

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

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
- 60	0.0160 at V <sub>GS</sub> = - 10 V	- 53	76 nC
	0.0200 at V <sub>GS</sub> = - 4.5 V	- 42	

### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- 100 % UIS Tested

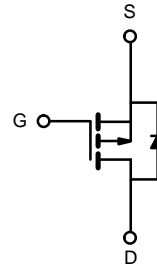
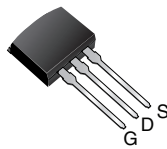
### APPLICATIONS

- Load Switch



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

I<sup>2</sup>PAK (TO-262)



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>	- 60	V	
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 53 <sup>a</sup>	A
		T <sub>C</sub> = 70 °C	- 46.8	
		T <sub>A</sub> = 25 °C	9.2 <sup>b</sup>	
		T <sub>A</sub> = 70 °C	- 8.1 <sup>b</sup>	
Pulsed Drain Current	I <sub>DM</sub>	- 150		
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	- 45	
Single Pulse Avalanche Energy		E <sub>AS</sub>	101	mJ
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	69 <sup>a</sup>	A
		T <sub>A</sub> = 25 °C	2.1 <sup>b</sup>	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	104.2 <sup>a</sup>	W
		T <sub>C</sub> = 70 °C	66.7 <sup>a</sup>	
		T <sub>A</sub> = 25 °C	3.1 <sup>b</sup>	
		T <sub>A</sub> = 70 °C	2 <sup>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</sup>	R <sub>thJA</sub>	33	40		°C/W
Maximum Junction-to-Case					

Notes:

a. Based on T<sub>C</sub> = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

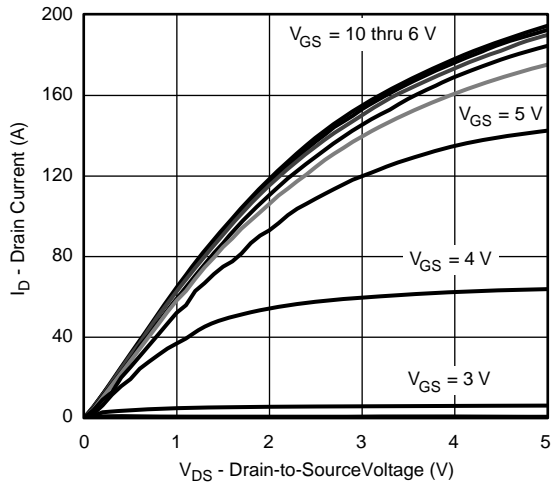
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-60			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		68		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-5.2		
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	$\mu\text{A}$
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-120			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		0.0160		$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		0.0200		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -50\text{ A}$	20			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		3500		pF
Output Capacitance	$C_{oss}$			390		
Reverse Transfer Capacitance	$C_{rss}$			290		
Total Gate Charge	$Q_g$	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -55\text{ A}$		76	115	nC
				38	60	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -30\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -55\text{ A}$		16		
Gate-Drain Charge	$Q_{gd}$			19		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		5.2		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -2\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		10	15	ns
Rise Time	$t_r$			7	15	
Turn-Off Delay Time	$t_{d(off)}$			70	110	
Fall Time	$t_f$			40	60	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-69	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				-150	
Body Diode Voltage	$V_{SD}$	$I_S = -30\text{ A}$		-1	-1.5	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		45	68	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			59	120	nC
Reverse Recovery Fall Time	$t_a$			29		ns
Reverse Recovery Rise Time	$t_b$			16		

Notes:

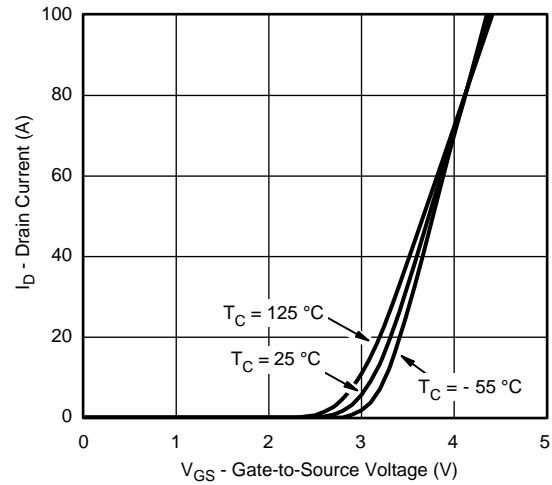
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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.

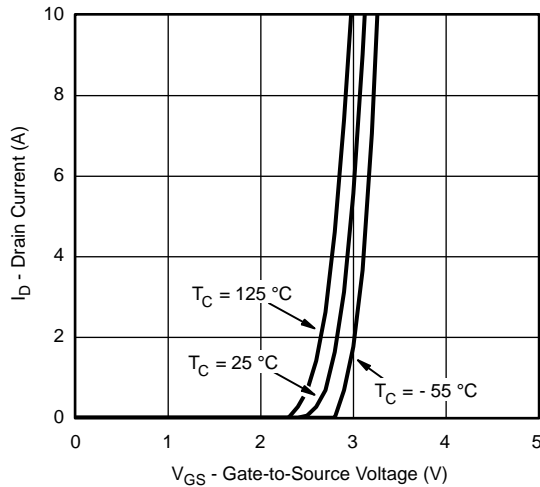
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



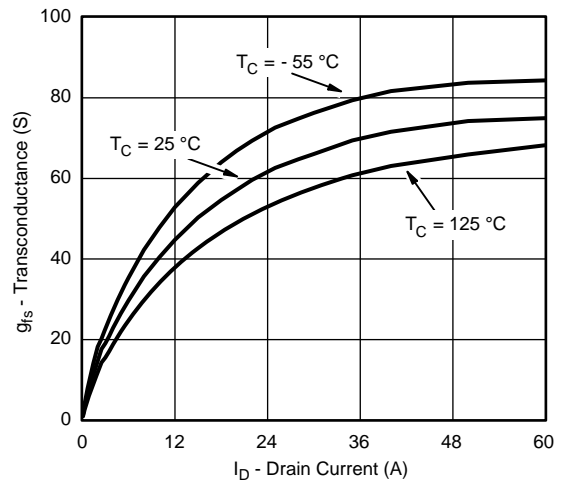
**Output Characteristics**



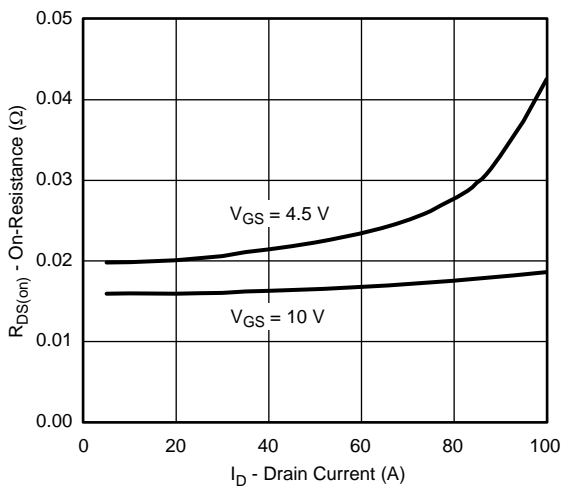
**Transfer Characteristics**



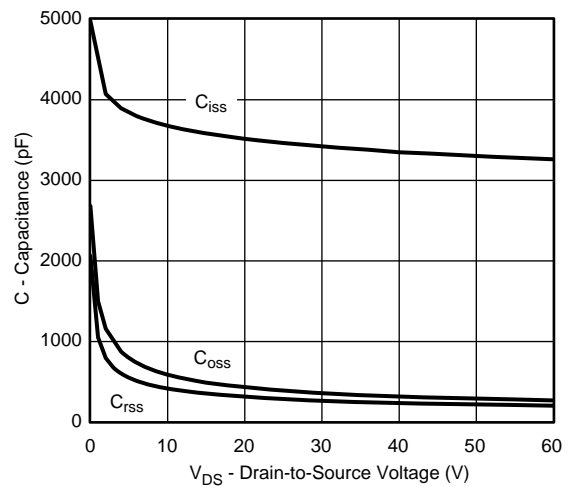
**Transfer Characteristics**



**Transconductance**

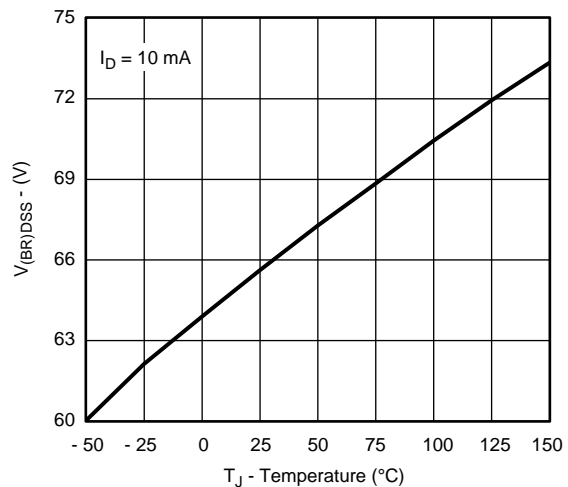
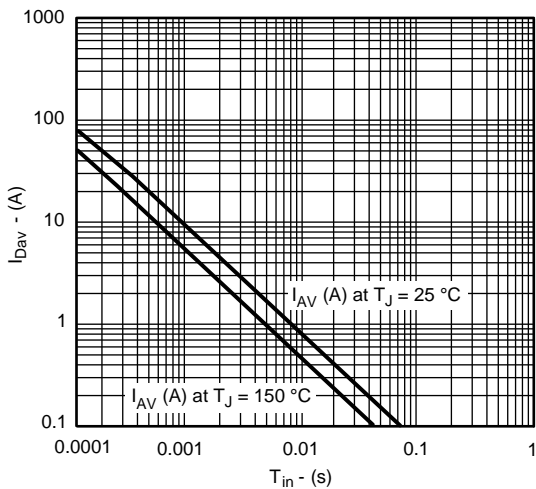
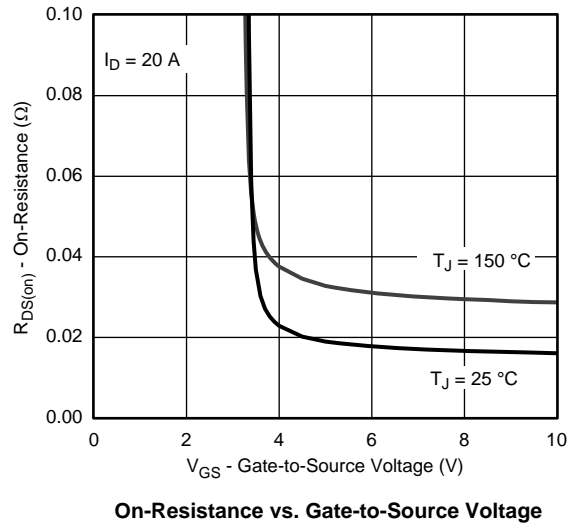
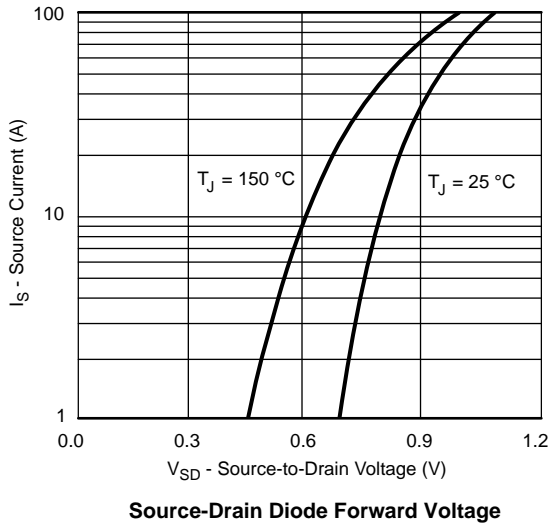
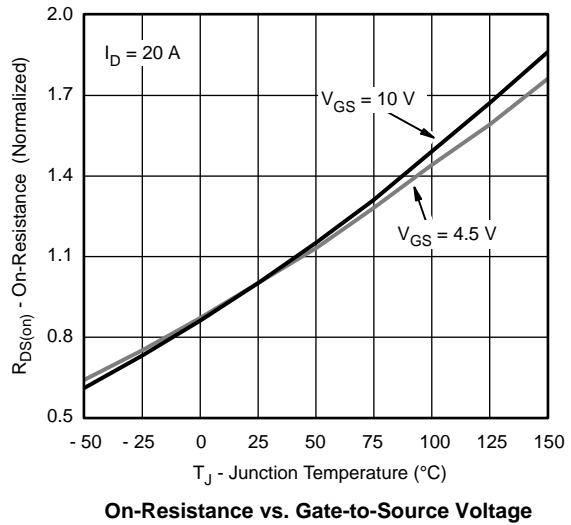
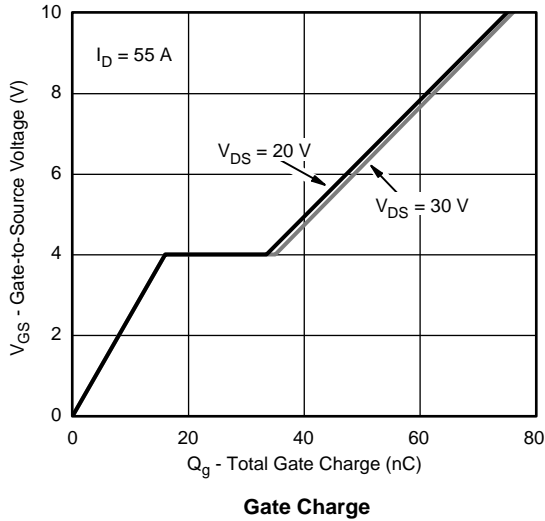


**On-Resistance vs. Drain Current**



**Capacitance**

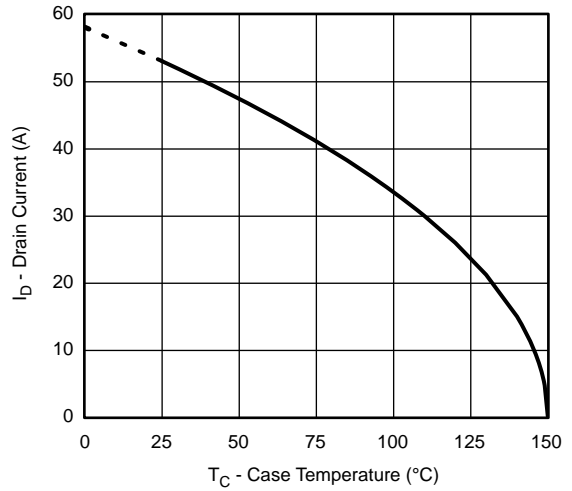
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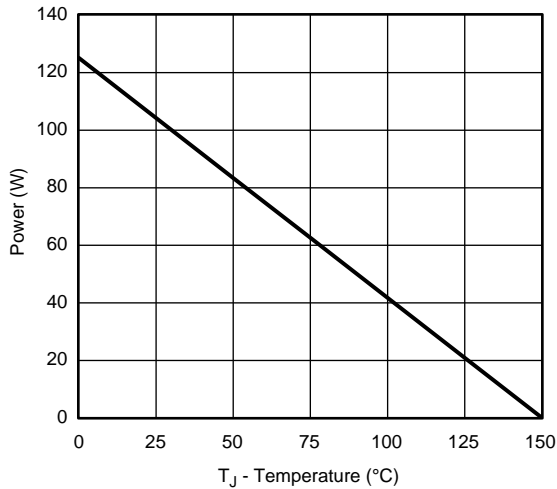
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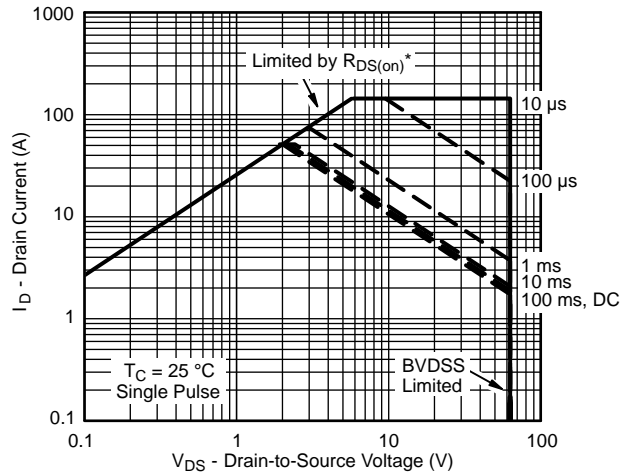
**Threshold Voltage**



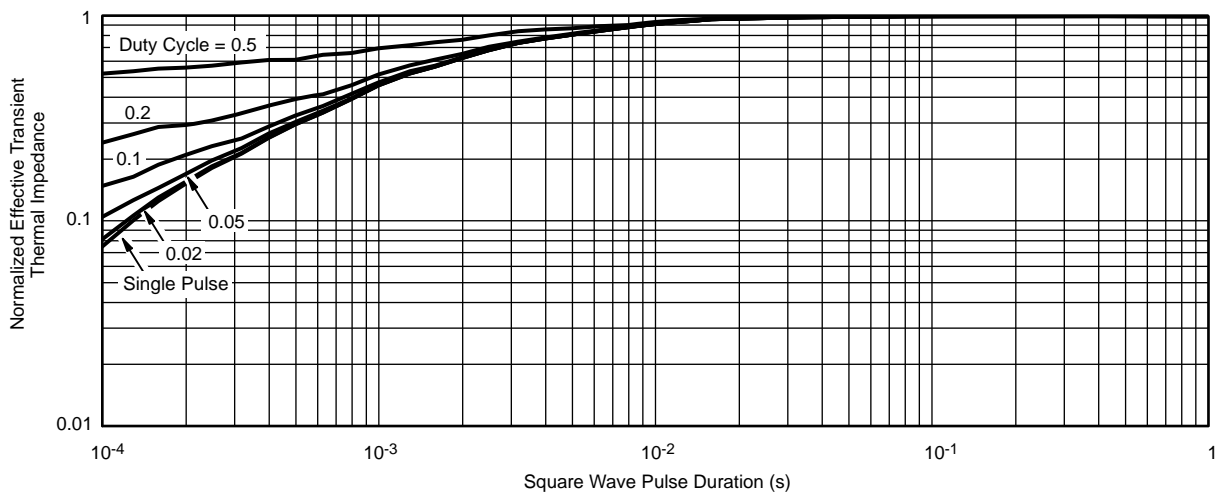
**Max. Drain Current vs. Case Temperature**



**Power Derating, Junction-to-Case**

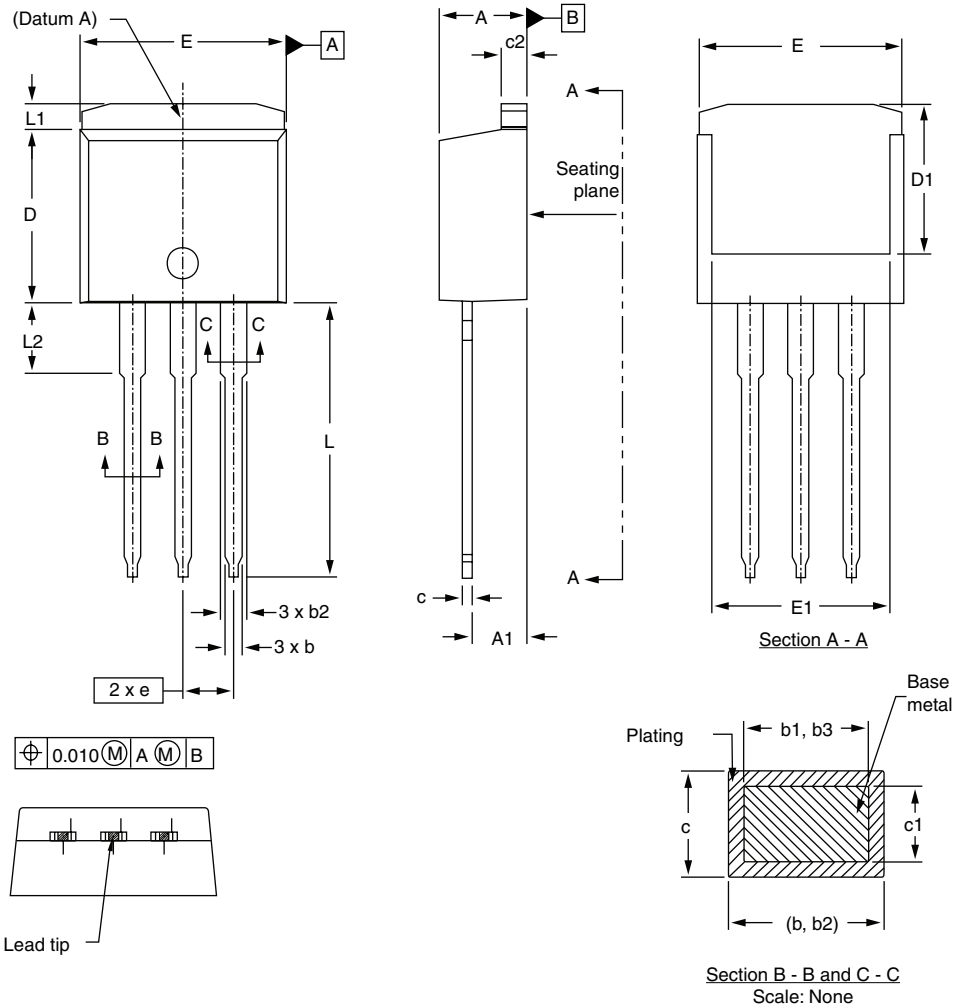


**Safe Operating Area, Junction-to-Case**



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

**I<sup>2</sup>PAK (TO-262) (HIGH VOLTAGE)**



⊕ 0.010 (M) A (M) B

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	2.03	3.02	0.080	0.119
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D	8.38	9.65	0.330	0.380
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
L	13.46	14.10	0.530	0.555
L1	-	1.65	-	0.065
L2	3.56	3.71	0.140	0.146

ECN: S-82442-Rev. A, 27-Oct-08  
DWG: 5977

**Notes**

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm per side. These dimensions are measured at the outmost extremes of the plastic body.
3. Thermal pad contour optional within dimension E, L1, D1, and E1.
4. Dimension b1 and c1 apply to base metal only.

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