

Product Summary

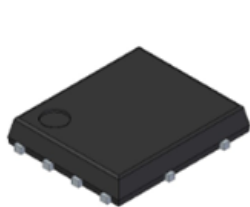
BV _{DSS}	R _{DS(ON)} Max	I _D T _C = +25°C
40V	6.5mΩ @ V _{GS} = 10V	85A
	9.8mΩ @ V _{GS} = 4.5V	70A

Description and Applications

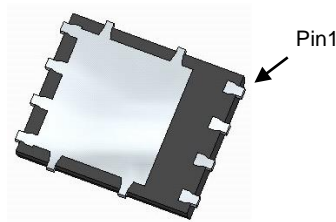
This new generation N-Channel Enhancement Mode MOSFET is designed to minimize R_{DS(ON)} yet maintain superior switching performance.

- Notebook Battery Power Management
- DC-DC Converters
- Loadswitch

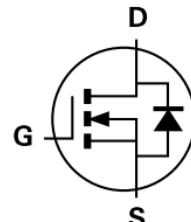
PowerDI5060-8



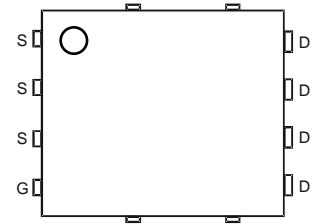
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- 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)**
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>
- An Automotive-Compliant Part is Available Under Separate Datasheet ([DMTH4007LPSQ](#))

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 (3)
- Weight: 0.097 grams (Approximate)

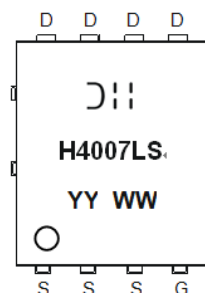
Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH4007LPS-13	PowerDI5060-8	2,500/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

PowerDI5060-8



DII = Manufacturer's Marking
H4007LS = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 21 = 2021)
WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	40	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current, V _{GS} = 10V (Note 5)		T _A = +25°C T _A = +100°C	I _D	15 11	A
Continuous Drain Current, V _{GS} = 10V (Note 6)	Steady State	T _C = +25°C T _C = +100°C	I _D	85 60	A
Maximum Continuous Body Diode Forward Current (Note 6)			I _S	85	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	340	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 5)	T _A = +25°C	P _D	2.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	55	°C/W
Total Power Dissipation (Note 6)	T _C = +25°C	P _D	83.3	W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	1.8	°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 7)						
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 7)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	5.4	6.5	mΩ	V _{GS} = 10V, I _D = 20A
		—	8.4	9.8		V _{GS} = 4.5V, I _D = 20A
Diode Forward Voltage	V _{SD}	—	—	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	1,895	—	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	485	—		
Reverse Transfer Capacitance	C _{rss}	—	20.9	—		
Gate Resistance	R _g	—	0.62	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	12.4	—	nC	V _{DS} = 30V, I _D = 20A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	29.1	—		
Gate-Source Charge	Q _{gs}	—	5.9	—		
Gate-Drain Charge	Q _{gd}	—	3.5	—		
Turn-On Delay Time	t _{D(ON)}	—	5.4	—	ns	V _{DD} = 30V, V _{GS} = 10V, I _D = 20A, R _G = 3Ω
Turn-On Rise Time	t _R	—	4.5	—		
Turn-Off Delay Time	t _{D(OFF)}	—	16.2	—		
Turn-Off Fall Time	t _F	—	3.5	—		
Body Diode Reverse Recovery Time	t _{RR}	—	30.6	—	ns	I _F = 20A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	28.1	—	nC	

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

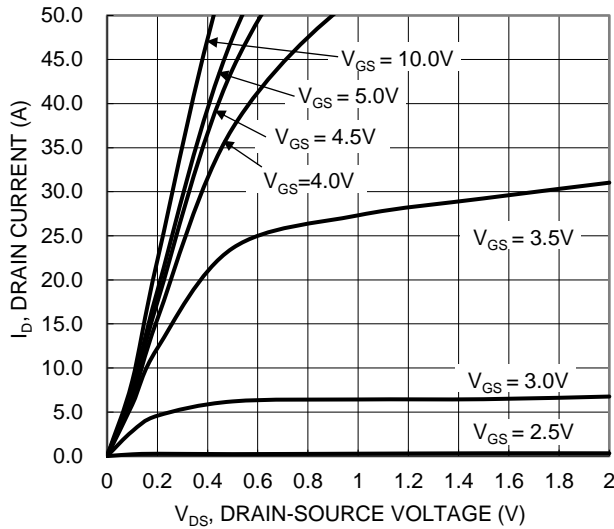


Figure 1. Typical Output Characteristic

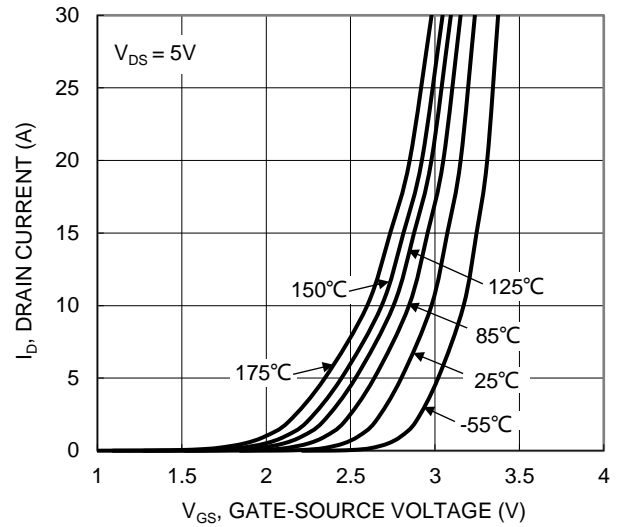


Figure 2. Typical Transfer Characteristic

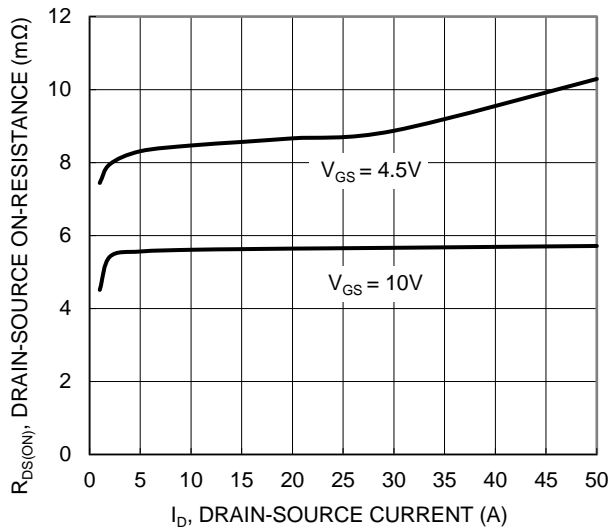


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

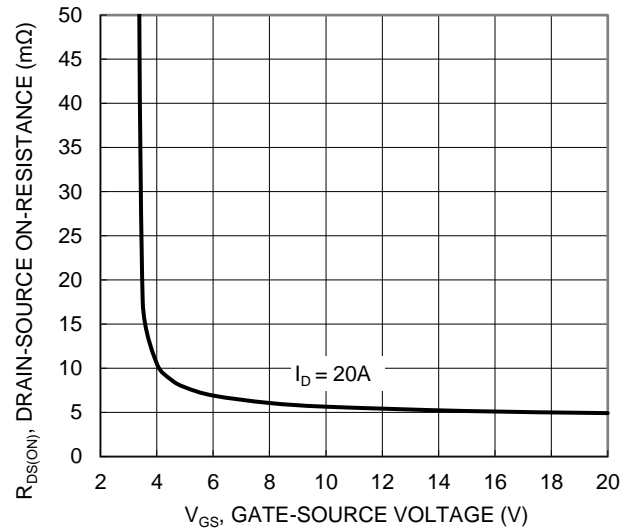


Figure 4. Typical Transfer Characteristic

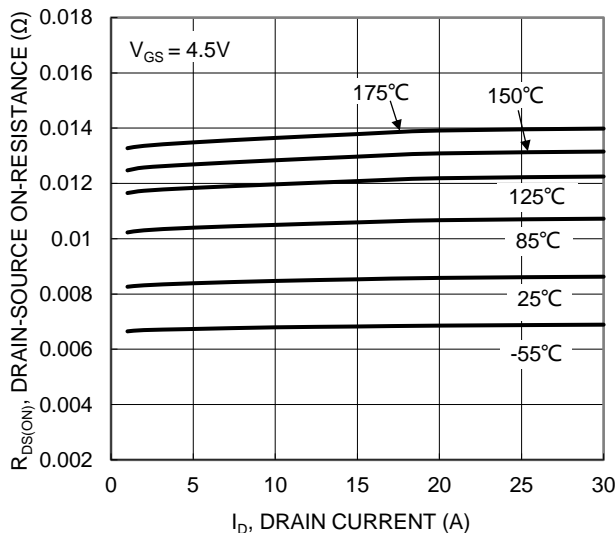


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

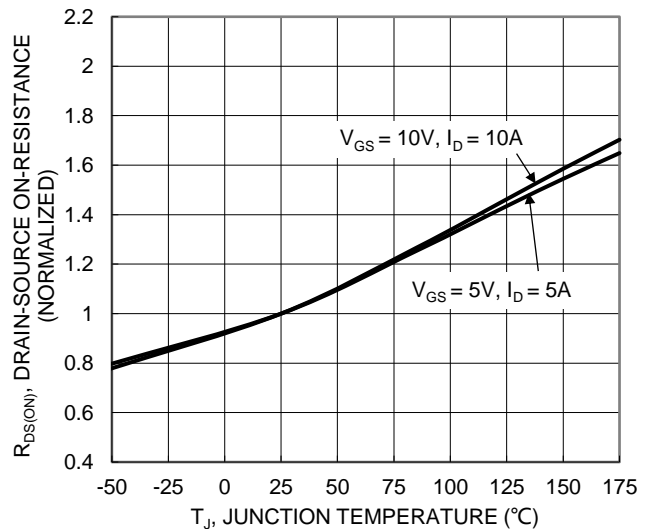
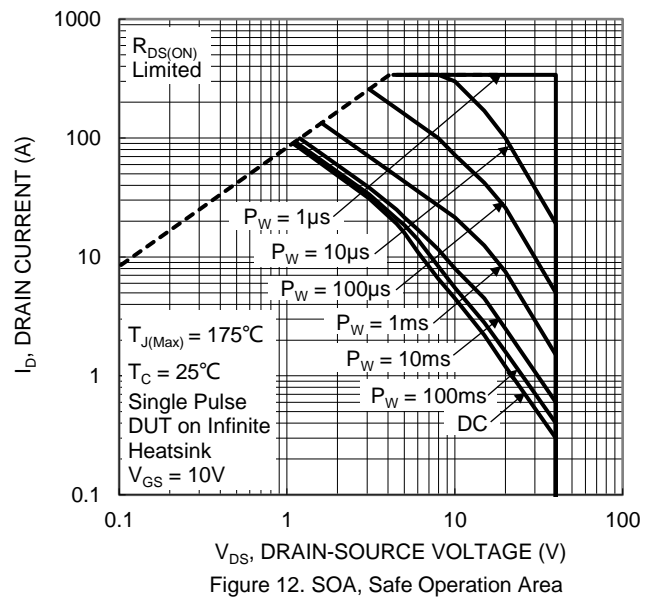
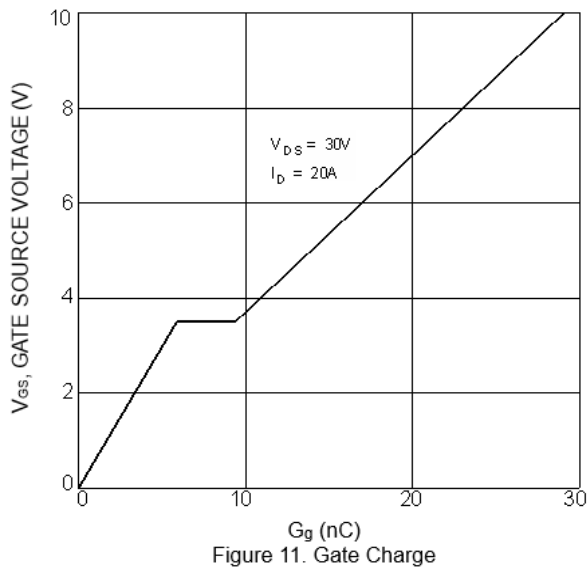
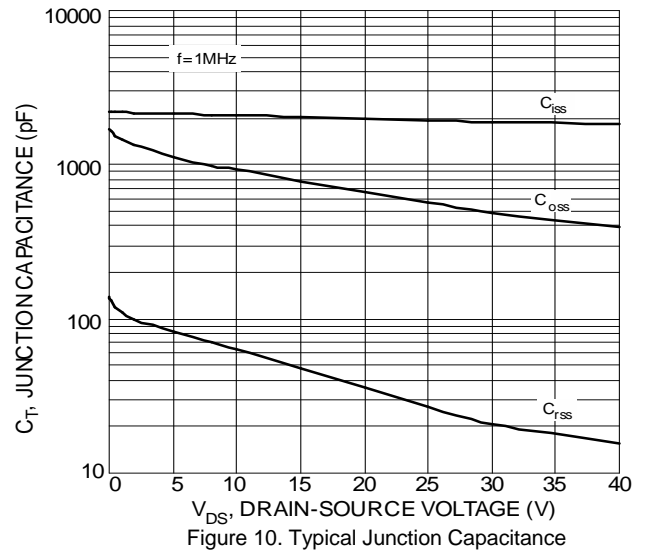
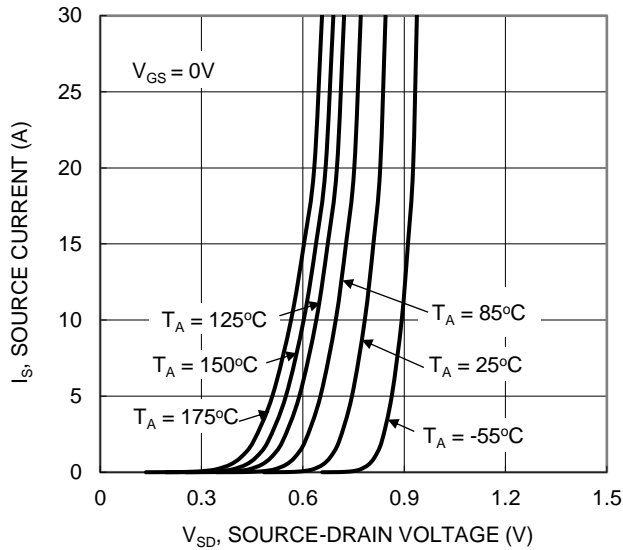
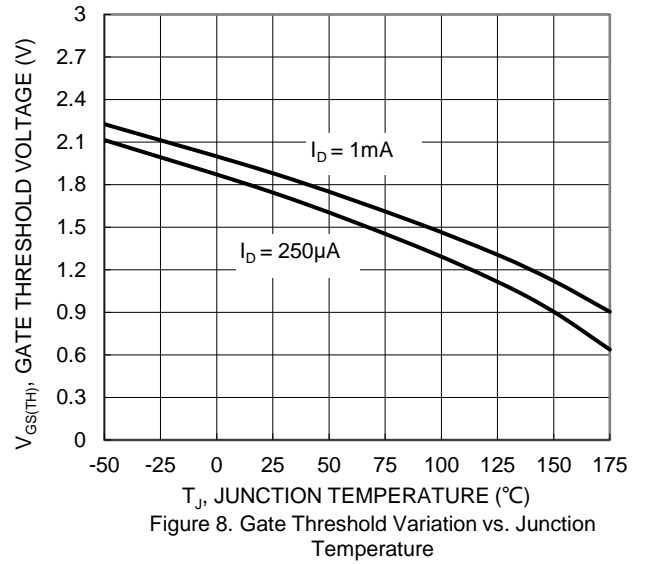
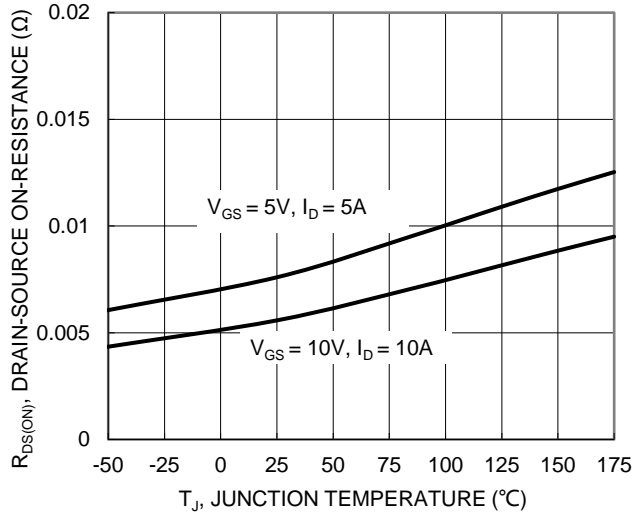


Figure 6. On-Resistance Variation with Temperature



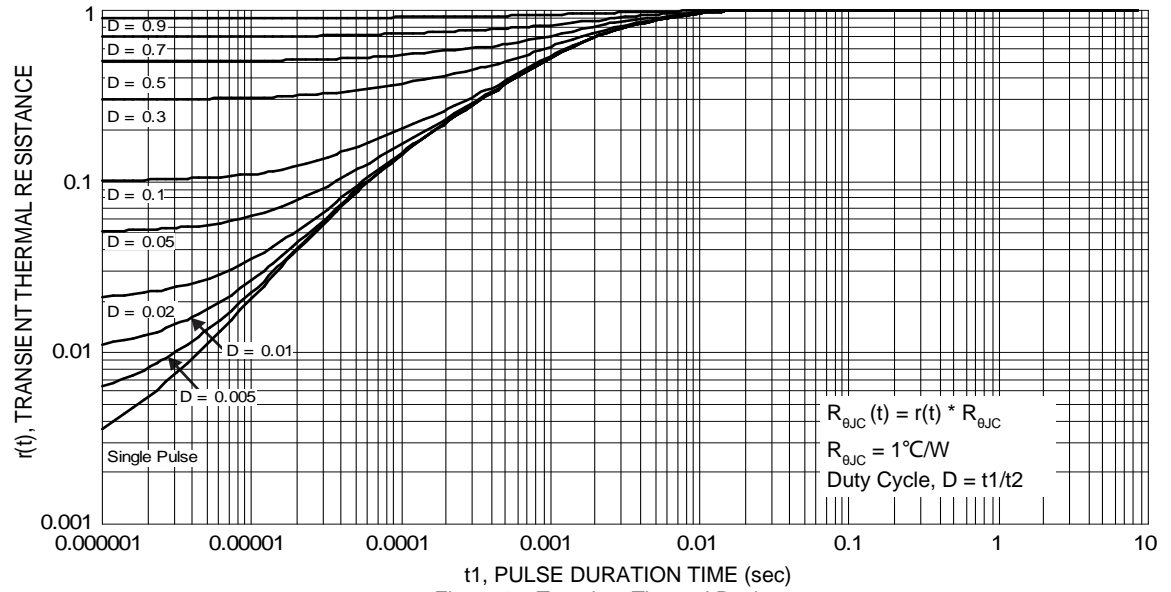
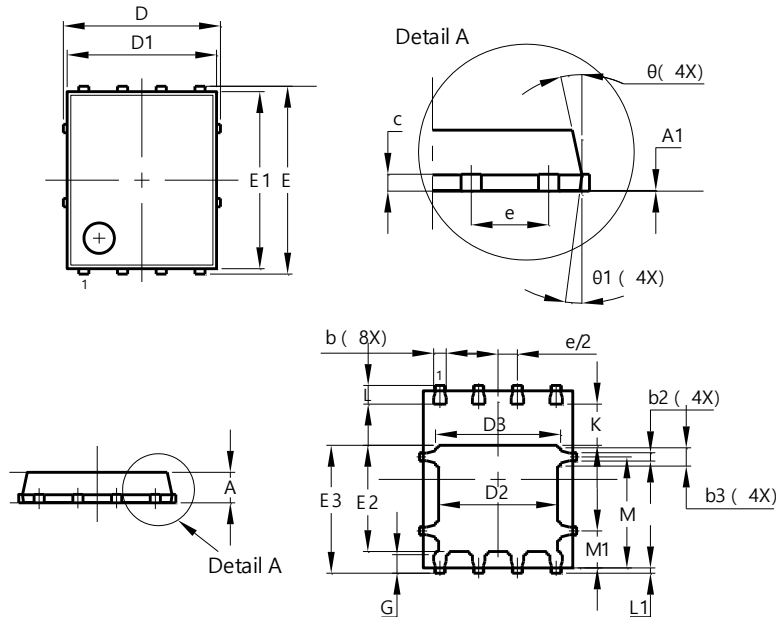


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8

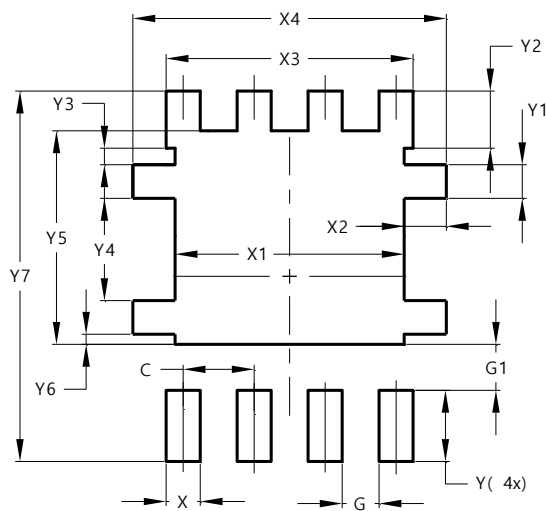


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	—
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
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	10°	12°	11°
$\theta 1$	6°	8°	7°
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI5060-8



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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