N-Channel 45-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a, c]	Q_g (Typ.)
45	0.0024 at V_{GS} = 10 V	110	240 nC
	0.0035 at V_{GS} = 4.5 V	100	

FEATURES

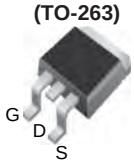
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

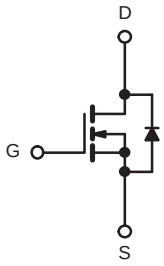
RoHS COMPLIANT

APPLICATIONS

- Synchronous Rectification
- Power Supplies

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}	45	V
Gate-Source Voltage		V_{GS}	± 25	
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	110[a, c]	A
	T_C = 70 °C		100[c]	
	T_A = 25 °C		29[b]	
	T_A = 70 °C		23[b]	
Pulsed Drain Current		I_{DM}	330	
Avalanche Current Pulse	L = 0.1 mH	I_{AS}	80	
Single Pulse Avalanche Energy		E_{AS}	320	V
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	110[a, c]	A
	T_A = 25 °C		2.6[b]	
Maximum Power Dissipation	T_C = 25 °C	P_D	312[a]	W
	T_C = 70 °C		200	
	T_A = 25 °C		3.13[b]	
	T_A = 70 °C		2.0[b]	
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[b]	Steady State	R_{thJA}	32	40	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	0.33	0.4	

Notes:
a. Based on T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. Calculated based on maximum junction temperature. Package limitation current is 110 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	45			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		41		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.2		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} = 40 V, V_{GS} = 0 V			1	µA
		V_{DS} = 40 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	120			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A		0.0024	0.0033	Ω
		V_{GS} = 4.5 V, I_D = 20 A		0.0035	0.0039	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A		180		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		6689		pF
Output Capacitance	C_{oss}			1350		
Reverse Transfer Capacitance	C_{rss}			772		
Total Gate Charge	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 20 A		240	360	nC
Gate-Source Charge	Q_{gs}			40		
Gate-Drain Charge	Q_{gd}			22		
Gate Resistance	R_g	f = 1 MHz		0.85	1.3	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 1.0 Ω $I_D \cong$ 20 A, V_{GEN} = 10 V, R_g = 1 Ω		20		ns
Rise Time	t_r			11		
Turn-Off Delay Time	$t_{d(off)}$			77		
Fall Time	t_f			10		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 1.0 Ω $I_D \cong$ 20 A, V_{GEN} = 4.5 V, R_g = 1 Ω		102		
Rise Time	t_r			62		
Turn-Off Delay Time	$t_{d(off)}$			180		
Fall Time	t_f			60		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			110	A
Pulse Diode Forward Current[a]	I_{SM}				330	
Body Diode Voltage	V_{SD}	I_S = 20 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		50		ns
Body Diode Reverse Recovery Charge	Q_{rr}			70		nC
Reverse Recovery Fall Time	t_a			30		ns
Reverse Recovery Rise Time	t_b			20		

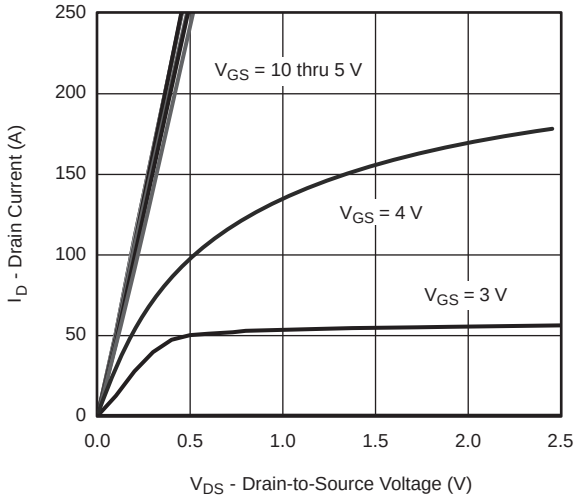
Notes:

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

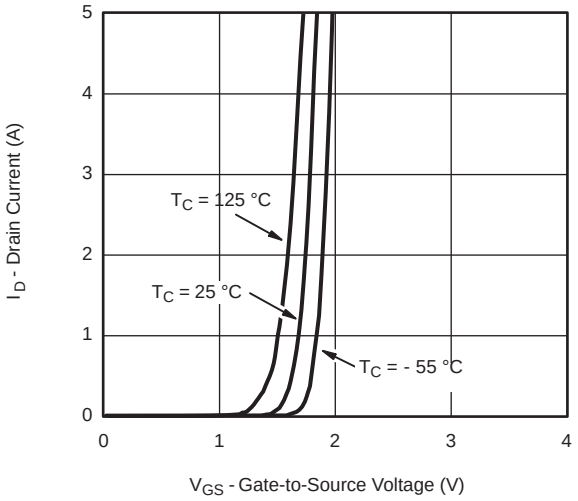
b. Guaranteed by design, not subject to production testing.

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.

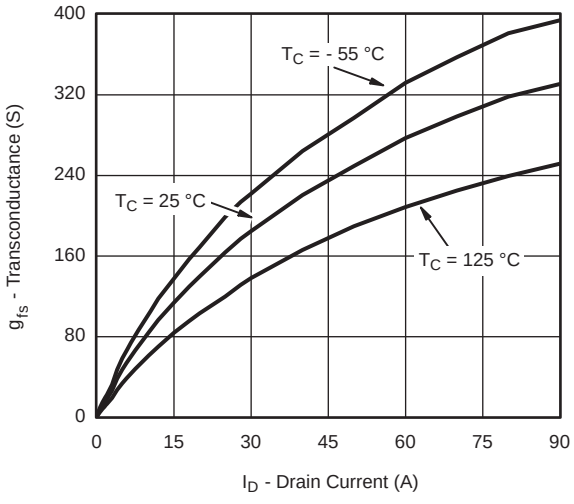
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



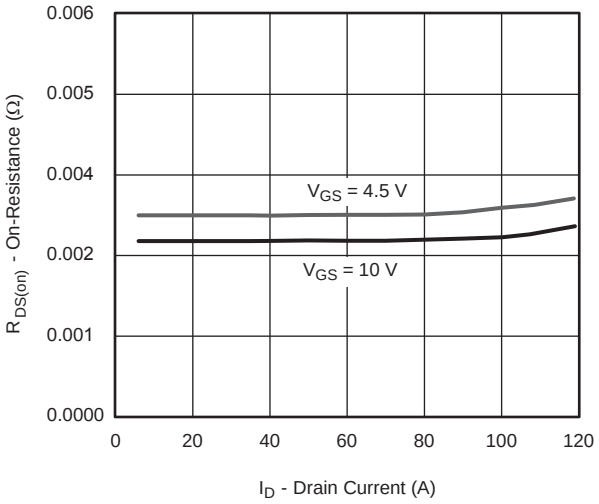
Output Characteristics



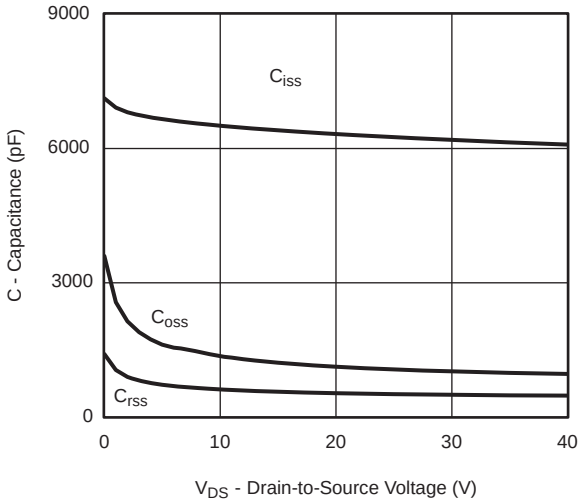
Transfer Characteristics



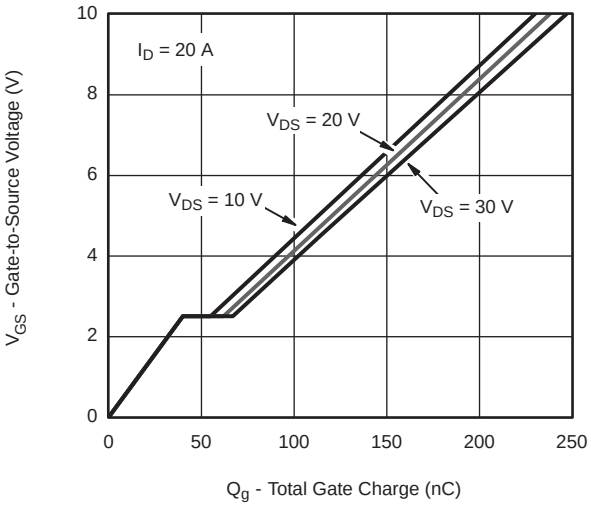
Transconductance



On-Resistance vs. Drain Current

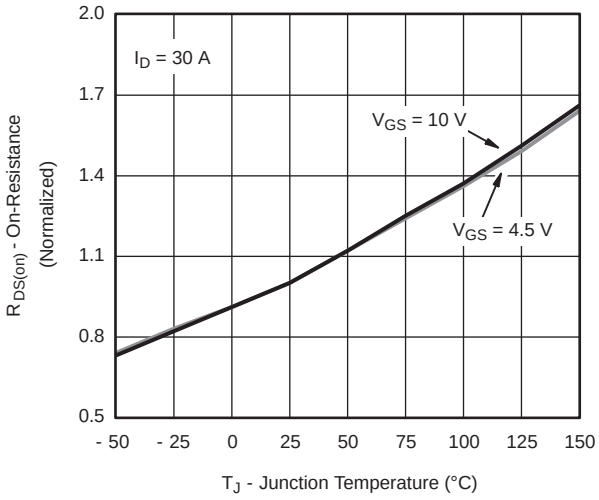


Capacitance

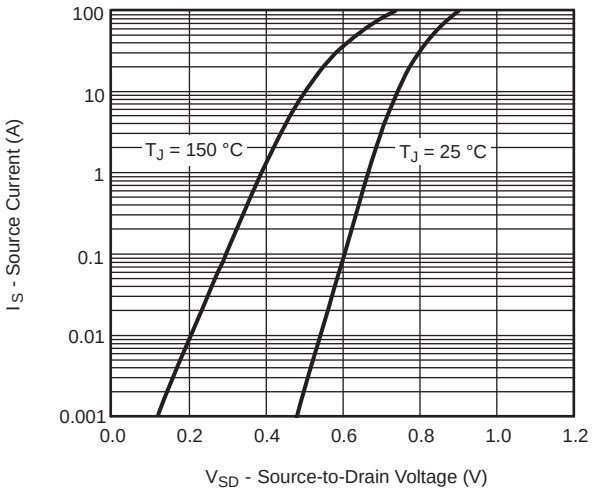


Gate Charge

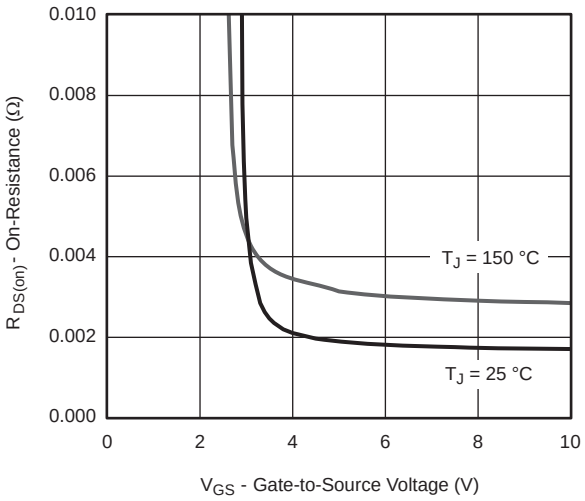
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



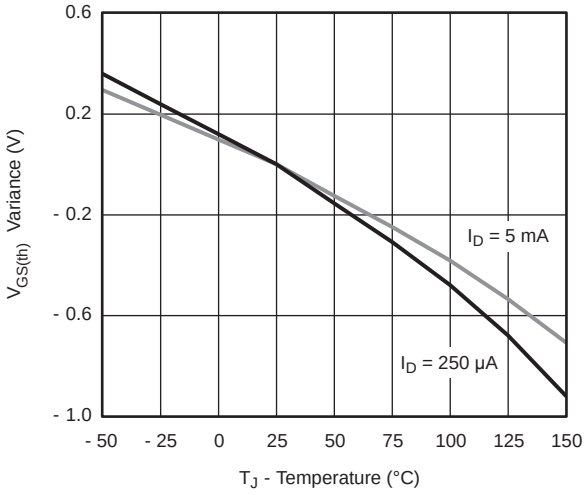
On-Resistance vs. Junction Temperature



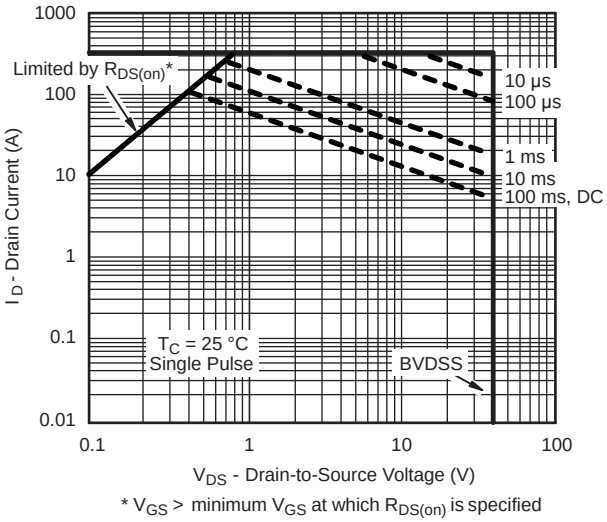
Forward Diode Voltage vs. Temperature



On-Resistance vs. Gate-to-Source Voltage



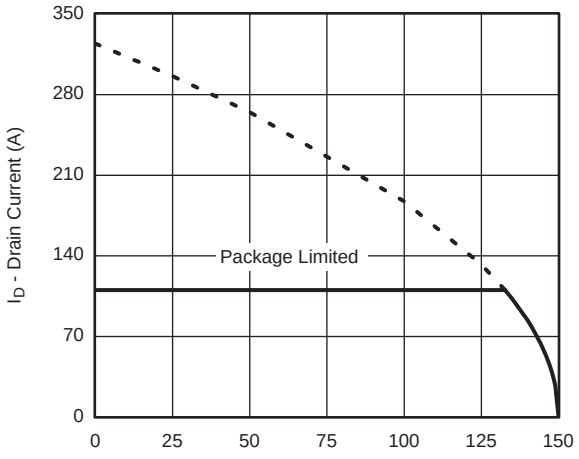
Threshold Voltage



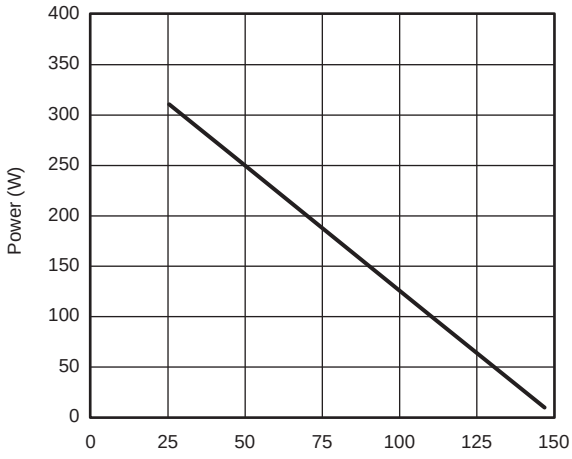
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

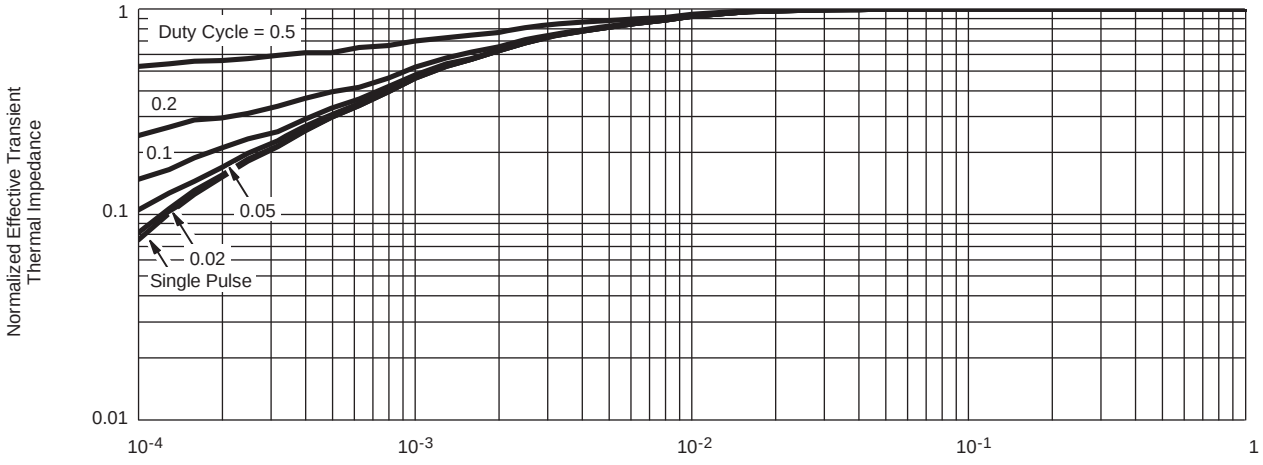


Current Derating*



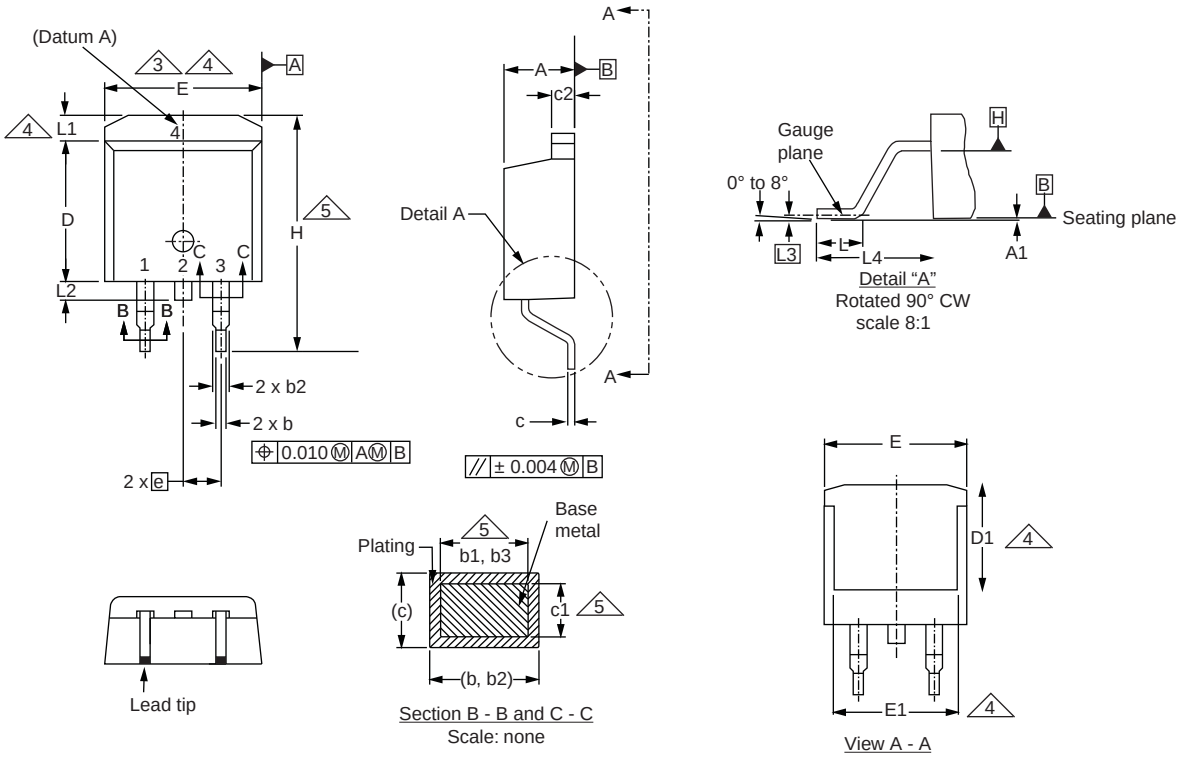
Power Derating

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



Normalized Thermal Transient Impedance, Junction-to-Case

TO-263AB (HIGH VOLTAGE)



	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	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

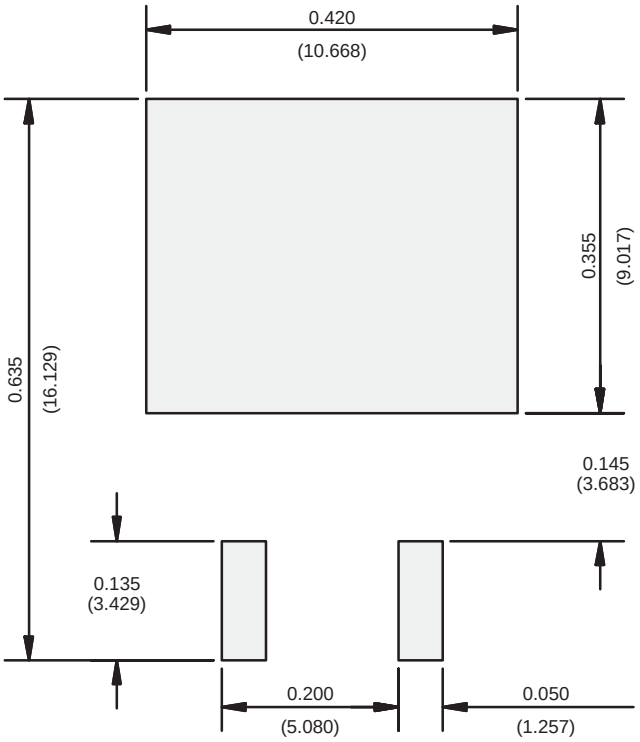
	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

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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