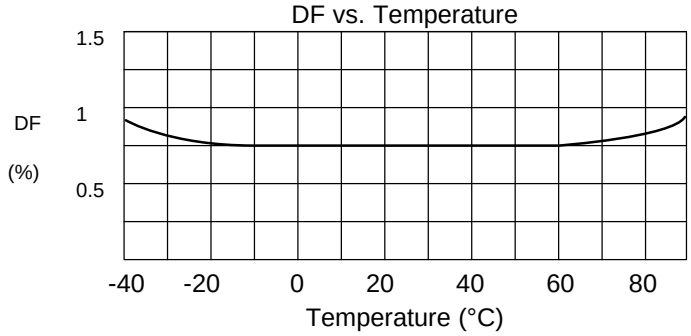
Specifications:

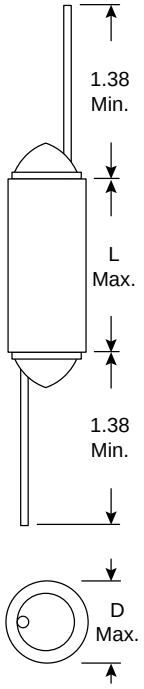
- Operating temperature: -55°C ~ +125°C
- Working voltage: 500WDC
- Tolerance: ±5%
- Vibration test: 10 ~ 2000 cycles
- Dielectric voltage: 1000WVDC
- Insulation resistance: 100,000MΩ

Case Type	Size Range (L x H x T ~ L x H x T)
DM10	.36 x .33 x .19 ~ .36 x .33 x .22
DM15	.45 x .36 x .17 ~ .50 x .43 x .25
DM19	.64 x .50 x .19 ~ .70 x .58 x .35

Performance Curves







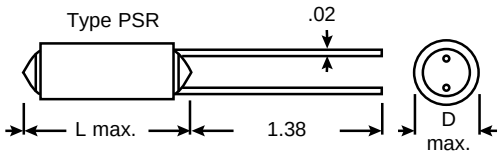
Dimensions (In.)

Specifications:

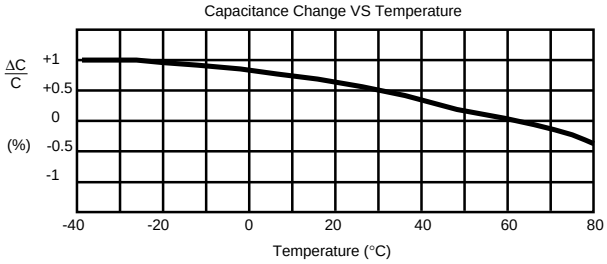
- Working voltage: 250V
- Tolerance: ±10%
- Operating temperature: -40°C ~ +85°C
- Test voltage: 750V
- Dissipation factor (DF): 0.1% max. @ 1KHz, 25°C if the capcaitance C>330pf
- Insulation resistance: >100,000MΩ @ rated voltage, 25°C

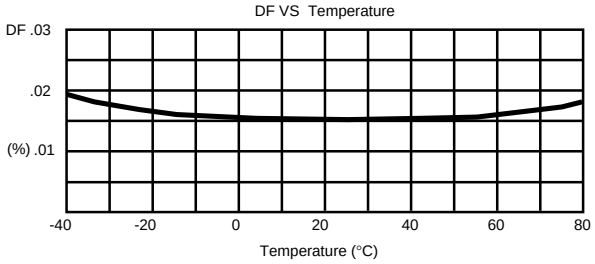
Mouser Stock No.	Value (pf)	Dimensions D x L (In.)	Lead Dia. (In.)
23PS110	100	.22 x .47	.016
23PS112	120	.22 x .47	.016
23PS115	150	.22 x .47	.016
23PS118	180	.22 x .47	.016
23PS122	220	.22 x .47	.016
23PS127	270	.22 x .47	.016
23PS133	330	.22 x .47	.016
23PS139	390	.22 x .47	.016
23PS147	470	.22 x .47	.016
23PS156	560	.22 x .47	.016
23PS168	680	.22 x .47	.016
23PS182	820	.24 x .47	.016
23PS210	1000	.24 x .47	.016

Mouser Stock No.	Value MFD	Dimensions D x L (In.)	Lead Dia. (In.)
23PS212	1200	.24 x .47	.016
23PS215	1500	.24 x .47	.016
23PS218	1800	.24 x .47	.016
23PS220	2000	.26 x .47	.016
23PS222	2200	.26 x .47	.016
23PS227	2700	.28 x .47	.016
23PS233	3300	.28 x .47	.02
23PS239	3900	.29 x .47	.02
23PS247	4700	.31 x .47	.02
23PS250	5000	.31 x .47	.02
23PS268	6800	.35 x .47	.02
23PS282	8200	.37 x .47	.02
23PS310	10000	.39 x .47	.02



Dimensions (In.)



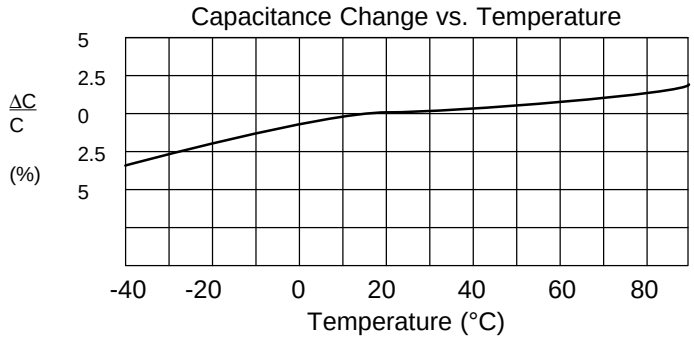


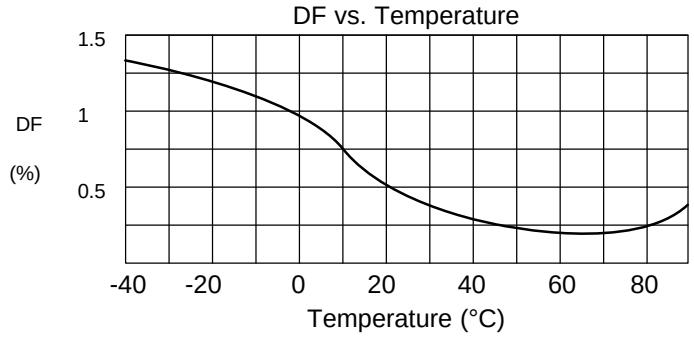
Specifications:

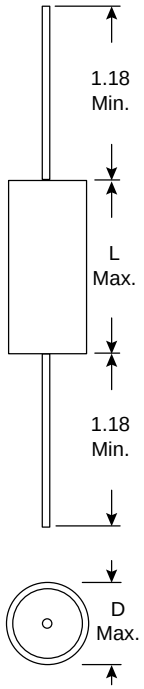
- Operating temperature: -40°C to +85°C
- Capacitance tolerance: ±5%
- Rated voltage: 50V
- Test voltage: 200% of rated voltage for 1 minute
- Dissipation factor (DF): 0.1% max. @ 1KHz, 25°C, if the capacitance C>330pf
- Insulation resistance: >100,000MΩ @ rated voltage, 25°C

Number	Value	Dia. (Max.)	Lenght (Max.)
23PW156	560PF	.21	.47
23PW210	1000PF	.24	.47
23PW220	2000PF	.24	.47
23PW222	2200PF	.26	.47
23PW233	3300PF	.28	.47
23PW247	4700PF	.31	.47
23PW250	5000PF	.31	.47
23PW268	6800PF	.35	.47
23PW310	10000PF	.39	.47

Performance Curves





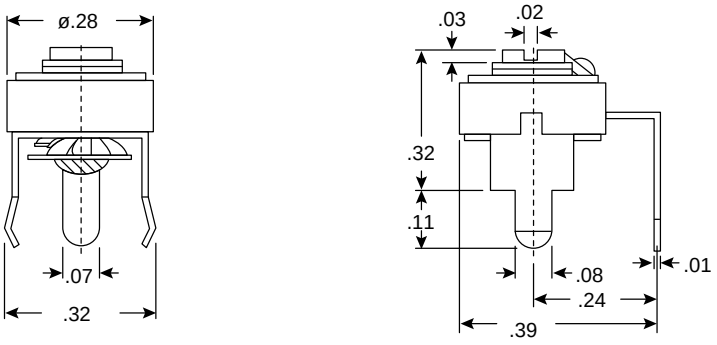


Dimensions (In.)

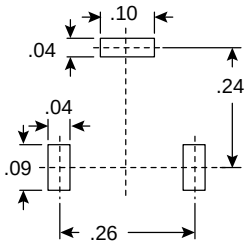
Specifications:

- Working voltage: 250V
- Tolerance: ±10%
- Operating temperature: -40°C ~ +85°C
- Test voltage: 750V
- Materials: metallized polyester film dielectric in a non-inductive form polyester film tape outer wrap sealed with epoxy resin
- Features: high stability, self-healing, miniature size
- Used for: coupling, RF filtering, & all solid state circuits

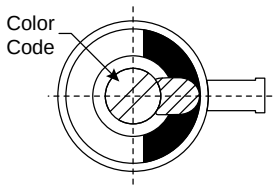
Mouser Stock No.	Value MFD	Dimensions D x L (In.)	Lead Dia. (In.)
23ME310	.01	.24 x .59	.024
23ME315	.015	.24 x .59	
23ME322	.022	.24 x .59	
23ME333	.033	.24 x .59	
23ME347	.047	.24 x .71	
23ME368	.68	.26 x .71	
23ME410	.1	.3 x .71	
23ME415	.15	.33 x .71	
23ME422	.22	.33 x .91	
23ME433	.33	.35 x .91	
23ME447	.47	.39 x 1.1	.030
23ME468	.68	.47 x 1.1	
23ME510	1.0	.53 x 1.1	
23ME515	1.5	.59 x 1.3	
23ME520	2.0	.67 x 1.3	
23ME522	2.2	.67 x 1.3	



Dimensions (In.)



Mounting Hole

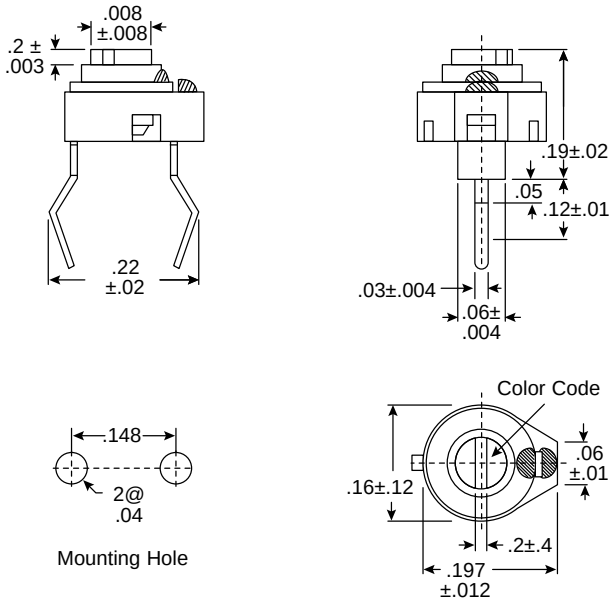


Top View

Specifications:

- Type: 7mm ultra-miniature
- Insulation resistance: >10M @ 250VDC
- Withstand voltage: 500VDC
- Working voltage: 225VDC
- Rotation torque: 40 ~ 400gr-cm
- Operating temperature range: -30°C ~ -85°C

Mouser Stock No.	Capacitance (pF)		Temp. Coeff. PPM/°C	Q Factor @ 10MHz	Color Code
	minimum	maximum			
242-3610-12	2.0 max.	12.0 min.	NPO ± 200	>300	None
242-3610-23	2.8 max.	23.0 min.	N450 ± 200	>300	Blue
242-3610-45	7.0 max.	45.0 min.	N1400 ± 800	>200	Brown
242-3610-55	7.0 max.	55.0 min.	N1400 ± 800	>200	Green
242-3610-70	7.0 max.	70.0 min.	N1400 ± 800	>200	Gray
242-3610-100	12.0 max.	100.0 min.	N1400 ± 800	200/1MHz	Black

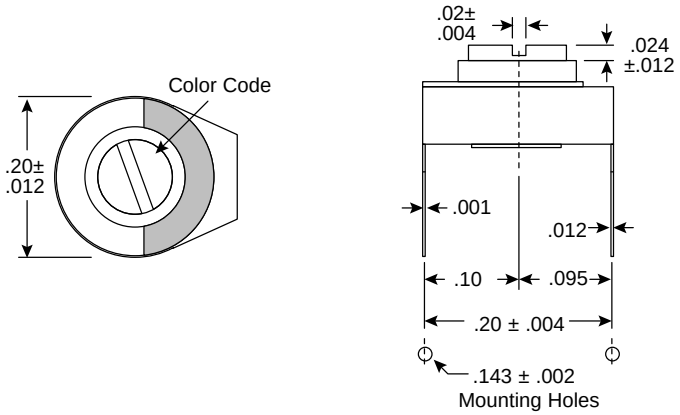


Dimensions (In.)

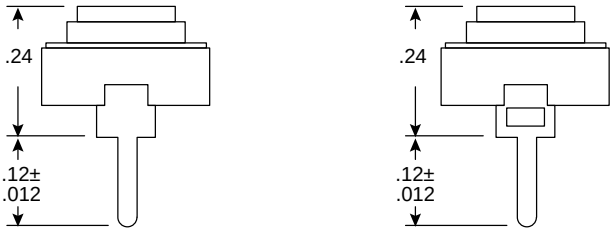
Specifications:

- Type: 4mm super miniature
- Insulation resistance: >10MΩ @ 50VDC
- Withstand voltage: 110VDC
- Working voltage: 50VDC
- Rotation torque: 20 ~ 150 gr-cm
- Operating temperature range: -30°C ~ +85°C

Mouser Stock No.	Temperature Coefficient	Q Factor	Color Code
242-1810	-550 ± 300	<300	None
242-2820	-500 ± 300	<300	Blue
242-4030	-1,200 ± 500	<300	Yellow



Dimensions (In.)

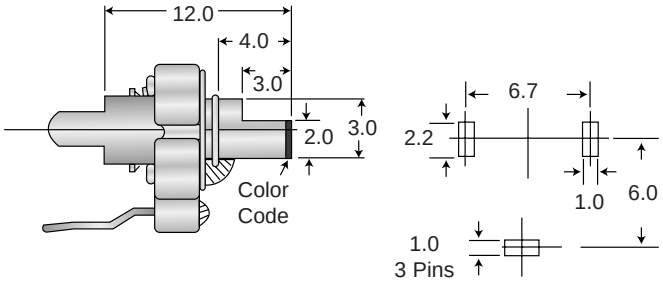


Old Version New Version

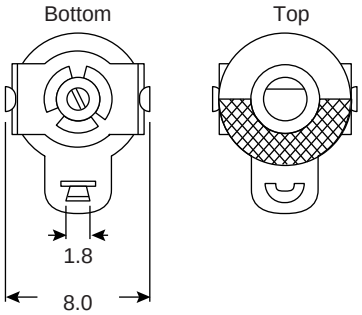
Specifications:

- Rating: 250VDC
- Breakdown voltage: 500VDC
- Insulation resistance: >10^4M @ 250VDC
- Torque: 35~200gr-cm

Mouser Stock No.	Capacity Range (pF)	Temperature Coeff. PPM/°C	Q Factor @ 10MHz	Rotor Color Code
24AA020	1.8 ~ 6.0	NPO ± 250	>300	Red
24AA021	2.8 ~ 12.5	-600 ± 300	>300	None
24AA022	3.5 ~ 20.0	-750 ± 300	>300	Blue
24AA023	5.0 ~ 30.0	-1,500 ± 500	>200	Yellow
24AA024	9.0 ~ 50.0	-1,500 ± 500	(>200/1MHz)	Green



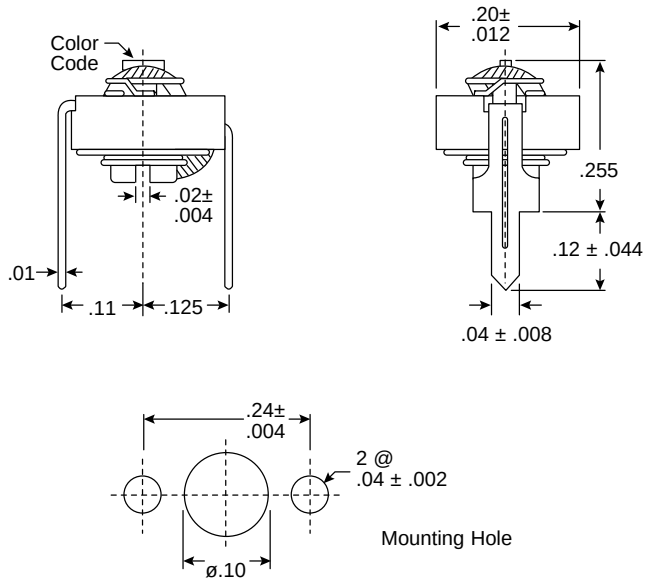
Dimensions (mm)



Mouser Stock No.	Range (PF)	Q Factor @ 10MHz	Temperature Coeff. ppm°C	Color Code
242-3410-34	4.0-34	> 300	N 500 ± 800	Yellow
242-3410-45	5.0-45	> 200	N 1400 ± 800	Brown
242-3410-55	5.0-55	> 200	N 1400 ± 800	Green
242-3410-70	6.0-70	> 200	N 1400 ± 800	None

Specifications:

- Dielectric withstanding rating: 250VDC
- Voltage breakdown: 500VDC
- Torque: 40 - 400 gr-cm
- Insulation reistance: $>10^4$ MΩ @ 250VDC

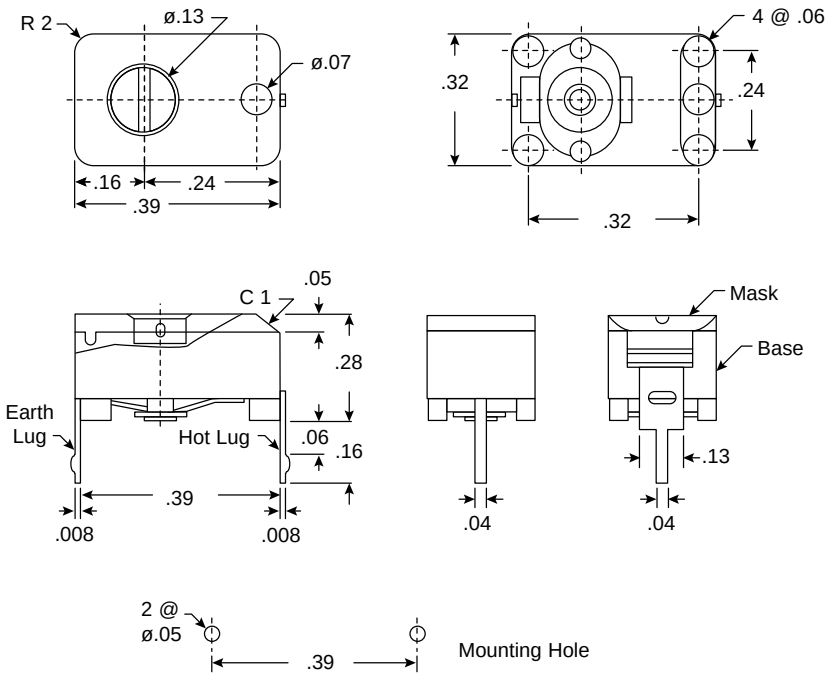


Dimensions (In.)

Specifications:

- Type: 5mm micro-miniature
- Dielectric withstanding: 250VDC
- Breakdown voltage: 500VDC
- Torque: 35 ~ 200gr-cm
- Rating: 10A @ 250VAC
- Insulation resistance: $>10^4$M @ 250VDC

Mouser Stock No.	Capacity Range (pF)	Temperature Coefficient PPM/°C	Q Factor @ 10MHz	Color Code
24AA091	2.8 ~ 12.5	-600 ± 300	>300	None
24AA092	3.5 ~ 20.0	-750 ± 300	>300	Blue
24AA093	5.0 ~ 30.0	-1,500 ± 500	>200	Yellow
24AA094	9.0 ~ 50.0	-1,500 ± 500	(>200/1Mhz)	Green

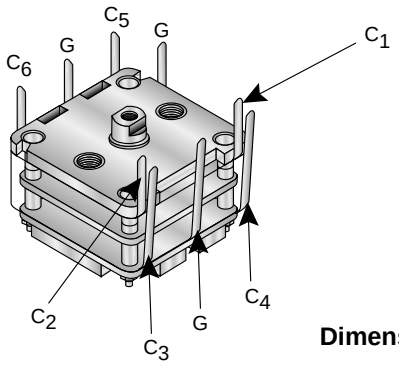


Dimensions (In.)

Specifications:

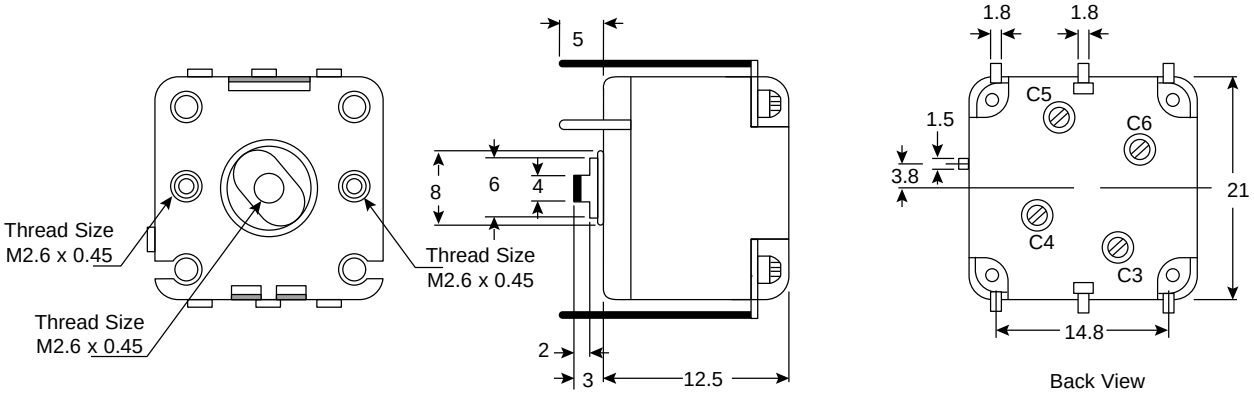
- Mechanical rotation: 360°
- Insulation resistance: 500MΩ (min.) @ 100VDC
- Voltage breakdown: 100VDC for 1 minute
- Q value: 500 (min.) @ 10MHz
- Temperature coefficient: -200 ~ +250 PPM/C°
- Dielectric: polyetylene or polystylene film
- Base: polycarbonate resin
- Rotor, stator, & shaft: brass

Mouser Stock No.	Range (pF)
24PX005	1.0 ~ 5.0
24PX016	1.0 ~ 15.0
24PX020	1.2 ~ 20.0
24PX030	1.5 ~ 30.0

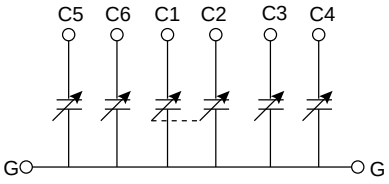


Front View

Dimensions (mm)

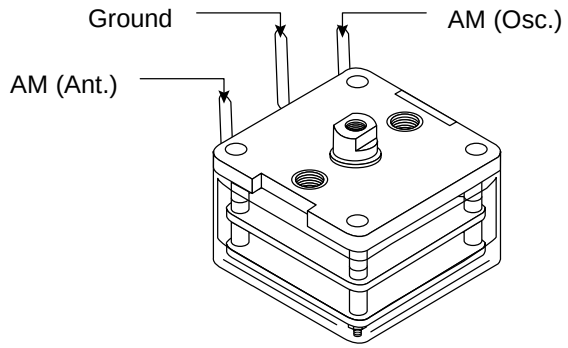


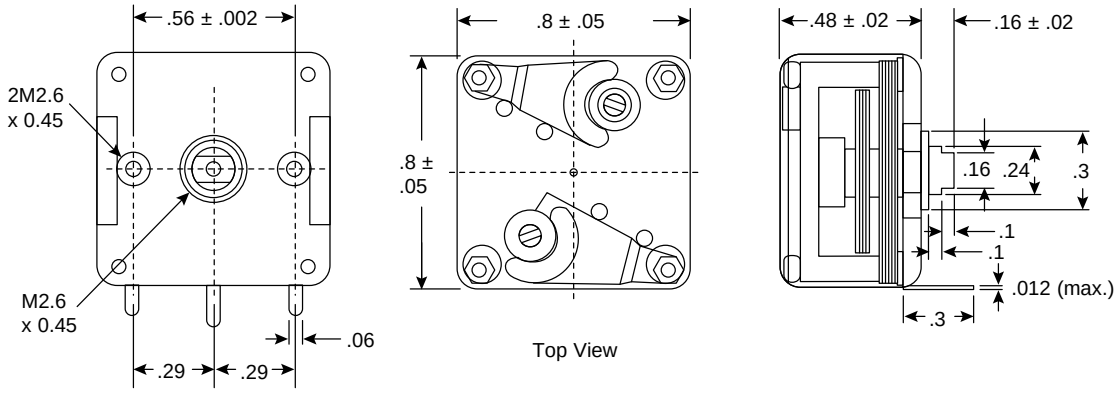
Back View



Specifications:

- C_1, C_2 capacitance range (section 1 & 2): 5.5 - 266 pF each
- Trimmer capacitance $C_{3\text{-}6}$: 7 pF each (min.)
- Ground: G
- Insulation resistance: 500MΩ (min.) @ 100VDC
- Maximum working voltage: 50V peak
- Contact resistance: 10mΩ (max.)
- Q characteristic: AM - 500 (min.) @ 50 pF, 100 KHz





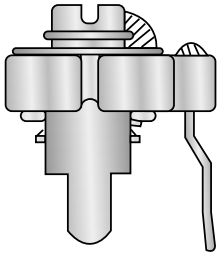
Dimensions (In.)

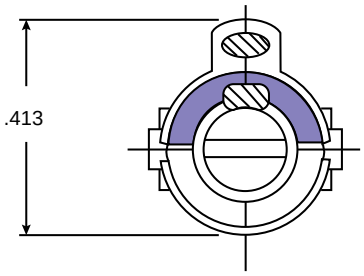
Specifications:

- Insulation Resistance: 250MΩ
- Rotor contact resistance: 10mΩ
- Voltage proof: 100VDC
- Q: 700 @ 10 MHz, 50 pF
- Temperature range: -10/50˚C
- Operating torque: 50 - 400gcm
- End stop torque: 3kgcm
- Trimmer capacitance swing: 8pF
- Rotation angle: 180˚=100% of angle w/tolerance of 97± 2%
- Rotation direction: counter-clock wise = capacitance increase
- Tolerance of effective capacity:
  Osc.± (1.5% + 1pF)
  Ant.± (1.5% + 1pF)

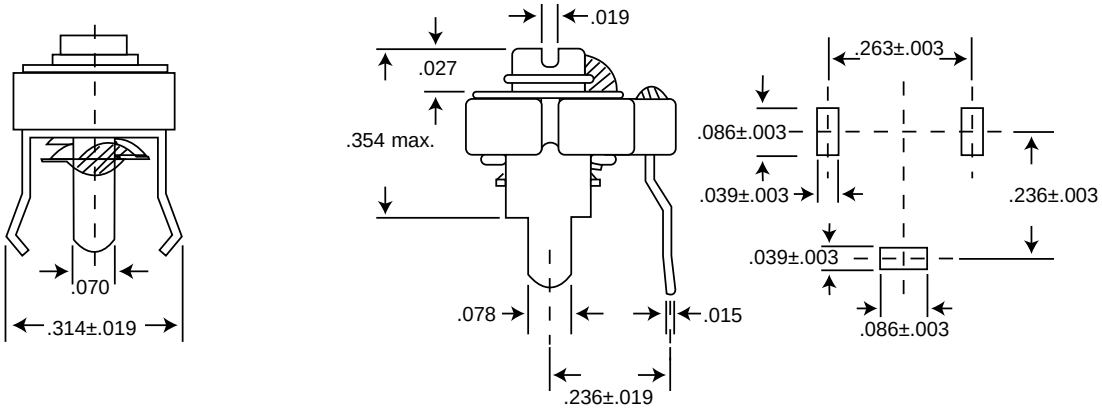
* Minimum capacity is 5.0pF

Rotation (%)	Osc. Section		Ant. Section	
	Coefficient	Capacity (pF)	Coefficient	Capacity (pF)
100	100.0	59.2	100.0	141.6
90	93.4	55.2	89.3	126.3
80	86.0	50.9	78.5	111.2
75	82.0	48.5	73.2	103.7
70	78.0	46.2	67.8	96.1
60	69.2	41.0	56.1	80.4
50	59.0	35.0	45.4	64.3
40	48.0	28.4	34.2	48.5
30	35.5	21.0	23.4	33.2
25	28.5	16.9	18.1	25.7
20	21.8	12.9	13.0	18.5
10	8.1	4.8	4.0	6.2



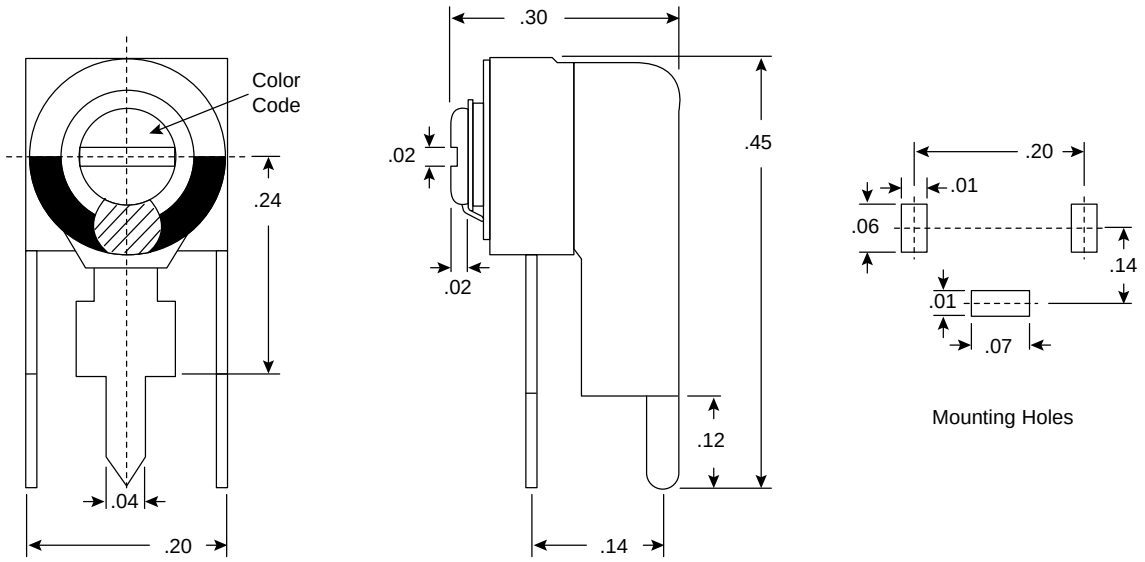


Dimensions (In.)



Specifications:

- Capacitance range: 2.0 - 12.0pf
- Dielectric withstanding rating: 250VDC
- Voltage breakdown: 500VDC
- Q @ 10MHz: >300
- Temp coeff: NPO±200
- Torque: 40-400 gr-cm
- Insulation resistance: $>10^4 M\Omega$ @ 250VDC

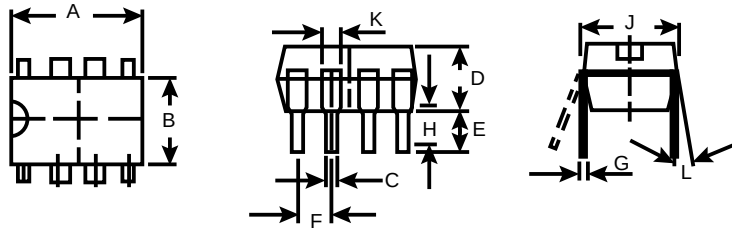


Dimensions (In.)

Specifications:

- Rating: 200VDC
- Breakdown voltage: 400VDC
- Insulation resistance: $>10^4$MΩ @ 250VDC
- Torque: 35~200gr-cm
- Operating temp. range: -30°C ~ +85°C

Mouser Stock No.	Capacity Range (pF)	Temperature Coeff. PPM/°C	Q Factor @ 10MHz	Rotor Color Code
24AA080	1.8 ~ 6.0	NPO ± 250	>300	Red
24AA081	2.8 ~ 12.5	N600 ± 300	>300	None
24AA082	3.5 ~ 20.0	N750 ± 300	>300	Blue
24AA083	5.0 ~ 30.0	N1,500 ± 500	>200	Yellow
24AA084	9.0 ~ 50.0	N1,500 ± 500	(>200/1MHz)	Green



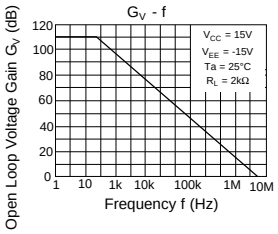
Dim.	Inches
A	.377 ± .007
B	.253 ± .007
C	.018 ± .003
D	.149 ± .011
E	.129 ± .011
F	0.1
G	.009 + .003 - .001
H	.019 min
J	0.3
K	.059 ± .003
L	0 - .590

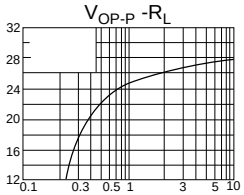
Maximum Ratings (Ta=25°C)

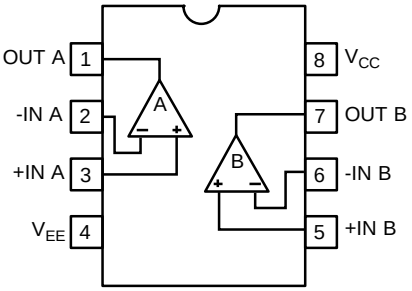
Characteristics	Symbol	Rating	Unit
Supply Voltage	V_{CC} V_{EE}	36, or +18 0, -18	V
Differential Input Voltage	D_{VIN}	±30	V
Input Voltage	V_{IN}	V_{CC} ~ V_{EE}	V
Power Dissipation	P_D	500	mW
Operating Temperature	T_{opr}	-40 ~ 85	°C
Storage Temperature	T_{stg}	-55 ~125	°C

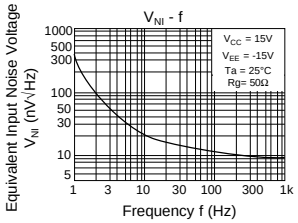
Electrical Characteristics (V_{CC}=15V, V_{EE}=-15V, Ta=25°C)

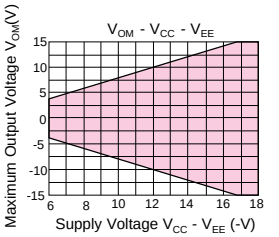
Characteristics	Symbol	Test Cicuit	Test Conditions	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{IO}	-	Rg≤10kΩ	-	0.5	6	mV
Input Offset Current	I_{IO}	-	-	-	5	200	nA
Input Bias Current	I_I	-	-	-	60	500	nA
Common Mode Input Voltage	CMV_{IN}	-	-	±12	±14	-	V
Maximum Output Voltage	V_{OM}	-	R_L=10kΩ	±12	±14	-	V
	V_{OMR}		R_L=2kΩ	±10	±13	-	
Source Current	I_{source}	-	-	-	40	-	mA
Sink Current	I_{sink}	-	-	-	40	-	mA
Voltage Gain (Open Loop)	G_V	-	V_{OUT}=±10V, R_L=2kΩ	86	100	-	dB
Common Mode Input Signal Rejection Ratio	CMRR	-	RG≤10KΩ	70	90	-	dB
Supply Voltage Rejection Ratio	SVRR	-	RG≤10KΩ	-	30	150	µV/V
Slew Rate	SR	-	G_V=1, R_L=2KΩ	-	2.0	-	V/µS
Unity Gain Cross Frequency	f_T	-	Open Loop	-	5.0	-	MHz
Supply Current	I_{CC}, I_{EE}	-	-	-	4.0	6.0	mA
Equivalent Input Noise Voltage	V_{NI}	-	R_S=1kΩ, f=30Hz ~ 30kHz	-	2.5	-	μV_{rms}

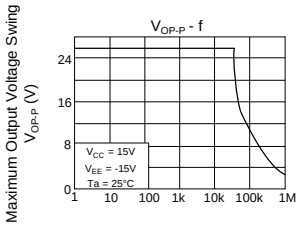


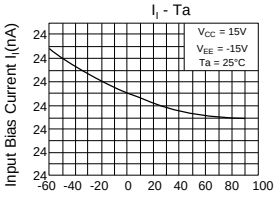






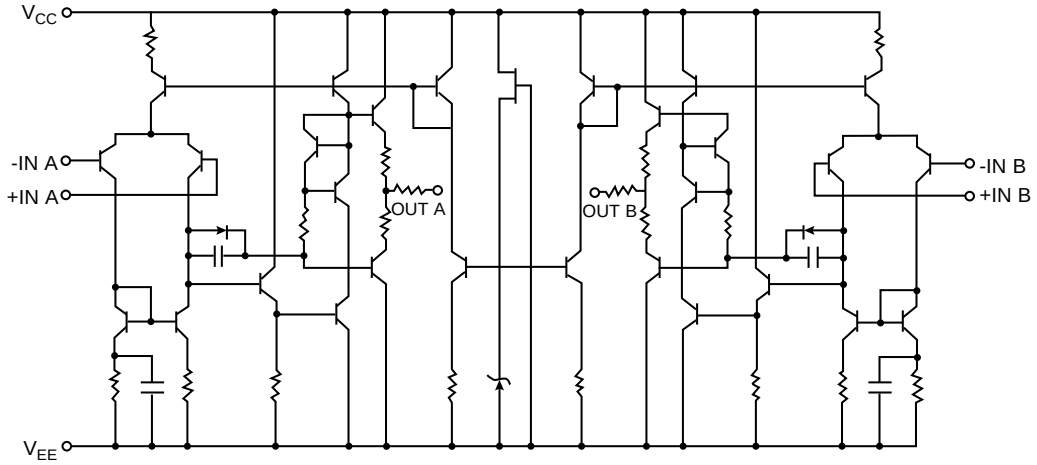


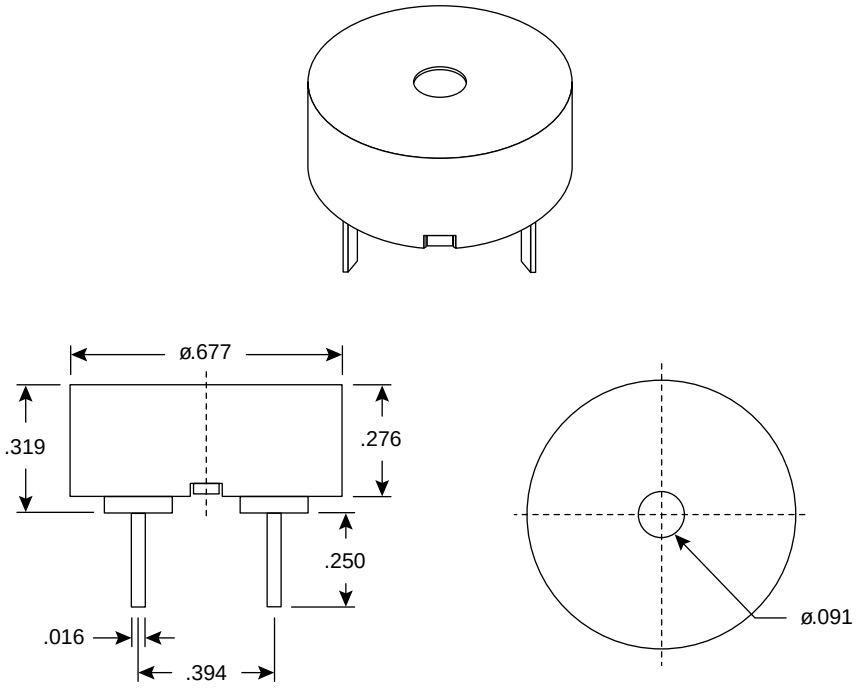




Specifications:

- Wide band decopensated: (Av≤20dB)
- Wide band range: f_T=5MHz (Typ)
- Suitable application for active filter, equalizer amp and headphone amp.

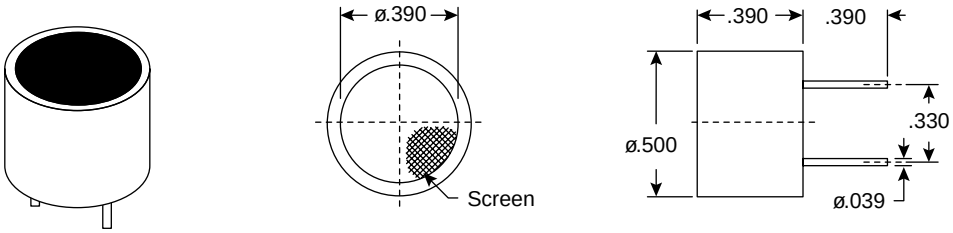




Dimensions (In.)

Specifications:

- Type: external drive
- Sound pressure level: 80dB min. @ 4,096Hz/9Vp-p**,** square wave/10cm; 70dB min. @ 4,096Hz/1Vrms, sine wave/10cm
- Capacitance: 10,000pF ±30% @ 120Hz 25°C
- Current consumption: 3mA max. @ 4,096Hz 9Vp-p square wave
- Top case: PC UL94V2
- Bottom case: PBTGF UL94V0
- Pins: tin plated brass
- Pin pitch: 10±.3mm
- Operating temperature: -20°~+105°C
- Weight: 1gm
- Tolerance: ±.012"

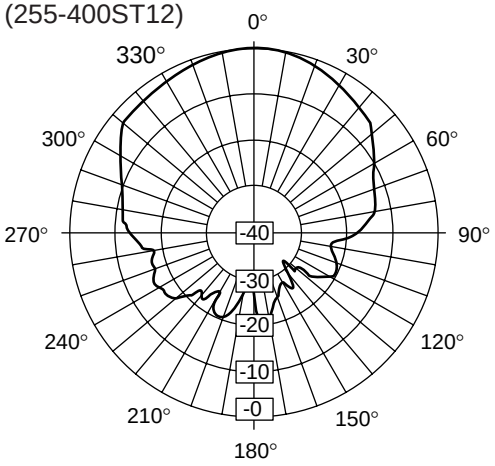


Dimensions (In.)

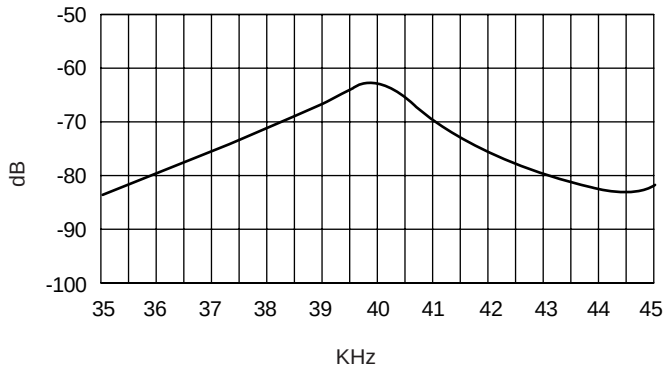
Specifications:

- Type: transmitter: 255-400ST12; receiver: 255-400SR12
- Center frequency (f_0): 40.0KHz ± 1.0KHz
- SPL@ f_0: 255-400ST12 = 115dB (0dB re 0.0002 µ bar)
- Sensitivity @ f_0: 255-400SR12 = -67dB (0dB = 1V/µ bar)
- Bandwidth (-6dB): 2KHz
- Allowable input power: .2W
- Capacitance @ 1KHz: 2,400pF ± 20%
- Operating temperature: -30°C ~ +85°C
- Storage temperature: -40°C ~ +100°C

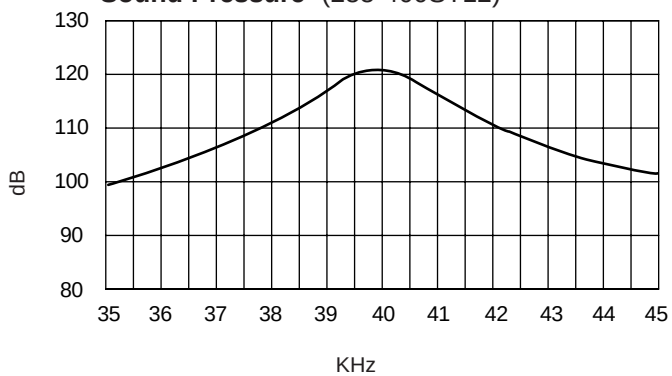
Directivity
(255-400ST12)

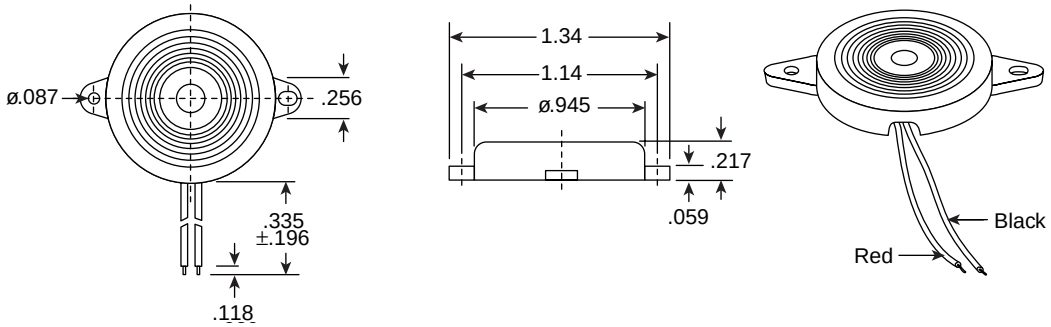


Sensitivity (255-400SR12)



Sound Pressure (255-400ST12)

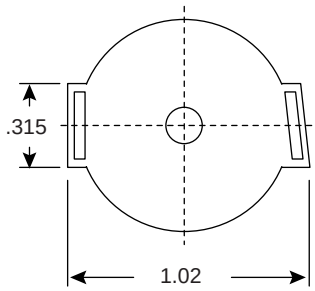


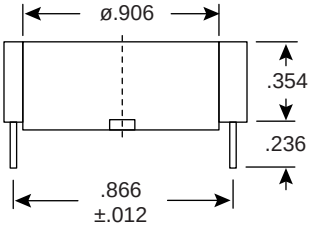


Dimensions (In.)

Specifications:

- Body: ABS UL94HB
- Weight: 2.0 grams
- Number of leads: 2
- Lead wire: UL1095; 28AWG; 3.35" ± .197"
- Resonant frequency: 1.2KHz
- Voltage: 30Vp-p
- Current: 3mA @ 5KHz 9Vp-p; square wave
- Sound pressure: 90dB (min.) @ 5KHz/9Vp-p, square wave/10cm; 80dB (min.) @ 5KHz/1Vrms, sine wave/10cm
- Operating temperature range: -20°C ~ +105°C
- Capacitance: 15,000pF ± 30% @ 120Hz 25°C

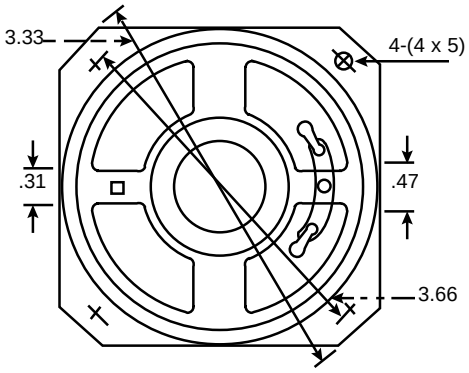




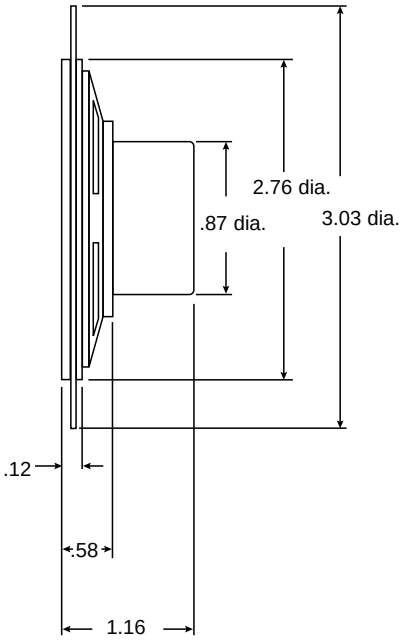
Dimensions (In.)

Specifications:

- Type: external drive
- No. of pins: 2
- Resonant frequency: 2000Hz
- Voltage: 15Vp-p max.
- Current: 3mA max. @ 2KHz 9Vp-p square wave
- Sound pressure: 80dB min. 2KHz 9Vp-p
- Capacitance: 25,000pF ± 30% @ 120Hz 25°C
- Operating temperature: -20°C ~ +105°C
- Pin material: tin coated brass
- Weight: 2.0 grams

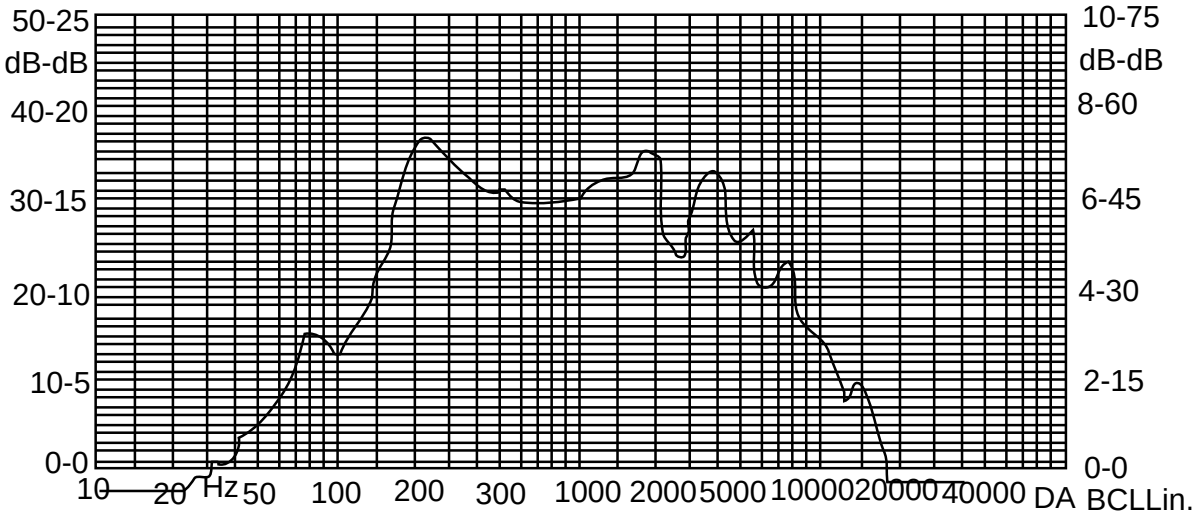


Dimensions (In.)

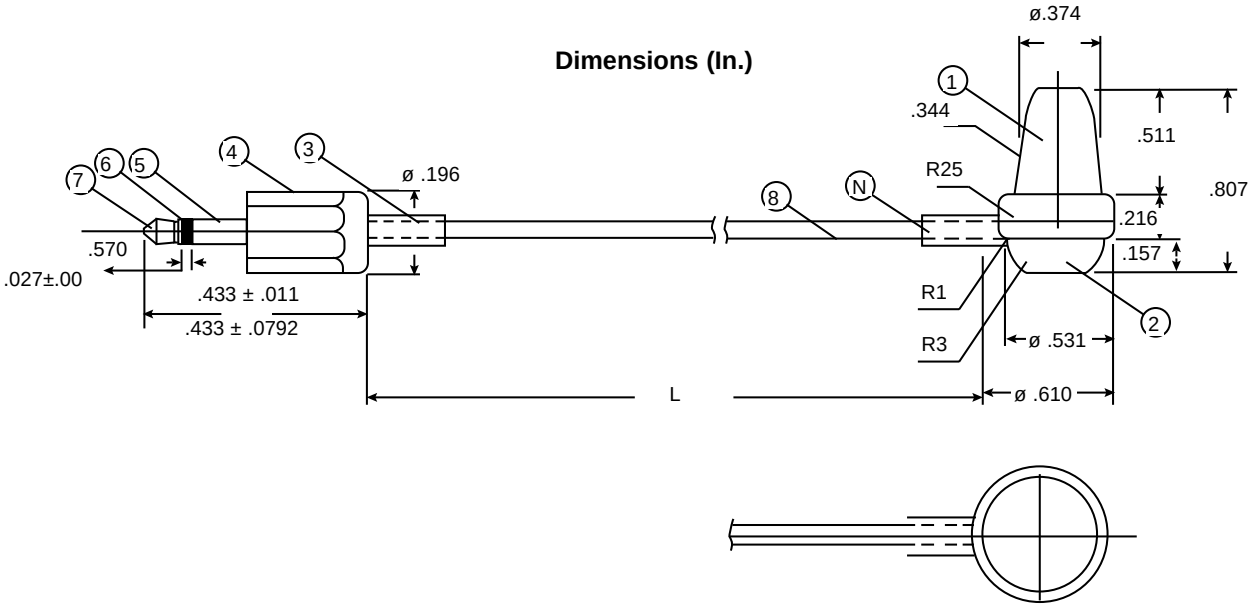


Specifications:

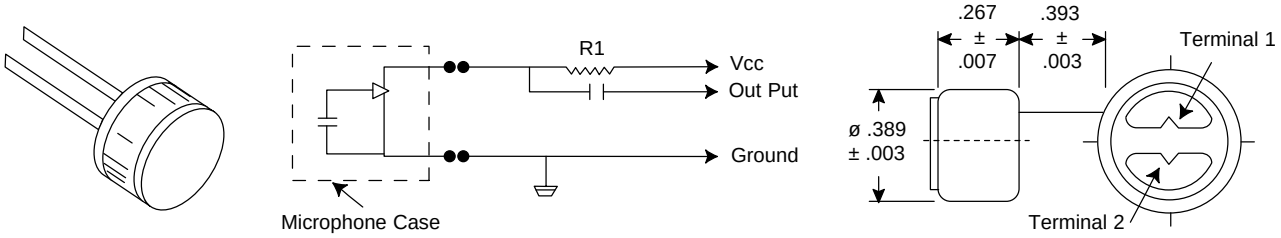
- Voice coil impedance: 8Ω±15% @ 800Hz/1V
- Operation: Must be normal
- Buzzes & rattle: Must be normal, sin wave 3.46V
- Resonant Freq.: 250±45Hz, without baffle
- Output SPL: 95±2dB
- Freq. response: fo 5000Hz, 10dB
- Rated power input:0.3W
- Max. power input: 0.5W
- Load test: White noise @ 0.3W for 5 hours
- Heat test: 40°C±2°C, 20~50%RH for 5 hours
- Humidity test: 40°C±2°C, 90~95%RH for 5 hours
- Distortion: 5% max., @ rated power input 800Hz
- Flux density: 6500 Gauss
- Magnet: .512 x .472, 0.4oz
- Total weight: 2.08oz



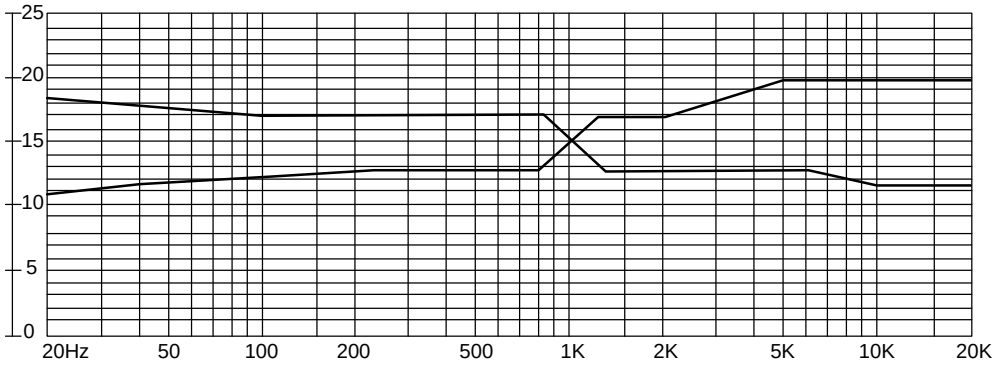
Dimensions (In.)



Item	Name	Material	Color
1	H - Cap	P.P.	1
2	H - Cover	P.P.	1
3	Tube	Vinyl	2 Trans
4	P - Cap	P.P.	1
5	P - Sleeve	Copper	1 Glow
6	Insulation Collar	A.B.S.	1
7	P - Tip	Copper	1
8	Cord	P.V.C.	1



Dimensions (In.)



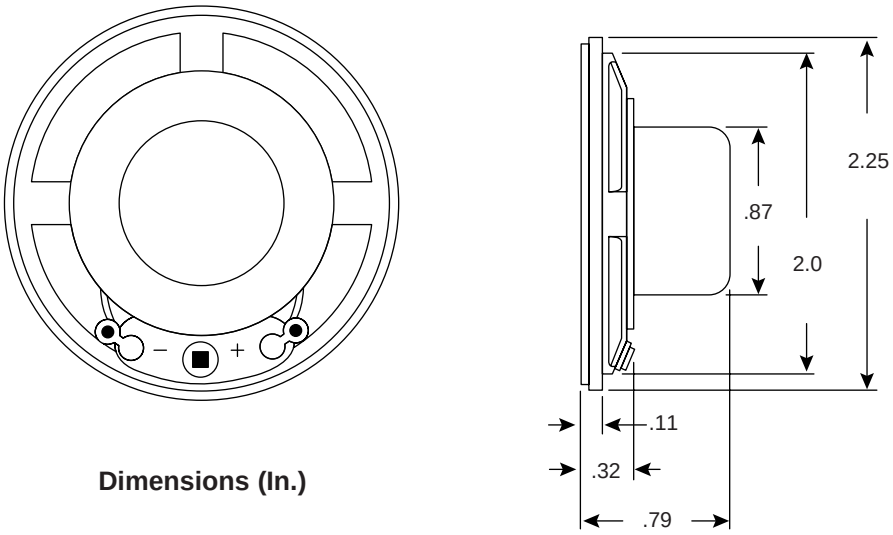
Specifications:

- Impedance: low impedance
- Frequency: 20~12,000HZ
- Operation voltage: 1.5~12V (4.5V standard)
- Sensitivity reduction: within - 3dB @ 3V
- S/N ration: <40dB
- Weight: >1.3g
- Solderability: 260°C±5°C for 10±3 seconds
- Operating voltage (Vg): 10V
- Storage temperature range (Tstg): -20˚C~+60˚C

Reliability Tests:

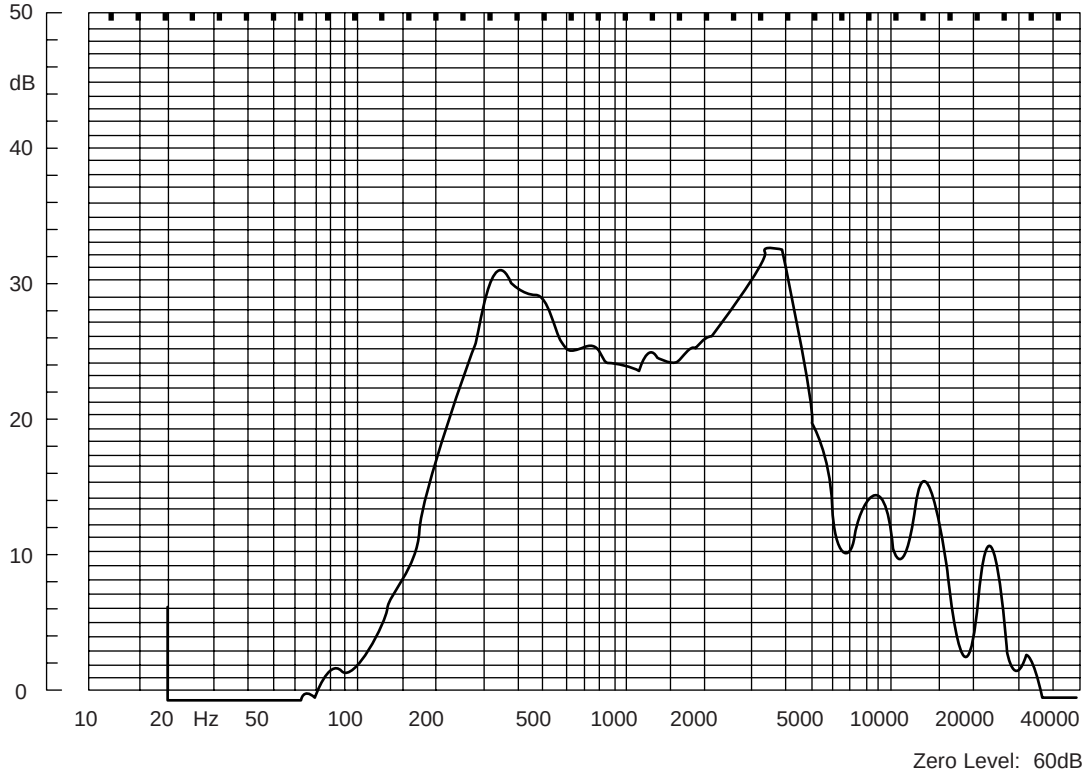
- Vibration test: to be no interference in operation after vibrations, 10Hz~55Hz for 1 minute full amplitude 1.52mm for 2 hours
- Drop test: to be no interference in operation after dropped to concrete floor one time each from 1 meter height @ 3 directions in state of packing
- Temperature test: A) after exposure @ 70°C for 240 hours, sensitivity to be within ±3dB from initial sensitivity (measurement to be done after 2 hrs of conditioning @ 20°C)
  B) after exposure @ 25°C for 240 hrs, sensitivity to be within ±3dB from initial sensitivity (measurement to be done after 2 hrs of conditioning @ 20°C)
- Humidity test: after exposure @ 60°C and 90~9.596 relative humidity for 240 hrs, sensitivity to be within ±3dB from initial sensitivity (measurement to be done after 2 hrs of conditioning @ 20°C)
- Temperature cycle test: after exposure @ -55°C for 30 min., @ 20°C for 10 min., @ +85°C for 30 min., 5 cycles, sensitivity to be within ±3dB from initial sensitivity (measurement to be done after 2 hrs of conditioning @ 20°C)

Item	Symbol	Test Conditions	Minimum	Standard	Maximum	Unit
Sensitivity	S	*f*=1kHz, Pin=1µbar	66	64	62	dB Ddb=1V/µbar
Output Impedance	Zout	*f*=1kHz, Pin=1µbar		2		kΩ
Current Consumption	I				500	µA
S/N Ratio	S/N(A)	*f*=1kHz, Pin=1µbar	40			dB
		A curve			3	



Dimensions (In.)

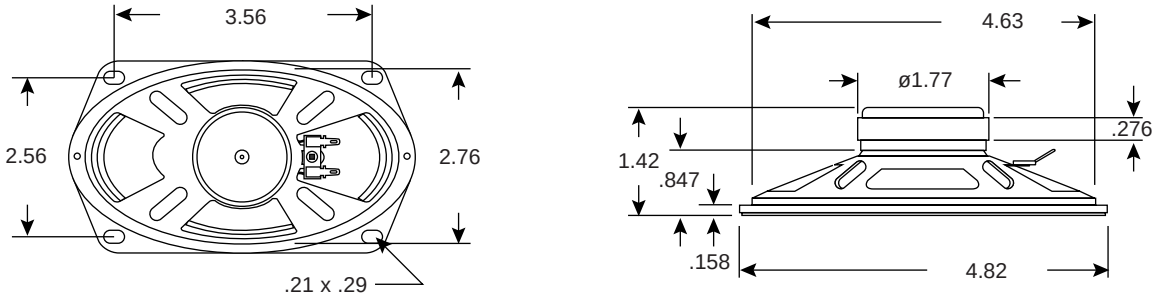
Frequency Response



Zero Level: 60dB

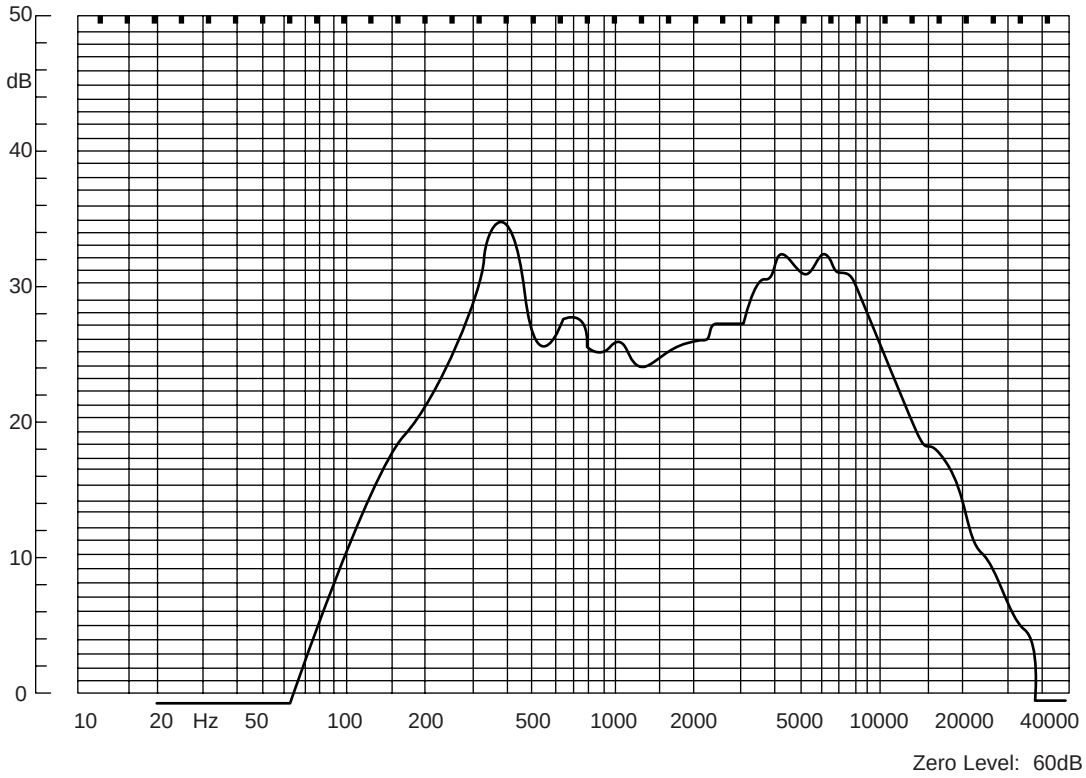
Specifications:

- Magnet: Alnico, .35oz.
- Impedance: 8Ω ±15%
- Resonant frequency: 400Hz ±80Hz
- Frequency range: 400Hz ~ 4.5KHz
- Sensitivity: 84dB/W ±2dB
- Input power: 0.2W nominal, 0.3W maximum



Dimensions (In.)

Frequency Response



Zero Level: 60dB

Specifications:

- Magnet: Ferrite, 1.48oz.
- Impedance: 8Ω ± 15%
- Resonant frequency: 230Hz ±46Hz
- Frequency range: 230Hz ~ 10KHz
- Sensitivity: 88dB/W ± 2dB
- Input power: 1.5W nominal, 2.0W maximum

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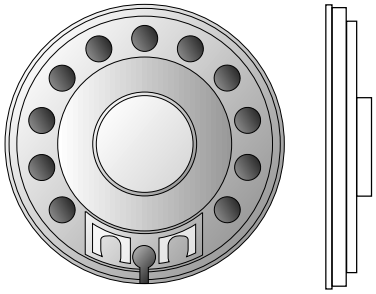
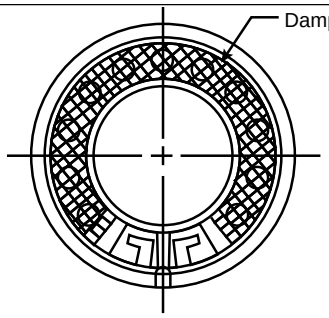
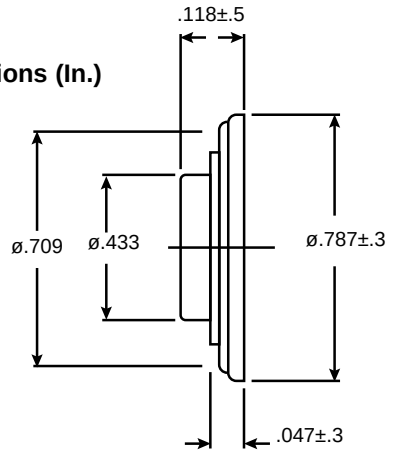
253-5008 Mylar Cone Speaker





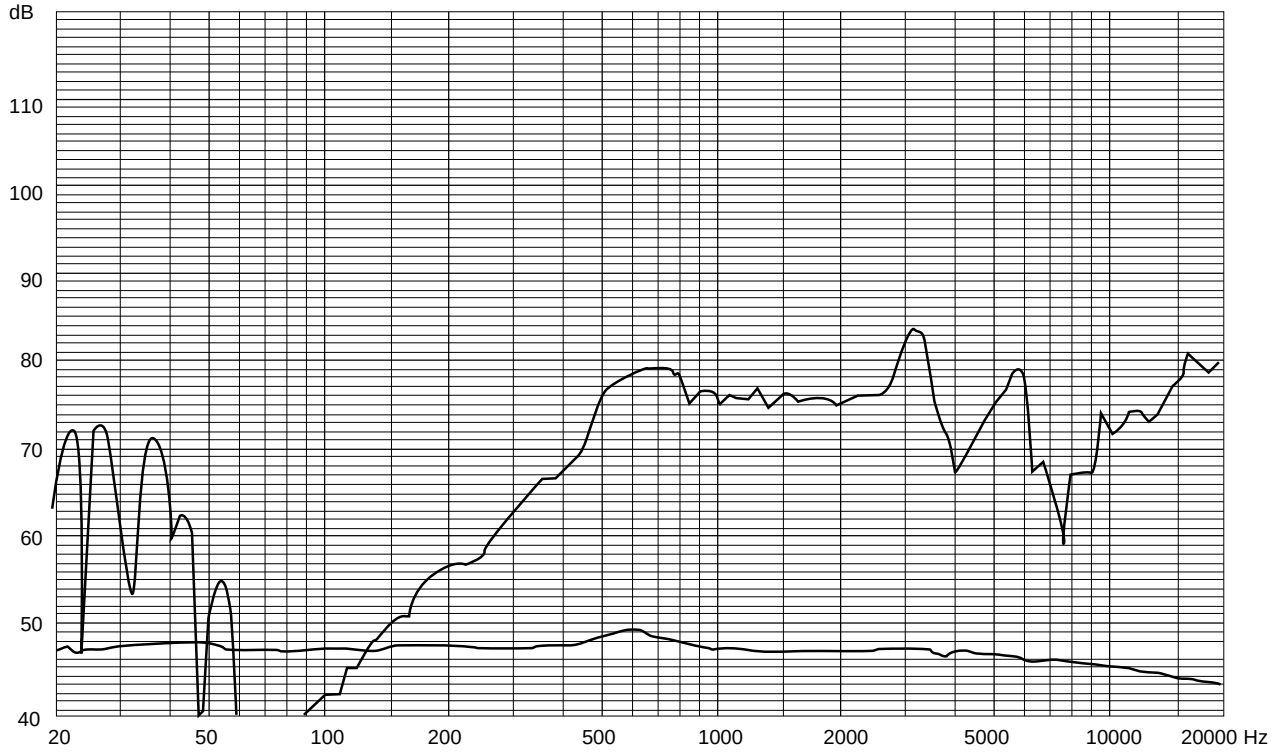
Dimensions (In.)



Specifications:

- Size: 20 mm (0.8 inches)
- Magnet: size Nd 8.0 x 1.0 (mm) weight 0.01 oz (0.38 g)
- Total weight: 0.08 oz (2.4 g)
- Power rating: nominal power rating 0.1W, peak music power 0.2W
- Voice coil imp.: 8Ω ± 1.2Ω @ 1200Hz 1V
- Resonance freq.: 550Hz ± 110Hz @ Fo Hz 1V
- S.P.L.: 75dB/W ± 3dB 1W 39.4 inches 100 cm average of 1.0, 1.2, 1.5, 2.0 KHz
- Response: Fo ~ 7000Hz, Dev. 20dB max. 1W 39.4 inches 100 cm
- Distortion: 5% max. 1200Hz 0.1W 39.4 inches 100 cm
- Voice coil: dia. 0.37 inches 9.30 mm
- Polarity: with positive voltage applied to. (+) terminal, the cone shall move away from pole piece.

Test conditions: 20°C, 65% R.H. Standard Response Zero Level: 40dB S.P.L. average of 1.0, 1.2, 1.5, 2.0KHz



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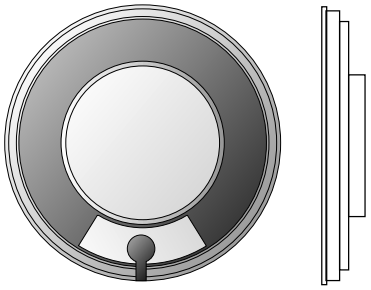
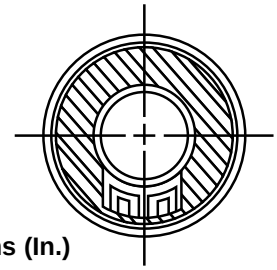
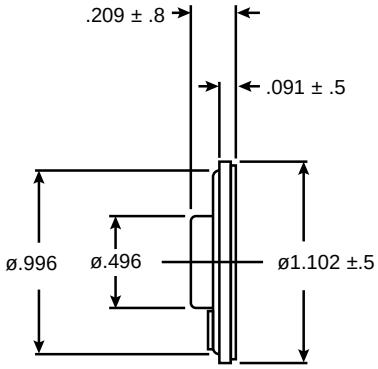
253-5011 Mylar Cone Speaker



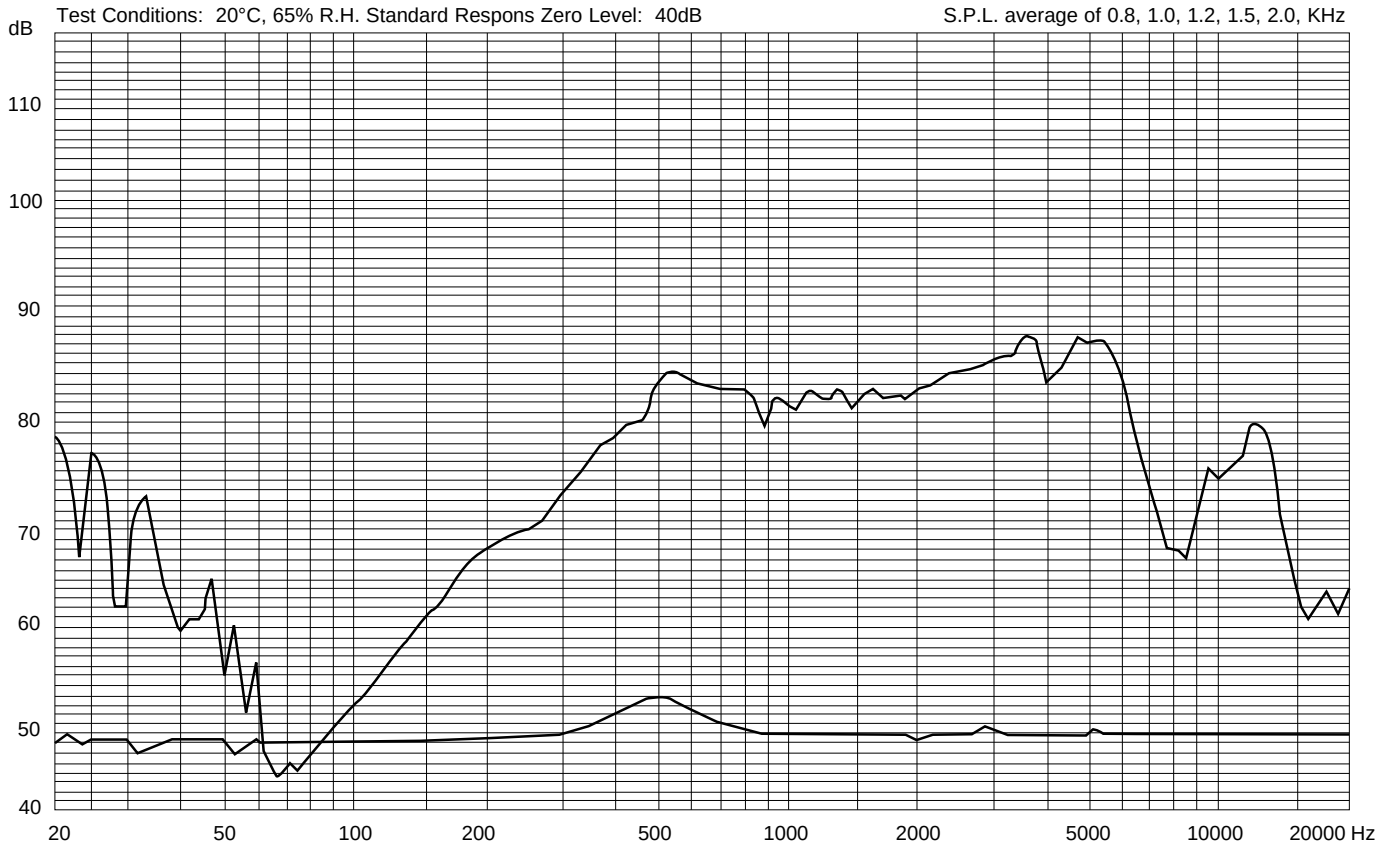


Dimensions (In.)



Specifications:

- Size: 28mm (1.1 inch)
- Magnet size: Nd 9.5 x 1.5 (mm) Weight: 0.03 oz. (.77 g)
- Total weight: .20 oz. (5.75 g)
- Power rating: nominal power rating .1W Peak music power: .2W
- Voice coil imp.: 8Ω ± 1.2Ω @ 1000Hz 1V
- Resonance freq.: 550Hz ± 110Hz @ Fo Hz 1V
- S.P.L.: 81dB/W ± 3dB 1W 39.4 inch 100cm average of 0.8, 1.0, 1.2, 1.5KHz
- Response: Fo ~ 10000Hz, Dev. 20dB max. 1W 39.4 inch 100cm
- Distortion: 5% max. 1000Hz .1W 39.4 inch 100cm
- Voice coil: dia. .41 inch 10.4mm
- Polarity: with positive voltage applied to. (+) terminal, the cone shall move away from pole piece.



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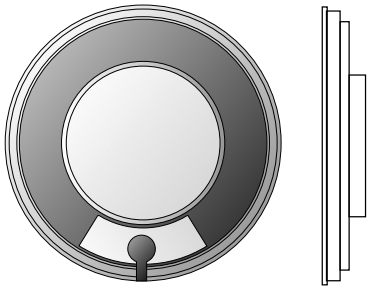
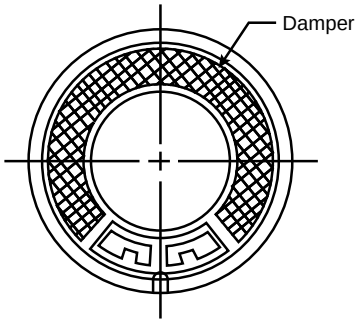
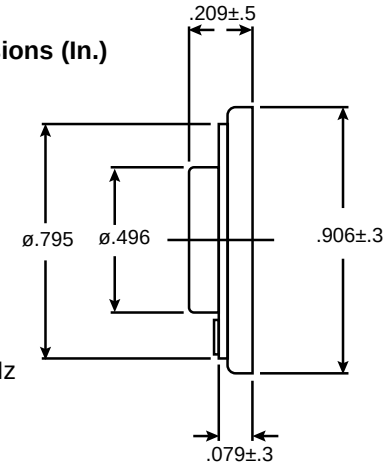
253-5009 Mylar Cone Speaker



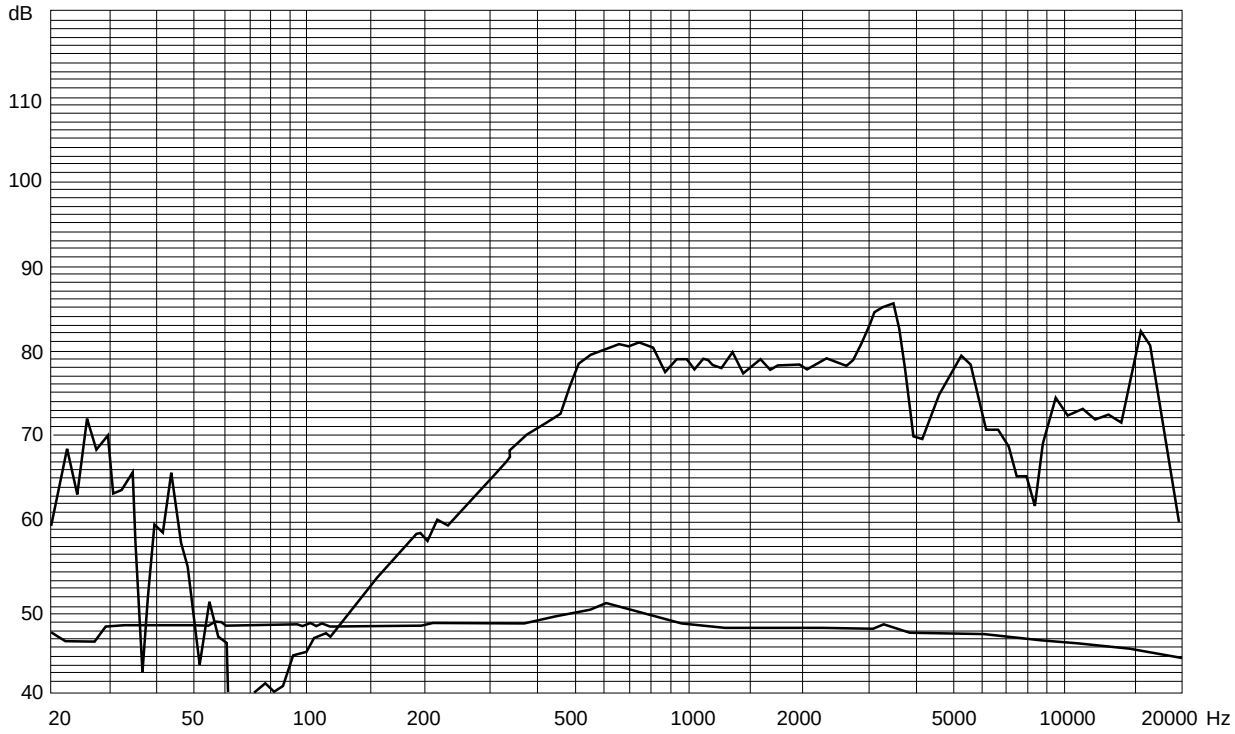


Dimensions (In.)



Specifications:

- Size: 23 mm (0.9 inches)
- Magnet: size Nd 9.5 x 1.5 (mm) weight 0.03 oz (0.77 g)
- Total weight: 0.16 oz (4.6 g)
- Power rating: nominal power rating 0.1W, peak music power 0.2W
- Voice coil imp.: 8Ω ± 1.2Ω @ 1200Hz 1V
- Resonance freq.: 700Hz ± 140Hz @ Fo Hz 1V
- S.P.L.: 78dB/W ± 3dB 1W 39.4 inches 100 cm average of 1.0, 1.2, 1.5, 2.0 KHz
- Response: Fo ~ 7000Hz, dev. 20dB max. 1W 39.4 inches 100 cm
- Distortion: 5% max. 1200Hz 0.1W 39.4 inches 100 cm
- Voice coil: dia. 0.41 inches 10.4 mm
- Polarity: with positive voltage applied to. (+) terminal, the cone shall move away from pole piece.



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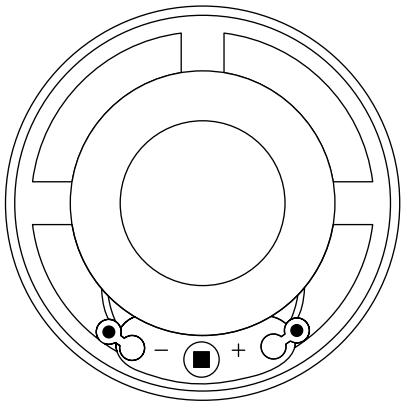
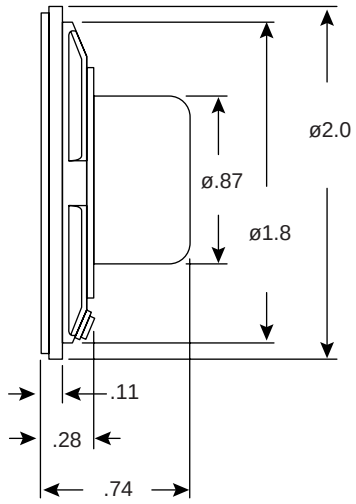
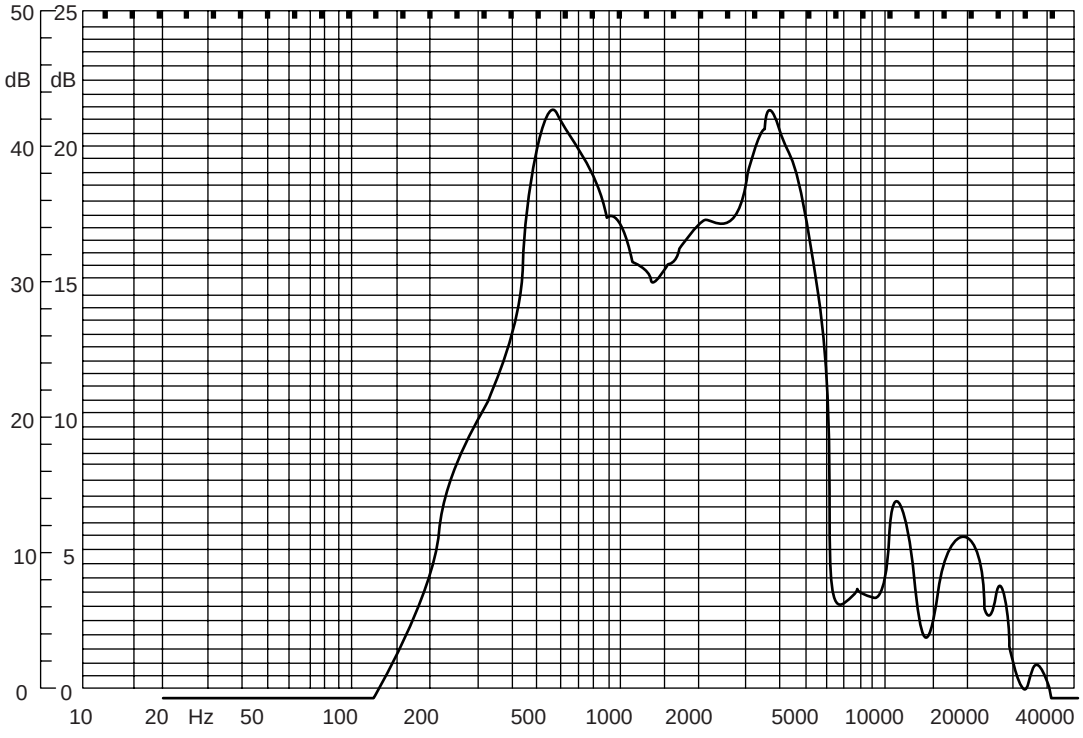
(800) 346-6873





Dimensions (In.)

Frequency Response

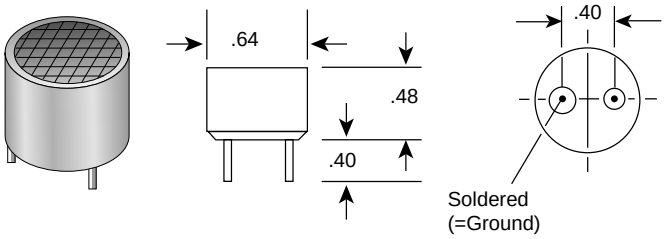


Zero Level: 60dB

Specifications:

- Magnet: Alnico, .35oz.
- Impedance: 100Ω ±15% @ 1KHz, 1V
- Resonant frequency: 460Hz ± 90Hz @1V
- Frequency range: 460Hz ~ 5.3KHz
- Sensitivity: 86dB/W ±2dB
- Input power: 0.2W nominal, 0.3W maximum

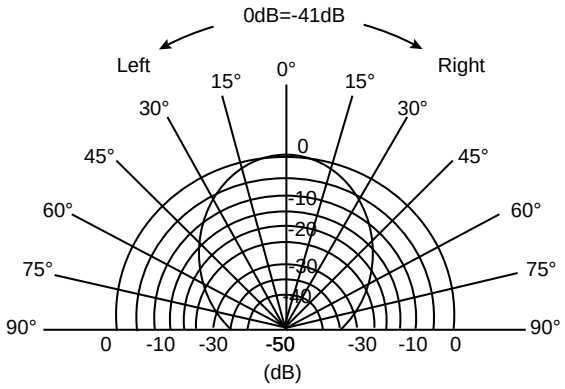
Dimensions (In.)



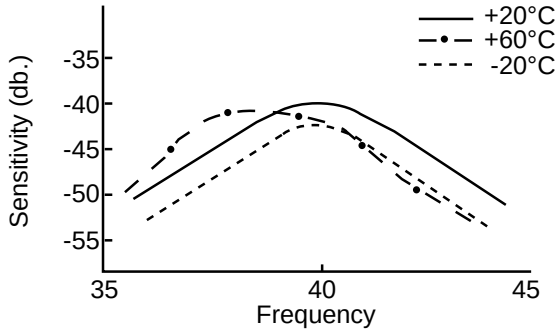
Specifications	Receiver	Transmitter
Center frequency	40KHz±1.0KHz	40KHz±1.0KHz
Sound pressure level (Center frequency) (0dB=0.0002µ bar)	- - - - -	115dB min.
Sensitivity (Center frequency) (dB/V/µ bar)	-64 min.	- - - - -
Capacitance (pF)	2400±25%	2400±25%

Current rating: 40mA min.
50mA max.
Impedance: min. 1KΩ @ 40KHz
min. 2.5KΩ @ other Hz. (fa)
Voltage rating: 20VDC

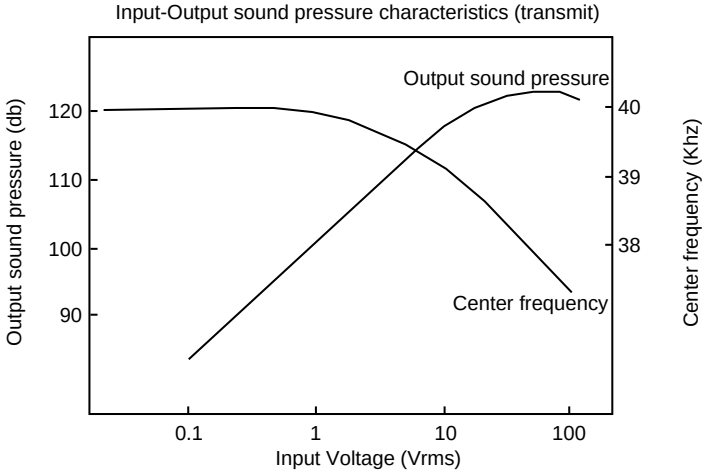
Directivity Pattern

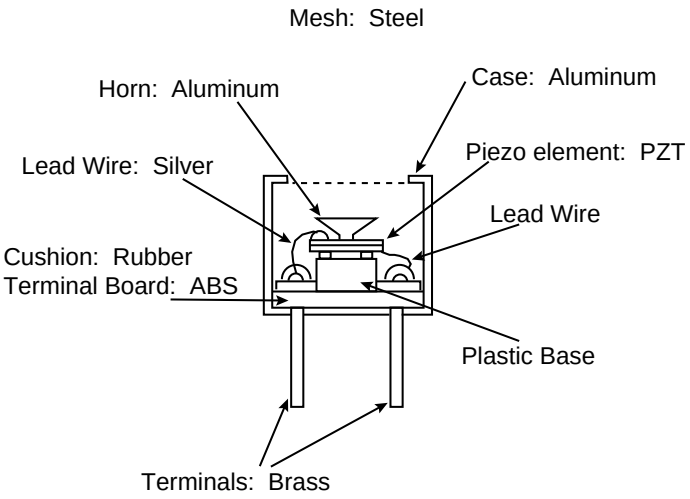


Temperature Characteristics

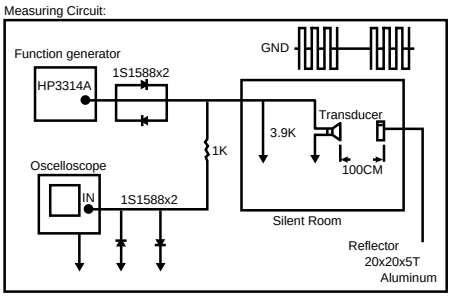


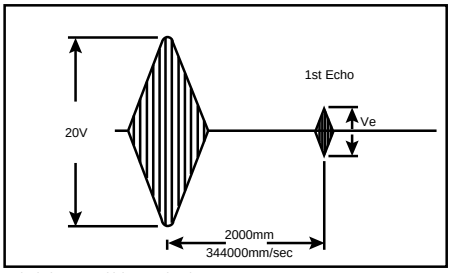
Input-Output sound pressure characteristics (transmit)





PZT=Titanium acid varium and zilcon acid lead





Calculation: Sensitivity = 20 log (V_e p-p÷V_{input})
0dB refers to V_{input} = 20V_{pp}
Sensitivity: Measured per diagram

Fig. A Temperature Tests

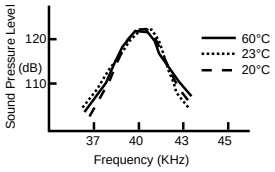


Fig. B Shock/Humidity Tests

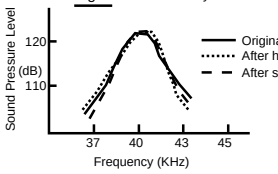
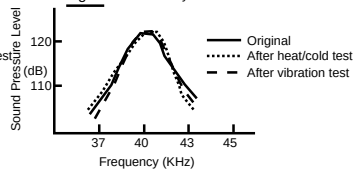
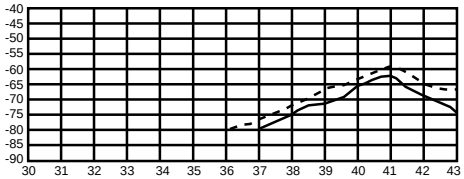
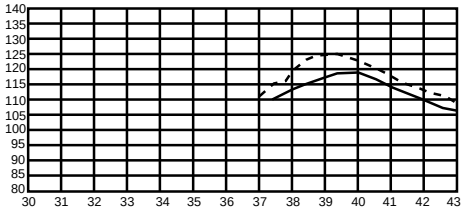


Fig. C Heat/Cold Cycle and Vibration Tests





Sound Pressure Level

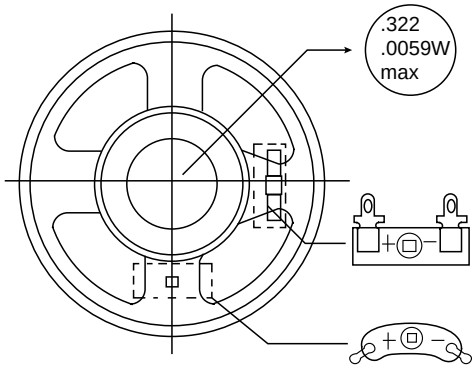


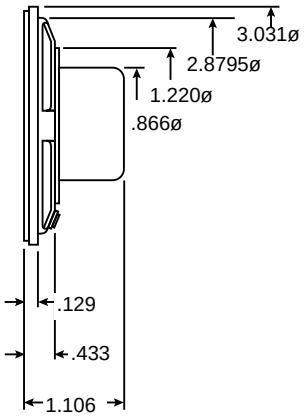
Environmental Tests:

Temperature	Specimens are placed for 15 min. in temperature chambers of -20°C & 60°C respectively. Readings are done immediately on removal from each chamber. Figure A
Shock	Specimen receives sine 100G: 6m/sec from 3 direction (X,Y,Z). Figure B
Humidity	Specimen is stored in 40±2°C, 90 to 95%RH atmosphere for 100 hrs., prior to subsequent 24 hrs. recuperatory period under room temperature/humidity. Figure B
Heat/Cold Cycle	Specimen is first exposed to 120°C for 30 min., then to -30°C for another 30 min., for the total time length of 60 min. or a cycle. After ten of such consecutive cycles, it is returned to and kept at room temperature for 30 min. prior to reading. Figure C
Vibration	Specimen undergoes following vibration: Frequency: 10 to 55Hz, Amplitude: 1.5mm, Duration: 2 hrs., Sweeping period: 1 min., Direction: 3 (X,Y,A) each direction. Figure C

MOUSER® ELECTRONICS

25SP013 Round Speaker



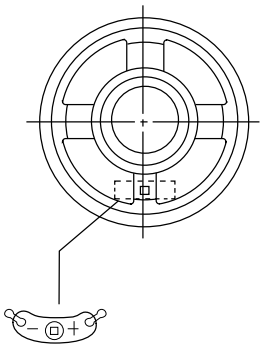


Specifications:

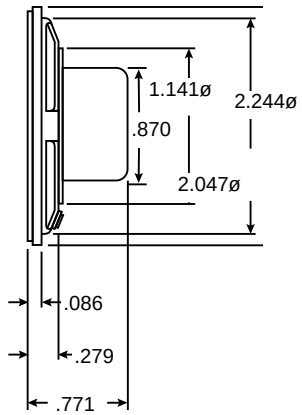
- Voice coil impedance: 8Ω±7%
- Operation: Must be normal
- Buzzes & Rattles: Must be normal sin wave 1.4V
- Resonant freq.: 250±60Hz without baffle
- Output SPL: 90±2dB
- Rated freq. response: 250Hz to 10KHz
- Rated power input: W
- Max power input: W
- Load test: White noise @ 1.4V for 24 hrs
- Heat test: 55°C±2°C, 20-50%RH for 2 hrs
- Humidity test: 40°C±2°C, 90-95%RH 48 hrs
- Distortion: 5% max., @ rated power input 800Hz
- Flux density: Gauss
- Magnet: 13mm x 10mm, 0.34 oz
- Speakers weight: 46.80 gm (1.65 oz)

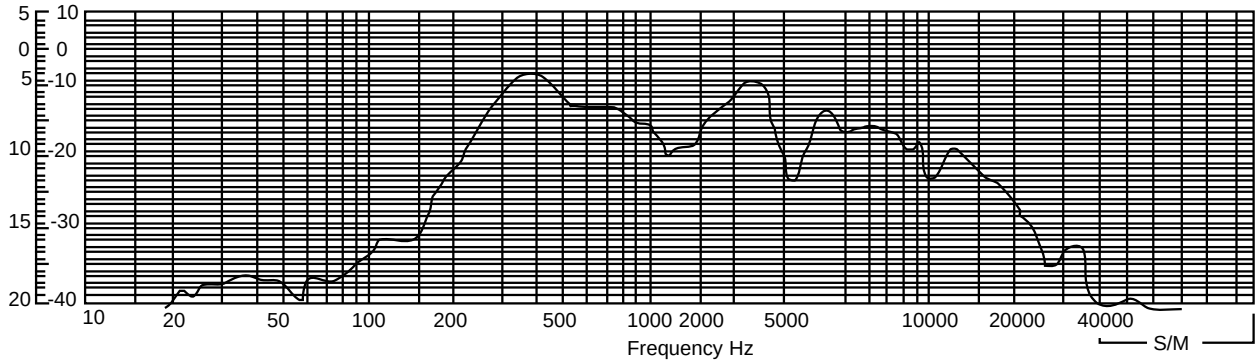
MOUSER® ELECTRONICS

25SP024 Round Speaker



Dimensions (In.)



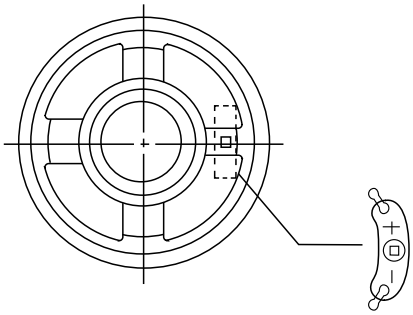


Specifications:

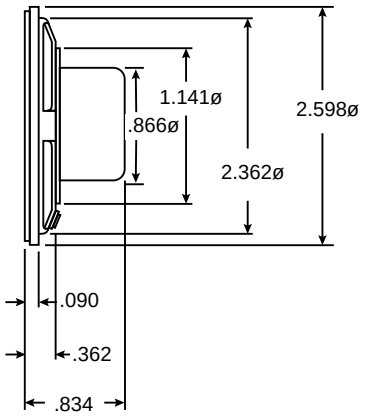
- Voice coil impedance: 8Ω±7%
- Operation: Must be normal
- Buzzes & Rattles: Must be normal sin wave 1.4V
- Resonant freq.: 500±60Hz without baffle
- Output SPL: 90±2dB
- Rated freq. response: 500Hz to 5KHz
- Rated power input: .2W
- Max power input: .2W
- Load test: White noise @ 1.4V for 24 hrs
- Heat test: 55°C±2°C, 20-50%RH for 2 hrs
- Humidity test: 40°C±2°C, 90-95%RH 48 hrs
- Distortion: 5% max., @ rated power input 800Hz
- Flux density: Gauss
- Magnet: Alnico
- Speakers weight: 1.65 oz

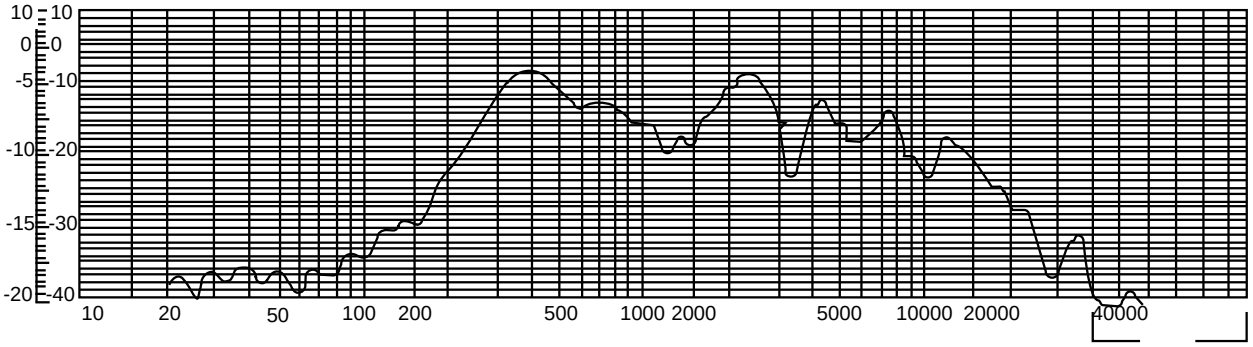
MOUSER® ELECTRONICS

25SP025 Round Speaker



Dimensions (In.)





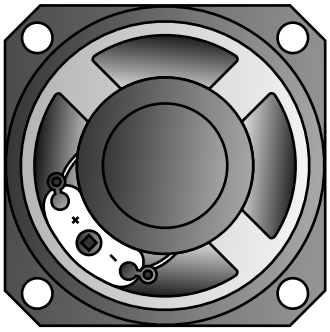
Specifications:

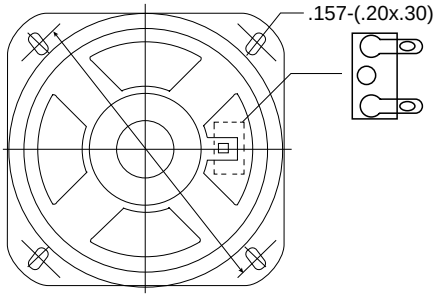
- Voice coil impedance: 8Ω±7%
- Operation: Must be normal
- Buzzes & Rattles: Must be normal sin wave 1.4V
- Resonant freq.: 400±60Hz without baffle
- Output SPL: 90±2dB
- Rated freq. response: 400Hz to 10KHz
- Rated power input: .3W
- Max power input: .3W
- Load test: White noise @ 1.4V for 24 hrs
- Heat test: 55°C±2°C, 20-50%RH for 2 hrs
- Humidity test: 40°C±2°C, 90-95%RH 48 hrs
- Distortion: 5% max., @ rated power input 800Hz
- Flux density: Gauss
- Magnet: Alnico
- Speakers weight: 1.65 oz

5-22-95

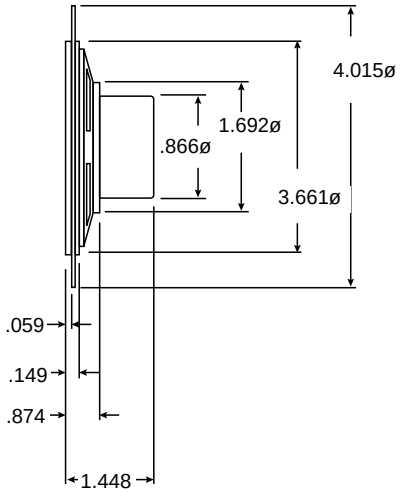
MOUSER® ELECTRONICS

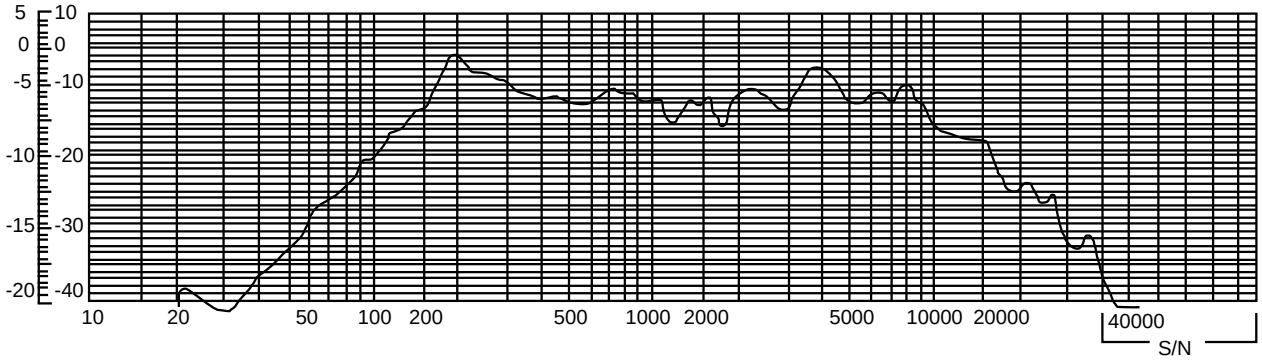
25SP041 Square Speaker





Dimensions (In.)

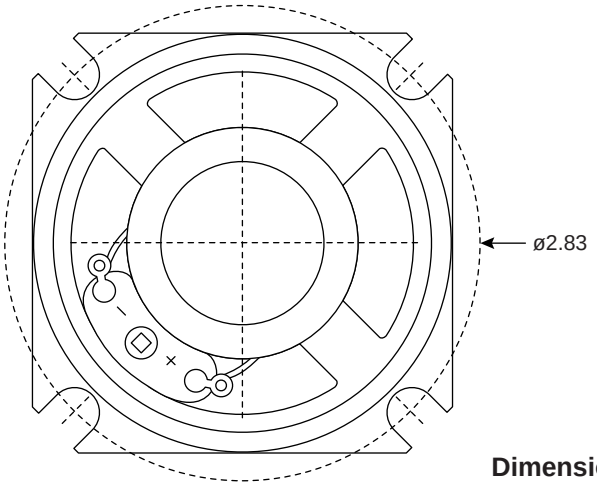


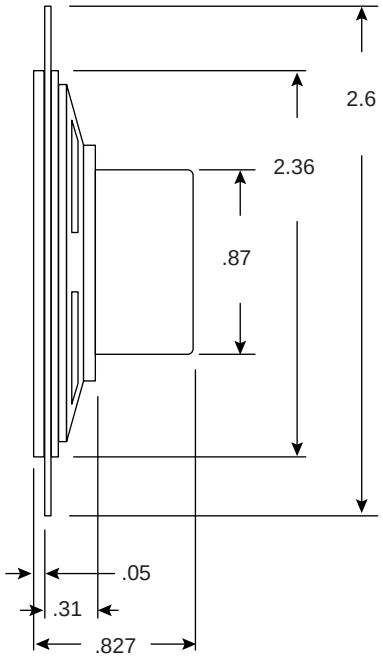


Specifications:

- Voice coil impedance: 8Ω±7%
- Operation: Must be normal
- Buzzes & Rattles: Must be normal sin wave 1.4V
- Resonant freq.: 200±60Hz without baffle
- Output SPL: 90±2dB
- Rated freq. response: 200Hz to 10KHz
- Rated power input: 3.0W
- Max power input: 3.0W
- Load test: White noise @ 1.4V for 24 hrs
- Heat test: 55°C±2°C, 20-50%RH for 2 hrs
- Humidity test: 40°C±2°C, 90-95%RH 48 hrs
- Distortion: 5% max., @ rated power input 800Hz
- Flux density: Gauss
- Magnet: Alnico
- Speakers weight: 1.65 oz

5-22-95



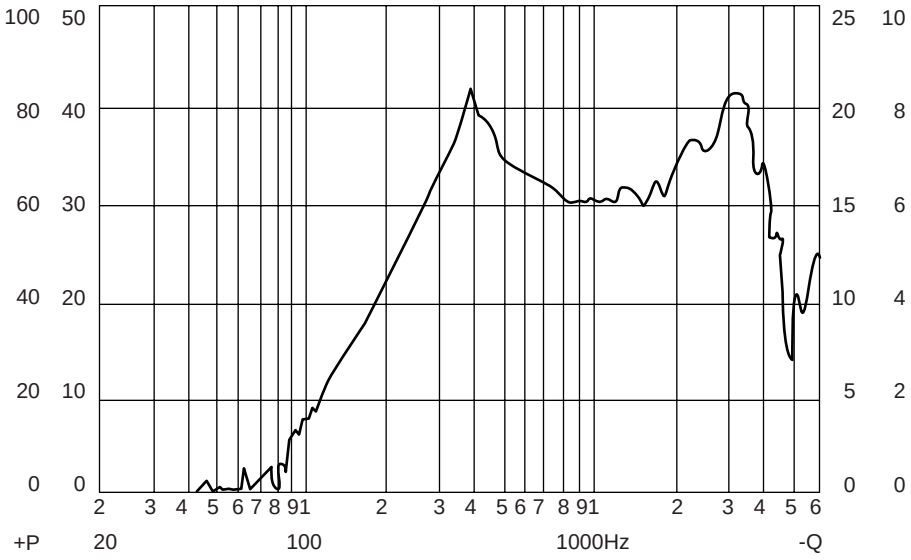


Dimensions (In.)

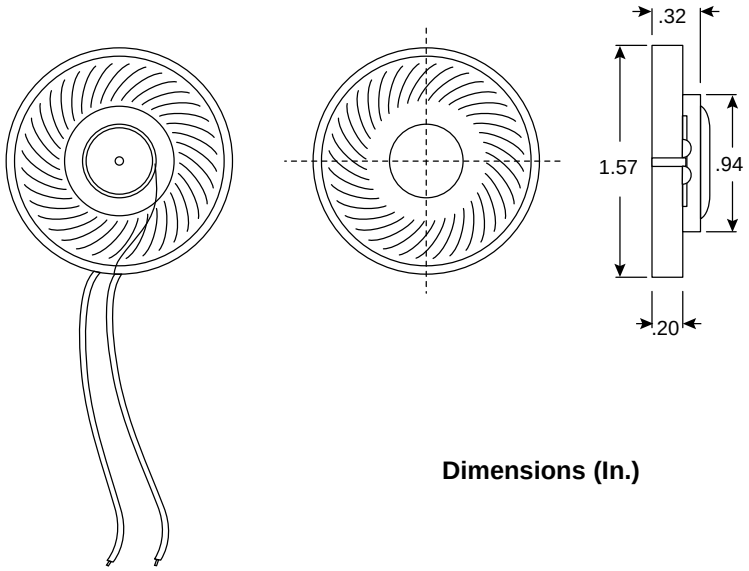
Specifications:

- Impedance: 8Ω ± .15%
- Sensitivity: 87db/w ± 3db
- Power rating: nominal 0.3W, max. 0.5W
- Resonant frequency: 350Hz ± 50Hz
- Frequency response: 350Hz ~ 4.5Hz-10db (max.)
- Magnet type: Alnico, square
- Total weight: 1.65oz

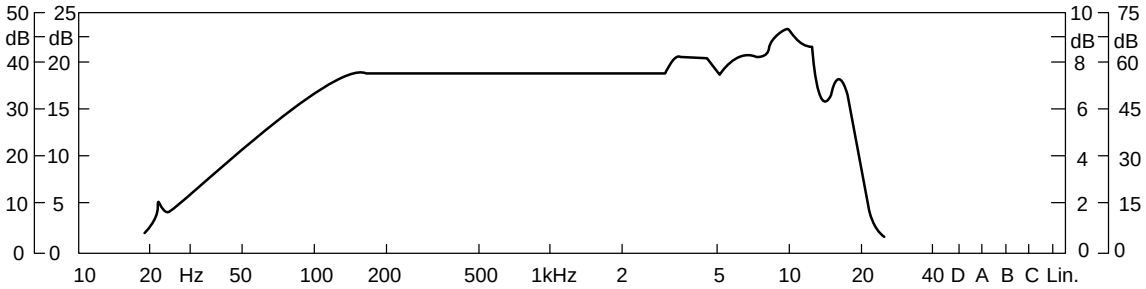
Frequency Response Curve



Frequency In Cycles Per Second



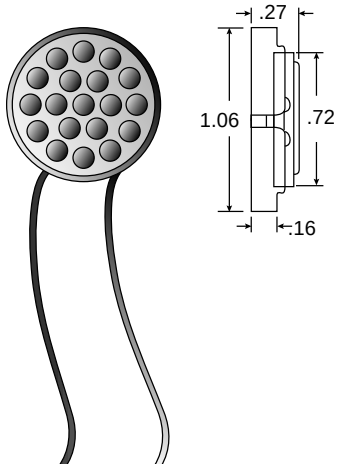
Dimensions (In.)

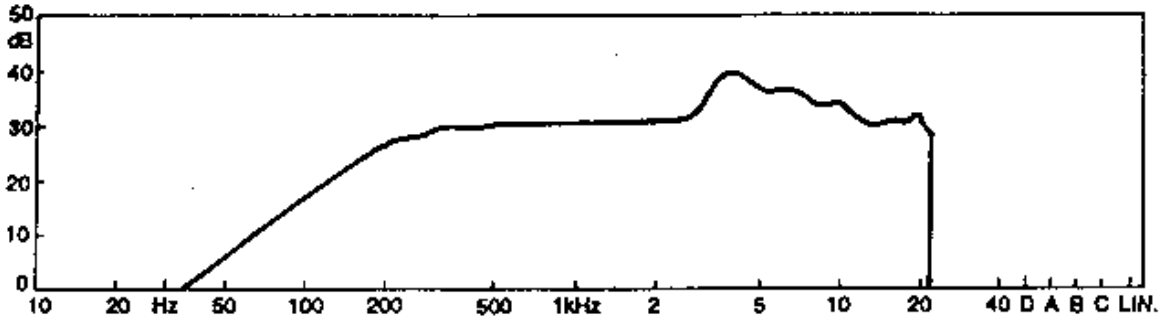


Specifications:

- Test point: 5mm from standard microphone in freefield
- Magnet: rare earth cobalt magnet
- Impedance: 32Ω @ 1KHz
- Impedance tolerance: ±20%
- Sensitivity: 87 ± 4dB 1mW @ 1.5mm from standard microphone @ 1KHz in pressure field
- Frequency response: 150 - 18KHz
- Rated input: 30mW
- Max. input: 40mW
- Operating temperature: -20˚C to 65˚C

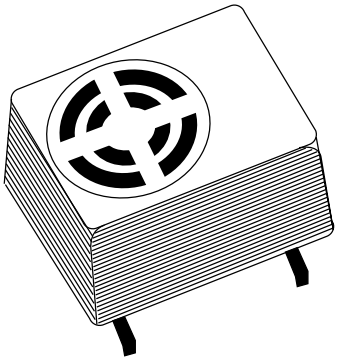
Dimensions (In.)

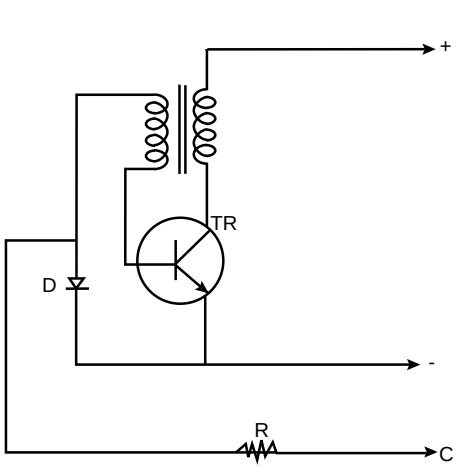


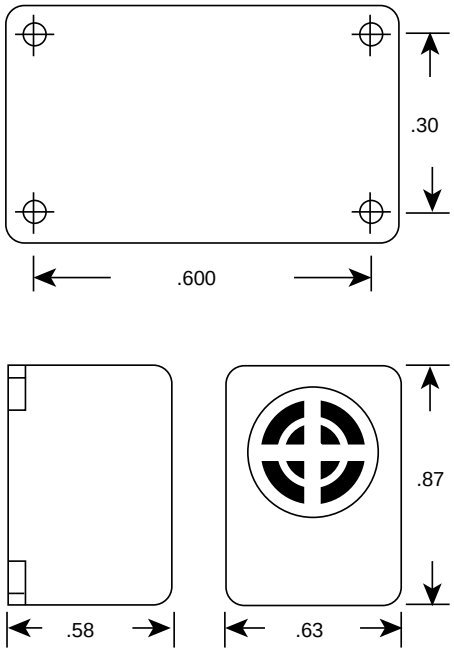


Specifications:

- Type: Dynamic mylar speaker
- Magnet: Rare earth cobalt magnet
- Impedance: 32Ω at 1KHz
- Impedance tolerance: ±20%
- Sensitivity: 117 ± 4dB 1mw at 1.5mm from standard microphone at 1KHz in pressure field
- Frequency response: Fo - 18KHz
- Resonance (Fo): 200 ± 40Hz
- Rated input: 20mw
- Max input: 40mw
- Dimension: 27mm ø x 6mmH







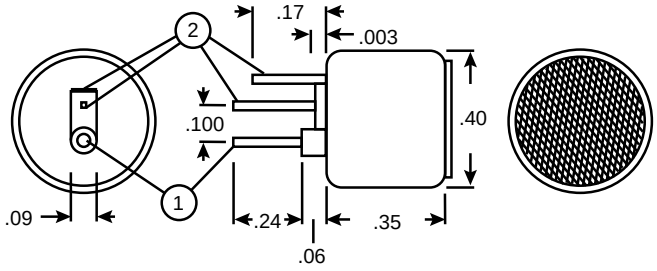
The buzzer MSL-120 or MSL-120 PC mount cannot withstand moisturte like water splash. These are designed to withstand normal indoor temperatures and humidity.

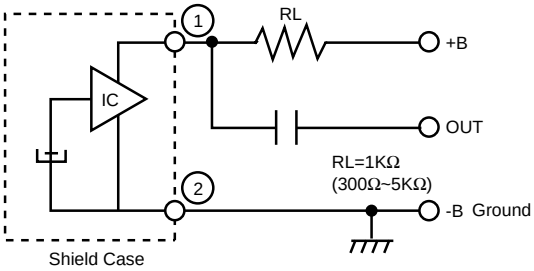
Specifications:

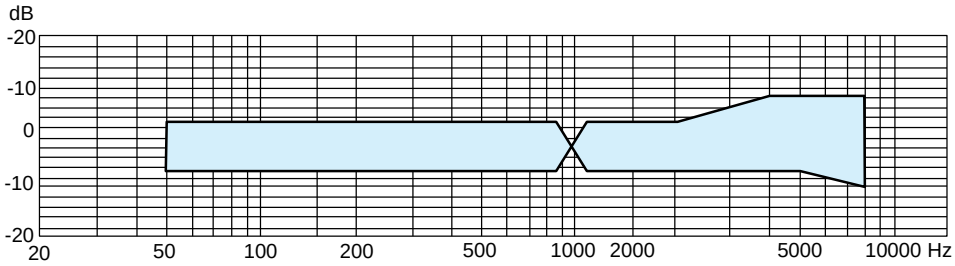
- Standard voltage: 12 VDC
- Operating voltage range: 6 VDC - 12 VDC
- Rated current: 25 mA
- Trigger current: 1 mA
- Sound output: 80 db AT 20 cm
- Frequency: 400Hz

MOUSER® ELECTRONICS

25LM040 Omni-Directional Electret Condenser Microphone Element







Specifications:

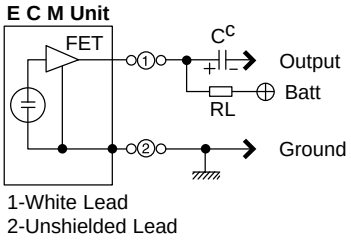
- Directionality: omni directional
- Sensitivity (odb=1V/1µ bar 1 KHz): -61±3db
- Output impedance: low
- Frequency: 50Hz~13KHz
- Range of operating voltage: 1.5V to 10V standard voltage 4.5V
- Current drain: ø.6mA max.
- S/N ratio: 40db or more
- Maximum input sound pressure: 130db SPL

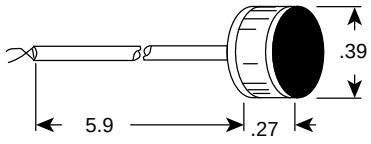
Reliability Test

Vibration Test	To be no interference in operation after vibration, 12Hz to 50Hz for 1 minute full amplitude 2mm, for 1.5 hour at 3 axises
Drop Test	To be no interference in operation after dropped to concrete floor each one time from 1 meter height at 3 direction in state of packing.
Temperature Test	a) After exposure at 55°C for 1 hour, sensitivity to be within ±3dB from initial b) After exposure at -10°C for 1 hour, sensitivity to be within ±3dB from initial (the measurement to be done after 2 hours of conditioning at 25°C.)
Humidity Test	After exposure at 40°C and 95% RH for 48 hours, sensitivity to be within ±3dB from initial (after 1 hour of conditioning at 25°C.)
Temperature Cycle Test	After exposure at -10°C for 1 hour, at 25°C for 1 hour, at 50°C for 1 hour, at 25°C for 2 hours, 4 cycles sensitivity to be within ±3dB (after 2 hours of conditioning at 25°C)

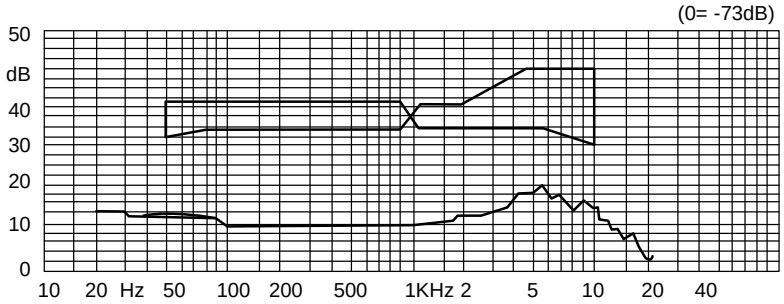
Each con. Mic. contains a FET within its case.
Generally, semiconductors are easily weakened by over-heating, over-charge of voltage.
Special caution is needed for proper soldering as follows.

1. Use 30W (or under) soldering iron and maintain 230°-260°C in operation
2. Soldering should be accomplished within two seconds at each terminal so as not to be overheated.
3. Do not make a cavity at the surface of lead on the pattern plate. (A cavity may change the characteristics of Con. Mic.)





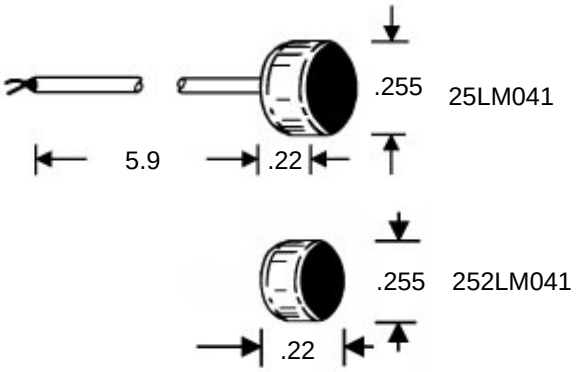
Dimensions (In.)

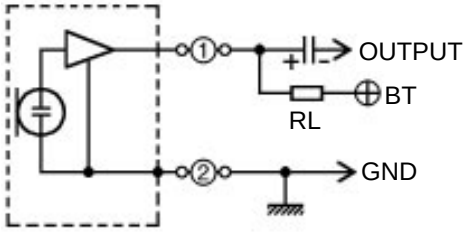


Specifications:

- Type: electret condenser
- Housing: solid aluminum
- Sensitivity: 0dBV=1V/µbar @ 1KHz, RL=1KΩ, Vcc=6V: -63 ± 3dB
- Output impedance: same as the load resistance (may be 150Ω ~ 5KΩ ≈)
- Directionality: omnidirectional
- Frequency range: 20~12,000Hz
- S/N ration: > 40dB, measured with A curve @ 1KHz 1µ bar
- Self noise level: < 34dB SPL (referred SPL 0DB=0.0002µbar)
- Operation voltage: 1.5~15VDC
- Current consumption: ≤ 0.5mA (Supply voltage 6V)
- Polarity of power supply: (-) for ground
- Temperature test: after exposure @ 55°C for 1 hr, sensitivity to be within ± 3dB for initial; after exposure @ -10°C for 1 hr, sensitivity to be within ± 34dB for initial
- Humidity test: after exposure @ 40°C & 95% RH for 48 hrs, sensitivity to be within ± 3dB for initial

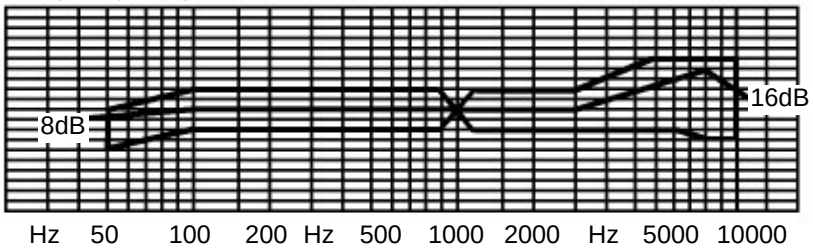
Dimensions (In.)





1-White lead
2-Unshielded Lead

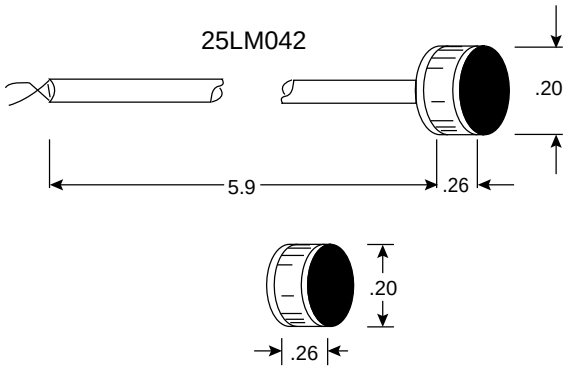
Frequency Response Deviation



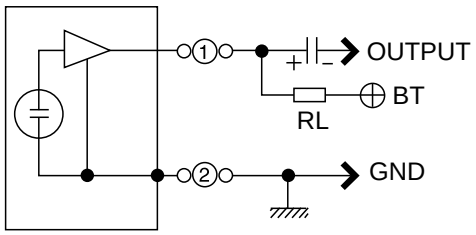
Electrical Specifications:

- Sensitivity: -64dB ±3dB (OdB=1V/ubar 1KHz)
- Output impedance: 1KΩ max. (RL=2.2KΩ)
- Directionality: Omnidirectional
- Frequency range: 50HZ-10,000HZ
- Working voltage range: 2V-10V
- Standard working voltage: 4V
- Current drain: 0.5µA max.
- Maximum input sound pressure: 120dB SL
- S/N ratio: 40dB or more
- Ground connection: (-) negative grounding
- Sensitivity reduction: Within -3dB at 1.5V
- Temperature test: (a) After the exposure in the atmosphere of +55°C for 100 hrs., the volt is kept in the normal temperature for 24 hours. The sensitivity deviation should remain within ±3dB comparing with the initial value. (b) After the exposure in the atmosphere of -20°C for 100 hrs., the unit is kept in the normal temperature for 24 hours. The sensitivity deviation should remain within ±3dB comparing with the initial value.
- Humidity test: After exposure at +65°C and humidity of 90-95% for 100 hours. The sensitivity deviation should be within ±3dB of the initial value.
- Temperature cycle test: One cycle is set up as: "1 hour in the atmosphere of -20°C±2°C, 1 hour at +65°C±2°C, 10 minutes in the normal temperature." After undergoing this cycle test five times, the unit is kept in the normal temperature atmosphere for 24 hours. Then the sensitivity deviation should remain ±3dB comparing with the initial value.

Dimensions (In.)

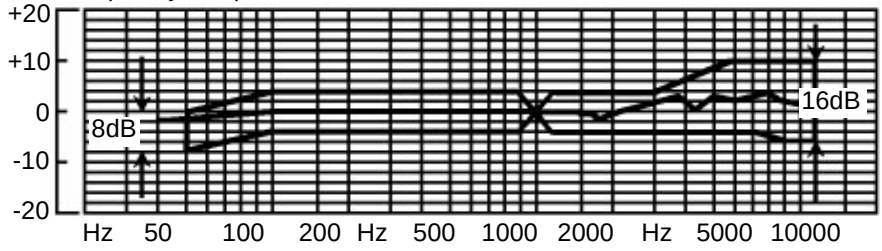


252LM042



1-Shielded Wire
2-Unshielded Lead

Frequency Response Deviation

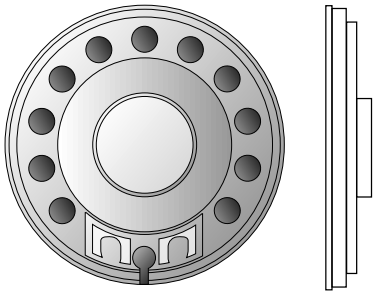


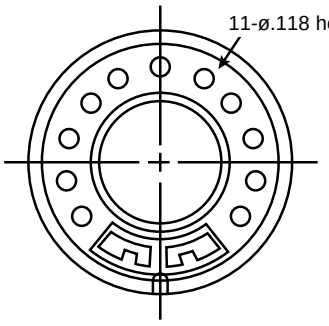
Electrical Specifications:

- Sensitivity: -64dB ±3dB (OdB=1V/ubar 1KHz)
- Output impedance: 2KΩ max. (RL=2.2KΩ)
- Directionality: Omnidirectional
- Frequency range: 50HZ-10,000HZ
- Working voltage range: 1V-10V
- Standard working voltage: 3V
- Current drain: 500µA max.
- Maximum input sound pressure: 120dB SL
- S/N ratio: 40dB or more
- Ground connection: (-) negative grounding
- Temperature test: After exposure at +55°C for 100 hours, the sensitivity deviation should be within ±3dB of the initial value. After exposure at -20°C for 100 hours, the sensitivity deviation should be within ±3dB of the initial value.
- Humidity test: After exposure at +65°C and humidity of 90-95% for 100 hours. The sensitivity deviation should be within ±3dB of the initial value.

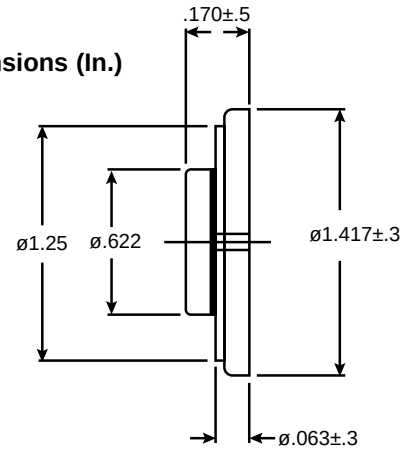
MOUSER® ELECTRONICS

253-5014 Mylar Cone Speaker



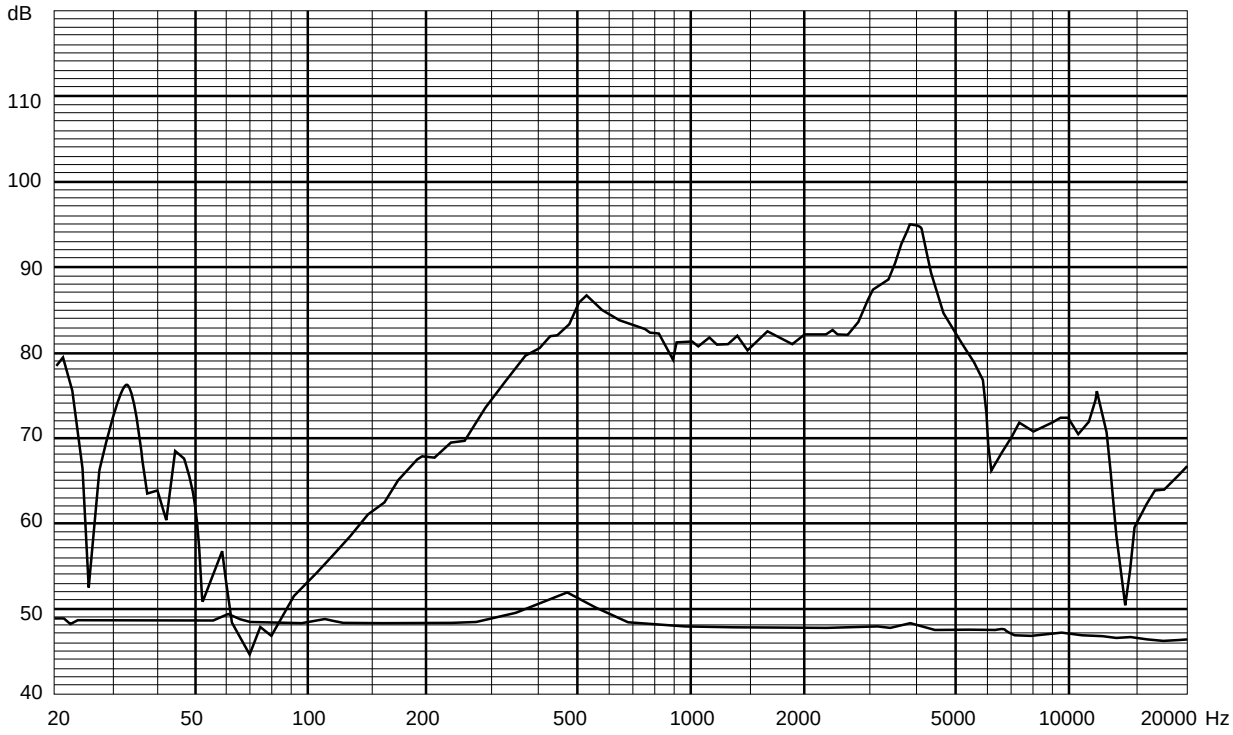


Dimensions (In.)



Specifications:

- Size: 36 mm (1.42 inches)
- Magnet: Nd size 12.5 x 1.5 (mm) weight 0.05 oz (1.40 g)
- Total weight: 0.26 oz (7.5 g)
- Power rating: nominal power rating 0.2W, peak music power 0.3W
- Voice coil imp.: 8Ω ± 1.2Ω @ 1000Hz 1V
- Resonance freq.: 450Hz ± 90Hz @ Fo Hz 1V
- S.P.L.: 82dB/W ± 3dB 1W 39.4 inches 100 cm average of 0.8, 1.0, 1.2, 1.5 KHz
- Response: Fo ~ 6K Hz, dev. 20dB max. 1W 39.4 inches 100 cm
- Distortion: 5% max. 1000Hz 0.2W 39.4 inches 100 cm
- Voice coil: dia. 0.53 inches 13.5 mm
- Polarity: with positive voltage applied to. (+) terminal, the cone shall move away from pole piece.



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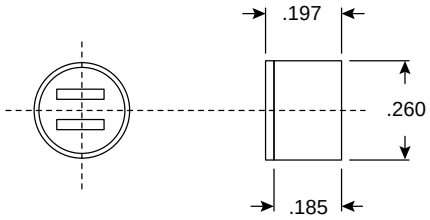
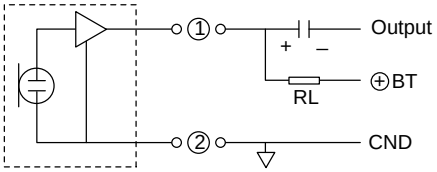
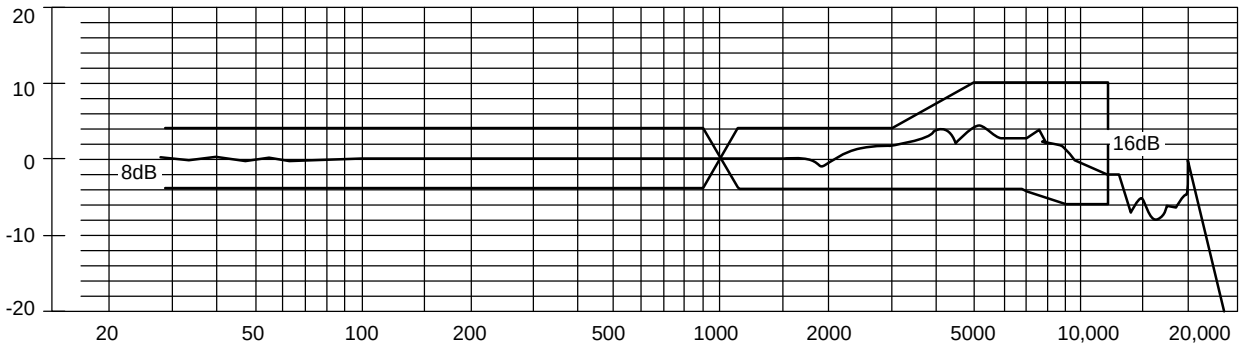
2-20-96





Dimensions (In.)

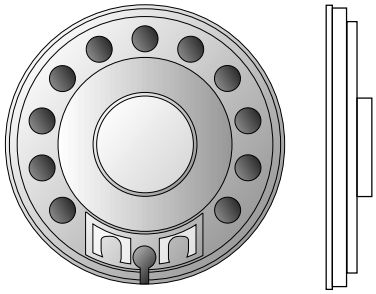


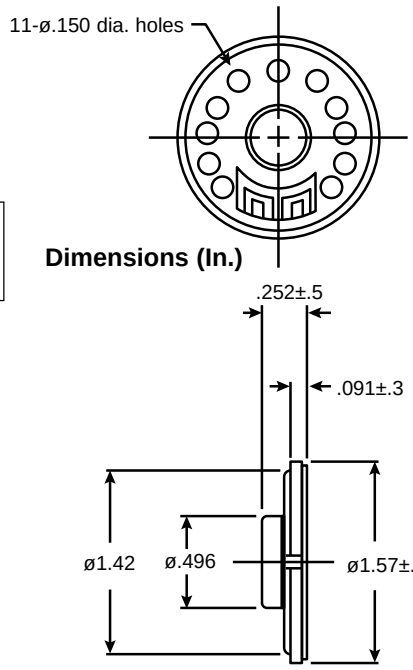
Specifications:

- Sensitivity: -64dB ± 3dB (0dB = 1V/ubar 1KHz)
- Frequency range: 50-10,000Hz
- Output impedance: 2KΩ max. (RL=2.2KΩ)
- Directionality: omnidirectional
- Working voltage range: 1-10V
- Standard working voltage: 3V
- Current drain: 500µA max.
- Maximum input sound pressure: 120dB SL
- S/N ratio: 40dB or more
- Ground connection: (-) negative grounding
- Sensitivity reduction: within -3dB @ 1.5V

MOUSER® ELECTRONICS

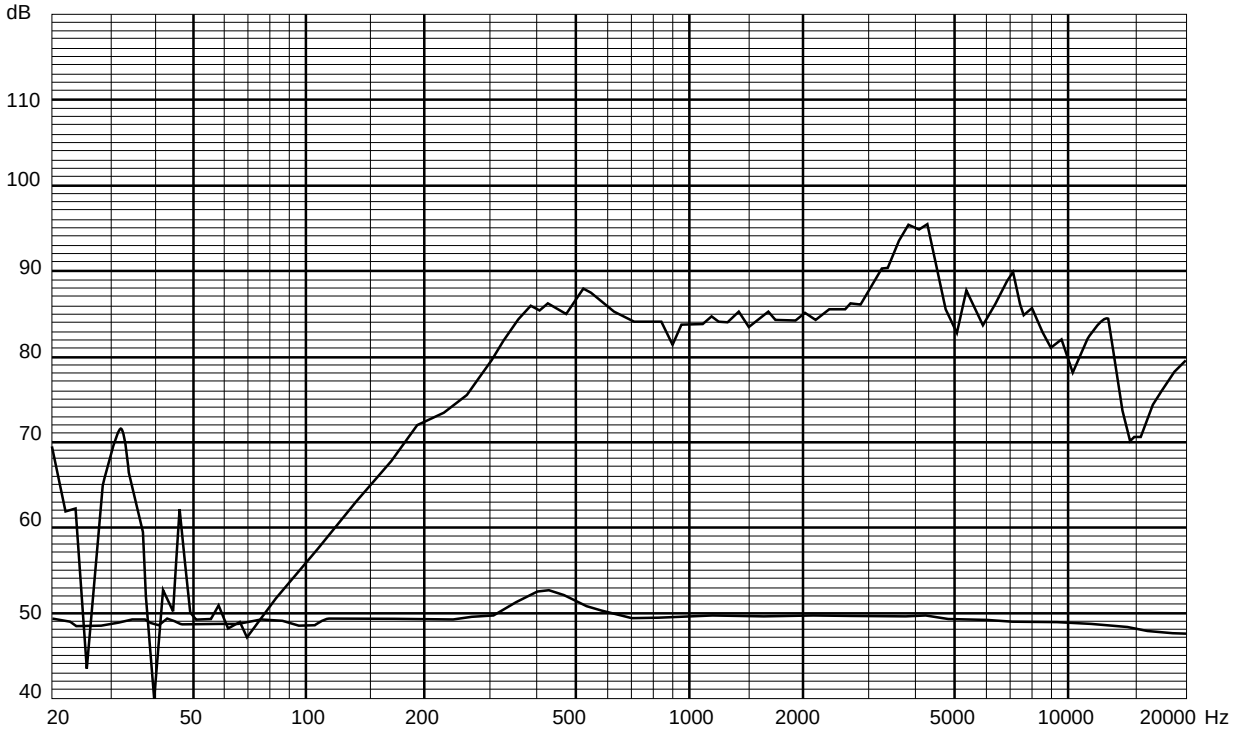
253-5015 Mylar Cone Speaker





Specifications:

- Size: 40 mm (1.57 inches)
- Magnet: Nd size 9.5 x 1.5 (mm) weight 0.03 oz (0.77 g)
- Total weight: 0.34 oz (9.8 g)
- Power rating: nominal power rating 0.1W, peak music power 0.2W
- Voice coil imp.: 8Ω ± 1.2Ω @ 1000Hz 1V
- Resonance freq.: 400Hz ± 80Hz @ Fo Hz 1V
- S.P.L.: 84dB/W ± 3dB 1W 39.4 inches 100 cm average of 0.8, 1.0, 1.2, 1.5 KHz
- Response: Fo ~ 12K Hz, dev. 20dB max. 1W 39.4 inches 100 cm
- Distortion: 5% max. 1000Hz 0.1W 39.4 inches 100 cm
- Voice coil: dia. 0.41 inches 10.5 mm
- Polarity: with positive voltage applied to. (+) terminal, the cone shall move away from pole piece.



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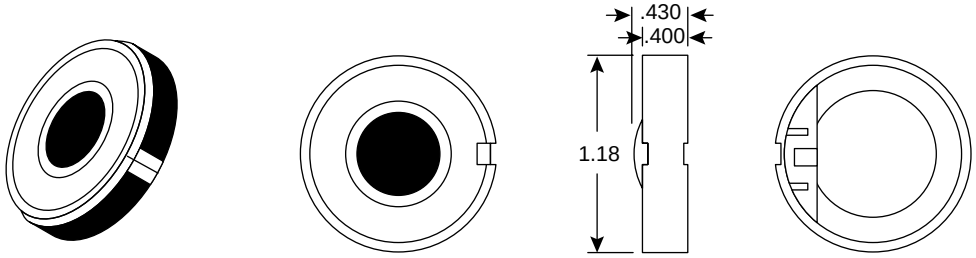
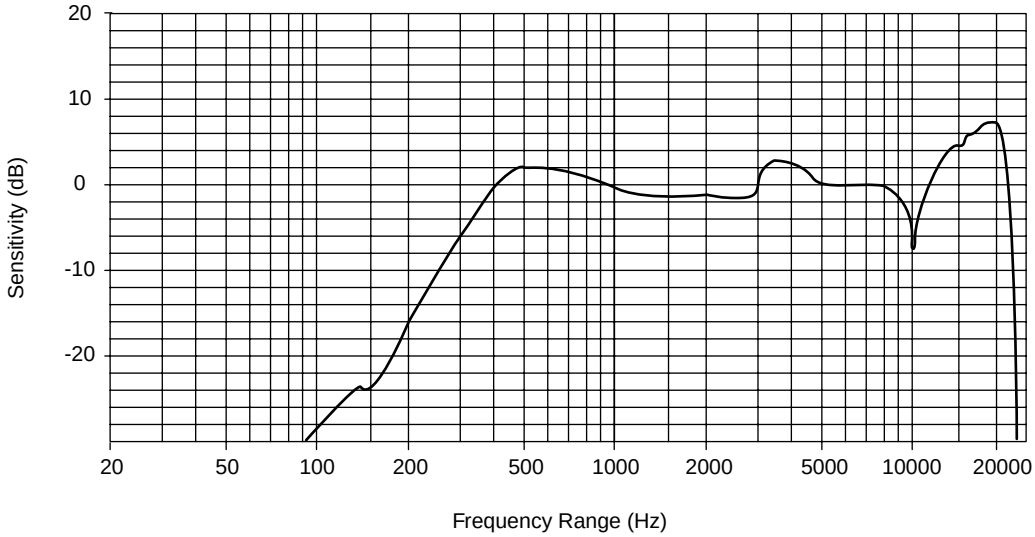


Dimensions (In.)

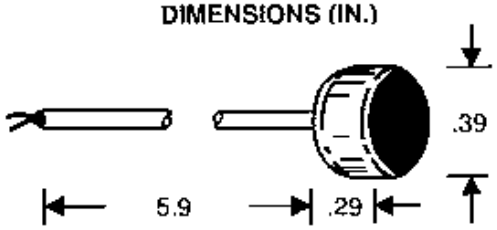
Frequency Response Deviation



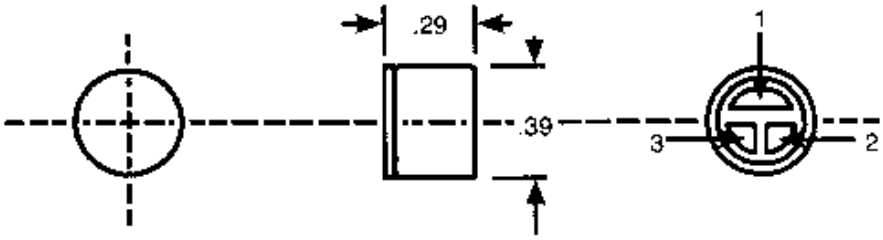
Specifications:

- Impedance: 500Ω ±15% @ 1KHz
- Sensitivity: 97dB ±3dB @ 100mW, 1KHz
- Rated input: 30mW
- Maximum input: 100mW
- Frequency range: 150Hz ~ 20KHz
- Measuring method: 500x500mm baffle board
- Weight: 20g
- Diaphragm: thick polyester film

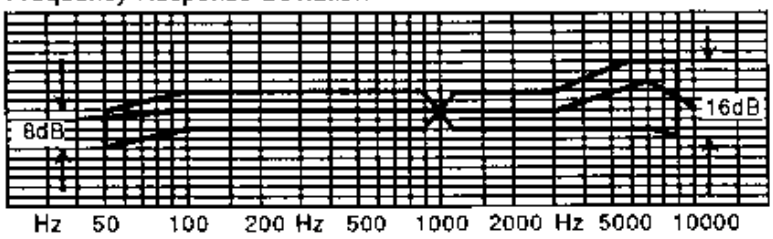
DIMENSIONS (IN.)

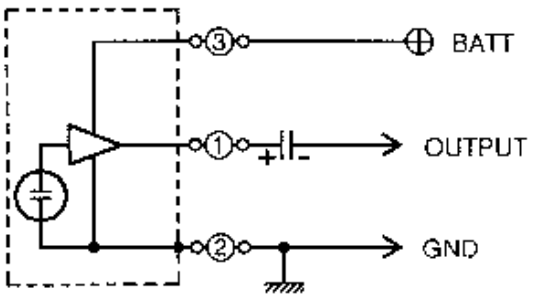


1-White Lead
2-Unshielded Lead
3-Red Lead



Frequency Response Deviation

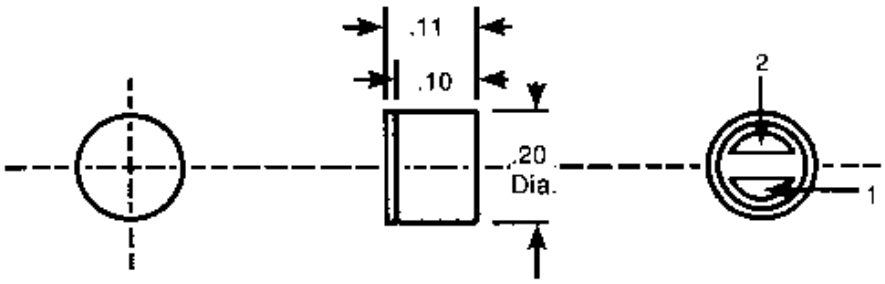


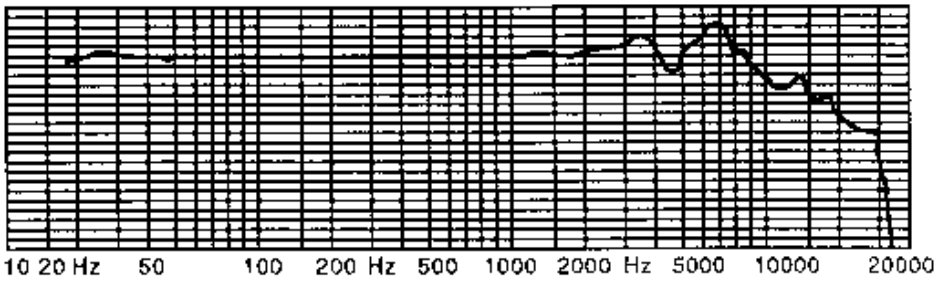


Electrical Characteristics:

- Sensitivity: -64dB ±3dB (0dB=1V/ubar 1kHz)
- Output impedance: 1kΩ max.
- Directionality: Omnidirectional
- Frequency range: 50Hz~8kHz
- S/N ratio: 40dB or more
- Current drain: 1mA max.
- Working voltage range: 2V~10V
- Standard working voltage: 4V
- Maximum input sound pressure: 120dB SL
- Ground connection: (-) negative grounding
- Temperature test: After exposure at +55°C for 100 hour sensitivity to be within ±3dB from initial. After exposure at -20°C for 100 hour sensitivity to be within ±3dB from initial.
- Humidity test: After exposure at +65°C and 90-95% RH for 100 hours Sensitivity to be within ±3dB from initial.

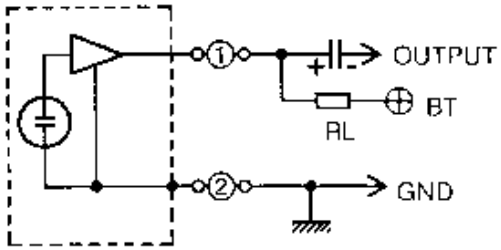
DIMENSIONS (IN.)





Electrical Characteristics:

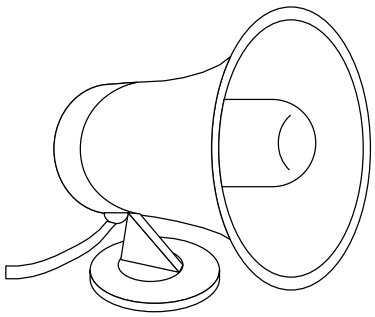
- Sensitivity: -64dB±4dB (OdB=1V/ubar 1KHz)
- Output impedance: 2KΩ max. (RL=2.2KΩ)
- Directionality: Omnidirectional
- Frequency range: 50-15,000Hz
- Working voltage range: 1V-10V
- Standard working voltage: 3V
- Current drain: 200µA max.
- Maximum input sound pressure: 120dB SL
- S/N ratio: 40dB or more
- Ground connection: (-) negative grounding
- Operating temperature: -10 to +70C
- Temperature range: -10°C~+70°C
- Humidity range: 60%-85%



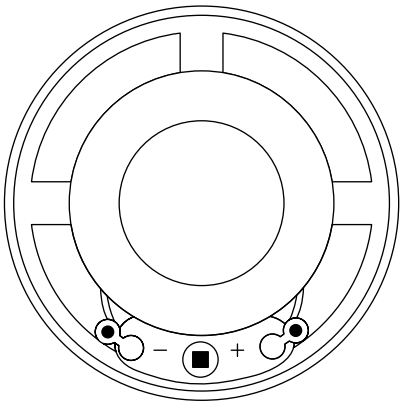
1-Shielded Wire
2-Unshielded Wire

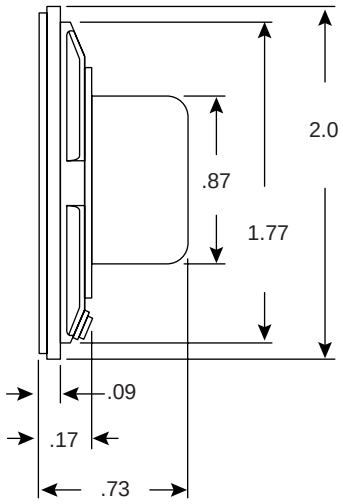
MOUSER® ELECTRONICS

25AE211 External Paging Speaker



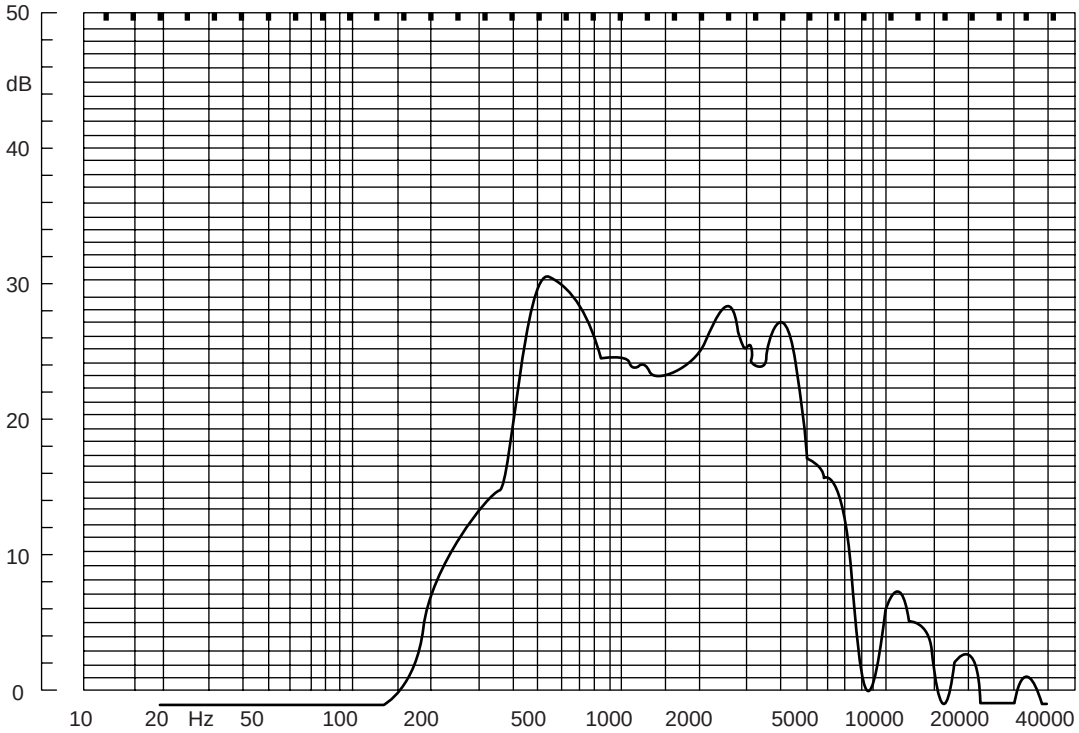
Specifications:
- Bell: ABS plastic
- Size (In.): 5 1/4" Ø x 4 7/8" L.
- Input power (RMS): 10W
- Impedance (Ω): 8
- Frequency range (Hz): 400-7K





Dimensions (In.)

Frequency Response



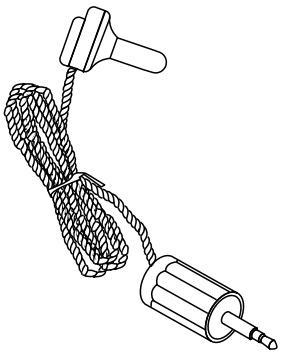
Zero Level: 60dB

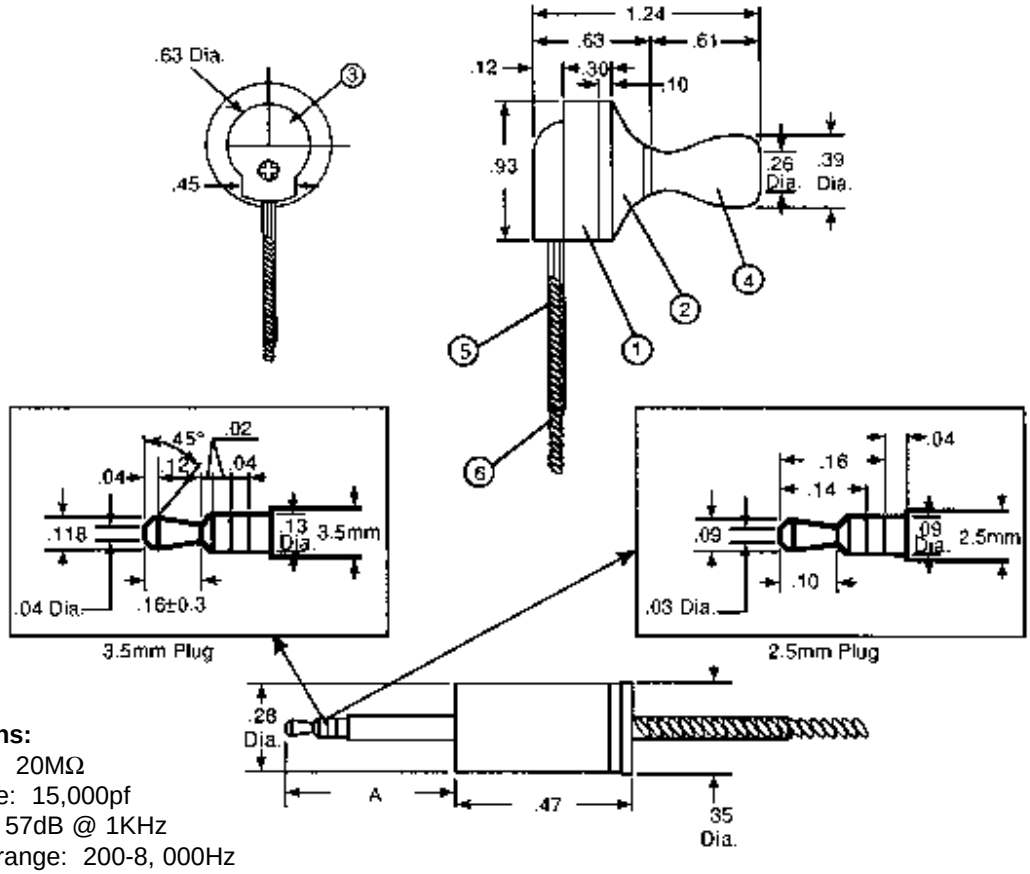
Specifications:

- Magnet: Alnico, .35oz.
- Impedance: 8Ω ±15% @ 1v, 1KHz
- Resonant frequency: 500Hz ± 100Hz @1V
- Frequency range: 500Hz ~ 5KHz
- Sensitivity: 84dB/W ±2dB
- Input power: 0.2W nominal

MOUSER® ELECTRONICS

25CR025
25CR035 Earphones
25CR060



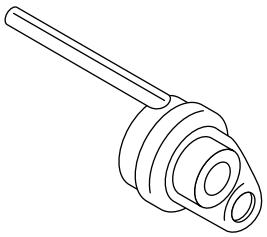


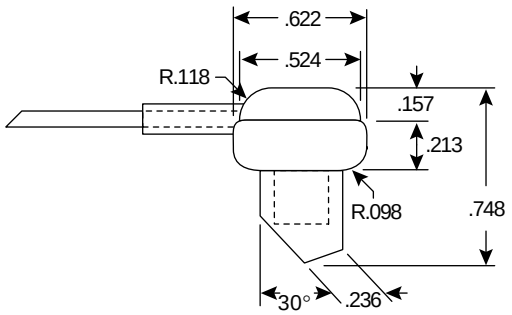
Specifications:

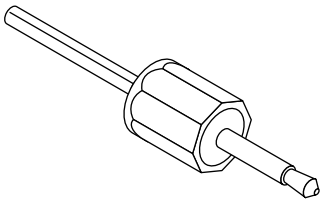
- Impedance: 20MΩ
- Capacitance: 15,000pf
- Sensitivity: 57dB @ 1KHz
- Frequency range: 200-8, 000Hz
- Operation temperature: -20°C~60°C
- Color: tan

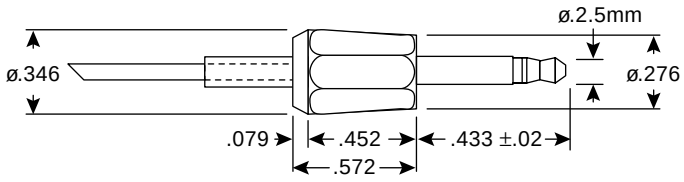
Mouser Stock No.	Type	Impedance (Ω)	Plug	Cord Length (Ft)	Dim. A
25CR025	Crystal	2K - 10K	2.5mm	3	.43
25CR035	Crystal	2K - 10K	3.5mm	3	.55
25CR060	Crystal	2K - 10K	Tinned	3	----

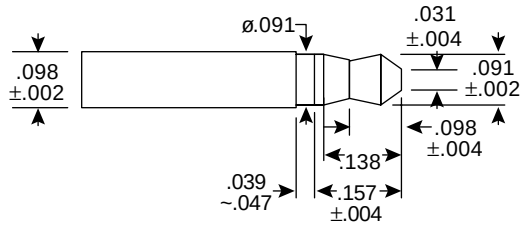
Item	Name	Material	Color
1	H - cover	ABS	
2	H - cap	ABS	
3	Top - cover	ABS	
4	Earpiece	PS	Trans.
5	Sleeve	PVC	Trans.
6	Cord	PVC, Twisted	











Dimensions (In.)
(except where noted)

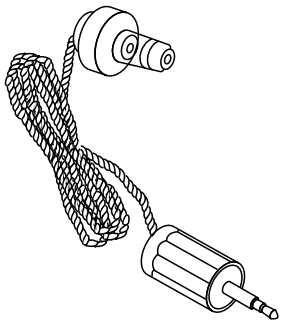
Specifications:

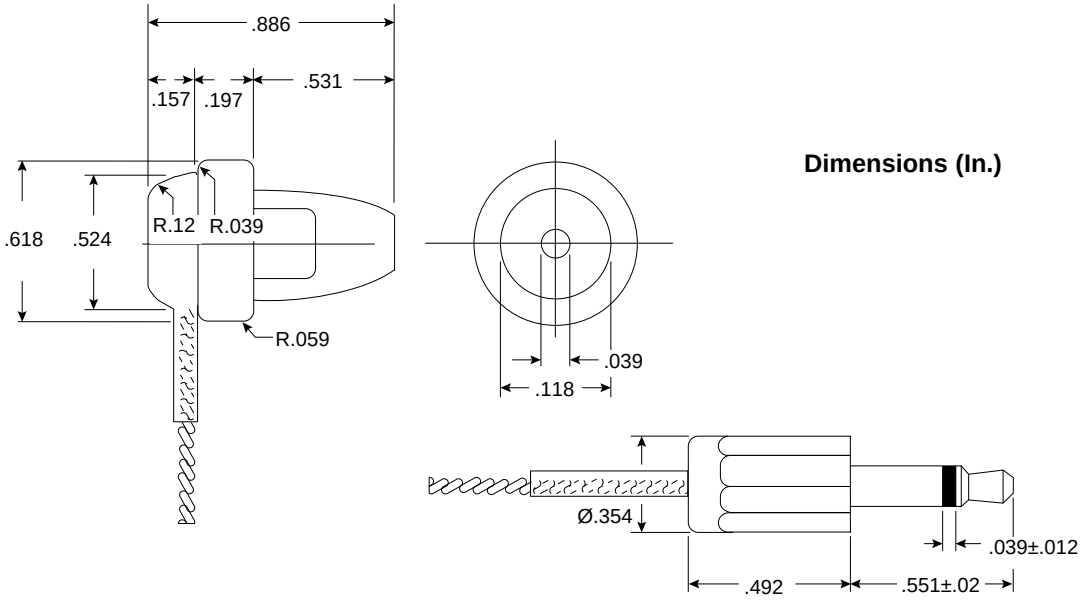
- Type: dynamic
- Impedance: 8Ω ± 20%
- Plug: 2.5mm
- Cord length: 3 Ft.
- Color: gray
- Other: no ear support needed

MOUSER® ELECTRONICS

25DE128
25DE136
25DE138
25DE139

Dynamic Earphones

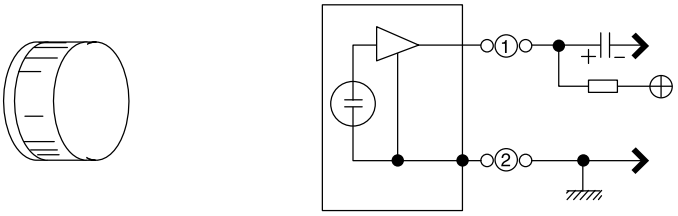




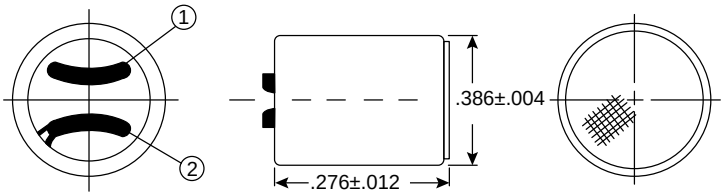
Dimensions (In.)

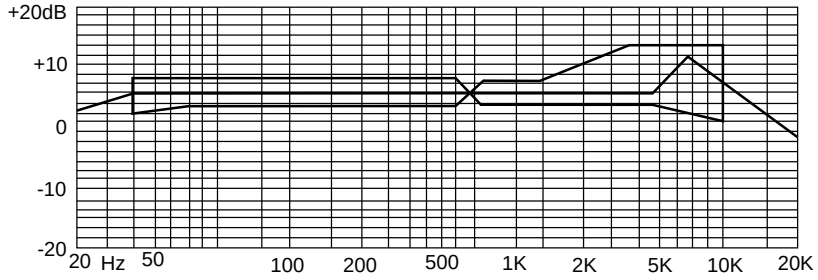
Specifications:
- Sensitivity: 90 db ± 7 db
- Max pwr input: 150mW
- Weight: 1.5 lbs / 100
- Coil inductance: 100 mH

Mouser Stock No.	Type	Impedance (Ω)	Plug (MM)	Cord Length (Ft)	Color
25DE128	Dynamic	15 ± 20%	2.5	6	Flesh
25DE136	Dynamic	8 ± 20%	3.5	3	Flesh
25DE138	Dynamic	15 ± 20%	3.5	6	Flesh
25DE139	Dynamic	1K ± 20%	3.5	3	Flesh



Dimensions (In.)



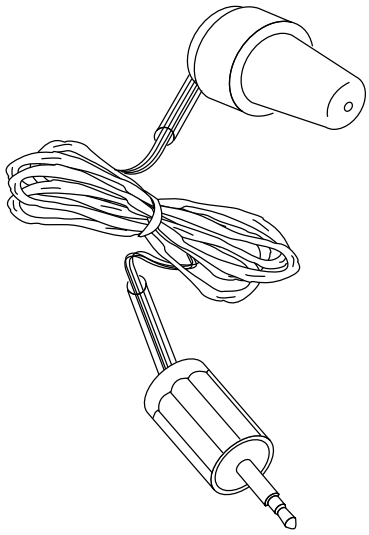


Electrical Specifications:

- Sensitivity (0dB=1V/µbar @ 1KHz, RL=1KΩ, Vcc=4.5V): -65±3dB
- Impedance: low
- Standard voltage: 4.5V
- Range of operating voltage: 1.5V to 10V
- Current drain: 0.4mA max.
- Self noise level: Less than 34dB SPL (referred SPL 0DB=0.0002µbar.)
- Operation voltage: 1.5 to 15VDC
- Current consumption: 0.5mA or less (Supply voltage 6V)
- Polarity of power supply: (-) for ground
- Temperature test: After exposure @ 55°C for 1 hour sensitivity to be within ±3dB for initial. After exposure @ -10°C for 1 hour sensitivity to be within ±34dB for initial.
- Humidity test: After exposure @ 40°C and 95% RH for 48 hours Sensitivity to be within ±3dB from initial.

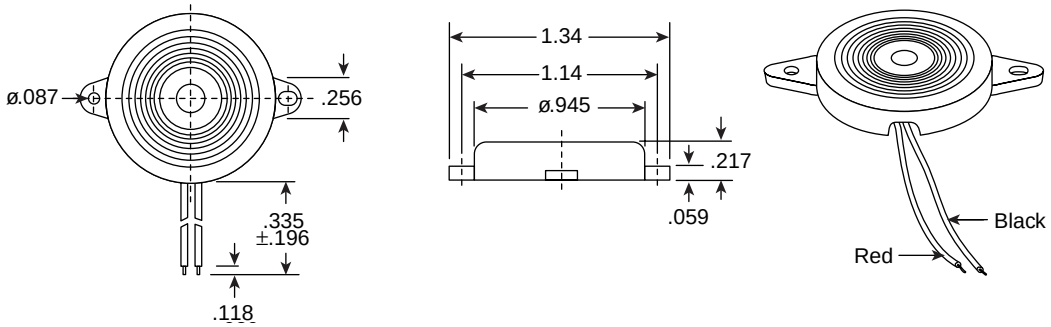
MOUSER® ELECTRONICS

25DE025 Earphone



Specifications:

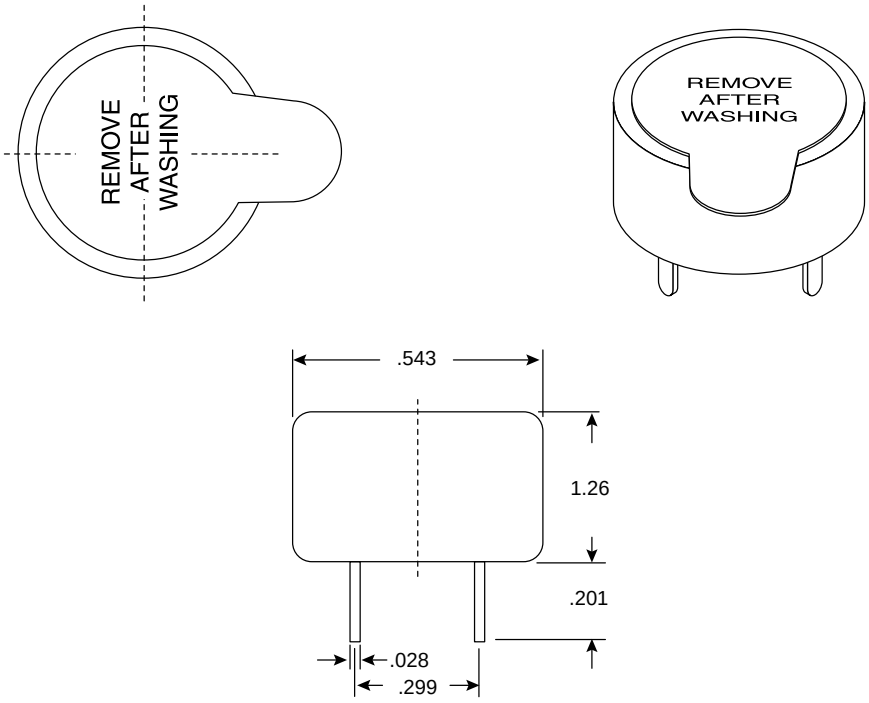
- Type: Dynamic
- Impedance (Ω): 8±20%
- Sensitivity: 95dB @ 1KHz
- Plug: 2.5mm
- Power: 50mW
- Cord length: 3 feet
- Color: white



Dimensions (In.)

Specifications:

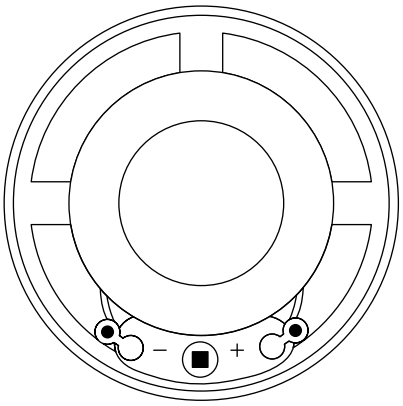
- Body: ABS UL94HB
- Weight: 5.0 grams
- Number of pins: 2
- Resonant frequency: 1.2KHz
- Voltage: 40Vp-p
- Current: 3mA @ 9Vp-p / square wave
- Sound pressure: 80dB (min.) @ 9Vp-p / square wave 10cm; 70dB (min.) @ 1Vrms / sine wave 10cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1095 / 28AWG / 4.33 ± .197 inches
- Capacitance: 60,000pF ± 30% @ 120Hz 25°C

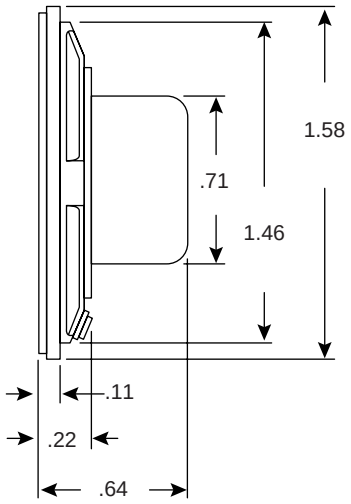


Dimensions (In.)

Specifications:

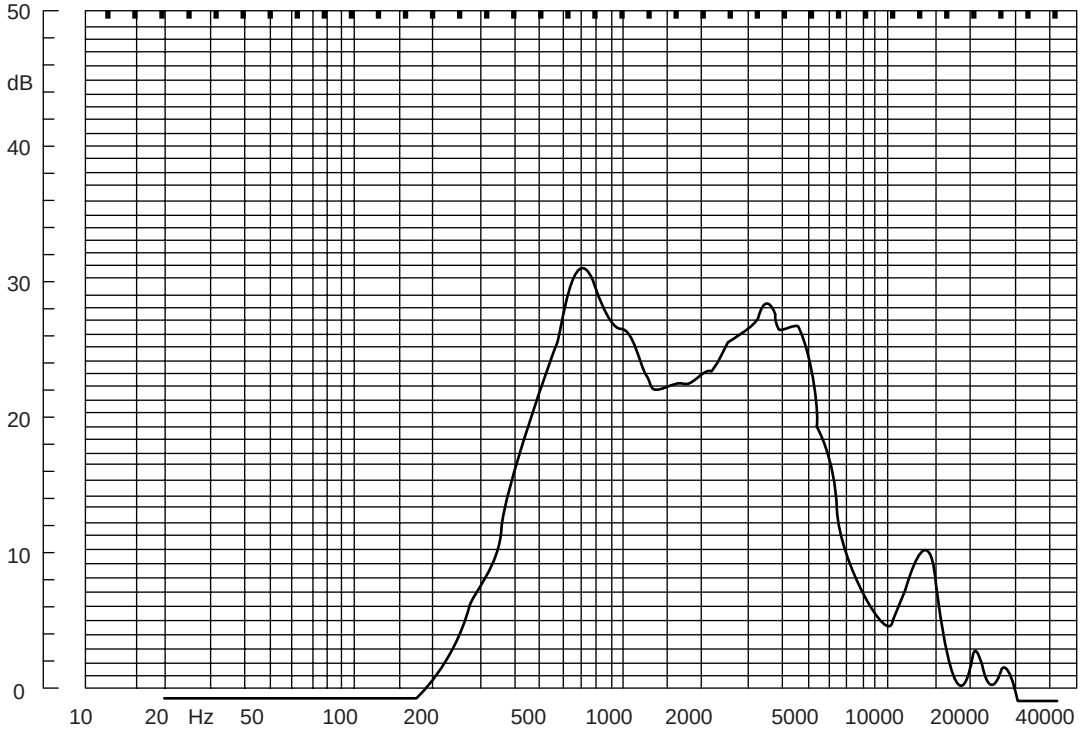
- Type: External drive
- Number of pins: 2
- Resonant frequency: 3.2KHz
- Allowable input voltage: 15Vp-p (max.)
- Current consumption: 3mA @3.2KHz 9Vp-p, square wave
- Sound pressure: 80dB (min.) @3.2KHz/9Vp-p, square wave/10cm; 70dB (min.) @3.2KHz/1Vrms, sine wave/10cm
- Capacitance: 12,000pF±30% @ 120Hz 25˚C
- Case material: PC UL94V2
- Pin pitch & material: 7.6mm±0.3mm; tin plated brass
- Operating temperature range: -20˚C~ +105˚C
- Weight: 1.0 grams





Dimensions (In.)

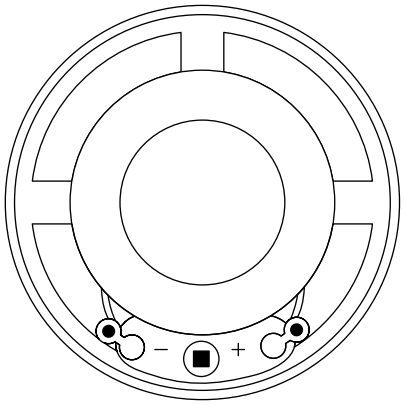
Frequency Response

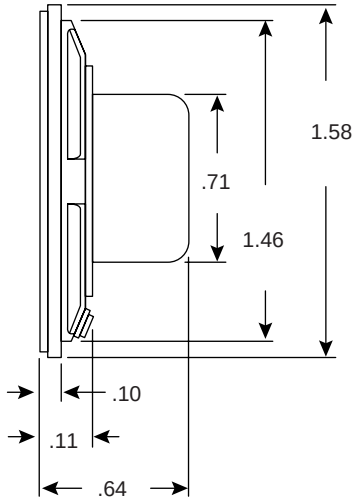


Zero Level: 60dB

Specifications:

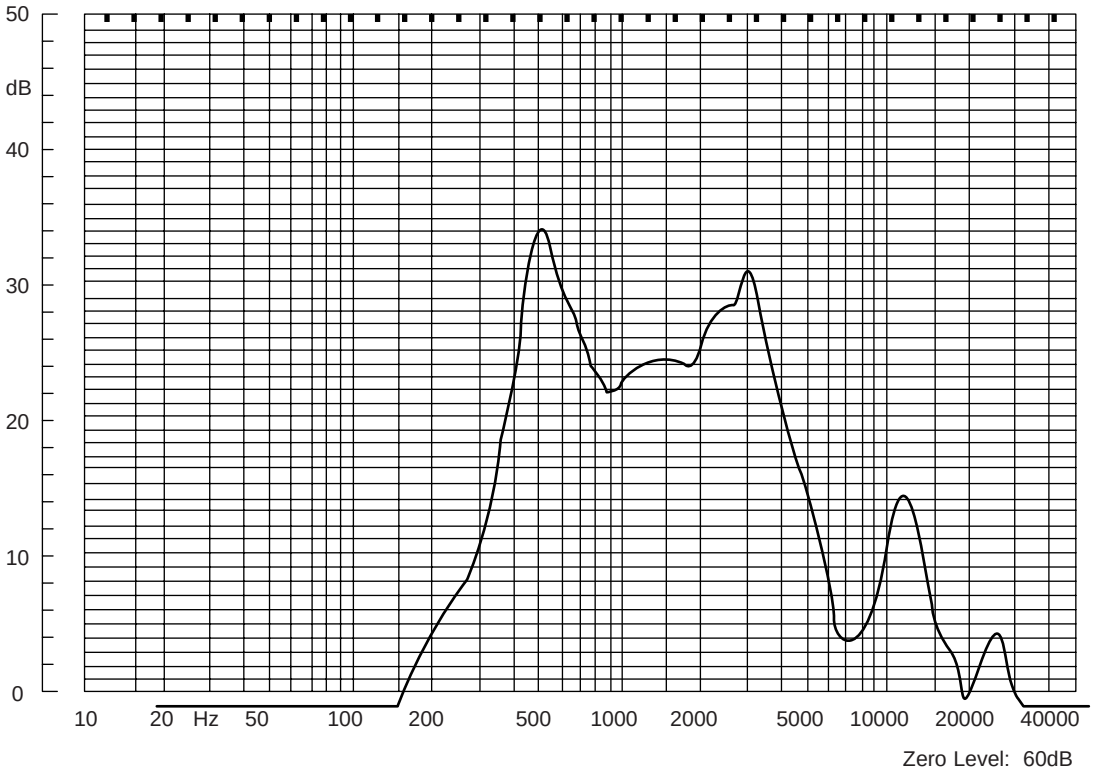
- Magnet: Alnico, .35oz.
- Impedance: 100Ω ±15% @ 1V, 1KHz
- Resonant frequency: 700Hz ± 140Hz @ 1V
- Frequency range: 700Hz ~ 5KHz
- Sensitivity: 82dB/W ± 2dB
- Input power: 0.2W nominal





Dimensions (In.)

Frequency Response



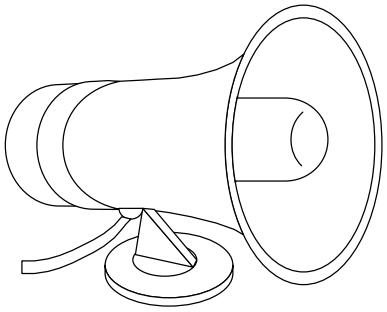
Zero Level: 60dB

Specifications:

- Magnet: Alnico, .35oz.
- Impedance: 8Ω ±15% @ 1V, 1.2KHz
- Resonant frequency: 700Hz ± 140Hz @ 1V
- Frequency range: 700Hz ~ 4.5KHz
- Sensitivity: 82dB/W ± 2dB
- Input power: 0.2W nominal, 0.3W maximum

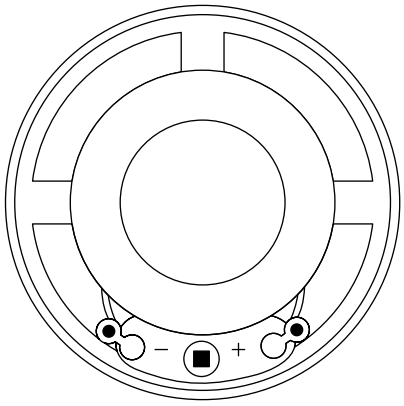
MOUSER® ELECTRONICS

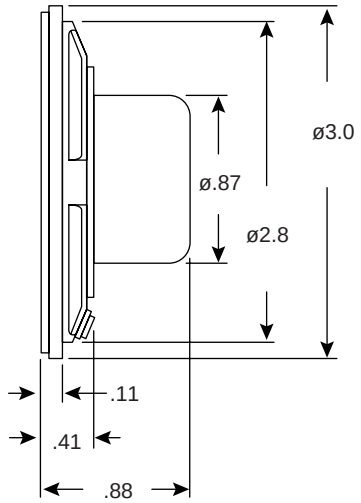
25BR520 Electronic Siren



Specifications:

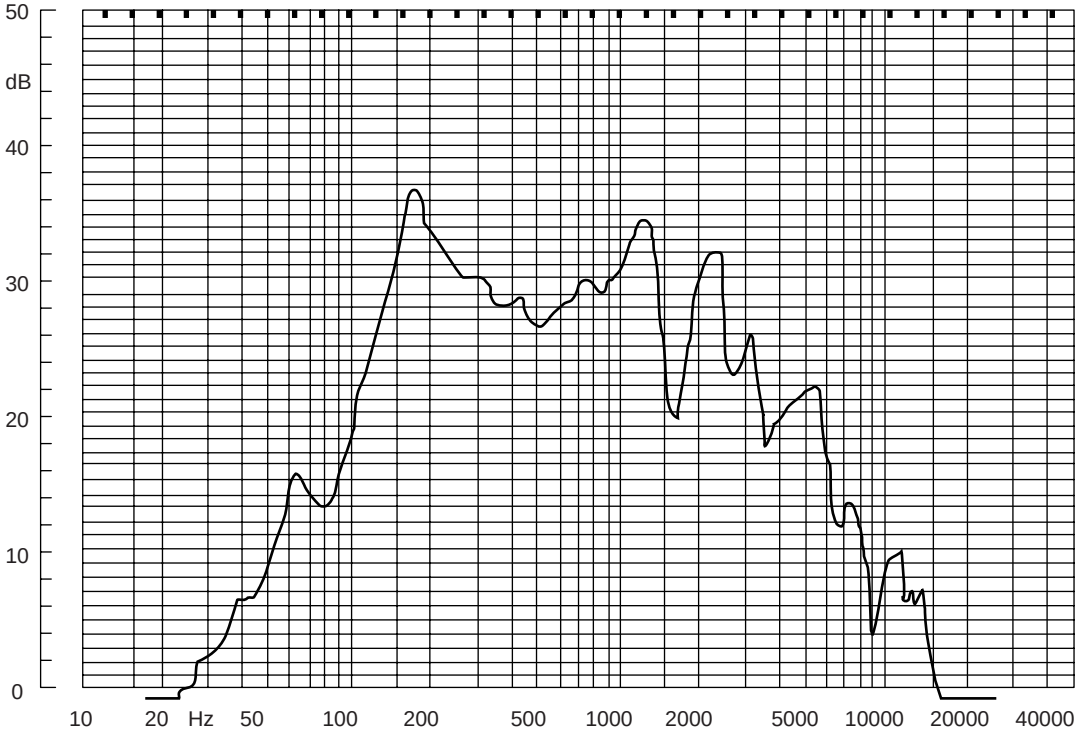
- Size: 5.25 x 6 inches
- Impedance: 4Ω ± 15%
- Sensitivity (DBW): 105
- Nominal power: 10W
- Tone: 800-1200Hz 4 cycles/second
- Operating Voltage: 6-12VDC
- Current drain: 600mA max.
- Temperature range: -30°F~+185°F
- Weather resisant





Dimensions (In.)

Frequency Response



Zero Level: 60dB

Specifications:

- Magnet: Alnico, .35oz.
- Impedance: 40Ω ±15%
- Flux density: 6300 Gauss
- Resonant frequency: 250Hz ± 45Hz
- Frequency range: 450Hz ~ 4KHz
- Sensitivity: 84dB/W ± 2dB
- Input power: 0.3W nominal, 0.5W maximum

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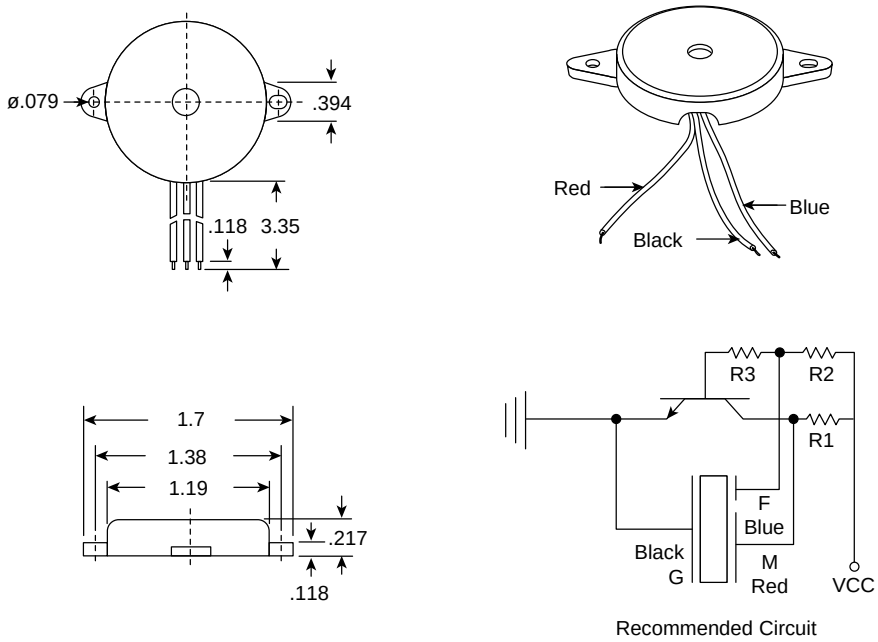


Recommended Circuit

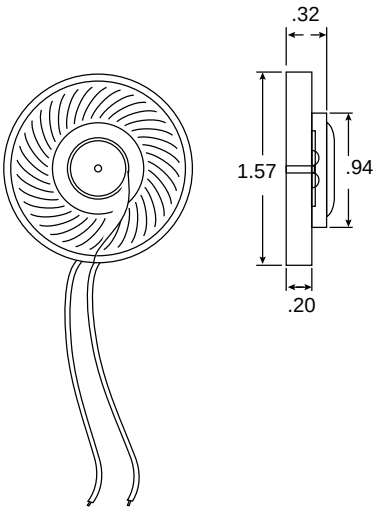
Dimensions (In.)

Specifications:

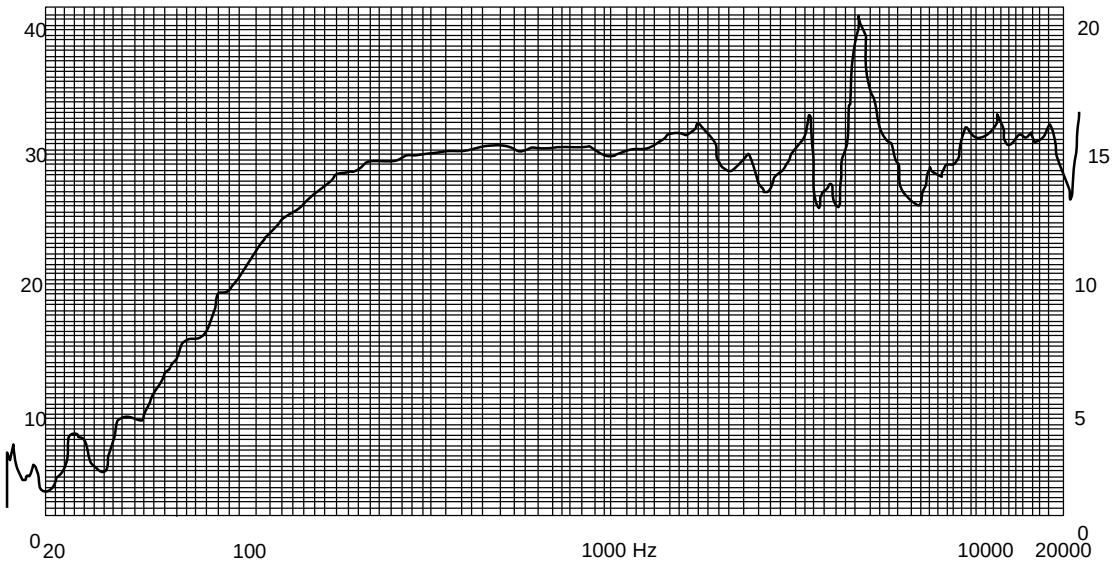
- Type: self drive
- Body: ABS UL94HB
- Weight: 4.5 grams
- Number of pins: 3
- Resonant frequency: 4.4 ± 0.5KHz
- Voltage: 3 ~ 30VDC (max.)
- Current: 6mA@ 9Vp-p / 6VDC
- Sound pressure: 85dB (min.) / 9VDC / 30cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1571 / 32AWG / 3.35 ± .197 inches

MOUSER® ELECTRONICS

25SP500 Dynamic Mylar Speaker



Dimensions (In.)



Specifications:

- Magnet: rare earth cobalt
- Impedance: 500Ω @ 1KHz
- Impedance variation: ±20%
- Sensitivity: 117 ± 4dB 1mW @ 1.5mm, from standard microphone
- Frequency response: Fo - 18KHz
- Resonant frequency: 150 ±30Hz
- Rated input: 30mW
- Max input: 40mW

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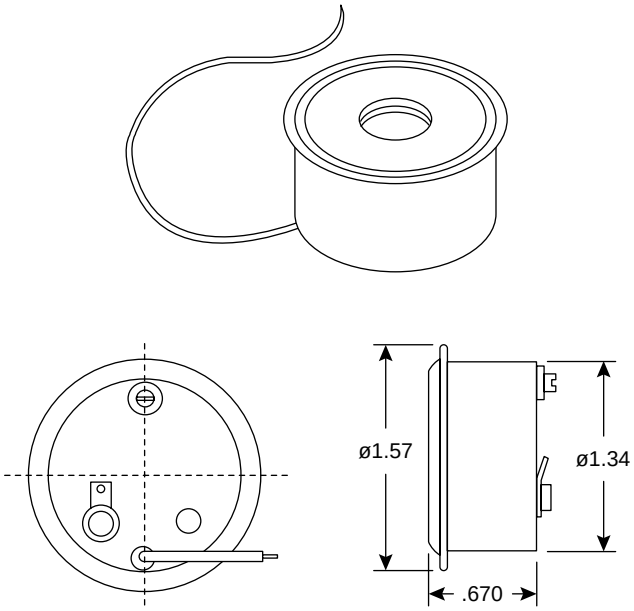

Dimensions (In.)

Specifications:

- Type: solid state
- Rated voltage: 12VDC
- Starting voltage: 6VDC max.
- Rated current: 60mA max.
- Frequency: 700~900 Hz.
- Sound output @ 12VDC: 105dB @ 1ft.
- Housing: zinc-chrome plated cold rolled steel
- Contact: silver/cadium coated contact

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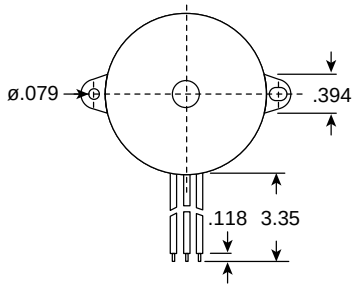
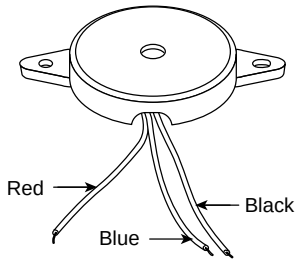
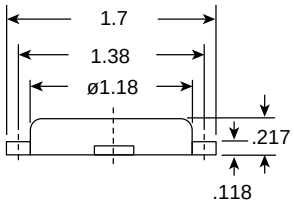
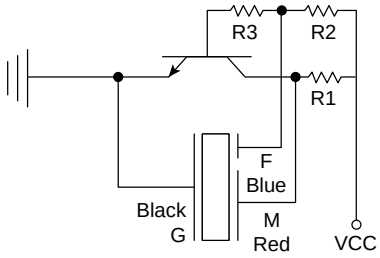






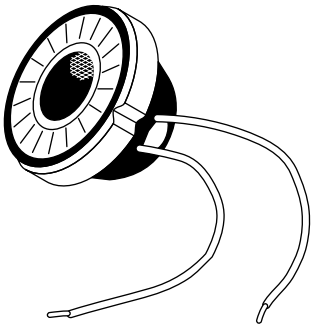


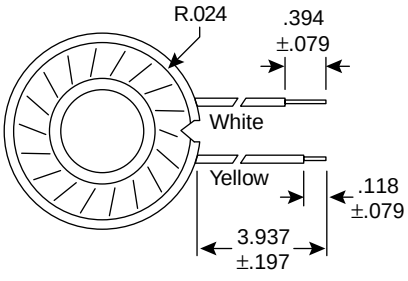
Recommended Circuit

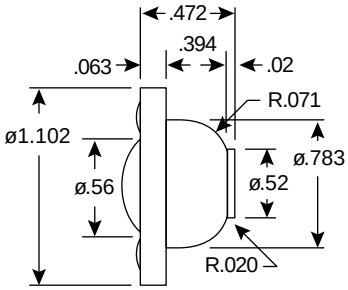
Dimensions (In.)

Specifications:

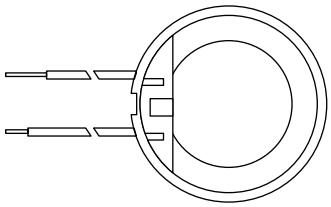
- Type: self drive
- Body: ABS UL94HB
- Weight: 4.5 grams
- Number of pins: 3
- Resonant frequency: 4.4 ± 0.5KHz
- Voltage: 3 ~ 30VDC (max.)
- Current: 6mA@ 9Vp-p / 6VDC
- Sound pressure: 85dB (min.) / 9VDC / 30cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1571 / 32AWG / 3.35 ± .2 inches

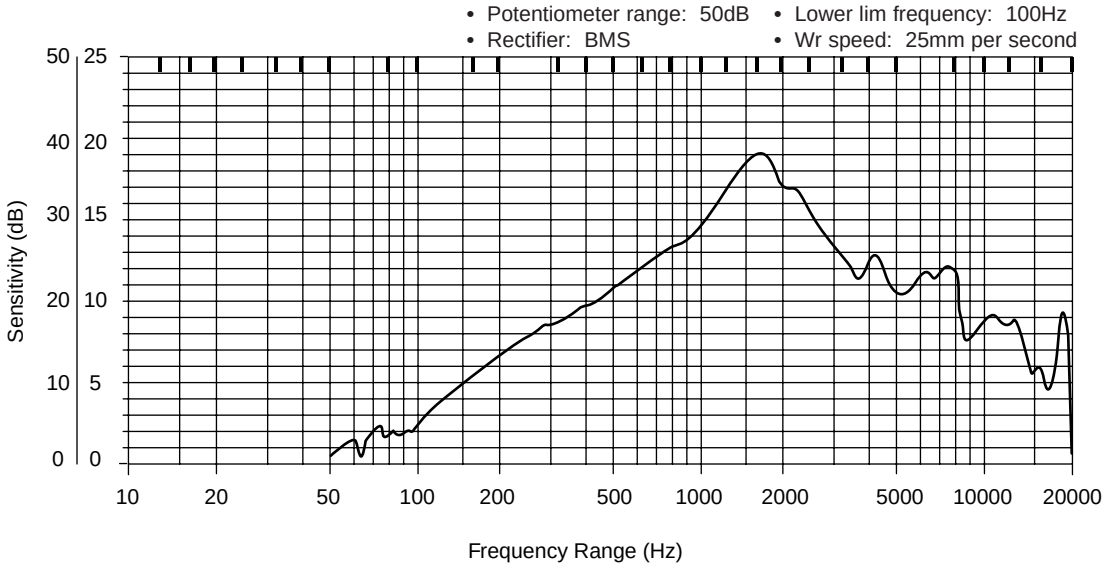






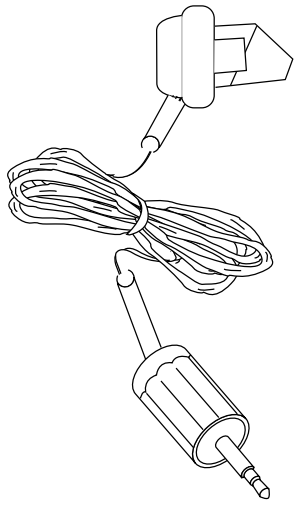
Dimensions (In.)

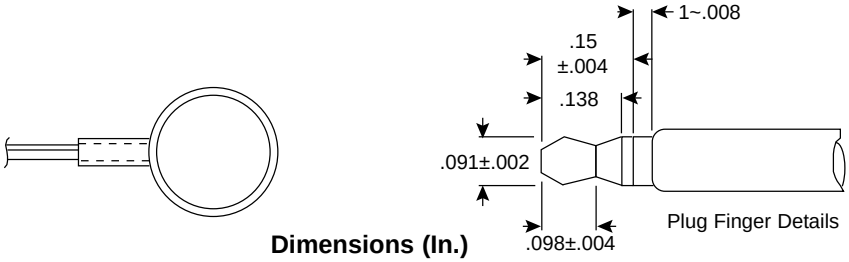




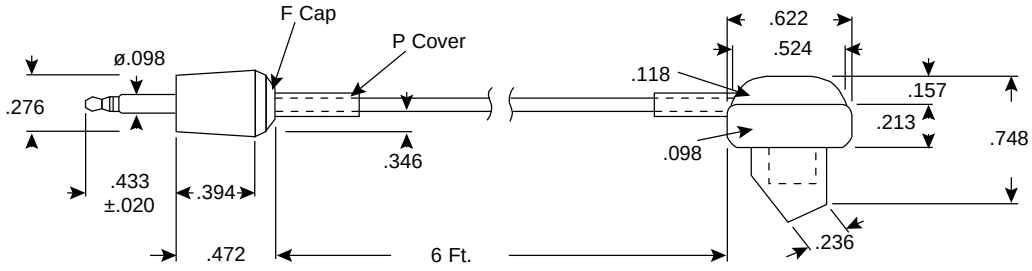
Specifications:

- Impedance: 500Ω @ 1KHz (tolerance ±30%)
- Sensitivity: 76dB ±3dB @ 1KHz (0dB=1V/microbar)
- Frequency response: 100Hz~5KHz
- Operating temperature: -10°C~ +55°C
- Maximum sound pressure level: 105dB

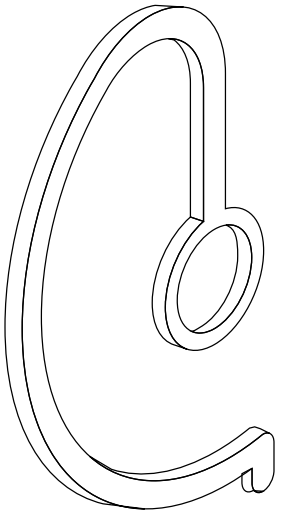




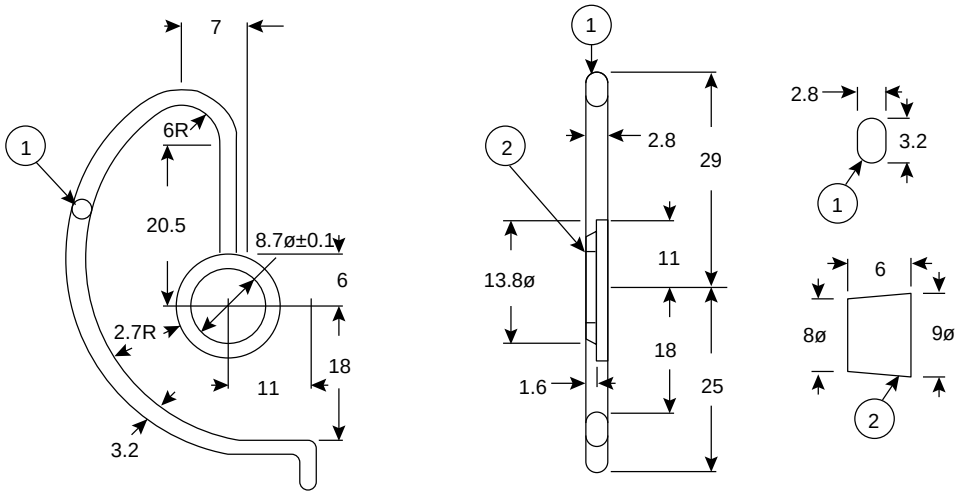
Dimensions (In.)



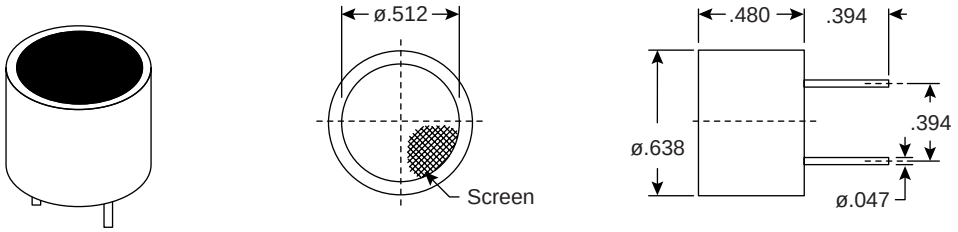
25DE034 - 6 foot
25DE035 - 3 foot



Dimensions (mm)



Specifications:
- Tolerance: ±0.1mm
- Flesh ear support

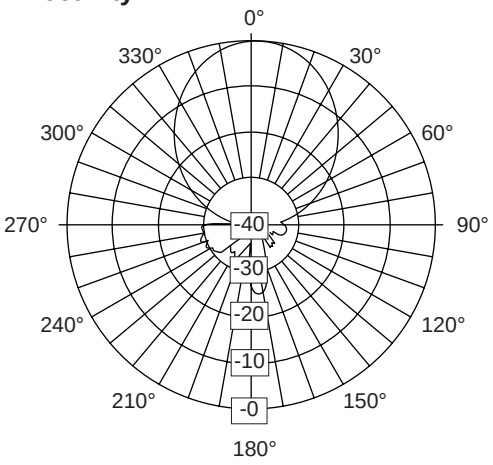


Dimensions (In.)

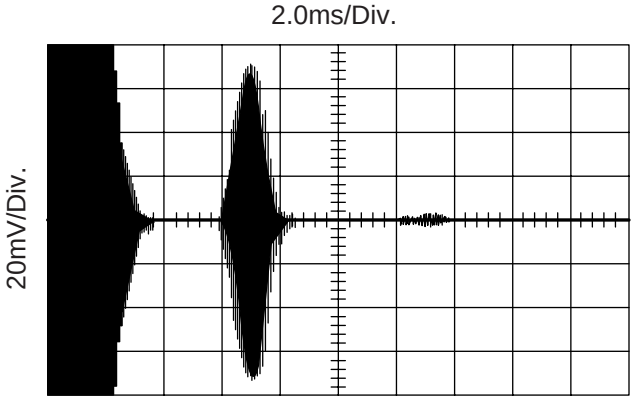
Specifications:

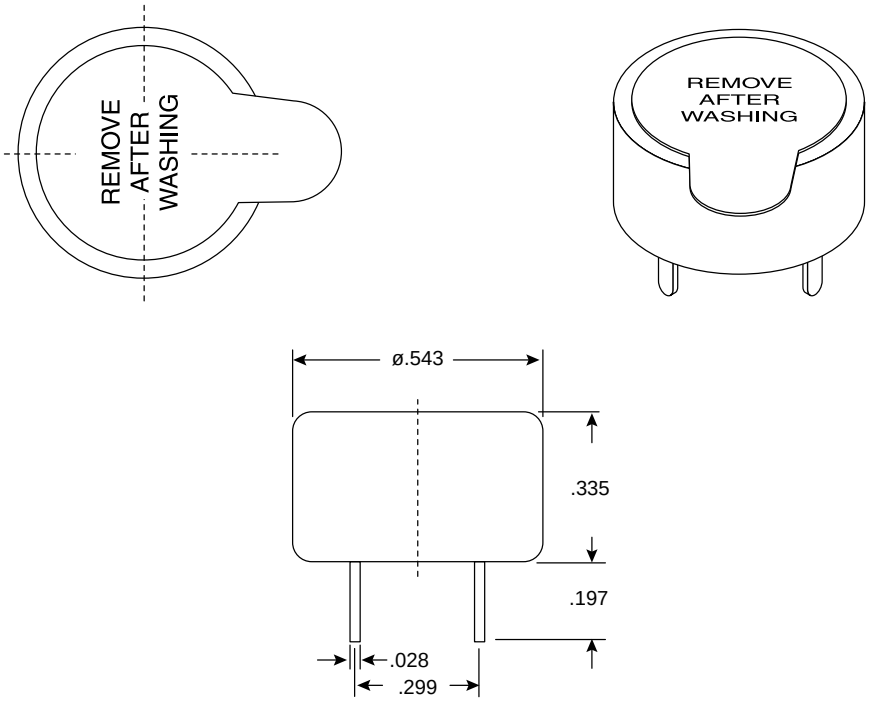
- Center frequency (f_0): 40.0KHz ± 1.0KHz
- Nominal impedance: 1,000Ω
- Sound pressure level @ f_0: 117dB (0dB re 0.0002 µ bar)
- Sensitivity @ f_0: -65dB (0dB = 1V/µ bar)
- Echo sensitivity @ f_0: -45dB (0dB re 50 bursts sine wave of 20 volts peak-peak; 100cm reflection target)
- Bandwidth -3dB: 2KHz
- Ringing: 1.0mS (max.)
- Beam angle -6dB: 40°
- Beam angle -12dB: 60°
- Capacitance @ 1KHz: 2,400pF ± 20%
- Max. driving voltage: 150V peak-peak 10% duty cycle
- Operation temperature: -40°C ~ +85°C
- Storage temperature: -40°C ~ +100°C

Directivity



Echo Sensitivity

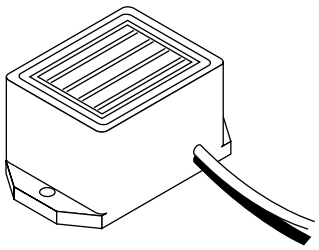


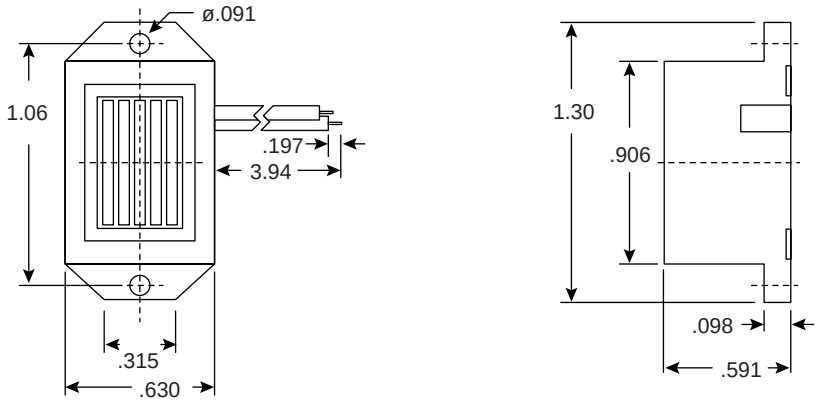


Dimensions (In.)

Specifications:

- Type: built-in drive circuit
- Number of pins: 2
- Resonant frequency: 4 ± .5KHz
- Allowable input voltage: 3~15VDC
- Current consumption: 6mA max. @ 6VDC
- Sound pressure: 90dB min./ 9VDC/ 10cm
- Case material: PC UL94V2
- Pin pitch & material: .299" ± .012"; tin plated brass
- Operating temperature range: -20°C~ +105°C
- Weight: 1.0 grams





Dimensions (In.)

Specifications:

- Frequency: 300~500Hz
- Min. sound pressure @ rated voltage: 75dB/30cm
- Pulse rate @ rated voltage: NIL (pulse/sec.)
- Tone: single
- Terminal: wire

Mouser Stock No.	Voltage DC	Operating Voltage (V) DC		Current Drain (mA)
		Minimum	Maximum	
251-0103	3	2	4	15
251-0106	6	3	7	20
251-0112	12	7	17	15

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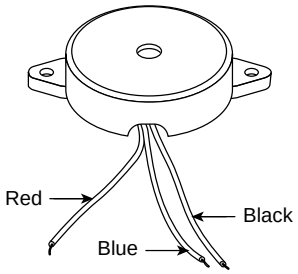
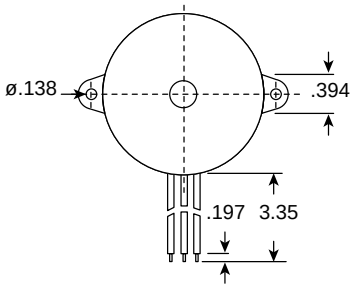
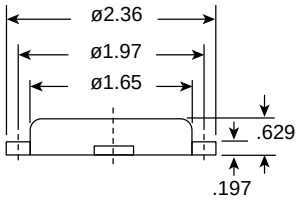
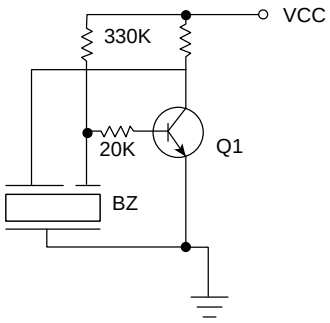


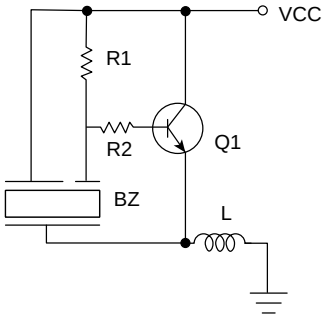




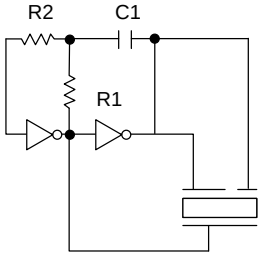
Dimensions (In.)



Tr Type



Tr Type



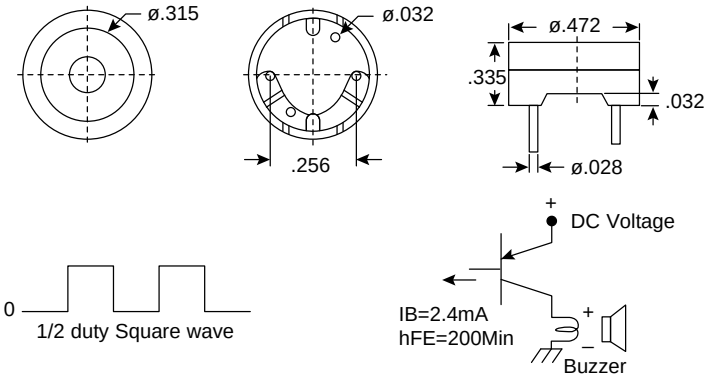
IC Type

Recommended Circuit
Self-Oscillation Circuit

Specifications:

- Type: self drive
- Body: ABS UL94HB
- Weight: 10.0 grams
- Resonant frequency: 2.8 ± 0.5KHz
- Voltage: 3 ~ 30VDC (max.)
- Current: 6mA (max.) / 6VDC
- Sound pressure: 90dB (min.) / 9VDC / 30cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1095 / 28AWG / 3.35 ± .197 inches

KOBITONE™ AUDIO COMPANY OBO



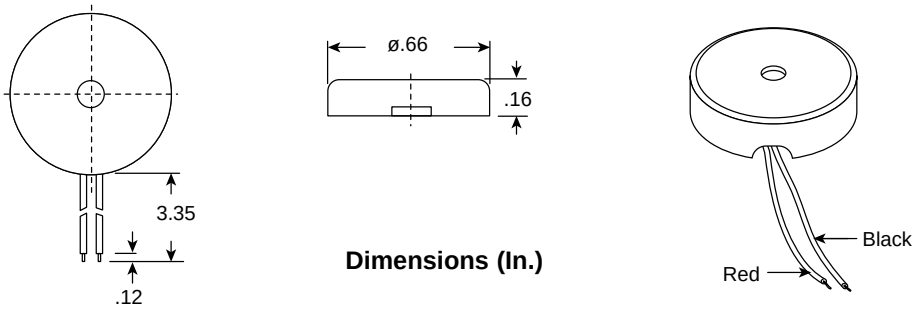
Standard Driving Circuit for Transducer

Dimensions (In.)

Specifications:

- Rated voltage: 1.5DC
- Weight: 2 grams
- Resonant frequency: 2,048Hz
- Operating voltage: 1~2V
- Current consumption: 30mA (max.); applying rated voltage (square wave, 1/2 duty, resonant frequency)
- Sound pressure: 85dB (min.); distance @ 10cm (applying rated voltage, square wave, 1/2 duty, resonant freguency)
- Operating temperature range: -25°C ~ +55°C
- Coil resistance: 16±2Ω
- Coil impedance: 40Ω; applying resonant frequency, sine wave measuring current 60µ A

KOBITONE™ AUDIO COMPANY OBQ

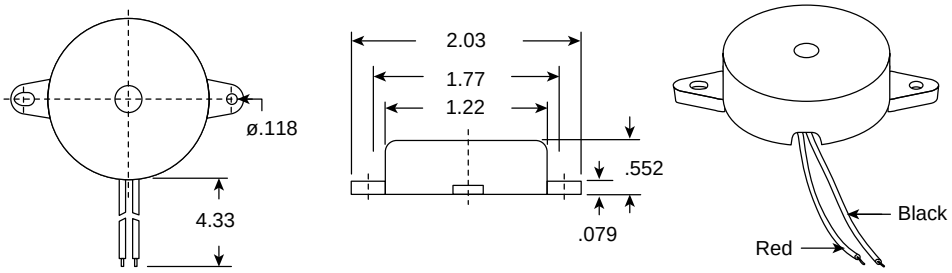


Dimensions (In.)

Specifications:

- Type: external drive
- Body: ABS UL94HB
- Weight: 1.5 grams
- Resonant frequency: 4KHz
- Voltage: 30Vp-p (max.)
- Current: 3mA (max.)@ 9Vp-p square wave
- Sound pressure: 80dB (min.)
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1571 / 32AWG
- Capacitance: 14,000pF ±30% @ 120Hz 25°C

KOBITONE™ AUDIO COMPANY OBL

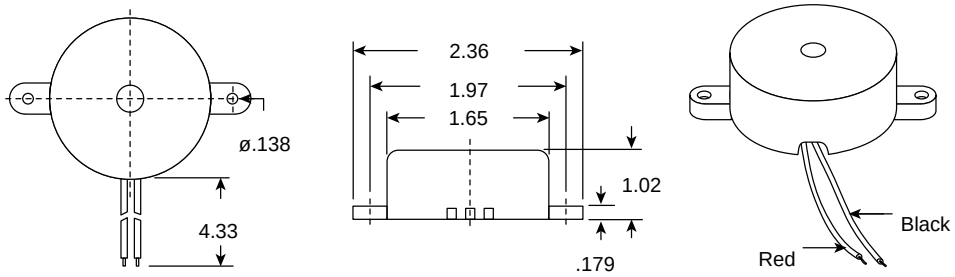


Dimensions (In.)

Specifications:

- Body: PC UL94V2
- Weight: 6.0 grams
- Number of pins: 2
- Resonant frequency: 2.5 ± 0.5KHz continuous tone
- Voltage: 3~30VDC
- Current: 6mA @ 6VDC
- Sound pressure: 100dB (min.) @ 9Vp-p 30cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1095 / 28AWG / 4.33 ± .197 inches

KOBITONE™ AUDIO COMPANY OBQ

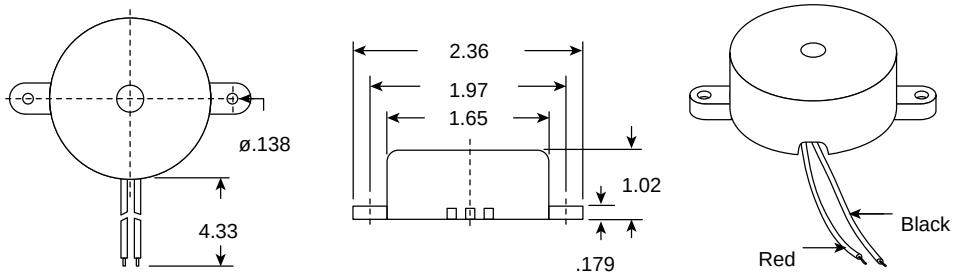


Dimensions (In.)

Specifications:

- Body: ABS UL94HB
- Weight: 16.5 grams
- Number of pins: 2
- Resonant frequency: 2.8 ± 0.5KHz continuous tone
- Voltage: 3~15VDC
- Current: 4mA @ 6VDC
- Sound pressure: 110dB (min.) @ 9VDC 10cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1007 / 28AWG / 4.33 ± .197 inches

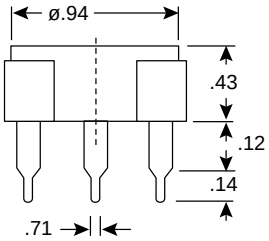
KOBITONE™ AUDIO COMPANY OBQ

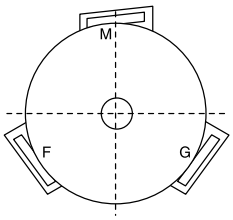


Dimensions (In.)

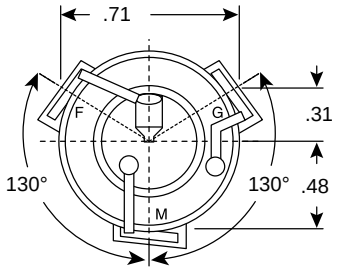
Specifications:

- Body: PC UL94V2
- Weight: 12.0 grams
- Number of pins: 2
- Resonant frequency: 2.8 ± 0.5KHz continuous tone
- Voltage: 3~20VDC
- Current: 6mA @ 6VDC
- Sound pressure: 100dB (min.) @ 9VDC 30cm
- Operating temperature range: -20°C ~ +105°C
- Lead wire: UL1007 / 28AWG / 4.33 ± .197 inches





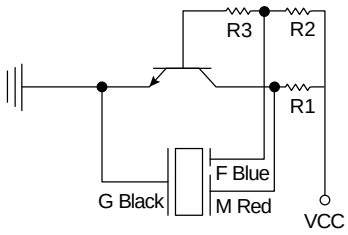
Top View



Bottom View

Dimensions (In.)

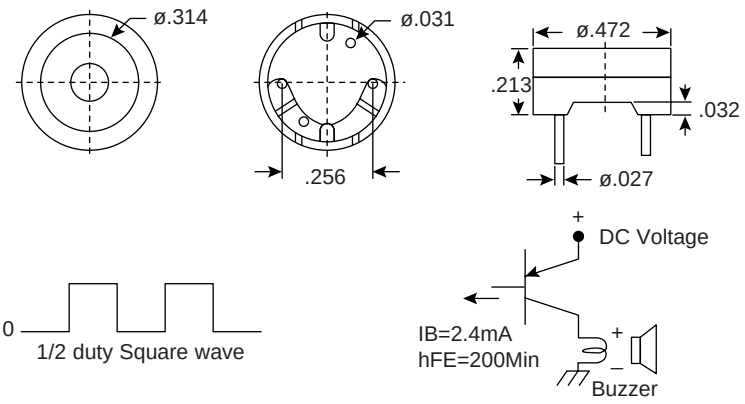
Recommend Circuit



Specifications:

- Type: self drive
- Sound pressure level: 90dB min./9VDC/30cm
- Oscillating frequency: 3.4 ± 0.5KHz
- Current consumption: 6mA max. /6VDC
- Allowable input voltage: 3~30VDC
- Operating temperature range: -20°C~ +105°C
- Pin pitch & material: 0.12 ± 0.01 tin coated brass
- Case material: PC UL94V2
- Weight: 2.5 gms

KOBITONE™ AUDIO COMPANY OBL



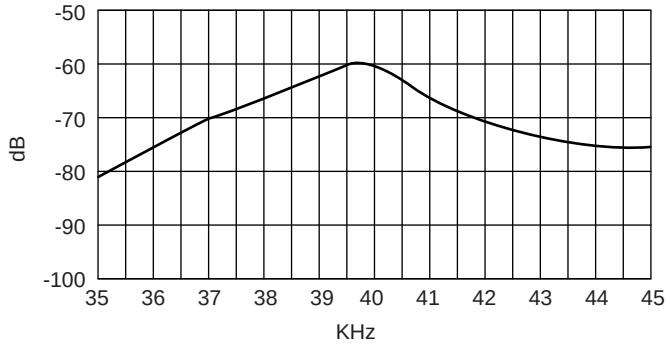
Standard Driving Circuit for Transducer

Dimensions (In.)

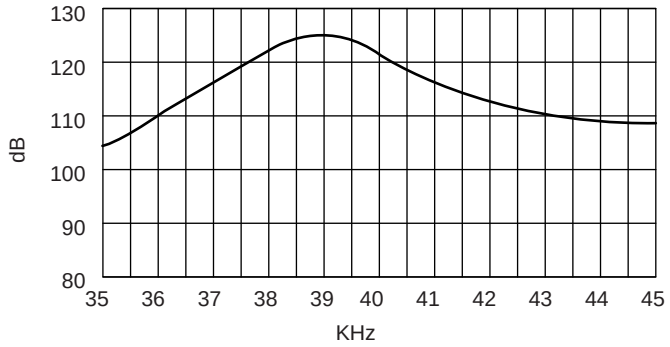
Specifications:

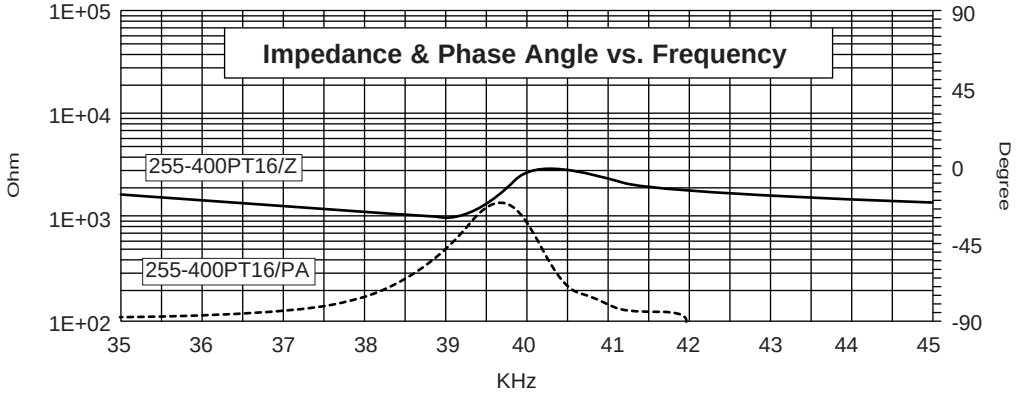
- Rated voltage: 1.5DC
- Weight: 2 grams
- Resonant frequency: 2,048Hz
- Operating voltage: 1~2V
- Current consumption: 10mA (max.); applying rated voltage (square wave, 1/2 duty, resonant frequency)
- Sound pressure: 70dB (min.); distance @ 10cm (applying rated voltage, square wave, 1/2 duty, resonant freguency)
- Operating temperature range: -20°C ~ +70°C
- Coil resistance: 42 ± 6Ω
- Coil impedance: 140Ω; applying resonant frequency, sine wave measuring current 60µ A

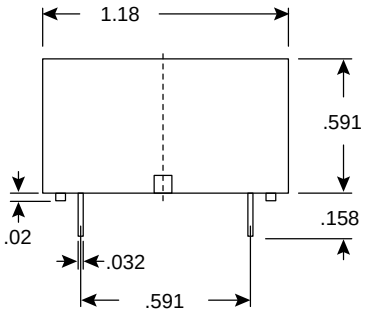
Sensitivity

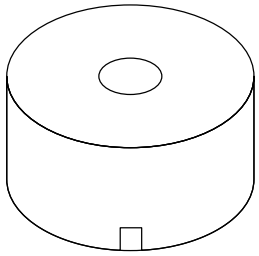


Sound Pressure vs. Frequency





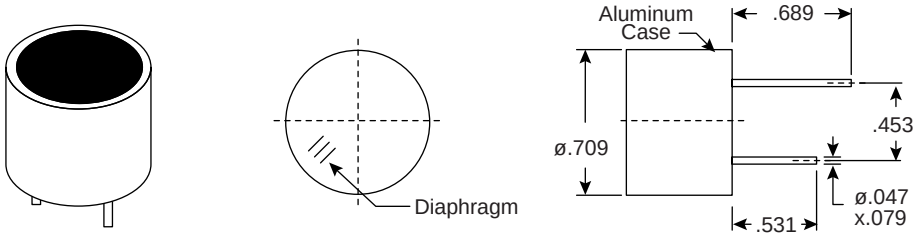




Dimensions (In.)

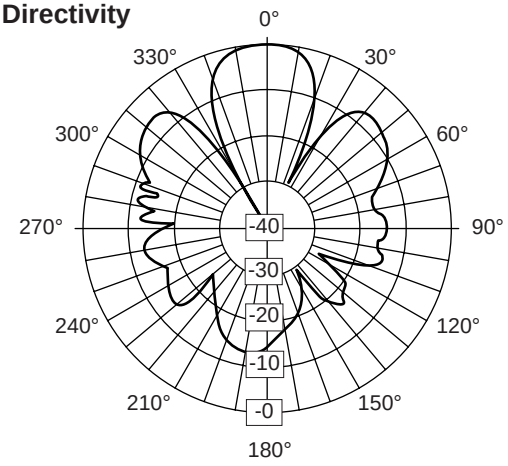
Specifications:

- Type: built-in drive circuit
- Sound pressure level: 90dB min. @ 9VDC/30cm
- Oscillating frequency: 3.4 ± 0.5KHz
- Current consumption: 3mA max. @ 9VDC
- Allowable input voltage: 6~24VDC
- Operating temperature range: -20°C~ +105°C
- Pin pitch & material: .591 ± .012 tin coated brass
- Case material: PC UL94V2
- Weight: 6.0 grams



Dimensions (In.)

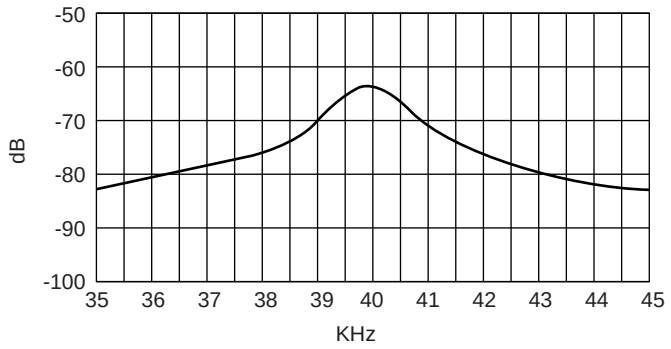
Transmitter Directivity



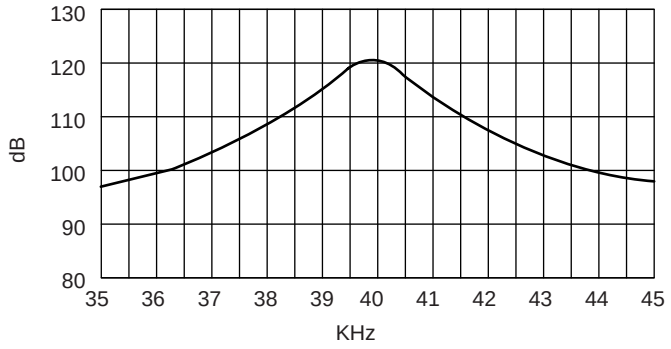
Specifications:

- Type: 255-400ET18=transmitter; 255-400ER18=reciever
- Center frequency (f_0): 40.0KHz ± 1.0KHz
- Sound pressure level @ f_0: 115dB (0dB re 0.0002 µ bar)
- Sensitivity @ f_0: -70dB (0dB = 1V/µ bar)
- Bandwidth: 1.5KHz (-6dB)
- Capacitance @ 1KHz: 2,600pF ± 20%
- Operation temperature: -30°C ~ +85°C
- Storage temperature: -40°C ~ +100°C
- Allowable input power: 0.2W

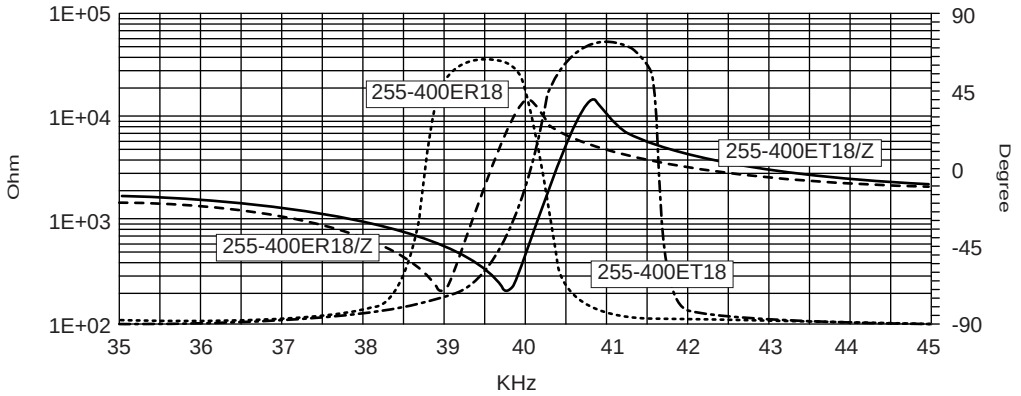
Sensitivity (255-400ER18)

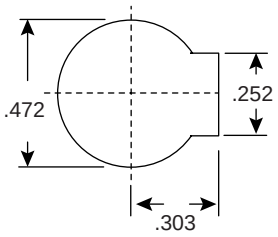


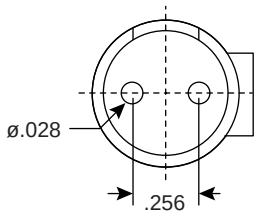
Sound Pressure Level (255-400ET18)

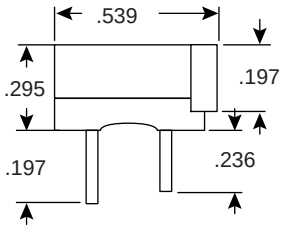


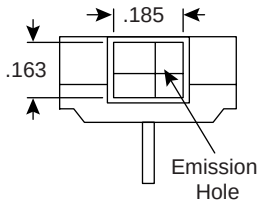
Impedance & Phase Angle vs. Frequency







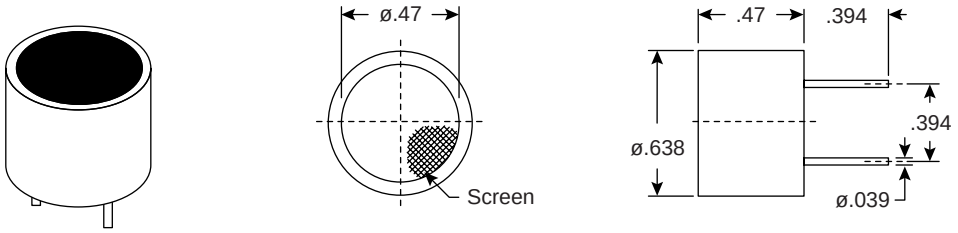




Dimensions (In.)

Specifications:

- Rated voltage: 1.5VDC
- Operating voltage: 1~2V
- Current consumption: 70mA max. [applying rated voltage (square wave, 1/2 duty, resonant frequency)]
- Weight: 2g
- Operating temperature: -25~ +70
- Sound pressure level: 85dB min. [distance 10cm (applying rated voltage, square wave, 1/2 duty, resonant frequency)]
- Coil resistance: 6.5±1Ω
- Coil impedance: 22Ω (applying resonant frequency, sine wave measuring current 60μA)
- Resonant frequency: 2,731Hz

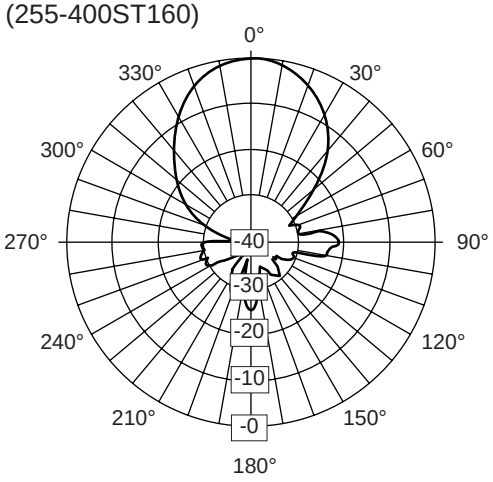


Dimensions (In.)

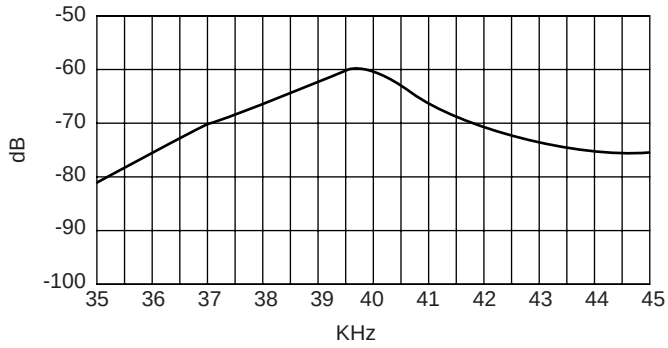
Specifications:

- Type: transmitter: 255-400ST16; receiver: 255-400SR16
- Center frequency (f_0): 40.0KHz ± 1.0KHz
- SPL@ f_0: 255-400ST16 = 119dB (0dB re 0.0002 µ bar)
- Sensitivity @ f_0: 255-400SR16 = -65dB (0dB = 1V/µ bar)
- Bandwidth (-6dB): 255-400ST16 = 2KHz
  255-400SR16 = 2.5KHz
- Allowable input power: .2W
- Capacitance @ 1KHz: 2,400pF ± 20%
- Operating temperature: -30°C ~ +85°C
- Storage temperature: -40°C ~ +100°C

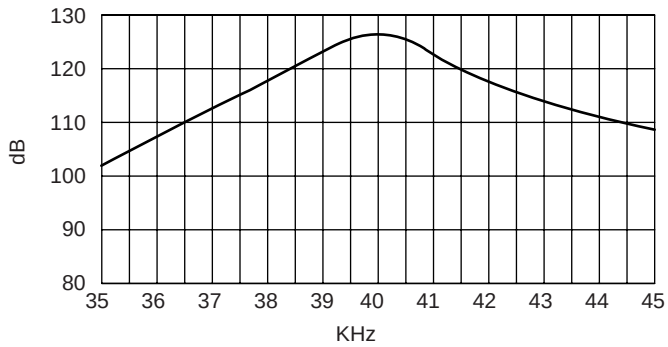
Directivity
(255-400ST160)

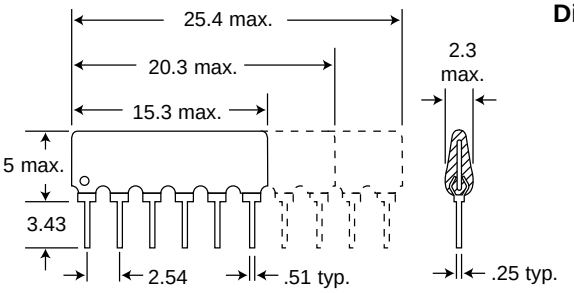


Sensitivity (255-400SR160)



Sound Pressure (255-400ST160)

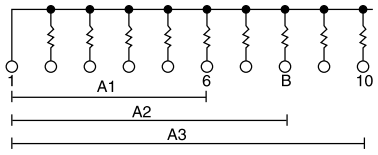




Dimensions (mm)

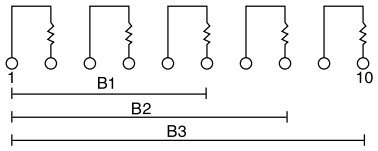
MEETS MIL SPECS™

Common Bus Configuration



Pin 1 common, 5 to 9 resistors
6 to 10 pin single-in-line package

Isolated Configuration



3, 4, or 5 isolated resitors
6, 8, or 10 pins single-in-line package

Specifications:

- Resistance range: 22Ω to 1MΩ
- Resistance tolerance: ±2%
- Temperature coefficient: 100ppm/°C
- Power rating: 1/8 watt per resistor
- Operating temp. range: -55°C to +150°C
- Solderability: per MIL-R-83401
- Flammability: conforms to UL94V-0
- Thick film SIP resistor networks: 2%; 100ppm/°C

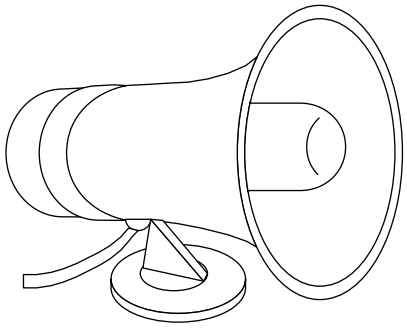
TransOhm	No. of Pins	No. of Res.	Fig.
264(Value)	6	5	A1
265(Value)	8	7	A2
266(Value)	10	9	A3
267(Value)	6	3	B1
268(Value)	8	4	B2
269(Value)	10	5	B3

Table of Values (Ω)

22	680	6.8K	68K	680K
47	820	8.2K	82K	1M
100	1K	10K	100K	
150	1.5K	15K	150K	
220	2.2K	22K	220K	
330	3.3K	33K	330K	
470	4.7K	47K	470K	
560	5.6K	56K	560K	

Insustry Cross Reference

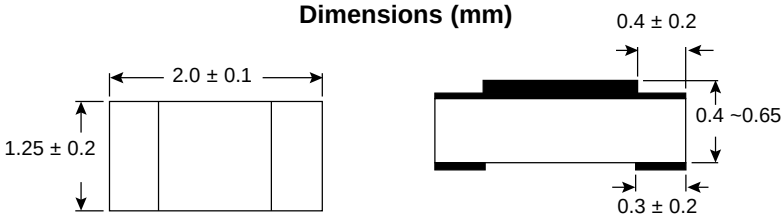
TransOhm	Sprague	Dale	Bourns	Allen-Bradley
264(Value)	210CF-PD	CSC06A-01-G	4606-101	106A
265(Value)	210CH-PD	CSC08A-01-G	4608-101	108A
266(Value)	210CK-PD	CSC10A-01-G	4610-101	110A
267(Value)	210CF-SR	CSC06A-03-G	4606-102	106B
268(Value)	210CH-SR	CSC08A-03-G	4608-102	108B
269(Value)	210CK-SR	CSC10A-03-G	4610-102	110B

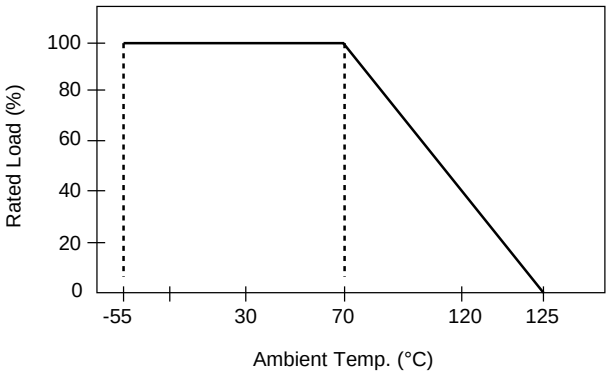


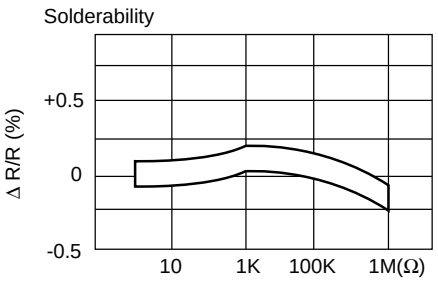
Specifications:

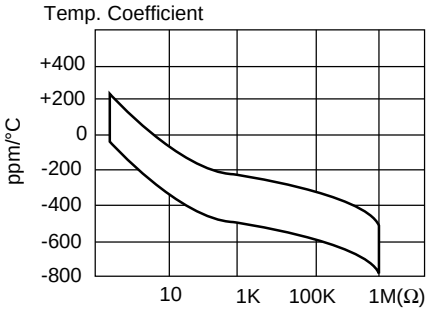
- Size: 5.25 x 6 inches
- Impedance: 4Ω ± 15%
- Sensitivity: 105DBW
- Nominal power: 10W
- Tone: 800-1200Hz 4 cycles/second
- Operating voltage: 6-12VDC
- Current drain: 600mA max.
- Temperature range: -30°F~+185°F
- Weather resistant
- Loudness: 108~110dB
- Horn: ABS plastic

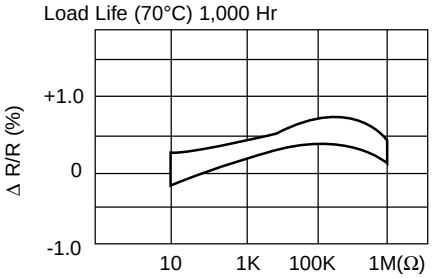
Dimensions (mm)







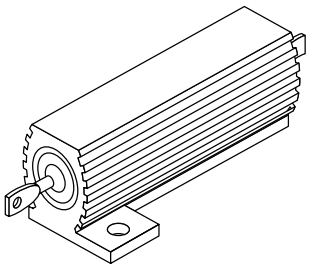


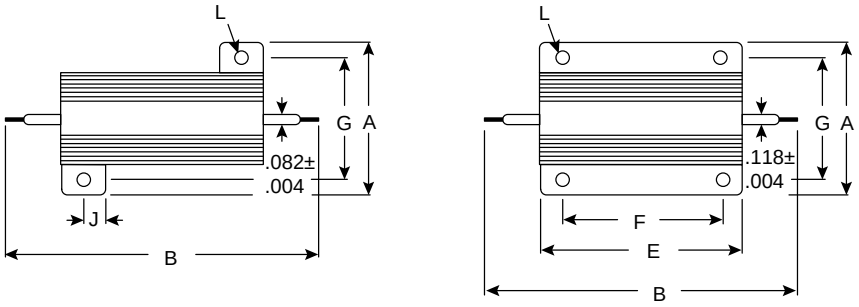


Specifications:

- Type: CR1/10
- Power rating: 0.1W
- Max. working: 100V
- Max. overload: 200V

Characteristic	Test Method	Requirement
Temp. Range	-55°C to +125°C	
Temp. Coefficient	Room temp +100°C	R ≤ 100 ± 500ppm/°C 100 < R ≤ 500K ± 250ppm/°C 500K < R ± 500ppm/°C
Temp. Cycling	-55°C to +125°C	± (1.0% + 0.1Ω) max.
Short Time Overload	Rated voltage x 2.5, 5 sec.	± (2.0% + 0.1Ω) max.
Humidity	40°C RH 90-95%	± (3.0% + 0.1Ω) max.
Humidity Load Life	40°C RH 90-95%	± (3.0% + 0.1Ω) max.
Load Life	70°C	± (3.0% + 0.1Ω) max.
Vibration	Low frequency, 3 directions, 2 hrs, ea	± (1% + 0.1Ω) max.
Solderability	230°C, 3 sec	75% min., coverage
Resistance to Soldering Heat	260°C, 10 sec	± (2.5% +0.1Ω) max.
Termination Adhesion	500g	± (1% + 0.1Ω) max.





	Tol.	HS10	HS15	HS25	HS50	HS75	HS100	HS150
A	Max.	.669	.827	1.102	1.181	1.890	1.890	1.890
B	Max.	1.181	1.437	2.008	2.854	2.795	3.465	4.803
C	Max.	.354	.433	.591	.669	1.024	1.024	1.024
D	±.063	.335	.441	.531	.594	1.063	1.063	1.063
E	Max.	.669	.827	1.142	2.008	1.929	2.579	3.858
F	±.021	.445	.563	.720	1.563	1.142	1.378	2.283
G	±.012	.488	.626	.780	.843	1.457	1.457	2.252
H	±.020	.157	.205	.283	.311	.453	.453	.453
J	±.016	.787	.094	.170	.189	.394	.591	.787
K	±.031	.067	.094	.094	.094	.138	.138	.138
L	±.010	.094	.094	.126	.126	.173	.173	.173

Mechanical Specifications:

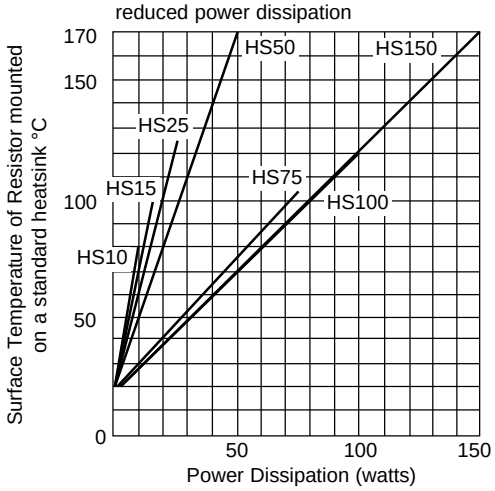
- Construction: Arcol HS resistors are encapsulated in an aluminum housing by a transfer moulding process which ensures a good humidity seal and a permanent compression fit. The special Arcol design of moulding tool also ensures accurate concentricity of the resistive element inside the housing giving a high level of voltage protection.
- Core: high alumina ceramic with high thermal conductivity and capable of withstanding severe thermal shock. It is chemically inert is impervious to moisture and is ground to a close toleranced finish to give maximum contact with wire element for rapid heat transfer.
- Resistance element: copper nickel alloy or chrome alloy depending on resistance value and tolerance
- End caps: formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties
- Encapsulant: high temperature silicone transfer moulding compound
- Housing: anodized aluminum
- Robustness of termination: Arcol HS resistors will withstand the following tensile test without their terminations being mechanically damaged. HS10 and HS15 = 5lb. pull. HS25 and HS50 = 10lb. pull.
- Solderability: meets the requirements of current BS and MIL specifications standards. The use of high temperature solder is recommended when HS resistors are operated at, or near, the maximum specified ratings.

Electrical Specifications:

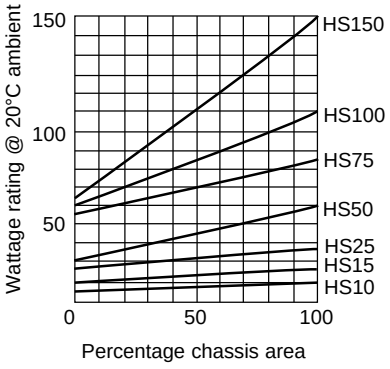
- Tolerance: standard ≤ 1.0Ω, 5%, > 1.0, 1%
- Tolerance for low: >R05 ±5%
- Ohmic values: <R047 ±10%
- Temperature coefficients: above 50R 25ppm/°C is standard 1R-50R 50ppm/°C is standard below 1R 100ppm/°C is standard for lower TC's please consult the factory
- Dielectric strength: 1000VAC peak HS10 & HS15, 2500VAC peak HS25 & HS50, 5000VAC peak HS75-µ5150
- Insulation resistance (dry): 10,000MR minimum
- Non inductive styles NHS: Arcol HS resistors are available with noninductive and are identified by adding the letter N before the HS identification. e.g. NHS10, HS15, NHS25, NHS50. Divide maximum value by 4. Divide maximum working volts by 1.414
- Surface temperature: maximum surface temperature is 200°C for surface temperature at lower power dissipation see graph 1.
- Ambient temperature: for operation in temperatures above 20°C the power which can be dissipated in HS resistors is shown in graph 2
- De-rating for smaller heatsinks: graph 3 shows the power dissipation of resistors mounted on smaller heatsinks. The surface temperature must not exceed 200°C. Long term stability: for improved long term stability de-rate as shown in graph 4
- Maximum overload: we consider it unwise to quote figures in view of the many variable parameters which can be involved. Please consult the factory for assistance concerning your particular overload application.

HS10 to HS150 Performance Data

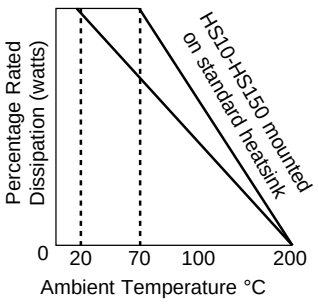
Graph 1: Surface Temperature at reduced power dissipation



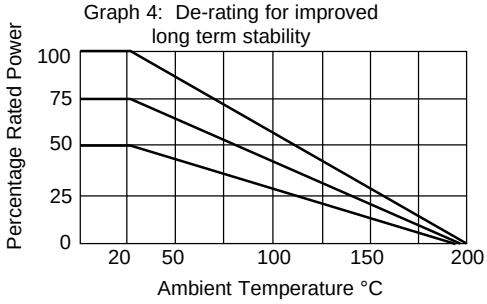
Graph 3: Power Dissipation of Resistor mounted on a smaller heatsink

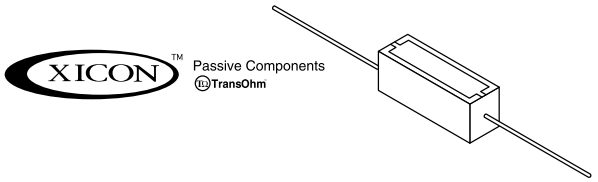


Graph 2: Power Dissipation @ increased ambient temperature

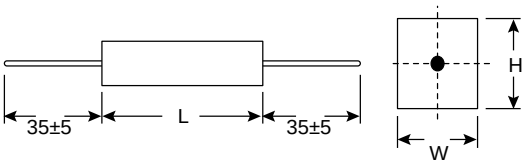


Graph 4: De-rating for improved long term stability





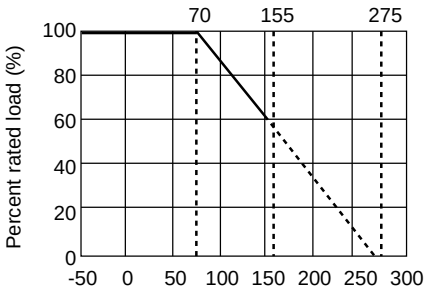
Style	Dimensions (mm)			Resistance Range	
	W±1	D±1	L±1	Wirewound	Power Film
5W	10	9	22	0.1Ω~200Ω	56Ω~50KΩ
10W	10	9	49	0.1Ω~990Ω	500Ω~50KΩ
15W	12.5	11.5	49	1Ω~1KΩ	1KΩ~150KΩ
25W	14.5	13.5	64	1Ω~1KΩ	1KΩ~150KΩ



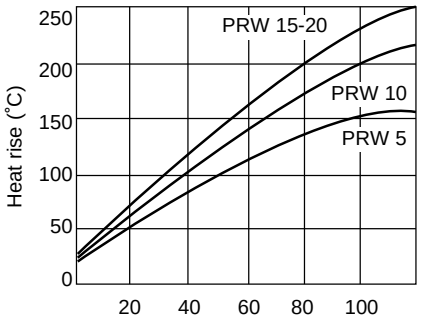
Dimensions (mm)

Specifications:
- Extremely small, very sturdy, & mechanically safe
- Excellent flame & moisture resistance
- Self-extinguishing

Derating Curve



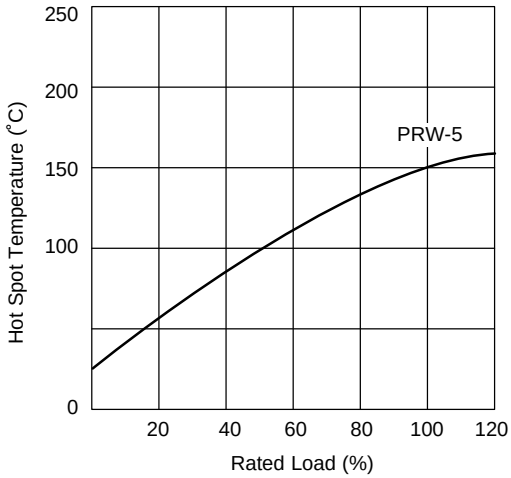
Heat Rise Chart

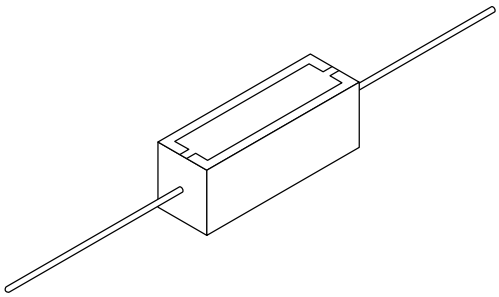


Characteristics	Limits	Test Method (JIS-C-5202)
Terminal Strength	No evidence of mechanical damage	Direct load: resistance to a 2.5kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads Twist test: terminal leads shall be bent through 90° @ a point of about 6mm from the body of the resistor & shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations
Resistance to Soldering Heat	Resistance change rate is ±(1%+0.05Ω) max. w/ no evidence of mechanical damage	Permanent resistance change when leads immersed to 3.2~4.8mm from the body in 350°C solder for 3±0.5 seconds
Solderability	95% coverage min.	The area covered w/ a new, smooth, clean, shiny, & continuous surface free from concentrated pinholes. Test temperature of solder: 235°C±5°C Dwell time in solder: 3+0.5/-0 seconds

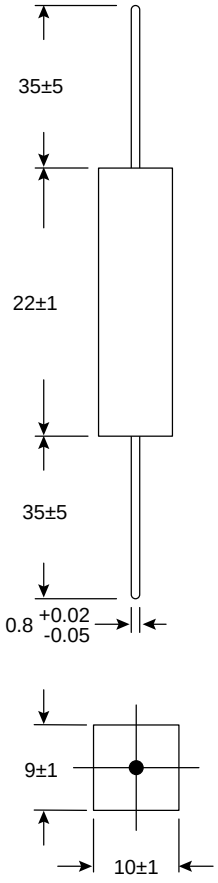
Characteristics	Limits	Test Method (JIS-C-5202)
Temperature Coefficient	±350PPM/°C (max.) <20Ω±400PPM/°C	Natural resistance change per temperature degree centigrade [R2-R1÷ R1(t2-t1)] x 10^6(PPM°C) Resistance value @ room temperature: R1: (t1); R2: +100°C (t2) Test pattern: room temp.,room temp. +100°C
Dielectric Withstanding Voltage	No evidence of flashover,mechanical damage, arcing, or insulation breakdown	Resistors shall be champed in the trough of a 90°, metallic V-block & shall be tested @ AC potential respectively specified in the above list for 60+10/-0 seconds.
Temperature Cycling	Resistance change rate is ±(2%+0.05Ω) max. w/ no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty cycle specified below. Step 1: -55°C ± 3°C for 30 minutes Step 2: room temp. for 10~15 minutes Step 3: +155°C ± 2°C for 30 minutes Step 4: room temp. for 10~15 minutes
Humidity (Steady State)	Resistance change rate is (5%+0.05Ω) maximum with no evidence of mechanical damage	Temporary resistance change after 240 hours of exposure in a humidity test chamber controlled @ 40°C±2°C & 90~95% relative humidity.
Short-Time Overload		Permanent resistance change after the application of a potential of 2.5 x RCWV for 5 seconds
Load Life in Humidity		Resistance change after 1,000 hrs operating @ RCWV w/duty cycle of 1.5 hrs "on", 0.5 hr "off" in a humidity test chamber controlled @ 40°C±2°C & 90~95% relative humidity
Load Life		Permanent resistance change after 1,000 hrs operating @ RCWV w/duty cycle of 1.5 hrs "on", 0.5 hr "off" @ 70°C ± 2°C ambient

Heat Rise Chart





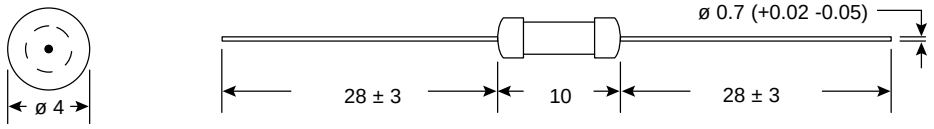
Dimensions (mm)



Specifications:

- Rated power: 5W
- Operating temperature range: -40˚C~200˚C
- Temperature coefficient: ±350PPM/˚C (<20Ω ±400PPM/˚C)
- Resistivity to heat: 275˚C
- Dielectric withstanding V.: ±(1% ±0.05Ω)
- Insulation resistance: 100MΩ min. @ 500VDC
- Rated load: ±(2% ±0.05Ω)
- Short time overload: ± (5% ±0.05Ω)
- Moisture resistance: ±5% ±0.05Ω
- Load life: ±(5%-0.05Ω) for 1,000 hrs
- Resistance range: wirewound- 0.1Ω~200Ω
  power film- 56Ω~50KΩ
- Resistance tolerance: ±5% (J)
- Incombustibility: E x 16 times V. 5 minutes
- Shock & vibration: ±(1%±0.5Ω)
- Soldering heat: ±(1%+0.05Ω)
- Cap material: tin plated iron
- Lead material: copper wire
- Body material: $3AL_2O_3 2SIO_2$

XICON™ Passive Components



Dimensions (mm)

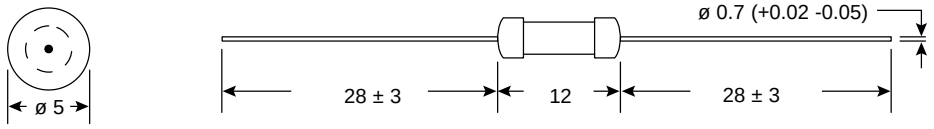
Specifications:
- Max. working voltage: 350V
- Max. overload: 600V
- Resistance range: 0.3Ω ~ 50KΩ
- Rated power: 1 watt

Features:
- Excellent flame retardant coating
- Stable performance in diverse environments
- High purity ceramic core
- Meet EIAJ-RC2655A requirements

Characteristics	Limits	Test Method (JIS-C-5202)
Terminal Strength	No evidence of mechanical damage	Direct load: resistance to a 2.5kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads Twist test: terminal leads shall be bent through 90° @ a point of about 6mm from the body of the resistor & shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations
Resistance to Soldering Heat	Resistance change rate is ±(1%+0.05Ω) max. w/ no evidence of mechanical damage	Permanent resistance change when leads immersed to 3.2~4.8mm from the body in 350°C solder for 3±0.5 seconds
Solderability	95% coverage min.	The area covered w/ a new, smooth, clean, shiny, & continuous surface free from concentrated pinholes. Test temperature of solder: 235°C±5°C Dwell time in solder: 3+0.5/-0 seconds
Resistance to Solvent	No deterioration of protective coatings and markings	Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic.
Flame Retardant	No evidence of flaming or arcing	Resistors shall resist flaming or arcing when overloaded up to 16 x RCWV.

Characteristics	Limits	Test Method (JIS-C-5202)
Temperature Coefficient	±350PPM	Natural resistance change per temperature degree centigrade $[R_2-R_1 \div R_1(t_2-t_1)] \times 10^6$(ppm/°C) Resistance value @ room temperature: R_1: (t_1); R_2: +100°C (t_2) Test pattern: room temp.,room temp. +100°C
Dielectric Withstanding Voltage	350V w/ no evidence of flashover,mechanical damage, arcing, or insulation breakdown	Resistors shall be clamped in the trough of a 90°, metallic V-block & shall be tested @ AC potential respectively specified in the above list for 60 + 10/-0 seconds.
Temperature Cycling	Resistance change rate is ±(2%+0.05Ω) maximum with no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty cycle specified below. Step 1: -55°C ± 3°C for 30 minutes Step 2: room temp. for 10~15 minutes Step 3: +155°C ± 2°C for 30 minutes Step 4: room temp. for 10~15 minutes
Humidity (Steady State)		Temporary resistance change after 240 hours of exposure in a humidity test chamber controlled @ 40°C±2°C & 90~95% relative humidity.
Short-Time Overload	Resistance change rate is N: ±(2%+0.05) max. S: ±(5%+0.05) maximum with no evidence of mechancial damage.	Permanent resistance change after the application of a potential of 2.5 x RCWV or the max. overload voltage respectively specified in the above list, whichever less for 5 seconds
Pulse Overload		Resistance change after 10,000 cycles (1 second "on", 25 seconds "off") @ 4 x RCWV or the max. pulse overload voltage.
Load Life in Humidity	Resistance change rate is (5%+0.05Ω) maximum with no evidence of mechanical damage	Resistance change after 1,000 hrs operating @ RCWV w/duty cycle of 1.5 hrs "on", 0.5 hr "off" in a humidity test chamber controlled @ 40°C±2°C & 90~95% relative humidity
Load Life		Permanent resistance change after 1,000 hrs operating @ RCWV w/duty cycle of 1.5 hrs "on", 0.5 hr "off" @ 70°C ± 2°C ambient

XICON™ Passive Components



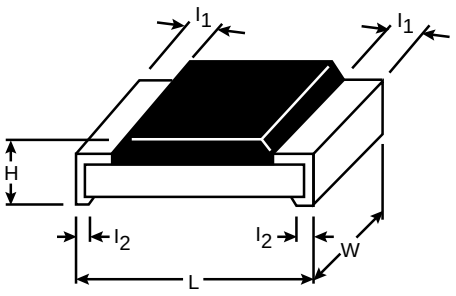
Dimensions (mm)

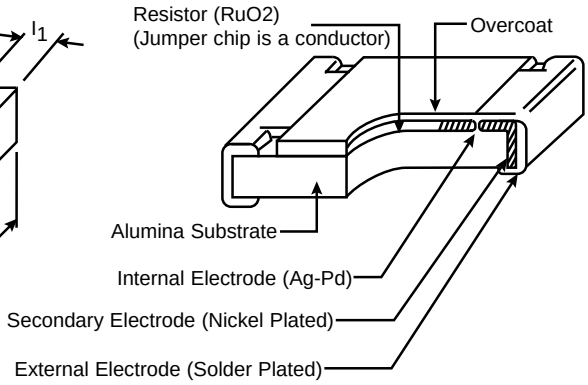
Specifications:
- Max. working voltage: 350V
- Max. overload: 600V
- Resistance range: 0.3Ω ~ 50KΩ
- Rated power: 2 watts

Features:
- Excellent flame retardant coating
- Stable performance in diverse environments
- High purity ceramic core
- Meet EIAJ-RC2655A requirements

Characteristics	Limits	Test Method (JIS-C-5202)
Terminal Strength	No evidence of mechanical damage	Direct load: resistance to a 2.5kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads Twist test: terminal leads shall be bent through 90° @ a point of about 6mm from the body of the resistor & shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations
Resistance to Soldering Heat	Resistance change rate is ±(1%+0.05Ω) max. w/ no evidence of mechanical damage	Permanent resistance change when leads immersed to 3.2~4.8mm from the body in 350°C solder for 3±0.5 seconds
Solderability	95% coverage min.	The area covered w/ a new, smooth, clean, shiny, & continuous surface free from concentrated pinholes. Test temperature of solder: 235°C±5°C Dwell time in solder: 3+0.5/-0 seconds
Resistance to Solvent	No deterioration of protective coatings and markings	Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic.
Flame Retardant	No evidence of flaming or arcing	Resistors shall resist flaming or arcing when overloaded up to 16 x RCWV.

Characteristics	Limits	Test Method (JIS-C-5202)
Temperature Coefficient	±350PPM	Natural resistance change per temperature degree centigrade $[R_2-R_1 \div R_1(t_2-t_1)] \times 10^6$(ppm/°C) Resistance value @ room temperature: R_1: (t_1); R_2: +100°C (t_2) Test pattern: room temp.,room temp. +100°C
Dielectric Withstanding Voltage	350V w/ no evidence of flashover,mechanical damage, arcing, or insulation breakdown	Resistors shall be clamped in the trough of a 90°, metallic V-block & shall be tested @ AC potential respectively specified in the above list for 60 + 10/-0 seconds.
Temperature Cycling	Resistance change rate is ±(2%+0.05Ω) maximum with no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty cycle specified below. Step 1: -55°C ± 3°C for 30 minutes Step 2: room temp. for 10~15 minutes Step 3: +155°C ± 2°C for 30 minutes Step 4: room temp. for 10~15 minutes
Humidity (Steady State)		Temporary resistance change after 240 hours of exposure in a humidity test chamber controlled @ 40°C±2°C & 90~95% relative humidity.
Short-Time Overload	Resistance change rate is N: ±(1%+0.05) max. S: ±(5%+0.05) max.w/ no evidence of mech. damage.	Permanent resistance change after the application of a potential of 2.5 x RCWV or the max. overload voltage respectively specified in the above list, whichever less for 5 seconds
Pulse Overload	Resistance change rate is N: ±(2%+0.05) max. S: ±(5%+0.05) max.w/ no evidence of mech. damage.	Resistance change after 10,000 cycles (1 second "on", 25 seconds "off") @ 4 x RCWV or the max. pulse overload voltage.
Load Life in Humidity	Resistance change rate is (5%+0.05Ω) maximum with no evidence of mechanical damage	Resistance change after 1,000 hrs operating @ RCWV w/duty cycle of 1.5 hrs "on", 0.5 hr "off" in a humidity test chamber controlled @ 40°C±2°C & 90~95% relative humidity
Load Life		Permanent resistance change after 1,000 hrs operating @ RCWV w/duty cycle of 1.5 hrs "on", 0.5 hr "off" @ 70°C ± 2°C ambient





Marking diagram

1% marking
Value = 10KΩ

Electrical Specifications:

- Operating temp. range: -55°C to +125°C
- Derated to 0 load @: +125°C
- Maximum working voltage: 150V
- Maximum overload voltage: 300V
- Resistance range 1%, E-96: 10Ω - 1MΩ

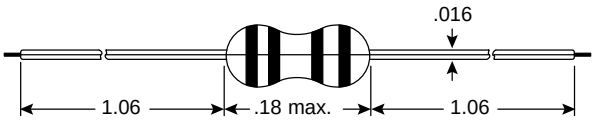
Marking Explanation:

- 1% tolerance: 4 digits, first three digits are significant, forth digit is number of zeros. Letter R is decimal point.

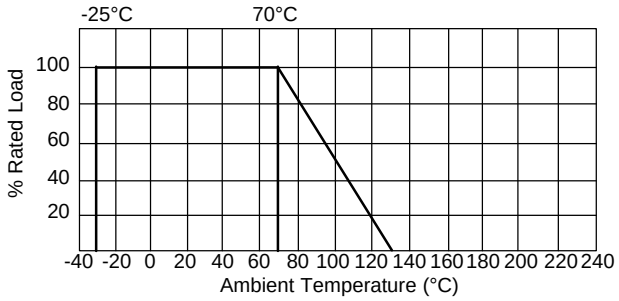
Size Code	L	W	H	I_1	I_2
RC05 (0805)	.079±.006 (2.00±.15)	.049±.004 (1.25±.10)	.020±.004 (.50±.10)	.016±.008 (.40±.20)	.016±.008 (.40±.20)

Environmental Characteristics

Performance Test	Test Method	1% Tolerance	5% Tolerance
Temperature Coefficient (by Type)	MIL-STD-20F, Method 304 -55°C to +125°C	±100ppm/°C	±200ppm/°C
Thermal Shock	MIL-STD-202F, Method 107 5 cycles, -55°C to +125°C	±(.5%, .05Ω)	±(1.0%, +.05Ω)
Low Temperature Operation	MIL-R-55342D, Para 4.7.4 One hour @ -55°C followed by 45 minutes RCWV	±(.5%, .05Ω)	±(1.0%, +.05Ω)
Short Time Overload	MIL-R-55342D, Para 4.7.5 2.5 x RCWV for 5 seconds	±(1.0%, .05Ω)	±(2.0%, +.05Ω)
High Temperature Exposure	MIL-R-55342D, Para 4.7.6 125°C for 100 hours	±(1.0%, .05Ω)	±(2.0%, +.1Ω)
Resistance to Soldering Heat	MIL-R-55342D, Para 4.7.7 Soldered to test board @ 260°C for 10 seconds	±(.5%, .05Ω)	±(1.0%, +.05Ω)
Moisture Resistance	MIL-STD-202F, Method 106 10 cycles. Total 240 hours	±(.5%, .05Ω)	±(2.0%, +.05Ω)
Life	MIL-STD-202F, Method 108A 1000 hours @ 70°C RCWV intermittent	±(1.0%, .05Ω)	±(3.0%, +.1Ω)
Solderability	MIL-STD-202F, Method 208 230°C for 5 seconds	95% min. coverage	95% min coverage
Bending Strength	Unit mounted in center of 90mm board length, deflected 5mm in either direction for 10 seconds	±(1.0%+.05Ω)	±(1.0%+.05Ω)



Dimensions (mm)



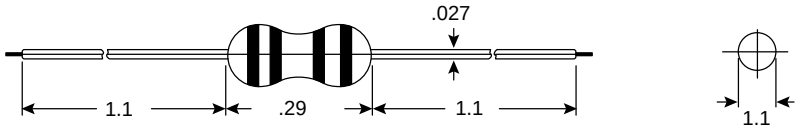
Specifications:

- Power rating: 70°C 1/8W
- Working voltage: 150V max.
- Overload voltage: 300V max.
- Resistance value: 10Ω min. ~ 1MΩ max.

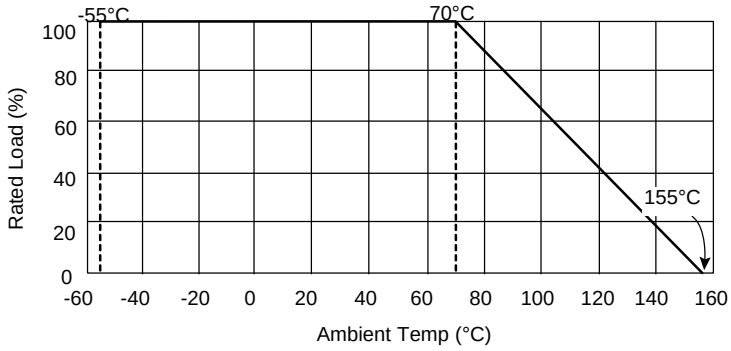
Characteristics

Item	Test Method	Limits
Max. Resistance Coefficient (ppm/°C)	$\frac{\Delta R}{R} \times \frac{1}{\Delta t} \div 104$ (ppm/°C) R: Resistance at room temperature Δt: room temperature +50°C ΔR: R- (resistance at room temperature / 50°C)	Less than 100kΩ +350 ~ -500 100kΩ ~ 1MΩ +0 ~ -700 1MΩ over +0 ~ -1000
Short Time Overload	2.5 time the rated AC or DC voltage shall be applied for 5 seconds	± (1.0% .050)
Load Life in Humidity	Application of the rated DC voltage @ 40°C 90~95% RH with a period of 1 5 hrs "ON" and 0 5 hrs "OFF" shall be repeated for 500 12 hrs	±10%
Load Life	Application of the rated DC voltage at 70°C with a period of 1 5 hrs "ON" and 0 5 hrs "OFF" shall be repeated for 1000 times	±5 ~ ±8%
Effective of Soldering	The lead of a resistor shall be dipped in 350°C solder at the height of 3 2~4 8 m/m from the body of the resistor for 3 seconds	±(1.0% .050)
Temperature Cycling	Temperature cycling between -22°C and 85°C shall be repeated 5 times	±(1.0% .050)
Vibration Durability	A vibration (amplitude .75m/m frequency 10-55Hz with a cycle of one minute) shall be applied to 3 directions perpendicular to each other for 6 hours with each direction for 2 hours	±(1.0% .050)
Pulse Characteristics	Application of 4 times the rated voltage shall be repeated 10,000 times with a cycle of 1 seconds "ON" and 25 seconds "OFF"	±(1.0% .050)
Noise	Noise shall be measured at room temperature with the rated voltage	Less than 10kΩ 0.2μV/V 10kΩ ~100kΩ 0.4μV/V 100kΩ ~ 1MΩ 0.6μV/V 1MΩ over 1.5μV/V
Withstand Voltage	A resistor shall be place on a metal V-block and be applied with Δf voltage for 5 seconds	NA 1 W 500V NA 1 W 750V NA 1 W 1,000V

Dimensions (In.)



Derating Curve



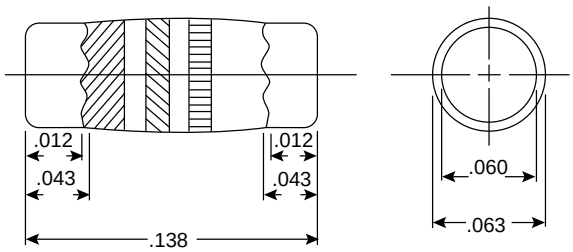
Specifications:

- Temperature coefficient: +350 ~ -1000 ppm/°C
- Load life: ±35%
- Moisture load: ±5%
- Short-time overload: ±(1% +0.05)
- Temperature cycling: ±(1% +0.05)
- Effect of soldering: ±(1% +0.05)
- Intermittent overload: ±(1% +0.05)
- Tolerance: J (±5%)
- Power rating: 1/4W @ 70°C
- Max. working voltage: 250V
- Max. overload voltage: 500V

Mouser	R-Ω	Piher	Stackpole	Dale
ME295	R-25	PR-25	CF07	SBB

Table of Values in (Ω)

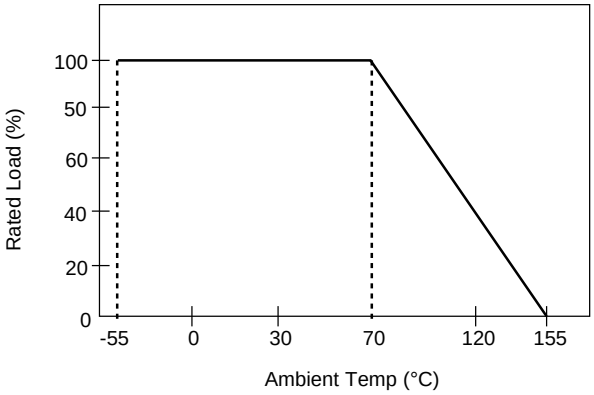
0.5	6.2	39	240	1.5K	9.1K	300K	1.8M
1.0	6.8	43	270	1.6K	10K	330K	2.0M
1.1	7.5	47	300	1.8K	11K	360K	2.2M
1.2	8.2	51	330	2.0K	12K	390K	2.4M
1.5	9.1	56	360	2.2K	13K	430K	2.7M
1.6	10	62	390	2.4K	15K	470K	3.0M
1.8	11	68	430	2.7K	16K	510K	3.3M
2.0	12	75	470	3.0K	91K	560K	3.6M
2.2	13	82	510	3.2K	100K	620K	3.9M
2.4	15	91	560	3.3K	110K	680K	4.3M
2.7	16	100	620	3.6K	120K	720K	4.7M
3.0	18	110	680	3.9K	130K	820K	5.1M
3.3	20	120	750	4.3K	150K	910K	5.6M
3.6	22	130	820	4.7K	160K	1.0M	6.2M
3.9	24	150	910	5.6K	180K	1.1M	6.8M
4.3	27	160	1.0K	6.2K	200K	1.2M	7.5M
4.7	30	180	1.1K	6.8K	220K	1.3M	8.2M
5.1	33	200	1.2K	7.5K	240K	1.5M	9.1M
5.6	36	220	1.3K	8.2K	270K	1.6M	10M



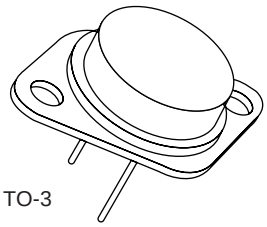
Dimensions (In.)

Table of Values (Ω)

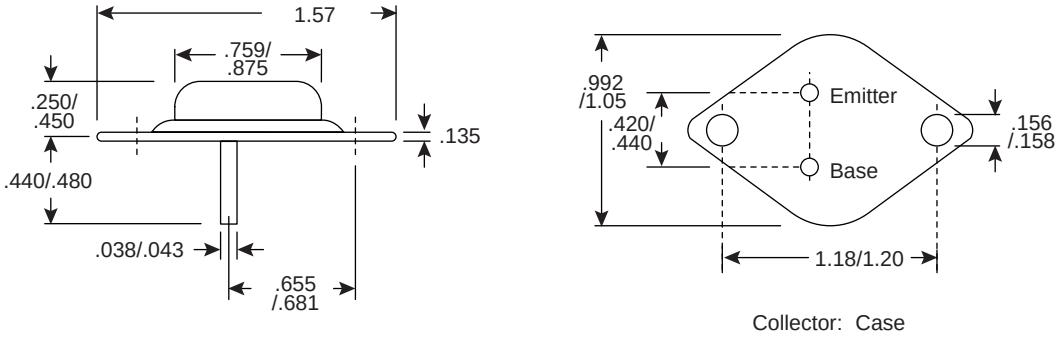
2.2	22	220	1.5K	10K	68K	470K
2.7	27	270	1.8K	12K	82K	560K
4.7	33	330	2.2K	15K	100K	680K
5.6	39	390	2.7K	18K	120K	820K
6.8	47	470	3.3K	22K	150K	1M
8.2	56	560	3.9K	27K	180K	
10	68	680	4.7K	33K	220K	
12	82	820	5.6K	39K	270K	
15	150	1K	6.8K	47K	330K	
18	180	1.2K	8.2K	56K	390K	



Characteristics	Test Method	Requirements	
		ME296-Series	MRN
Resistor Range	(E-24 series)	22 ~ 1M	10 ~ 510K
Anti Solvent	JLS-C-5202. 4. 1	no remarkable change	no remarkable change
Temp. Cycling	-55°C to +155°C 5 cycles	±(1% + 0.05Ω)	±(0.5% + 0.05Ω)
Short Time Overload	rated voltage x 2.5, 5 sec.	±(1% + 0.05Ω)	±(1% + 0.05Ω)
Intermittent Overload	rated votlage x 4, 1000 cycles	±(1% + 0.05Ω)	±(1% + 0.05Ω)
Terminal Strength	EIAJ-RC-8008	±(1% + 0.05Ω)	±(1% + 0.05Ω)
Resistance to Soldering Heat	260°C, 5 sec.	±(1% + 0.05Ω)	±(0.5% + 0.05Ω)
Solderability	230°C, 3 sec.	75% min. coverage	75% min. coverage
Humidity Load Life	40°C, 90-95% RH, 1000hr	±(5% + 0.05Ω)	±(2% + 0.05Ω)
Load Life	70°C, 1000hr	±(3% + 0.05Ω)	±(2% + 0.05Ω)
T.C.R.	less than 10	±350ppm/°C	+50ppm/°C +100ppm/°C
	10 - 1K	-150 ~ -350ppm/°C	
	1.1K - 47K	-150 ~ -600ppm/°C	
	51K - 510K	-150 ~ -1000ppm/°C	
	560K - 1M	-150 ~ -1500ppm/°C	



TO-3

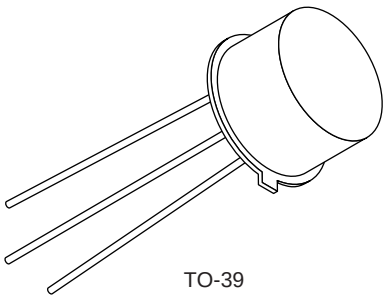


Collector: Case

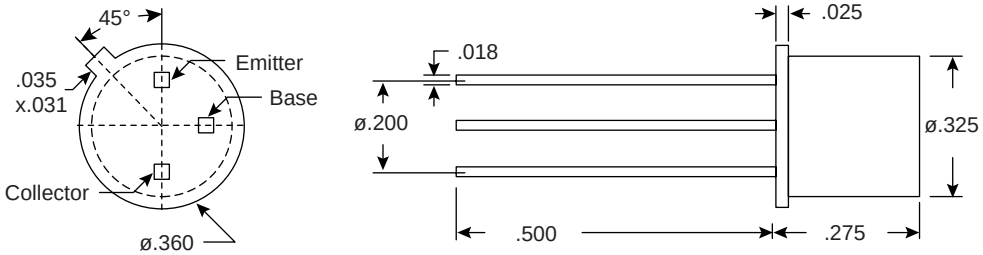
Dimensions (In.)
(Minimum/Maximum)

Specifications:

- Type: NPN power switching
- V_{CBO}: 650V (333-2N6546)
  850V (333-2N6547)
- V_{CEO}: 300V (333-2N6546)
  400V (333-2N6547)
- P_D: 175W
- H_{FE} (min./max.): 12/60
- I_C/V_{CE}: 5.0A/2V
- $V_{CE\ (SAT)}$: 1.5V
- I_C/I_B: 10.0A/2000mA



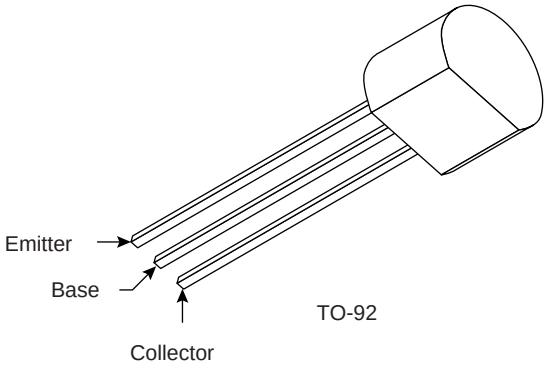
TO-39

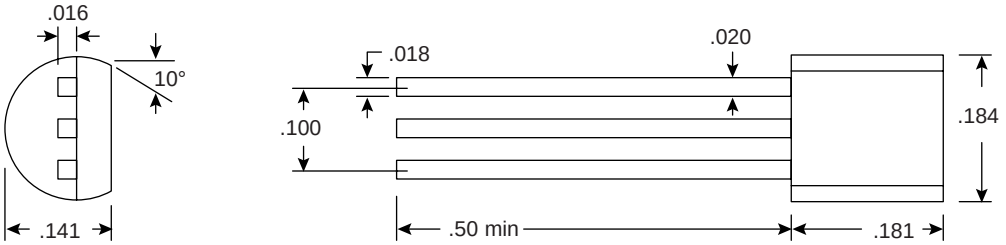


Dimensions (In.)

Specifications:

- Type: PNP general purpose small signal
- V_{CEO}: 60V
- I_C: 0.6A
- Pd: 600mW
- H_{FE}: 100 min., 300 max. with V_{CE} @ 10V & I_C @ 150mA
- V_{CE}(sat): 1.6V max. with I_C @ 0.5A
- fT: 200MHz min.
- Cob: 8pF max.

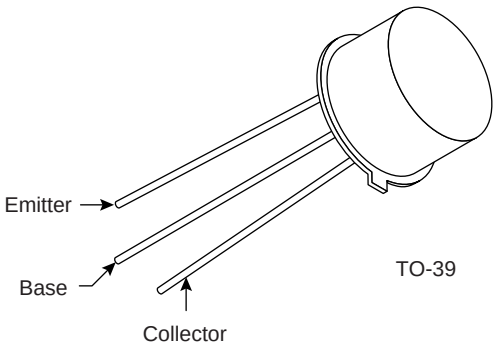


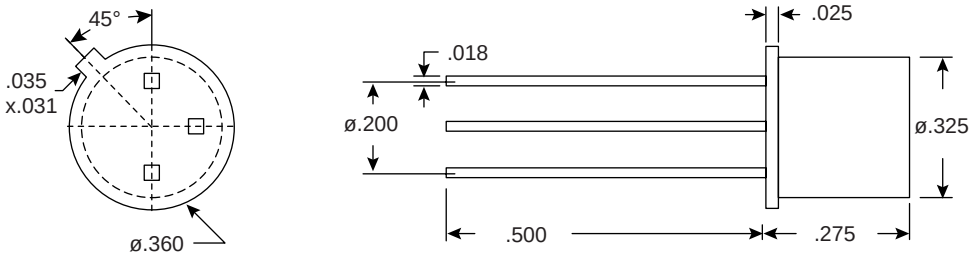


Dimensions (In.)

Specifications:

- Type: NPN general purpose small signal
- V_{CEO}: 25V
- P_D: 360mW
- I_C: 100mA
- H_{FE}: 150 min., 300 max. with V_{CE} @ 4.5V & I_C @ 2mA
- C_{OB}: 10pF max.

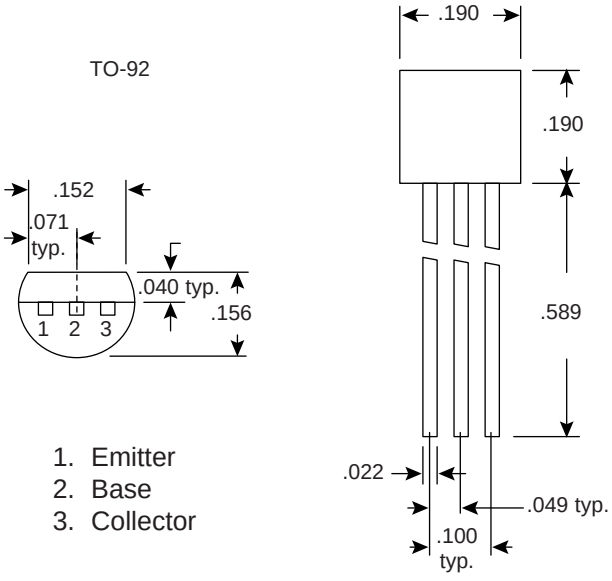




Dimensions (In.)

Specifications:

- Type: NPN general purpose small signal
- V_{CEO}: 40V
- I_C: 0.7A
- Pd: 1000mW
- H_{FE}: 50 min., 250 max. with V_{CE} @ 10V & I_C @ 150mA
- V_{CE}(sat): 1.4V max. with I_C @ 0.15A
- fT: 100MHz min.
- Cob: 15pF max.



Dimensions (In.)

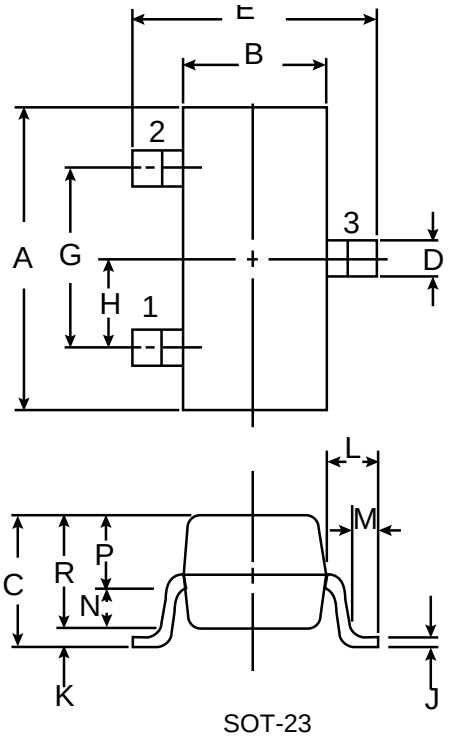
Specifications:

- Type: PNP general purpose small signal
- Junction temperature (TJ): 150°C
- Storage temperature (TSTG): -50 ~ 150°C

Maximum Ratings				Electrical Characteristics (T_A=25°C)								
BV_{CBO} BV_{CES}	BV_{CEO} BV_{CES}	I_C	P_D	I_{CBO} I_{CES} $+I_{CEX}$	Max. V_{CB} V_{CE} $+V_{CE}$	h_{FE} Typ. min./ max.	I_C	V_{CE}	V_{CESAT}	Max. I_C	Max. I_B	f_T min. Typical
40V	40V	600mA	625mW	100nA	35V	100/300	150mA	2V	0.4V	150mA	15mA	200MHz

MOUSER® ELECTRONICS

333-2N3906S PNP General Purpose SS Transitor



SOT-23

Dim.	Inches	
	Min.	Max.
A	.110	.120
B	.049	.053
C	.038	.044
D	.015	.021
E	.091	.098
G	.075	
H	.036	.039
J	.004	.006
K	.0004	.0043
L	.018	.024
M	.008	-
N	.010	.012
P	.026	.028
R	.037	.039

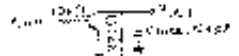
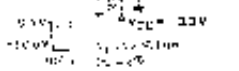
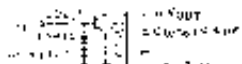
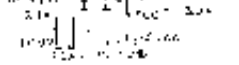
1. Emitter 2. Base 3. Collector

Features:
- Low leakage cureent
- Excellent DC current gain linarity
  Low saturation voltage
- Low collector output capacitance

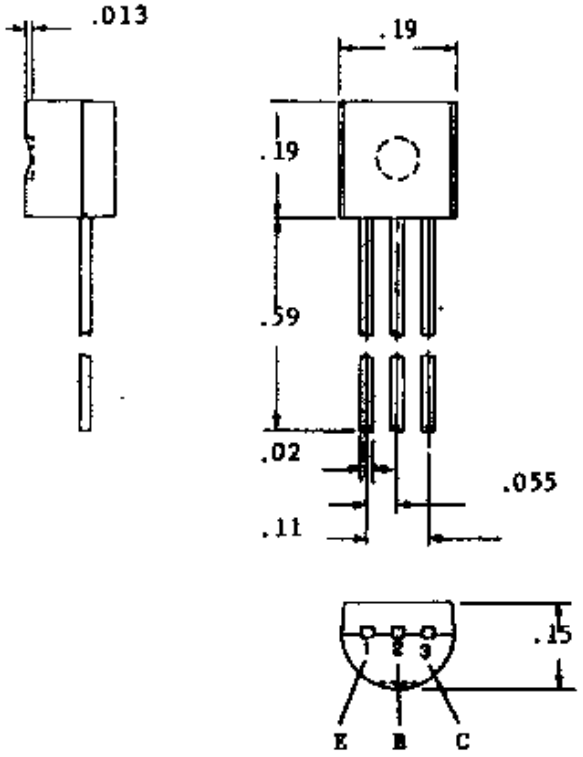
Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector Current	I_C	-200	mA
Base Current	I_B	-50	mA
Collector Power Dissipation (Ta=25°C)	P_C	350	mW
Junction Temperature	T_j	150	°C
Storage Temperature Ragne	T_{stg}	-55~150	°C

Electrical Characteristics (Ta=25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector Cut-off Current		I_{CEX}	V_{CE}=-30V, V_{BE}=3V	-	-	-50	nA
Base Cut-off Current		I_{BL}	V_{CE}=-30V, V_{BE}=3V	-	-	50	nA
Collector-base Breakdown voltage		$V_{(BR)CBO}$	I_C=-10μA, I_E=0	-40	-	-	V
Collector-Emitter Breakdown Voltage		$V_{(BR)CEO}$	I_C =-10μA, I_B=0	-40	-	-	V
Emitter-Base Breakdown Voltage		$V_{(BR)EBO}$	I_E=-10μA, IC=0	-5	-	-	V
DC Current Gain		$h_{FE(1)}$	V_{CE}=-1V, I_C=-0.1mA	60	-	-	-
		$h_{FE(2)}$	V_{CE}=-1V, I_C=-1mA	80	-	-	
		$h_{FE(3)}$	V_{CE}=-1V, I_C=-10mA	100	-	300	
		$h_{FE(4)}$	V_{CE}=-1V, I_C=-50mA	60	-	-	
		$h_{FE(5)}$	V_{CE}=-1V, I_C=-100mA	30	-	-	
Collector-Emitter Saturation Voltage		$V_{CE(sat)1}$	I_C=-10mA, I_B=-1mA	-	-	-0.25	V
		$V_{CE(sat)2}$	I_C=-50mA, I_B=-5mA	-	-	-0.4	
Base-Emitte Saturation Voltage		$V_{BE(sat)1}$	I_C=-10mA, I_B=-1mA	-0.65	-	-0.85	V
		$V_{BE(sat)2}$	I_C=-50mA, I_B=-5mA	-	-	-0.95	
Transition Frequency		f_T	V_{CE}=-20V, I_C=-10mA f=100MHz	250	-	-	MHz
Collector Output Capacitance		C_{ob}	V_{CB}=-5V, I_E=0, f=1MHz	-	-	4.5	pF
Input Capacitance		C_{ib}	V_{EB}=-0.5V, I_C=0, f=1MHz	-	-	10	pF
Input Impenance		h_{ie}	V_{CE}=-10V, I_C=-0.1mA f=1kHz	2.0	-	12	kΩ
Voltage Feedback Ratio		h_{re}		1.0	-	10	x10-/4
Small-Signal Current Gain		h_{fe}		100	-	400	
Collector Output Admittance		h_{oe}		3.0	-	60	μU
Noise Figure		NF	V_{CE}=5V, I_C=0.1mA Rg=1kΩ, f=10Hz~15.7Hz	-	-	4	dB
Switching Time	Delay Time	t_d		-	-	35	ns
	Rise Time	t_r		-	-	35	
	Storage Time	t_{stg}		-	-	225	
	Fall Time	t_f		-	-	75	

TO-92 PACKAGE DIMENSIONS



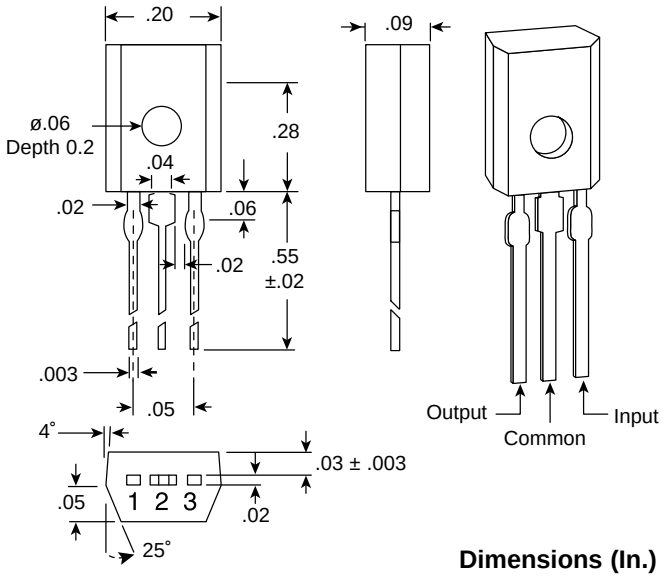
NPN OR PNP	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS (TA = 25°C)										
	BVceo * BVces (V)	BVcbo * BVcer (V)	Ic (mA)	Po (mW)	Icbo * Iceo + Iebo (nA)	MAX Vce * Vce + Veb (V)	hFE *TYPICAL MIN	hFE *TYPICAL MAX	Ic (mA)	Vce (V)	VCE(SAT) (V)	MAX Ic (mA)	MAX Ib (mA)	ft MIN *TYPICAL (MHz)	Cob MAX *TYPICAL (pF)
NPN	200	200	500	625	100	100	40	—	10	10	0.5	20.	2	50	3

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)

Maximum Ratings (Ta = 25°C)

- Input voltage (V_{IN}): 35V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C



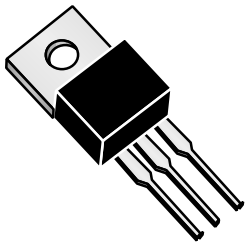
Dimensions (In.)

Electrical Characteristics
(Unless otherwise specified, V_{IN}=10V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		4.8	5.0	5.2	V
Input Regulation	Reg. Line	Tj=25°C	7.0V ≤ V_{IN} ≤20V	-	55	150	mV
			8.0V ≤ V_{IN} ≤ 20V	-	45	100	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	11	60	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	5.0	30	
Output Voltage	V_{OUT}	7.0V ≤ V_{IN} ≤ 20V 1.0mA ≤ I_{OUT} ≤ 40mA		4.75	-	5.25	V
		V_{IN} ≤ 10V, 1.0mA ≤ I_{OUT} ≤ 70mA		4.75	-	5.25	
Quiescent Current	I_B	Tj=25°C		-	3.1	6.0	mA
		Tj=125°C		-	-	5.5	
Quiescent Current Change	ΔI_B	8.0V ≤ V_{IN} ≤ 20V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	40	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	56	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 8.0V ≤ V_{IN} ≤ 18V, Tj=25°C		41	12	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.6	-	mV/°C

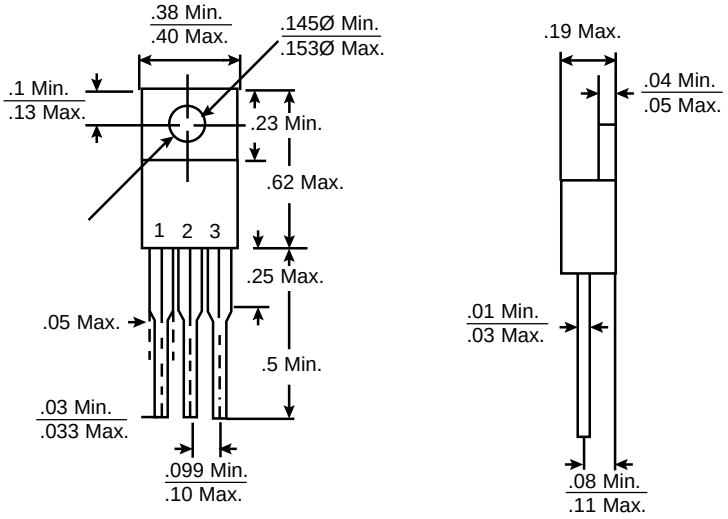
MOUSER® ELECTRONICS

333-IRF510
333-IRF511 N-Channel
333-IRF512 Power Mosfet
333-IRF513



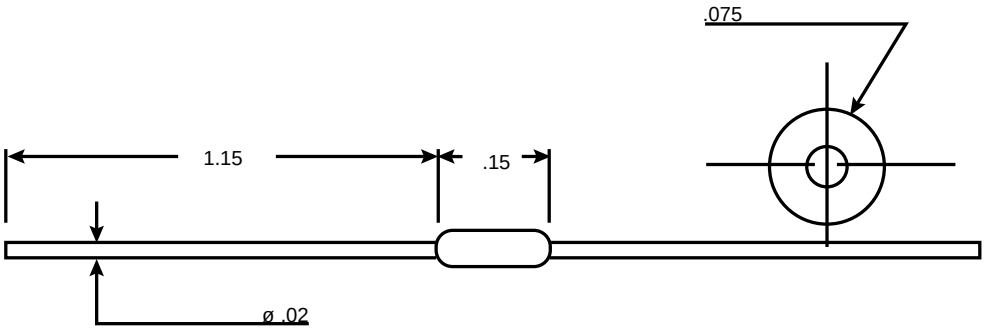
TO-220

Dimensions (In.)



1. Gate 2. Drain 3. Source

Mouser Stock No.	Drain Source Voltage (V)	On-state Resistance (Ω)	Continuous Drain Current (A)	Max Power Dissipation (watts)
333-IRF510	100	.60	4.0	20
333-IRF511	60	.60	4.0	20
333-IRF512	100	.80	3.5	20
333-IRF513	60	.80	3.5	20



DO-7 Package

Specifications:

- Peak reverse voltage: 60V
- Maximum forward voltage: 1.0V
- Maximum forward current: 8.5mA @ Vf max
- Reverse leakage current: 15µA
- Junction temperature: 70°C
- Storage temperature: -55° ~ +70°C

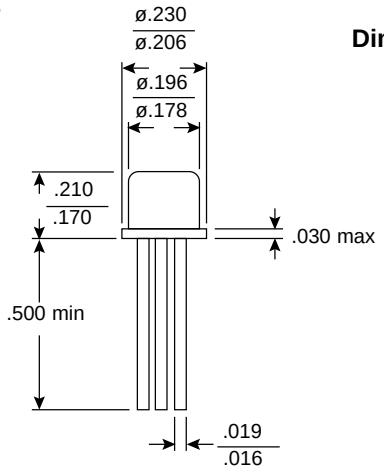
MOUSER® ELECTRONICS

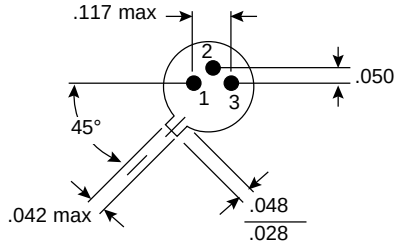
333-2N930

NPN General Purpose Signal Switch

TO-18

Dimensions (In.)





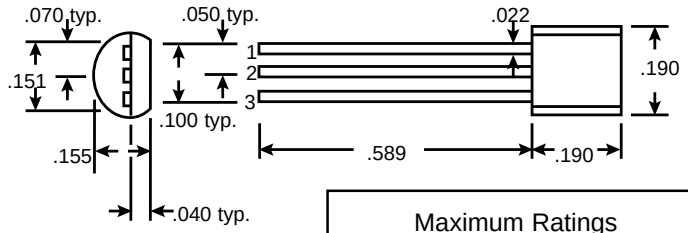
Pin	
1	Emitter
2	Base
3	Collector

Mouser Stock No.	V_{CEO} (V) min	V_{CBO} (V) min	V_{EBO} (V) min	hFE @ bias min/max	I_C (mA)	V_{CE} (V)	I_{CM} (mA) max	P_{TA} (mW) max	P_{TC} (W) max	I_{CBO} (µA) max @	V_{CB} (V)	$V_{CE(sat)}$ (V) max @	I_C (mA)	fT (MHz) typ	Cob (pf) max
333-2N930	45	45	5	100/300	.01	5	30	300	-	.010	45	1.00	10	30	8

MOUSER® ELECTRONICS

333-MPSA05
333-MPSA06
333-MPSA55
333-MPSA56

Medium Power Transistor



Dimensions (In.)

1. Emitter
2. Base
3. Collector

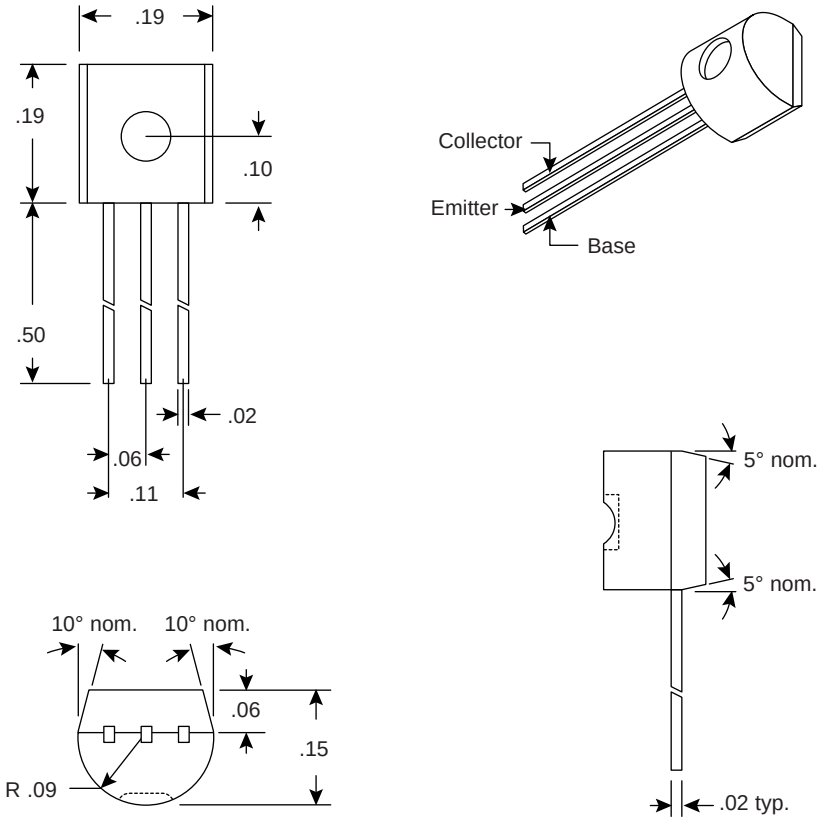
Maximum Ratings	Symbol	MPSA05 MPSA55	MPSA06 MPSA56	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Collector-Base Voltage	V_{CBO}	80	80	Vdc
Emitter-Base Voltage	V_{EBO}	4.0		Vdc
Collector Current (Continuous)	I_C	500		mAdc
Total Device Dissipation @ T_A = 25°C Derate Above 25°C	P_D	625 6.0		mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate Above 25°C	P_D	1.5 12		Watts mW/°C
Operating and Storage Junction Temperature Range	T_j, T_{stj}	-55 to +150		°C

Electrical Characteristics (T_A = 25°C unless otherwise noted)

Characteristics		Symbol	Min	Max	Unit
Off Characteristics					
Collector - Emitter Breakdown Voltage(1) (I_C = 1.0 mAdc, I_B = 0)	MPSA05, MPSA55 MPSA06, MPSA56	$V_{(BR)CEO}$	60 80	- -	Vdc
Emitter - Base Breakdown Voltage (I_E = 100µAdc, I_E = 0)		$V_{(BR)EBO}$	4.0	-	Vdc
Collector Cutoff Current (V_{CE} = 60Vdc, I_E = 0)		I_{CEO}	-	0.1	uAdc
Collector Cutoff Current (V_{CB} = 60Vdc, I_E = 0) (V_{CB} = 60Vdc, I_E = 0)	 MPSA05, MPSA55 MPSA06, MPSA56	I_{CBO}	 - -	 0.1 0.1	uAdc
On Characteristics					
DC Current Gain (I_C = 10 mAdc, V_{CE} = 1.0Vdc) (I_C = 60Vdc, I_E = 0)		h_{FE}	 50 50	 - -	
Collector-Emitter Saturation Voltage (I_C = 100mAdc, I_B = 1.0Vdc)		$V_{CE(sat)}$	-	0.25	Vdc
Base-Emitter On Voltage (I_C = 100mAdc, V_{CE} = 1.0Vdc)		$V_{BE(ON)}$	-	1.2	Vdc
Small Signal Characteristics					
Current Gain-Bandwidth Product(2) (I_C = 10 mA, V_{CE} = 2.0V, f = 100MHz) (I_C = 100mAdc, V_{CE} = 1.0Vdc, f = 100MHz)	 MPSA05 MPSA06 MPSA55 MPSA56	f_T	 100 50	 - -	MHz

(1) Pulse Test: Pulse width - 300µS. Duty Cycle = 2.0%
(2) f_T is defined as the frequency at which h_{FE} extrapolated to unity.

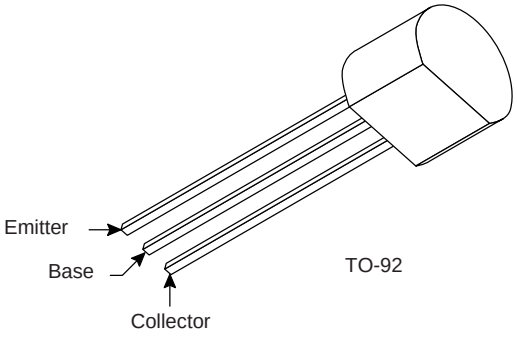
6-7-95

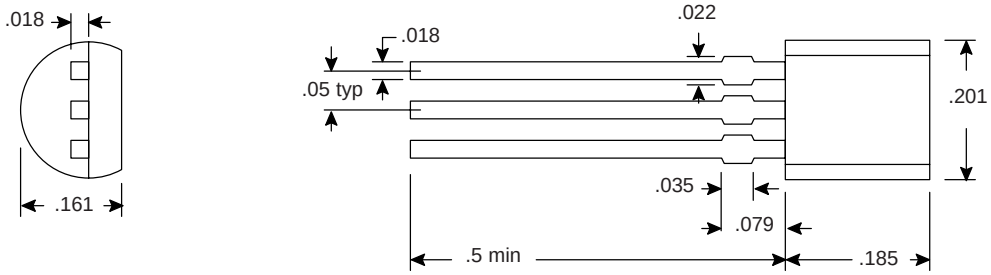


Dimensions (In.)

Specifications: • Device type: NPN • Material: silicon

Maximum Ratings				Electrical Characteristics (T_A=25°C)									
BV_{CBO} BV_{CES}	BV_{CBO} BV_{CES}	I_C	P_D	I_{CBO} I_{CES} $+I_{CEX}$	Max. V_{CB} V_{CE} $+V_{CE}$	h_{FE} Typ.	I_C	V_{CE}	V_{CESAT}	Max. I_C	Max. I_B	f_T min. Typical	C_{OB} max. Typical
30V	25V	50mA	350mW	100nA	25V	60 min.	4mA	10V	0.5V	4mA	.4mA	650MHz	0.7pF

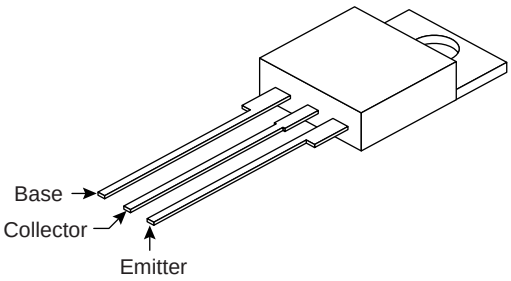


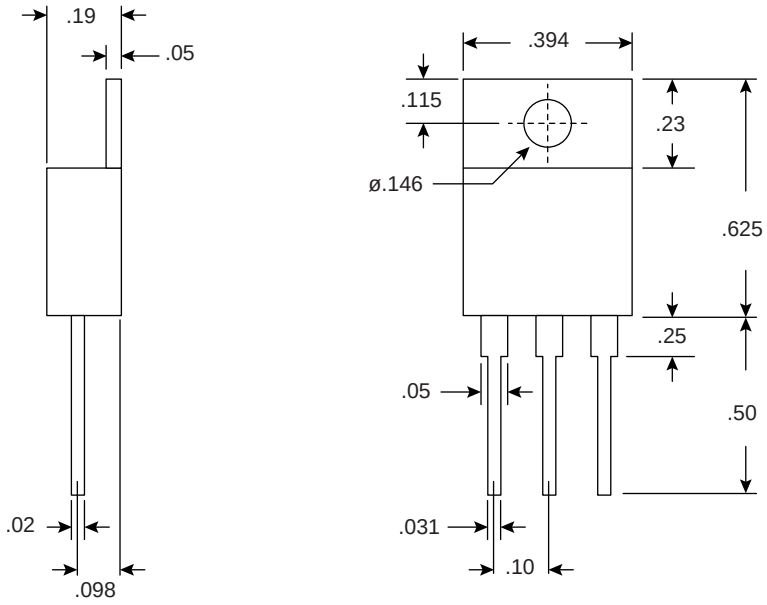


Dimensions (In.)

Specifications:

- Type: PNP high-volt amp
- V_{CEO}: -120V
- I_C: -600mA
- H_{FE}: 40~180V (V_{CE} = -5V, I_C = -10mA)
- V_{CE}(sat): 0.2V (I_C = -10mA, I_B = -1mA)
- f_T: 50MHz min. (V_{CE} = -10V, I_C = -10mA)
- P_D: 625mW
- C_{OB}: 12pF max. (V_{CB} = -10V, f = 1MHz)

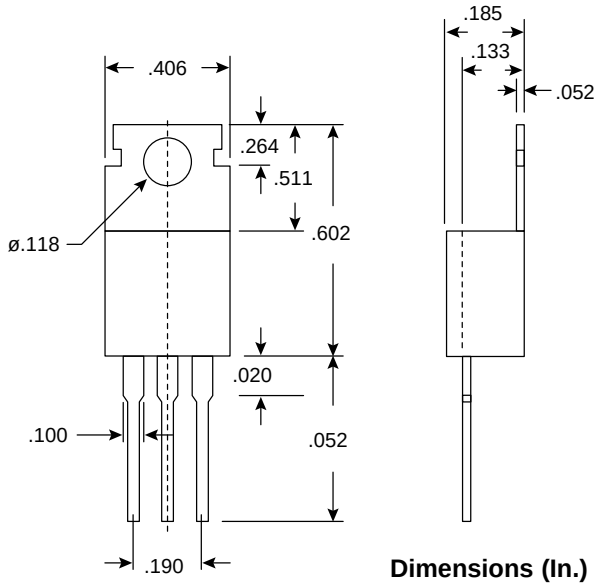




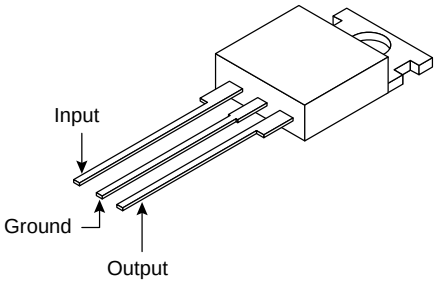
Dimensions (In.)

Specifications:

- Type: TO-220 NPN high voltage switching
- I_C: 5A
- V_{CBO}: 400V
- V_{CEO}: 300V
- P_D: 80W
- H_{FE}: 10 min., 75 max.
- I_C/V_{CE}: 2.5A/10V
- V_{CE} (sat): 1.5V
- I_C/I_B: 2.5A/500mA



Dimensions (In.)



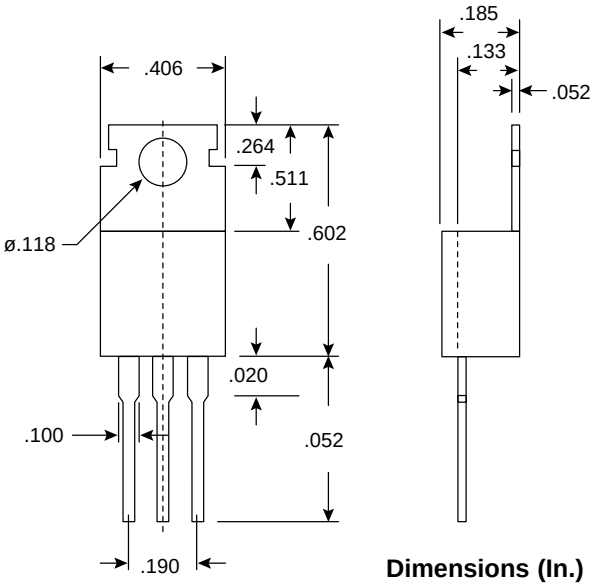
Maximum Ratings (Ta=25°C)

Specifications:

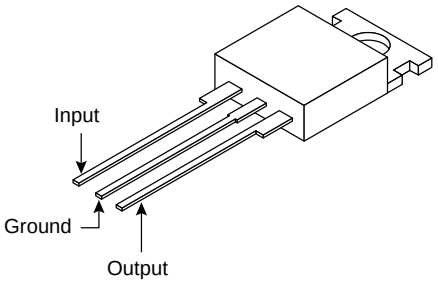
- Suitable for C-MOS, TTL, the other digital IC's power supply
- Internal thermal overload protection
- Internal short circuit current limiting
- Output current in excess of 1A
- Input Voltage (V_{IN}): 35V
- Power Dissipation (P_D): 20.8W (T_C=25°C)
- Operating Temperature (T_{opr}): -30~75˚C
- Storage Temperature (T_{stg}): -55~150˚C

Electrical Characteristics (V_{IN}=11V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		5.75	6.0	6.25	V
Input Regulation	Reg. line	T_j=25°C	8.0V≤V_{IN}≤25V	-	4	120	mV
			9V≤V_{IN}≤13V	-	2	60	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	15	120	mV
			250mA≤I_{OUT}≤750mA	-	5	60	
Output Voltage	V_{OUT}	8V≤V_{IN}≤21V 5.0mA≤I_{OUT}≤1.0A, P_O<15W		5.7	-	6.3	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.3	8.0	mA
Quiescent Current Change	I_B	8.0V≤V_{IN}≤25V		-	-	1.3	mA
Output Noise Voltage	V_{NO}	Ta=25°C,10Hz≤f≤100kHz I_{OUT}=50mA		-	55	-	µV
Ripple Rejection	RR	f=120Hz, 9V≤V_{IN}≤19V I_{OUT}=50mA, T_j=25°C		61	77	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	1.5	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-0.7	-	mV/deg



Dimensions (In.)



Maximum Ratings (Ta=25°C)

Specifications:

- Suitable for C-MOS, TTL, the other digital IC's power supply
- Internal thermal overload protection
- Internal short circuit current limiting
- Output current in excess of 1A
- Input Voltage (V_{IN}): 35V
- Power Dissipation (P_D): 20.8W (T_C=25°C)
- Operating Temperature (T_{opr}): -30~75˚C
- Storage Temperature (T_{stg}): -55~150˚C

Electrical Characteristics (V_{IN}=19V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

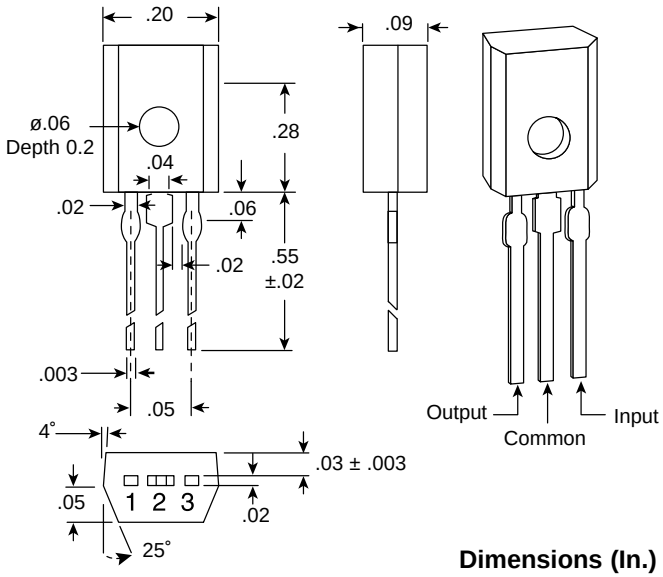
Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		11.5	12.0	12.5	V
Input Regulation	Reg. line	T_j=25°C	14.5V≤V_{IN}≤30V	-	10	240	mV
			16V≤V_{IN}≤22V	-	3	120	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	12	240	mV
			250mA≤I_{OUT}≤750mA	-	4	120	
Output Voltage	V_{OUT}	14.5V≤V_{IN}≤27V 5.0mA≤I_{OUT}≤1.0A, P_O<15W		11.4	-	12.6	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.3	8.0	mA
Quiescent Current Change	I_B	14.5V≤V_{IN}≤30V		-	-	1.0	mA
Output Noise Voltage	V_{NO}	Ta=25°C,10Hz≤f≤100kHz I_{OUT}=50mA		-	90	-	µV
Ripple Rejection	RR	f=120Hz, 15V≤V_{IN}≤25V I_{OUT}=50mA, T_j=25°C		55	71	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	0.7	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-1.6	-	mV/deg

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)

Maximum Ratings (Ta = 25°C)

- Input voltage (V_{IN}): 35V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C



Dimensions (In.)

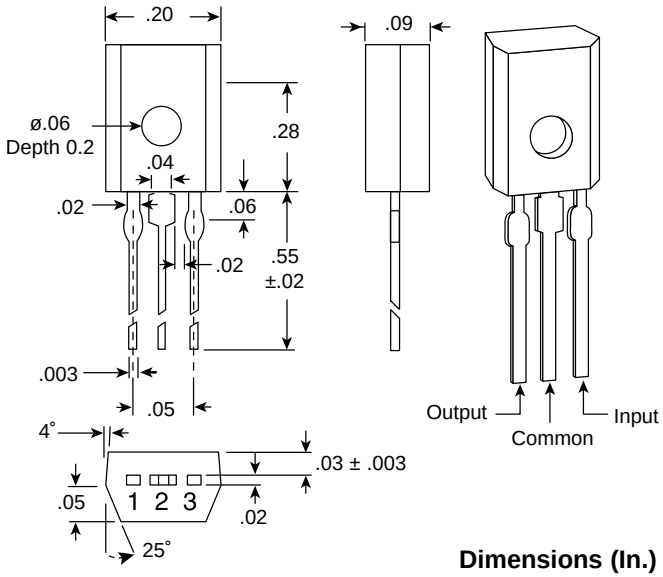
Electrical Characteristics
(Unless otherwise specified, V_{IN}=15V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		8.64	9.0	9.36	V
Input Regulation	Reg. Line	Tj=25°C	11.4V ≤ V_{IN} ≤24V	-	80	200	mV
			12V ≤ V_{IN} ≤ 24V	-	20	160	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	17	90	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	8.0	45	
Output Voltage	V_{OUT}	11.4V ≤ V_{IN} ≤ 24V 1.0mA ≤ I_{OUT} ≤ 40mA		8.55	-	9.45	V
		V_{IN} ≤ 15V, 1.0mA ≤ I_{OUT} ≤ 70mA		8.55	-	9.45	
Quiescent Current	I_B	Tj=25°C		-	3.2	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	11.5V ≤ V_{IN} ≤ 26V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	65	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	21	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 9.0V ≤ V_{IN} ≤ 19V, Tj=25°C		36	44	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.85	-	mV/°C

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)
- Input voltage (V_{IN}): 40V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C

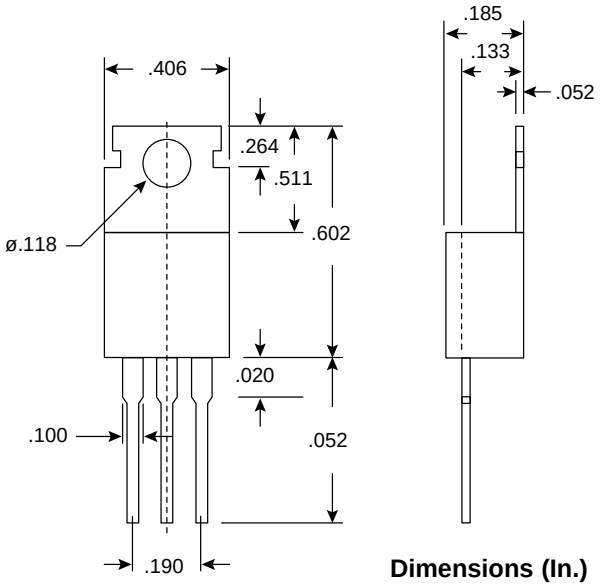
Maximum Ratings (Ta = 25°C)



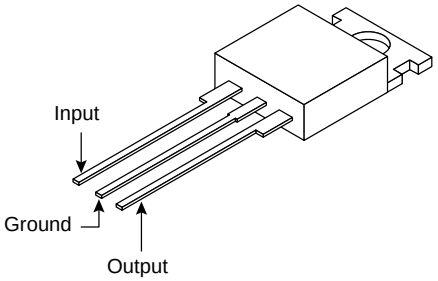
Dimensions (In.)

Electrical Characteristics
(Unless otherwise specified, V_{IN}=29V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		19.2	20	20.8	V
Input Regulation	Reg. Line	Tj=25°C	23.5V ≤ V_{IN} ≤35V	-	33	330	mV
			24V ≤ V_{IN} ≤ 35V	-	28	285	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	33	180	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	17	90	
Output Voltage	V_{OUT}	23.5V ≤ V_{IN} ≤ 35V 1.0mA ≤ I_{OUT} ≤ 40mA		19.0	-	21.0	V
		V_{IN} ≤ 29V, 1.0mA ≤ I_{OUT} ≤ 70mA		19.0	-	21.0	
Quiescent Current	I_B	Tj=25°C		-	3.3	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	24V ≤ V_{IN} ≤ 35V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	170	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	49	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 25V ≤ V_{IN} ≤ 35V, Tj=25°C		31	37	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-1.7	-	mV/°C



Dimensions (In.)



Maximum Ratings (Ta=25°C)

Specifications:

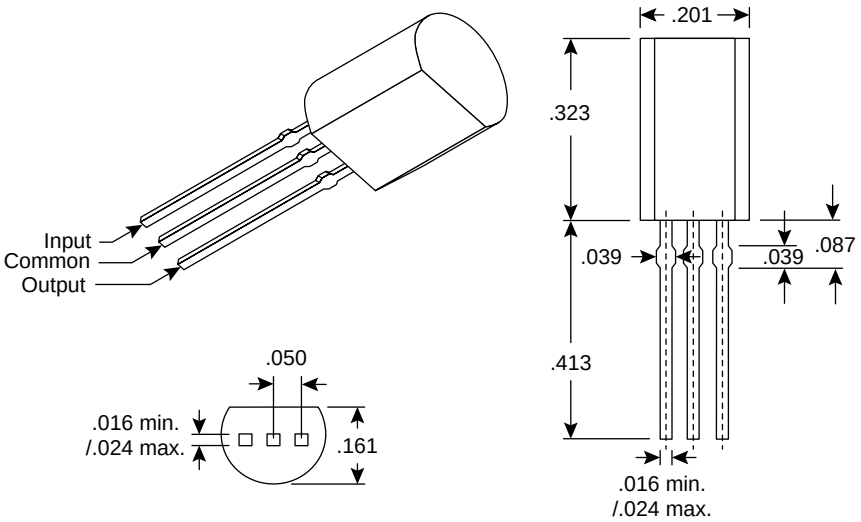
- Suitable for C-MOS, TTL, the other digital IC's power supply
- Internal thermal overload protection
- Internal short circuit current limiting
- Output current in excess of 1A
- Input Voltage (V_{IN}): 35V
- Power Dissipation (P_D): 20.8W (T_C=25°C)
- Operating Temperature (T_{opr}): -30~75˚C
- Storage Temperature (T_{stg}): -55~150˚C

Electrical Characteristics (V_{IN}=10V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		4.8	5.0	5.2	V
Input Regulation	Reg. line	T_j=25°C	7.0V≤V_{IN}≤2.5V	-	3	100	mV
			8.0V≤V_{IN}≤12V	-	1	50	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	15	100	mV
			250mA≤I_{OUT}≤750mA	-	5	50	
Output Voltage	V_{OUT}	7.0V≤V_{IN}≤20V 5.0mA≤I_{OUT}≤1.0A, P_O<15W		4.75	-	5.25	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.2	8.0	mA
Quiescent Current Change	I_B	7.0V≤V_{IN}≤25V		-	-	1.3	mA
Output Noise Voltage	V_{NO}	Ta=25°C,10Hz≤f≤100kHz I_{OUT}=50mA		-	50	-	µV
Ripple Rejection	RR	f=120Hz, 8.0V≤V_{IN}≤18V I_{OUT}=50mA, T_j=25°C		62	78	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	1.6	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-0.6	-	mV/deg

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Output current: 150mA max. (T_j=25°C)
- Input voltage (V_{IN}): 35V max. (T_A=25°C)
- Power dissipation (P_D): 800mW max. (T_A=25°C)
- Operating temperature (T_{opr}): -30~75˚C (T_A=25°C)
- Storage temperature (T_{stg}): -55~150˚C (T_A=25°)



Dimensions (In.)

Electrical Characteristics

(Unless otherwise specified, V_{IN}=11V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

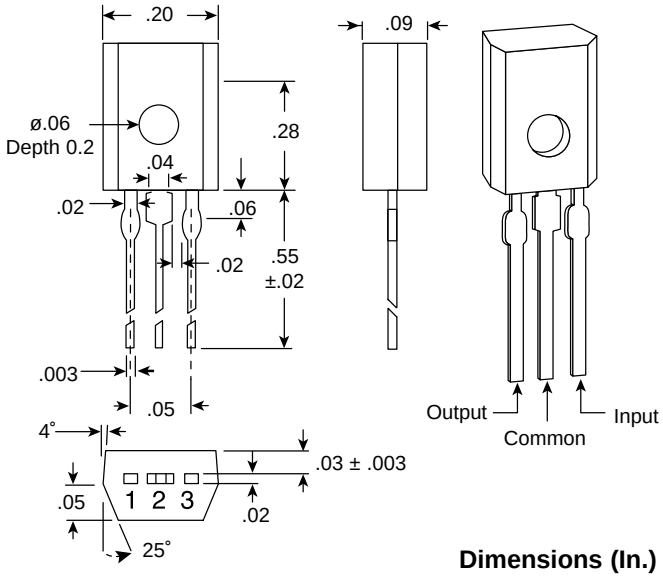
Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C		5.76	6.0	6.24	V
Input Regulation	Reg. Line	T_j=25°C	8.1V ≤ V_{IN} ≤ 21V	-	50	150	mV
			9.0V ≤ V_{IN}≤ 21V	-	45	110	
Load Regulation	Reg. Load	T_j=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	12	70	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	5.5	35	
Output Voltage	V_{OUT}	8.0V ≤ V_{IN} ≤ 21V 1.0mA ≤ I_{OUT} ≤ 40mA		5.7	-	6.3	V
		V_{IN} ≤ 11V, 1.0mA ≤ I_{OUT} ≤ 70mA		5.7	-	6.3	
Quiescent Current	I_B	T_j=25°C		-	3.1	6.0	mA
		T_j=125°C		-	-	5.5	
Quiescent Current Change	ΔI_B	9.0V ≤ V_{IN} ≤ 20V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	T_a=25°C, 10Hz ≤ f ≤ 100kHz		-	40	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	14	-	mV/1.0 kHrs
Ripple Rejection	RR	f=120Hz 9.0V ≤ V_{IN} ≤ 19V, T_j=25°C		39	47	-	dB
Dropout Voltage	V_{IN} V_{OUT}	T_j=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.7	-	mV/°C

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)

Maximum Ratings (Ta = 25°C)

- Input voltage (V_{IN}): 35V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C



Dimensions (In.)

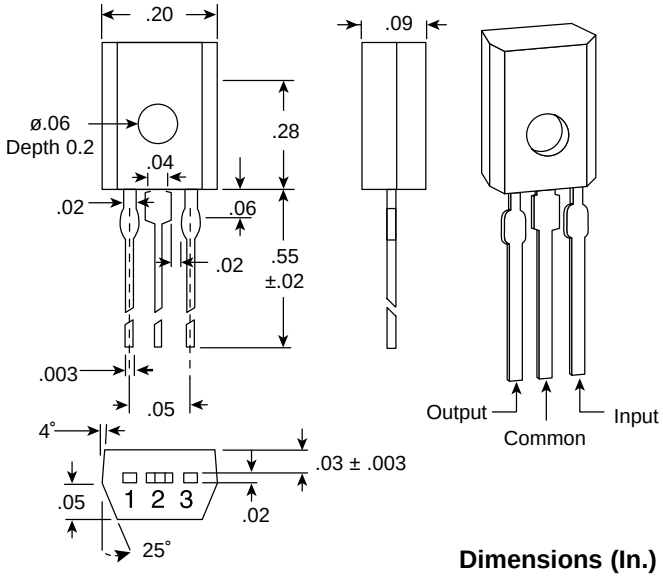
Electrical Characteristics
(Unless otherwise specified, V_{IN}=14V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		7.7	8.0	8.3	V
Input Regulation	Reg. Line	Tj=25°C	10.5V ≤ V_{IN} ≤23V	-	20	175	mV
			11V ≤ V_{IN} ≤ 23V	-	12	125	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	15	80	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	7.0	40	
Output Voltage	V_{OUT}	10.5V ≤ V_{IN} ≤ 23V 1.0mA ≤ I_{OUT} ≤ 40mA		7.6	-	8.4	V
		V_{IN} ≤ 14V, 1.0mA ≤ I_{OUT} ≤ 70mA		7.6	-	8.4	
Quiescent Current	I_B	Tj=25°C		-	3.1	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	11V ≤ V_{IN} ≤ 23V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	60	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	20	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 9.0V ≤ V_{IN} ≤ 19V, Tj=25°C		37	45	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.8	-	mV/°C

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)
- Input voltage (V_{IN}): 35V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C

Maximum Ratings (Ta = 25°C)



Dimensions (In.)

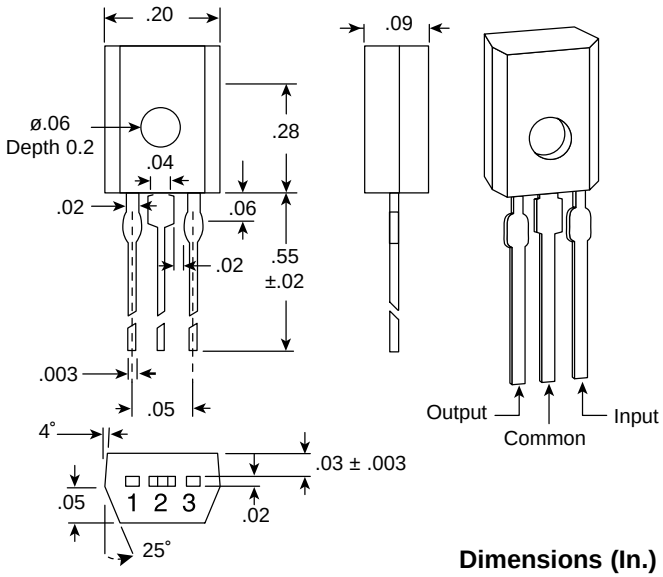
Electrical Characteristics
(Unless otherwise specified, V_{IN}=16V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		9.6	10	10.4	V
Input Regulation	Reg. Line	Tj=25°C	12.5V ≤ V_{IN} ≤25V	-	80	230	mV
			13V ≤ V_{IN} ≤ 25V	-	30	170	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	18	90	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	8.5	45	
Output Voltage	V_{OUT}	12.5V ≤ V_{IN} ≤ 25V 1.0mA ≤ I_{OUT} ≤ 40mA		9.5	-	10.5	V
		V_{IN} ≤ 16V, 1.0mA ≤ I_{OUT} ≤ 70mA		9.5	-	10.5	
Quiescent Current	I_B	Tj=25°C		-	3.2	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	13V ≤ V_{IN} ≤ 25V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	70	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	22	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 9.0V ≤ V_{IN} ≤ 24V, Tj=25°C		36	43	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.9	-	mV/°C

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)
- Input voltage (V_{IN}): 35V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C

Maximum Ratings (Ta = 25°C)



Dimensions (In.)

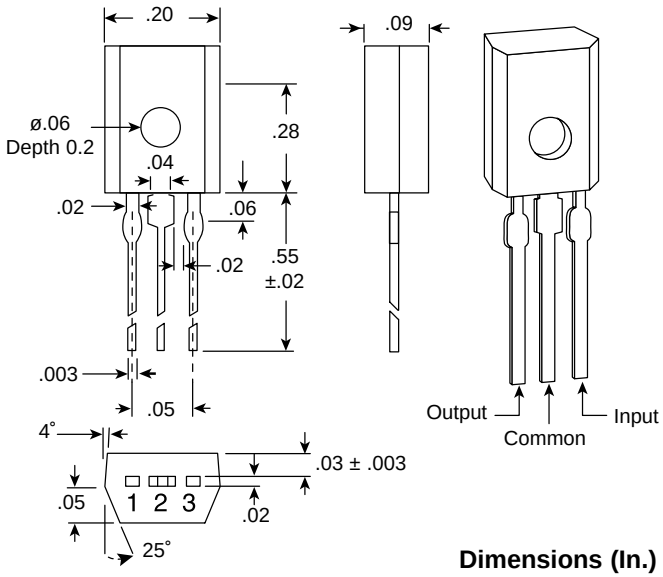
Electrical Characteristics
(Unless otherwise specified, V_{IN}=19V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		11.5	12	12.5	V
Input Regulation	Reg. Line	Tj=25°C	14.5V ≤ V_{IN} ≤27V	-	120	250	mV
			16V ≤ V_{IN} ≤ 27V	-	100	200	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	20	100	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	10	50	
Output Voltage	V_{OUT}	14.5V ≤ V_{IN} ≤ 27V 1.0mA ≤ I_{OUT} ≤ 40mA		11.4	-	12.6	V
		V_{IN} ≤ 19V, 1.0mA ≤ I_{OUT} ≤ 70mA		11.4	-	12.6	
Quiescent Current	I_B	Tj=25°C		-	3.2	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	16V ≤ V_{IN} ≤ 27V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	80	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	24	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 15V ≤ V_{IN} ≤ 25V, Tj=25°C		36	41	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-1.0	-	mV/°C

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)
- Input voltage (V_{IN}): 35V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C

Maximum Ratings (Ta = 25°C)



Dimensions (In.)

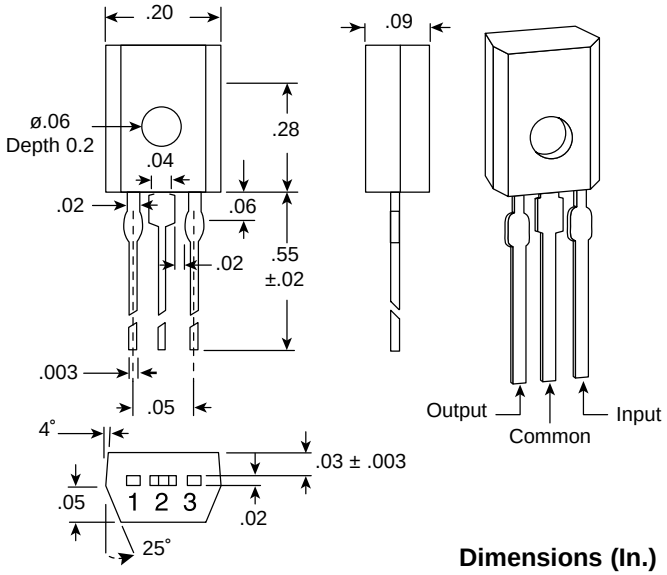
Electrical Characteristics
(Unless otherwise specified, V_{IN}=23V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		14.4	15	15.6	V
Input Regulation	Reg. Line	Tj=25°C	17.5V ≤ V_{IN} ≤30V	-	130	300	mV
			20V ≤ V_{IN} ≤ 30V	-	110	250	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	25	150	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	12	75	
Output Voltage	V_{OUT}	17.5V ≤ V_{IN} ≤ 30V 1.0mA ≤ I_{OUT} ≤ 40mA		14.25	-	15.75	V
		V_{IN} ≤ 23V, 1.0mA ≤ I_{OUT} ≤ 70mA		14.25	-	15.75	
Quiescent Current	I_B	Tj=25°C		-	3.3	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	20V ≤ V_{IN} ≤ 30V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	90	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	30	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 18.5V ≤ V_{IN} ≤ 28.5V, Tj=25°C		34	40	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-1.3	-	mV/°C

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)
- Input voltage (V_{IN}): 40V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C

Maximum Ratings (Ta = 25°C)



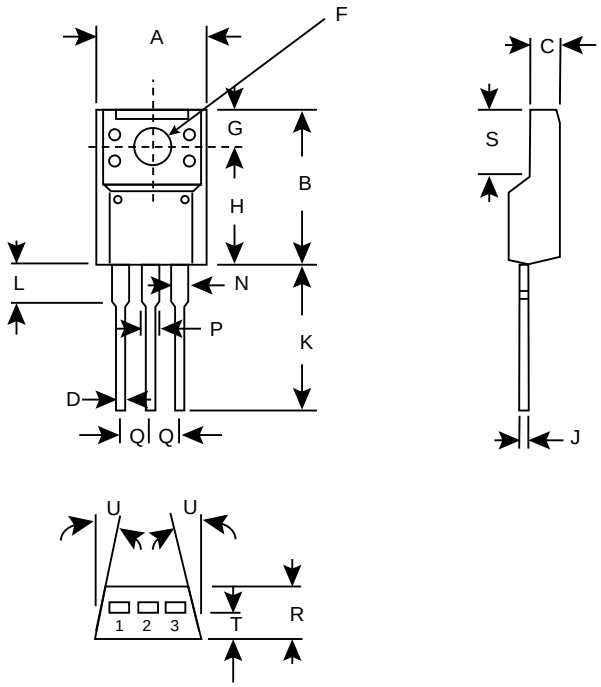
Dimensions (In.)

Electrical Characteristics
(Unless otherwise specified, V_{IN}=27V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		17.3	18	18.7	V
Input Regulation	Reg. Line	Tj=25°C	21.4V ≤ V_{IN} ≤33V	-	32	325	mV
			22V ≤ V_{IN} ≤ 33V	-	27	275	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	30	170	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	15	75	
Output Voltage	V_{OUT}	21.4V ≤ V_{IN} ≤ 33V 1.0mA ≤ I_{OUT} ≤ 40mA		17.1	-	18.9	V
		V_{IN} ≤ 27V, 1.0mA ≤ I_{OUT} ≤ 70mA		17.1	-	18.9	
Quiescent Current	I_B	Tj=25°C		-	3.3	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	22V ≤ V_{IN} ≤ 33V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	150	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	45	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 23V ≤ V_{IN} ≤ 33V, Tj=25°C		32	38	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-1.5	-	mV/°C

MOUSER® ELECTRONICS

333-7812PI 12V 1AMP Positive Voltage Regulator



Dim.	Min.	Max.
A	- - -	.41
B	.58	.60
C	.10	.12
D	.01	.03
F	Ø.12	Ø.13
G	.12	.13
H	.46	.48
J	.03	.03
K	.51	.55
L	.14	.15
N	- - -	.10
P	- - -	.10
Q	.1	.1
R	.17	.19
S	.22	.25
T	.09	.11
U	5°	5°

1. Input
2. Common
3. Output

Maximum Ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	35	V
Power Dissipation (note)	P_D	20.8	W
Operating Temperature	T_{opr}	-30~75	°C
Storage Temperature	T_{stg}	-55~150	°C

Note: T_C=25°C

333-7812PI

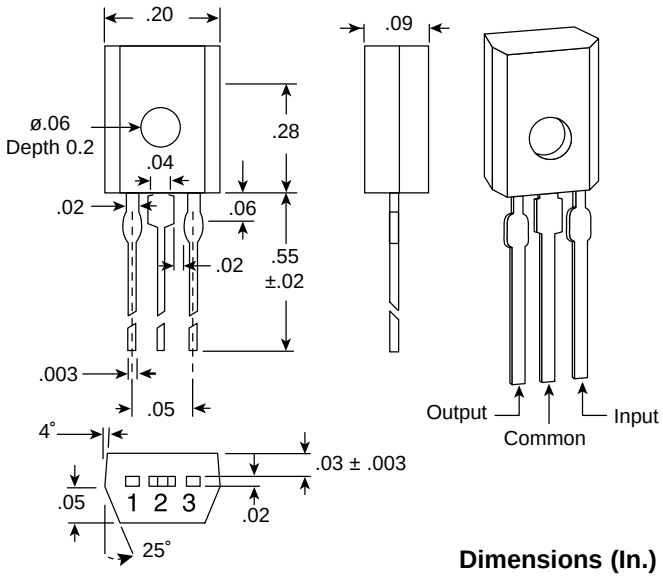
Electrical Characteristics (V_{IN}=19V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		11.5	12.0	12.5	V
Input Regulation	Reg. line	T_j=25°C	14.5V≤V_{IN}≤30V	-	10	240	mV
			16V≤V_{IN}≤22V	-	3	120	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	12	240	mV
			250mA≤I_{OUT}≤750mA	-	4	120	
Output Voltage	V_{OUT}	14.5V≤V_{IN}≤27V 5.0mA≤I_{OUT}≤1.0A, P_o<15W		11.4	-	12.6	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.3	8.0	mA
Quiescent Current Change	I_B	14.5V≤V_{IN}≤30V		-	-	1.0	mA
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz≤f≤100kHz I_{OUT}=50mA		-	90	-	µV
Ripple Rejection	RR	f=120Hz, 15V≤V_{IN}≤25V I_{OUT}=50mA, T_j=25°C		55	71	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	0.7	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-1.6	-	mV/deg

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS Power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 150mA (Tj=25°C)
- Input voltage (V_{IN}): 40V
- Power dissipation (P_D): 800mW
- Operating temperature (T_{opr}): -30~75˚C
- Storage temperature (Tstg): -55~150˚C

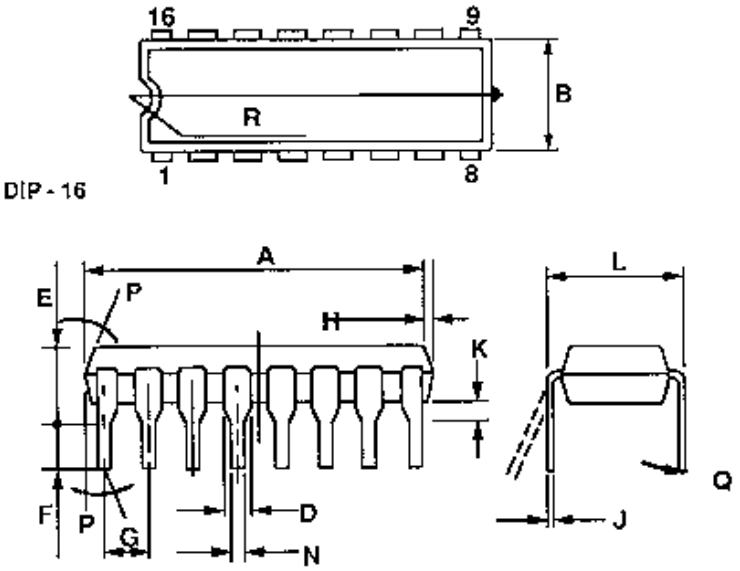
Maximum Ratings (Ta = 25°C)



Dimensions (In.)

Electrical Characteristics
(Unless otherwise specified, V_{IN}=33V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		23	24	25	V
Input Regulation	Reg. Line	Tj=25°C	27.5V ≤ V_{IN} ≤38V	-	35	350	mV
			28V ≤ V_{IN} ≤ 38V	-	30	300	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	40	200	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	20	100	
Output Voltage	V_{OUT}	27.5V ≤ V_{IN} ≤ 38V 1.0mA ≤ I_{OUT} ≤ 40mA		22.8	-	25.2	V
		V_{IN} ≤ 33V, 1.0mA ≤ I_{OUT} ≤ 70mA		22.8	-	25.2	
Quiescent Current	I_B	Tj=25°C		-	3.5	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	28V ≤ V_{IN} ≤ 38V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	200	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	56	-	mV/ 1.0 kHrs
Ripple Rejection	RR	f=120Hz 29V ≤ V_{IN} ≤ 39V, Tj=25°C		31	35	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-2.0	-	mV/°C



Dim.	Inches	
	Min.	Max.
A	-	.783
B	-	.256
D	.014	.026
E	-	.197
F	.098	-
G	.1	
H	-	.008
J	.008	.014
K	.02	-
L	.29	.31
N	.049	.061
P	8°	
Q	7°	
R	.039	

Specifications:

- Recording playback for pre amplifier
- Buffer amplifier (recording amplifier)
- Power amplifier
- Low distortion and wide dynamic range
- Without turn-on "pop" for muting circuit
- Operating supply voltage range: V_{CC}=3.5~9V

Maximum Ratings (Ta=25°C)

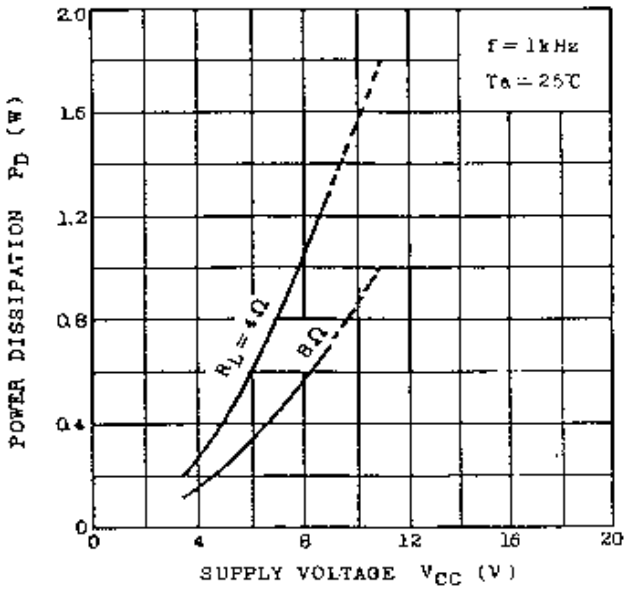
Characteristics	Symbol	Rating	Unit
Supply Voltage	V_{CC}	14	V
Output Current	$I_{O(PEAK)}$	1.5	A
Power Dissipation (note)	P_D	1200	mW
Operating Temperature	T_{opr}	-20~75	°C
Storage Temperature	T_{stg}	-55~150	°C

Note: derated above Ta=25°C in the proportion of 9.6mW/°CV

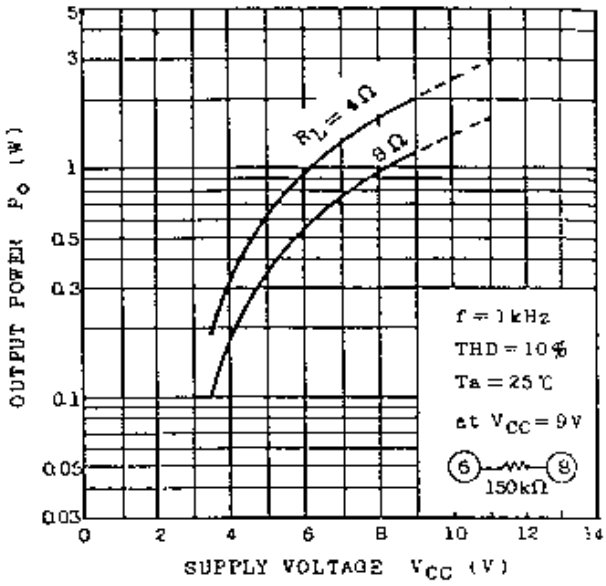
Electrical Characteristics
(Unless otherwise specified, V_{CC}=6V, f=1kHz, Ta=25°C)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Total						
Quiescent Current	I_{CCQ}(1)	V_{CC} = 3.5V	7.5	-	-	mA
	I_{CCQ}(2)	V_{CC} = 6V	11	-	35	mA
Pre Amp.						
Open Loop Voltage Gain	G_{VO1}	-	55	70	-	dB
Closed Loop Voltage Gain	G_{V1}	-	-	40	-	dB
Maximum Output Voltage	V_{OUT1}	THD ≤ 1%	-	0.7	-	V_{rms}
Input Resistance	R_{IN1}	-	-	30	-	kΩ
Equivalent Input Noise Voltage	V_{NI}	R_g = 0	-	1.4	2.5	μV_{rms}
Pre Amp. + Buffer Amp.						
Closed Loop Voltage Gain	G_{V2}	Pre Amp. G_V = 40dB Buffer Amp. G_V = 20dB	-	60	-	dB
Maximum Output Voltage	V_{OUT2}	THD = 3%	1.5	1.7	-	V_{rms}
Output Noise Voltage	V_{NO2}	R_g = 0, G_{V2} = 60dB	-	1.2	2.5	mV_{rms}
ALC Effect	ALC_1	V_{IN} = -60dBm ~ -20dBm	-	2	-	dB
ALC Range	ALC_2	Range of THD ≤ 1%	-	60	-	dB
Power Amp.						
Open Loop Voltage Gain	G_{VO3}	-	60	70	-	dB
Closed Loop Voltage Gain	G_{V3}	-	-	40	-	dB
Maximum Output Power	P_{OM}	R_L = 4Ω, THD = 10%	0.8	0.96	-	W
		V_{CC}=9V, R_L=4Ω, THD=10%	-	2.0	-	
Output Noise Voltage	V_{NO3}	R_g = 0, G_V = 40dB	-	0.3	1.0	mV_{rms}

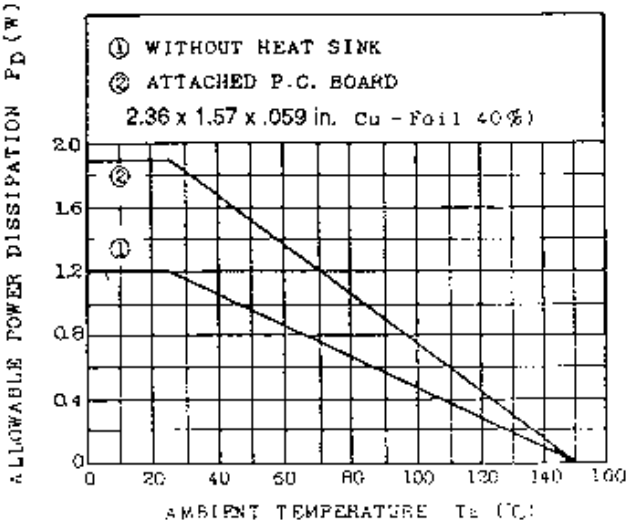
$P_D - V_{CC}$



$P_O - V_{CC}$



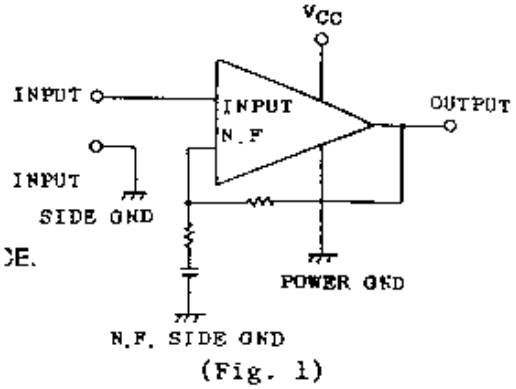
$P_D - Ta$



Precaution for Use:

1. Precaution of Ground Line

The ground points of input side ground and N.F. side ground in each amplifier must be arranged at the preamplifier side. (Fig. 1) The input side ground point and the N.F. side ground point must be arranged near each other to have no impedance.



(Fig. 1)

2. About Radiation

1) The capacitance between the output and ground din preamplifier, buffer amplifier and power amplifier must be near the IC. The radiation loop must be as small as possible.

2) The voltage gain of high frequency in each amplifier must be reduced to reduce the noise with high frequency component. (In the application circuit, the feed back capacitor is used). A 1000pF or same order capacitor must be connected from the input terminal of preamplifier and poser amplifier to ground to prevent the interference or radiation.

3) In radio cassette tape recorder applications, place the IC away from antenna.

4) The electrolytic capacitance 100µF ~ 20µF between VCC and ground must be near the IC;.

3. To Prevent Oscillation

1) The output terminal of the preamplifier must be terminated to ground by a capacitance of more than 5600F. (The recommended value: C=0.01µF)

2) The output terminal of the buffer amplifier must be terminated to ground by a capacitance or more than 0.01µF. (The recommended value: C=0.01µF)

3) The output terminal of the power amplifier must be terminated to ground by a good temperature characteristic capacitance of 1~2.2µF. The bootstrap terminal must be terminated to ground with a capacitance of more than 0.47µF.

4. Precaution or Preamplifier

1) It is better that the coupling capacitor between the volume and the output of preamplifier is small. Recommended value: C=0.7µF

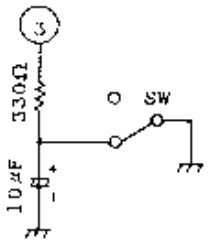
2) In recording mode, the signal source resistance must be more than 1kΩ for ALC (automatic level control) operation. When this resistance is small, the A:c range becomes narrow.

5. Buffer Amplifier

When the output signal is clipped in the buffer amplifier, the signal returns to preamplifier and influences to make the THD bad. To prevent this, in playback mode, the buffer amplifier is recommended to be cut-off by termination the output terminal to ground directly, or by termination the feedback terminal to ground though a 330Ω or less, as shown in fig. 2.

6. Power Amplifier

1) In case of battery use (VCC≤6C), this IC happens to oscillate (blocking oscillation) when the impedance of power supply is high.



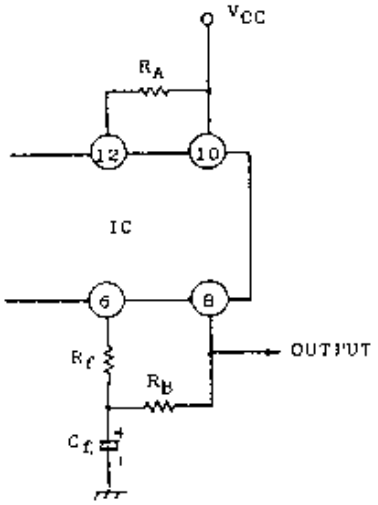
(Fig. 2)

In this case, it is recommended to insert the resistance RA of 500Ω ~ 1kΩ between 10 pin and 12 pin (VCC-filter II). By this method, this IC becomes very stable. But the output DC voltage is not centered by the influence of RA. Then the output wave shape is not symmetrical clipping wave, and the maximum output voltage is reduced. So we recommend to insert the other resistance RB between 6 pin and 8 pin for compensating the output DC voltage.

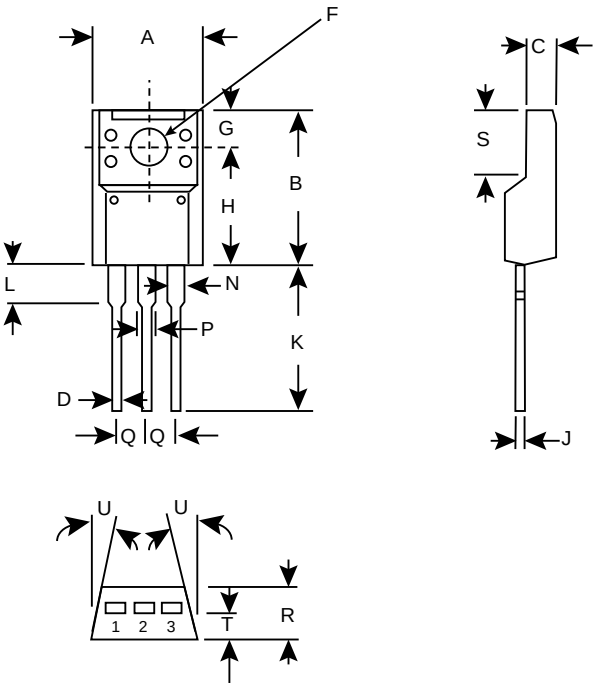
2) When you use the IC at the supply voltage of more than 6V, it is better to insert the resistance RB for compensating output DC voltage. (fig. 3) The recommended value: RB=220kΩ @ VCC=7.5V
RB=150kΩ @ VCC-9V

3) The output coupling capacitance and bootstrap capacitance is better to be large to get the maximum output power.

4) On the PC board, the interval between VCC and ground is better to be large.



(Fig. 3)



Dim.	Min.	Max.
A	- - -	.41
B	.58	.60
C	.10	.12
D	.01	.03
F	Ø.12	Ø.13
G	.12	.13
H	.46	.48
J	.03	.03
K	.51	.55
L	.14	.15
N	- - -	.10
P	- - -	.10
Q	.1	.1
R	.17	.19
S	.22	.25
T	.09	.11
U	5°	5°

1. Input
2. Common
3. Output

Maximum Ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	35	V
Power Dissipation (note)	P_D	20.8	W
Operating Temperature	T_{opr}	-30~75	°C
Storage Temperature	T_{stg}	-55~150	°C

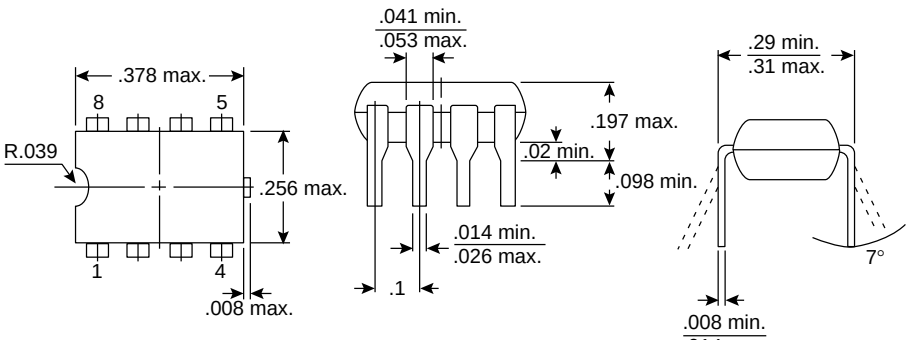
Note: T_C=25°C

333-7815PI

Electrical Characteristics (V_{IN}=23V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		14.4	15.0	15.6	V
Input Regulation	Reg. line	T_j=25°C	17.5V≤V_{IN}≤30V	-	11	300	mV
			20V≤V_{IN}≤26V	-	3	150	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	12	300	mV
			250mA≤I_{OUT}≤750mA	-	4	150	
Output Voltage	V_{OUT}	17.5V≤V_{IN}≤30V 5.0mA≤I_{OUT}≤1.0A, P_O<15W		14.25	-	15.75	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.4	8.0	mA
Quiescent Current Change	I_B	17.5V≤V_{IN}≤30V		-	-	1.0	mA
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz≤f≤100kHz I_{OUT}=50mA		-	110	-	µV
Ripple Rejection	RR	f=120Hz, 18.5V≤V_{IN}≤28.5V I_{OUT}=50mA, T_j=25°C		54	70	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	0.5	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-2.0	-	mV/deg

Dimensions (In.)



Specifications:

- 1W audio power amplifier
- Suitable for the audio power amplifier of portable cassette tape recorder and radio
- Very few external part counts (only 3 capacitors)
- Low quiescent current: I_{CCQ}=6.6mA (typ.), (V_{CC}=6V)
- Wide operating supply voltage range: V_{CC}=2~10V
- Output power: P_{OUT} = 720mW (typ.), (V_{CC}=6V), R_L=4Ω, THD=10%)
- Voltage gain: G_V=40dB (typ.)

Maximum Ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{CC}	14	V
Power Dissipation (Package Limiation) Note 1	P_D	900	mW
Operating Temperature	T_{opr}	-25~+75	°C
Storage Temperature	T_{stg}	-55~+150	°C

Note: derated above Ta=25°C in the proportion of 7.2mW/°C

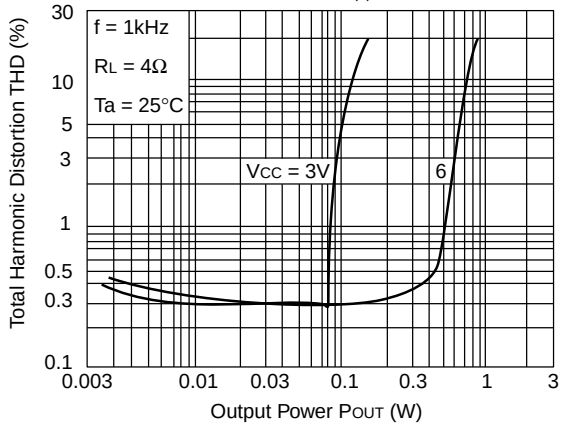
Electrical Characteristics
(Unless otherwise specified, V_{CC}=6V, f=1kHz, R_g=600Ω, R_L=4Ω, Ta=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Quiescent Current	I_{CCQ}	V_{CC} = 3V, V_{IN} = 0V	-	5.5	-	mA
		V_{CC} = 6V, V_{IN} = 0V	-	6.6	15	
		V_{CC} = 9V, V_{IN} = 0V	-	7.5	18	
Output Power	P_{OUT}	V_{CC} = 3V, R_L = 4Ω THD = 10%	-	120	-	mW
		V_{CC} = 6V, R_L = 4Ω THD = 10%	500	720	-	
		V_{CC} = 6V, R_L = 8Ω THD = 10%	300	450	-	
		V_{CC} = 9V, R_L = 8Ω THD = 10%	800	1100	-	
		V_{CC} = 9V, R_L = 16Ω THD = 10%	450	610	-	
Total Harmonic Distortion	THD	P_{OUT} = 100mW	-	0.3	1.0	%
Voltage Gain	G_V	V_{IN} = 0.5mV_{rms}	37	40	43	dB
Output Noise Voltage	V_{NO}	R_g = 10kΩ BW=20Hz ~ 20kHz	-	0.2	0.5	mV_{rms}
Ripple Rejection Ratio	RR	f=100Hz, V_{RIP}=0.3V_{rms} Without C_{RIP}	-	25	-	dB
Input Resistance	R_{IN}		-	27	-	kΩ

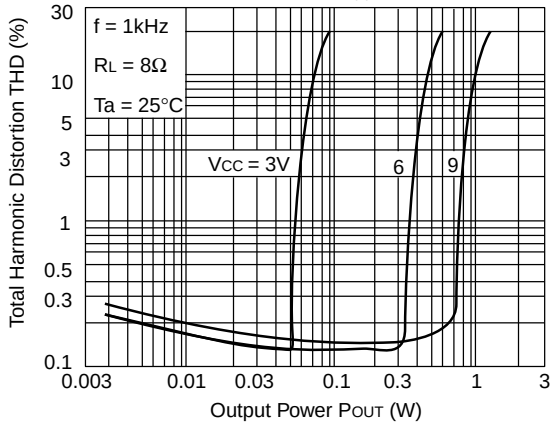
Typical Voltage of Each Terminal
(V_{CC}=6V, Ta=25°C, by test circuit)

Terminal No.	1	2	3	4	5	6	7	8	9
DC Voltage	0	2.40	0.62	0.64	0	0	2.61	NC	6.0

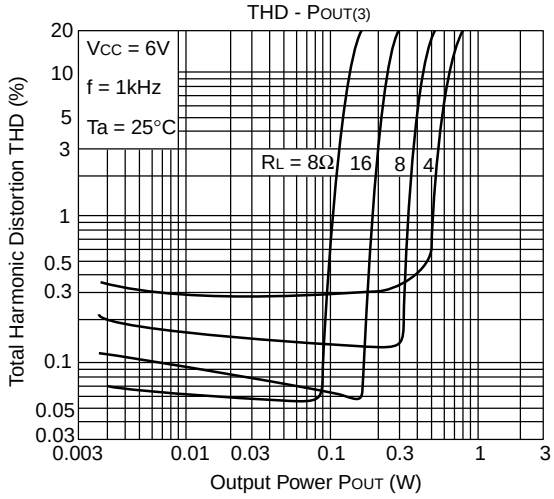
THD - POUT(1)



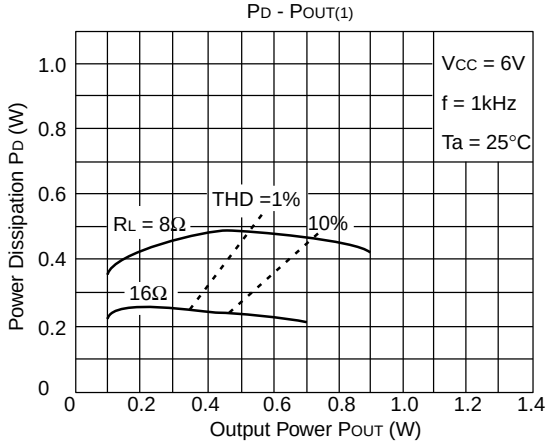
THD - POUT(2)



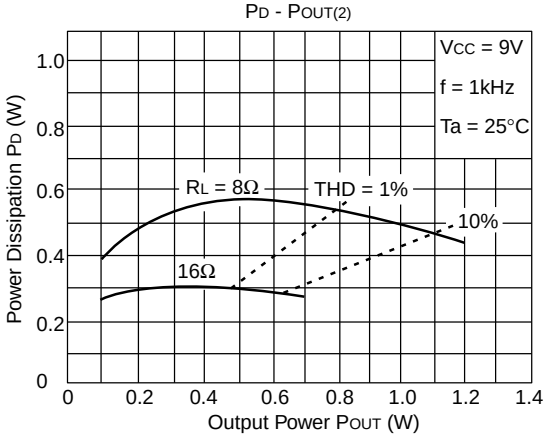
THD - POUT(3)



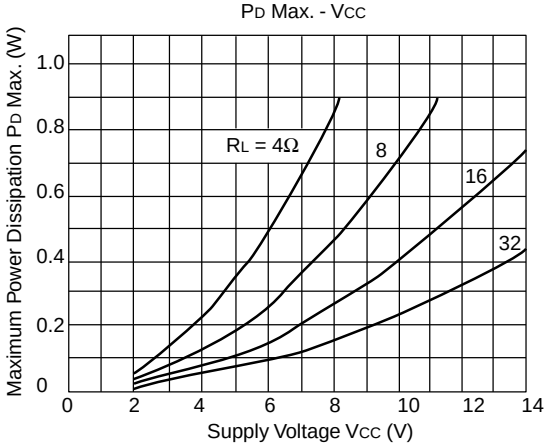
PD - POUT(1)

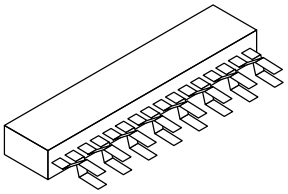


PD - POUT(2)



PD Max. - VCC





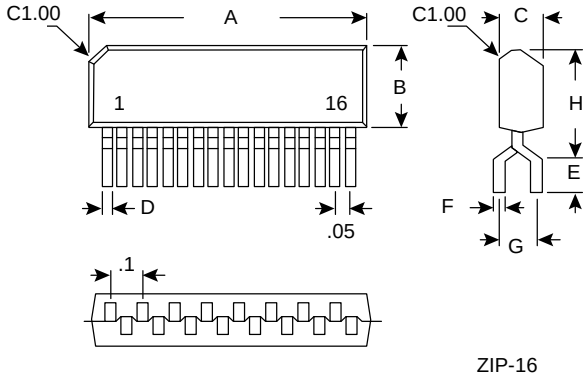
Maximum Ratings (Ta=25°C)

Characteristics	Symbol	Rating	Unit
Power Supply Voltage	V_{CC}	16	V
Power Dissipation	P_D	750	mW
Operating Temperature	T_{opr}	-30 ~ 85	°C
Storage Temperature	T_{stg}	-55 ~ 150	°C
Tuning Indication Current	I7 MAX	20	mA
External Leak Current	I13MAX	5	mA

Note: Derated above Ta=25°C in the proportion of 6mW/°C

Dimensions (In.)

Dim.	Min.	Max.
A	- - -	.84
B	- - -	.25
C	.12	.13
D	.01	.02
E	.1	- - -
F	.006	.01
G	.09	.15
H	- - -	.33



ZIP-16

Specifications:

- Differential 6-stage IF Limiter
- Signal meter output
- Station detection
- Bandwidth muting
- Signal strength muting
- Application of differential peak detection is useful against multi-path distortion
- With single tuned coil, low distortion ratio can be realized (0.05%, typical @ Δf=±75KHz dev.)
- Sensitivity of signal strength muting, sensitivity of attenuation and stop signal, and bandwidth can freely be set with external resistance
- Signal meter output proportioned to input signal strength can be obtained
- AMR is excellent, (55dB, typical @ Vi=80dBμ)
- S/N is excellent, ((78dB, typical)
- S curve variation against input voltage is reduced (±100mV, typical @ Vi=0 ~ 120dBμ)
- Operating power supply voltage: Vopr=7 ~ 16V (Ta=25°C)

Electrical Characteristics

(Unless otherwise specified, V_{CC}=8.5V, f=10.7MHz, Δf=±75KHz dev, fm=400Hz, V_i=80dBμ, SW1=on (Mute off) Ta=25°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Quiescent Current	I_{CCQ}	Vi=0, SW1=Off		10	15	21.5	mA
Limiting Sensitivity	V_i (Lim)			-	33	35	dBμ
Detection Output	V_{OD}			350	450	550	mVrms
Total Harmonic Distortion Ratio	THD	Δf=±22. 5KHz dev.		-	0.06	0.5	%
Signal to Noise Ratio	S / N			71	78	-	dB
AM Rejection Ratio	AMR	AM=30%		46	55	-	dB
Signal Meter Output	VSM 1			-	0	0.3	V
	VSM 2	Vi=50dBμ		0.5	1.5	2.5	
	VSM 3			2.6	3.8	5.1	
	VSM 4	Vi=100dBμ		5.4	6.5	6.8	
Soft Muting Attenuation	ATT 1	Vi=80dBμ → 0dBμ fi=±200KHz	SW1=off	45	60	76	dB
Detuning Attenuation	ATT 2			47	55	66	dB
Station Detection Sensitivity	V_{SS}	At the point of V_{SD}=L → H		35	50	65	dBμ
Station Detection Band	BW(S)			60	100	170	KHz
Muting Band	BW(M)	At the point of V_{OD}=-3dB	SW1=off	80	150	220	KHz

Description of Terminals

(Terminal voltage shows the value at V_{CC}=8.5V, Ta=25°C, and non-signal in measuring circuit.)

Pin No.	Terminal Name	Terminal Voltage (V)	Contents
1	Bypass	3.0	IF amplifier bypass
2	IF in	3.0	IF amplifier input
3	Bias	3.0	IF amplifier bias
4	GND(IF)	0	IF amplifier GND
5	SD.S	0	Setting of station, detection sensitivity
6	Meter	0	Signal meter output
7	SD out	8.5	Station detection output
8	GND	0	GND except IF amplifier
9	Δf	4.8	S curve (Δf) detection
10	AF out	4.8	Audio output
11	Mute	4.8	Setting of soft mute, sensitivity & mute amount
12	VCC	8.5	Power supply
13	Reg	4.8	Constant voltage source
14	Det 1	2.4	Peak detection, demodulation input THD @ Δf=±75KHz dev., fm=400HZ can be adjusted to about 0.05% by adjusting RD (500ΩVR). In case of making into the fixed resistance, 1.2KΩ becomes the typical value.
15	Det 2		
16	IF out	2.4	IF output

Figure 1

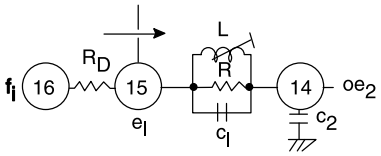
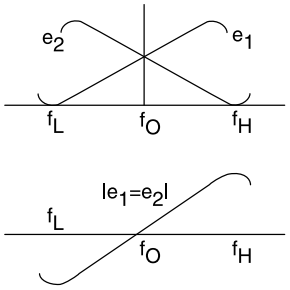


Figure 2



Differential Detection:

The differential peak detection system means a system for detecting the variation of voltages of e_1 and e_2 when the input frequency is varied and amplifying the DC voltage by a differential amplifier to take out the detection output.
In Figure 2, the level of e_1 and e_2 for the input frequency is shown, the point where e_1 becomes minimum is the point where the impedance Z viewed from the point e_1 becomes minimum and the impedance Z_1 is expressed by the following equation.

$$Z_1 = \frac{1+s^2L(C_1+C_2)}{sC_2\,(1+s^2\,LC_1)} \quad \ldots \quad (1)$$

and f_L is expressed by the equation (2)

$$f_L = \frac{1}{2\pi\sqrt{L\ (C_1+C_2)}} \qquad (2)$$

Also, the point where e_2 becomes minimum is the point where L and C_1 are oscillated in parallel, and f_H is expressed by the equation (3)

$$f_H = \frac{1}{2\pi\sqrt{L\,C_1}} \qquad (3)$$

Further, the inductive susceptance of L and C_1 becomes f_O when it becomes 1/2 of the capacitive susceptance of C_2, and the f_O is expressed by the equation (4)

$$f_O = \frac{1}{2\pi\sqrt{L\ (C_1+C_2/2)}} \qquad (4)$$

The detection output is determined by the width of fH=fL that is, it is proportional to the ratio (C1 / C2) of C1 and C2. Figure 3 shows the variation of the detection output of C1=24pF to C2. It is necessary to pay attention that when the detection output is reduced by decreasing C1/C2, the detection band is widened and S/N is somewhat lowered. Therefore, for reducing the detection output holding a high S/N, and R to adjust the output.

In a conventional quadrature detection, a double tuning coil is required for obtaining a low distortion factor, but as the result, the cost is increased and adjustment is troublesome (it is fairly difficult to make fo coincide with the minimum value of distortion). In the KIA6029Z, fo adjustment can be performed by coil and distortion adjustment by R_D, and cost can be reduced and the adjustment time can be shortened. When making R_D a fixed resistance, R_D 1.2K is typical for the minimum value of distortion (under the condition of measuring circuit). As described above, the linearity (distortion) of S curve is determined by the R_D value. However, on the other hand, it is necessary to vary the R_D value so as to obtain the minimum value of distortion by the value of C_1 and C_2 and especially, C_2 is most influenced. Set R_1 for C_2 and C_2 by referring to the graph in Figure 3.

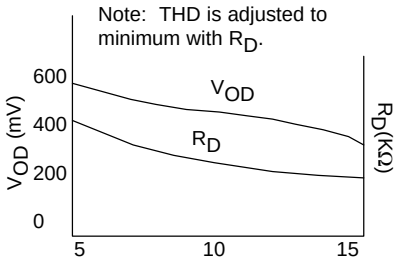


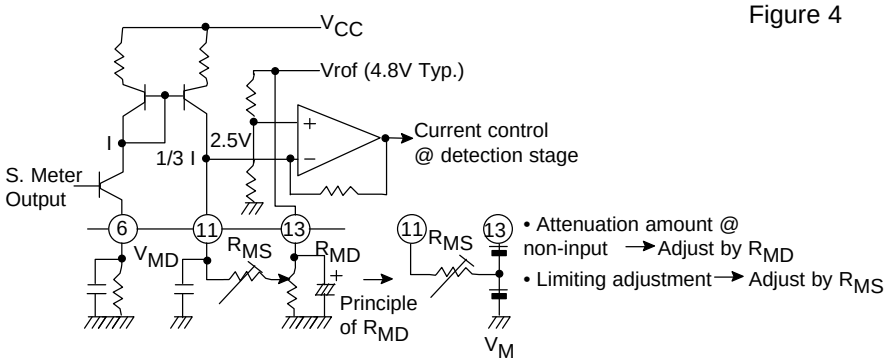
Figure 3

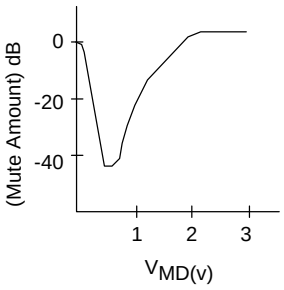
Signal Intensity Muting Properties:

The muting circuit of the KIA6029Z is constituted of an AF amplifier where gain is varied by control voltage and control voltage generation circuit (Mute Drive) proportional to a signal meter output. Figure 4 shows the outline of the muting circuit. The signal meter output is converted into the current by 10kΩ externally provided on 6pin and 1/3 I current is output in 11pin in 1:1/3 current mirror circuit. This current is converted into a control voltage by R_{MS} and V_H connected outside.

The attenuation amount at non-signal is substantially determined by the value of VM since the current output in 11pin is about 0. The V_M is set by the output of the volume R_{MD} of about 10kΩ connected to the constant voltage output (13pin) of 4.8V. The variation ratio (gradient) of attenuation amount of a detection output is determined by the ratio of the variation of the 11 pin voltage V_{MD} to the level of an input signal, that is, the variation of the signal meter voltage. Accordingly, as R_{MS} becomes larger, the gradient becomes steep it is presumed that usually, the value of R_{MS} is preferably about 33kΩ.

Figure 4

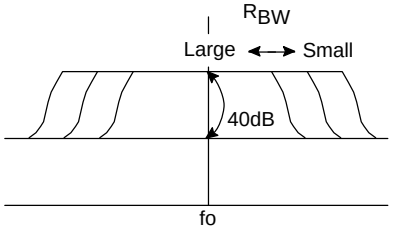




Muting Properties for Detuning:

In the (9) pin of AFC terminal, ± currents proportional to the S curve are generated. The AC component of them is smoothed by an external capacity and a DC voltage is generated in (9) pin by R_{BW} connected between (9) pin and (13) pin. When the DC voltage generated by R_{BW} becomes over about ±0.7V, the detection circuit (Δf Det) is operated to attenuate the AF amplifier by about 40dB.

The width of muting for detuning is determined by the resistance value of R_{BW} but the coil previously described is varied by setting and set the value of R_{BW} after setting of the coil. The property when varying R_{BW} on the condition of the measuring circuit is shown in figure 5.



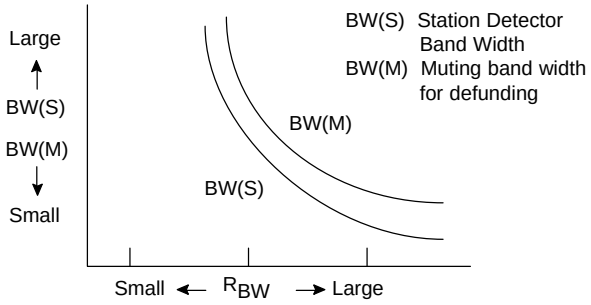


Figure 5

Station Detector:

The station detector (stop signal generator of DTS) detects detuning by the signal intensity of input and Δf detection circuit (Δf Det) respectively and outputs through AND circuit. As shown in figure 6, the signal meter output is converted into the current I by the 10kΩ connected to (6) pin and outputs the current I in (5) pin by a current mirror circuit.

This current is converted to-input of the comparator where IV is added to +input. Therefore, the stop signal sensitivity can be adjusted by varying the value of the Rss connected to (5) pin. Also, the variable width of the stop signal sensitivity is set widely as about 40dBμ by IF input voltage (when Rss = 2kΩ~10kΩ) the band width is varied by R_{BW} as shown in figure 5.

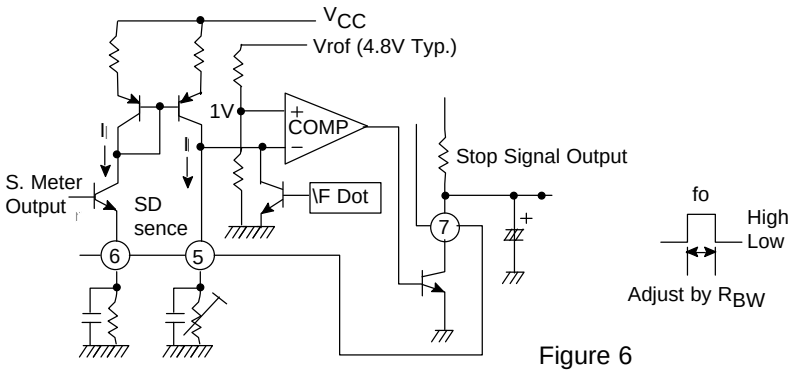


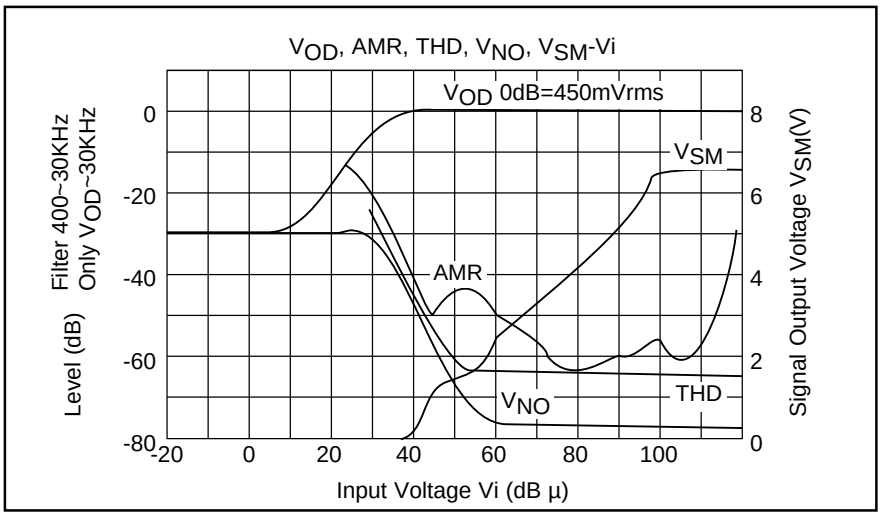
Figure 6

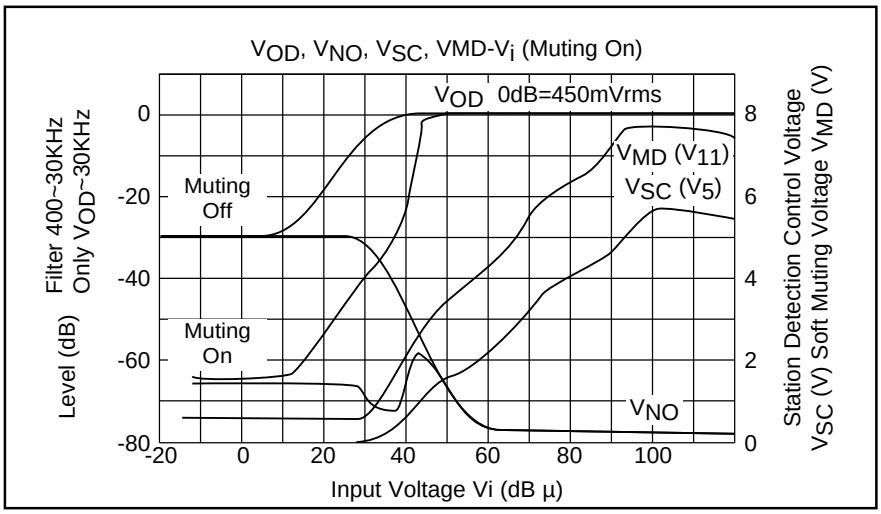
Adjustment Method of KIA6029Z:

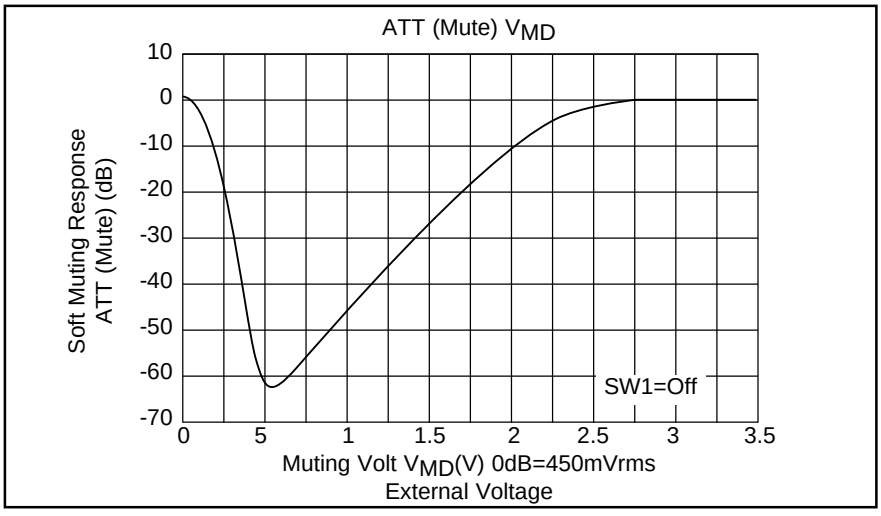
- Apply the signal of 10.7MHZ, 80dBμ to input
- Connect a voltmeter between (9) pin and (13) pin
- Adjust T_1 and set the indication of the voltmeter to about 0V
- Adjust R_D so that the detection distortion becomes minimum (when R_D is a variable resistance)

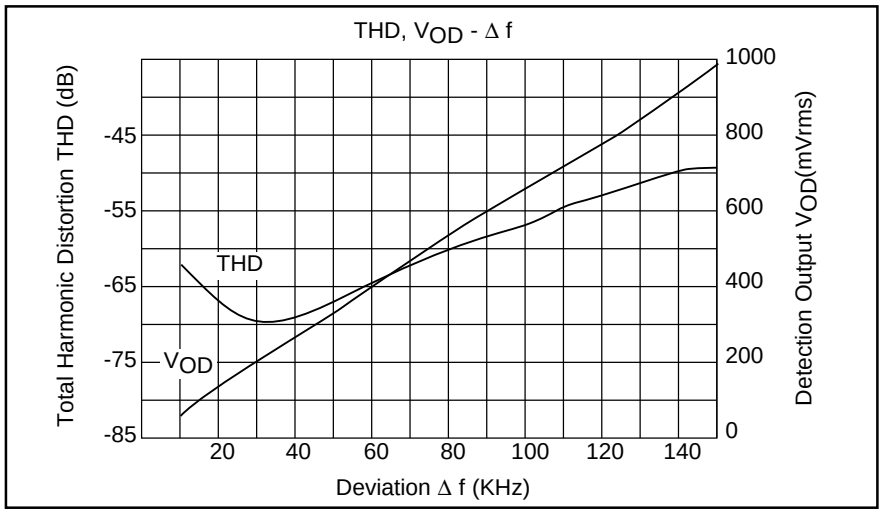
Precaution:

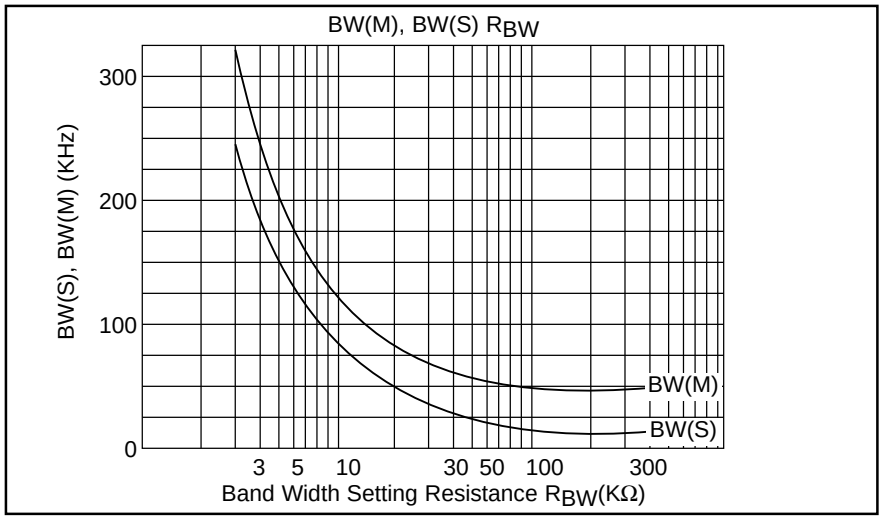
When the capacity value of the by-pass capacitor Cs connected to (6) pin of S meter output is fairly large, the audio signal corresponding to AM wave flows and the AMR properties are deteriorated.
Use at under 0.01μF.

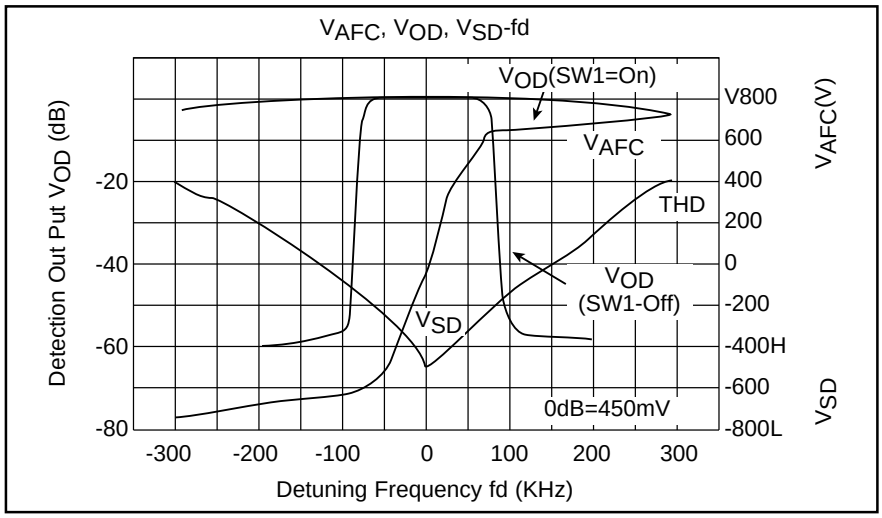


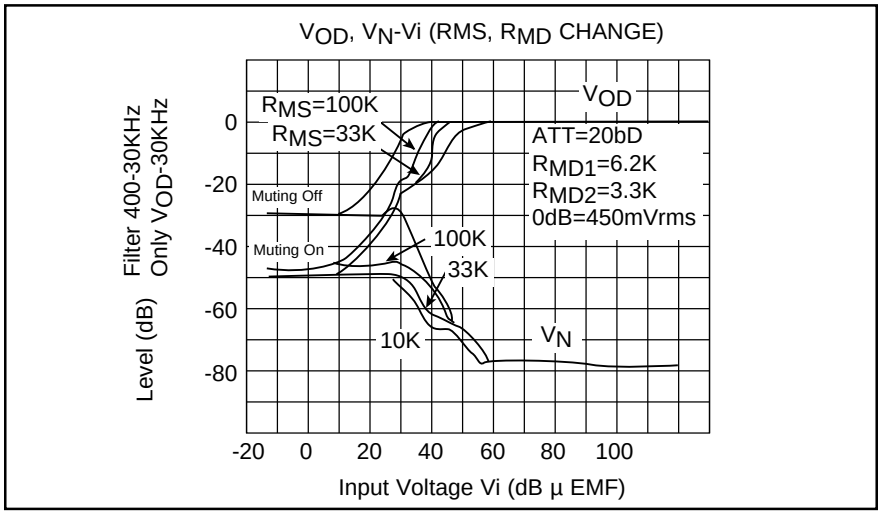


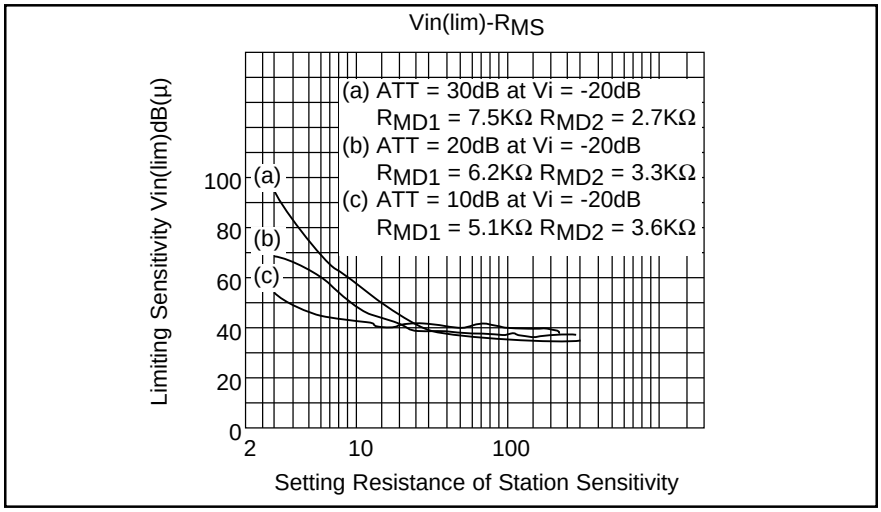


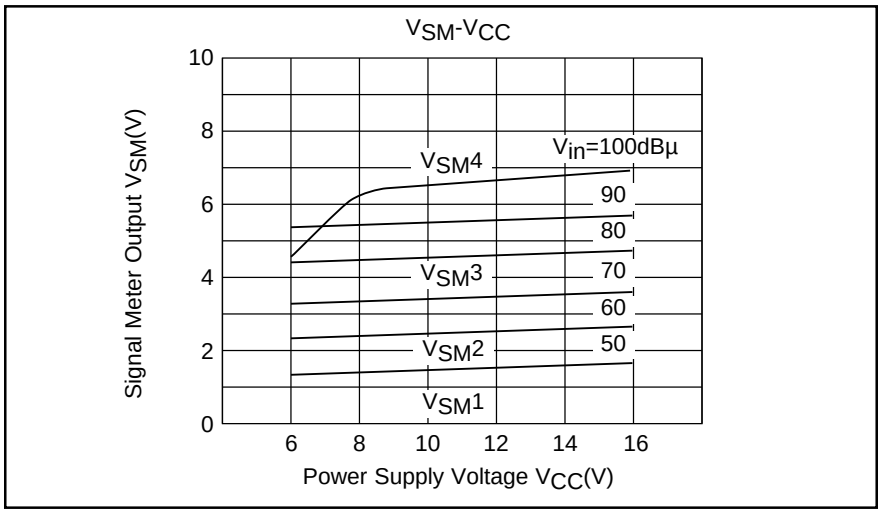


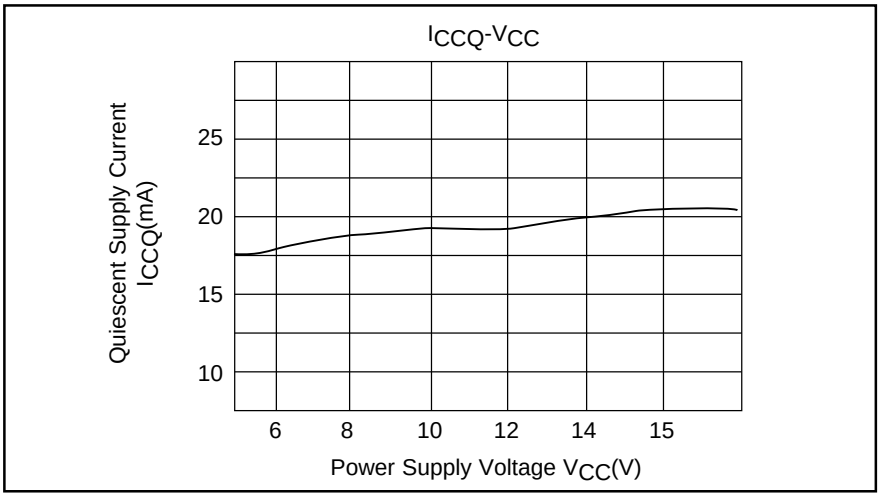


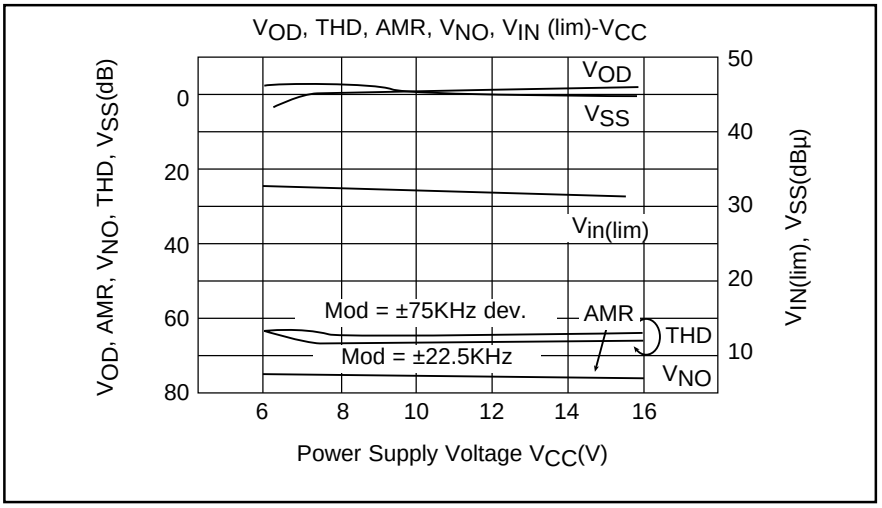


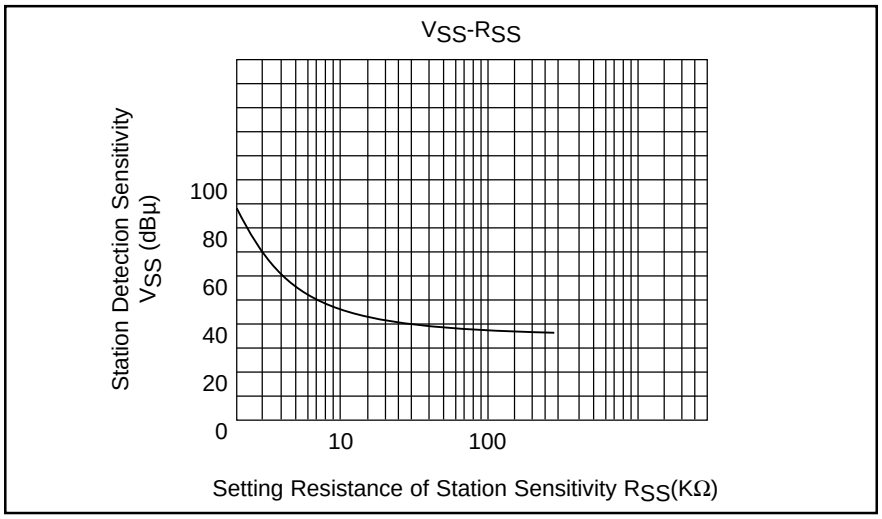


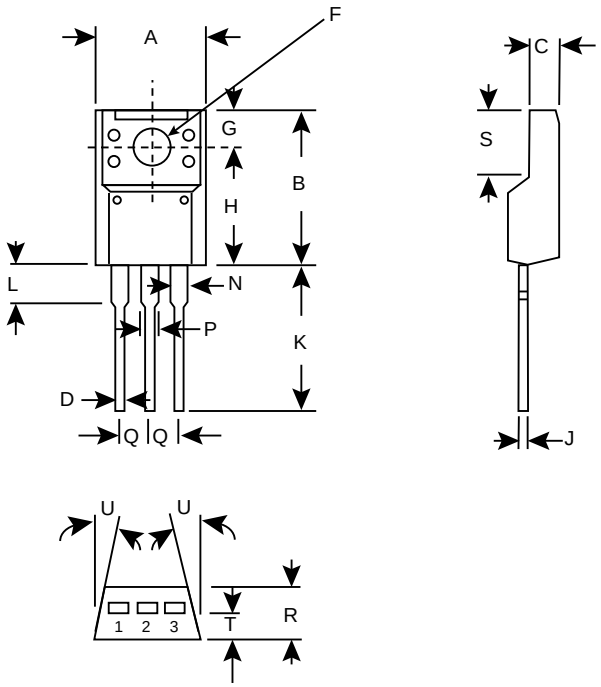












Dim.	Min.	Max.
A	- - -	.41
B	.58	.60
C	.10	.12
D	.01	.03
F	Ø.12	Ø.13
G	.12	.13
H	.46	.48
J	.03	.03
K	.51	.55
L	.14	.15
N	- - -	.10
P	- - -	.10
Q	.1	.1
R	.17	.19
S	.22	.25
T	.09	.11
U	5°	5°

1. Input
2. Common
3. Output

Maximum Ratings (Ta=25°C)

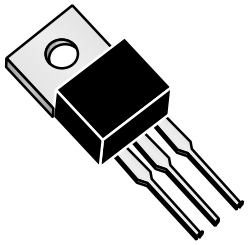
Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	40	V
Power Dissipation (note)	P_D	20.8	W
Operating Temperature	T_{opr}	-30~75	°C
Storage Temperature	T_{stg}	-55~150	°C

Note: T_C=25°C

333-7818PI

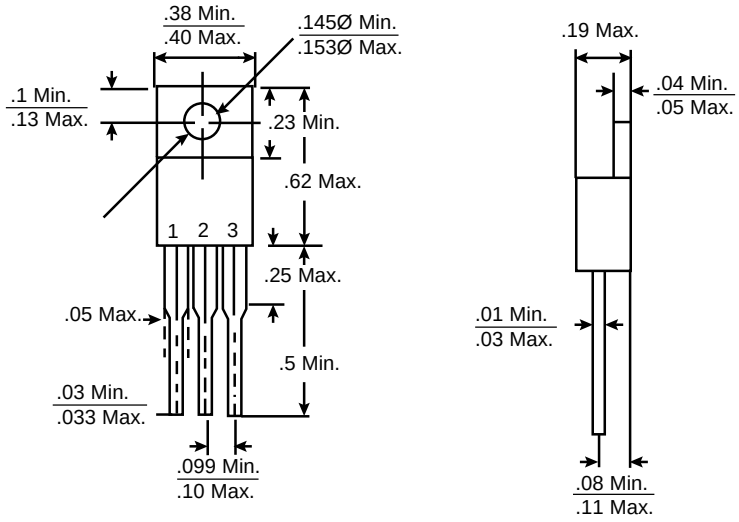
Electrical Characteristics (V_{IN}=27V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		17.3	18.0	18.7	V
Input Regulation	Reg. line	T_j=25°C	21V≤V_{IN}≤33V	-	13	360	mV
			24V≤V_{IN}≤30V	-	4	180	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	12	360	mV
			250mA≤I_{OUT}≤750mA	-	4	180	
Output Voltage	V_{OUT}	21V≤V_{IN}≤33V 5.0mA≤I_{OUT}≤1.0A, P_o<15W		17.1	-	18.9	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.5	8.0	mA
Quiescent Current Change	I_B	21V≤V_{IN}≤33V		-	-	1.0	mA
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz≤f≤100kHz I_{OUT}=50mA		-	125	-	µV
Ripple Rejection	RR	f=120Hz, 22V≤V_{IN}≤32V I_{OUT}=50mA, T_j=25°C		52	68	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	0.4	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-2.5	-	mV/deg



TO-220

Dimensions (In.)

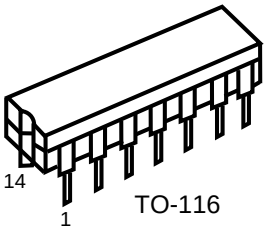


1. Gate 2. Drain 3. Source

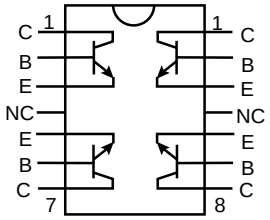
Mouser Stock No.	Drain Source Voltage (V)	On-state Resistance (Ω)	Continuous Drain Current (A)	Max Power Dissipation (watts)
333-IRF730	400	1.00	5.5	75

MOUSER® ELECTRONICS

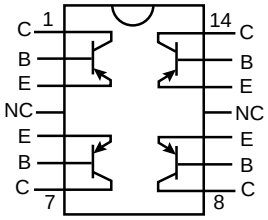
333-MPQ3904
333-MPQ3906
Multiple Bipolar Transistors-Quad



TO-116

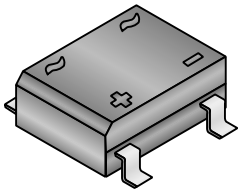


NPN

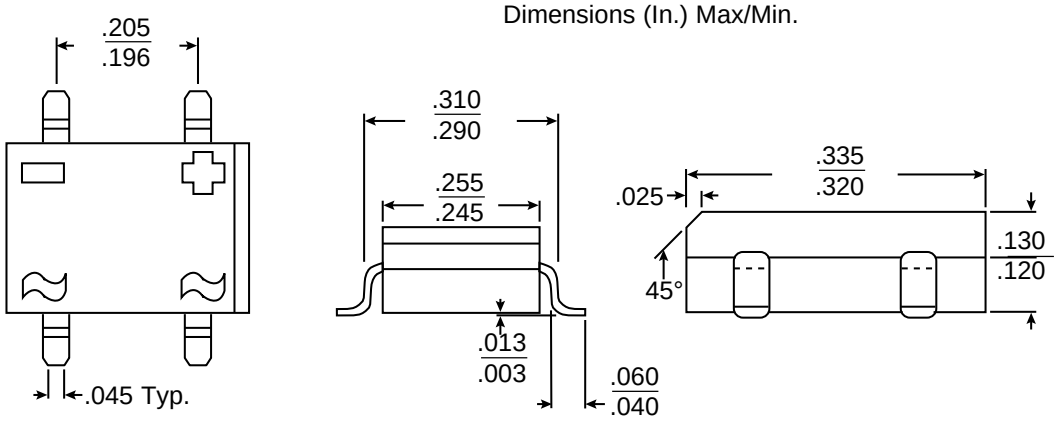


PNP

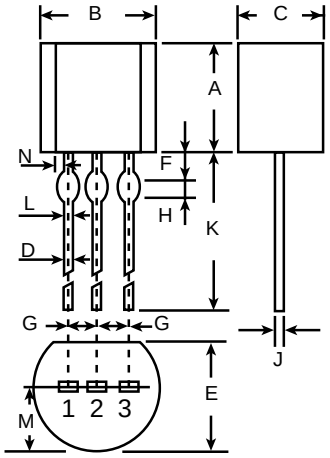
Part No.	Type	V_{CE} (V) Min	I_C (A) Max	h_{FE} @ I_C		f_T MHZ Min	C_{OB} PF Max	$V_{CE(SAT)}$ VOLTS @I_C/I_B&I_C	
				Min.	Max.			Max.	mA
333-MPQ3904	NPN	40	0.2	75	10	250	4	0.2	10
333-MPQ3906	PNP	40	0.2	75	10	200	4.5	0.25	10



Dimensions (In.) Max/Min.



Mouser Stock No.	PIV (Peak Inverse Voltage)	Max. Awg. Rectified Current @ Half Wave Res. Load 60Hz		Max. Fwd. Peak Surge Current 1~60Hz Superimposed	Max. Reverse Current @ PIV Voltage @ 25°C T_A	Max. Forward Voltage @ 25°C T_A	
	V_{PK}	A_{AV}	°C	A_{PK}	A_{dc}	A_{PK}	V_{PK}
333-DI100	50	1.0	25	50	10	1.0	1.1
333-DI101	100	1.0	25	50	10	1.0	1.1
333-DI102	200	1.0	25	50	10	1.0	1.1
333-DI104	400	1.0	25	50	10	1.0	1.1
333-DI106	600	1.0	25	50	10	1.0	1.1
333-DI108	800	1.0	25	50	10	1.0	1.1
333-DI1010	1000	1.0	25	50	10	1.0	1.1



1. Output
2. Common
3. Input

TO-92

Dim.	Inches	
	Min	Max
A	.175	.179
B	.179	.183
C	.135	.139
D	.016	.019
E	.135	.139
F	.035	.043
G	.047	.053
H	.031	.035
J	.014	.022
K	.531	.571
L	-	.019
M	.088	.092
N	-	.002

Specifications:

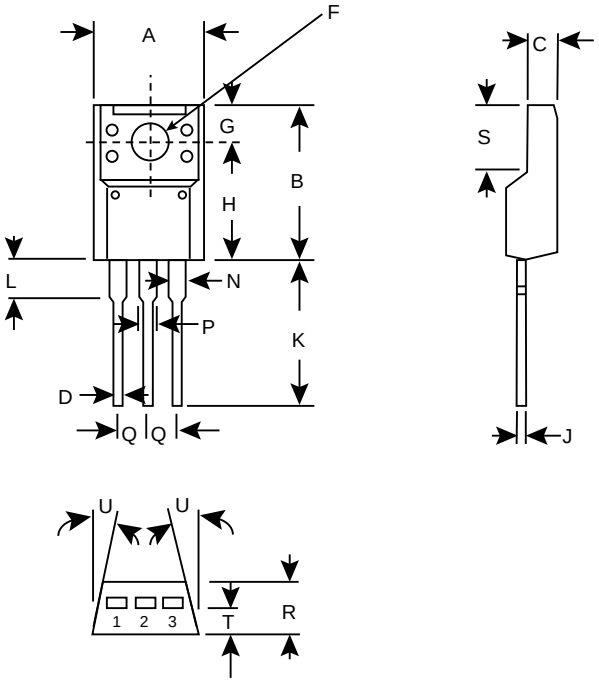
- Suitable for TTL, DTL, HTL, C-MOS power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 100mA (Tj=25°C)

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	40	V
Power Dissipation	P_D	600	mW
Operating Temperature	T_{opr}	-40 ~ 85	°C
Storage Temperature	Tstg	-55 ~150	°C

333-78S24P Electrical Characteristics
(Unless otherwise specified, V_{IN}=33V, I_{OUT}=40mA, C_{IN}=0.3µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		23	24	25	V
Input Regulation	Reg. Line	Tj=25°C	27.5V ≤ V_{IN} ≤ 38V	-	35	350	mV
			28V ≤ V_{IN} ≤ 38V	-	30	300	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	40	200	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	20	100	
Output Voltage	V_{OUT}	27.5V ≤ V_{IN} ≤ 38V 1.0mA ≤ I_{OUT} ≤ 40mA		22.8	-	25.2	V
		V_{IN} ≤ 33V, 1.0mA ≤ I_{OUT} ≤ 70mA		22.8	-	25.2	
Quiescent Current	I_B	Tj=25°C		-	3.5	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	28V ≤ V_{IN} ≤ 38V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	200	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	56	-	mV/ 1.0 KHrs
Ripple Rejection	RR	f=120Hz 29V ≤ V_{IN} ≤ 39V, Tj=25°C		31	35	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-2.0	-	mV/°C



Dim.	Min.	Max.
A	- - -	.41
B	.58	.60
C	.10	.12
D	.01	.03
F	Ø.12	Ø.13
G	.12	.13
H	.46	.48
J	.03	.03
K	.51	.55
L	.14	.15
N	- - -	.10
P	- - -	.10
Q	.1	.1
R	.17	.19
S	.22	.25
T	.09	.11
U	5°	5°

1. Input
2. Common
3. Output

Maximum Ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	40	V
Power Dissipation (note)	P_D	20.8	W
Operating Temperature	T_{opr}	-30~75	°C
Storage Temperature	T_{stg}	-55~150	°C

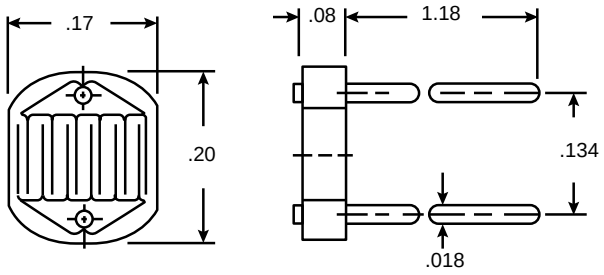
Note: T_C=25°C

333-7824PI

Electrical Characteristics (V_{IN}=33V, I_{OUT}=500mA, 0°C≤T_j≤125°C)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	T_j=25°C, I_{OUT}=100mA		19.2	20.0	20.8	V
Input Regulation	Reg. line	T_j=25°C	23V≤V_{IN}≤35V	-	15	400	mV
			26V≤V_{IN}≤32V	-	5	200	
Load Regulation	Reg. load	T_j=25°C	5mA≤I_{OUT}≤1.4A	-	12	400	mV
			250mA≤I_{OUT}≤750mA	-	4	200	
Output Voltage	V_{OUT}	23V≤V_{IN}≤35V 5.0mA≤I_{OUT}≤1.0A, P_o<15W		19.0	-	21.0	V
Quiescent Current	I_B	T_j=25°C, I_{OUT}=5mA		-	4.6	8.0	mA
Quiescent Current Change	I_B	23V≤V_{IN}≤35V		-	-	1.0	mA
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz≤f≤100kHz I_{OUT}=50mA		-	135	-	µV
Ripple Rejection	RR	f=120Hz, 24V≤V_{IN}≤34V I_{OUT}=50mA, T_j=25°C		50	66	-	dB
Dropout Voltage	V_D	I_{OUT}=1.0A, T_j=25°C		-	2.0	-	V
Short Circuit Current Limit	I_{SC}	T_j=25°C		-	0.4	-	A
Average Temperature Coefficient of Output Voltage	T_{CVO}	I_{OUT}=5mA, 0°C≤T_j≤125°C		-	-3.0	-	mV/deg

Dimensions (In.)



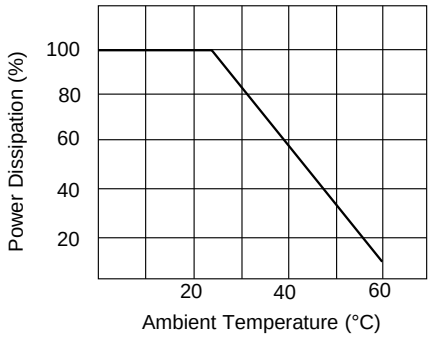
Specifications:

- Operating temperature : -30°C to +70°C
- Cadmium sulfide (CdS) construction
- Soldering: 230°C for 3 sec. (max) at 3mm from cell.
- High sensitivity, high stability
- 1 ft Candle: 10 Lux
- 10ft. Candle: 100 Lux

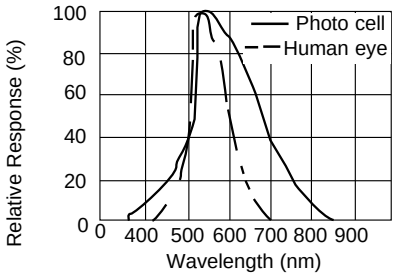
Mouser Stock No.	Voltage (Max.)	Light * Resistance (Ω)	Dark * * Resistance (Ω)	Maximum Power @ 25°C	Peak Response Wavelength (nm)
338-54C348	150	3K - 20K	500K	30mW	560
338-54C679	200	50K - 200K	20M	60mW	550
338-54C69	200	50K - 100K	20M	60mW	550
338-54C79	200	100K - 200K	20M	60mW	550

* Light resistance measured at 10 Lux and 2856°K color temperature.

* * Dark resistance measured 10 seconds after removal of 100 Lux Illumination.

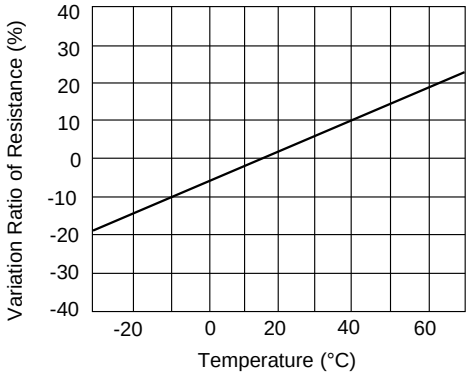


Tolerable power dissipation is the permissible amount of power the cell may dissipate when it is employed in a given circuit. This value is dependent on the characteristics of the photoconductive cell itself and is external covering in relation to ambient temperature and generated temperature all cells are measured at 25°C.

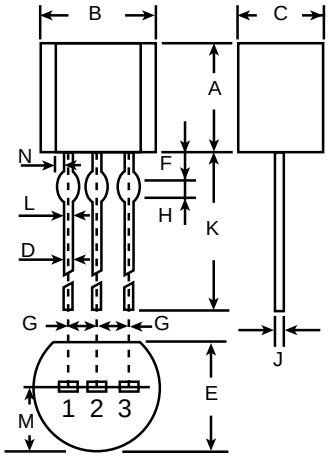


The spectral response characteristics of a cell indicates the ratio between the cells sensitivity to a light source of specific wavelength and the cells maximum sensitivity. Also color temperature error is given in the equation.

$$\Delta CE = -\log_{y_1^{10}} 2 \frac{R2856K}{R4874K}$$



The variation ratio of the temperature coefficient will be comparatively larger with week measuring light. The resistance value will increase as the ambient temperature goes up.



1. Output
2. Common
3. Input

TO-92

Dim.	Inches	
	Min	Max
A	.175	.179
B	.179	.183
C	.135	.139
D	.016	.019
E	.135	.139
F	.035	.043
G	.047	.053
H	.031	.035
J	.014	.022
K	.531	.571
L	-	.019
M	.088	.092
N	-	.002

Specifications:

- Suitable for TTL, DTL, HTL, C-MOS power supply
- Internal short-circuit current limiting
- Internal thermal overload protection
- Maximum output current of 100mA (Tj=25°C)

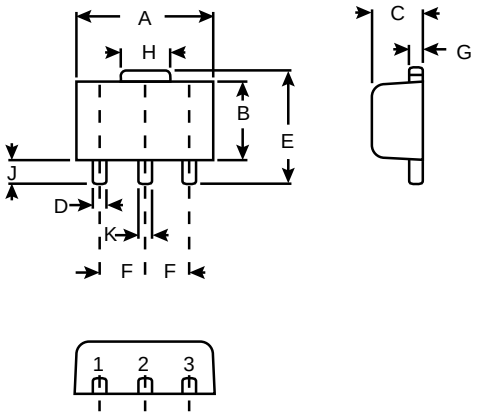
Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	40	V
Power Dissipation	P_D	600	mW
Operating Temperature	T_{opr}	-40 ~ 85	°C
Storage Temperature	Tstg	-55 ~150	°C

333-78S20P Electrical Characteristics

(Unless otherwise specified, V_{IN}=29V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		19.2	20	20.8	V
Input Regulation	Reg. Line	Tj=25°C	23.5V ≤ V_{IN} ≤ 35V	-	33	330	mV
			24V ≤ V_{IN} ≤ 35V	-	28	285	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	33	180	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	17	90	
Output Voltage	V_{OUT}	23.5V ≤ V_{IN} ≤ 35V 1.0mA ≤ I_{OUT} ≤ 40mA		19.0	-	21.0	V
		V_{IN} ≤ 29V, 1.0mA ≤ I_{OUT} ≤ 70mA		19.0	-	21.0	
Quiescent Current	I_B	Tj=25°C		-	3.3	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	24V ≤ V_{IN} ≤ 35V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	170	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	49	-	mV/ 1.0 KHrs
Ripple Rejection	RR	f=120Hz 25V ≤ V_{IN} ≤ 35V, Tj=25°C		31	37	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-1.7	-	mV/°C



Dim.	Inches
A	.181 max.
B	.098±.004
C	.063 max.
D	$.017^{+.003}_{-.002}$
E	.165 max.
F	.059±.004
G	.016±.002
H	.070 max.
J	.031 min.
K	$.018^{+.003}_{-.002}$

1. Output
2. Common
3. Input

Specifications:

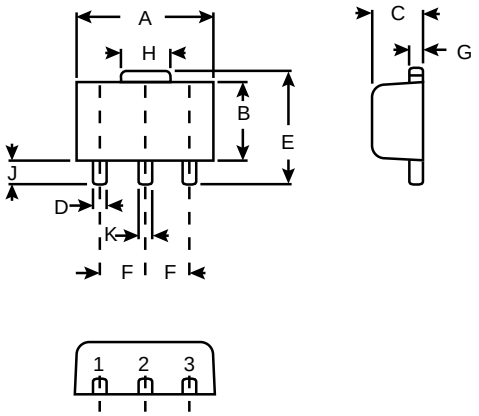
- Best suited to power supply for TTL/C^2 MOS
- No external part needed
- Built-in thermal protective circuit
- Max. output current 150mA. (Tj=25°C)

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	35	V
Power Dissipation	P_D	500	mW
Operating Temperature	T_{opr}	-30 ~ 75	°C
Storage Temperature	Tstg	-55 ~150	°C

333-78L05F
(Unless otherwise specified, V_{IN}=10V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		4.75	5.0	5.25	V
Input Regulation	Reg. Line	Tj=25°C	7.0V ≤ V_{IN} ≤ 20V	-	55	150	mV
			8.0V ≤ V_{IN} ≤ 20V	-	45	100	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	11	60	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	5.0	30	
Output Voltage	V_{OUT}	7.0V ≤ V_{IN} ≤ 20V 1.0mA ≤ I_{OUT} ≤ 40mA		4.65	-	5.3	V
		V_{IN} ≤ 10V, 1.0mA ≤ I_{OUT} ≤ 70mA		4.65	-	5.3	
Quiescent Current	I_B	Tj=25°C		-	3.1	6.0	mA
		Tj=125°C		-	-	5.5	
Quiescent Current Change	ΔI_B	8.0V ≤ V_{IN} ≤ 20V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	40	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	12	-	mV/ 1.0 KHrs
Ripple Rejection	RR	f=120Hz 8.0V ≤ V_{IN} ≤ 18V, Tj=25°C		41	49	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.6	-	mV/°C



Dim.	Inches
A	.181 max.
B	.098±.004
C	.063 max.
D	.017±.003 .002
E	.165 max.
F	.059±.004
G	.016±.002
H	.070 max.
J	.031 min.
K	.018±.003 .002

1. Output
2. Common
3. Input

Specifications:

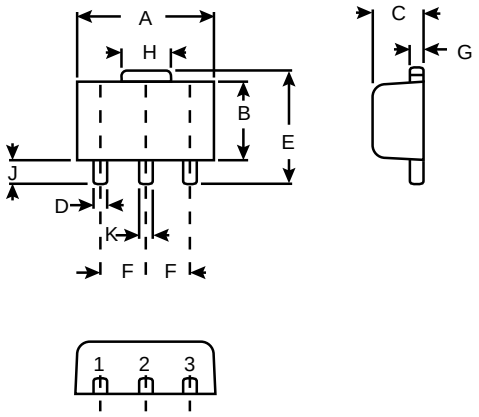
- Best suited to power supply for TTL/C^2 MOS
- No external part needed
- Built-in thermal protective circuit
- Max. output current 150mA. (Tj=25°C)

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	35	V
Power Dissipation	P_D	500	mW
Operating Temperature	T_{opr}	-30 ~ 75	°C
Storage Temperature	Tstg	-55 ~150	°C

333-78L08F
(Unless otherwise specified, V_{IN}=14V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		7.6	8.0	8.4	V
Input Regulation	Reg. Line	Tj=25°C	10.5V ≤ V_{IN} ≤ 23V	-	20	175	mV
			11V ≤ V_{IN} ≤ 23V	-	12	125	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	15	80	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	7.0	40	
Output Voltage	V_{OUT}	10.5V ≤ V_{IN} ≤ 23V 1.0mA ≤ I_{OUT} ≤ 40mA		7.44	-	8.56	V
		V_{IN} ≤ 24V, 1.0mA ≤ I_{OUT} ≤ 70mA		7.44	-	8.56	
Quiescent Current	I_B	Tj=25°C		-	3.1	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	11V ≤ V_{IN} ≤ 23V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	60	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	20	-	mV/ 1.0 KHrs
Ripple Rejection	RR	f=120Hz 12V ≤ V_{IN} ≤ 23V, Tj=25°C		37	45	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.8	-	mV/°C



Dim.	Inches
A	.181 max.
B	.098±.004
C	.063 max.
D	.017±.003 .002
E	.165 max.
F	.059±.004
G	.016±.002
H	.070 max.
J	.031 min.
K	.018±.003 .002

1. Output
2. Common
3. Input

Specifications:

- Best suited to power supply for TTL/C^2 MOS
- No external part needed
- Built-in thermal protective circuit
- Max. output current 150mA. (Tj=25°C)

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Input Voltage	V_{IN}	35	V
Power Dissipation	P_D	500	mW
Operating Temperature	T_{opr}	-30 ~ 75	°C
Storage Temperature	Tstg	-55 ~150	°C

333-78L09F
(Unless otherwise specified, V_{IN}=15V, I_{OUT}=40mA, C_{IN}=0.33µF, C_{OUT}=0.1µF, 0°C≤T_j≤125°C

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Tj=25°C		8.55	9.0	9.45	V
Input Regulation	Reg. Line	Tj=25°C	11.5V ≤ V_{IN} ≤ 24V	-	80	200	mV
			12V ≤ V_{IN} ≤ 24V	-	20	160	
Load Regulation	Reg. Load	Tj=25°C	1.0mA ≤ I_{OUT} ≤ 100mA	-	17	90	mV
			1.0mA ≤ I_{OUT} ≤ 40mA	-	8.0	45	
Output Voltage	V_{OUT}	11.4V ≤ V_{IN} ≤ 24V 1.0mA ≤ I_{OUT} ≤ 40mA		8.37	-	9.63	V
		V_{IN} ≤ 15V, 1.0mA ≤ I_{OUT} ≤ 70mA		8.37	-	9.63	
Quiescent Current	I_B	Tj=25°C		-	3.2	6.5	mA
		Tj=125°C		-	-	6.0	
Quiescent Current Change	ΔI_B	12V ≤ V_{IN} ≤ 24V		-	-	1.5	mA
		1.0mA ≤ I_{OUT} ≤ 40mA		-	-	0.1	
Output Noise Voltage	V_{NO}	Ta=25°C, 10Hz ≤ f ≤ 100kHz		-	65	-	µV
Long Term Stability	$\Delta V_{OUT}/\Delta t$			-	21	-	mV/ 1.0 KHrs
Ripple Rejection	RR	f=120Hz 12V ≤ V_{IN} ≤ 24V, Tj=25°C		36	44	-	dB
Dropout Voltage	V_{IN} V_{OUT}	Tj=25°C		-	1.7	-	V
Average Temperature Coefficient of Output Voltage	TC_{VO}	I_{OUT}=5mA		-	-0.85	-	mV/°C