TEMIC

Siliconix

TP1220L, TP/VP2020L, BSS92

P-Channel Enhancement-Mode MOS Transistors

Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(th)}$ (V)	I_D (A)
TP1220L	−120	20 @ V_{GS} = −4.5 V	−1 to −2.4	−0.12
TP2020L	−200	20 @ V_{GS} = −4.5 V	−1 to −2.4	−0.12
VP2020L	−200	20 @ V_{GS} = −4.5 V	−0.8 to −2.5	−0.12
BSS92	−200	20 @ V_{GS} = −10 V	−0.8 to −2.8	−0.15

Features

- High-Side Switching
- Secondary Breakdown Free: −220 V
- Low On-Resistance: 11.5 Ω
- Low-Power/Voltage Driven
- Excellent Thermal Stability

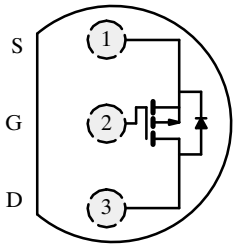
Benefits

- Ease in Driving Switches
- Full-Voltage Operation
- Low Offset Voltage
- Easily Driven Without Buffer
- No High-Temperature "Run-Away"

Applications

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Power Supply, Converters
- Motor Control
- Switches

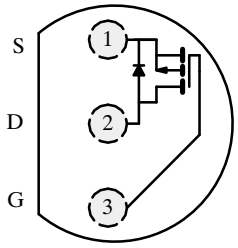
TO-226AA
(TO-92)



Top View

TP1220L
TP2020L
VP2020L

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



Top View

BSS92

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

Parameter		Symbol	TP1220L	TP2020L	VP2020L	BSS92	Unit
Drain-Source Voltage		V_{DS}	−120	−200	−200	−200	V
Gate-Source Voltage		V_{GS}	±20	±20	±20	±20	
Continuous Drain Current (T_J = 150°C)	T_A= 25°C	I_D	−0.12	−0.12	−0.12	−0.15	A
	T_A= 100°C		−0.08	−0.08	−0.08	−0.09	
Pulsed Drain Current		I_{DM}	−0.48	−0.48	−0.48	−0.6	
Power Dissipation	T_A= 25°C	P_D	0.8	0.8	0.8	1.0	W
	T_A= 100°C		0.32	0.32	0.32	0.4	
Maximum Junction-to-Ambient		R_{thJA}	156	156	156	125	°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.

TP1220L, TP/VP2020L, BSS92

Specifications[a]

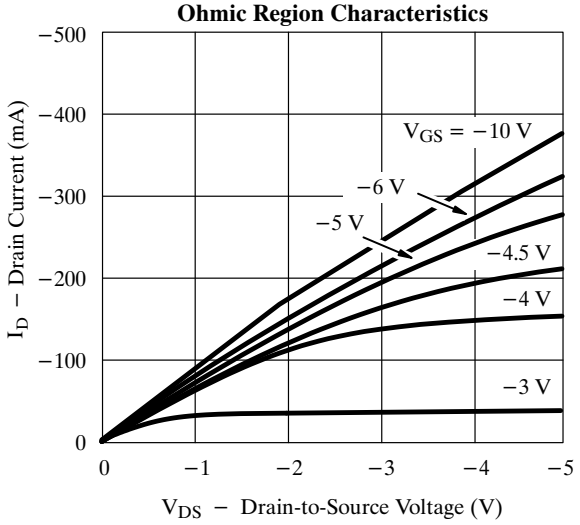
Parameter	Symbol	Test Conditions	Typ[b]	Limits TP1220L TP2020L Min	Limits TP1220L TP2020L Max	Limits VP2020L Min	Limits VP2020L Max	Limits BSS92 Min	Limits BSS92 Max	Unit
Static										
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −10 µA, TP1220L	−200	−120						V
		V_{GS} = 0 V, I_D = −10 µA, TP2020L	−220	−200		−200				
		V_{GS} = 0 V, I_D = −250 µA	−220					−200		
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = −1 mA	−1.9	−1	−2.4	−0.8	−2.5	−0.8	−2.8	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±10		±10		±10 0	nA
		T_J = 125°C			±50		±50			
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 0.8 x $V_{(BR)DSS}$, V_{GS} = 0 V			−1		−1			µA
		T_J = 125°C			−100		−100			
		V_{DS} = −200 V, V_{GS} = 0 V							−60	
		T_J = 125°C							−200	
		V_{DS} = −60 V, V_{GS} = 0 V							−0.2	
On-State Drain Current[c]	$I_{D(on)}$	V_{DS} = −10 V, V_{GS} = −4.5 V	−250	−50		−100				mA
Drain-Source On-Resistance[c]	$r_{DS(on)}$	V_{GS} = −10 V, I_D = −0.1 A	11.5		20				20	Ω
		V_{GS} = −4.5 V, I_D = −0.1 A	15				20			
		T_J = 125°C	28				40			
		V_{GS} = −4.5 V, I_D = −0.05 A	15		20					
		T_J = 125°C	28		40					
Forward Transconductance[c]	g_{fs}	V_{DS} = −10 V, I_D = −0.1 A	170	60		100				mS
		V_{DS} = −25 V, I_D = −0.1 A	170					60		
Diode Forward Voltage	V_{SD}	I_S = −0.3 A, V_{GS} = 0 V	−0.9						−1.2	V
Dynamic										
Input Capacitance	C_{iss}	V_{DS} = −25 V, V_{GS} = 0 V f = 1 MHz	30		60		70			pF
Output Capacitance	C_{oss}		10		20		20			
Reverse Transfer Capacitance	C_{rss}		3		10		10			
Switching[d]										
Turn-On Time	t_{ON}	V_{DD} = −25 V, R_L = 250 Ω I_D ≅ −0.1 A, V_{GEN} = −10 V R_G = 25 Ω	14		25					ns
	$t_{d(on)}$		6				10			
	t_r		8				15			
Turn-Off Time	t_{OFF}		35		55					
	$t_{d(off)}$		18				30			
	t_f		17				25			

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.

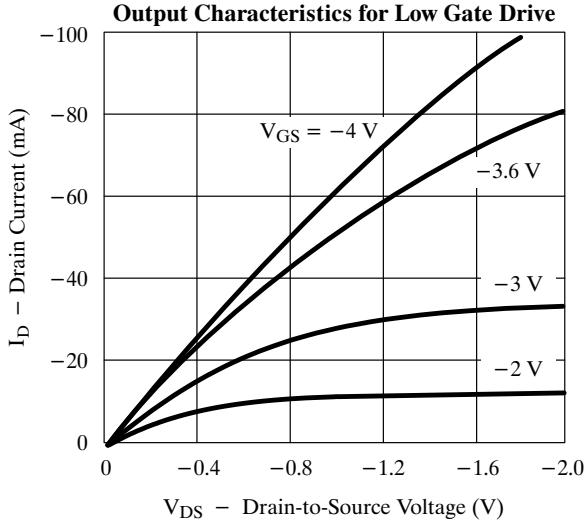
VPDQ20

Typical Characteristics (25°C Unless Otherwise Noted)

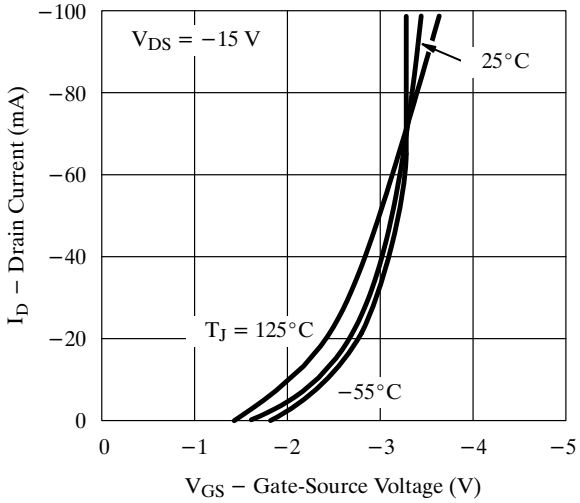
Ohmic Region Characteristics



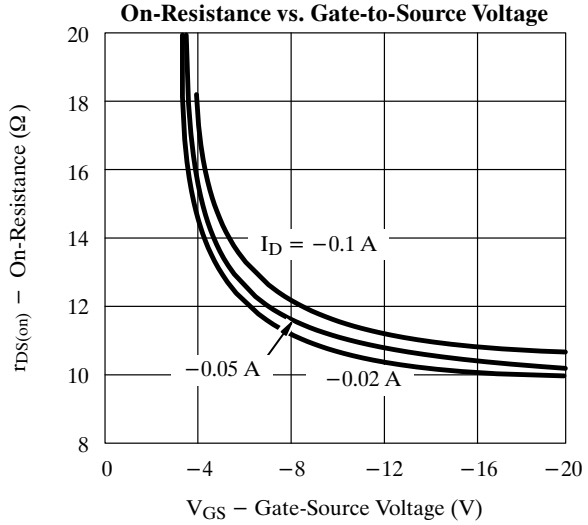
Output Characteristics for Low Gate Drive



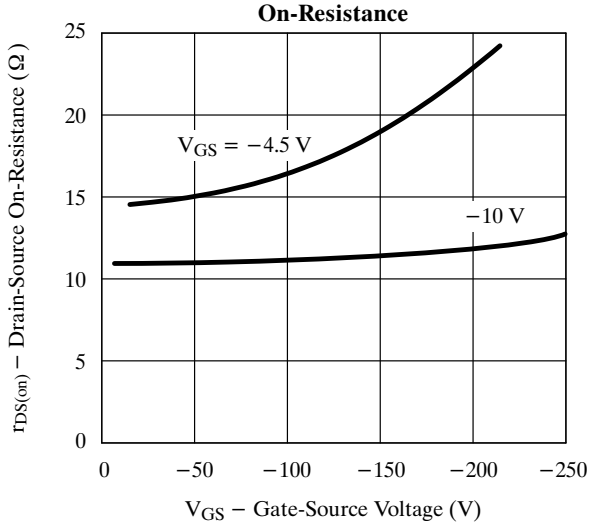
Transfer Characteristics



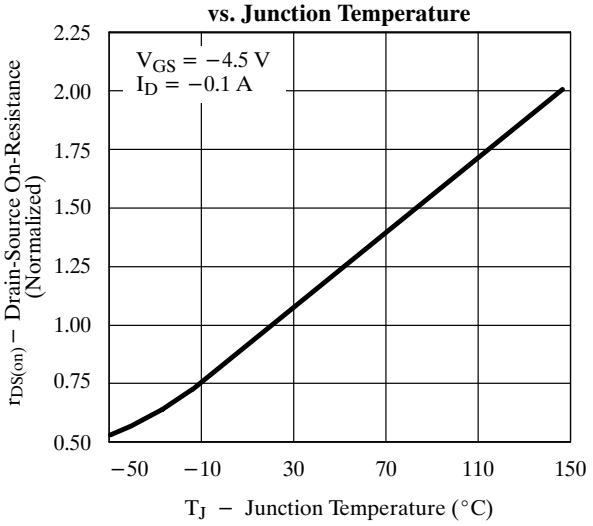
On-Resistance vs. Gate-to-Source Voltage



On-Resistance



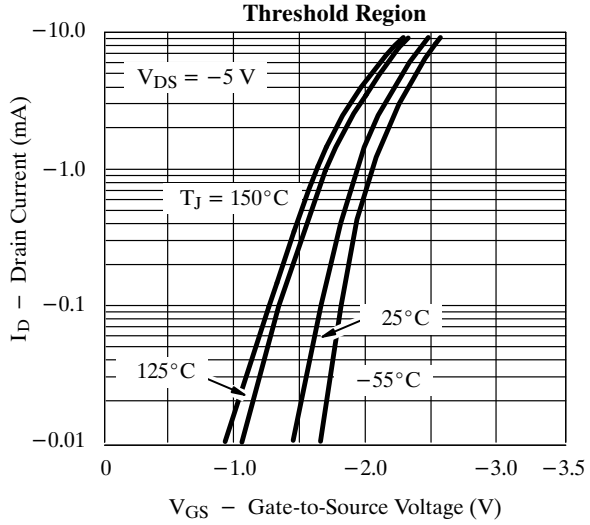
Normalized On-Resistance vs. Junction Temperature



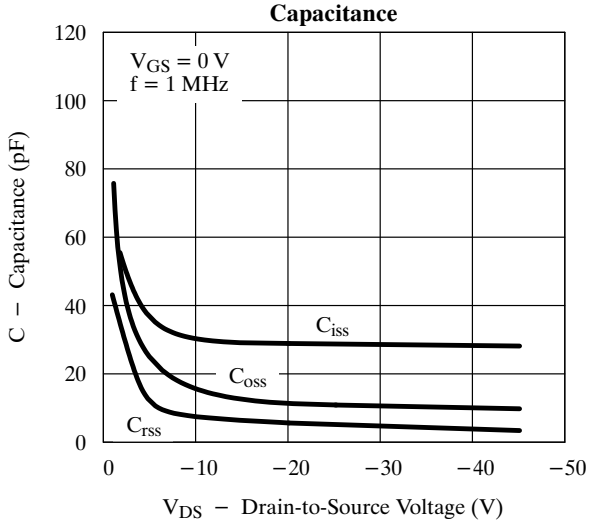
TP1220L, TP/VP2020L, BSS92

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

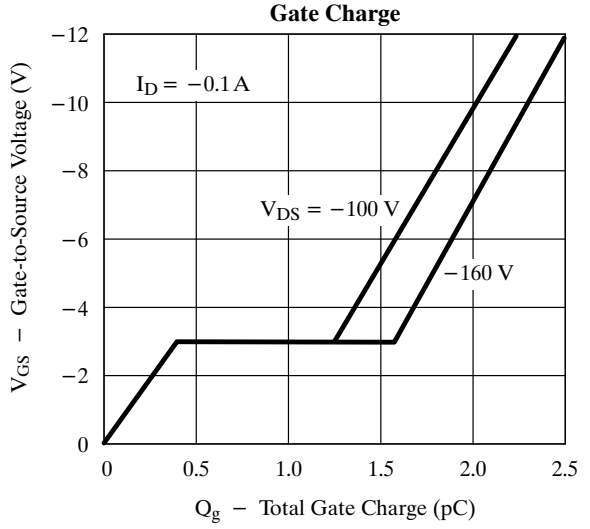
Threshold Region



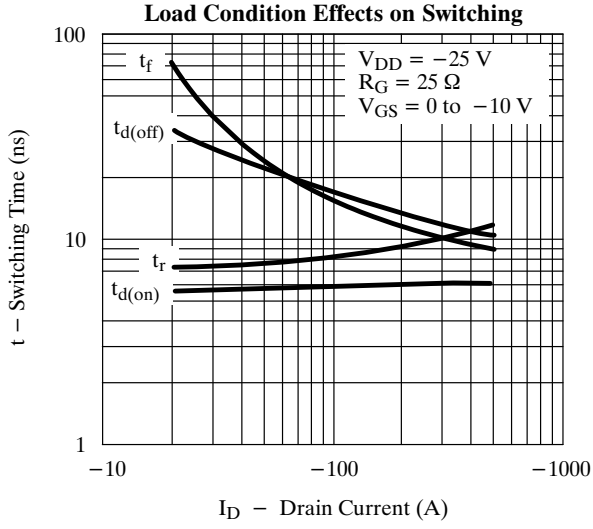
Capacitance



Gate Charge



Load Condition Effects on Switching



Normalized Effective Transient Thermal Impedance, Junction-to-Ambient (TO-226AA)