DMN4036LK3

40V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D T_A = 25°C
40V	36mΩ @ V_{GS}= 10V	12.2A
	61mΩ @ V_{GS}= 4.5V	9.4A

Features and Benefits

- Low on-resistance
- Fast switching speed
- **"Green" component and RoHS compliant (Note 1)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

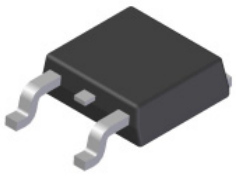
This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- DC-DC Converters
- Power management functions

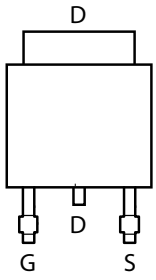
Mechanical Data

- Case: TO252-3L
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)

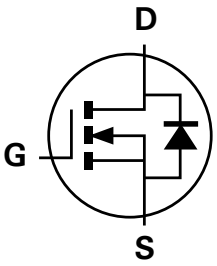
TO252-3L



TOP VIEW



PIN OUT -TOP VIEW



Equivalent Circuit

Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN4036LK3-13	N4036L	13	16	2,500

Note: 1. Diodes, Inc. defines "Green" products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.'s "Green" Policy can be found on our website. For packaging details, go to our website.

Marking Information



= Manufacturer's Marking
N4036L = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 09 = 2009)
WW = Week (01 - 53)

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Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source voltage			V_{DSS}	40	V
Gate-Source voltage		(Note 2)	V_{GS}	±20	V
Continuous Drain current	V_{GS} = 10V	(Note 4)	I_D	12.2	A
		T_A = 70°C (Note 4)		9.7	
		(Note 3)		8.5	
Pulsed Drain current	V_{GS} = 10V	(Note 5)	I_{DM}	31.7	A
Continuous Source current (Body diode)		(Note 4)	I_S	10.4	A
Pulsed Source current (Body diode)		(Note 5)	I_{SM}	31.7	A

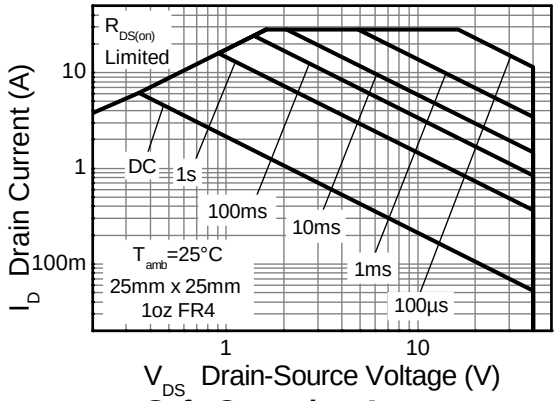
Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 3)	P_D	4.12 33	W mW/°C
	(Note 4)		8.49 67.9	
	(Note 6)		2.12 16.9	
Thermal Resistance, Junction to Ambient	(Note 3)	$R_{\theta JA}$	30.3	°C/W
	(Note 4)		14.7	
	(Note 6)		59.0	
Thermal Resistance, Junction to Lead	(Note 7)	$R_{\theta JL}$	3.1	
Operating and storage temperature range		T_J, T_{STG}	-55 to 150	°C

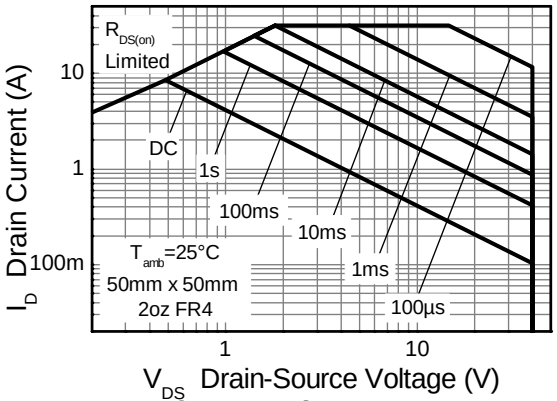
Notes:
2. AEC-Q101 V_{GS} maximum is ±16V.
3. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
4. Same as note 3, except the device is measured at t ≤ 10 sec.
5. Same as note 3, except the device is pulsed with D = 0.02 and pulse width 300 µs. The pulse current is limited by the maximum junction temperature.
6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
7. Thermal resistance from junction to solder-point (at the end of the drain lead).

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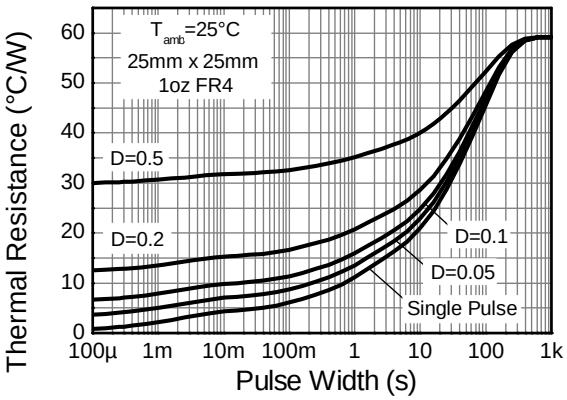
Thermal Characteristics



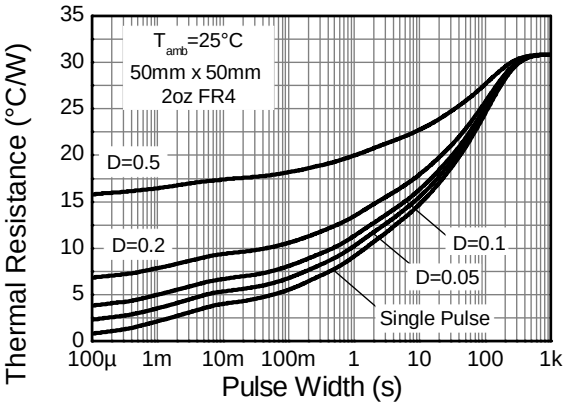
Safe Operating Area



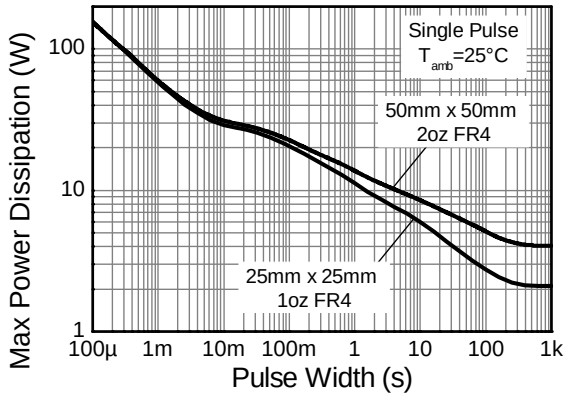
Safe Operating Area



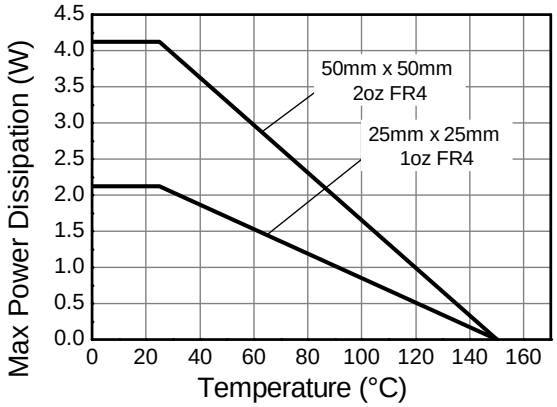
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



Derating Curve

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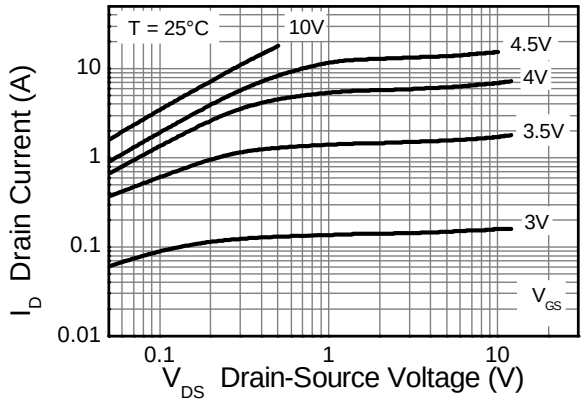
Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	I_D = 250μA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	0.5	μA	V_{DS} = 40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D = 250μA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS\ (ON)}$	—	0.026	0.036	Ω	V_{GS} = 10V, I_D = 12A
			0.049	0.061		V_{GS} = 4.5V, I_D = 6A
Forward Transconductance (Notes 8 & 9)	g_{fs}	—	19.6	—	S	V_{DS} = 15V, I_D = 12A
Diode Forward Voltage (Note 8)	V_{SD}	—	0.96	1.1	V	I_S = 12A, V_{GS} = 0V
Reverse recovery time (Note 9)	t_{rr}		112	—	ns	I_S = 12A, di/dt = 100A/μs
Reverse recovery charge (Note 9)	Q_{rr}	—	926	—	nC	
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	453	—	pF	V_{DS} = 20V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	79.1	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	40.5	—	pF	
Total Gate Charge (Note 10)	Q_g	—	4.9	—	nC	V_{GS} = 4.5V V_{DS} = 20V I_D = 12A
Total Gate Charge (Note 10)	Q_g	—	9.2	—	nC	V_{GS} = 10V
Gate-Source Charge (Note 10)	Q_{gs}	—	1.7	—	nC	
Gate-Drain Charge (Note 10)	Q_{gd}	—	2.7	—	nC	
Turn-On Delay Time (Note 10)	$t_{D(on)}$	—	3.2	—	ns	V_{DD} = 20V, V_{GS} = 10V I_D = 12A, $R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 10)	t_r	—	11.7	—	ns	
Turn-Off Delay Time (Note 10)	$t_{D(off)}$	—	11.6	—	ns	
Turn-Off Fall Time (Note 10)	t_f	—	9.5	—	ns	

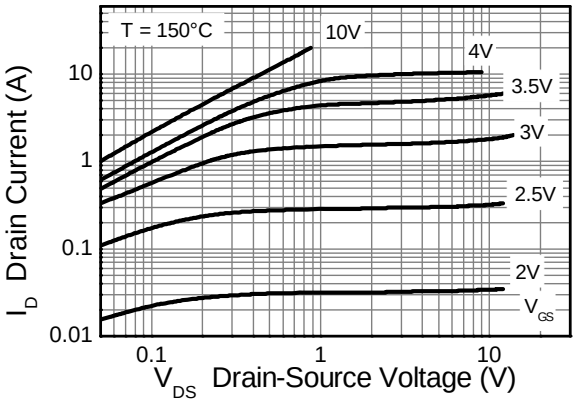
Notes:
8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

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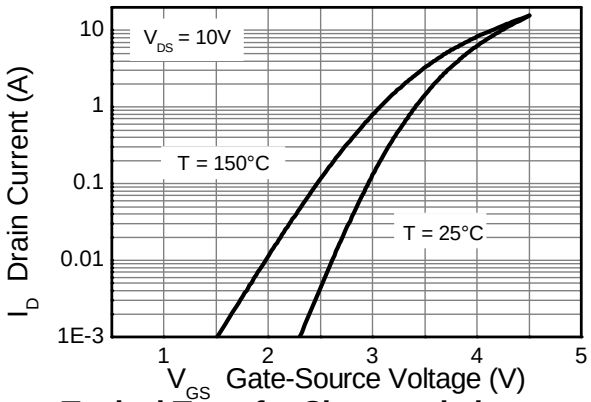
Typical Characteristics



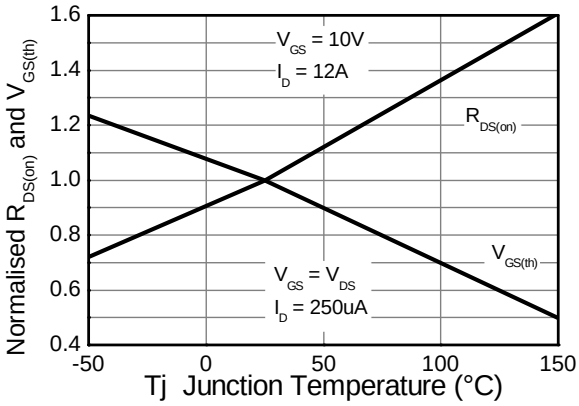
Output Characteristics



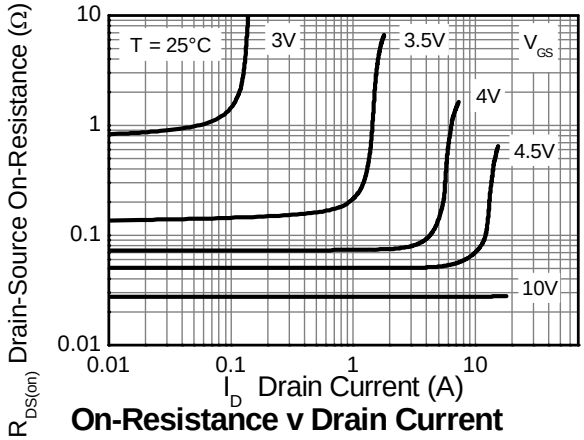
Output Characteristics



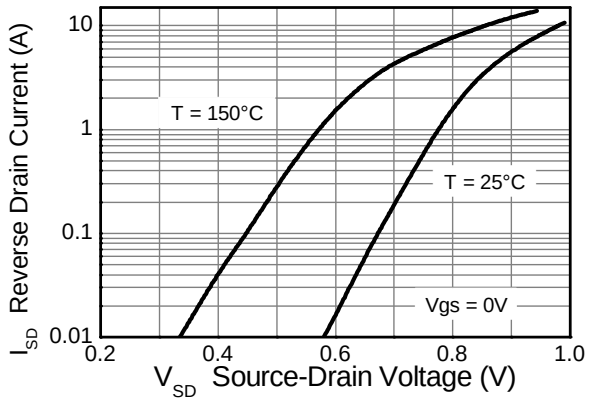
Typical Transfer Characteristics



Normalised Curves v Temperature



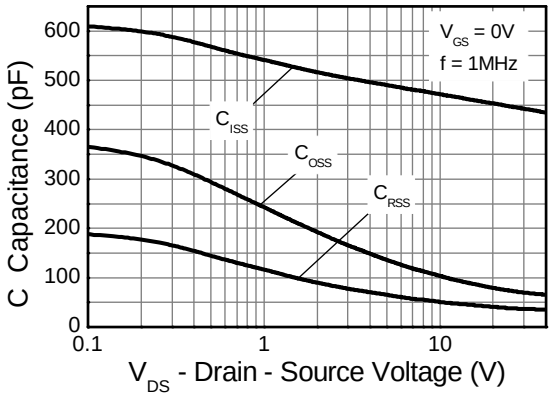
On-Resistance v Drain Current



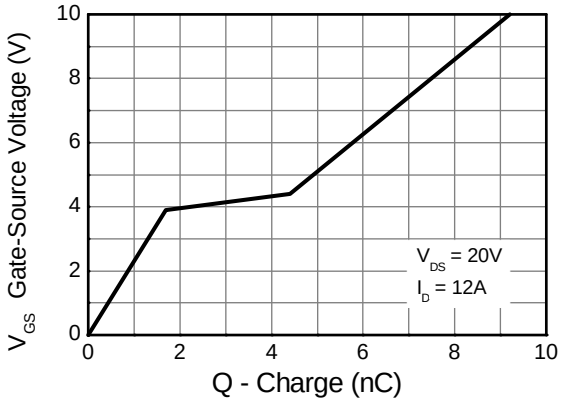
Source-Drain Diode Forward Voltage

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Typical Characteristics - continued

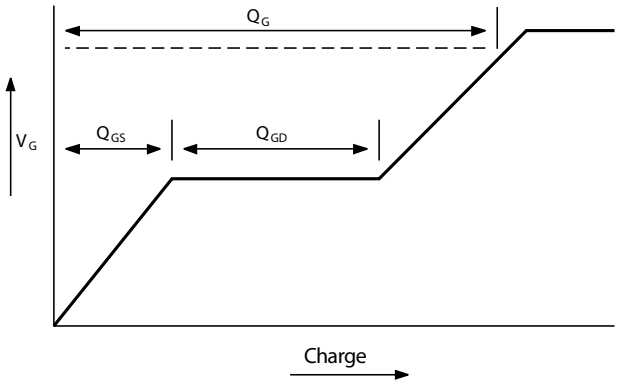


Capacitance v Drain-Source Voltage

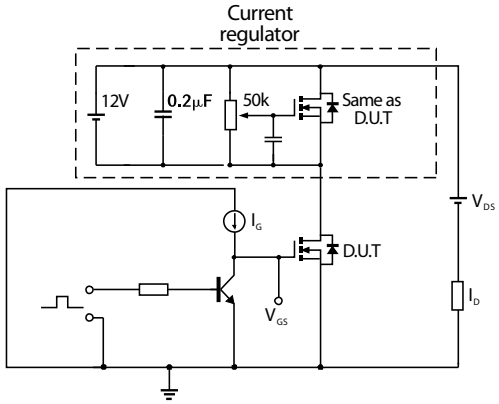


Gate-Source Voltage v Gate Charge

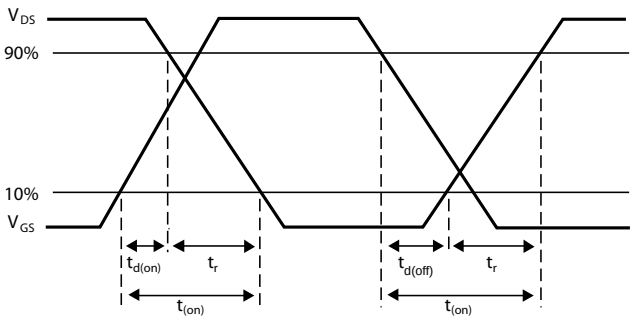
Test Circuits



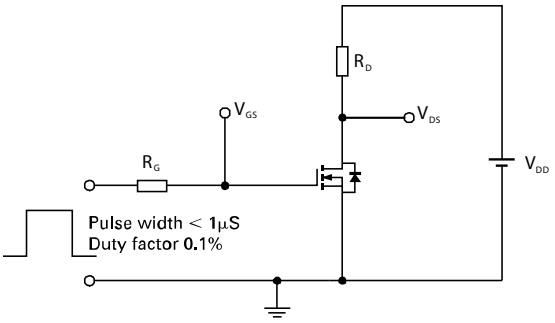
Basic gate charge waveform



Gate charge test circuit



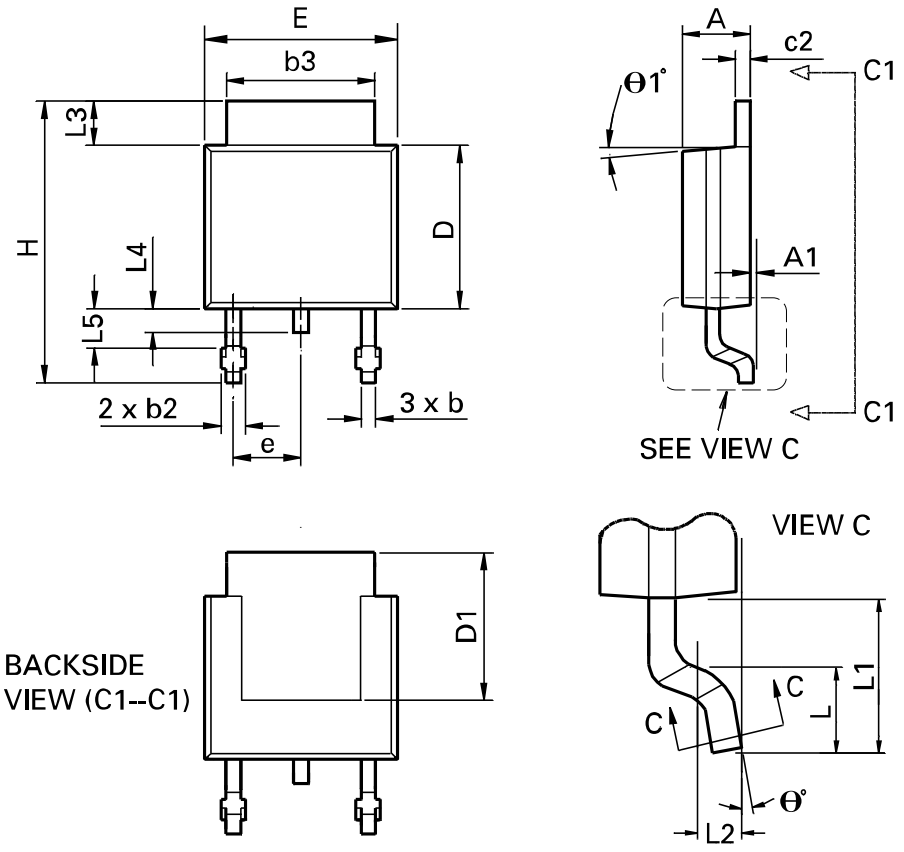
Switching time waveforms



Switching time test circuit

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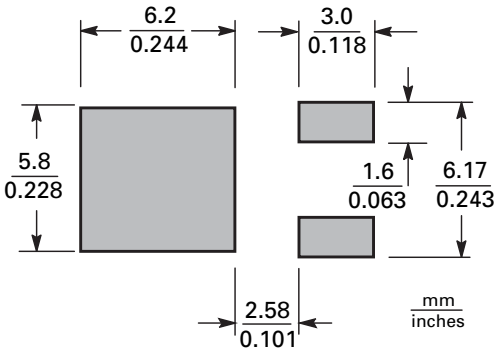
Package Outline Dimensions



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
A	0.086	0.094	2.18	2.39	**e**	0.090 BSC		2.29 BSC	
A1	-	0.005	-	0.127	**H**	0.370	0.410	9.40	10.41
b	0.020	0.035	0.508	0.89	**L**	0.055	0.070	1.40	1.78
b2	0.030	0.045	0.762	1.14	**L1**	0.108 REF		2.74 REF	
b3	0.205	0.215	5.21	5.46	**L2**	0.020 BSC		0.508 BSC	
c	0.018	0.024	0.457	0.61	**L3**	0.035	0.065	0.89	1.65
c2	0.018	0.023	0.457	0.584	**L4**	0.025	0.040	0.635	1.016
D	0.213	0.245	5.41	6.22	**L5**	0.045	0.060	1.14	1.52
D1	0.205	-	5.21	-	**θ1°**	0°	10°	0°	10°
E	0.250	0.265	6.35	6.73	**θ°**	0°	15°	0°	15°
E1	0.170	-	4.32	-	-	-	-	-	-

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Suggested Pad Layout



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