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

NEW PRODUCT

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
60V	8.0mΩ @ V_{GS} = 10V	16.5A

Description

This new generation N-Channel Enhancement Mode MOSFET is designed to minimize $R_{DS(ON)}$ and yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switch.

Applications

- Motor Control
- DC-DC Converters
- Power Management

Features

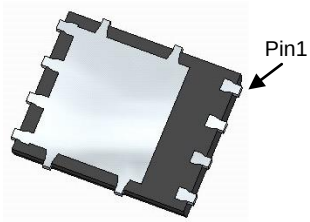
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile – Ideal for Thin Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (DMNH6008SPSQ)**

Mechanical Data

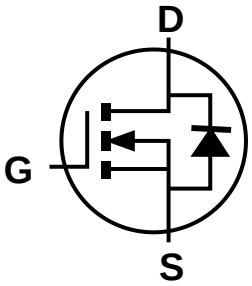
- Case: POWERDI®5060-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.097 grams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

POWERDI®5060-8

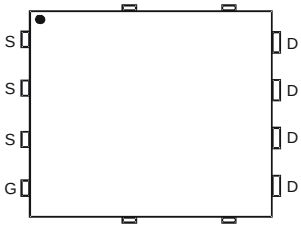
Top View



Bottom View



Internal Schematic



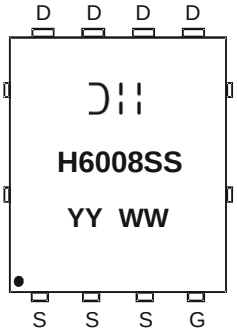
Top View
Pin Configuration

Ordering Information (Note 4)

Part Number	Case	Packaging
DMNH6008SPS-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. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



=Manufacturer's Marking
H6008SS = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 15 = 2015)
WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +100°C	I_D	16.5 11.7	A
	Steady State	T_C = +25°C T_C = +100°C	I_D	88 63	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I_{DM}	140	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	90	A
Avalanche Current (Note 7) L=0.1mH			I_{AS}	62	A
Avalanche Energy (Note 7) L=0.1mH			E_{AS}	194	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	1.6	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	95	°C/W
Total Power Dissipation (Note 6)		P_D	3.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	46	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.6	
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 = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	2	—	4	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	8.0	mΩ	V_{GS} = 10V, I_D = 20A
Diode Forward Voltage	V_{SD}	—	—	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	2597	—	pF	V_{DS} = 30V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	437	—		
Reverse Transfer Capacitance	C_{rss}	—	118	—		
Gate Resistance	R_G	—	2.0	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	40.1	—	nC	V_{DD} = 30V, I_D = 20A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	21.2	—		
Gate-Source Charge	Q_{gs}	—	8.3	—		
Gate-Drain Charge	Q_{gd}	—	11.8	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.7	—	ns	V_{DD} = 30V, V_{GS} = 10V, R_G = 1Ω, I_D = 20A
Turn-On Rise Time	t_R	—	5.0	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	15.6	—		
Turn-Off Fall Time	t_F	—	3.3	—		
Reverse Recovery Time	t_{RR}	—	33	—	ns	I_F = 20A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	33	—	nC	

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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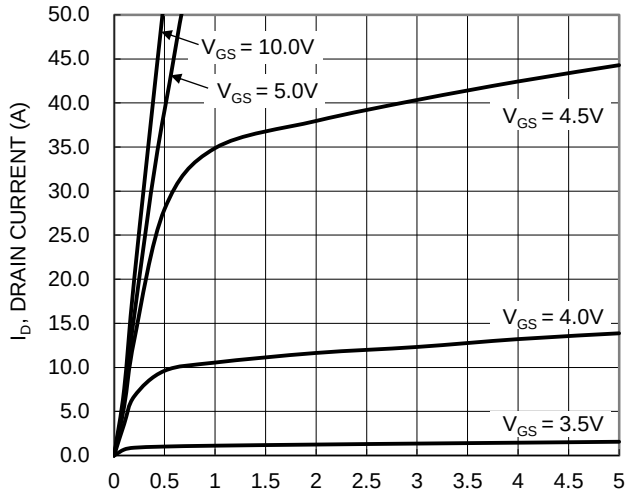

Figure 1. Typical Output Characteristic

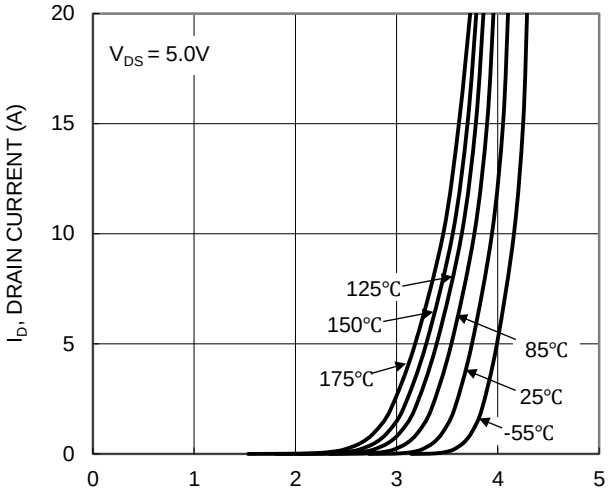

Figure 2. Typical Transfer Characteristic

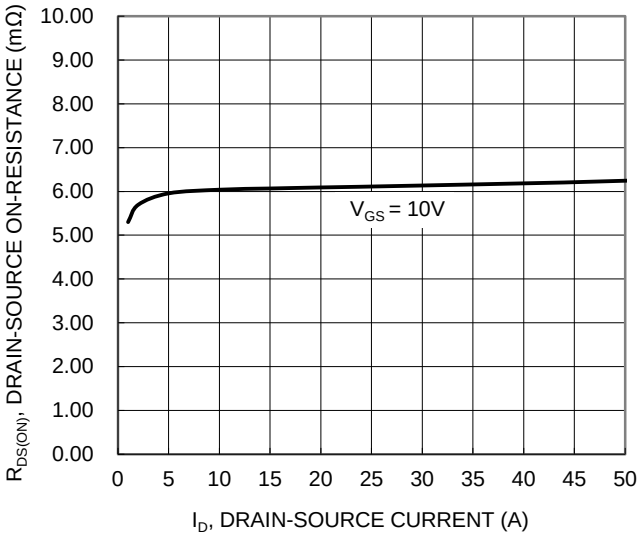

Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

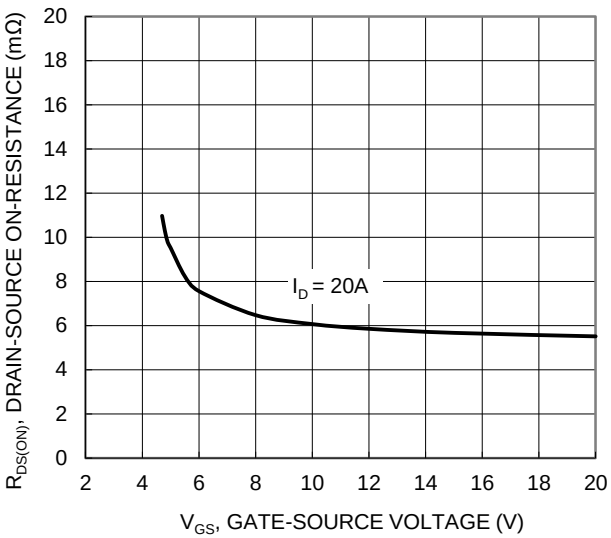

Figure 4. Typical Transfer Characteristic

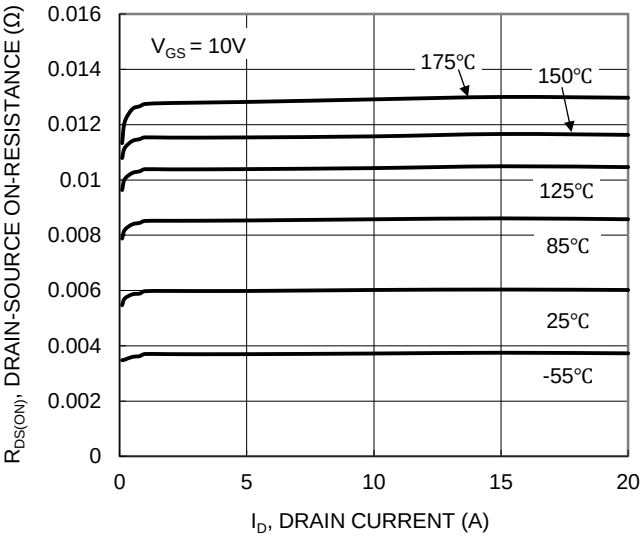

Figure 5. Typical On-Resistance vs. Drain Current and Temperature

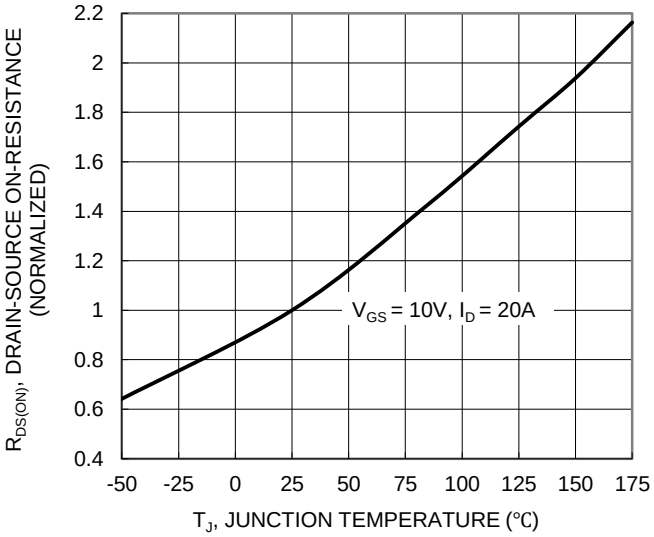

Figure 6. On-Resistance Variation with Temperature

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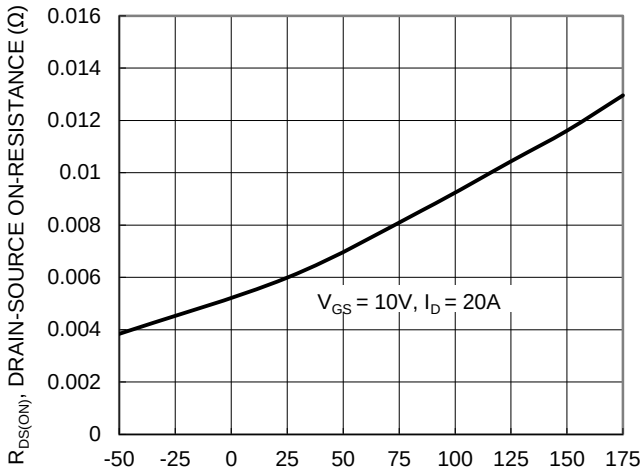

Figure 7. On-Resistance Variation with Temperature

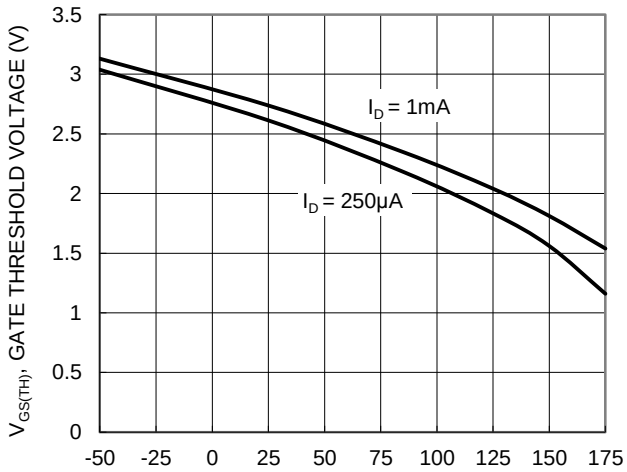

Figure 8. Gate Threshold Variation vs. Temperature

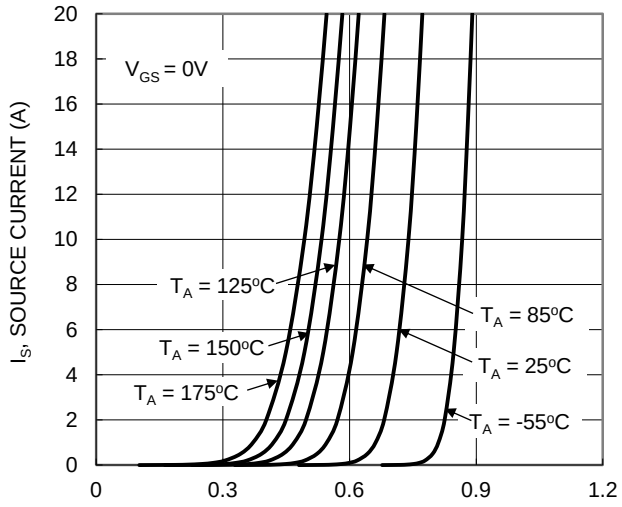

Figure 9. Diode Forward Voltage vs. Current

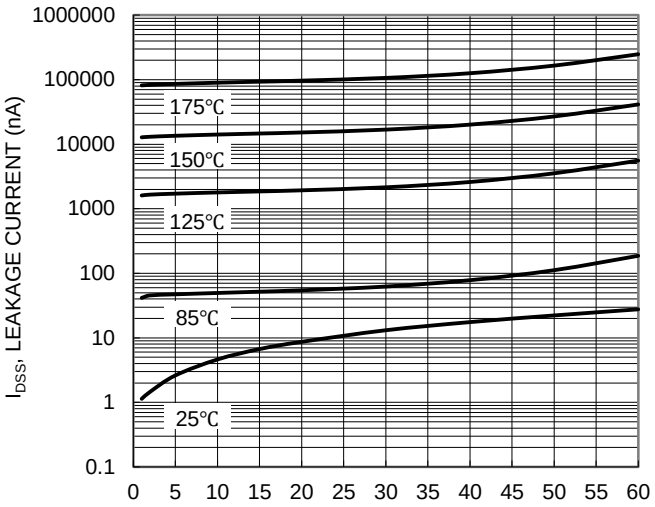

Figure 10. Typical Drain-Source Leakage Current vs. Voltage

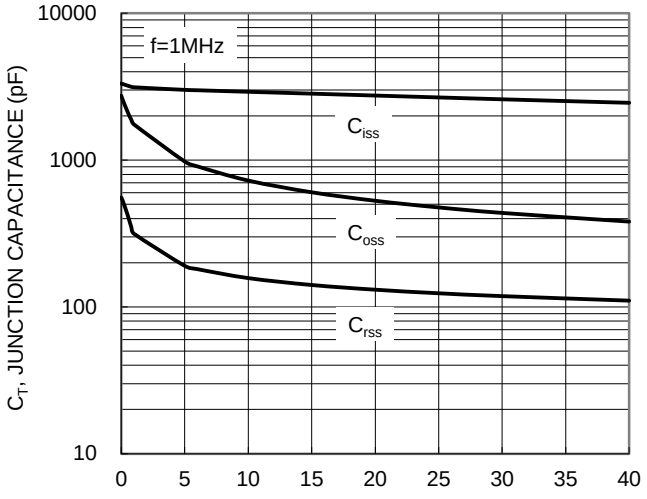

Figure 11. Typical Junction Capacitance

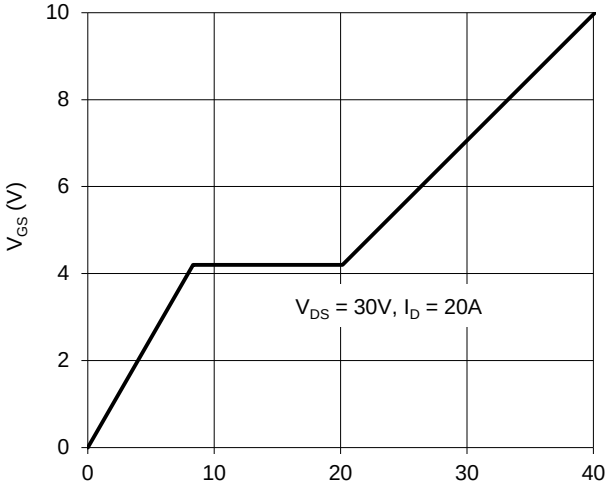

Figure 12. Gate Charge

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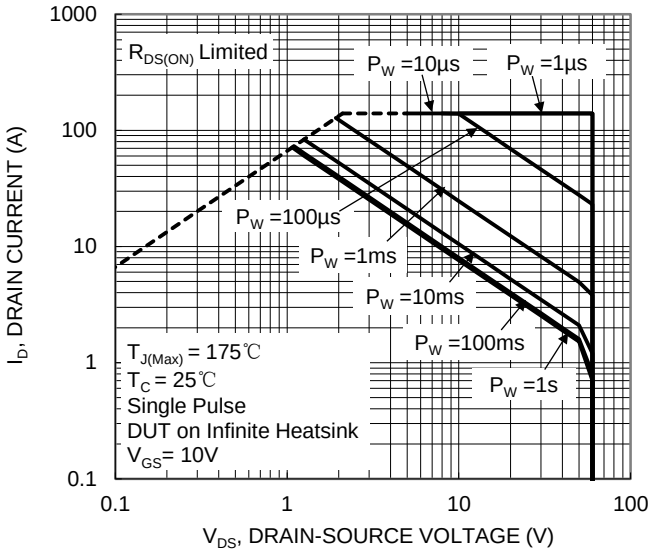

Figure 13. SOA, Safe Operation Area

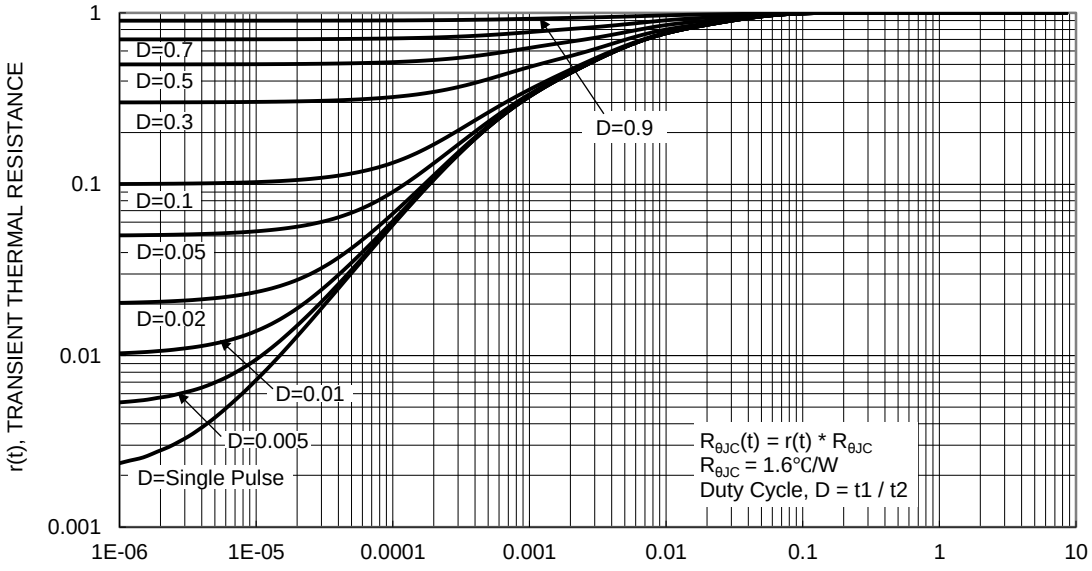

Figure 14. Transient Thermal Resistance

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Package Outline Dimensions

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

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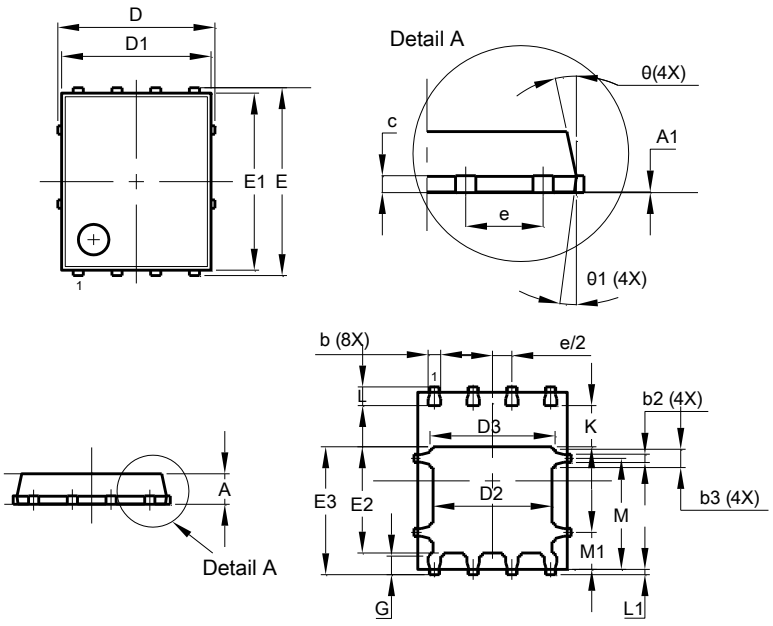

POWERDI®5060-8			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0.00	0.05	–
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
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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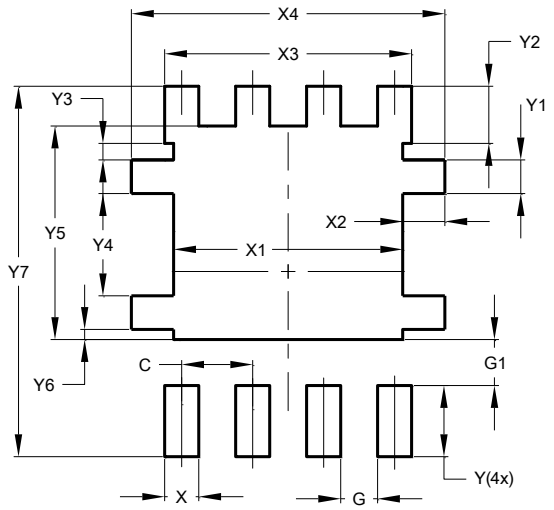

Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610

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