

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D T _A = +25°C
-40V	11mΩ @ V _{GS} = -10V	-11A
	15mΩ @ V _{GS} = -4.5V	-10A

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)**
- **The DIODES™ DMP4015SPSWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Description and Applications

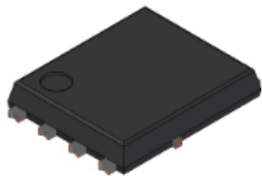
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC-DC converters
- Power management functions
- Analog switches

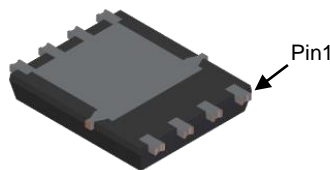
Mechanical Data

- Package: PowerDI[®]5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — 100% Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (A3)
- Weight: 0.097 grams (Approximate)

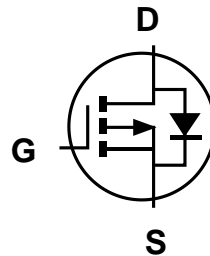
PowerDI5060-8 (SWP) (Type UX)



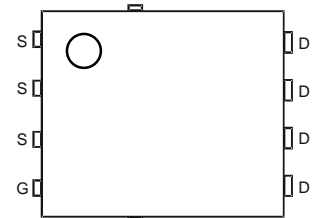
Top View



Bottom View



Internal Schematic



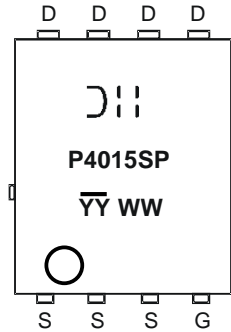
Top View
Pin Configuration

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP4015SPSWQ-13	PowerDI5060-8 (SWP) (Type UX)	2,500	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
 P4015SP = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 22 = 2022)
 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 (Note 5) V _{GS} = -10V	Steady State	T _A = +25°C T _A = +70°C	I _D	-8.5 -6.8	A
Continuous Drain Current (Note 6) V _{GS} = -10V	Steady State	T _A = +25°C T _A = +70°C	I _D	-11.0 -8.7	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-100	A
Maximum Body Diode Continuous Current (Note 6)			I _S	-11	A
Avalanche Current L = 1mH			I _{AS}	-22	A
Avalanche Energy L = 1mH			E _{AS}	242	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
	T _A = +70°C		0.8	
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	2.1	W
	T _A = +70°C		1.4	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	49	°C/W
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	1.6	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
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 8)						
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 _{D(S)ON}	—	7	11	mΩ	V _{GS} = -10V, I _D = -9.8A
		—	9	15		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 9)						
Input Capacitance	C _{iss}	—	4,234	—	pF	V _{DS} = -20V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	1,036	—		
Reverse Transfer Capacitance	C _{rss}	—	526	—		
Gate Resistance	R _G	—	7.77	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	47.5	—	nC	V _{DS} = -20V, V _{GS} = -5V, I _D = -9.8A
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, R _L = 20Ω
Turn-On Rise Time	t _R	—	10	—		
Turn-Off Delay Time	t _{D(OFF)}	—	302.7	—		
Turn-Off Fall Time	t _F	—	137.9	—		

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

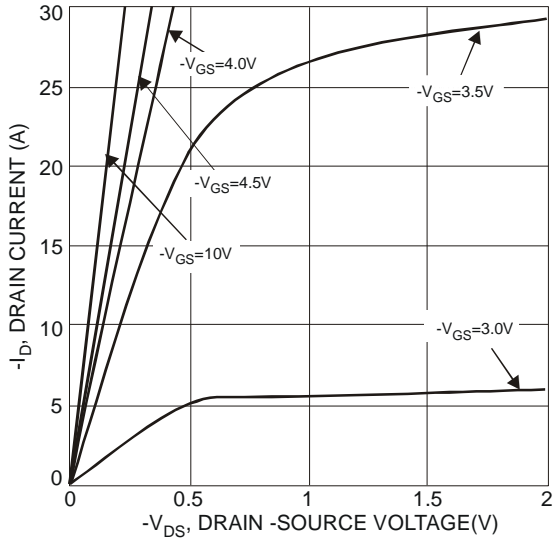


Figure 1. Typical Output Characteristics

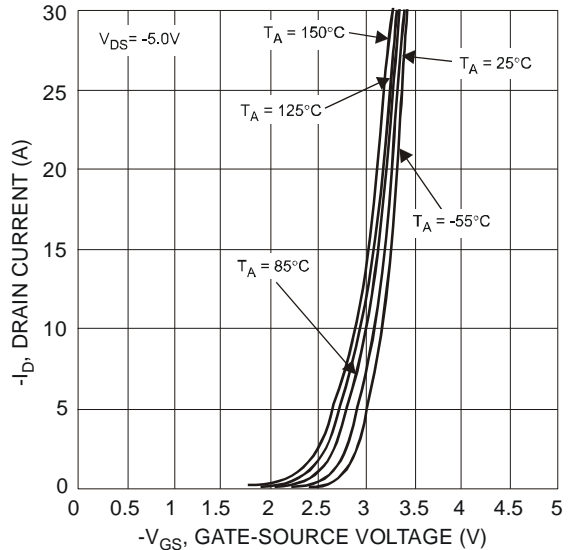


Figure 2. Typical Transfer Characteristics

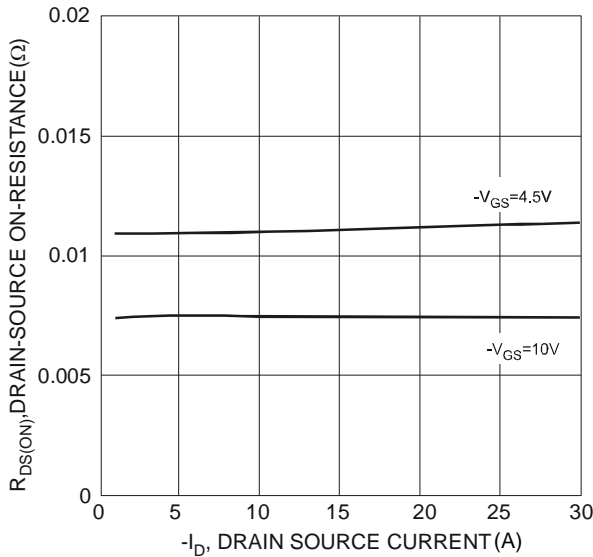


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

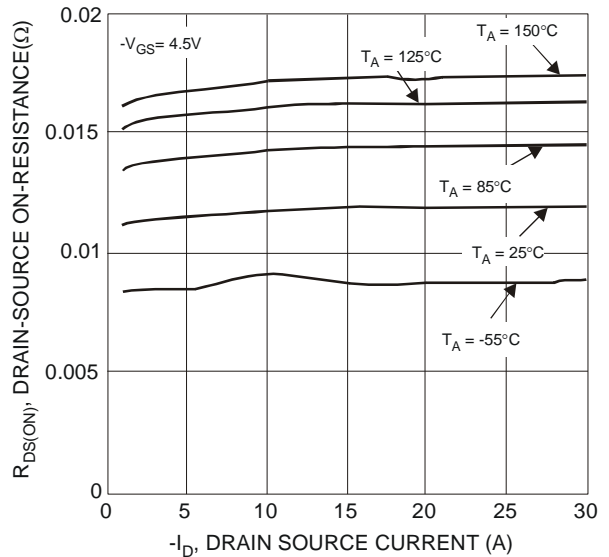


Figure 4. Typical On-Resistance vs. Drain Current and Temperature

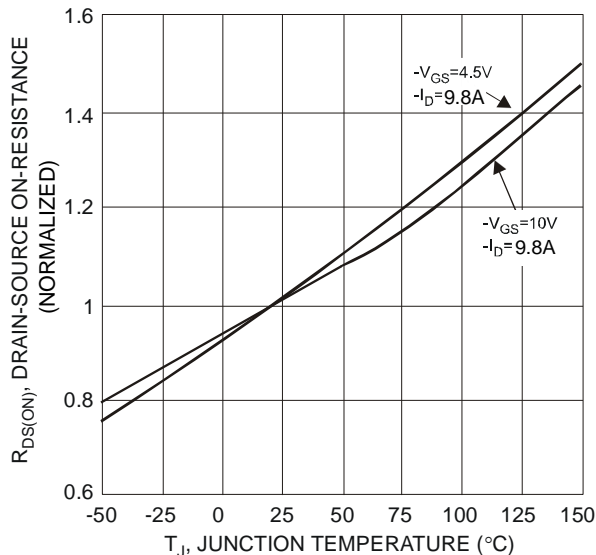


Figure 5. On-Resistance Variation with Temperature

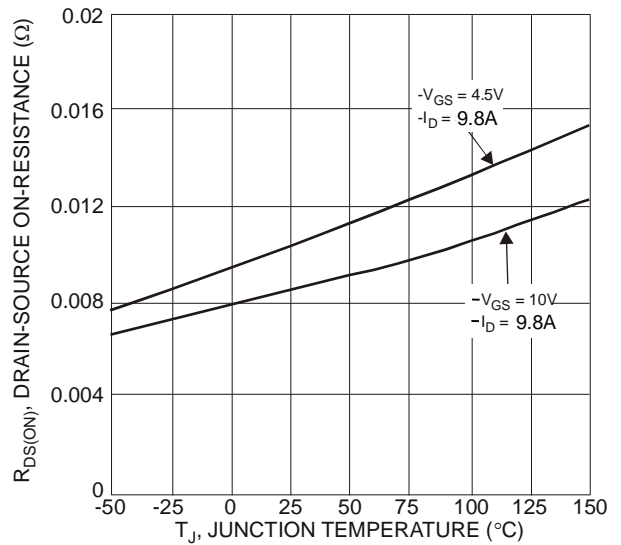


Figure 6. On-Resistance Variation with Temperature

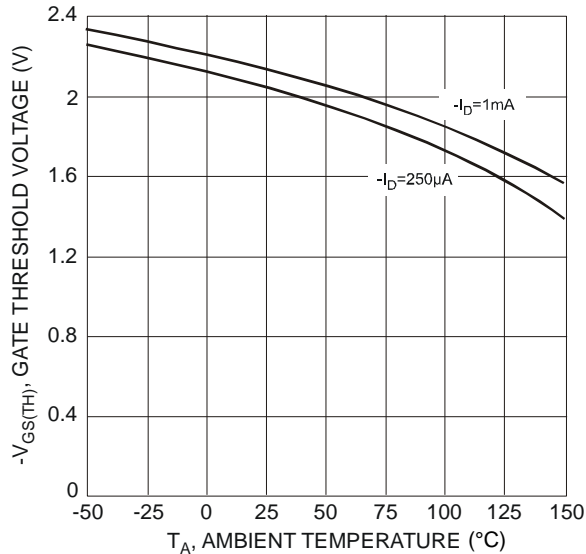


Figure 7. Gate Threshold Variation vs. Ambient Temperature

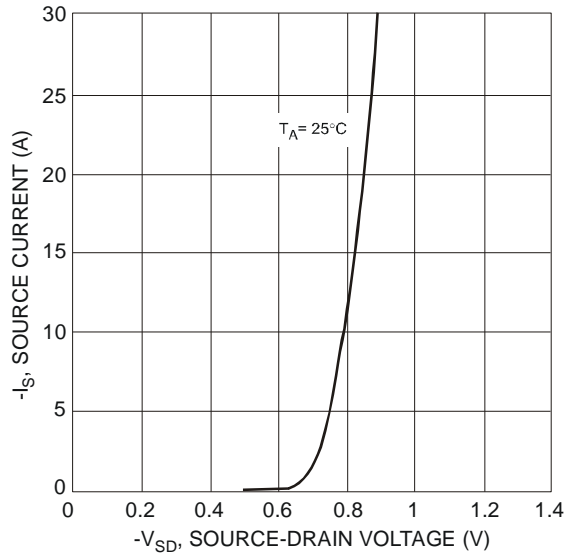


Figure 8. Diode Forward Voltage vs. Current

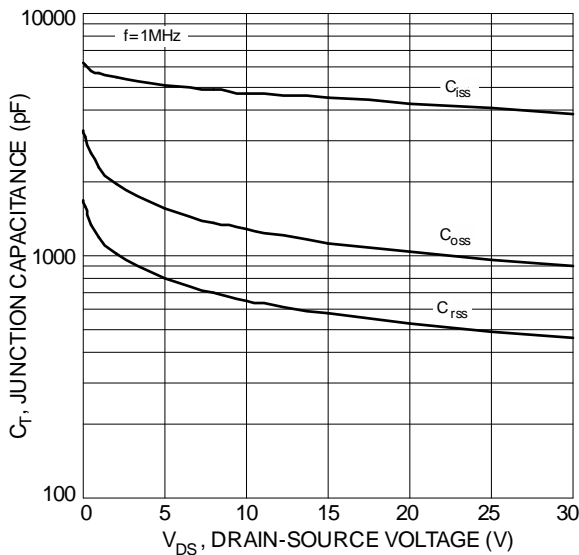


Figure 9. Typical Junction Capacitance

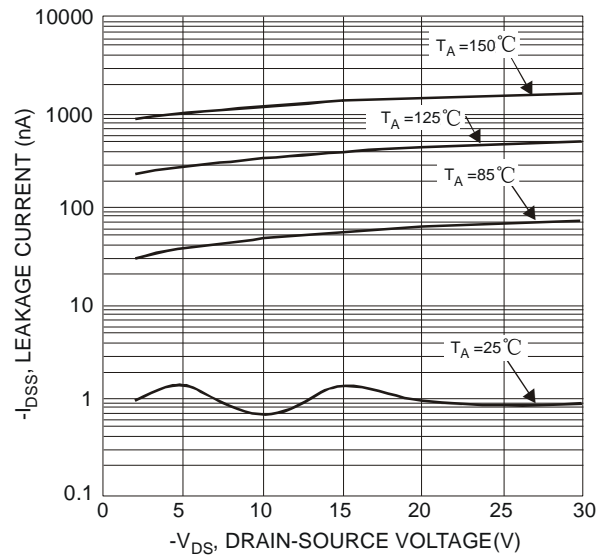


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

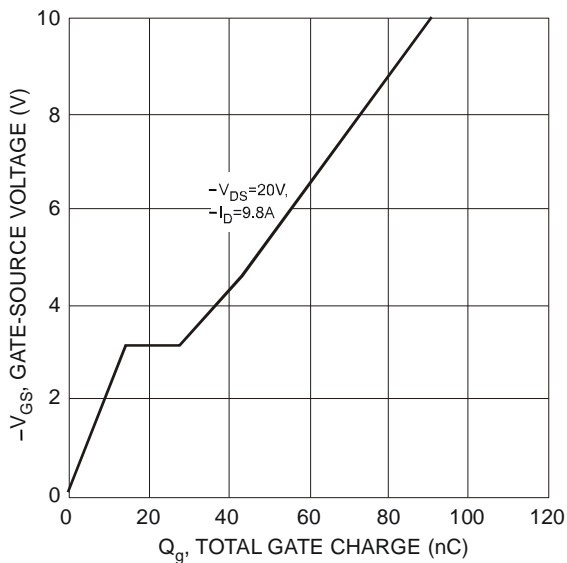


Figure 11. Gate-Charge Characteristics

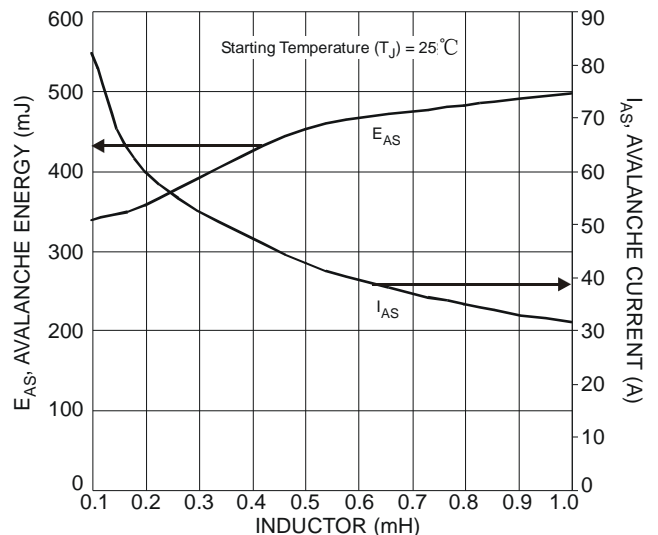


Figure 12. Single-Pulse Avalanche Tested

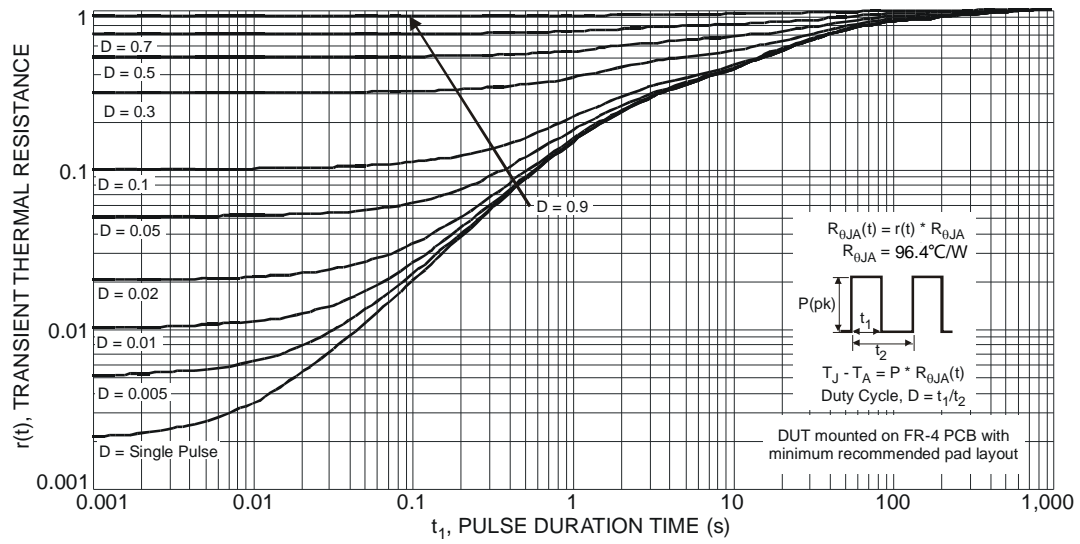
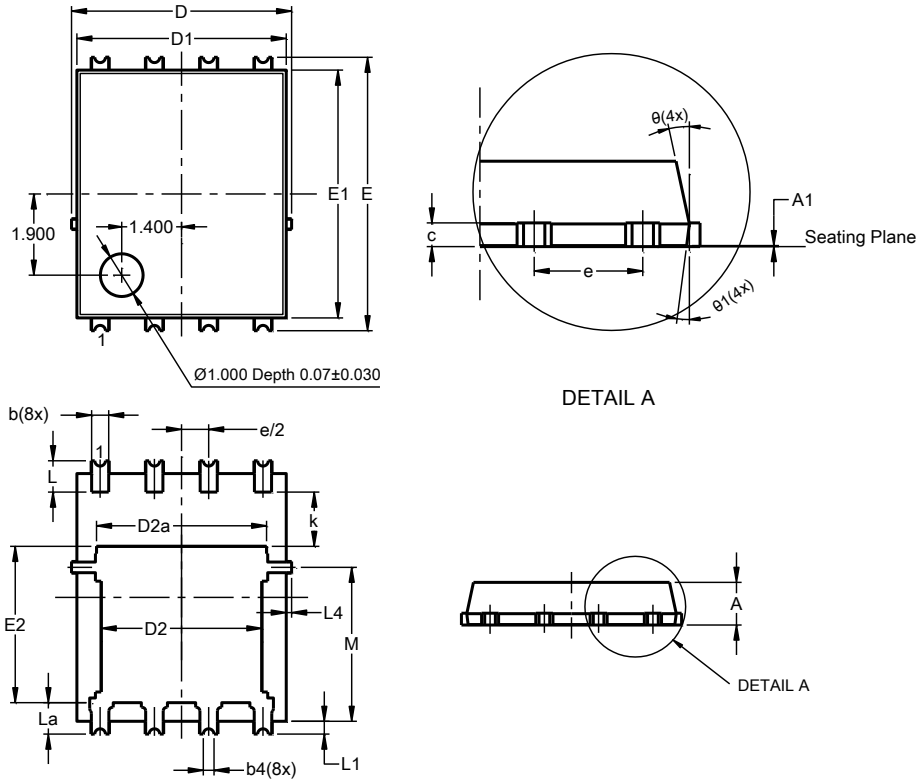


Figure 13. Transient Thermal Response

Package Outline Dimensions

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

PowerDI5060-8 (SWP) (Type UX)

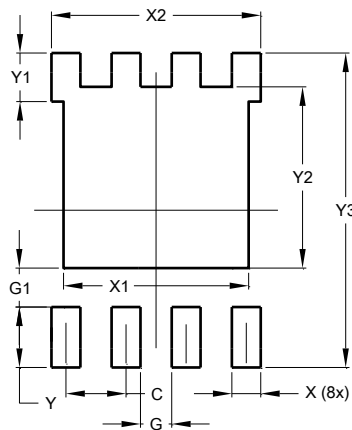


PowerDI5060-8 (SWP) (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
L1a	0.050REF		
L4	0.025	0.225	0.125
M	3.205	4.005	3.605
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 (SWP) (Type UX)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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