TEMIC

Siliconix

TN2010T

N-Channel Enhancement-Mode MOS Transistor

Product Summary

$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
200	11	0.8 to 3.0	0.085

Features

- Low On-Resistance: 9.5 Ω
- Secondary Breakdown Free: 220 V
- Low Power/Voltage Driven
- Low Input and Output Leakage
- Excellent Thermal Stability

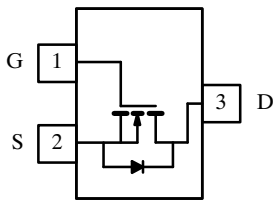
Benefits

- Low Offset Voltage
- Full-Voltage Operation
- Easily Driven Without Buffer
- Low Error Voltage
- No High-Temperature "Run-Away"

Applications

- High-Voltage Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Transistors, etc.
- Telephone Mute Switches, Ringer Circuits
- Power Supply, Converters
- Motor Control

TO-236
(SOT-23)



Top View

TN2010T (R1)*

*Marking Code for TO-236

Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150°C)	T_A = 25°C	I_D	0.085	A
	T_A = 70°C		0.07	
Pulsed Drain Current[a]		I_{DM}	0.34	
Power Dissipation	T_A = 25°C	P_D	0.2	W
	T_A = 70°C		0.128	
Maximum Junction-to-Ambient		R_{thJA}	625	°C/W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150	°C

Notes
a. Pulse width limited by maximum junction temperature.

TN2010T

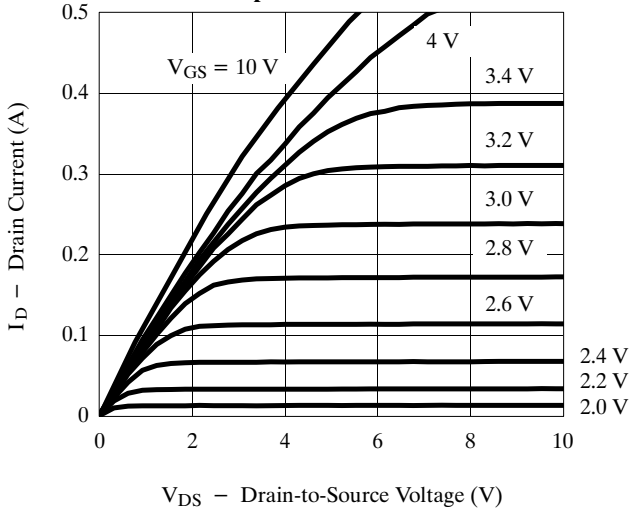
Specifications[a]

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ[b]	Max	
Static						
Drain-SourceBreakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 µA	200	220		V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 0.25 mA	0.8	1.6	3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 160 V, V_{GS} = 0 V			1	µA
		T_J = −55°C			10	
On-State Drain Current[c]	$I_{D(on)}$	V_{DS} = 10 V, V_{GS} = 10 V	0.3			mA
Drain-Source On-Resistance[c]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 0.1 A		9.5	11	Ω
		V_{GS} = 4.5 V, I_D = 0.05 mA		10	15	
Forward Transconductance[c]	g_{fs}	V_{DS} = 10 V, I_D = 0.1 A		300		mS
Diode Forward Voltage	V_{SD}	I_S = 0.085 A, V_{GS} = 0 V		0.8		V
Dynamic						
Total Gate Charge	Q_g	V_{DS} = 100 V, V_{GS} = 10 V, I_D ≃ 0.1 A		1750		pC
Gate-Source Charge	Q_{gs}			275		
Gate-Drain Charge	Q_{gd}			300		
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz		35		pF
Output Capacitance	C_{oss}			6		
Reverse Transfer Capacitance	C_{rss}			2		
Switching[d]						
Turn-On Time	$t_{d(on)}$	V_{DD} = 60 V, R_L = 600 Ω I_D ≅ 0.1 A, V_{GEN} = 10 V R_G = 6 Ω		4		ns
	t_r			16		
Turn-Off Time	$t_{d(off)}$			16		
	t_f			45		

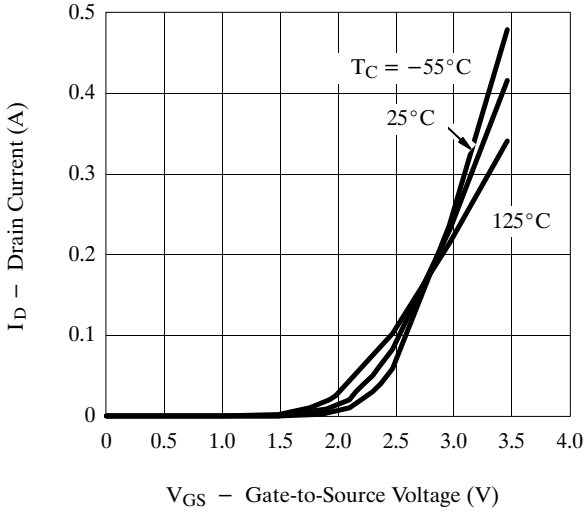
Notes
a. T_A = 25°C unless otherwise noted.
b. For DESIGN AID ONLY, not subject to production testing.
c. Pulse test: PW ≤300 µs duty cycle ≤2%.
d. Switching time is essentially independent of operating temperature.

Typical Characteristics (25°C Unless Otherwise Noted)

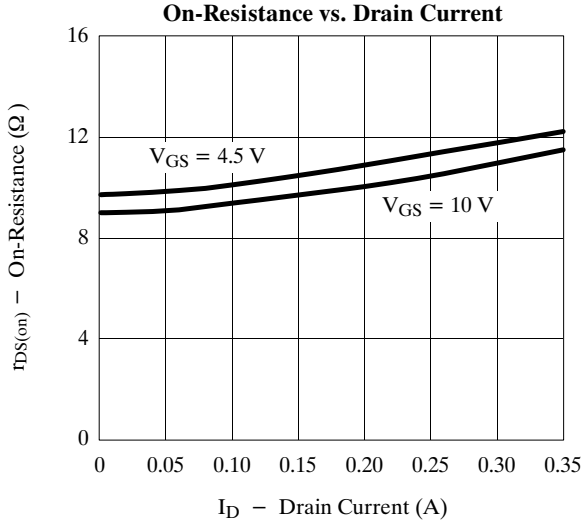
Output Characteristics



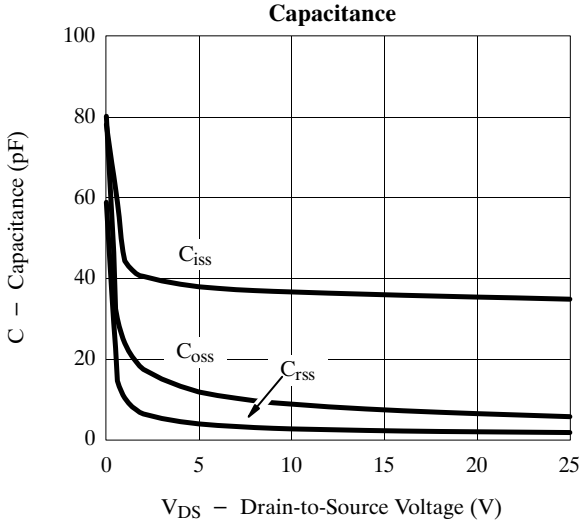
Transfer Characteristics



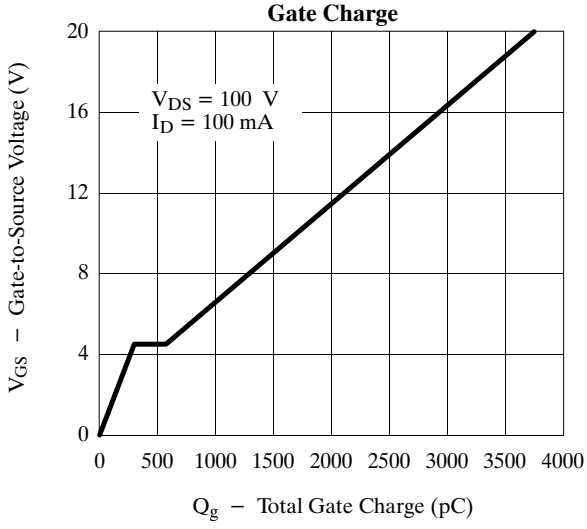
On-Resistance vs. Drain Current



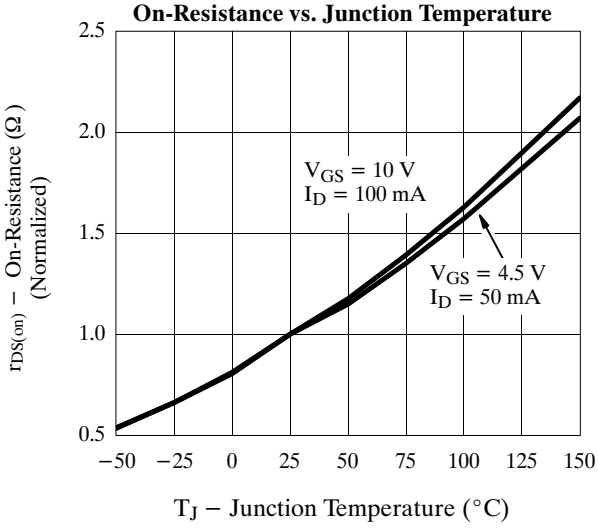
Capacitance



Gate Charge



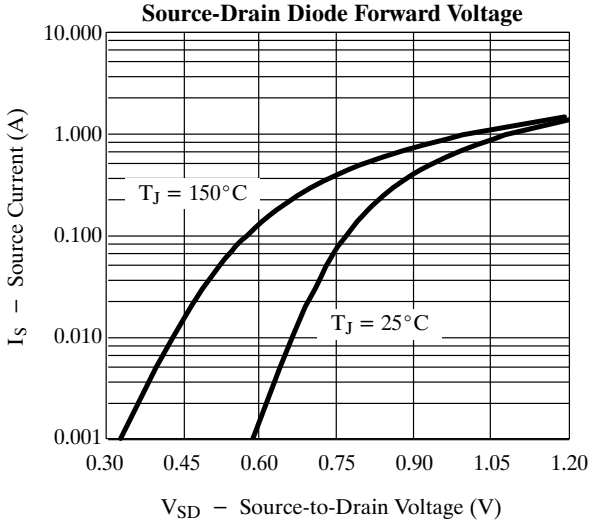
On-Resistance vs. Junction Temperature



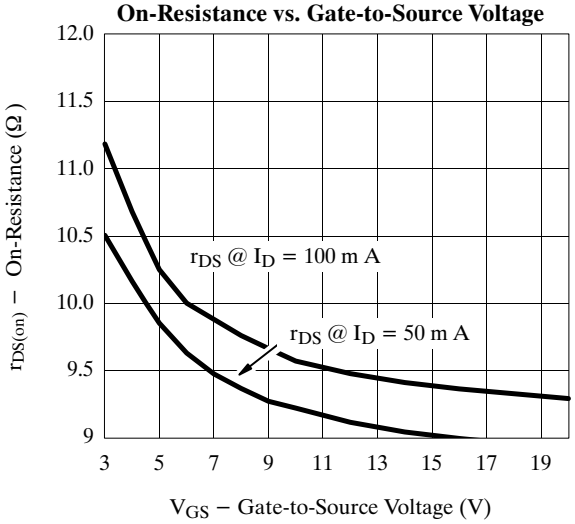
TN2010T

Typical Characteristics (25°C Unless Otherwise Noted)

Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage