

Product Summary

BV_{DSS}	$R_{DS(ON) \max}$	I_D $T_C = +25^\circ C$
-40V	10mΩ @ $V_{GS} = -10V$	-50A
	14mΩ @ $V_{GS} = -4.5V$	-40A

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:

- Reverse Polarity Protection
- BLDC Motor Control
- Power Management Functions

Features and Benefits

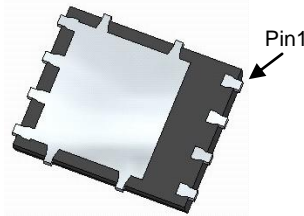
- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production Low On-resistance
- Fast Switching Speed
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**
- PPAP Capable (Note 4)**

Mechanical Data

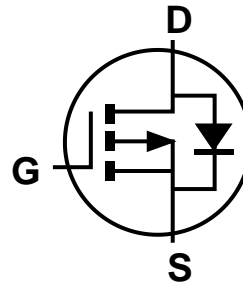
- Case: PowerDI[®] 5060-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – 100% Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.097 grams (Approximate)



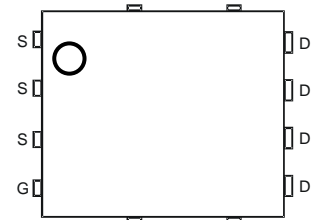
Top View



Bottom View



Internal Schematic



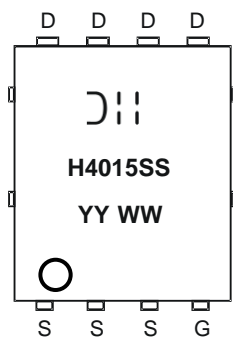
Top View
Pin Configuration

Ordering Information (Note 5)

Part Number	Case	Packaging
DMPH4015SPSQ-13	PowerDI5060-8	2,500 / Tape & Reel

- Notes:
- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - Automotive products are AEC-Q101 qualified and are PPAP capable. Please refer to <https://www.diodes.com/quality/>.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



- = Manufacturer's Marking
- H4015SS = Product Type Marking Code
- YYWW = Date Code Marking
- YY = Year (ex: 18 = 2018)
- WW = Week (01 to 53)

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}	±25	V	
Continuous Drain Current V _{GS} = -10V (Note 7)	I _D	T _C = +25°C	-50	A
		T _C = +100°C	-35	A
Continuous Drain Current V _{GS} = -10V (Note 6)	I _D	T _A = +25°C	-12.0	A
		T _A = +100°C	-9.0	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	-100	A	
Maximum Body Diode Continuous Current (Note 8)	I _S	-50	A	
Avalanche Current (Note 9) L = 1mH	I _{AS}	-22	A	
Avalanche Energy (Note 9) L = 1mH	E _{AS}	260	mJ	

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P _D	1.5	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	98	°C/W
Total Power Dissipation (Note 7)	P _D	2.6	W
Thermal Resistance, Junction to Ambient (Note 7)	R _{θJA}	57.0	°C/W
Thermal Resistance, Junction to Case (Note 8)	R _{θJC}	0.9	°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 10)						
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	V _{GS} = 0V, I _D = -250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	µA	V _{DS} = -40V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±25V, V _{DS} = 0V
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(TH)}	-1.5	-2	-2.5	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	8	10	mΩ	V _{GS} = -10V, I _D = -9.8A
		—	11	14		V _{GS} = -4.5V, I _D = -9.8A
Diode Forward Voltage	V _{SD}	—	-0.7	-1	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{iss}	—	4234	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	1036	—		
Reverse Transfer Capacitance	C _{riss}	—	526	—		
Gate Resistance	R _g	—	7.8	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	42.7	—	nC	V _{DS} = -20V, I _D = -9.8A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	91	—		
Gate-Source Charge	Q _{gs}	—	14.2	—		
Gate-Drain Charge	Q _{gd}	—	13.5	—		
Turn-On Delay Time	t _{D(ON)}	—	13.2	—	ns	V _{GS} = -10V, V _{DD} = -20V, R _G = 6Ω, I _D = -1A
Turn-On Rise Time	t _r	—	10	—		
Turn-Off Delay Time	t _{D(OFF)}	—	303	—		
Turn-Off Fall Time	t _f	—	138	—		
Reverse Recovery Time	t _{RR}	—	26	—	ns	I _F = -9.8A, di/dt = -100A/µs
Reverse Recovery Charge	Q _{RR}	—	20	—	nC	I _F = -9.8A, di/dt = -100A/µs

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

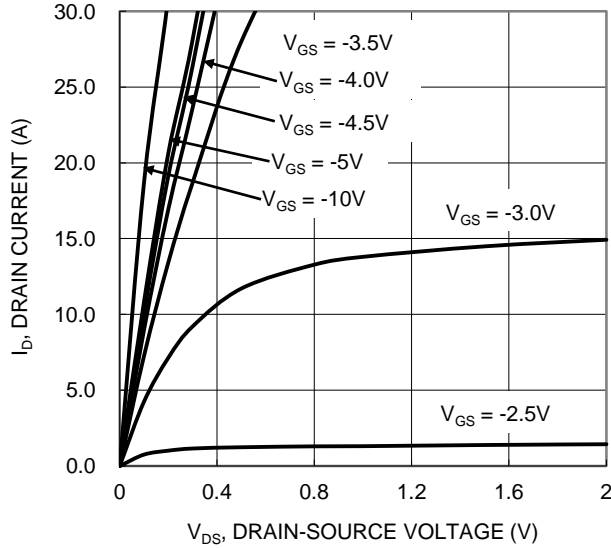


Figure 1. Typical Output Characteristic

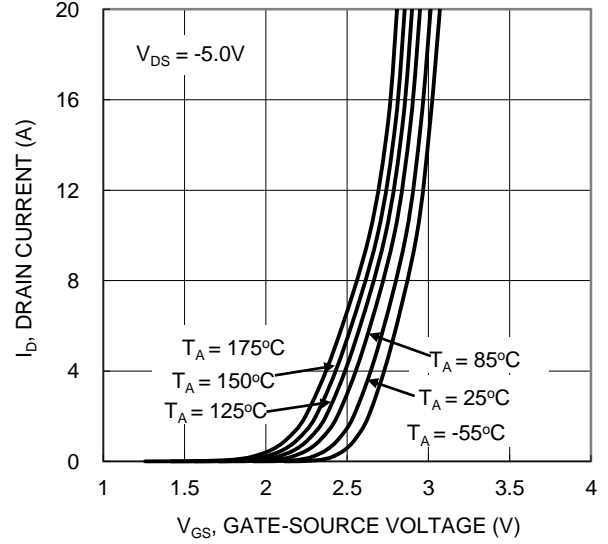


Figure 2. Typical Transfer Characteristic

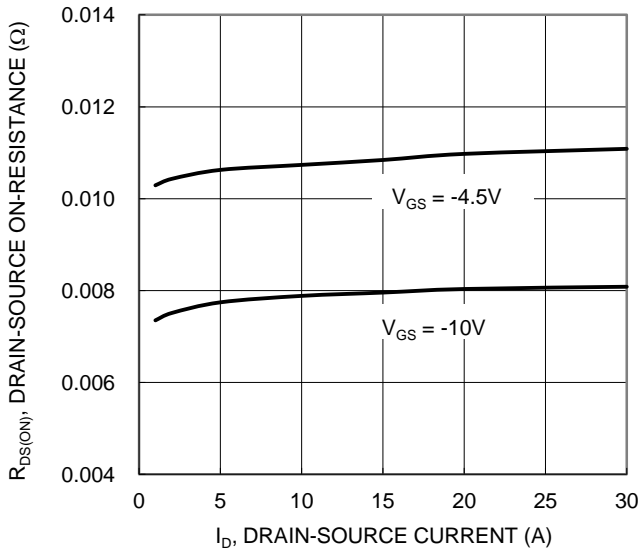


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

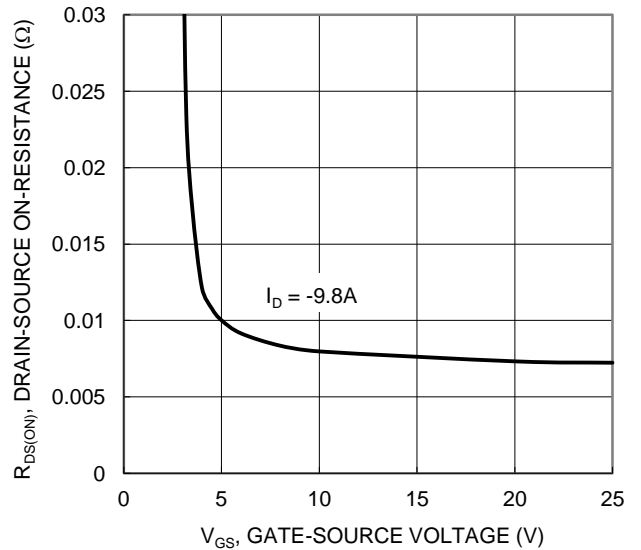


Figure 4. Typical Transfer Characteristic

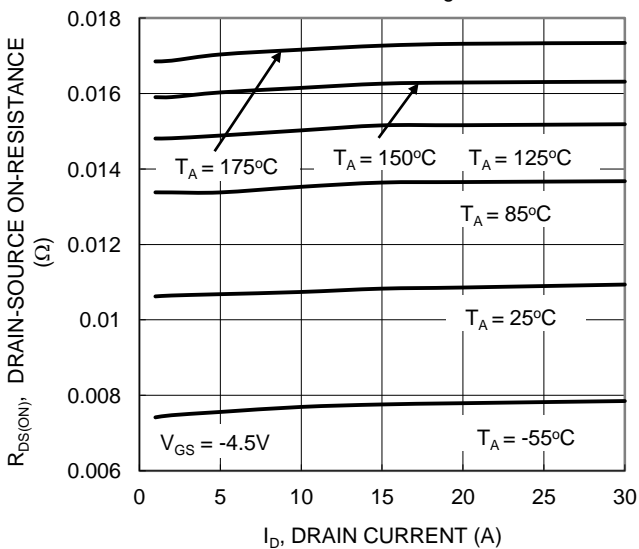


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

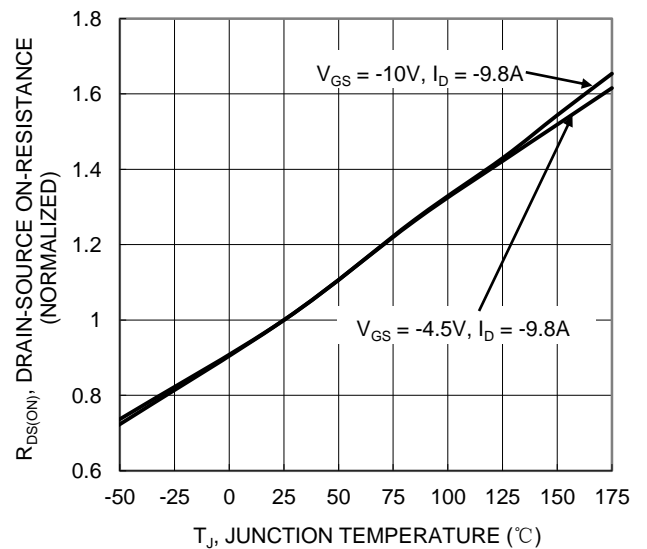
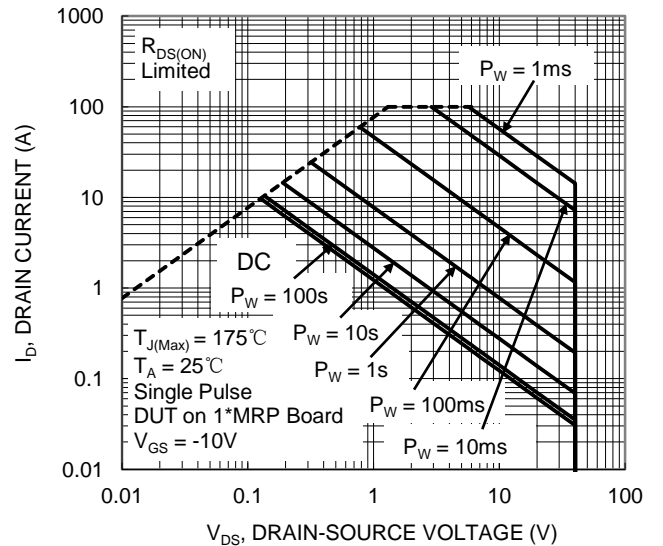
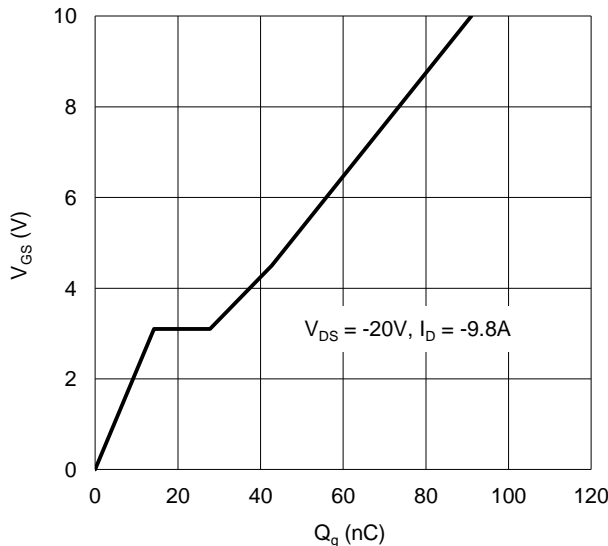
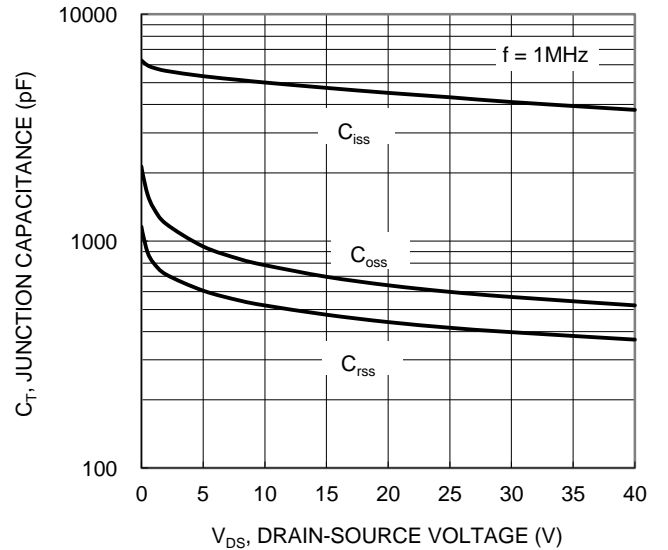
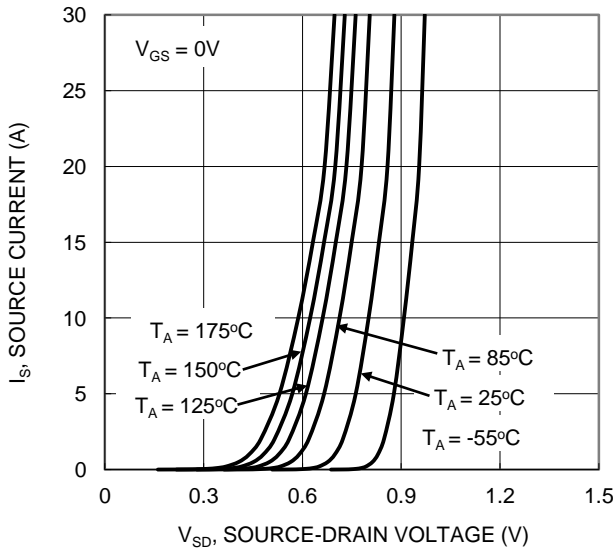
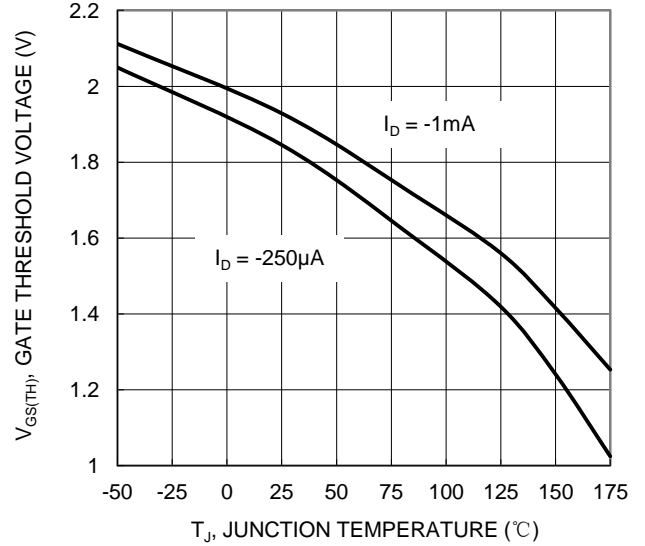
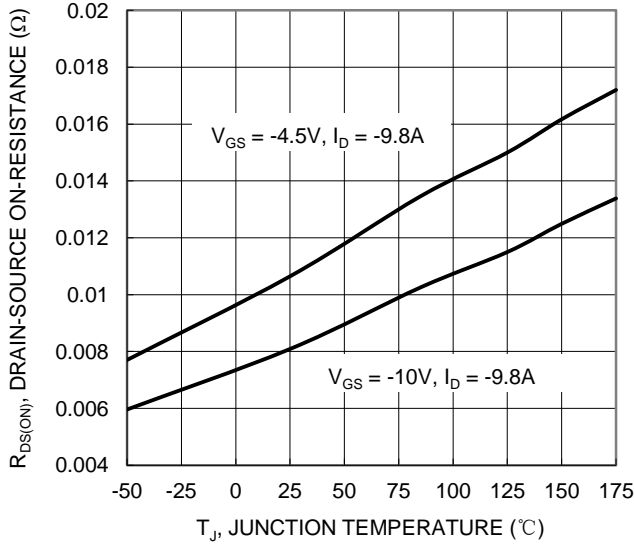


Figure 6. On-Resistance Variation with Temperature



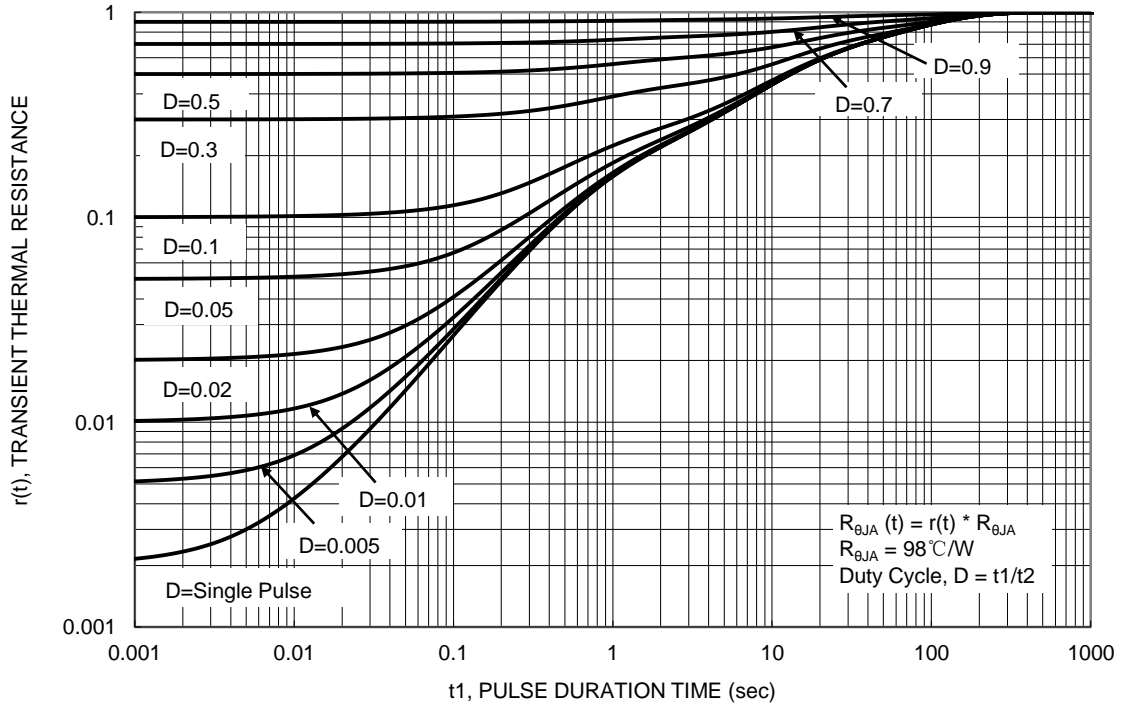
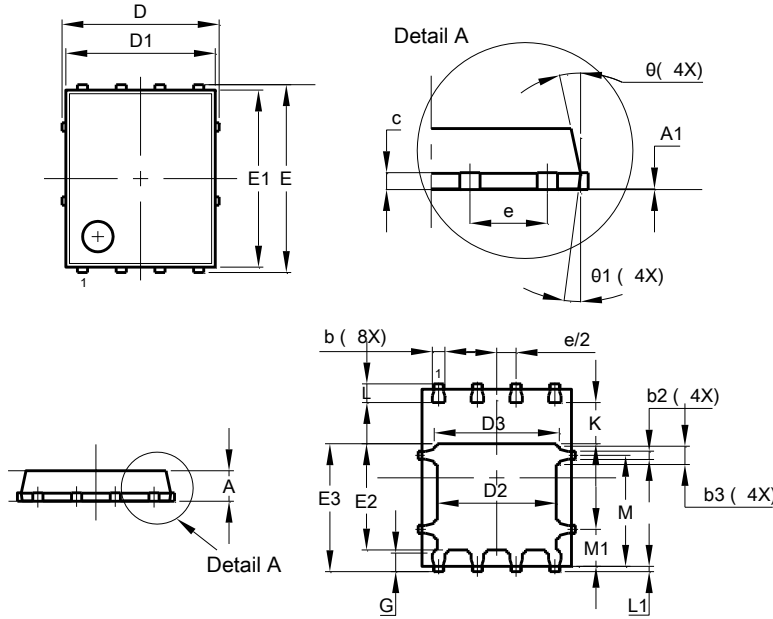


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8

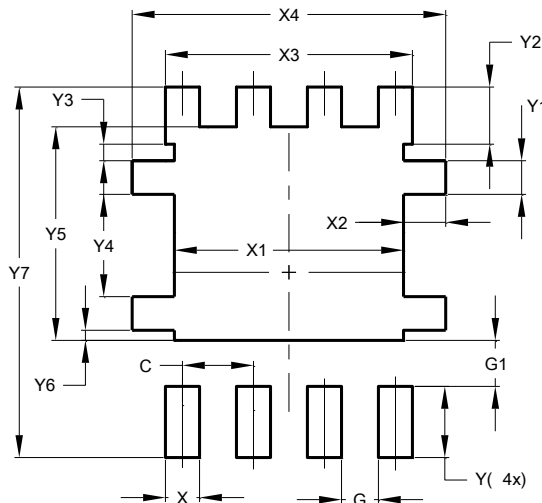


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	–
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
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
Theta	10°	12°	11°
Theta1	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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