



## P-Channel 200-V (D-S) MOSFETs

PRODUCT SUMMARY				
Part Number	$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
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  $\Omega$
- Low-Power/Voltage Driven
- Excellent Thermal Stability

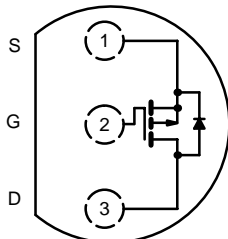
### BENEFITS

- 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)



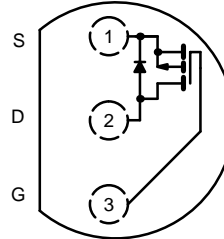
Top View  
VP2020L

Device Marking  
Front View



"S" = Siliconix Logo  
xxyy = Date Code

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



Top View  
BSS92

Device Marking  
Front View



"S" = Siliconix Logo  
xxyy = Date Code

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	VP2020L	BSS92	Unit
Drain-Source Voltage	$V_{DS}$	-200	-200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$I_D$	$T_A = 25^\circ\text{C}$	-0.12	A
		$T_A = 100^\circ\text{C}$	-0.08	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	-0.48	-0.6	
Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	0.8	W
		$T_A = 100^\circ\text{C}$	0.32	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	156	125	$^\circ\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$

Notes

a. Pulse width limited by maximum junction temperature.



SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits				Unit
				VP2020L		BSS92		
				Min	Max	Min	Max	
<b>Static</b>								
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -10 μA		-220				V
		V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-220			-200		
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1 mA	-1.9	-0.8	-2.5	-0.8	-2.8	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±10		±100	nA
		T <sub>J</sub> = 125 °C			±50			
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 0.8 × V <sub>(BR)DSS</sub> , V <sub>GS</sub> = 0 V			-1			μA
		T <sub>J</sub> = 125 °C			-100			
		V <sub>DS</sub> = -200 V, V <sub>GS</sub> = 0 V					-60	
		T <sub>J</sub> = 125 °C					-200	
		V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V					-0.2	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = -4.5 V	-250	-100				mA
Drain-Source On-Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -0.1 A	11.5				20	Ω
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -0.1 A	15		20			
		T <sub>J</sub> = 125 °C	28		40			
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -0.05 A	15					
		T <sub>J</sub> = 125 °C	28					
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -0.1 A	170	100				mS
		V <sub>DS</sub> = -25 V, I <sub>D</sub> = -0.1 A	170			60		
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = -0.3 A, V <sub>GS</sub> = 0 V	-0.9				-1.2	V
<b>Dynamic</b>								
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = -25 V, V <sub>GS</sub> = 0 V f = 1 MHz	30		70		130	pF
Output Capacitance	C <sub>oss</sub>		10		20		30	
Reverse Transfer Capacitance	C <sub>rSS</sub>		3		10		15	
<b>Switching<sup>c</sup></b>								
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -25 V, R <sub>L</sub> = 250 Ω I <sub>D</sub> ≅ -0.1 A, V <sub>GEN</sub> = -10 V R <sub>G</sub> = 25 Ω	6		10			ns
	t <sub>r</sub>		8		15			
Turn-Off Time	t <sub>d(off)</sub>		18		30			
	t <sub>f</sub>		17		25			

Notes

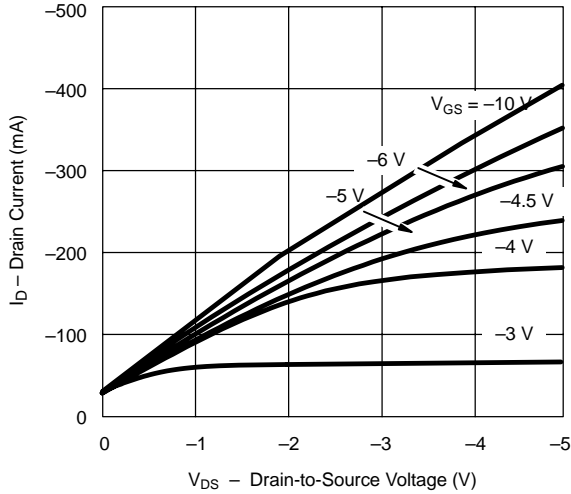
- a. For DESIGN AID ONLY, not subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
- c. Switching time is essentially independent of operating temperature.

VPDQ20

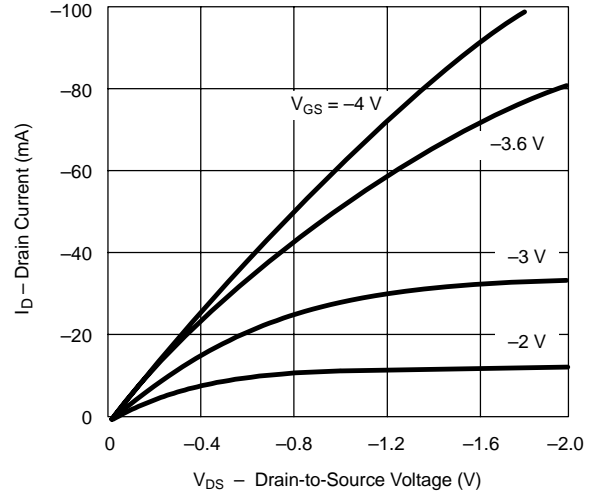


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

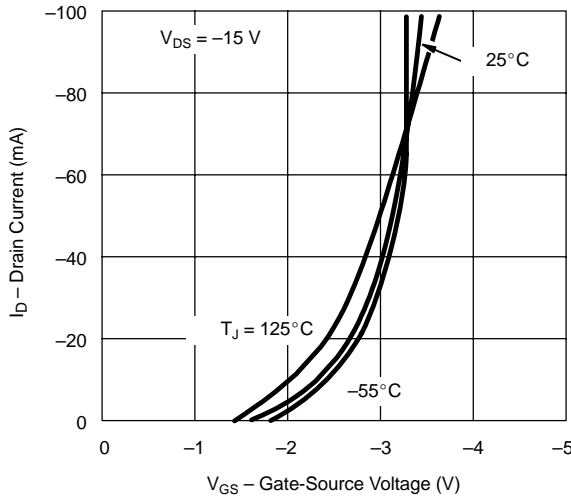
**Ohmic Region Characteristics**



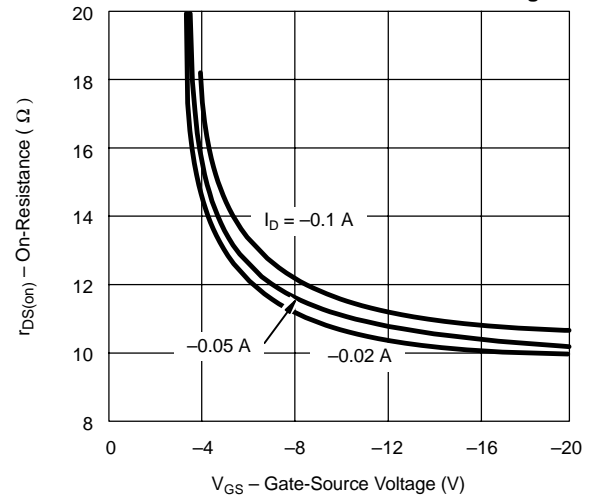
**Output Characteristics for Low Gate Drive**



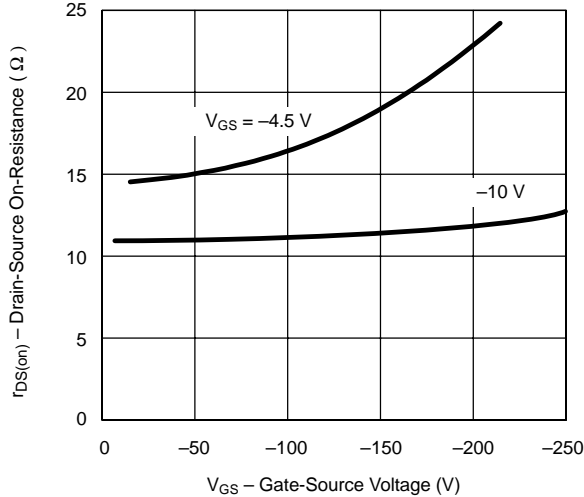
**Transfer Characteristics**



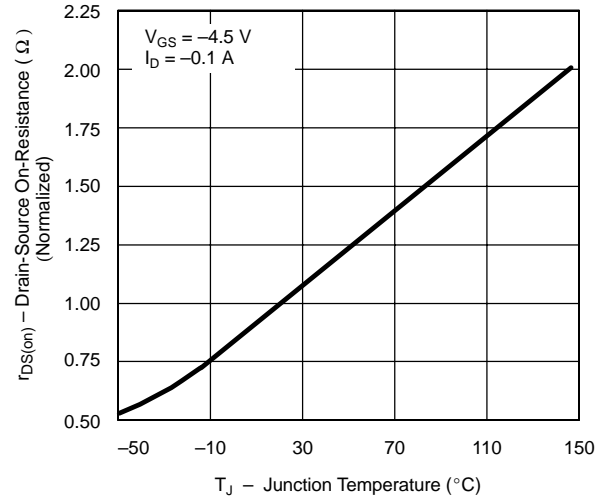
**On-Resistance vs. Gate-to-Source Voltage**



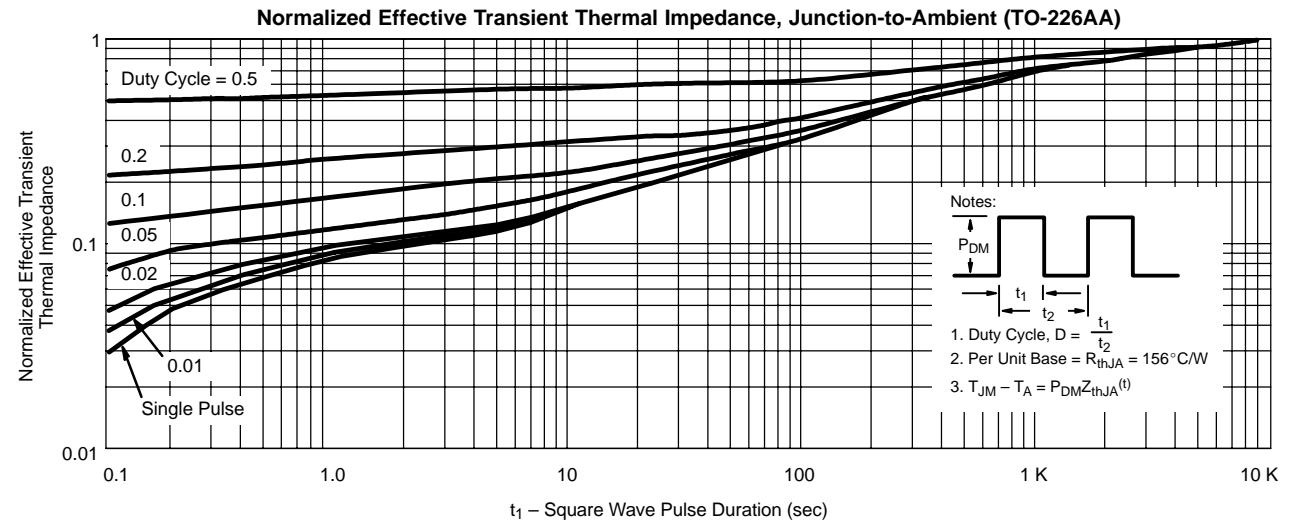
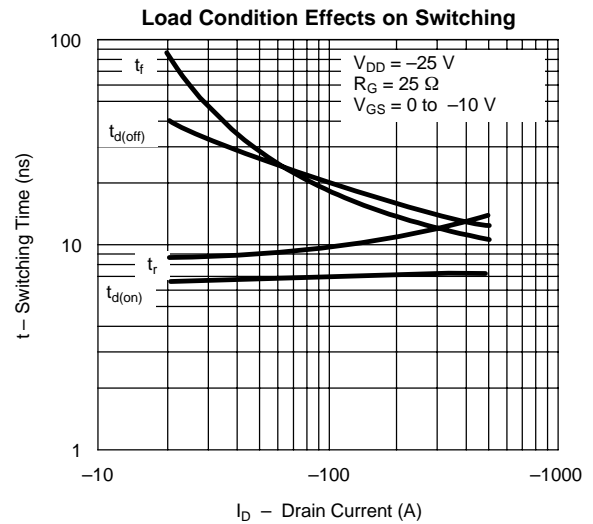
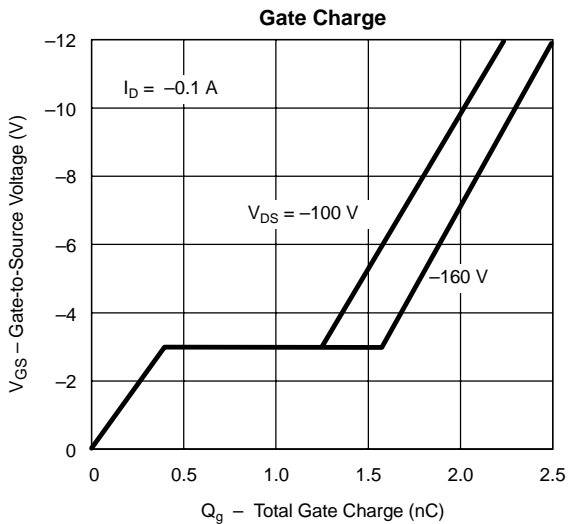
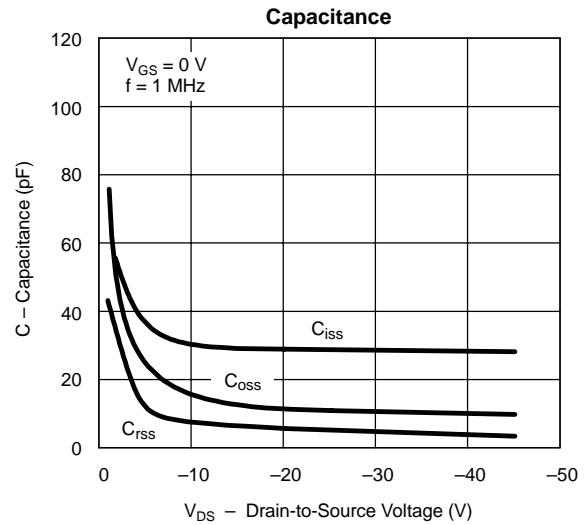
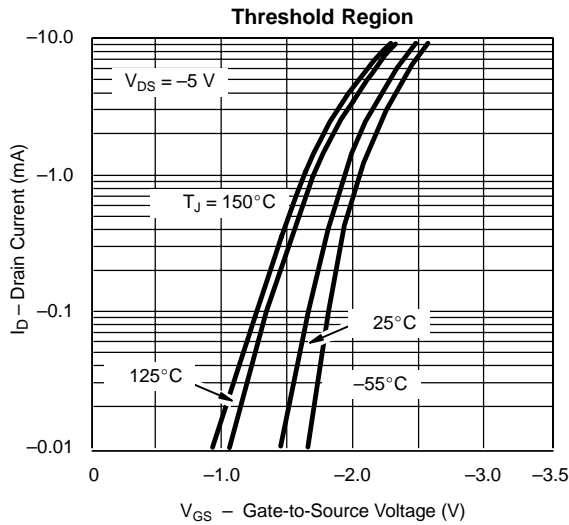
**On-Resistance**



**Normalized On-Resistance vs. Junction Temperature**



**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**





## Disclaimer

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