60V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET POWERDI®

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D T_C = +25°C (Note 10)
60V	5.5mΩ @ V_{GS} = 10V	100A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- High Frequency Switching
- Sync. Rectification
- DCDC Converters

Features

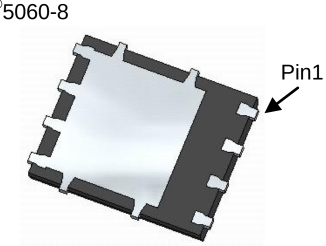
- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – ensures more reliable and robust end application
- Low $R_{DS(ON)}$ – minimizes power losses
- Low Q_g – minimizes switching losses
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

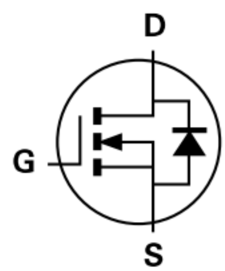
- Case: POWERDI®5060-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.097 grams (Approximate)

POWERDI®5060-8

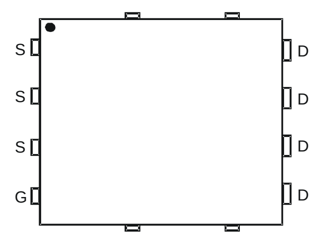
Top View



Bottom View



Internal Schematic



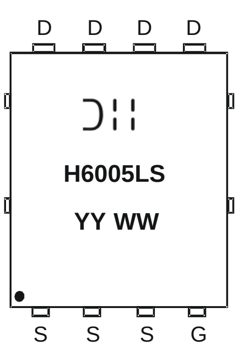
Top View
Pin Configuration

Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH6005LPSQ-13	POWERDI®5060-8	2,500 / Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. Automotive products are AEC-Q101 qualified and are PPAP capable. For more information, please refer to http://www.diodes.com/product_compliance_definitions.html.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



Ↄ¦¦ = Manufacturer's Marking
H6005LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 15 = 2015)
WW = Week (01 - 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 6)	T_A = +25°C T_A = +70°C	I_D	20.6 17.2	A
Continuous Drain Current (Note 7)	T_C = +25°C (Note 10) T_C = +100°C	I_D	100 90	A
Maximum Continuous Body Diode Forward Current (Note 7)		I_S	100	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)		I_{DM}	160	A
Avalanche Current, L=1mH		I_{AS}	14.8	A
Avalanche Energy, L=1mH		E_{AS}	98	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	3.2	W
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	47	°C/W
Total Power Dissipation (Note 7)	T_C = +25°C	P_D	150	W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	1	°C/W
Operating and Storage Temperature Range		$T_{J,}$ T_{STG}	-55 to +175	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	-	-	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	-	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	4.4	5.5	mΩ	V_{GS} = 10V, I_D = 50A
		-	5.7	7.2		V_{GS} = 6V, I_D = 20A
		-	7.7	10		V_{GS} = 4.5V, I_D = 12.5A
Diode Forward Voltage	V_{SD}	-	0.9	-	V	V_{GS} = 0V, I_S = 50A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	-	2962	-	pF	V_{DS} = 30V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	-	965.2	-		
Reverse Transfer Capacitance	C_{rss}	-	59.8	-		
Gate Resistance	R_g	-	0.66	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	-	47.1	-	nC	V_{DD} = 30V, I_D = 50A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	-	23.1	-		
Gate-Source Charge	Q_{gs}	-	10.2	-		
Gate-Drain Charge	Q_{gd}	-	12.5	-		
Turn-On Delay Time	$t_{D(ON)}$	-	8.3	-	ns	V_{DD} = 30V, V_{GS} = 10V, I_D = 30A, R_G = 3.3Ω
Turn-On Rise Time	t_R	-	9.4	-		
Turn-Off Delay Time	$t_{D(OFF)}$	-	22	-		
Turn-Off Fall Time	t_F	-	8.9	-		
Body Diode Reverse Recovery Time	t_{RR}	-	40.4	-	ns	I_F = 30A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	-	49.7	-	nC	

Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. Thermal resistance from junction to soldering point (on the exposed drain pad).
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.
10. Package limited.

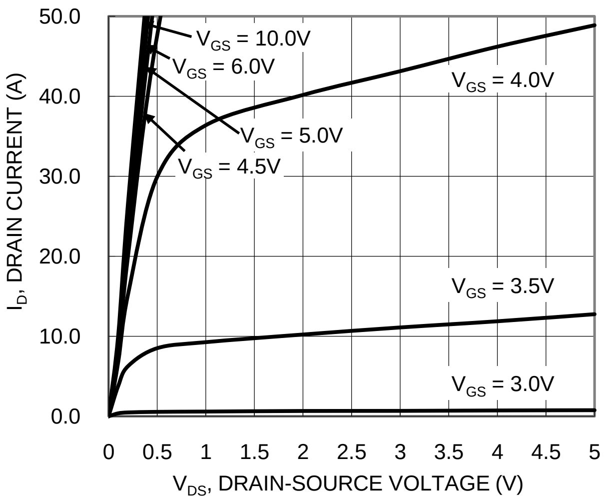


Figure 1. Typical Output Characteristic

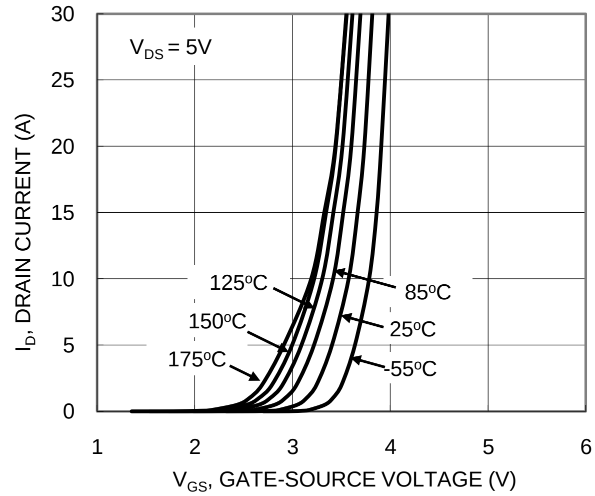


Figure 2. Typical Transfer Characteristic

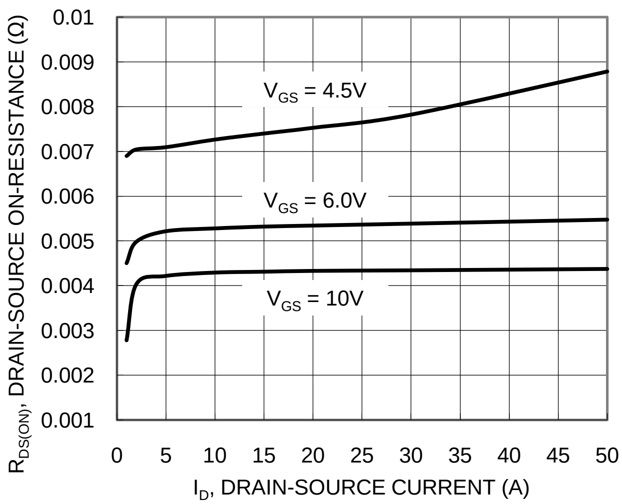


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

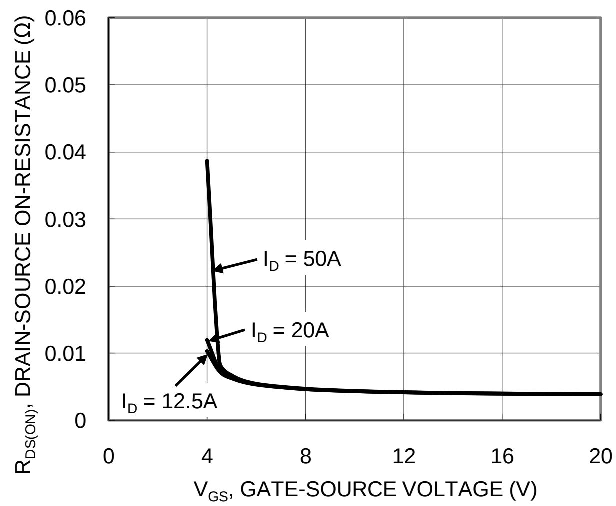


Figure 4. Typical Transfer Characteristic

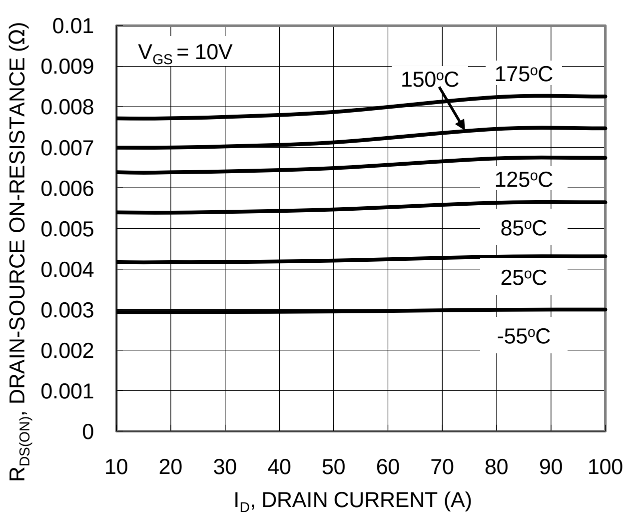


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

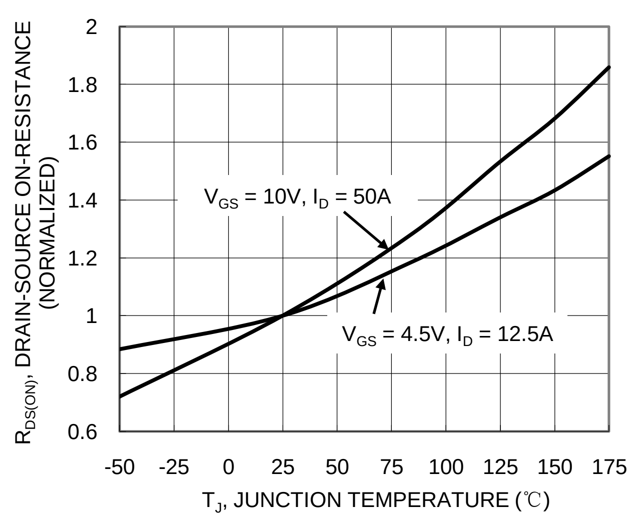


Figure 6. On-Resistance Variation with Junction Temperature

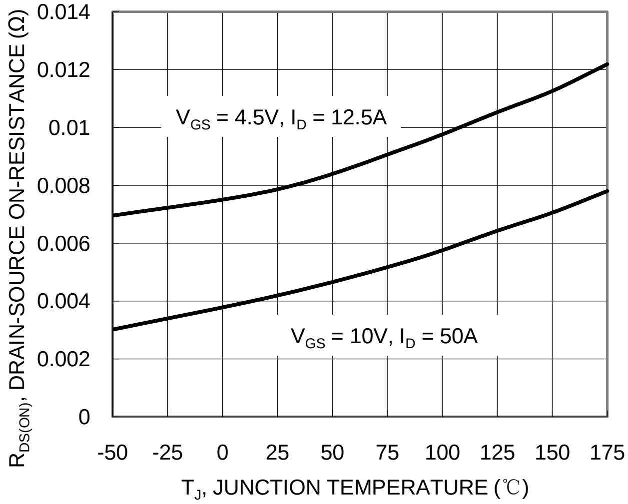


Figure 7. On-Resistance Variation with Junction Temperature

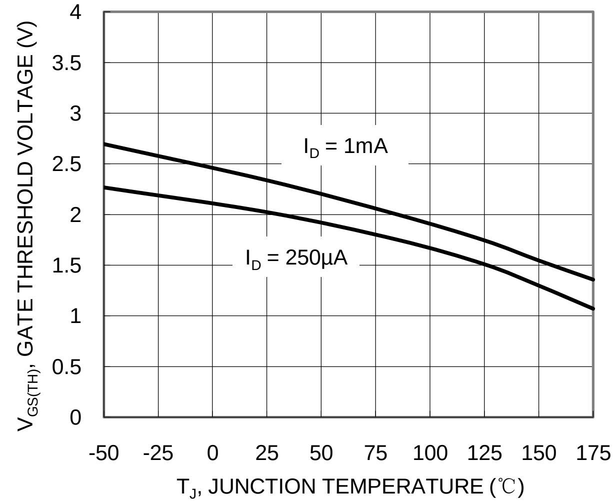


Figure 8. Gate Threshold Variation vs. Junction Temperature

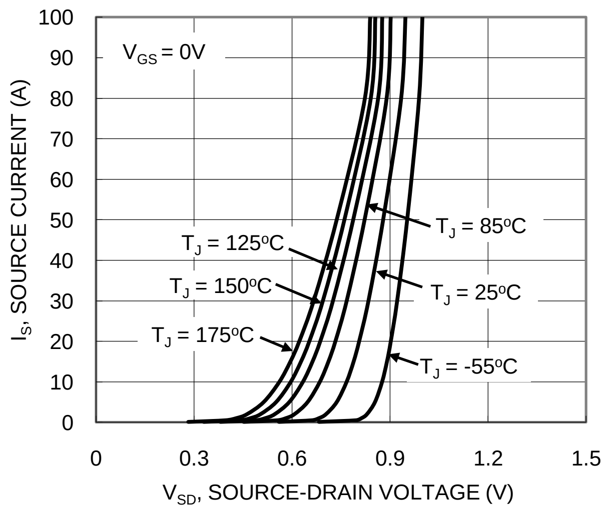


Figure 9. Diode Forward Voltage vs. Current

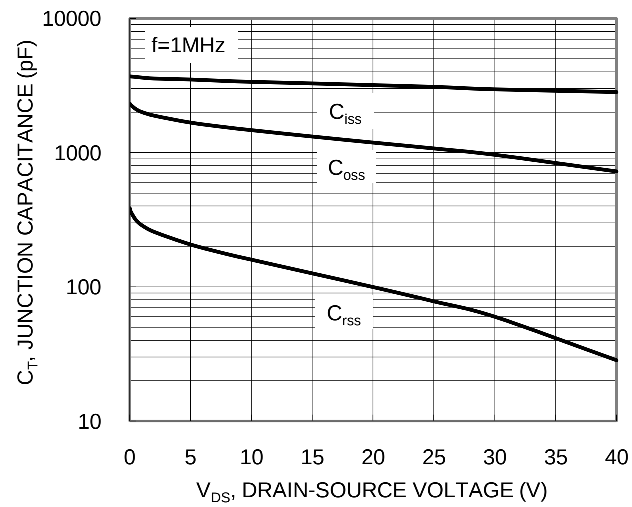


Figure 10. Typical Junction Capacitance

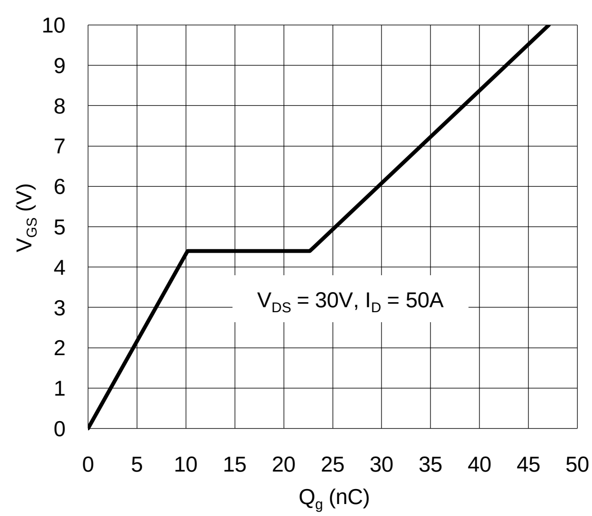


Figure 11. Gate Charge

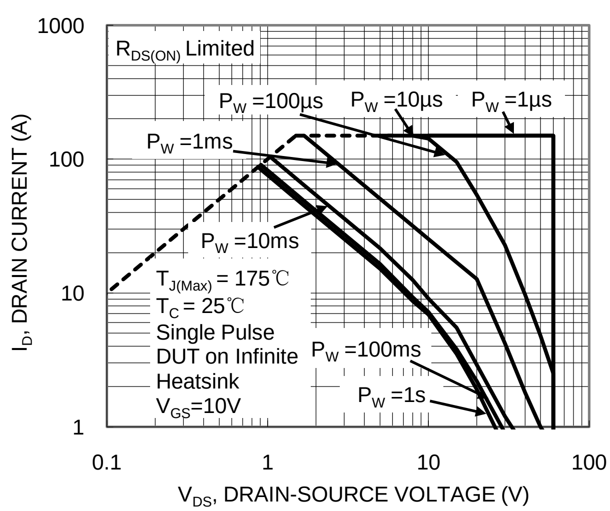


Figure 12. SOA, Safe Operation Area

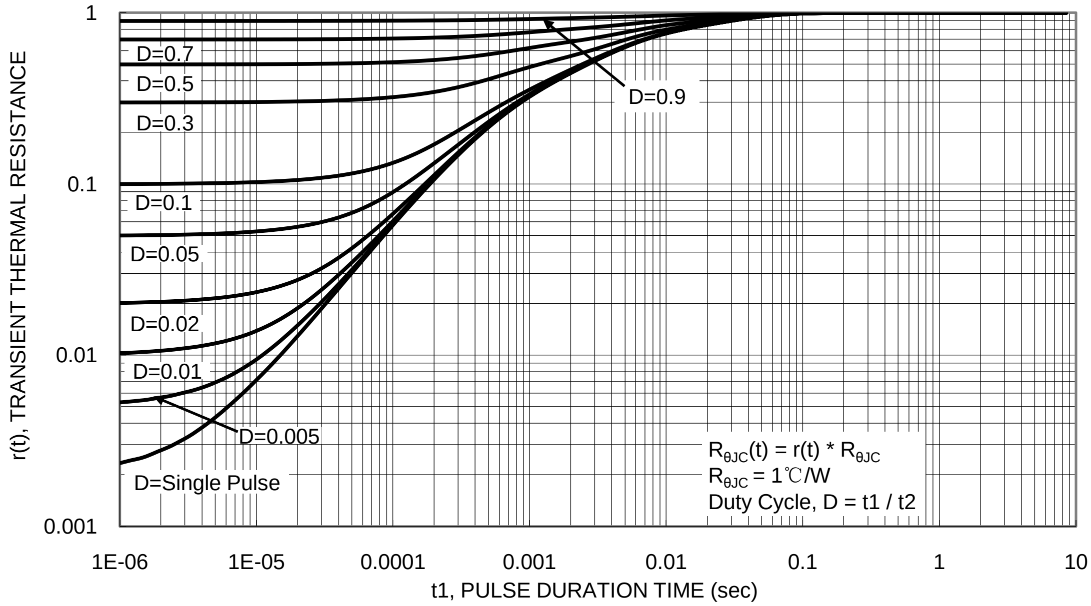
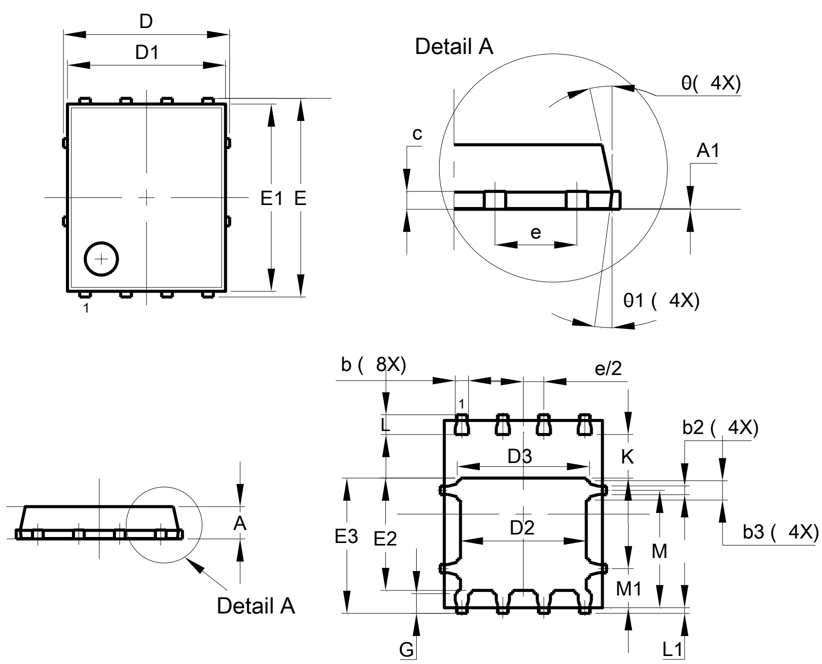


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

POWERDI®5060-8



POWERDI®5060-8			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0.00	0.05	-
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
K	0.51	-	-
L	0.51	0.71	0.61
L1	0.100	0.200	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
θ	10º	12º	11º
θ1	6º	8º	7º
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

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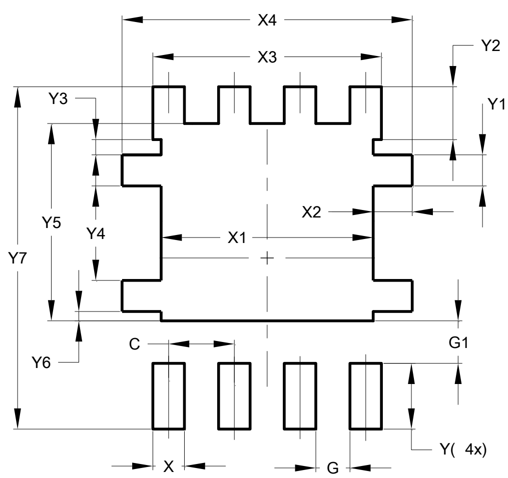

Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610

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