TP0610L/T, VP0610L/T, BS250

TEMIC Semiconductors

P-Channel Enhancement-Mode MOSFET Transistors

TP0610L VP0610L BS250
TP0610T VP0610T

Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
TP0610L	–60	10 @ V_{GS} = –10 V	–1 to –2.4	–0.18
TP0610T	–60	10 @ V_{GS} = –10 V	–1 to –2.4	–0.12
VP0610L	–60	10 @ V_{GS} = –10 V	–1 to –3.5	–0.18
VP0610T	–60	10 @ V_{GS} = –10 V	–1 to –3.5	–0.12
BS250	–45	14 @ V_{GS} = –10 V	–1 to –3.5	–0.18

Features

- High-Side Switching
- Low On-Resistance: 8 Ω
- Low Threshold: –1.9 V
- Fast Switching Speed: 16 ns
- Low Input Capacitance: 15 pF

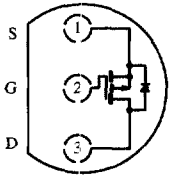
Benefits

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Switching
- Easily Driven Without Buffer

Applications

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control

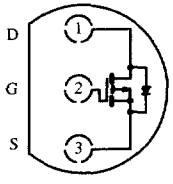
TO-226AA
(TO-92)



Top View

TP0610L
VP0610L

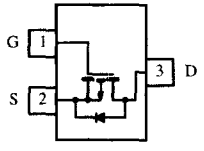
TO-92-18RM
(TO-18 Lead Form)



Top View

BS250

TO-236
(SOT-23)



Top View

TP0610T (T0)*
VP0610T (V0)*
*Marking Code for TO-236

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

Parameter		Symbol	TP0610L	TP0610T	VP0610L	VP0610T	BS250	Unit
Drain-Source Voltage		V_{DS}	–60	–60	–60	–60	–45	V
Gate-Source Voltage		V_{GS}	±30	±30	±30	±30	±25	
Continuous Drain Current (T_J = 150°C)	T_A= 25°C	I_D	–0.18	–0.12	–0.18	–0.12	–0.18	A
	T_A= 100°C		–0.11	–0.07	–0.11	–0.07		
Pulsed Drain Current[a]		I_{DM}	–0.8	–0.4	–0.8	–0.4		
Power Dissipation	T_A= 25°C	P_D	0.8	0.36	0.8	0.36	0.83	W
	T_A= 100°C		0.32	0.14	0.32	0.14		
Maximum Junction-to-Ambient		R_{thJA}	156	350	156	350	150	°C/W
Operating Junction & Storage Temperature Range		T_J, T_{stg}	–55 to 150					°C

Notes
a. Pulse width limited by maximum junction temperature.

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70209. Applications information may also be obtained via FaxBack, request document #70611.

Specifications[a]

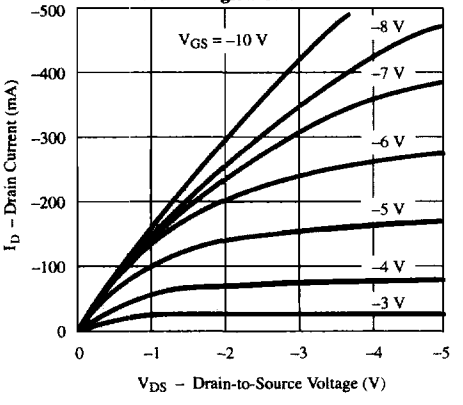
Parameter	Symbol	Test Conditions		Typ[b]	Limits TP0610L/T Min	TP0610L/T Max	VP0610L/T Min	VP0610L/T Max	BS250 Min	BS250 Max	Unit
Static											
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −10 µA		−70	−60		−60				V
		V_{GS} = 0 V, I_D = −100 µA							−45		
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = −1 mA		−1.9	−1	−2.4	−1	−3.5	−1	−3.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V				± 10		± 10			nA
			T_J = 125°C			± 50					
		V_{DS} = 0 V, V_{GS} = ± 15 V								± 20	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = −48 V, V_{GS} = 0 V				−1		−1			µA
			T_J = 125°C			−200		−200			
		V_{DS} = −25 V, V_{GS} = 0 V								−0.5	
On-State Drain Current[c]	$I_{D(on)}$	V_{DS} = −10 V, V_{GS} = −4.5 V		−180	−50						mA
		V_{DS} = −10 V, V_{GS} = −10 V	L	−750			−600				
			T				−220				
Drain-Source On-Resistance[c]	$r_{DS(on)}$	V_{GS} = −4.5 V, I_D = −25 mA		11		25					Ω
		V_{GS} = −10 V, I_D = −0.5 A	L	8		10		10			
			T_J = 125°C	15		20		20			
		V_{GS} = −10 V, I_D = −0.2 A	T	6.5		10		10		14	
Forward Transconductance[c]	g_{fs}	V_{DS} = −10 V, I_D = −0.5 A	L	125	80		80				mS
		V_{DS} = −10 V, I_D = −0.1 A	T	90	60		70				
Diode Forward Voltage	V_{SD}	I_S = −0.5 A, V_{GS} = 0 V		−1.1							V
Dynamic											
Input Capacitance	C_{iss}	V_{DS} = −25 V, V_{GS} = 0 V, f = 1 MHz		15		60		60			pF
Output Capacitance	C_{oss}			10		25		25			
Reverse Transfer Capacitance	C_{rss}			3		5		5			
Switching[d]											
Turn-On Time	t_{ON}	V_{DD} = −25 V, R_L = 133 Ω, I_D ≅ −0.18 A, V_{GEN} = −10 V, R_G = 25 Ω		8						10	ns
	$t_{d(on)}$			6		10		10			
	t_r			10		15		15			
Turn-Off Time	t_{OFF}			8						10	
	$t_{d(off)}$			7		15		15			
	t_f			8		20		20			

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.

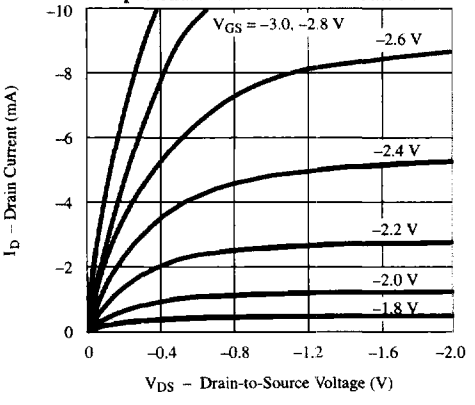
VPDS06

Typical Characteristics (25°C Unless Otherwise Noted)

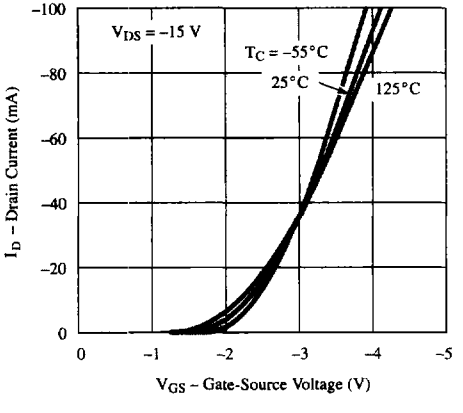
Ohmic Region Characteristics



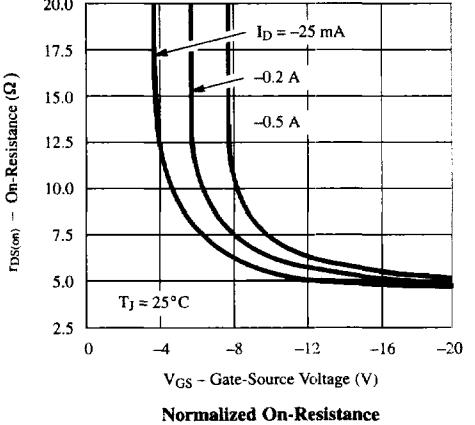
Output Characteristics for Low Gate Drive



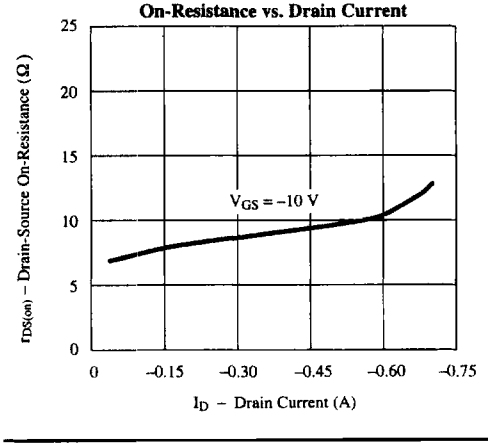
Transfer Characteristics



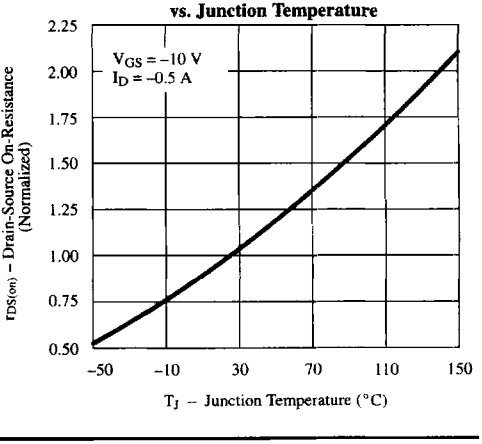
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Drain Current



Normalized On-Resistance vs. Junction Temperature



Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)