

## P-Channel 25-V (D-S) MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (m)(Typ.)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 25	18 at V <sub>GS</sub> = - 4.5 V	- 9 <sup>a</sup>	20 nC
	27 at V <sub>GS</sub> = - 2.5 V	- 6 <sup>a</sup>	

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> Tested
- Built in ESD Protection with Zener Diode
- Typical ESD Performance: 1800 V
- Compliant to RoHS Directive 2002/95/EC

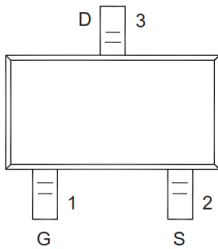


**RoHS**  
COMPLIANT

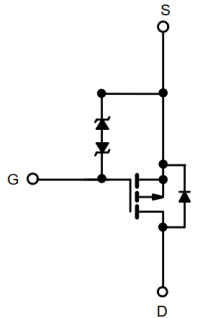
### APPLICATIONS

- Portable Devices
  - Load Switch
  - Battery Switch
  - Charger Switch

(SOT-23-3L)



Top View



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS T<sub>A</sub> = 25 °C, unless otherwise noted

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	- 25	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	- 9 <sup>a</sup>	
		T <sub>C</sub> = 70 °C	- 6 <sup>a</sup>	
		T <sub>A</sub> = 25 °C	- 5 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	- 4.1 <sup>b, c</sup>	
Pulsed Drain Current	I <sub>DM</sub>	- 27	A	
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C		- 6 <sup>a</sup>
		T <sub>A</sub> = 25 °C		- 2.9 <sup>b, c</sup>
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C		19
		T <sub>C</sub> = 70 °C	12	
		T <sub>A</sub> = 25 °C	3.5 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	2.2 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C	
Soldering Recommendations (Peak Temperature) <sup>d, e</sup>		260		

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, e</sup>	R <sub>thJA</sub>	28	36	°C/W
Maximum Junction-to-Case (Drain)	R <sub>thJC</sub>	5.3	6.5	

Notes:

- Package limited.
- Surface Mounted on 1" x 1" FR4 board.
- t = 5 s.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under Steady State conditions is 80 °C/W.

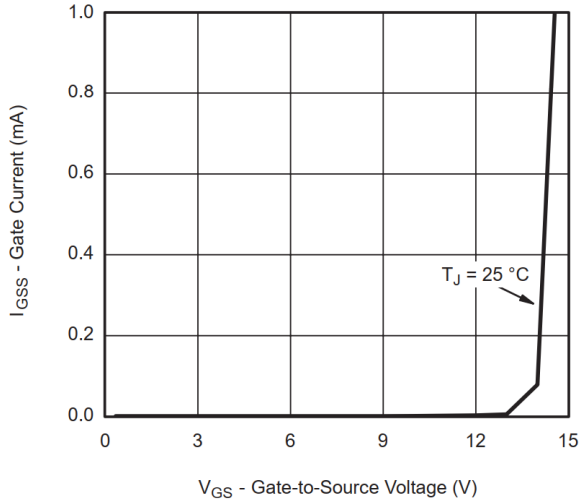
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-25			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-12		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.5		-1.5	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 20$	$\mu\text{A}$
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			$\pm 0.5$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}$			-1	
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -2.6\text{ A}$		18	24	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -2.3\text{ A}$		27	30	
		$V_{GS} = -1.8\text{ V}, I_D = -1.5\text{ A}$		40	65	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -1.6\text{ A}$		35		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		3050		pF
Output Capacitance	$C_{oss}$			1172		
Reverse Transfer Capacitance	$C_{rss}$			256		
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}, V_{GS} = -2.5\text{ V}, I_D = -2.6\text{ A}$		50		nC
Gate-Source Charge			$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -2.6\text{ A}$		20	
Gate-Drain Charge	$Q_{gds}$			3.3		
Gate Resistance	$Q_{gd}$			8.4		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		1		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 1\text{ }\Omega$ $I_D \cong -2.6\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		0.71		us
Rise Time	$t_r$			1.7		
Turn-Off Delay Time	$t_{d(off)}$			6		
Fall Time	$t_f$			3.2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 1\text{ }\Omega$ $I_D \cong -2.6\text{ A}, V_{GEN} = -2.5\text{ V}, R_g = 1\text{ }\Omega$		0.3		
Rise Time	$t_r$			0.6		
Turn-Off Delay Time	$t_{d(off)}$			10		
Fall Time	$t_f$			3.5		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-9	A
Pulse Diode Forward Current	$I_{SM}$				-27	
Body Diode Voltage	$V_{SD}$	$I_S = -2.6\text{ A}, V_{GS} = 0\text{ V}$		-0.85	-1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 6\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		30		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			20		nC
Reverse Recovery Fall Time	$t_a$			13		ns
Reverse Recovery Rise Time	$t_b$			17		

**Notes:**

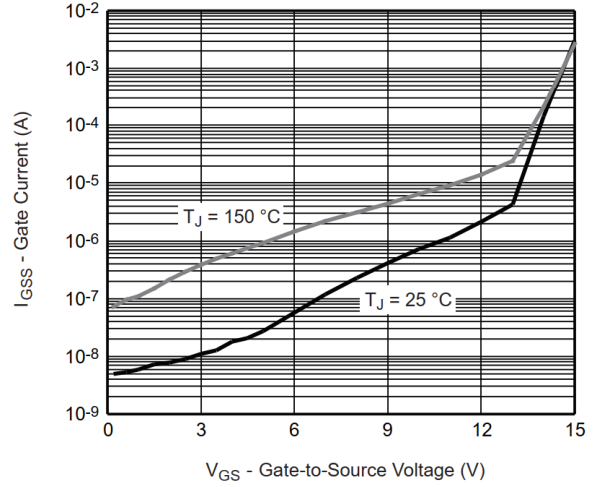
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

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.

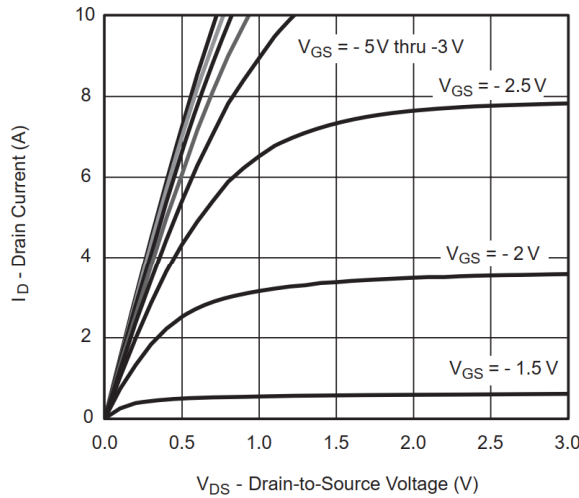
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



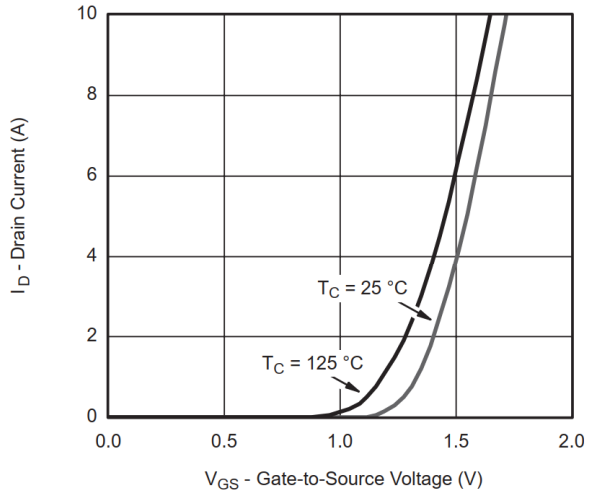
**Gate Current vs. Gate-Source Voltage**



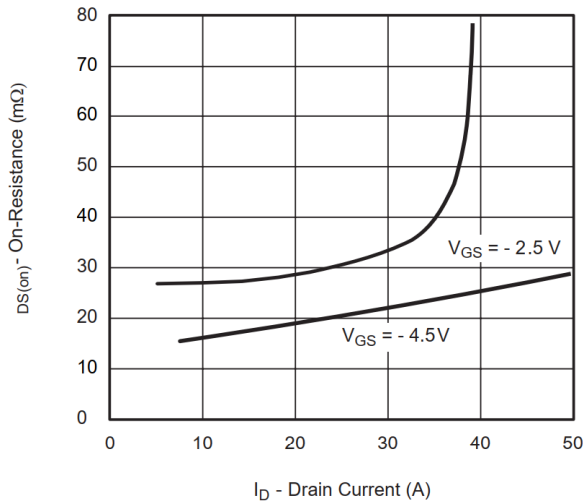
**Gate Current vs. Gate-Source Voltage**



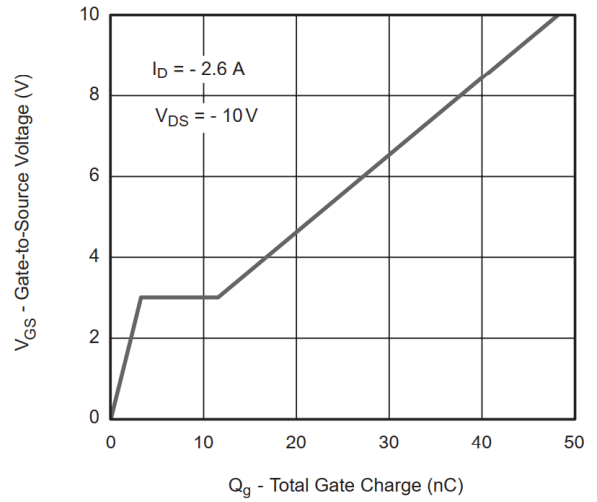
**Output Characteristics**



**Transfer Characteristics**

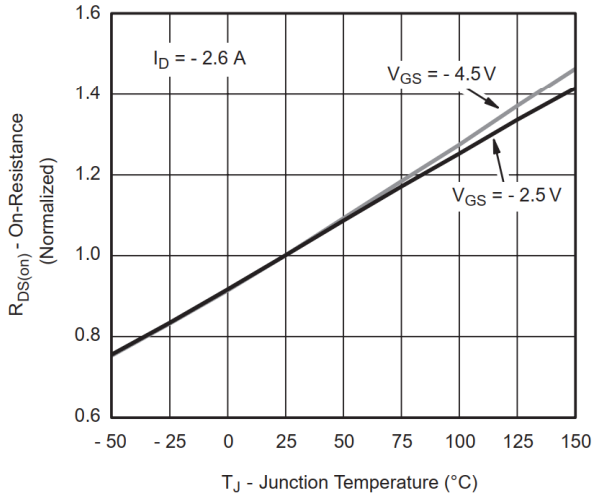


**On-Resistance vs. Drain Current**

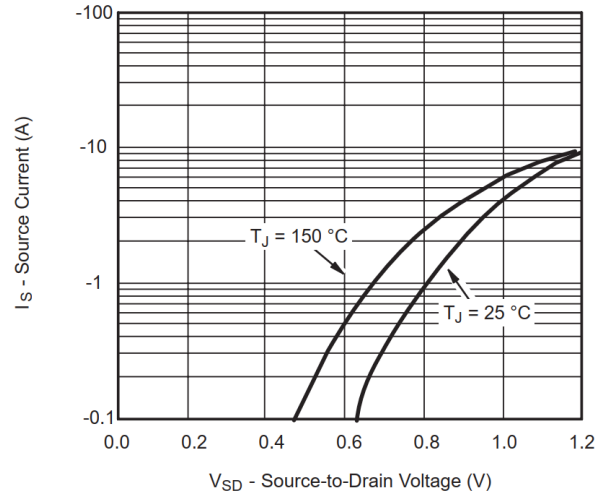


**Gate Charge**

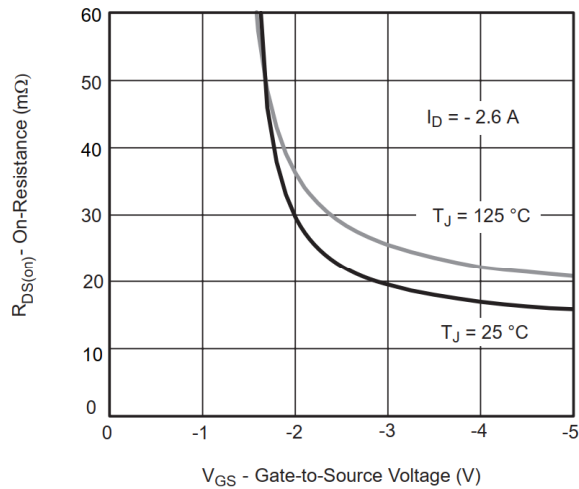
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



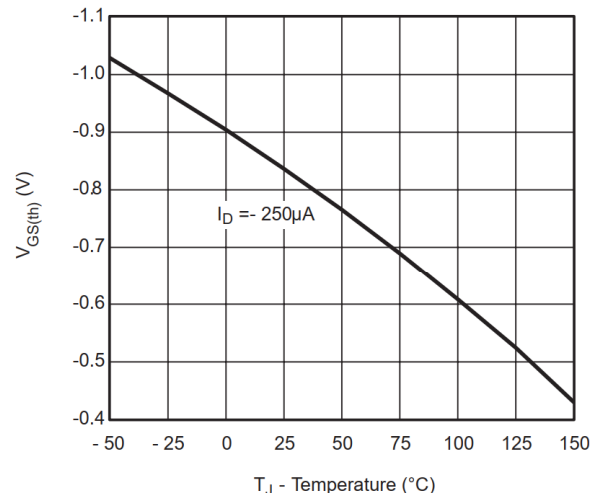
**On-Resistance vs. Junction Temperature**



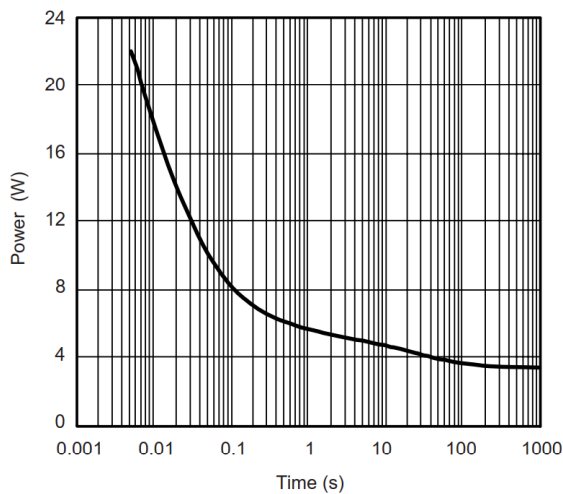
**Source-Drain Diode Forward Voltage**



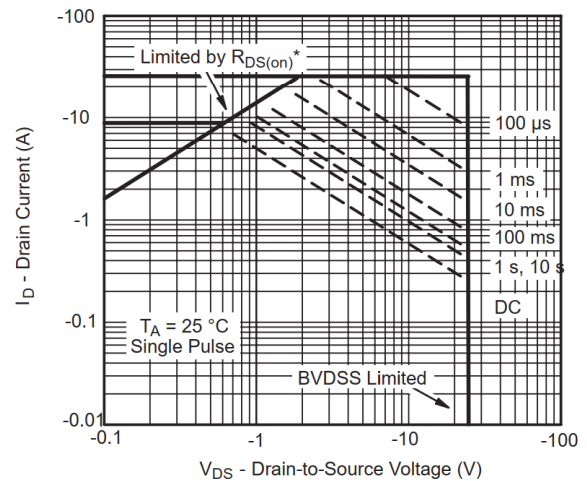
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

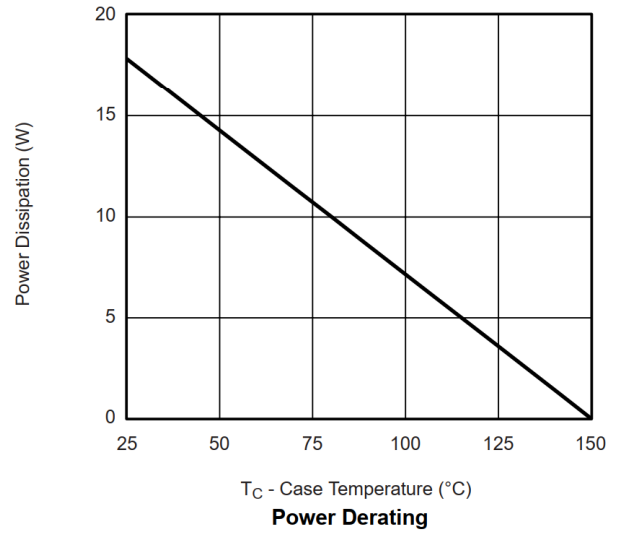
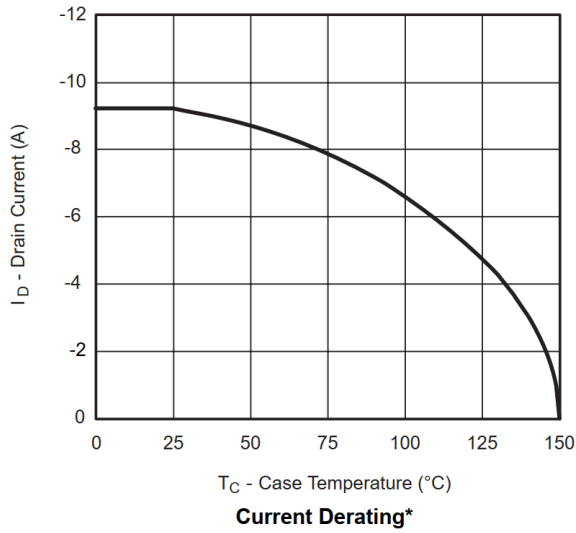


**Single Pulse Power, Junction-to-Ambient**



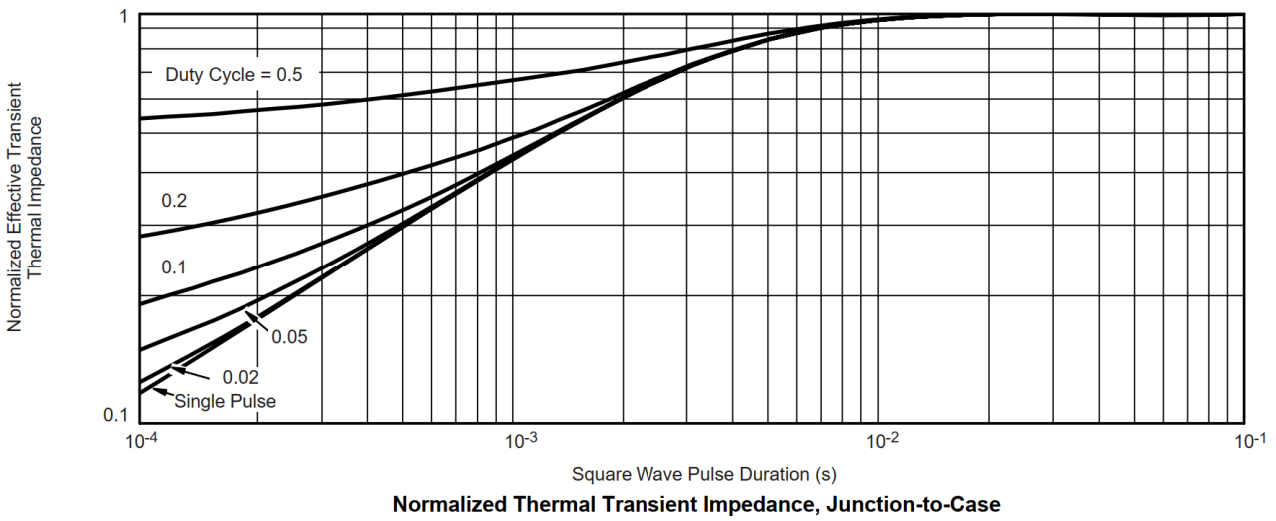
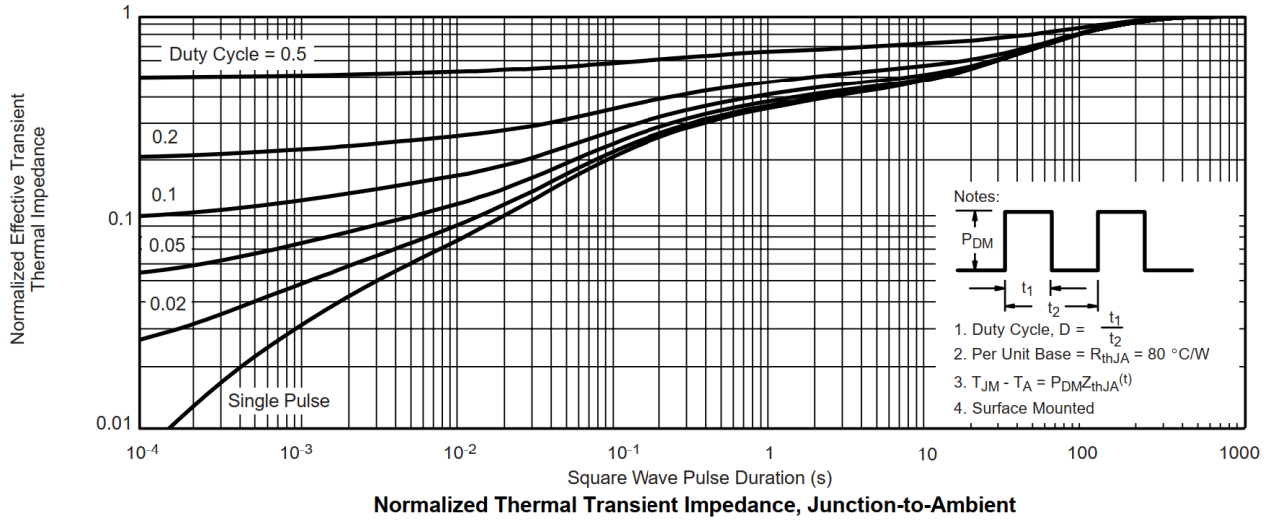
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified  
**Safe Operating Area, Junction-to-Ambient**

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

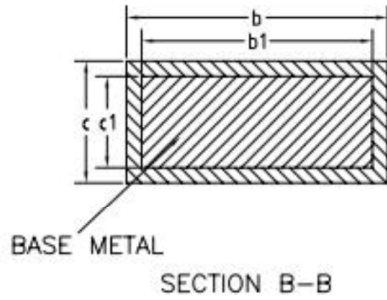
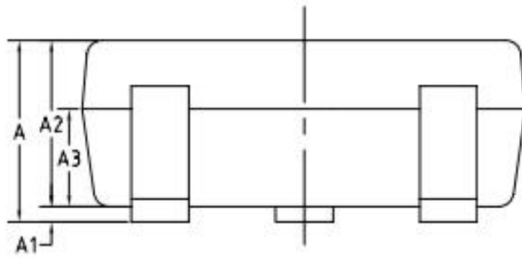
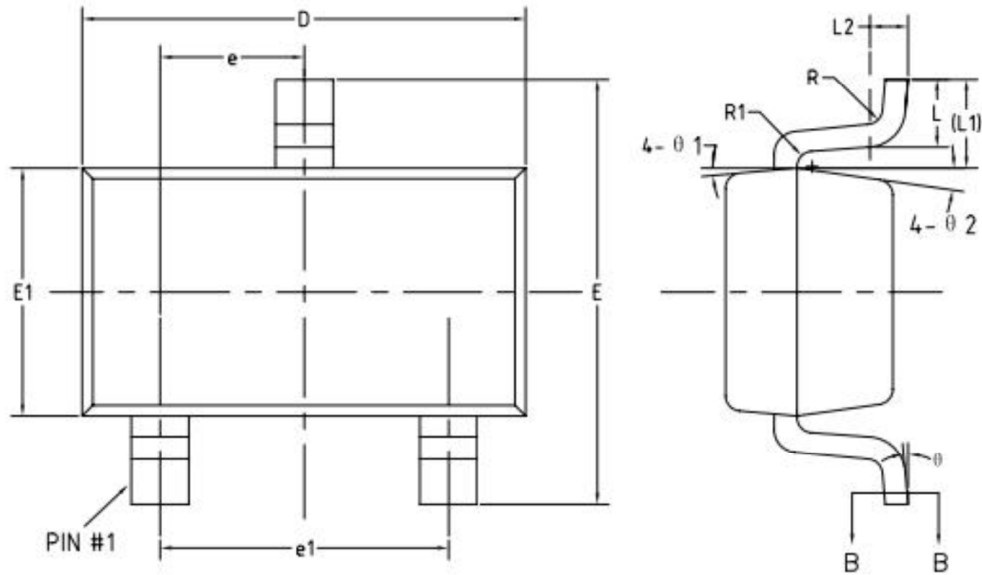


\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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



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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