

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _c = +25°C
-40V	26mΩ @ V _{GS} = -10V	-27A

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- The DMPH4023SPDWQ 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 Application

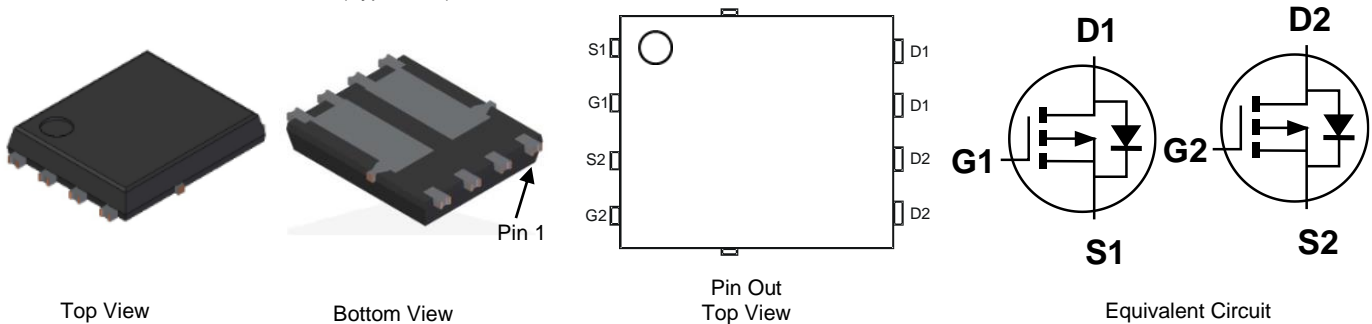
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Backlighting
- Power-management functions
- DC-DC converters

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
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 Ⓔ3
- Weight: 0.097 grams (Approximate)

PowerDI5060-8/SWP (Type UXD)

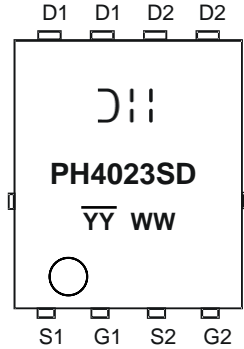


Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMPH4023SPDWQ-13	PowerDI5060-8/SWP (Type UXD)	2500	Tape & Reel

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 - 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.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



⌋|| = Manufacturer's Marking
 PH4023SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 23 = 2023)
 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 5) V _{GS} = -10V	I _D	T _C = +25°C	-27
		T _C = +100°C	-20
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	-108	A
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	-3	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	-108	A
Avalanche Current, L = 0.1mH (Note 7)	I _{AS}	-40	A
Avalanche Energy, L = 0.1mH (Note 7)	E _{AS}	85	mJ

Thermal Characteristics

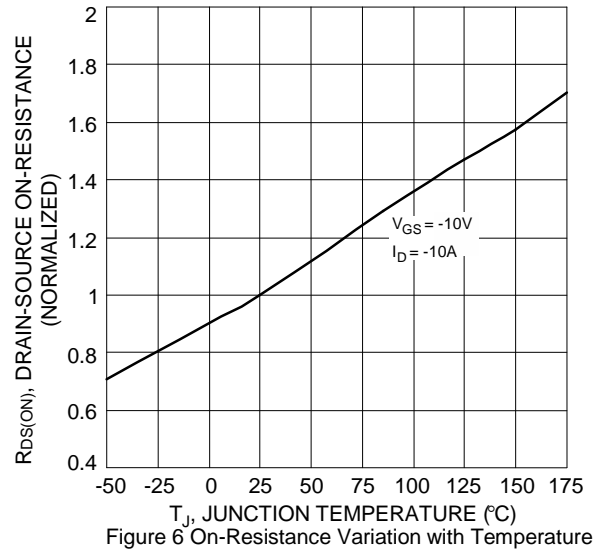
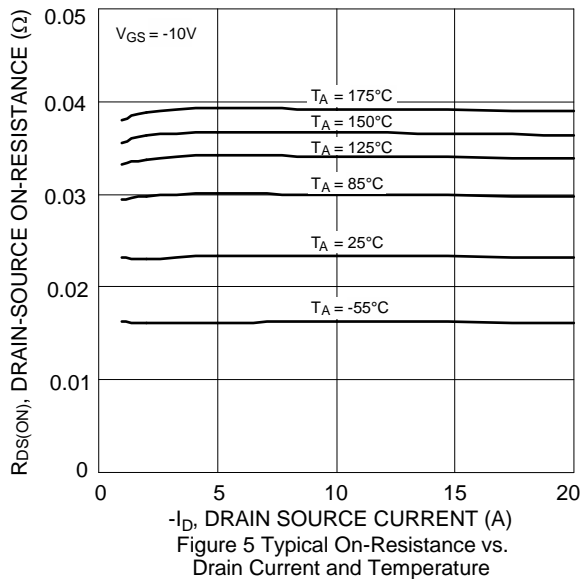
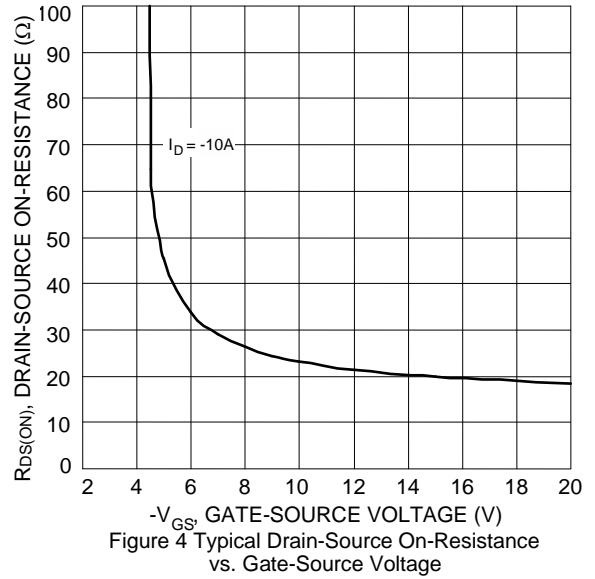
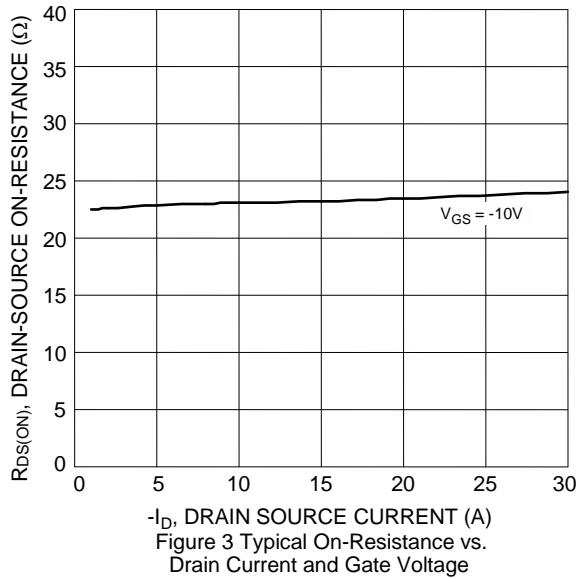
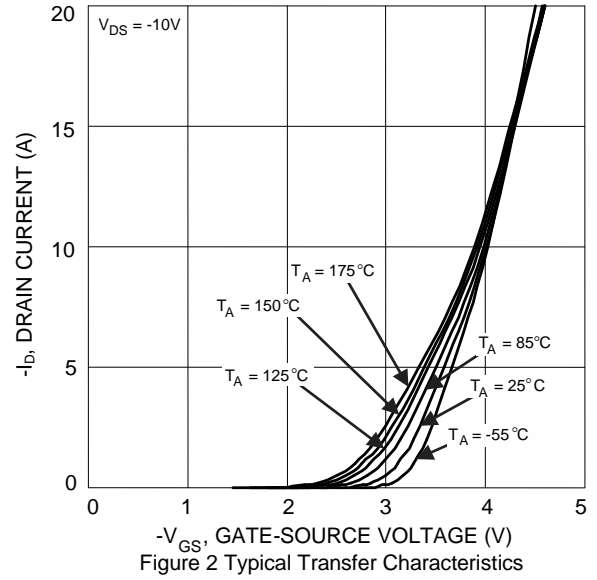
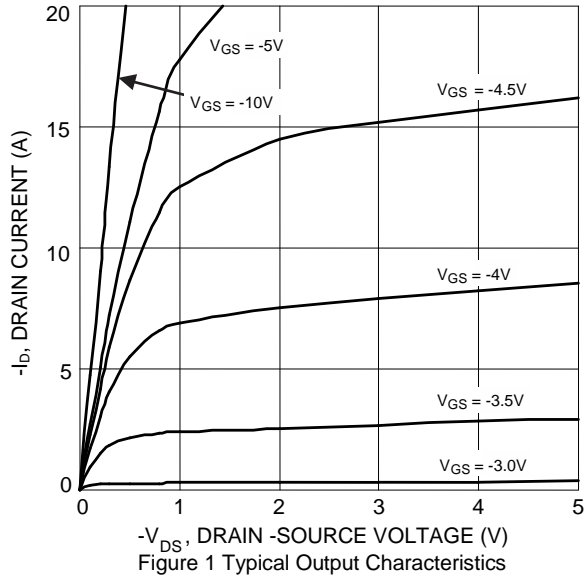
Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 8)	P _D	1.5	W
Thermal Resistance, Junction to Ambient (Note 8)	R _{θJA}	Steady State	99
		t < 10s	52
Total Power Dissipation (Note 6)	P _D	3.1	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	Steady State	49
		t < 10s	26
Thermal Resistance, Junction to Case (Note 5)	R _{θJC}	5	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C

- Notes:
5. Thermal resistance from junction to solder point (on the exposed drain pin).
 6. Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 8. Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.

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 T _J = +25°C	I _{DSS}	—	—	-1	μA	V _{DS} = -40V, 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	—	-3	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	22	26	mΩ	V _{GS} = -10V, I _D = -10A
Diode Forward Voltage	V _{SD}	—	-0.75	-1.2	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	1091	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	288	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	111	—	pF	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Gate Resistance	R _g	—	14	—	Ω	
Total Gate Charge	Q _g	—	18.7	—	nC	V _{DS} = -20V, I _D = -10A V _{GS} = -10V
Gate-Source Charge	Q _{gs}	—	4.2	—	nC	
Gate-Drain Charge	Q _{gd}	—	5.0	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.3	—	ns	V _{DD} = -20V, V _{GS} = -10V R _g = 6Ω, I _D = -10A
Turn-On Rise Time	t _R	—	4.8	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	30.7	—	ns	
Turn-Off Fall Time	t _F	—	23.4	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	17.8	—	ns	I _F = -10A, dI/dt = -100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	9.2	—	nC	

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



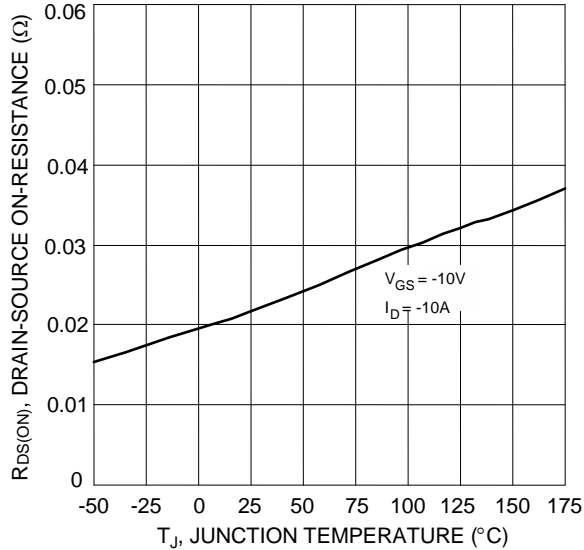


Figure 7 On-Resistance Variation with Temperature

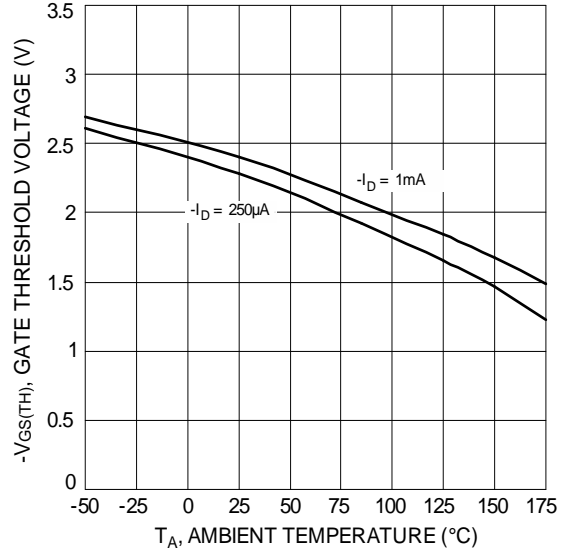


Figure 8 Gate Threshold Variation vs. Ambient Temperature

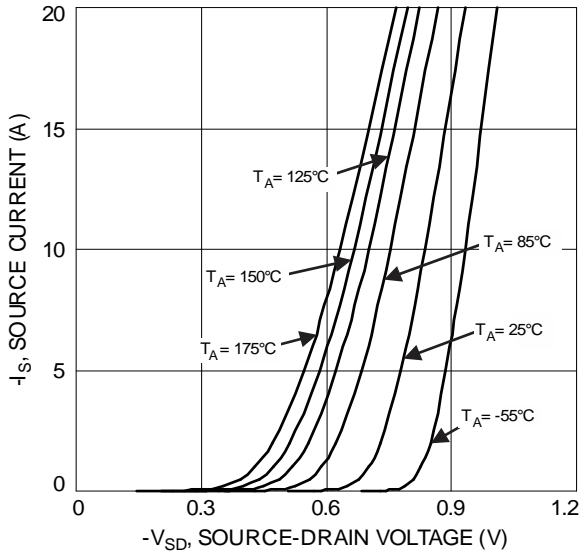


Figure 9 Diode Forward Voltage vs. Current

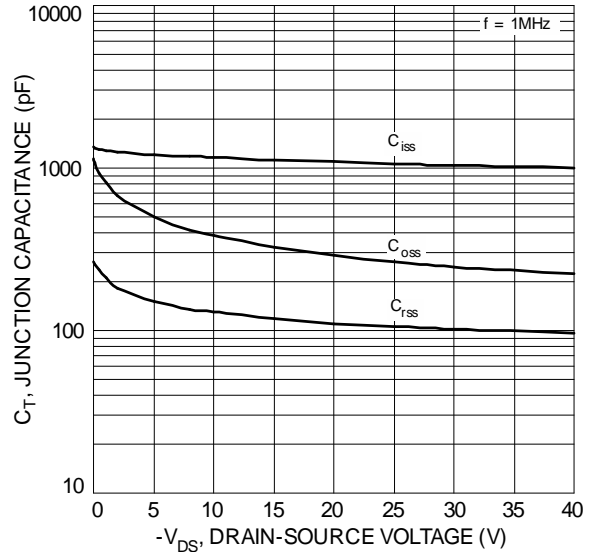


Figure 10 Typical Junction Capacitance

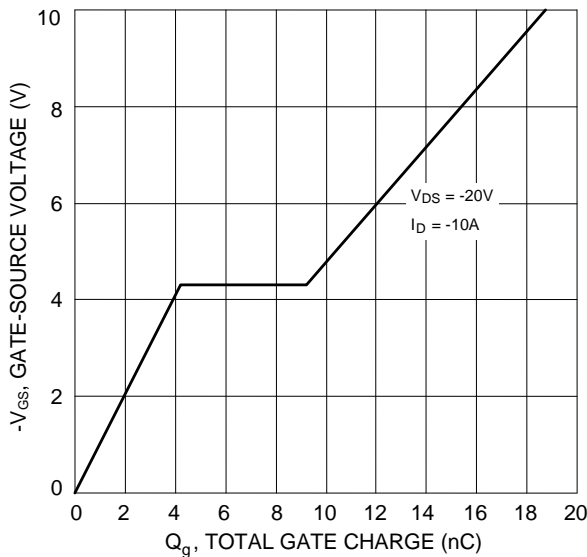


Figure 11 Gate Charge

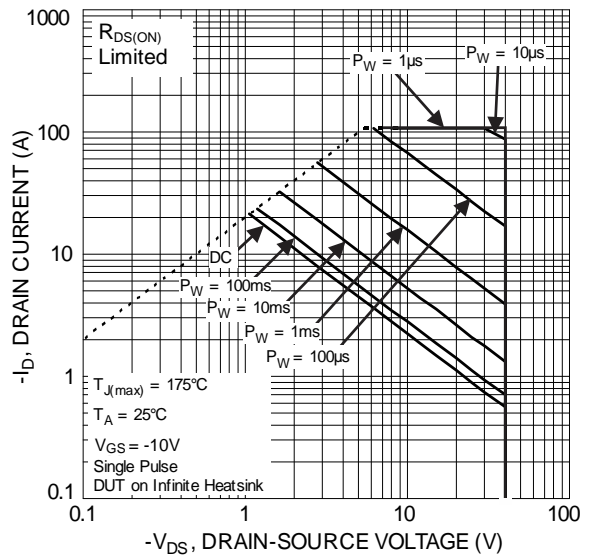
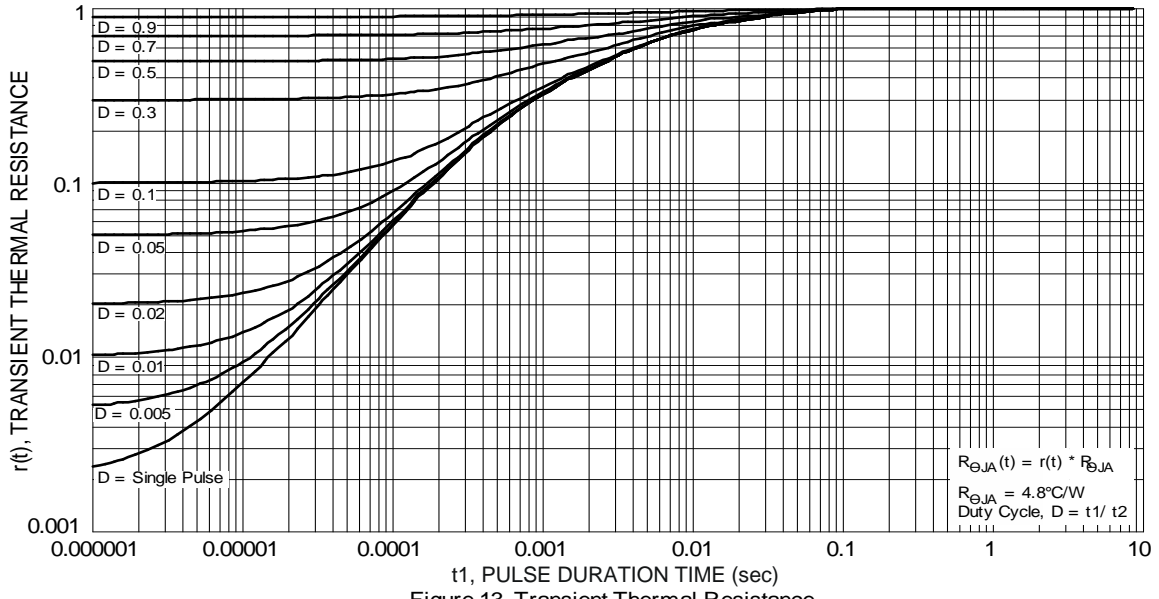


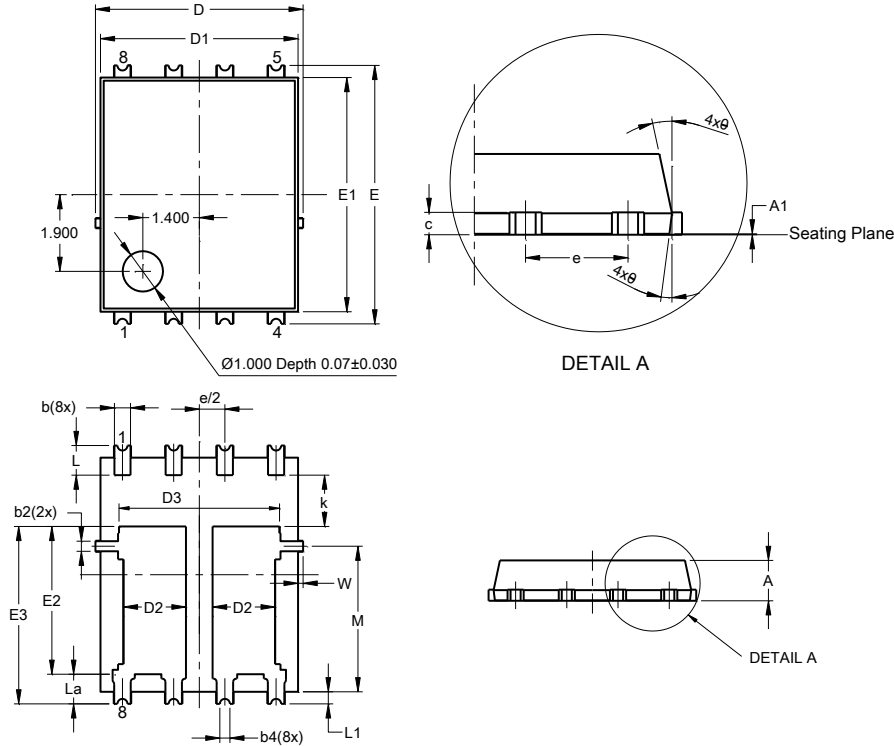
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

PowerDI5060-8/SWP (Type UXD)

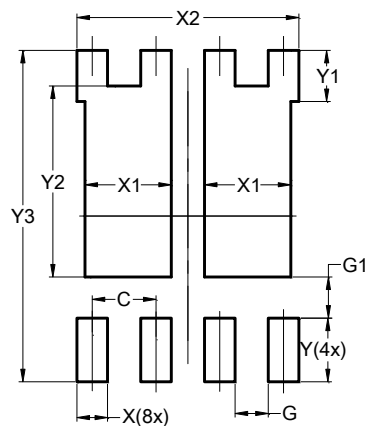


PowerDI5060-8/SWP (Type UXD)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	1.46	1.66	1.55
D3	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
M	3.205	4.005	3.605
W	0.025	0.225	0.125
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/SWP (Type UXD)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	1.720
X2	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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