40V 175°C DUAL N-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C (Note 10)
40V	8.6mΩ @ V_{GS} = 10V	45A

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully 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)**

Description and Applications

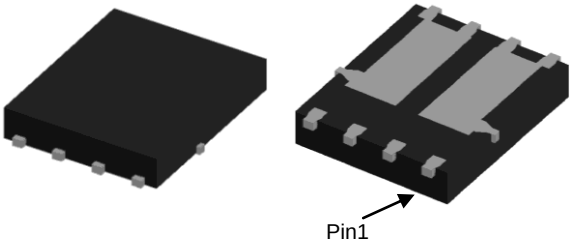
This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Backlighting
- Power Management Functions
- DC-DC Converters

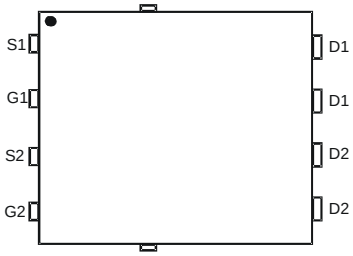
Mechanical Data

- 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)

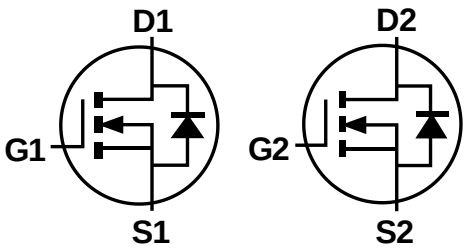
PowerDI5060-8



Top View Bottom View



Pin out
Top View



Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH4007SPDQ-13	PowerDI5060-8	2,500/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
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. 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.

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Marking Information



= Manufacturer's Marking
H4007SD = 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}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 7)	T_C = +25°C (Note 10) T_C = +100°C	I_D	45 38.1	A
Continuous Drain Current (Note 6)	T_A = +25°C T_A = +70°C	I_D	14.2 11.9	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I_{DM}	90	A
Maximum Continuous Body Diode Forward Current (Note 7)		I_S	34	A
Avalanche Current, L = 0.1mH		I_{AS}	20	A
Avalanche Energy, L = 0.1mH		E_{AS}	20	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	57	°C/W
Total Power Dissipation (Note 7)	T_C = +25°C	P_D	37.5	W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	4	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

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).

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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}	40	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	2	—	4	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	7.5	8.6	mΩ	V_{GS} = 10V, I_D = 17A
Diode Forward Voltage	V_{SD}	—	0.85	—	V	V_{GS} = 0V, I_S = 17A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{ISS}	—	2,026	—	pF	V_{DS} = 30V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{OSS}	—	702	—	pF	
Reverse Transfer Capacitance	C_{RSS}	—	84.8	—	pF	
Gate Resistance	R_G	—	0.46	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_G	—	41.9	—	nC	V_{DS} = 30V, I_D = 20A, V_{GS} = 10V
Gate-Source Charge	Q_{GS}	—	10	—	nC	
Gate-Drain Charge	Q_{GD}	—	11.5	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	7	—	ns	V_{DD} = 30V, V_{GS} = 10V, I_D = 20A, R_G = 3Ω
Turn-On Rise Time	t_R	—	11.5	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	15.6	—	ns	
Turn-Off Fall Time	t_F	—	8.8	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	29.9	—	ns	I_F = 20A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	23	—	nC	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.
10. Package limited.

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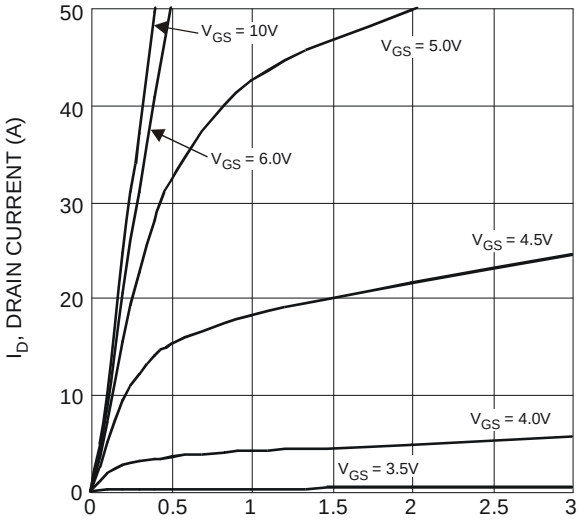


Figure 1 Typical Output Characteristics

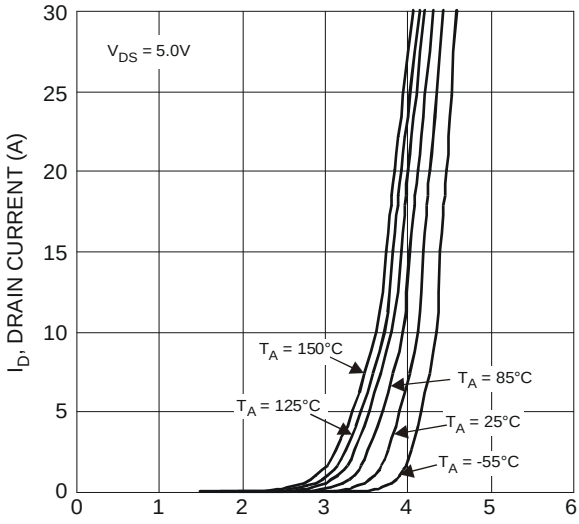


Figure 2 Typical Transfer Characteristics

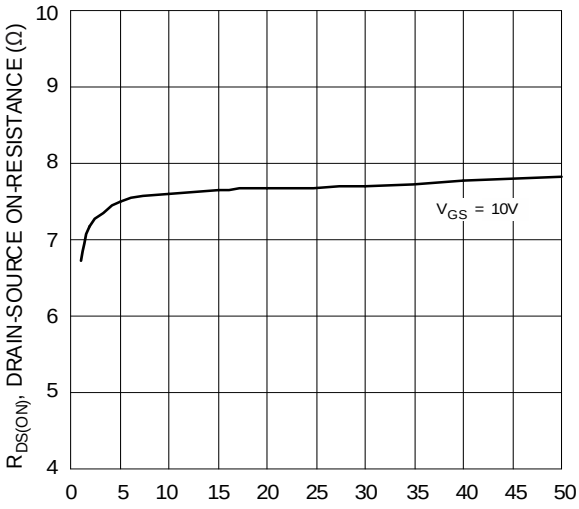


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

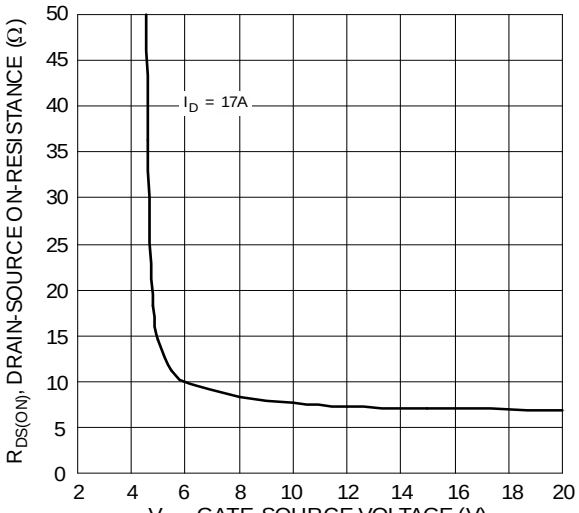


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

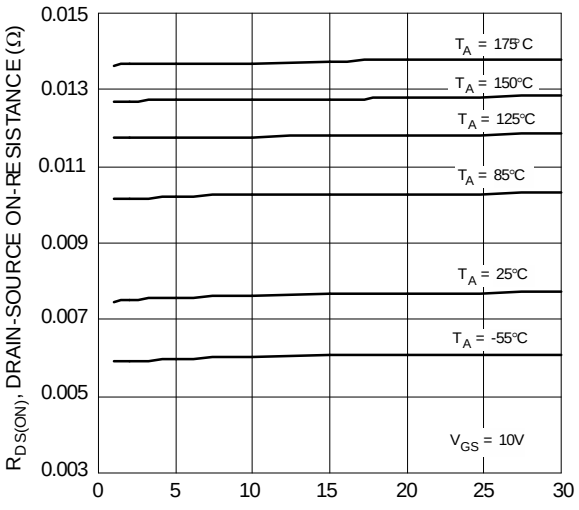


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

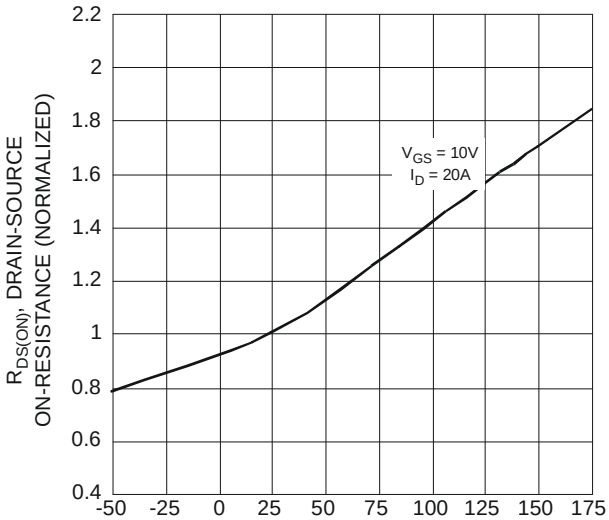


Figure 6 On-Resistance Variation with Temperature

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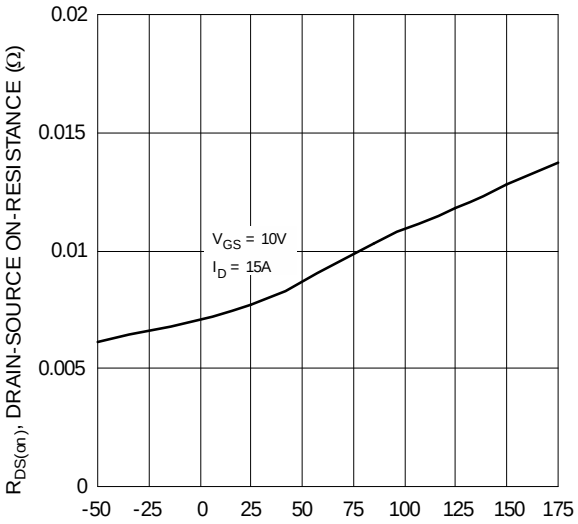


Figure 7 On-Resistance Variation with Temperature

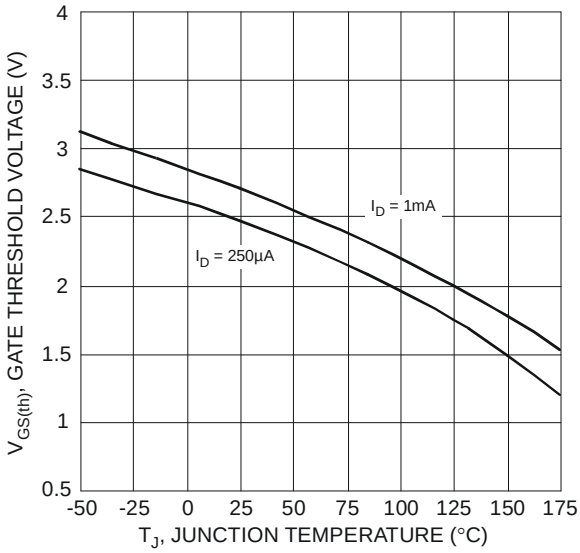


Figure 8 Gate Threshold Variation vs. Ambient Temperature

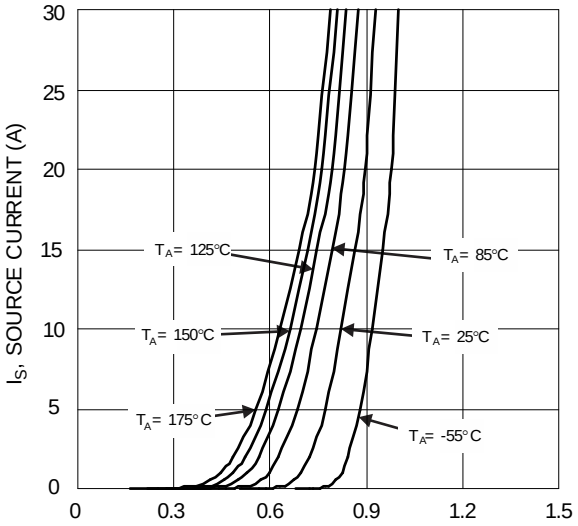


Figure 9 Diode Forward Voltage vs. Current

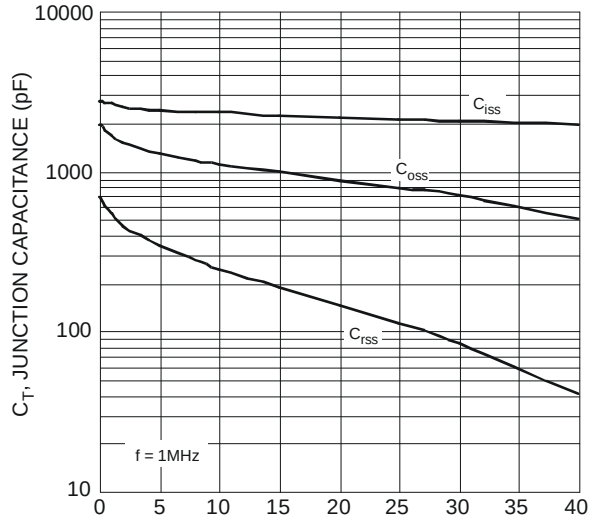


Figure 10 Typical Junction Capacitance

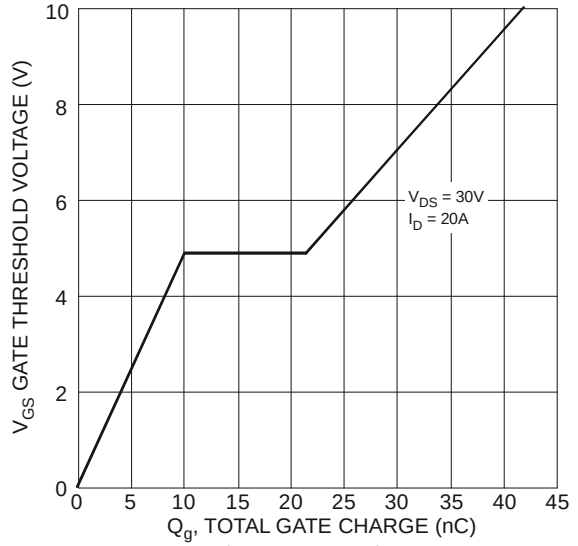


Figure 11 Gate Charge

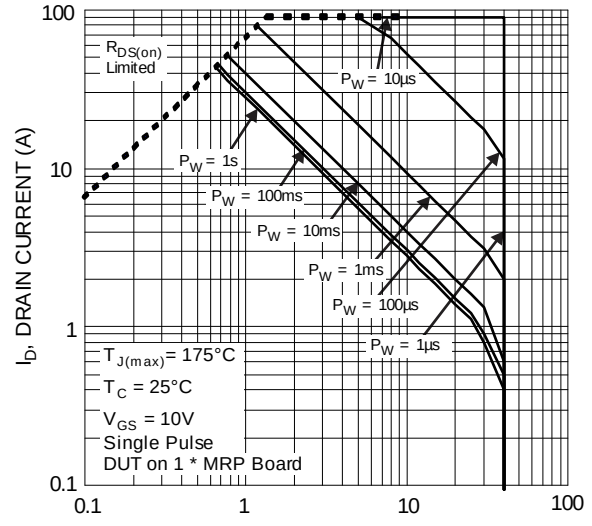


Figure 12 SOA, Safe Operation Area

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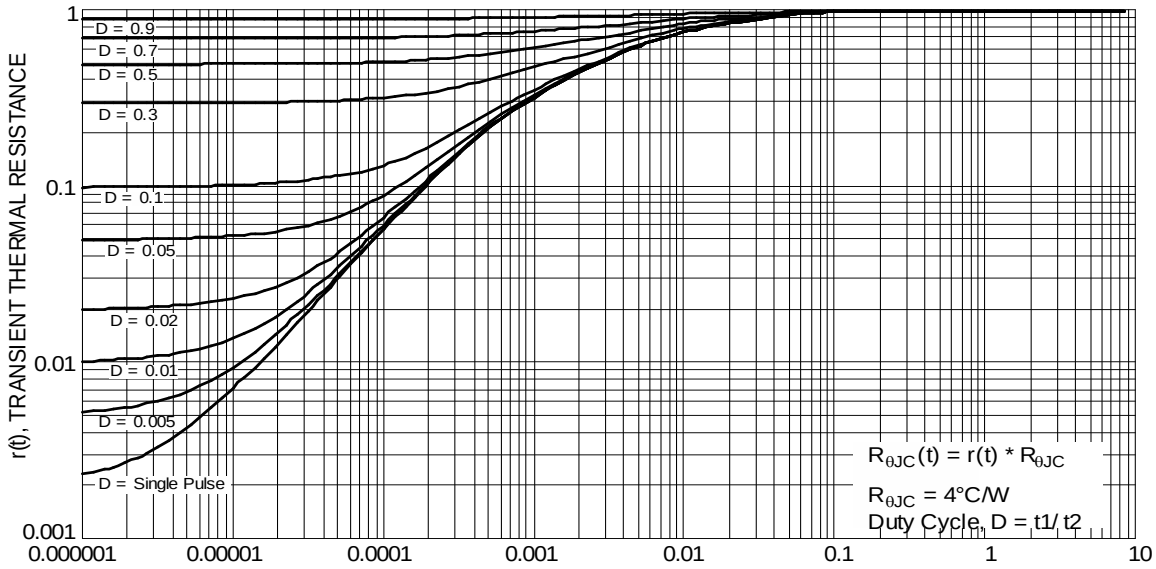


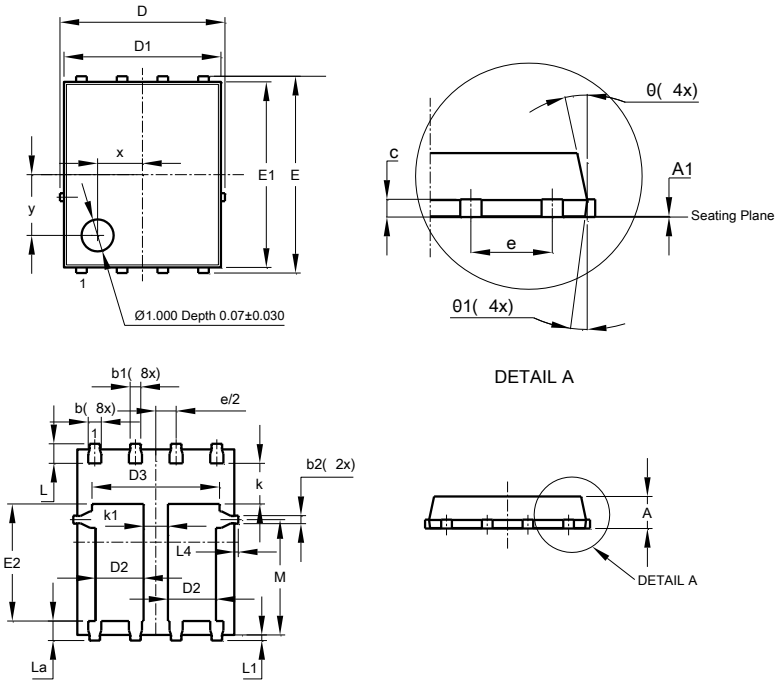
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

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

PowerDI5060-8 (Type C)

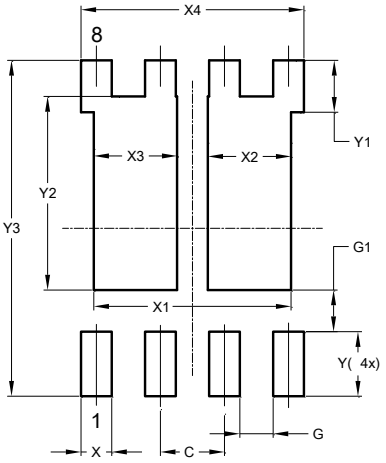


PowerDI5060-8 (Type C)			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	1.40	1.60	1.50
D3	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.76	3.66
e	1.27BSC		
k	-	-	1.27
k1	0.56	-	-
L	0.51	0.71	0.61
La	0.51	0.71	0.61
L1	0.05	0.20	0.175
L4	-	-	0.125
M	3.50	3.71	3.605
x	-	-	1.400
y	-	-	1.900
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

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

PowerDI5060-8 (Type C)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	3.910
X2	1.650
X3	1.650
X4	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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