

## F9Z34NL-VB Datasheet

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

#### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ.)
- 60	0.0160 at $V_{GS} = -10$ V	- 53	76 nC
	0.0200 at $V_{GS} = -4.5$ V	- 42	

#### FEATURES

- Trench Power MOSFET
- 100 % UIS Tested

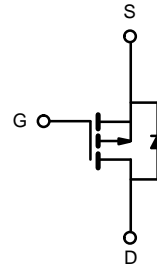
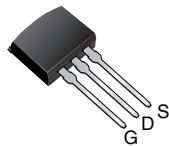
#### APPLICATIONS

- Load Switch



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

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



P-Channel MOSFET

#### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	- 60	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$T_C = 25$ °C	$I_D$	- 53 <sup>a</sup>	A
	$T_C = 70$ °C		- 46.8	
	$T_A = 25$ °C		9.2 <sup>b</sup>	
	$T_A = 70$ °C		- 8.1 <sup>b</sup>	
Pulsed Drain Current		$I_{DM}$	- 150	
Avalanche Current Pulse		$I_{AS}$	- 45	mJ
Single Pulse Avalanche Energy		$E_{AS}$	101	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	$I_S$	69 <sup>a</sup>	A
	$T_A = 25$ °C		2.1 <sup>b</sup>	
Maximum Power Dissipation	$T_C = 25$ °C	$P_D$	104.2 <sup>a</sup>	W
	$T_C = 70$ °C		66.7 <sup>a</sup>	
	$T_A = 25$ °C		3.1 <sup>b</sup>	
	$T_A = 70$ °C		2 <sup>b</sup>	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to 150	°C

#### THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b</sup>	Steady State	$R_{thJA}$	33	40	°C/W
Maximum Junction-to-Case	Steady State	$R_{thJC}$	0.98	1.2	

Notes:

a. Based on  $T_C = 25$  °C.

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

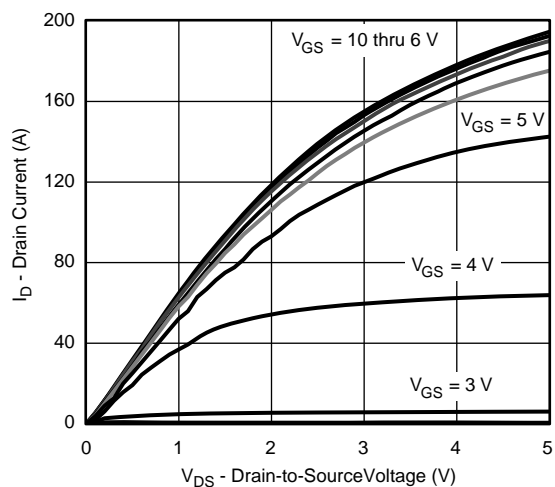
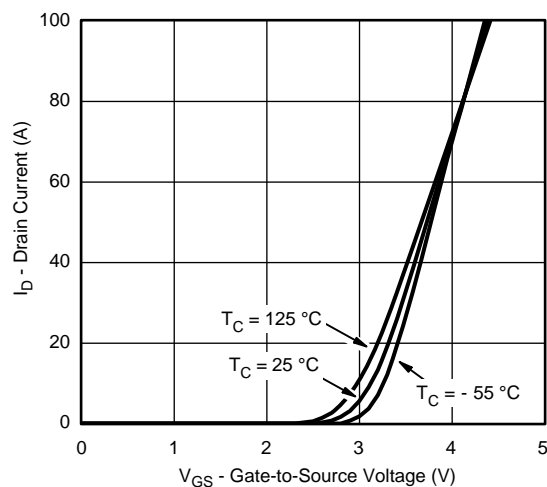
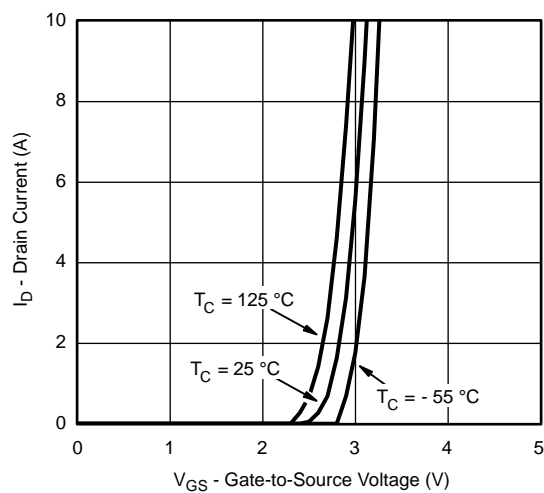
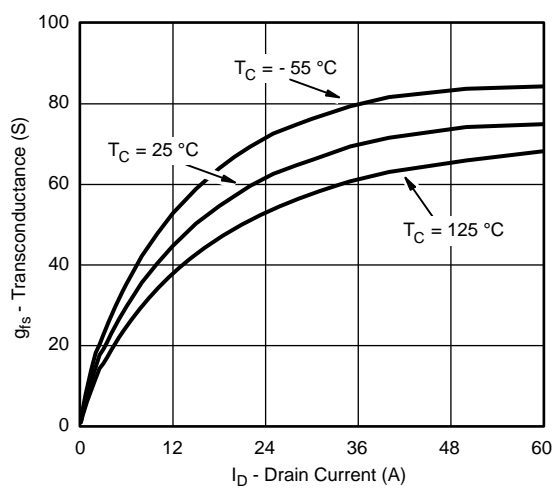
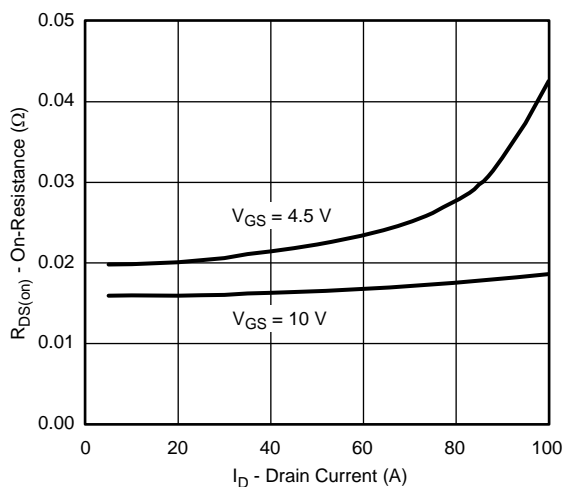
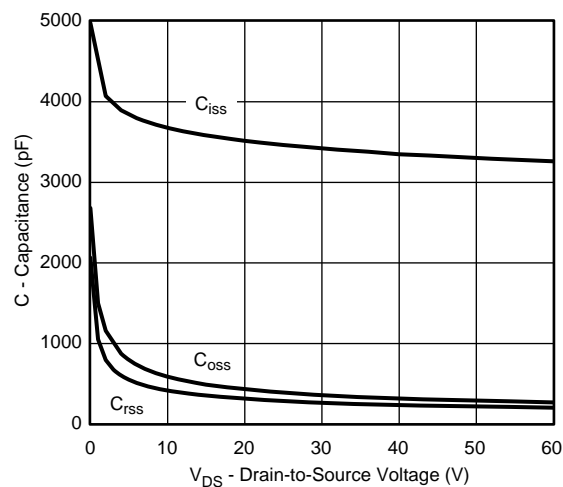
SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA	- 60			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = - 250 μA		68		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			- 5.2		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 1		- 3	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 60 V, V <sub>GS</sub> = 0 V			- 1	μA
		V <sub>DS</sub> = - 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = - 5 V, V <sub>GS</sub> = - 10 V	- 120			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 30 A		0.0160		Ω
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 20 A		0.0200		
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 50 A	20			S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = - 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz		3500		pF
Output Capacitance	C <sub>oss</sub>			390		
Reverse Transfer Capacitance	C <sub>rss</sub>			290		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 55 A		76	115	nC
		V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 55 A		38	60	
Gate-Source Charge	Q <sub>gs</sub>			16		
Gate-Drain Charge	Q <sub>gd</sub>			19		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		5.2		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 2 V, R <sub>L</sub> = 2 Ω I <sub>D</sub> ≡ - 10 A, V <sub>GEN</sub> = - 10 V, R <sub>g</sub> = 1 Ω		10	15	ns
Rise Time	t <sub>r</sub>			7	15	
Turn-Off Delay Time	t <sub>d(off)</sub>			70	110	
Fall Time	t <sub>f</sub>			40	60	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			- 69	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				- 150	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 30 A		- 1	- 1.5	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 50 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		45	68	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			59	120	nC
Reverse Recovery Fall Time	t <sub>a</sub>			29		ns
Reverse Recovery Rise Time	t <sub>b</sub>			16		

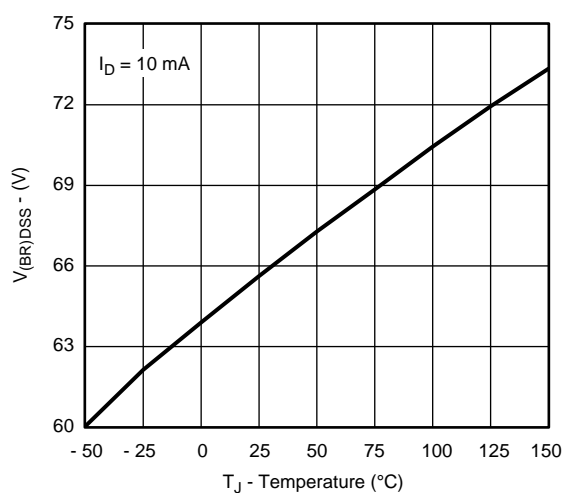
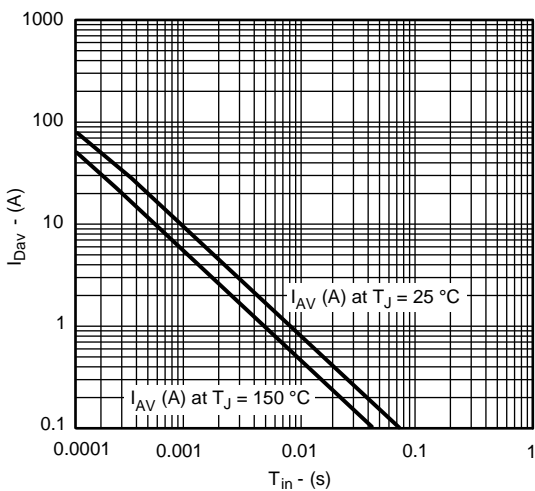
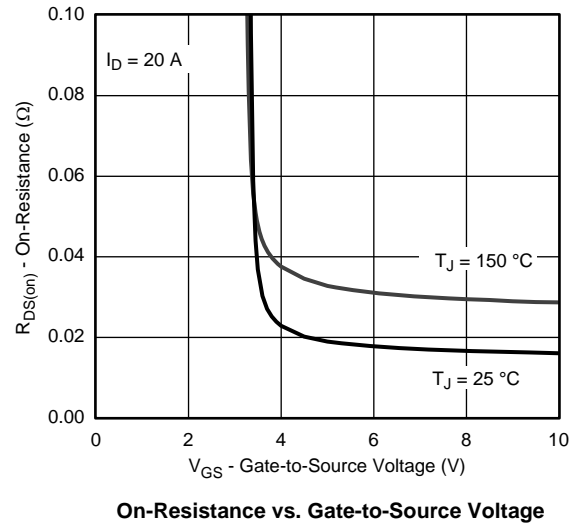
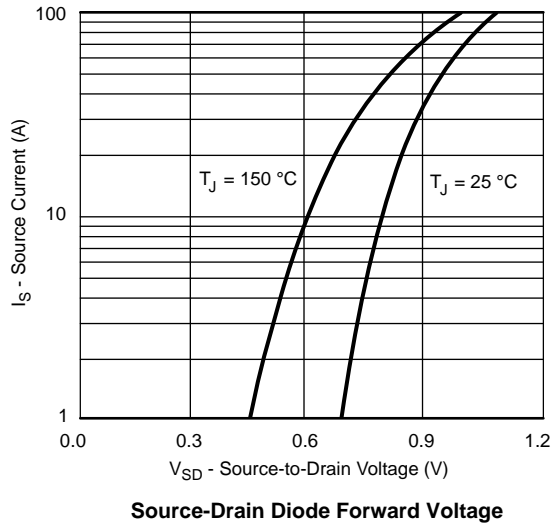
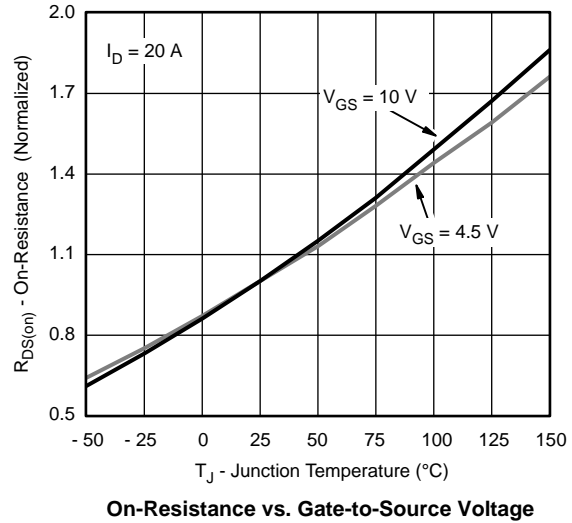
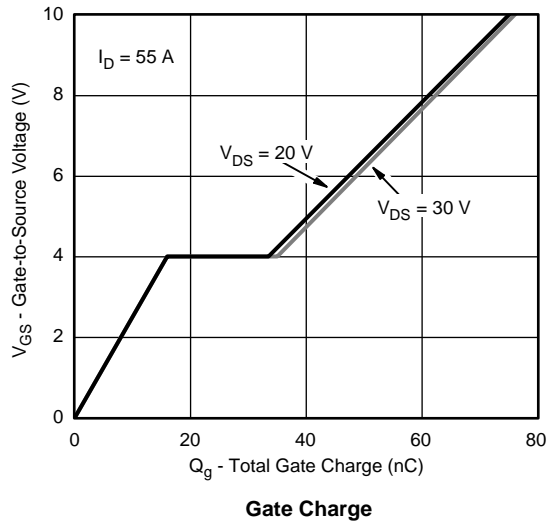
Notes:

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.

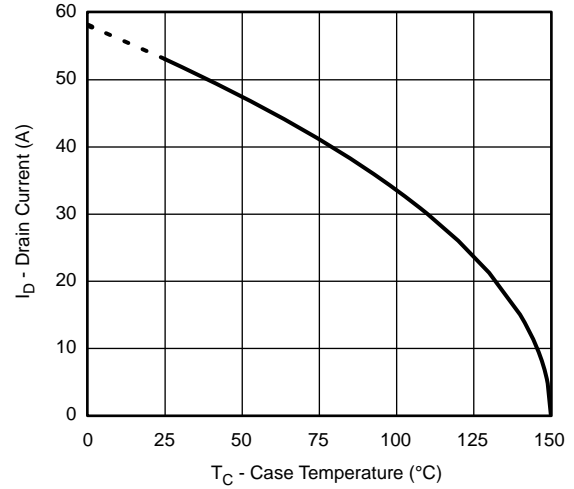
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Output Characteristics**

**Transfer Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

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

**Single Pulse Avalanche Current Capability vs. Time**
**Drain-Source Breakdown Voltage vs. Junction Temperature**

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



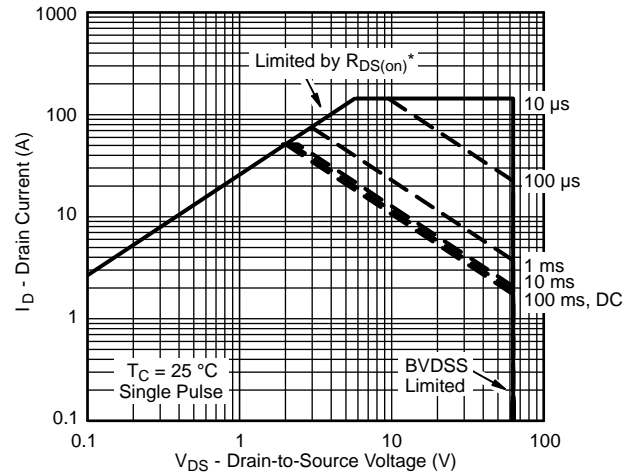
Threshold Voltage



Max. Drain Current vs. Case Temperature

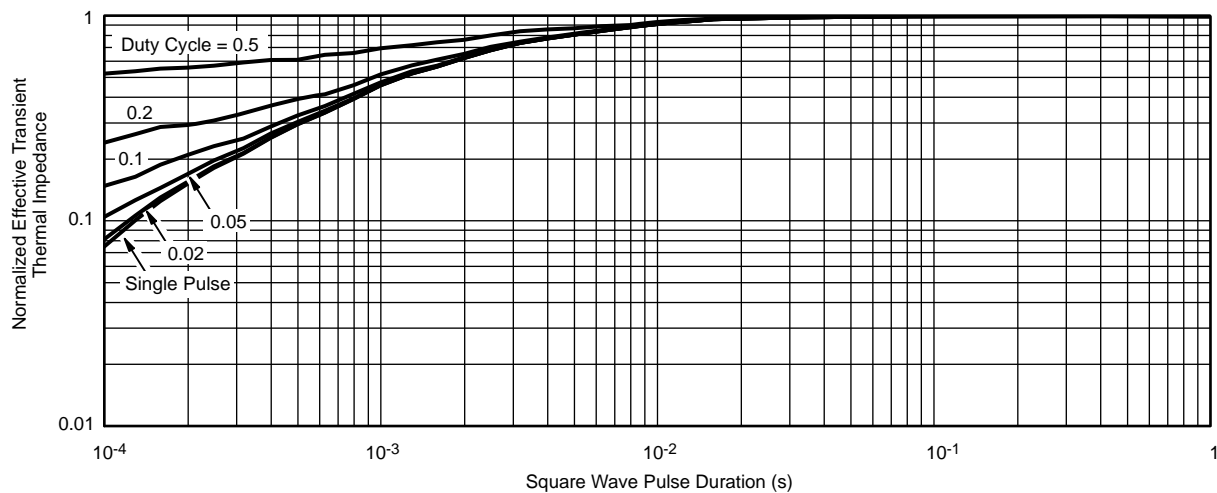


Power Derating, Junction-to-Case

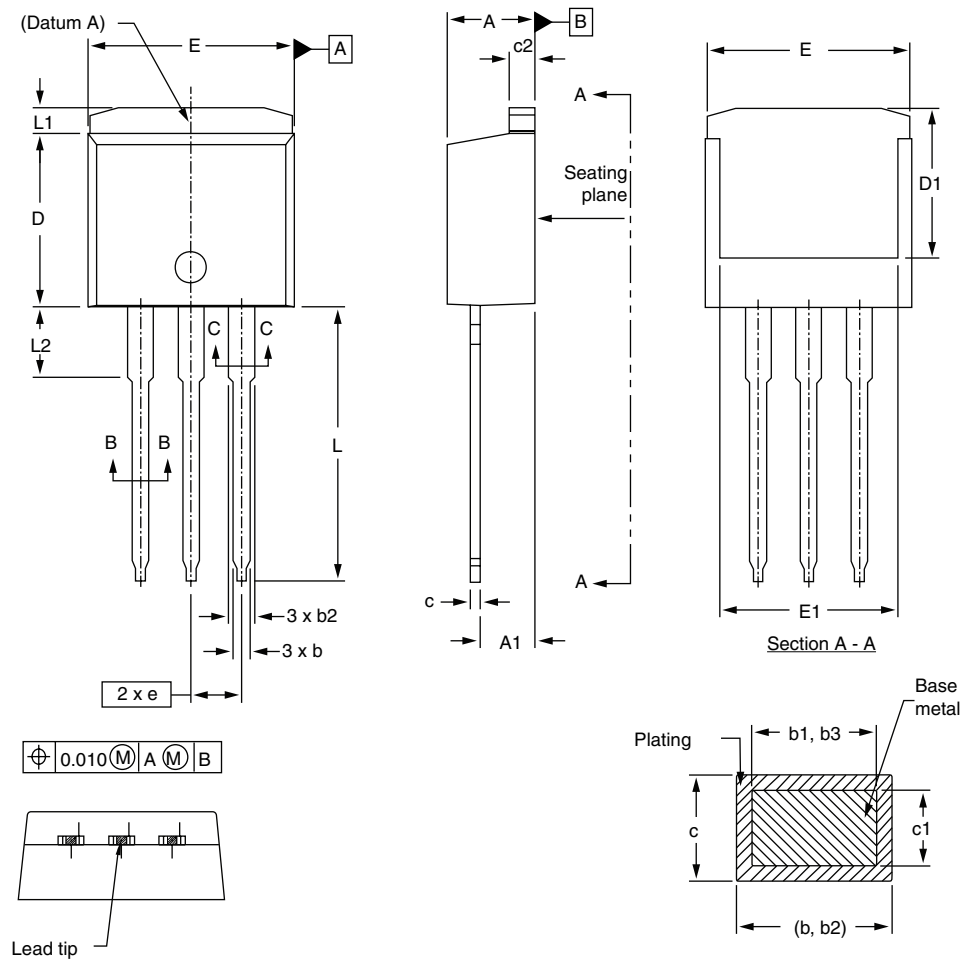


\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

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

Section B - B and C - C  
Scale: None

	MILLIMETERS		INCHES	
DIM.	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

	MILLIMETERS		INCHES	
DIM.	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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