

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
60V	23mΩ @ V _{GS} = 10V	55A
	28mΩ @ V _{GS} = 4.5V	48A

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:

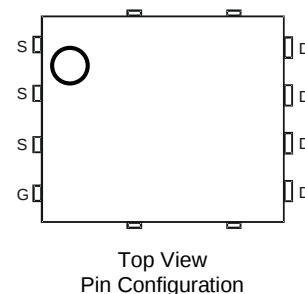
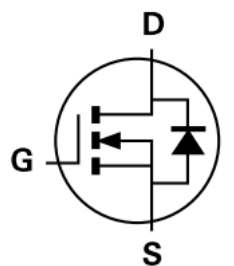
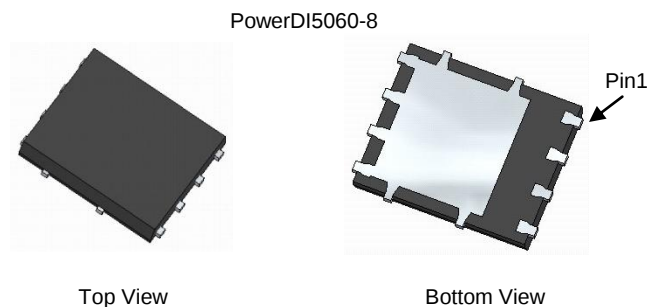
- Driving Solenoids
- Driving Relays
- Power Management Functions

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On-State Losses
- Low Input Capacitance
- 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: PowerDI5060-8
- 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 (E3)
- Weight: 0.097 grams (Approximate)

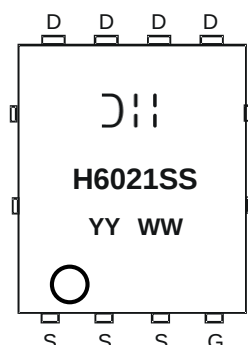


Ordering Information (Note 5)

Part Number	Case	Packaging
DMNH6021SPSQ-13	PowerDI5060-8	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. Automotive products are AEC-Q101 qualified and are PPAP capable. 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>.

Marking Information



DII = Manufacturer's Marking
 H6021SS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 16 = 2016)
 WW = Week (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}	60	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current, V _{GS} = 10V (Note 8)	I _D	55 39	A
Maximum Continuous Body Diode Forward Current (Note 8)	I _S	55	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I _{DM}	88	A
Avalanche Current, L = 0.1mH (Note 9)	I _{AS}	35	A
Avalanche Energy, L = 0.1mH (Note 9)	E _{AS}	64	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P _D	1.6	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	96	°C/W
Total Power Dissipation (Note 7)	P _D	3.0	W
Thermal Resistance, Junction to Ambient (Note 7)	R _{θJA}	50	°C/W
Total Power Dissipation (Note 8)	P _D	53	W
Thermal Resistance, Junction to Case (Note 8)	R _{θJC}	1.5	°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}	60	-	-	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	-	-	1	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	-	-	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(TH)}	1	-	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	-	12	23	mΩ	V _{GS} = 10V, I _D = 12A
		-	18	28		V _{GS} = 4.5V, I _D = 12A
Diode Forward Voltage	V _{SD}	-	0.75	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{iss}	-	1,016	-	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	-	153	-		
Reverse Transfer Capacitance	C _{rss}	-	76.8	-		
Gate Resistance	R _g	-	2.5	-	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	-	9.5	-	nC	V _{DS} = 30V, I _D = 20A
Total Gate Charge (V _{GS} = 10V)	Q _g	-	19.7	-		
Gate-Source Charge	Q _{gs}	-	3.6	-		
Gate-Drain Charge	Q _{gd}	-	4.8	-		
Turn-On Delay Time	t _{D(ON)}	-	4.2	-	ns	V _{DD} = 30V, V _{GS} = 10V, I _D = 10A, R _g = 4.7Ω
Turn-On Rise Time	t _R	-	13	-		
Turn-Off Delay Time	t _{D(OFF)}	-	27.5	-		
Turn-Off Fall Time	t _F	-	15.3	-		
Body Diode Reverse Recovery Time	t _{RR}	-	20.8	-	ns	I _F = 20A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	-	13.9	-	nC	

- 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.

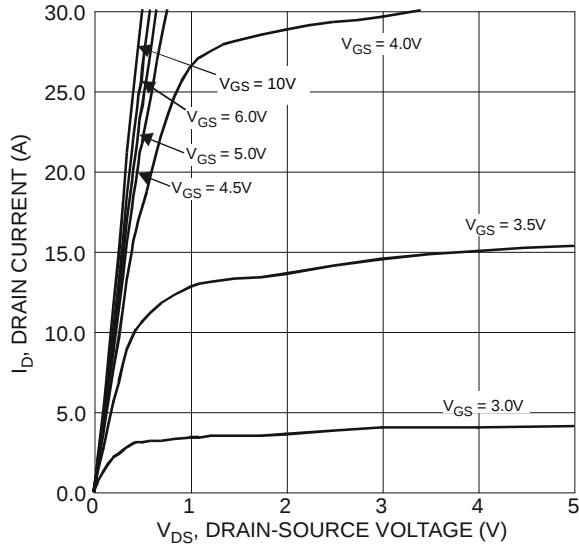


Figure 1 Typical Output Characteristics

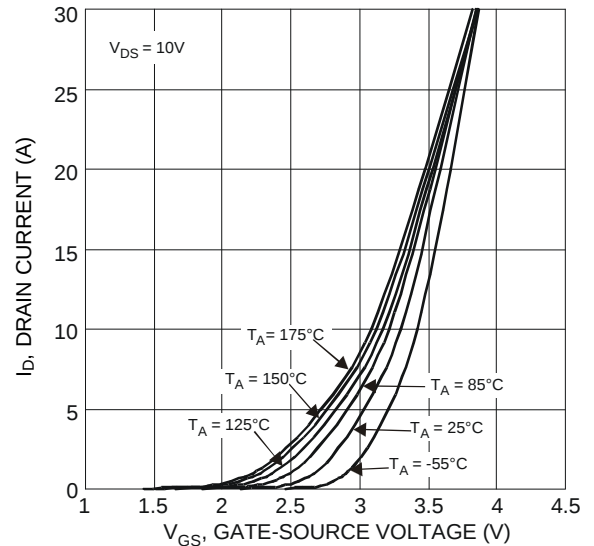


Figure 2 Typical Transfer Characteristics

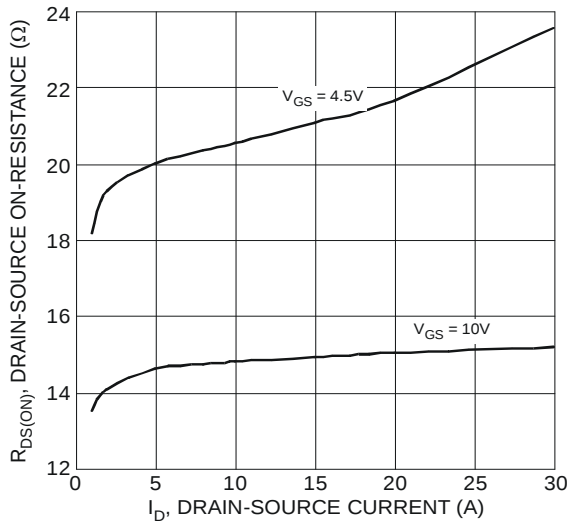


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

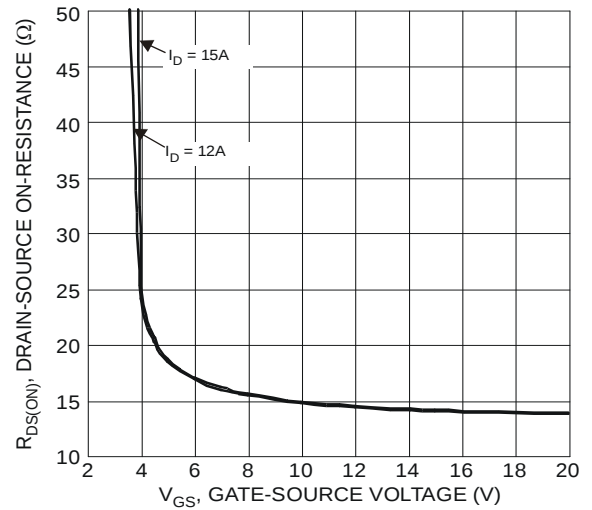


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

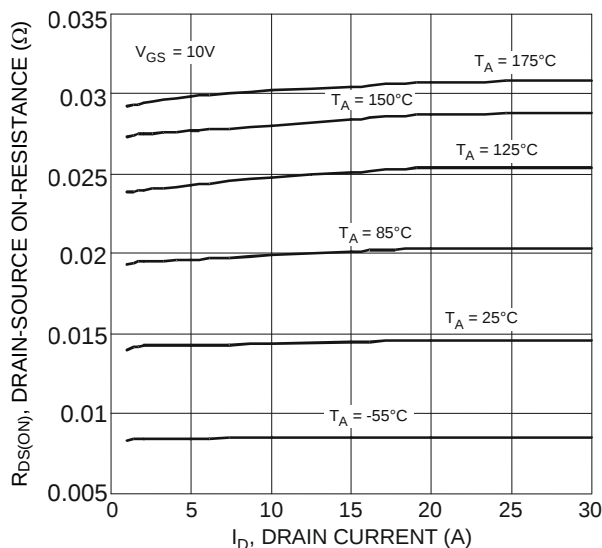


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

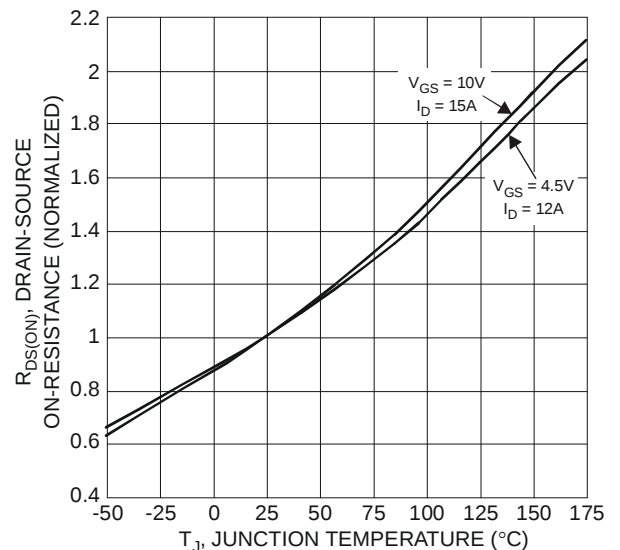
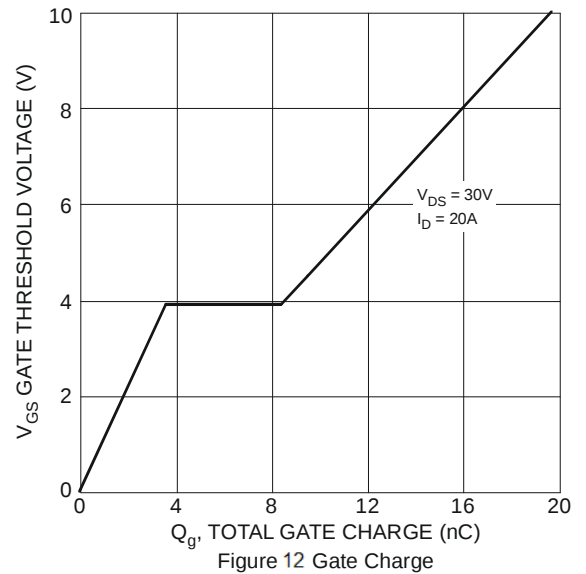
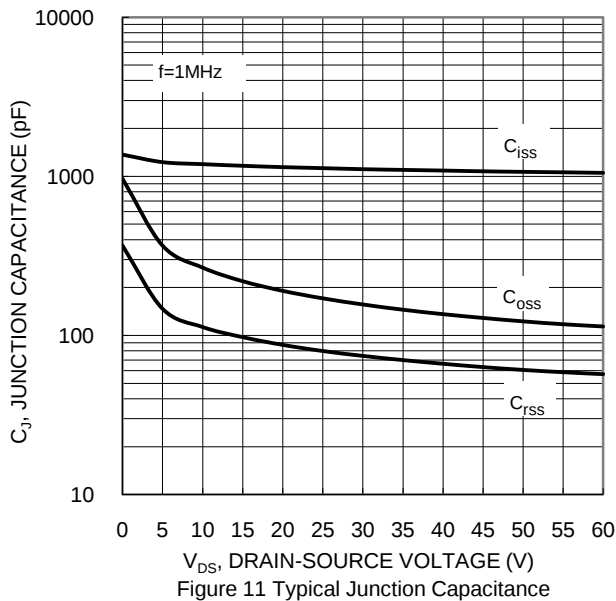
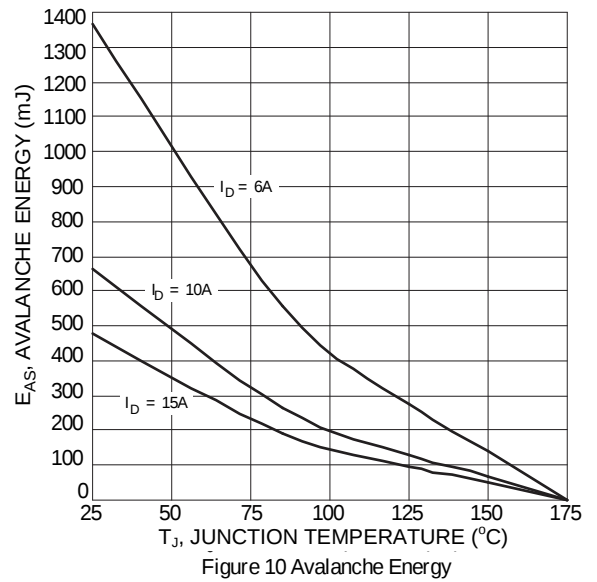
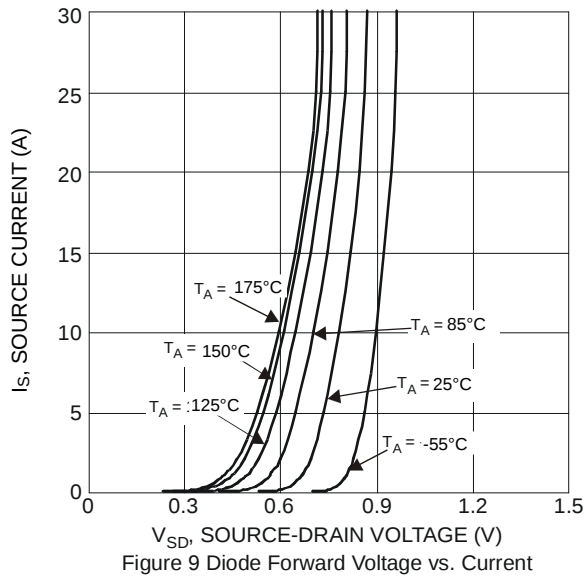
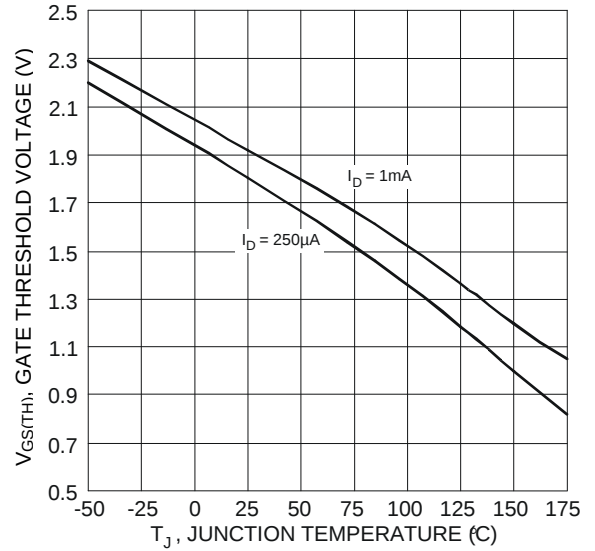
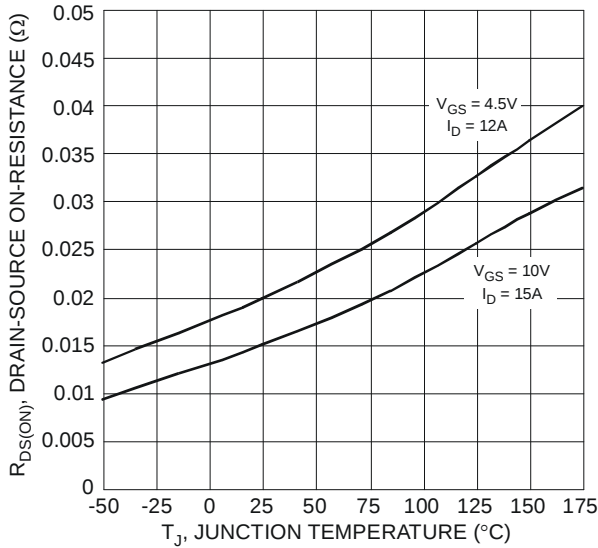


Figure 6 On-Resistance Variation with Temperature



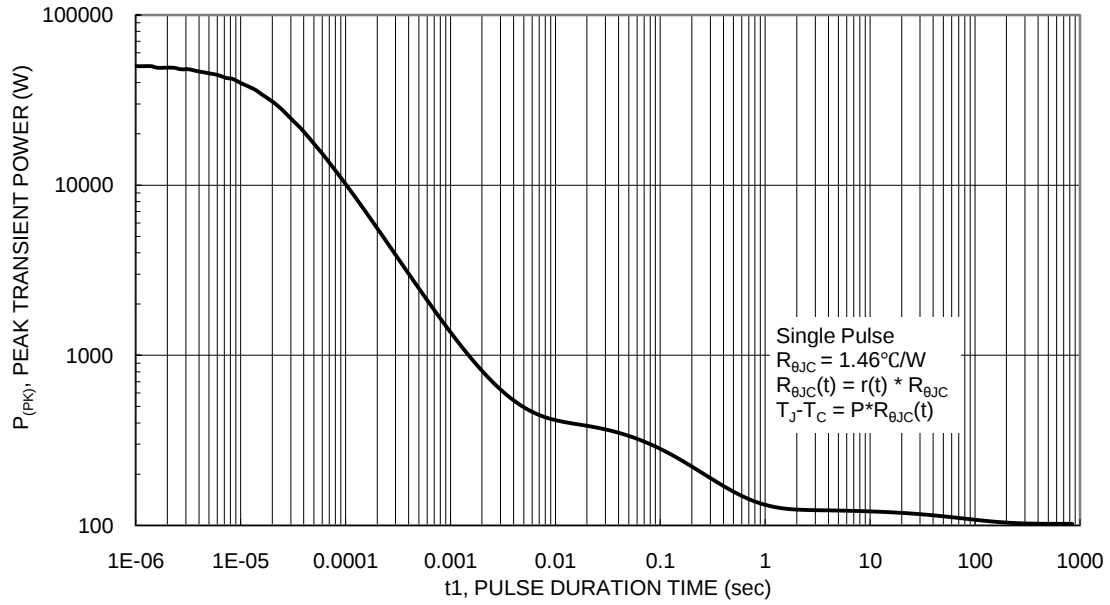


Figure 13 Single Pulse Maximum Power Dissipation

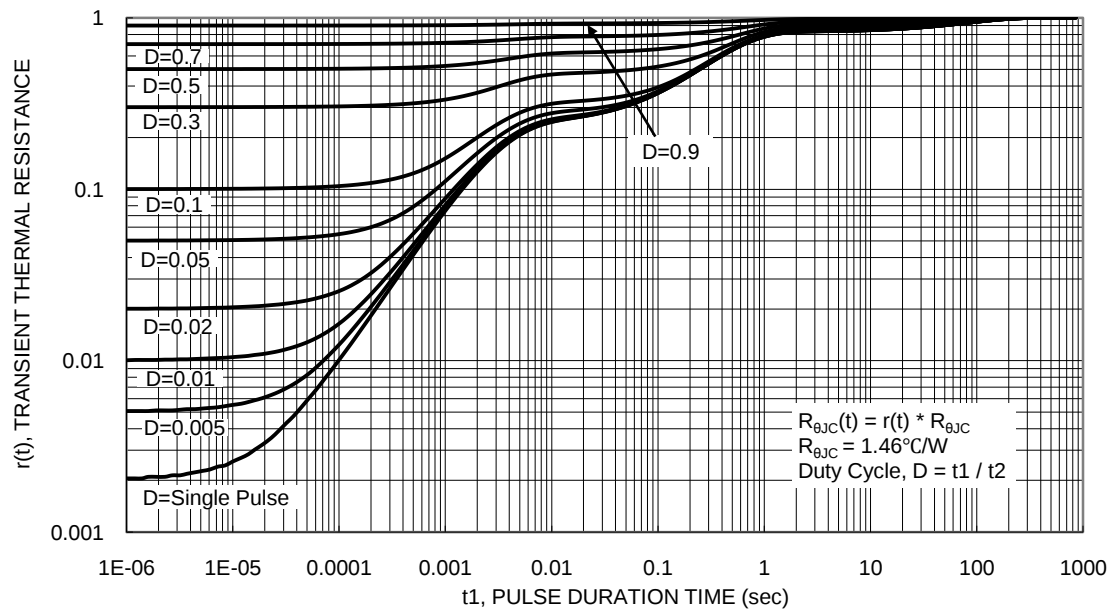
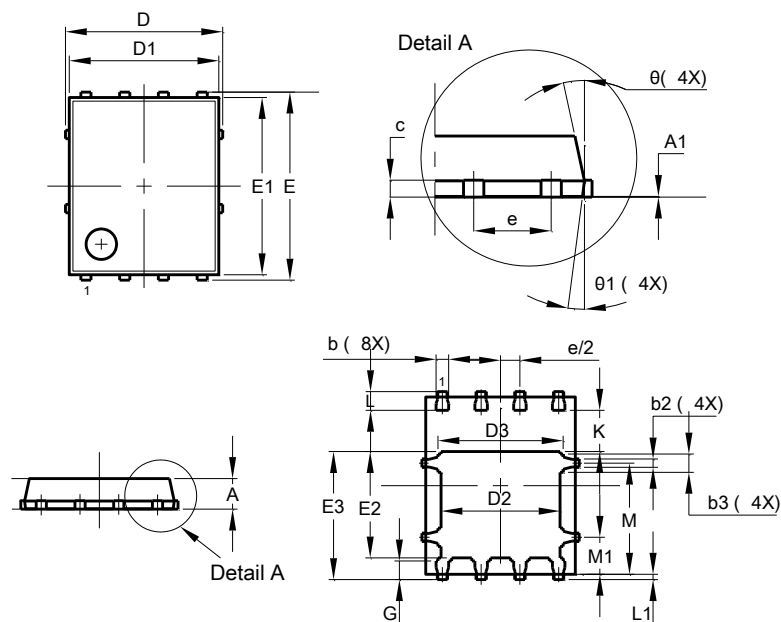


Figure 14 Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8

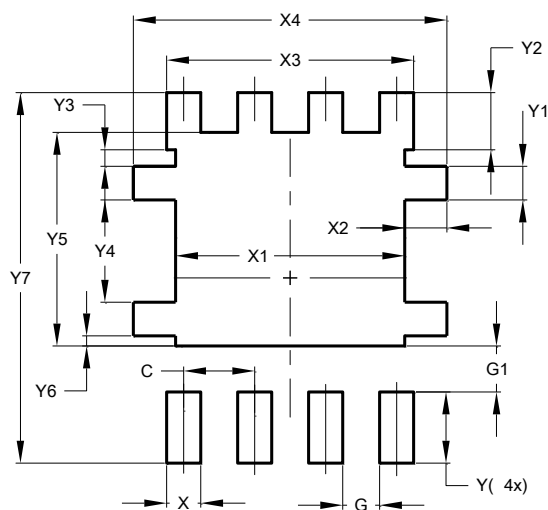


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	—
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
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°
θ1	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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