

## P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)(Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
-20	45 at V <sub>GS</sub> = -4.5 V	-5.5	13 nC
	60 at V <sub>GS</sub> = -2.5 V		

### FEATURES

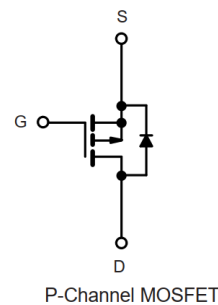
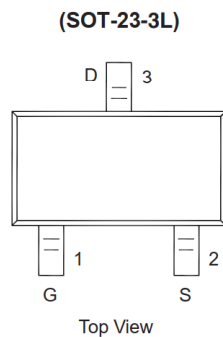
- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested

### APPLICATIONS

- Power Management for Portable and Consumer
  - Load Switches
  - DC/DC Converters



**RoHS**  
COMPLIANT



ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	- 20	V	
Gate-Source Voltage	V <sub>GS</sub>	± 12		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 5.5	A
		T <sub>C</sub> = 70 °C	- 4.6	
		T <sub>A</sub> = 25 °C	- 3.5 <sup>a, b</sup>	
		T <sub>A</sub> = 70 °C	- 2.6 <sup>a, b</sup>	
Pulsed Drain Current	I <sub>DM</sub>	-18		
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	- 2.4	
		T <sub>A</sub> = 25 °C	- 1 <sup>a, b</sup>	
Avalanche Current	I <sub>AS</sub>	L = 0.1 mH	- 5.5	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	1.7	W
		T <sub>C</sub> = 70 °C	1.1	
		T <sub>A</sub> = 25 °C	1 <sup>a, b</sup>	
		T <sub>A</sub> = 70 °C	0.6 <sup>a, b</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	R <sub>thJA</sub>	65	80	°C/W	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	40	55		

Notes:

- T<sub>C</sub> = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 100C/W.

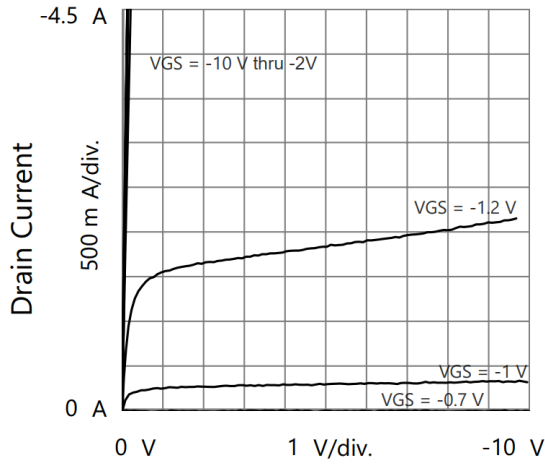
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.4		-1.2	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 10$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-1 -10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-15			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -2\text{ A}$		45	50	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -2\text{ A}$		60	70	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -4.5\text{ V}, I_D = -2\text{ A}$		15		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		970		$\mu\text{F}$
Output Capacitance	$C_{oss}$			130		
Reverse Transfer Capacitance	$C_{rss}$			115		
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -2\text{ A}$		13		nC
Gate-Source Charge	$Q_{gs}$			2		
Gate-Drain Charge	$Q_{gd}$			3		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		7		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 2.8\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		18		ns
Rise Time	$t_r$			20		
Turn-Off Delay Time	$t_{d(off)}$			58		
Fall Time	$t_f$			10		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 2.8\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -8\text{ V}, R_g = 1\text{ }\Omega$		8		
Rise Time	$t_r$			5		
Turn-Off Delay Time	$t_{d(off)}$			60		
Fall Time	$t_f$			15		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-5.5	A
Pulse Diode Forward Current	$I_{SM}$				-18	
Body Diode Voltage	$V_{SD}$	$I_S = -1\text{ A}, V_{GS} = 0\text{ V}$		-0.5	-1	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		12	20	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			5	10	nC
Reverse Recovery Fall Time	$t_a$			8		ns
Reverse Recovery Rise Time	$t_b$			5		

**Notes:**

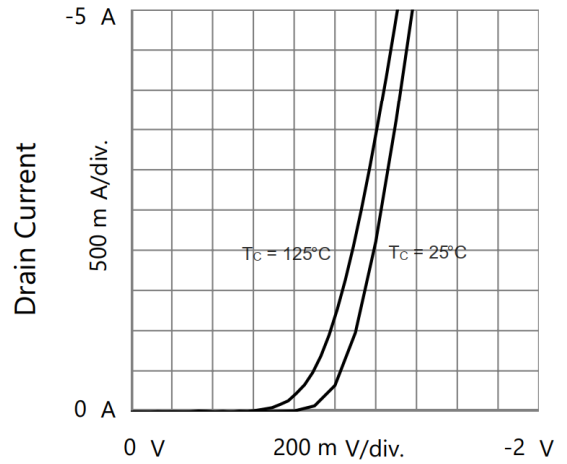
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

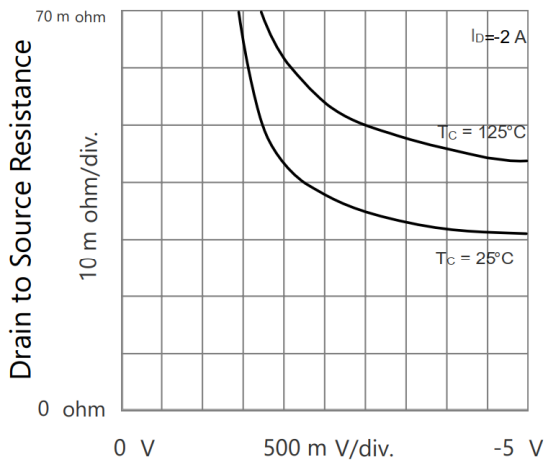
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



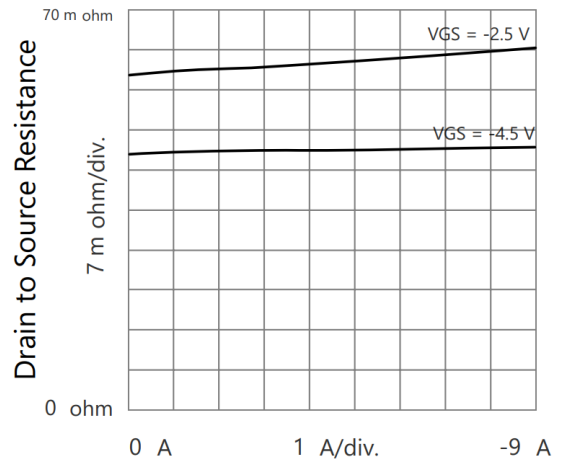
Drain to Source Voltage Output Characteristics



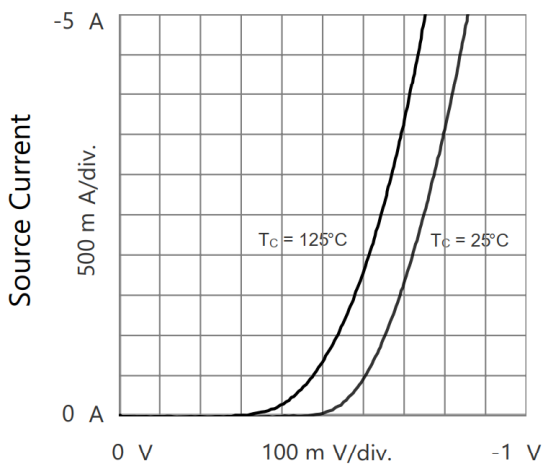
Gate to Source Voltage Transfer Characteristics



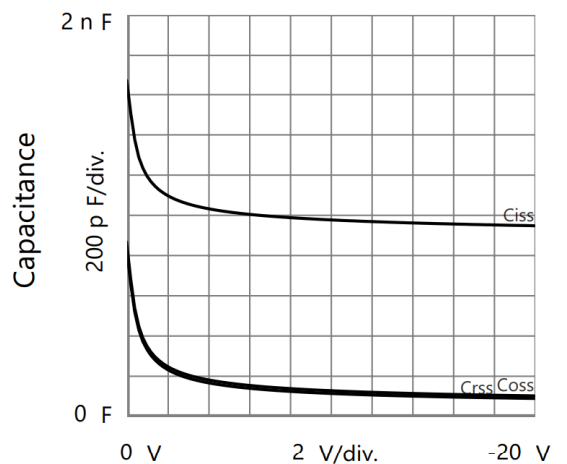
Gate to Source Voltage Drain to Source Resistance vs. Gate to Source Voltage



Drain Current Drain to Source Resistance vs. Drain Current

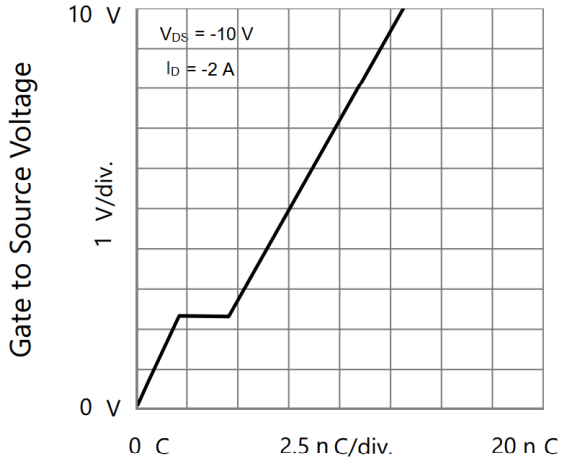


Source to Drain Voltage Body Diode Forward Characteristics

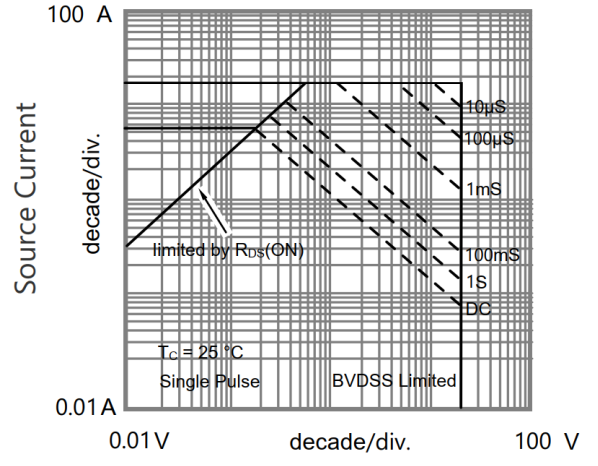


Drain to Source Voltage Capacitances

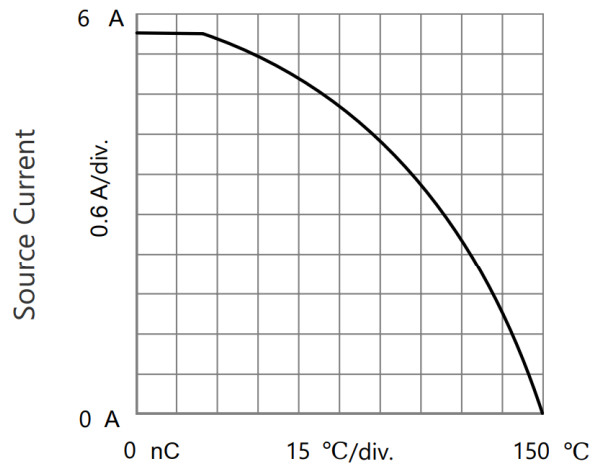
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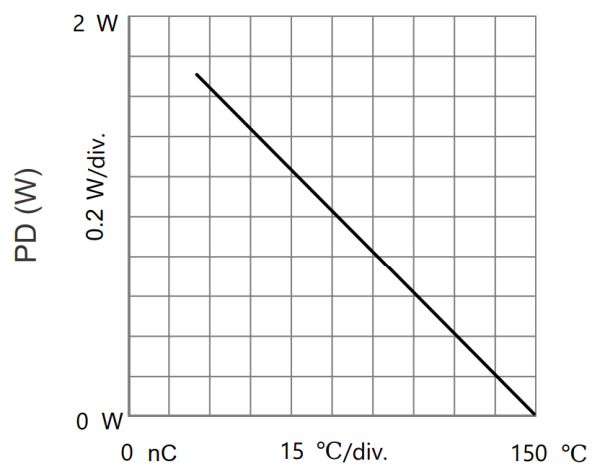
**Gate Charge**  
Gate to Source Voltage vs. GateCharge



**Source to Drain Voltage**  
Safe Operating Area, Junction-to-Ambient

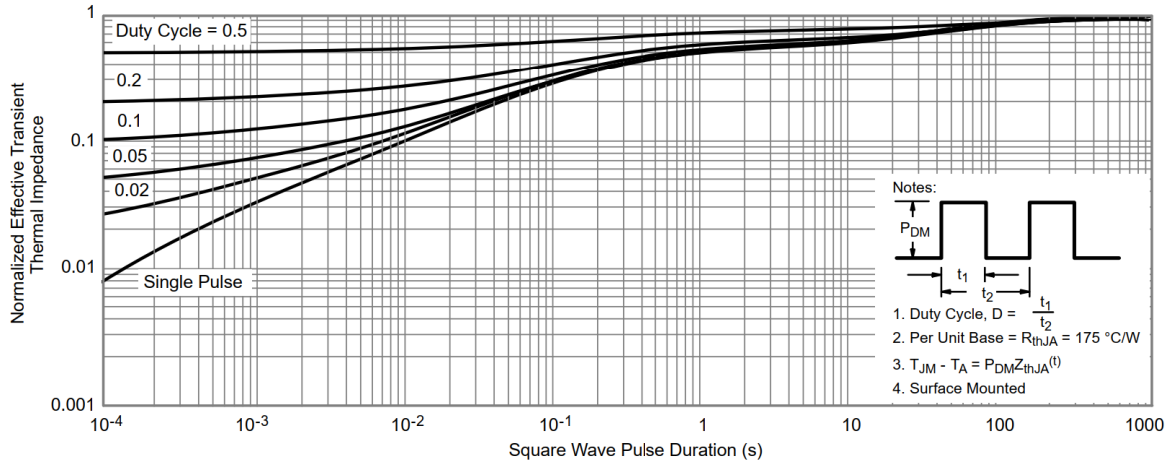


**T<sub>C</sub> - Case Temperature**  
Current Derating

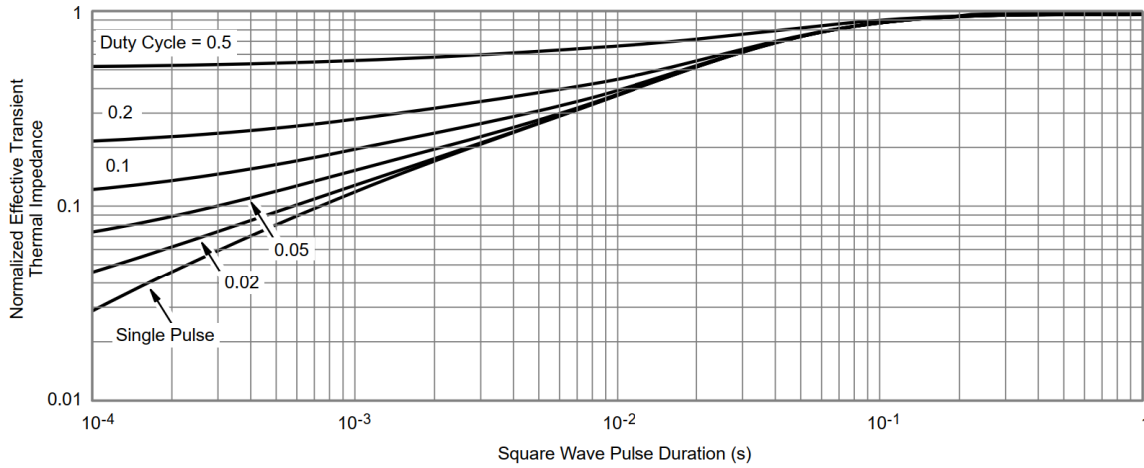


**T<sub>C</sub> - Case Temperature**  
Power Derating

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

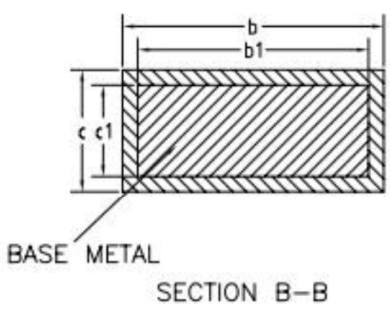
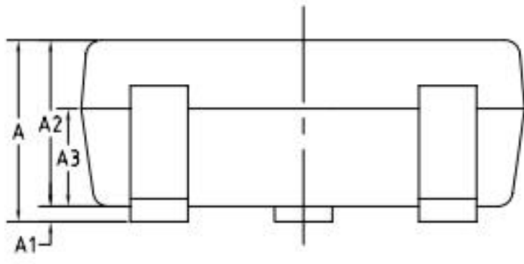
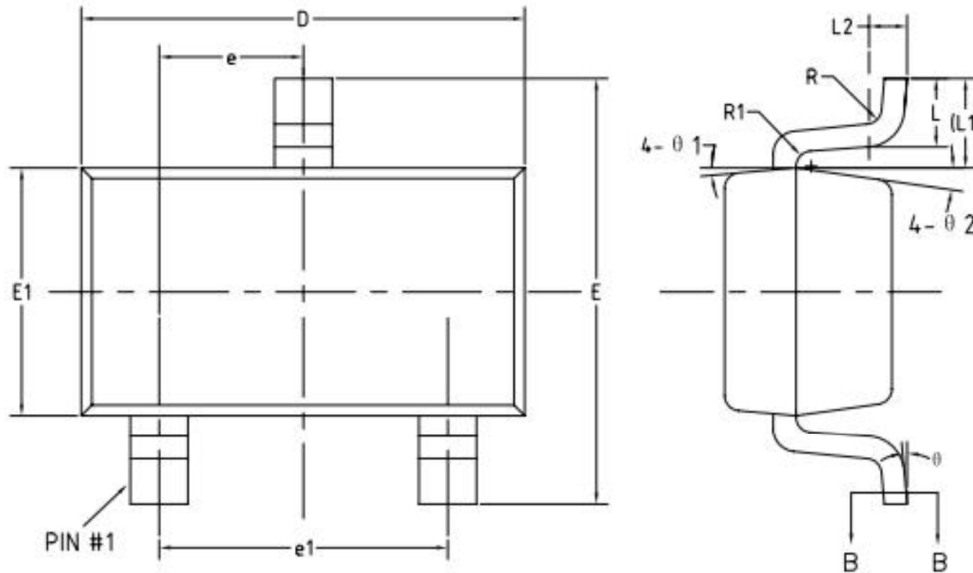


**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

SOT-23-3L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	-	-	1.50
A1	0.00	-	0.18
A2	0.85	1.10	1.35
A3	0.58	0.65	0.72
b	0.23	-	0.53
b1	0.20	0.40	0.50
c	0.09	-	0.22
c1	0.08	0.13	0.21
D	2.78	2.95	3.10
E	2.58	2.80	3.03
E1	1.55	1.65	1.78
e	0.83	0.95	1.07
e1	1.78	1.90	2.02
L	0.28	0.45	0.62
L1	0.59REF		
L2	0.25BSC		
R	0.04	-	-
R1	0.04	-	0.21
θ	0°	-	8°
θ 1	8°	10°	12°
θ 2	8°	10°	12°

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