IRL3803SPBF-VB Datasheet

N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a, e]	Q_g (Typ)
30	0.0024 at V_{GS} = 10 V	98	82 nC
	0.0027 at V_{GS} = 4.5 V	98	

FEATURES

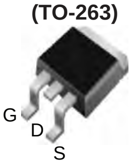
- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

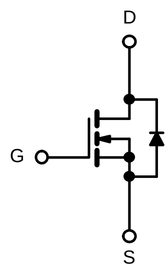
RoHS
COMPLIANT

APPLICATIONS

- OR-ing
- Server
- DC/DC

D²PAK
(TO-263)





N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	98[a, e]	A
	T_C = 70 °C		98[e]	
	T_A = 25 °C		28.8[b, c]	
	T_A = 70 °C		27[b, c]	
Pulsed Drain Current		I_{DM}	300	
Avalanche Current Pulse	L = 0.1 mH	I_{AS}	36	
Single Pulse Avalanche Energy		E_{AS}	64.8	V
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	90[a, e]	A
	T_A = 25 °C		3.13[b, c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	250[a]	W
	T_C = 70 °C		175	
	T_A = 25 °C		3.75[b, c]	
	T_A = 70 °C		2.63[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient[b, d]	t ≤ 10 sec	R_{thJA}	32	40	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	0.5	0.6	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 sec.
d. Maximum under steady state conditions is 90 °C/W.
e. Calculated based on maximum junction temperature. Package limitation current is 90 A.

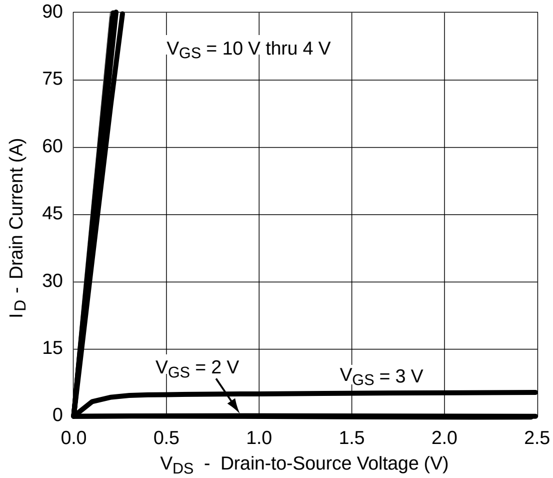
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		35		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 7.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	1.5		2.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			1	µA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	90			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 28.8 A		0.0024		Ω
		V_{GS} = 4.5 V, I_D = 27 A		0.0027		
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 28.8 A		160		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		12065		pF
Output Capacitance	C_{oss}			1725		
Reverse Transfer Capacitance	C_{rss}			970		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 28.8 A		171	257	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 28.8 A		81.5	123	
Gate-Source Charge	Q_{gs}			34		
Gate-Drain Charge	Q_{gd}			29		
Gate Resistance	R_g	f = 1 MHz		1.4	2.1	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 0.625 Ω $I_D \cong$ 24 A, V_{GEN} = 10 V, R_g = 1 Ω		18	27	ns
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			70	105	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 0.67 Ω $I_D \cong$ 22.5 A, V_{GEN} = 4.5 V, R_g = 1 Ω		55	83	
Rise Time	t_r			180	270	
Turn-Off Delay Time	$t_{d(off)}$			55	83	
Fall Time	t_f			12	18	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			90	A
Pulse Diode Forward Current[a]	I_{SM}				90	
Body Diode Voltage	V_{SD}	I_S = 22 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs, T_J = 25 °C		52	78	ns
Body Diode Reverse Recovery Charge	Q_{rr}			70.2	105	nC
Reverse Recovery Fall Time	t_a			27		ns
Reverse Recovery Rise Time	t_b			25		

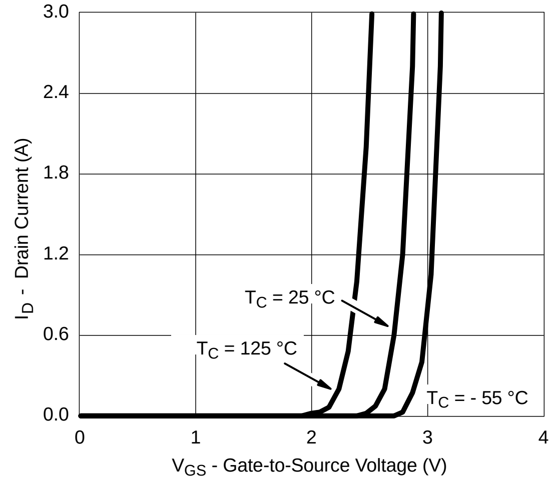
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

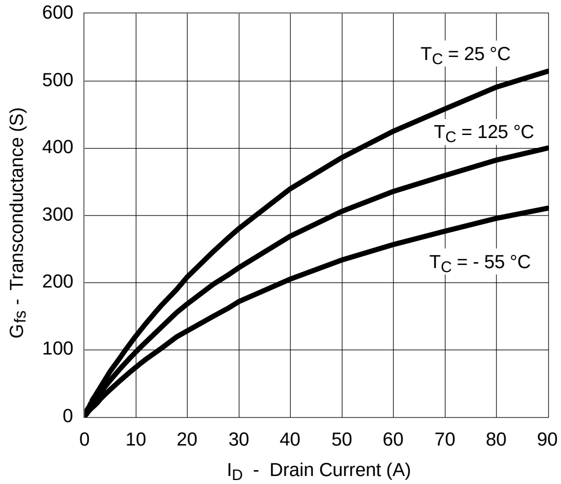
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



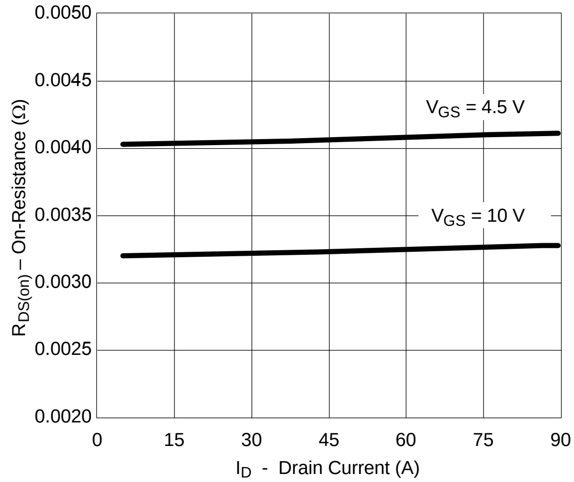
Output Characteristics



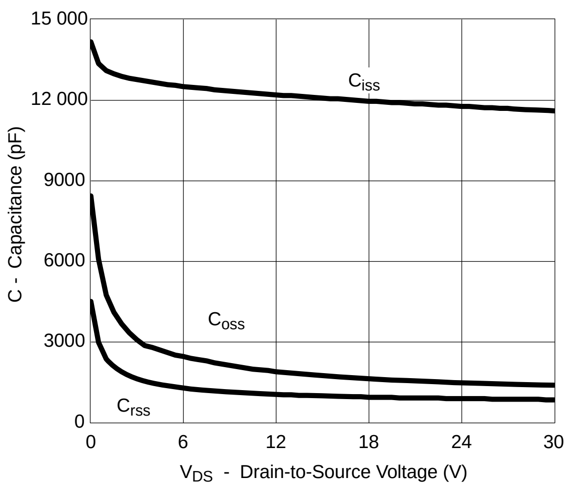
Transfer Characteristics



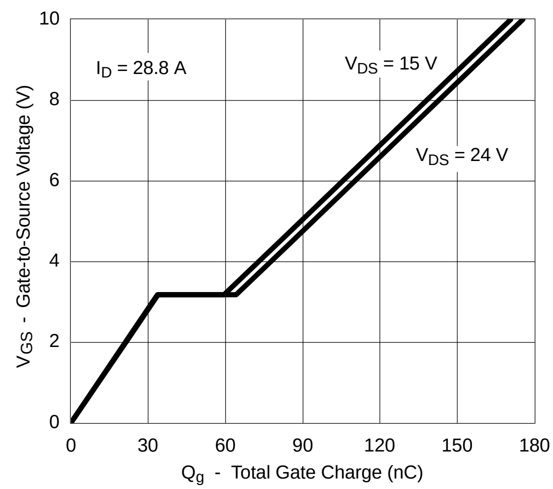
Transconductance



$R_{DS(on)}$ vs. Drain Current

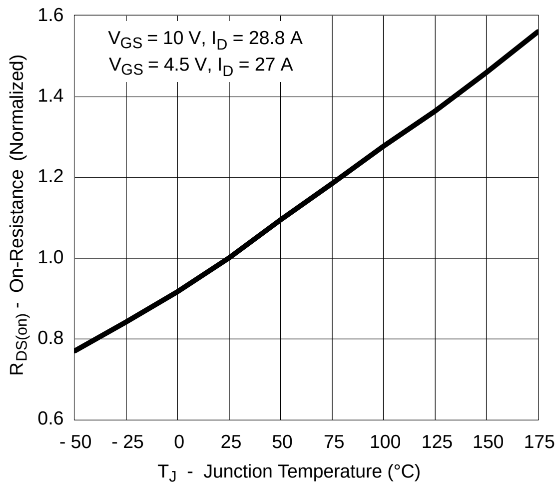


Capacitance

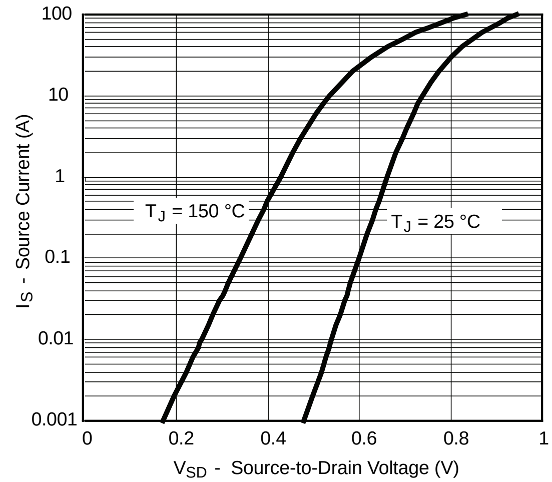


Gate Charge

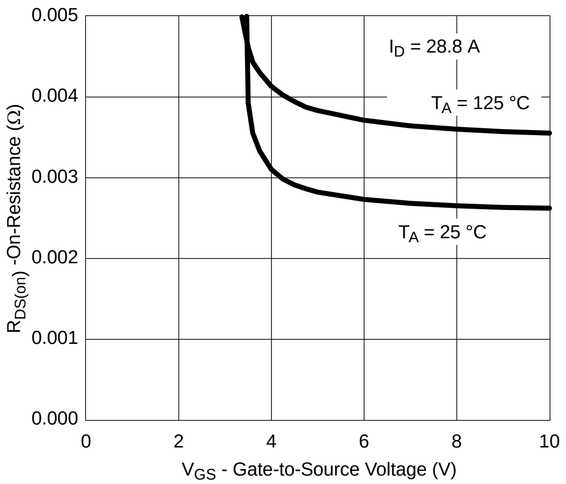
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



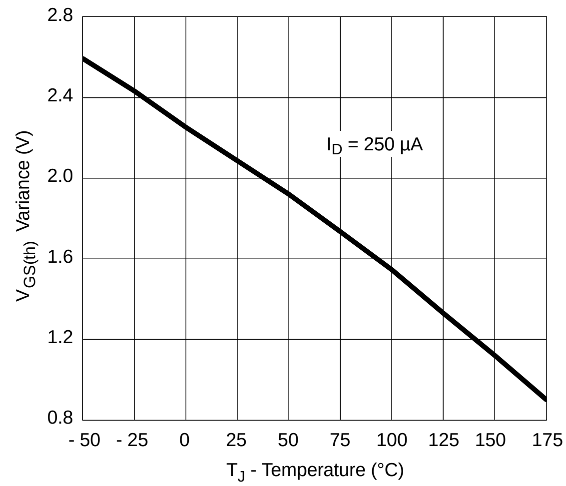
On-Resistance vs. Junction Temperature



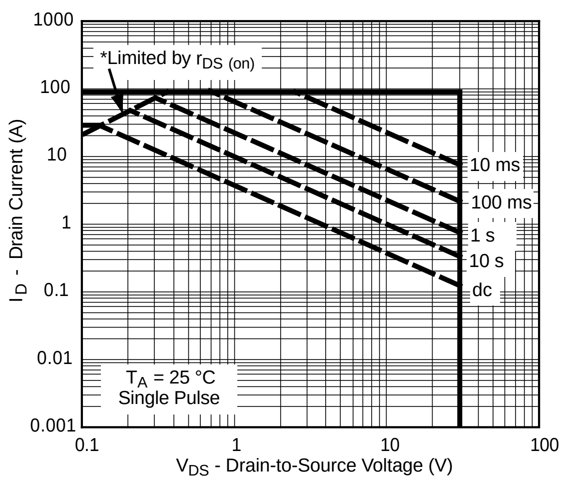
Forward Diode Voltage vs. Temperature



$R_{DS(on)}$ vs. V_{GS} vs. Temperature



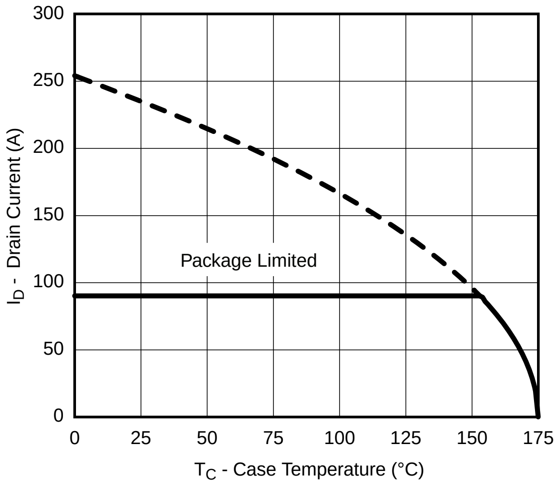
Threshold Voltage



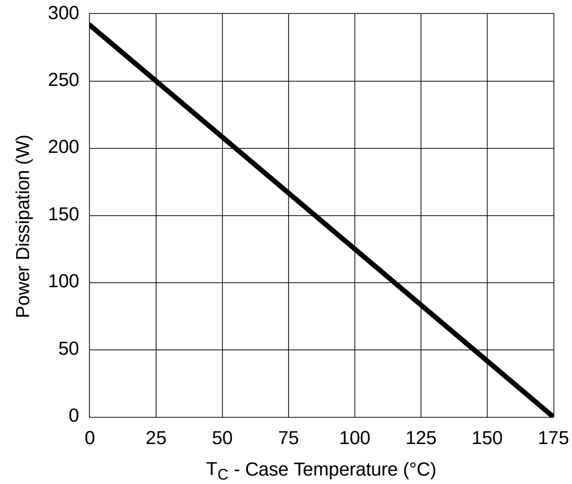
*V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

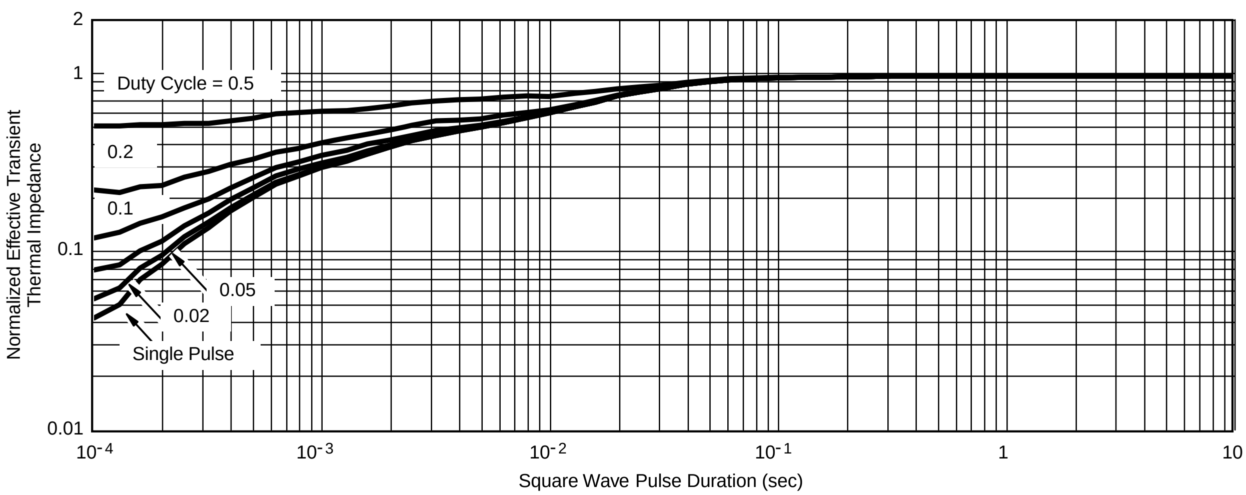


Current Derating*



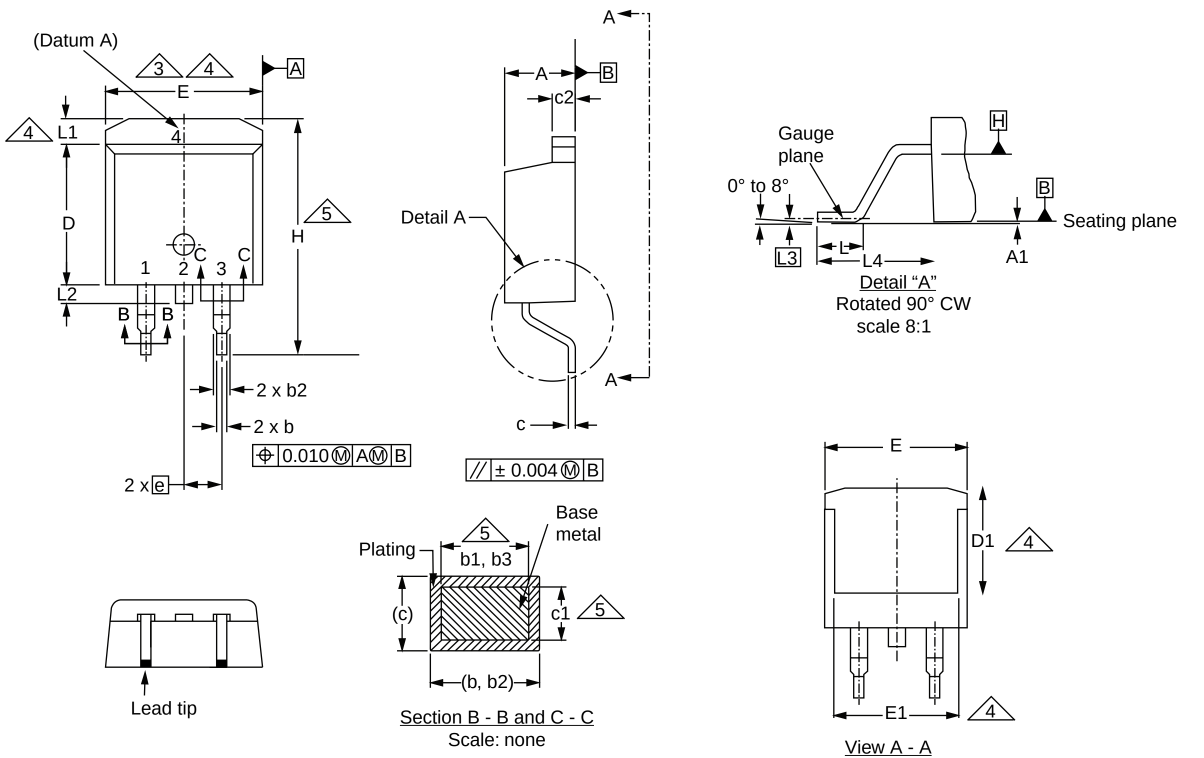
Power Derating

*The power dissipation P_D is based on $T_{J(max)}$ = 175 °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.



Normalized Thermal Transient Impedance, Junction-to-Case

TO-263AB (HIGH VOLTAGE)



DIM.	MILLIMETERS MIN.	MILLIMETERS MAX.	INCHES MIN.	INCHES MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
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
D	8.38	9.65	0.330	0.380

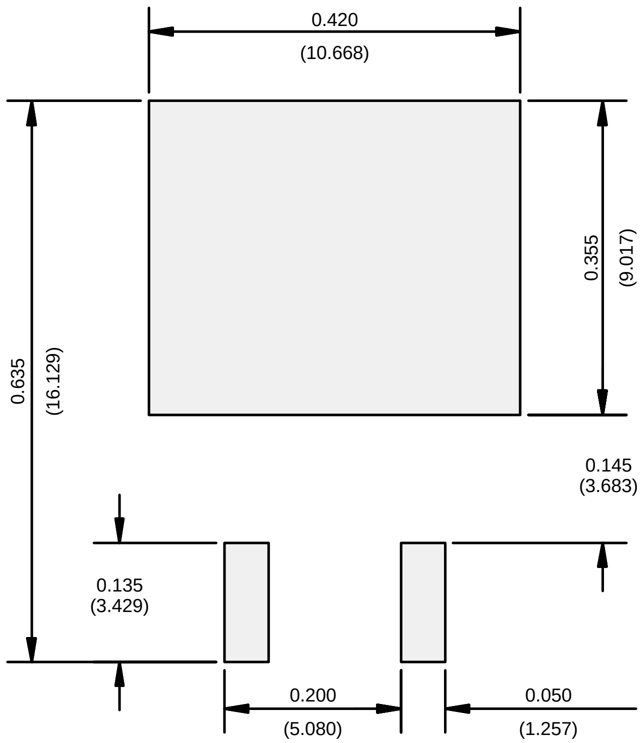
DIM.	MILLIMETERS MIN.	MILLIMETERS MAX.	INCHES MIN.	INCHES MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08
DWG: 5970

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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