

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D max $T_C = +25^\circ\text{C}$ (Note 9)
40V	8.6m Ω @ $V_{GS} = 10\text{V}$	45A

Description and Applications

This MOSFET is 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.

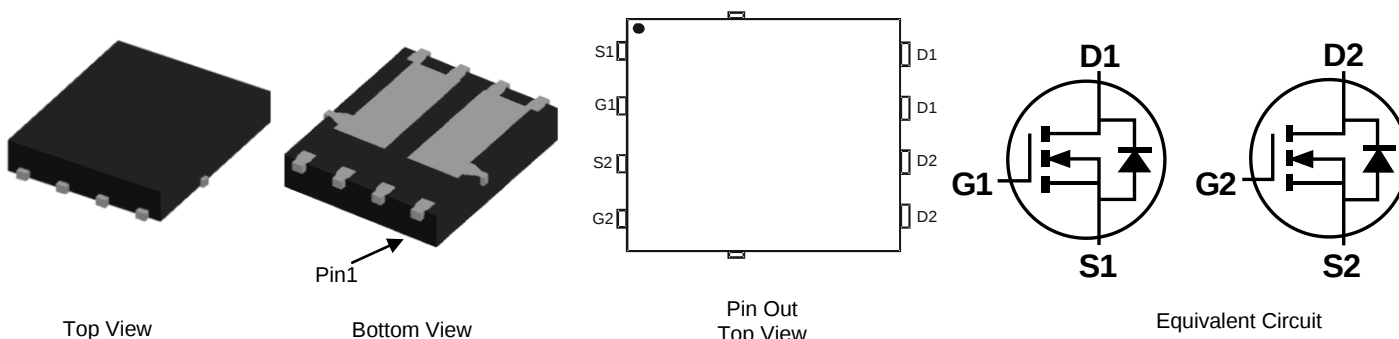
- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

- Rated to $+175^\circ\text{C}$ – 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**

Mechanical Data

- Case: PowerDI5060-8
- 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 208③
- Weight: 0.097 grams (Approximate)

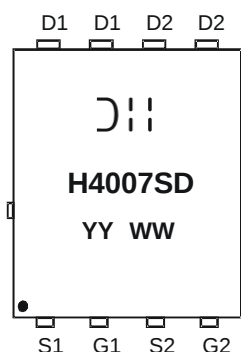


Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH4007SPD-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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



⑈ = Manufacturer's Marking
 H4007SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 14 = 2014)
 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 6)	I _D	45 38.1	A
Continuous Drain Current (Note 5)	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 6)	I _S	34	A
Avalanche Current, L = 0.1mH	I _{AS}	20	A
Avalanche Energy, L = 0.1mH	E _{AS}	89	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	2.6	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	57	°C/W
Total Power Dissipation (Note 6)	P _D	37.5	W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	4	°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 6)						
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 6)						
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 7)						
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	I _F = 20A, di/dt = 100A/μs
Body Diode Reverse Recovery Time	t _{rr}	—	29.9	—	nS	
Body Diode Reverse Recovery Charge	Q _{rr}	—	23	—	nC	

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

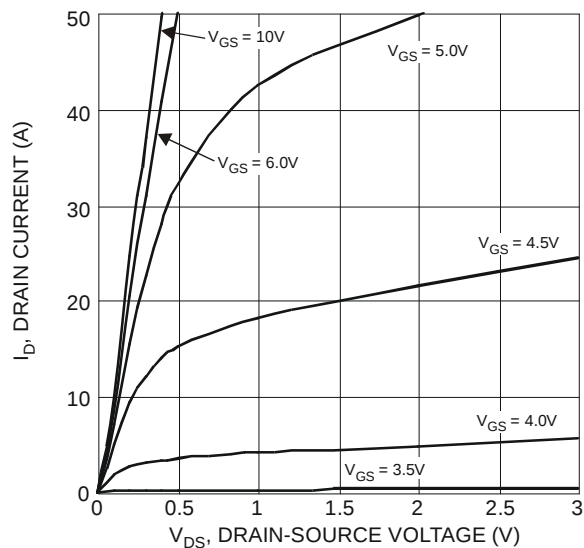


Figure 1 Typical Output Characteristics

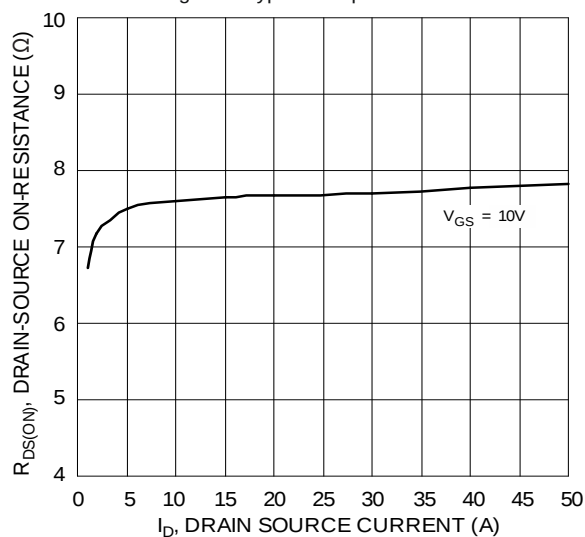


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

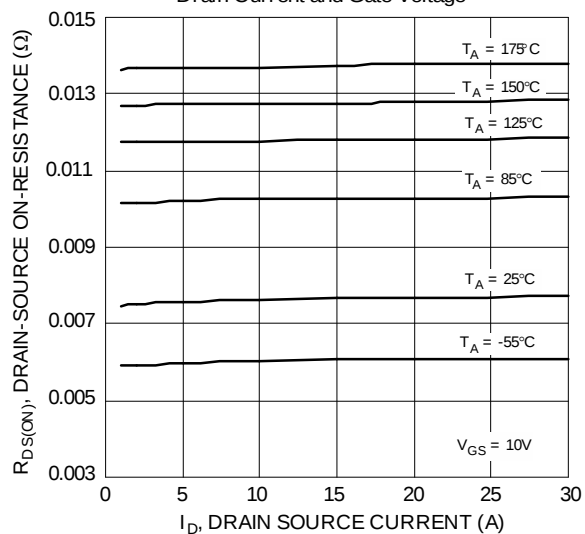


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

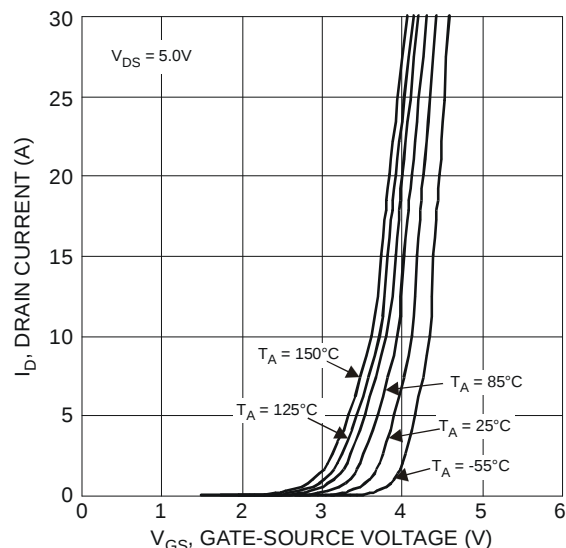


Figure 2 Typical Transfer Characteristics

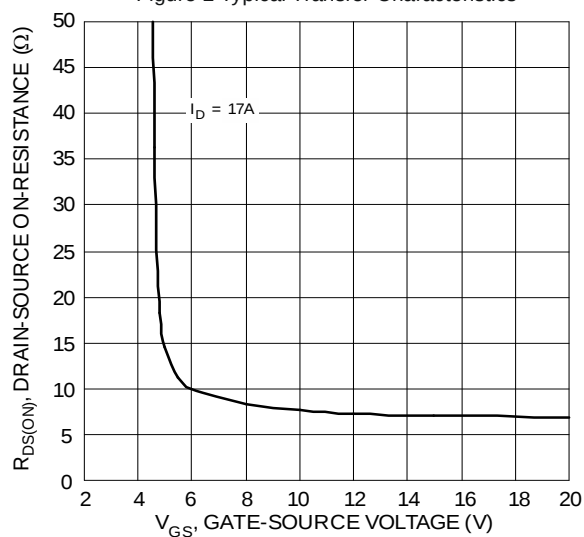


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

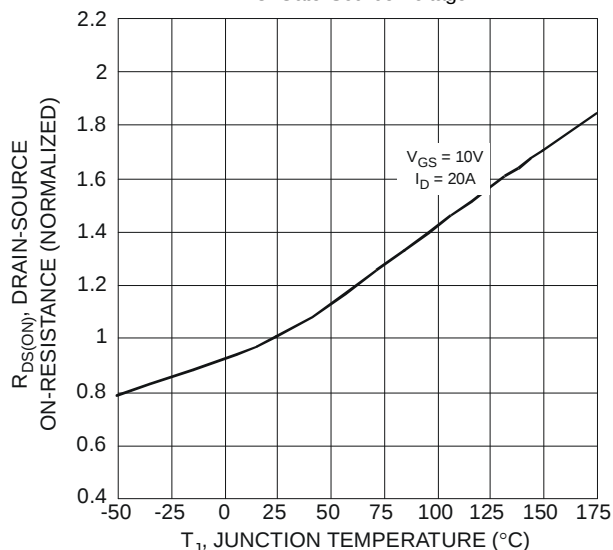
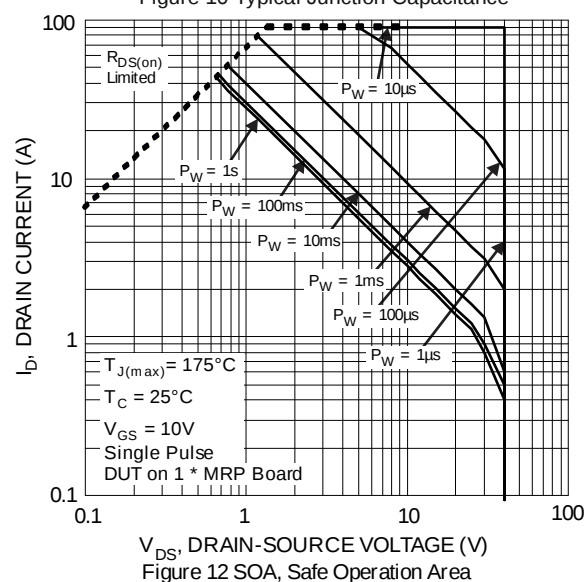
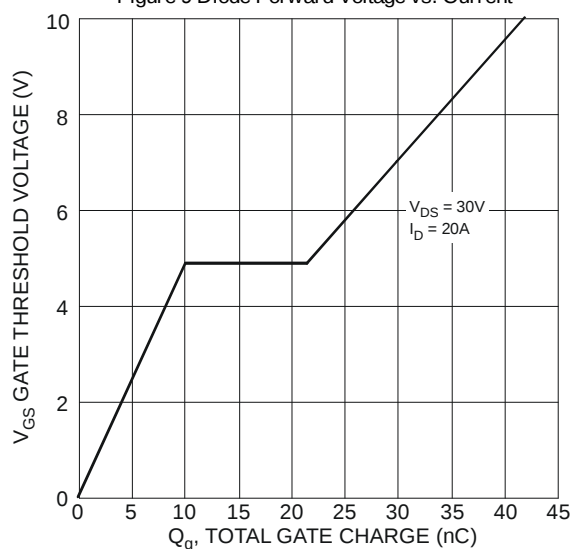
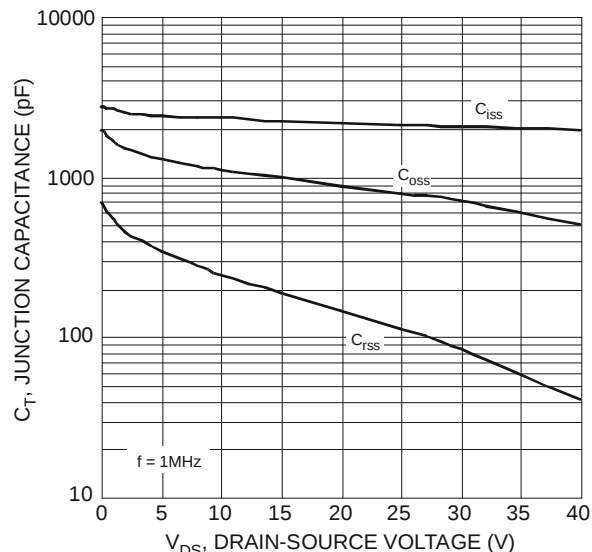
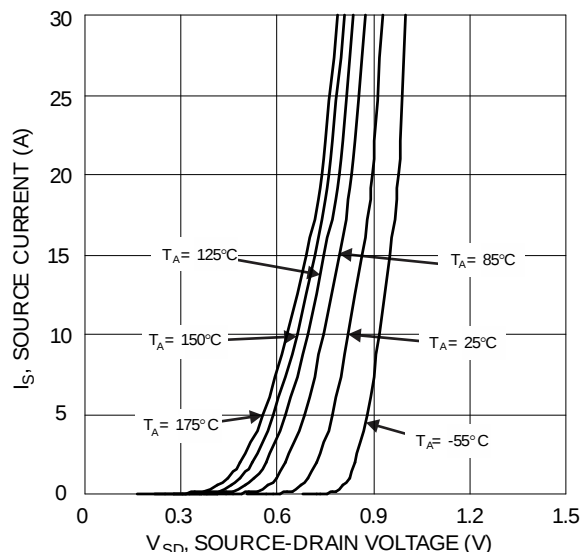
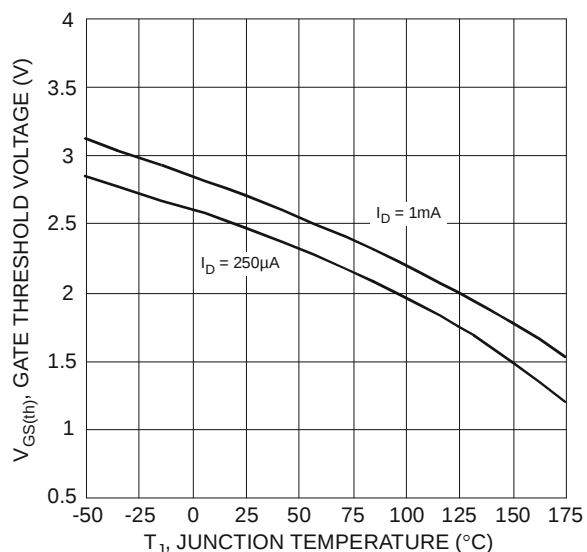
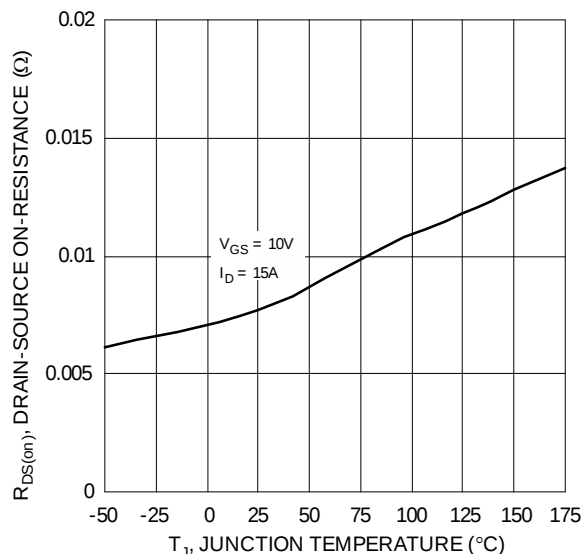


Figure 6 On-Resistance Variation with Temperature



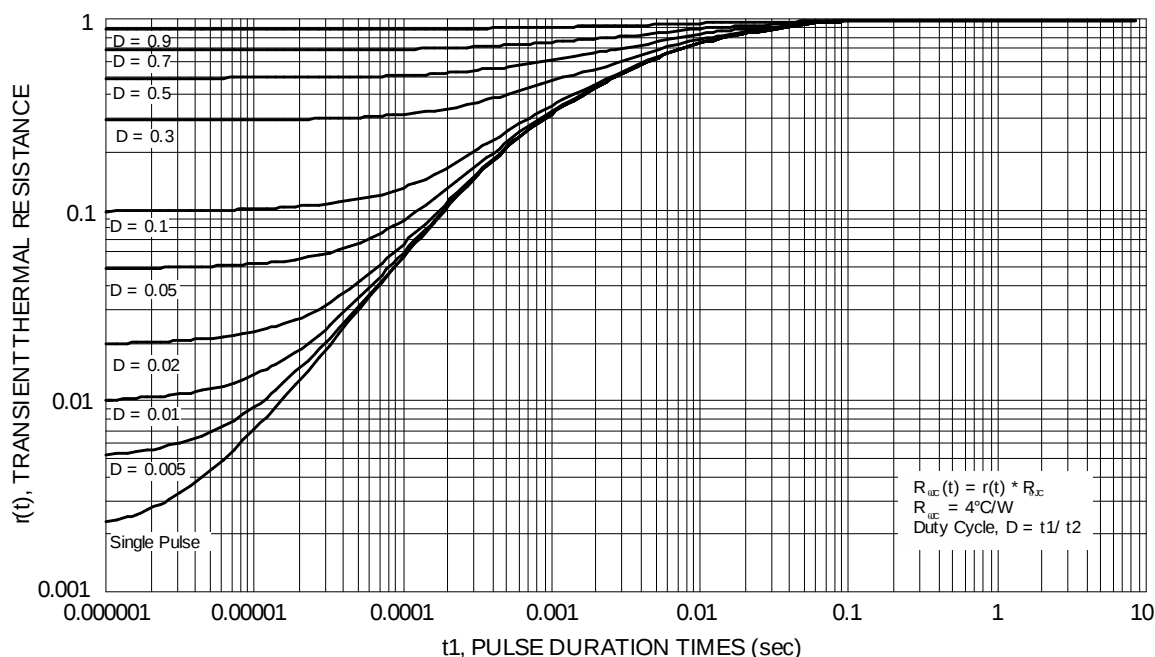
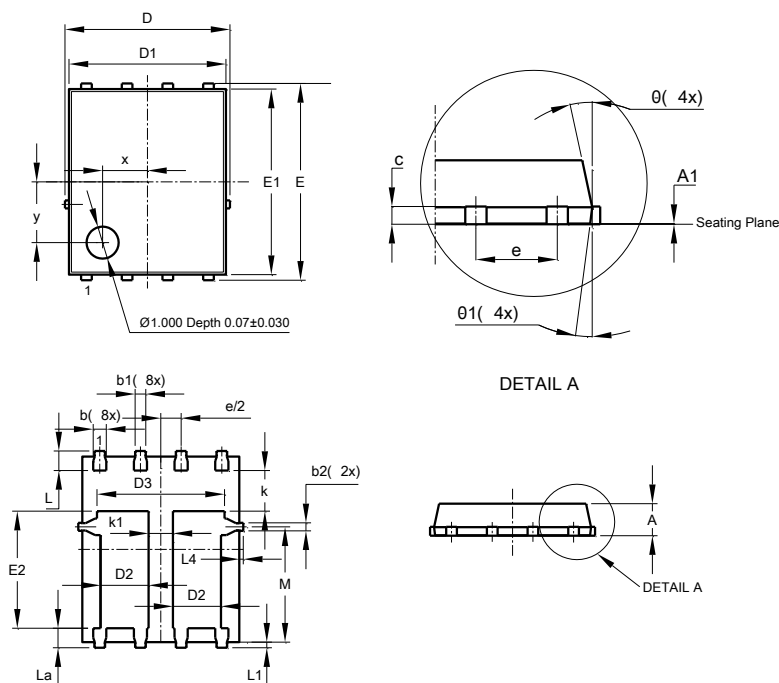


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8 (Type C)

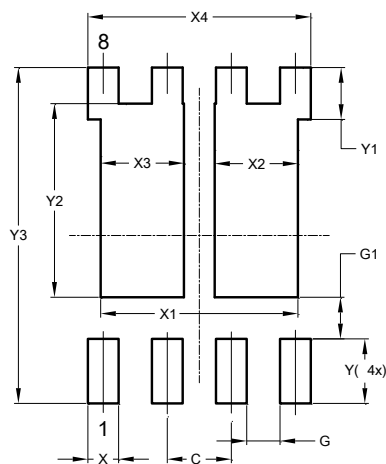


PowerDI5060-8 (Type C)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	1.40	1.60	1.50
D3	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.76	3.66
e	1.27BSC		
k	-	-	1.27
k1	0.56	-	-
L	0.51	0.71	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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