

## P-Channel 60-V (D-S) MOSFET



**RoHS**  
COMPLIANT

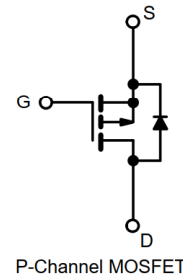
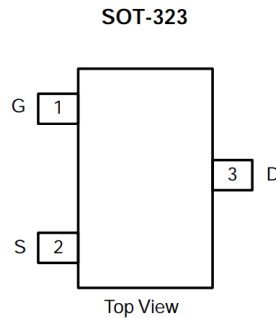
PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)(Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
- 60	170 at V <sub>GS</sub> = - 10 V	- 1.8	2.8 nC
	210 at V <sub>GS</sub> = - 4.5 V		

### FEATURES

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

### APPLICATIONS

- Load Switch
- DC/DC converter



ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	- 60	V	
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C)		T <sub>C</sub> = 25 °C	- 1.8	A
		T <sub>C</sub> = 70 °C	- 1.6	
Pulsed Drain Current	I <sub>DM</sub>	- 7.2		
Single-Pulse Avalanche Energy	E <sub>AS</sub>	2.9	mJ	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	3.0	W
		T <sub>C</sub> = 70 °C	1.92	
		T <sub>A</sub> = 25 °C	1.04 <sup>b,c</sup>	
		T <sub>A</sub> = 70 °C	0.66 <sup>b,c</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>	105	120	°C/W	
Maximum Junction-to-Case	R <sub>thJC</sub>	35	41.6		

### Notes

- T<sub>C</sub> = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under steady state conditions is 150 °C/W

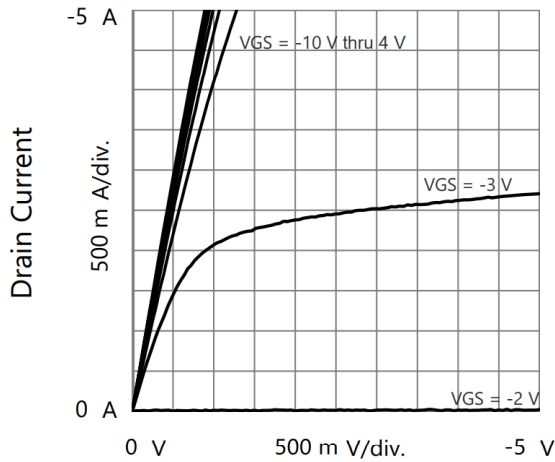
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0, I_D = -250\text{ }\mu\text{A}$	-60			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1		-3	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-50	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$	-1.8			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -1\text{ A}$		170	200	m $\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -1\text{ A}$		210	280	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -1\text{ A}$		2.8		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		417		pF
Output Capacitance	$C_{oss}$			33		
Reverse Transfer Capacitance	$C_{rss}$			17		
Total Gate Charge	$Q_g$	$V_{DS} = -30\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -1\text{ A}$		2.8		nC
Gate-Source Charge	$Q_{gs}$			1		
Gate-Drain Charge	$Q_{gd}$			1.5		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		10		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 30\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		40		ns
Rise Time	$t_r$			25		
Turn-Off Delay Time	$t_{d(off)}$			10		
Fall Time	$t_f$			8		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-1.8	A
Pulse Diode Forward Current	$I_{SM}$				-7.2	
Body Diode Voltage	$V_{SD}$	$I_S = -1\text{ A}$			-1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -1\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		34		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			1.8		nC

**Notes:**

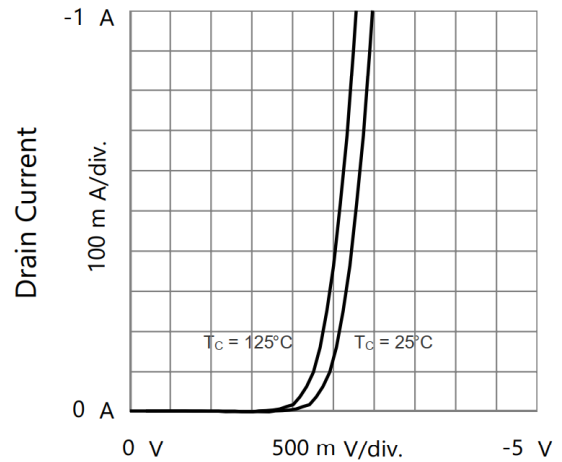
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

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.

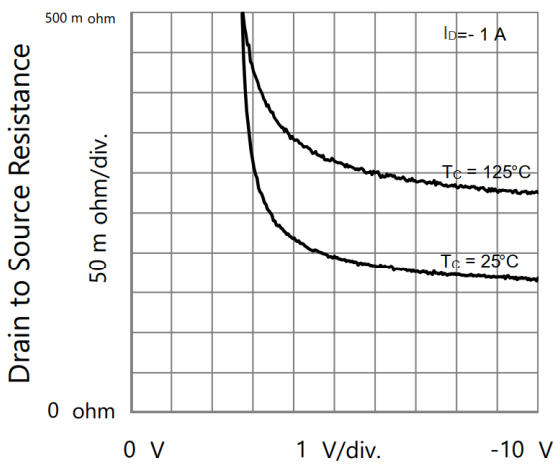
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



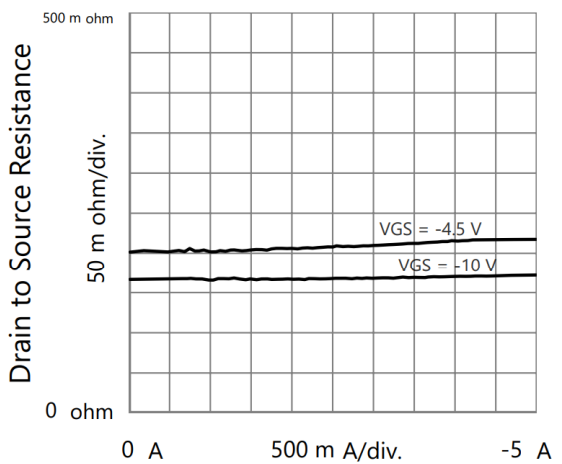
Drain to Source Voltage  
Output Characteristics



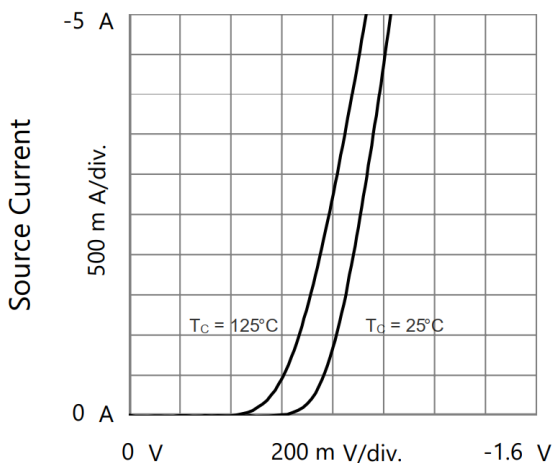
Gate to Source Voltage  
Transfer Characteristics



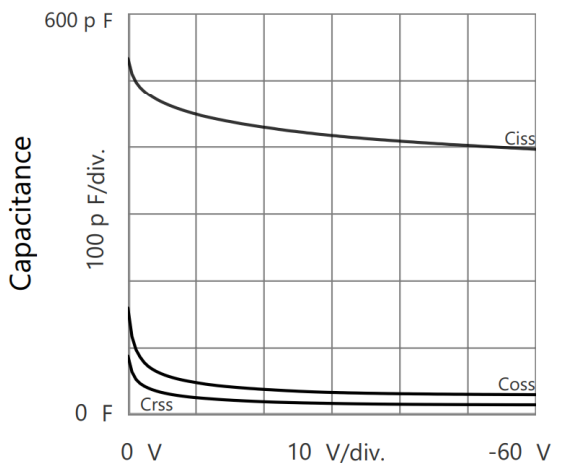
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

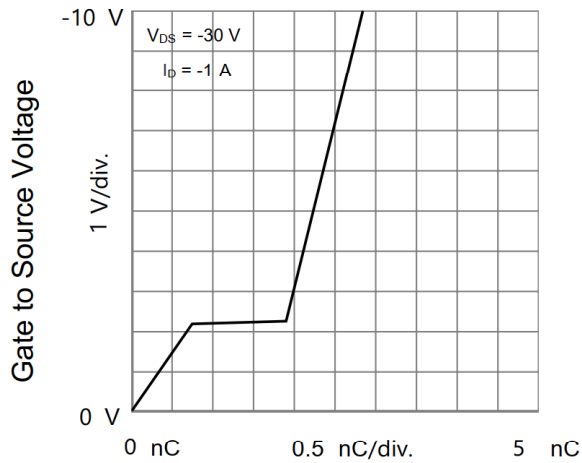


Source to Drain Voltage  
Body Diode Forward Characteristics

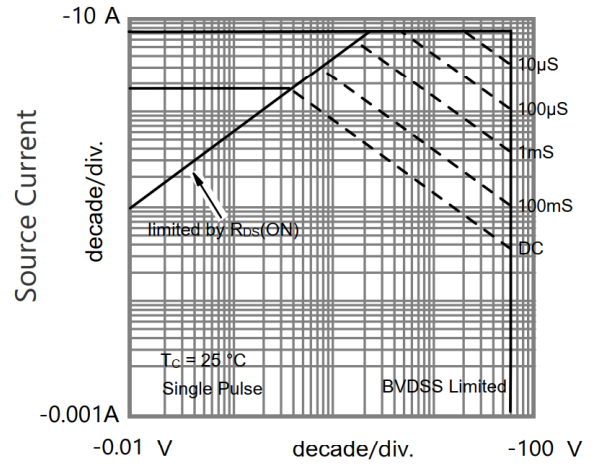


Drain to Source Voltage  
Capacitances

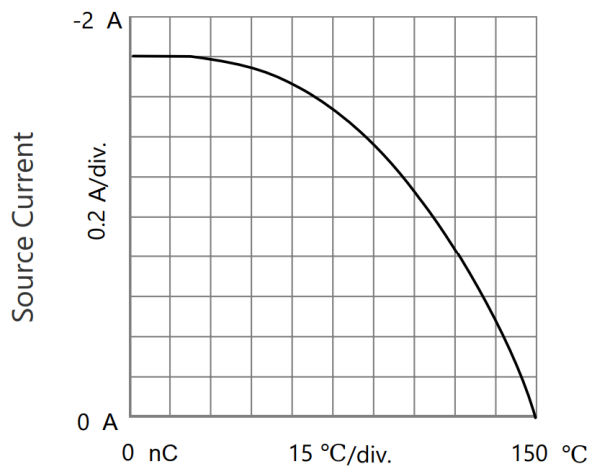
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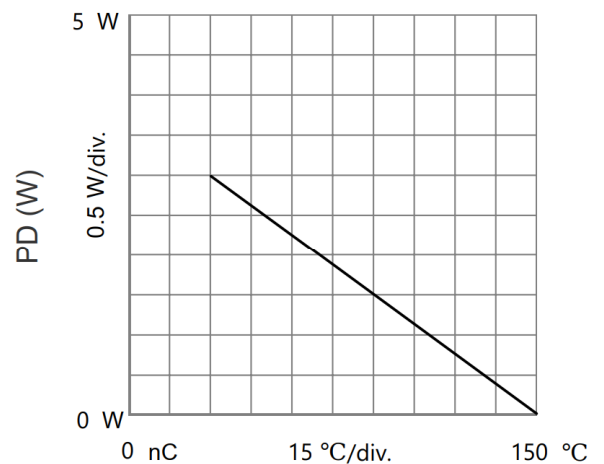
**Gate Charge**  
Gate to Source Voltage vs. Gate Charge



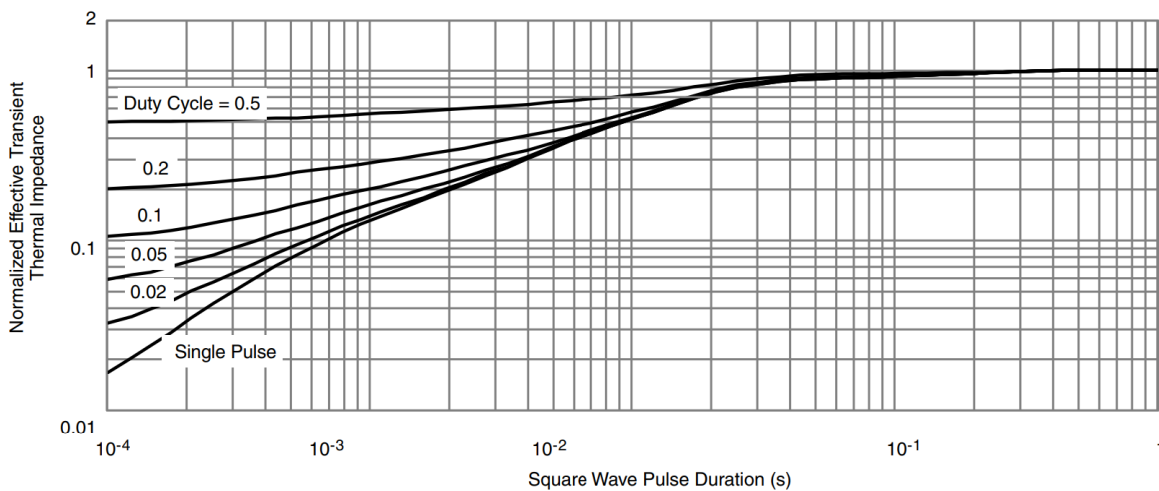
**Source to Drain Voltage**  
Safe Operating Area, Junction-to-Ambient



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

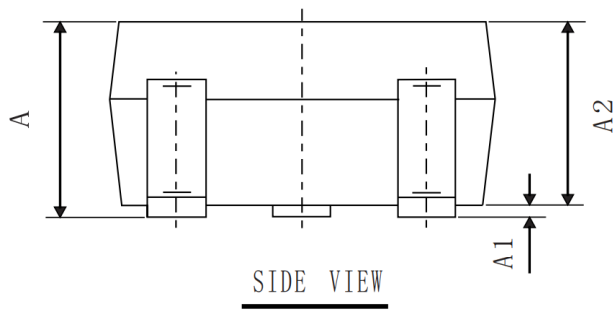
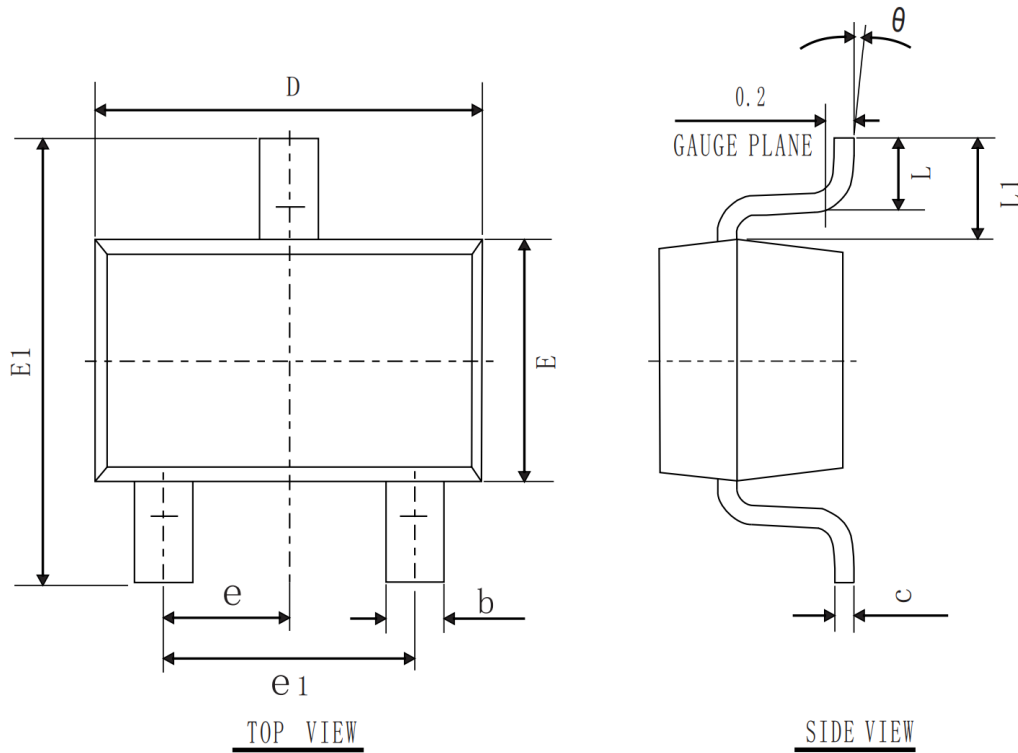


**T<sub>C</sub> - Case Temperature**  
Power Derating



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

SOT-323 PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	0.05	0.10
A2	0.90	0.95	1.00
b	0.20	0.25	0.30
c	0.08	0.10	0.15
e1	1.20	1.30	1.40
D	2.00	2.10	2.20
E	1.15	1.25	1.35
E1	2.15	2.30	2.45
L	0.26	0.36	0.46
$\theta$	0°	4°	8°
L1	0.525 REF		
e	0.65 TYP		

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