

Product Summary

BV _{DSS}	R _{DS(ON)} MAX	I _D MAX T _C = +25°C
-40V	10mΩ @ V _{GS} = -10V	-76A
	14mΩ @ V _{GS} = -4.5V	-58A

Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

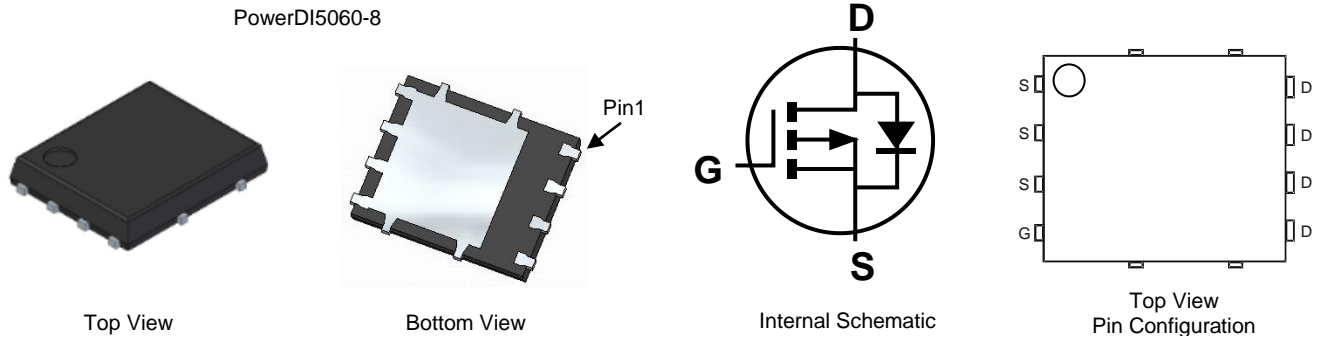
- DC-DC Converters
- Power Management Functions
- Analog Switch

Features and Benefits

- 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**
- **An Automotive-Complaint Part is Available Under Separate Datasheet ([DMP4011SPSQ](#))**

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 (E3)
- Weight: 0.097 grams (Approximate)

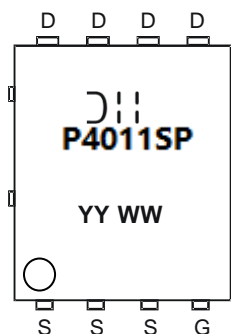


Ordering Information (Note 4)

Part Number	Case	Packaging
DMP4011SPS-13	PowerDI5060-8	2500 / 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



☺☺☺ = Manufacturer's Marking
 P4011SP = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 19 = 2019)
 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}	±20	V
Continuous Drain Current (Note 7) V _{GS} = -10V	Steady State	T _C = +25°C	-76	A
		T _C = +70°C	-61	
Continuous Drain Current (Note 6) V _{GS} = -10V	Steady State	T _A = +25°C	-11.7	A
		T _A = +70°C	-9.4	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I _{DM}	-300	A
Maximum Body Diode Continuous Current (Note 6)		I _S	-8.9	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)		I _{SM}	-300	A
Avalanche Current (Note 8) L = 1mH		I _{AS}	-22	A
Avalanche Energy (Note 8) L = 1mH		E _{AS}	250	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	1.3	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	96.4	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	2.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	55	°C/W
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	1.3	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
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} = -32V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-1.0	-2.0	-2.5	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	6	10	mΩ	V _{GS} = -10V, I _D = -9.8A
		—	10	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 10)						
Input Capacitance	C _{ISS}	—	2747	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{OSS}	—	508	—		
Reverse Transfer Capacitance	C _{RSS}	—	222	—		
Gate Resistance	R _g	—	21.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	25	—	nC	V _{DS} = -20V I _D = -9.8A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	52	—		
Gate-Source Charge	Q _{gs}	—	8.5	—		
Gate-Drain Charge	Q _{gd}	—	11.8	—		
Turn-On Delay Time	t _{D(ON)}	—	6.6	—	ns	V _{GS} = -10V, V _{DD} = -20V, R _g = 6Ω, I _D = -1A
Turn-On Rise Time	t _r	—	6.5	—		
Turn-Off Delay Time	t _{D(OFF)}	—	222	—		
Turn-Off Fall Time	t _f	—	138	—		
Reverse Recovery Time	t _{RR}	—	25	—	ns	I _F = -9.8A, di/dt = -100A/µs
Reverse Recovery Charge	Q _{RR}	—	17	—	nC	I _F = -9.8A, di/dt = -100A/µs

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

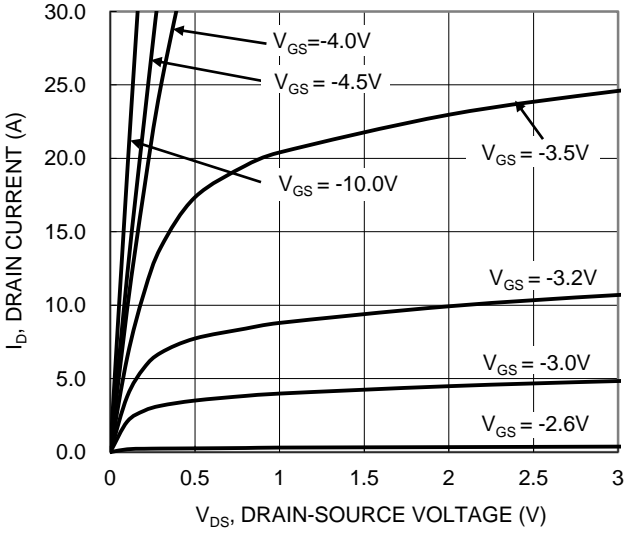


Figure 1. Typical Output Characteristic

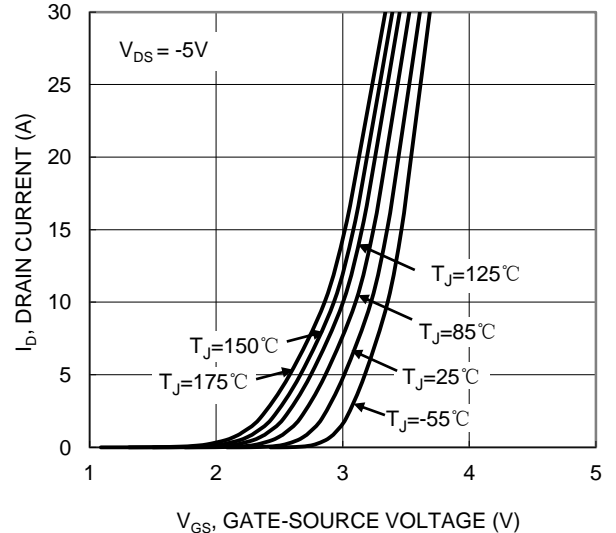


Figure 2. Typical Transfer Characteristic

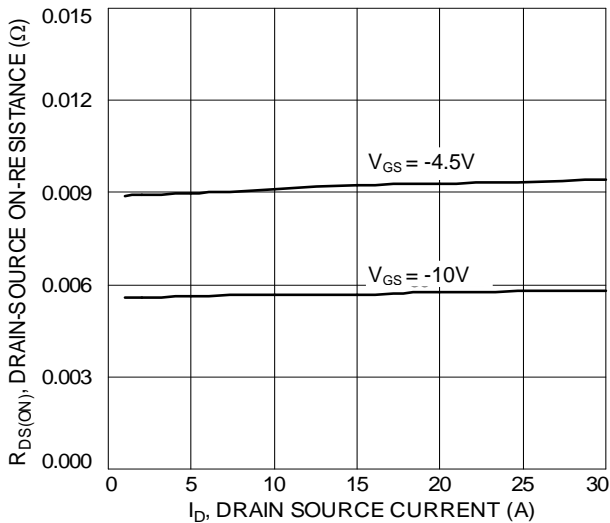


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

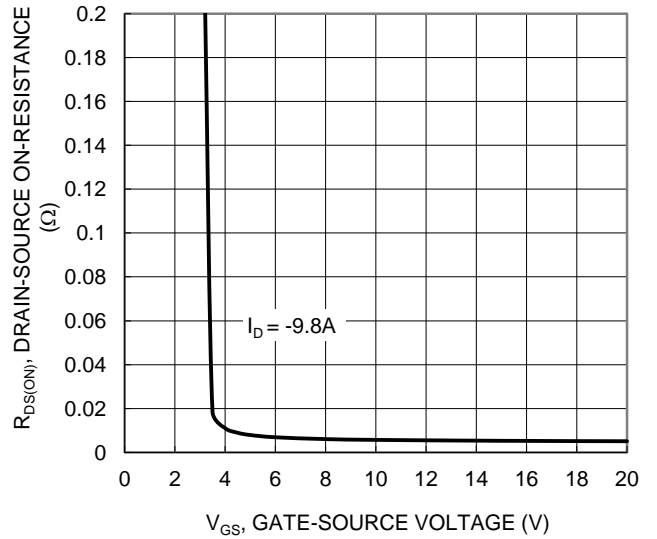


Figure 4. Typical Transfer Characteristic

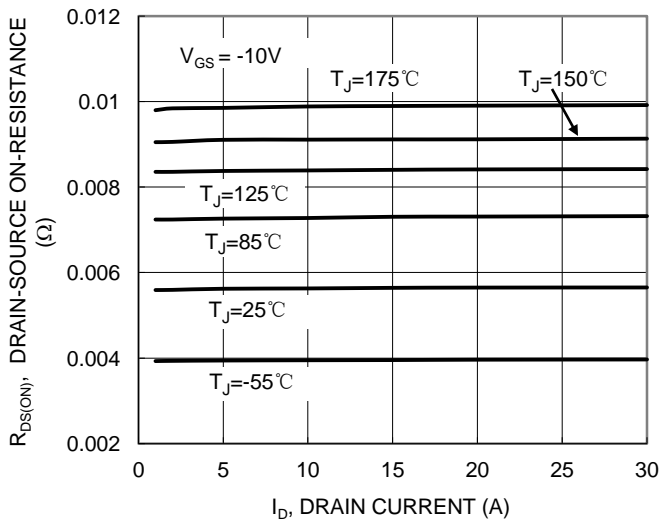


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

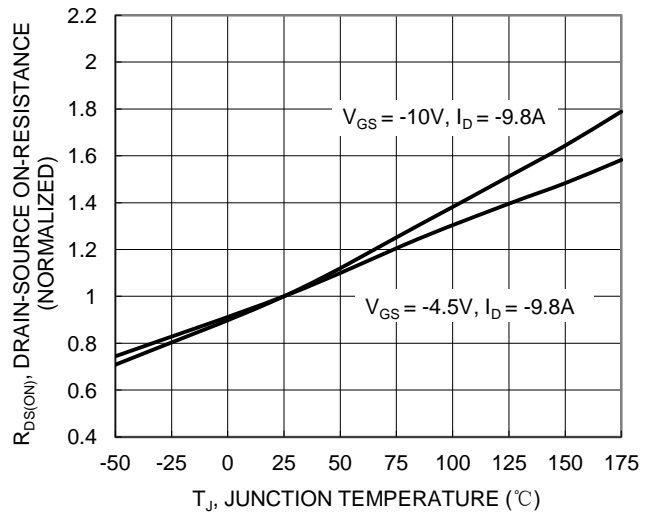
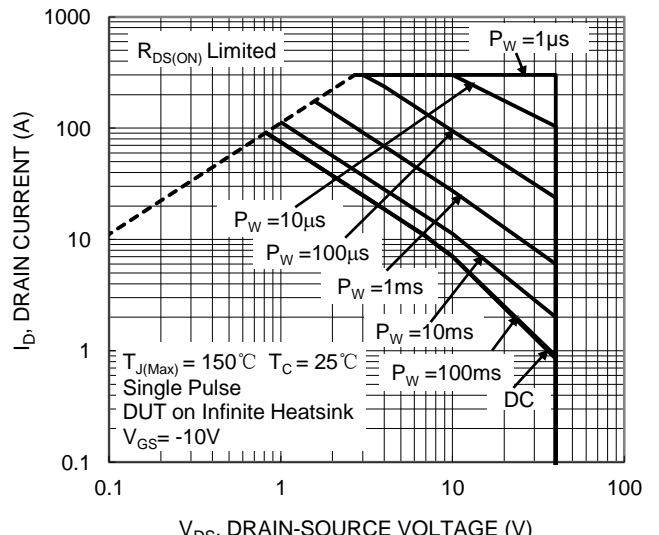
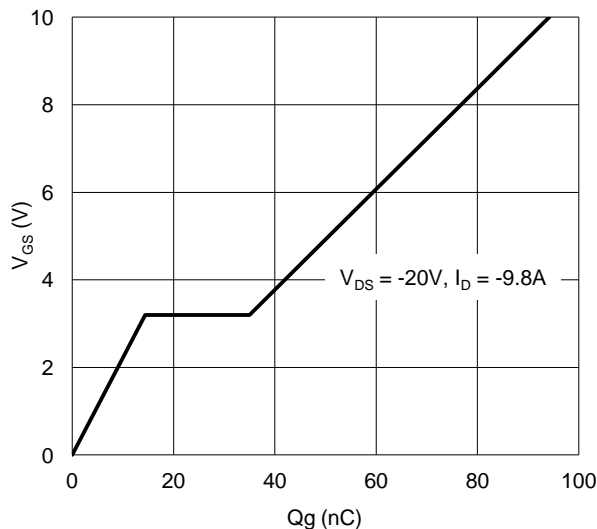
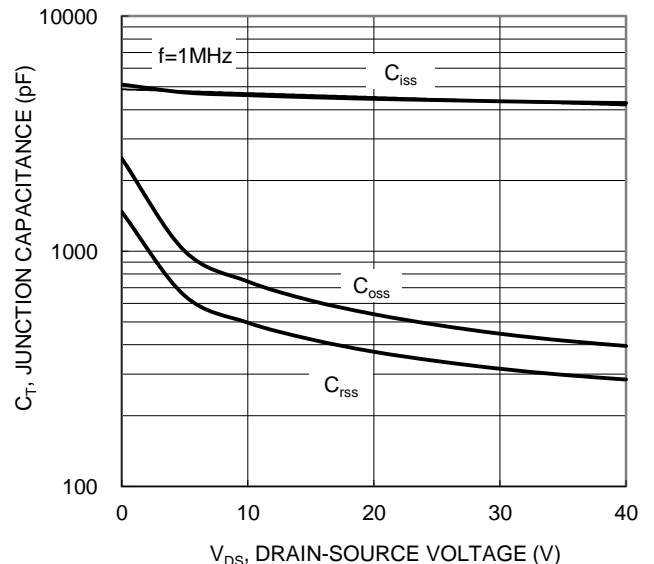
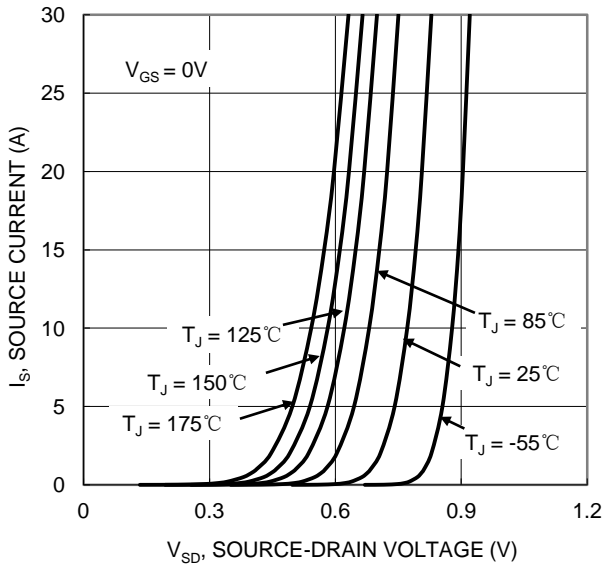
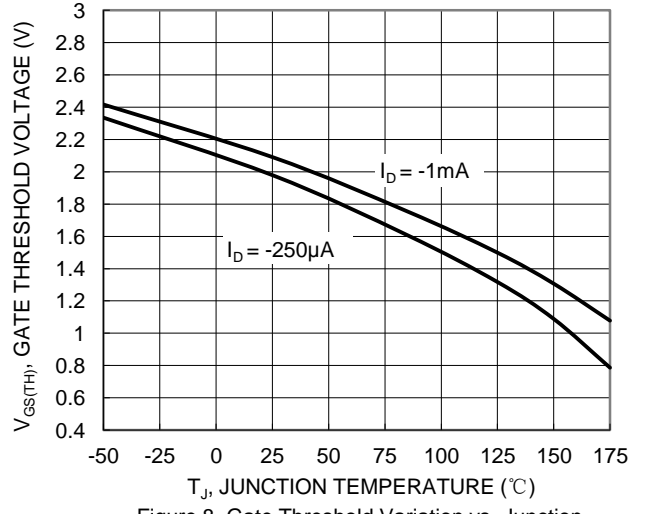
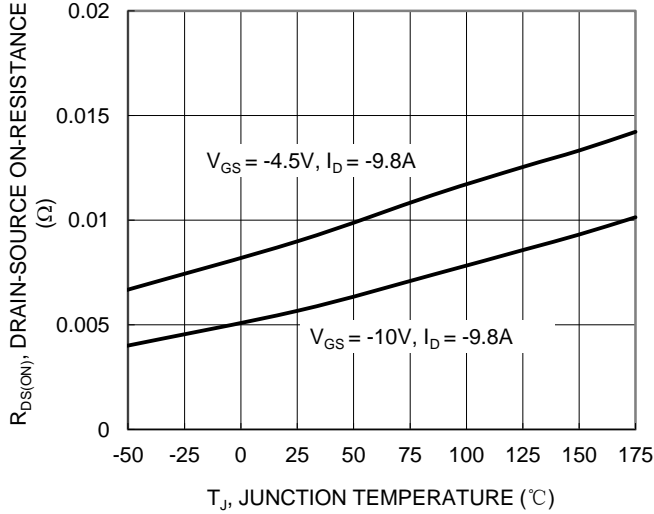


Figure 6. On-Resistance Variation with Temperature



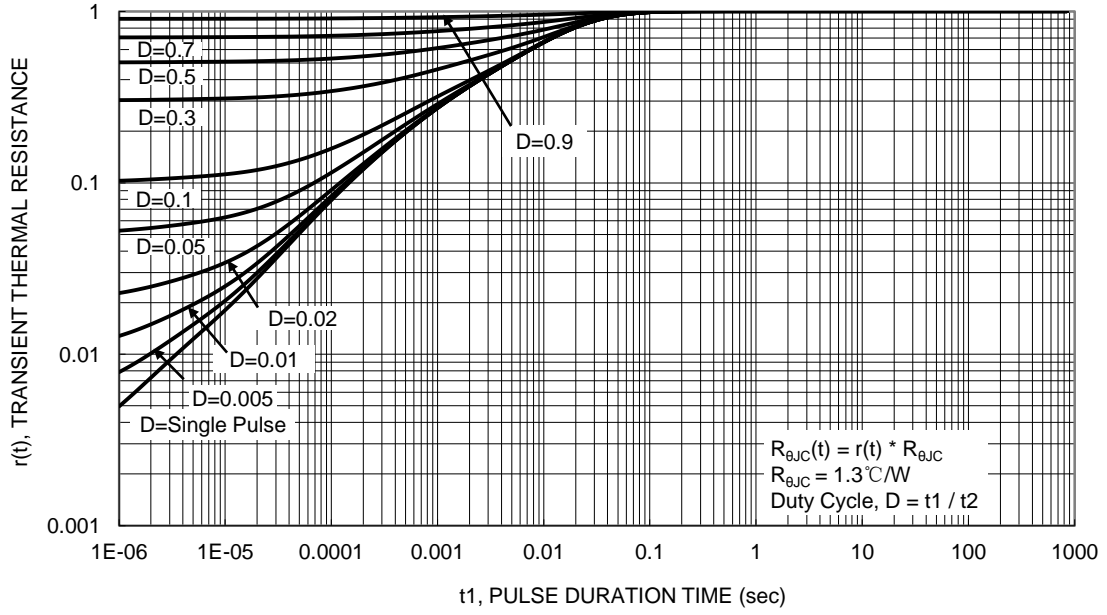
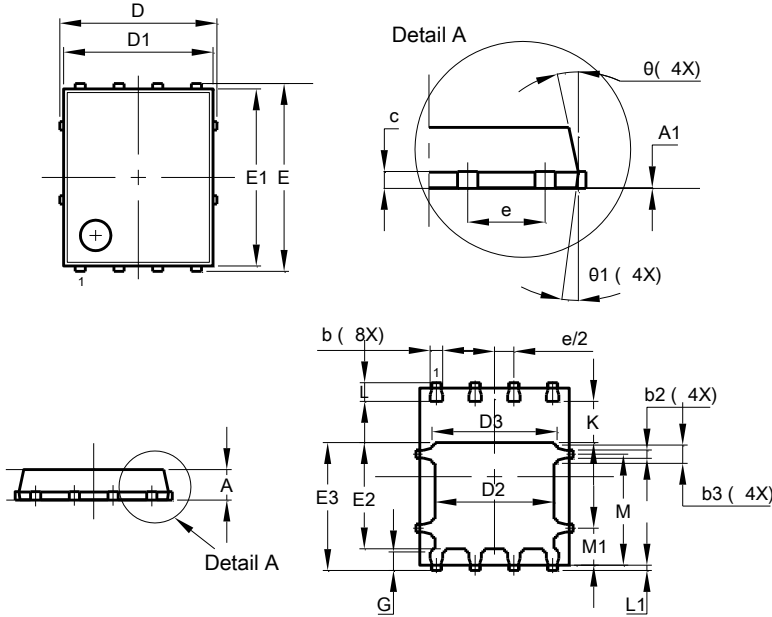


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8

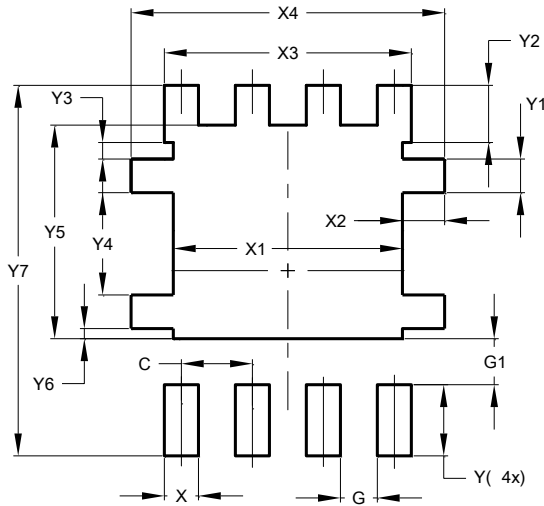


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	—
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61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