

Product Summary

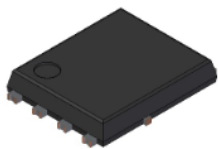
BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
60V	7.3mΩ @ V _{GS} = 10V	95A
	15mΩ @ V _{GS} = 4.5V	67A

Description and Applications

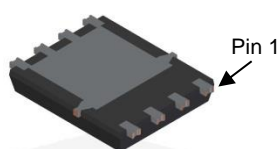
This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

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

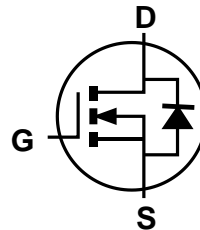
PowerDI5060-8/SWP (Type UX)



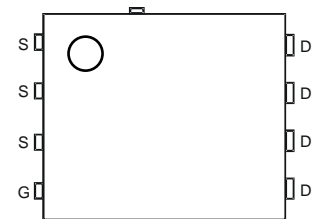
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Features and Benefits

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low R_{DS(ON)}—Minimizes Power Losses
- Low Q_g—Minimizes Switching Losses
- < 1.1mm Package Profile—Ideal for Thin Applications
- Wettable Flank for Improved Optical Inspections
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.** <https://www.diodes.com/quality/product-definitions/>

Mechanical Data

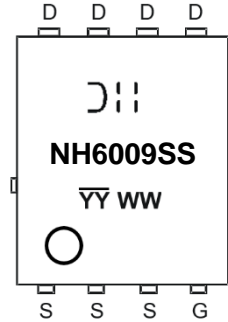
- Package: PowerDI[®]5060-8
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.097 grams (Approximate)

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMNH6009SPSW-13	PowerDI5060-8/SWP (Type UX)	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



Dii = Manufacturer's Marking
NH6009SS = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 24 = 2024)
WW = Week Code (01 to 53)

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 (Note 5) V _{GS} = 10V	I _D	T _C = +25°C	95	A
		T _C = +100°C	67	
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)	I _{DM}	380	A	
Maximum Continuous Body Diode Forward Current (Note 5)	I _S	95	A	
Pulsed Source Current (380µs Pulse, Duty Cycle = 1%)	I _{SM}	380	A	
Avalanche Current, L = 0.1mH (Note 6)	I _{AS}	56	A	
Avalanche Energy, L = 0.1mH (Note 6)	E _{AS}	226	mJ	

Thermal Characteristics

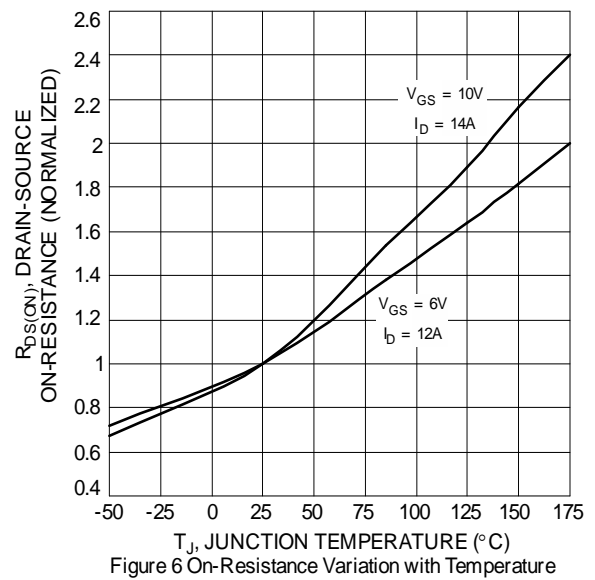
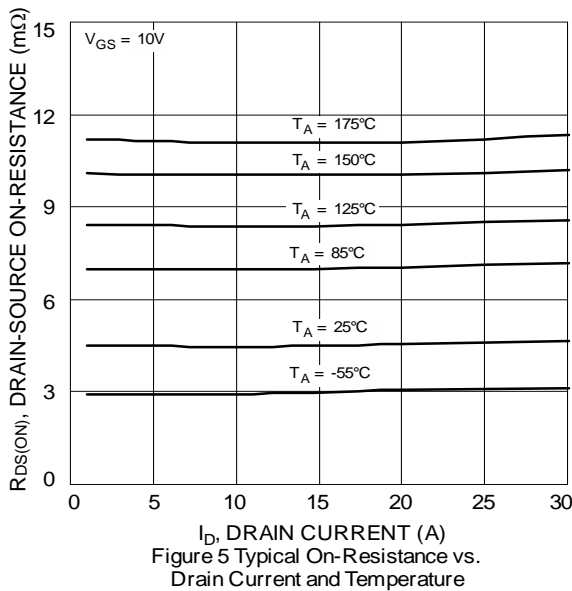
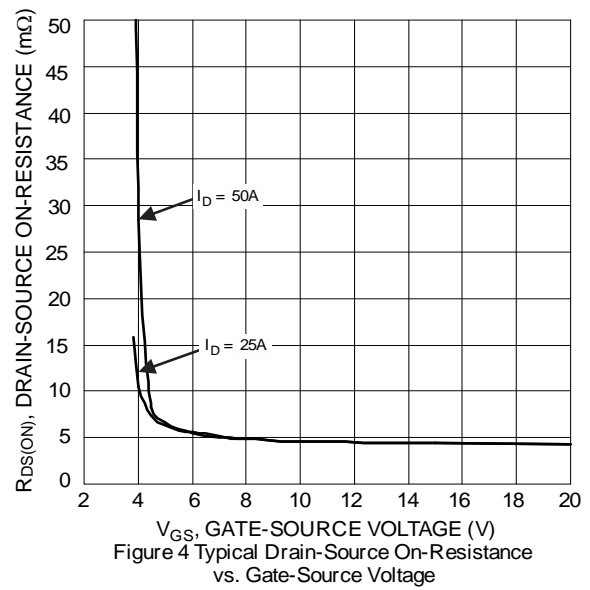
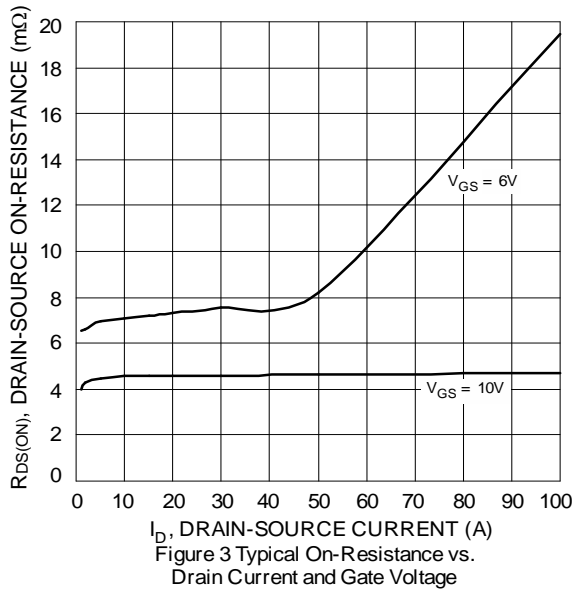
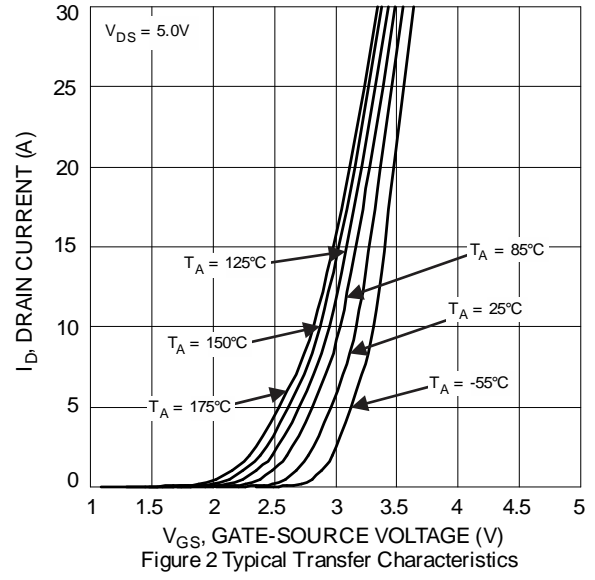
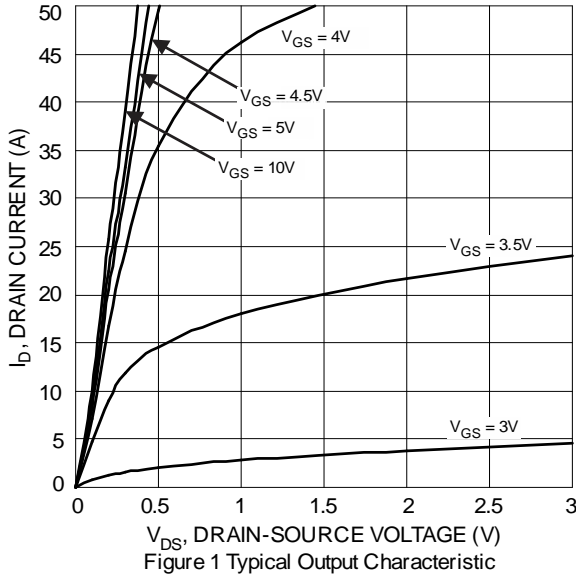
Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 7)	P _D	1.6	W	
Thermal Resistance, Junction to Ambient (Note 7)	R _{θJA}	Steady State	95	°C/W
Total Power Dissipation (Note 8)		P _D	3.3	
Thermal Resistance, Junction to Ambient (Note 8)	R _{θJA}	Steady State	46	°C/W
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	1.5	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C	

- Notes:
- 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.
 - 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.

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}	60	—	—	V	V _{GS} = 0V, I _D = 1mA
Zero Gate Voltage Drain Current, T _J = +25°C	I _{DSS}	—	—	1	μA	V _{DS} = 48V, 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	2	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	4.6	7.3	mΩ	V _{GS} = 10V, I _D = 50A
		—	7.1	15	mΩ	V _{GS} = 4.5V, I _D = 25A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 1.7A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	1882	—	pF	V _{DS} = 30V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	374	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	111	—	pF	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Gate Resistance	R _g	—	2.1	—	Ω	
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	18.5	—	nC	V _{DS} = 30V, I _D = 25A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	37.3	—	nC	
Gate-Source Charge	Q _{gs}	—	5.0	—	nC	
Gate-Drain Charge	Q _{gd}	—	11.2	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.7	—	ns	V _{GS} = 10V, V _{DS} = 30V R _g = 3Ω, I _D = 25A
Turn-On Rise Time	t _R	—	7.5	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	16.9	—	ns	
Turn-Off Fall Time	t _F	—	6.3	—	ns	
Body Diode Reverse-Recovery Time	t _{RR}	—	32	—	ns	I _F = 25A, di/dt = 100A/μs
Body Diode Reverse-Recovery Charge	Q _{RR}	—	30	—	nC	

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



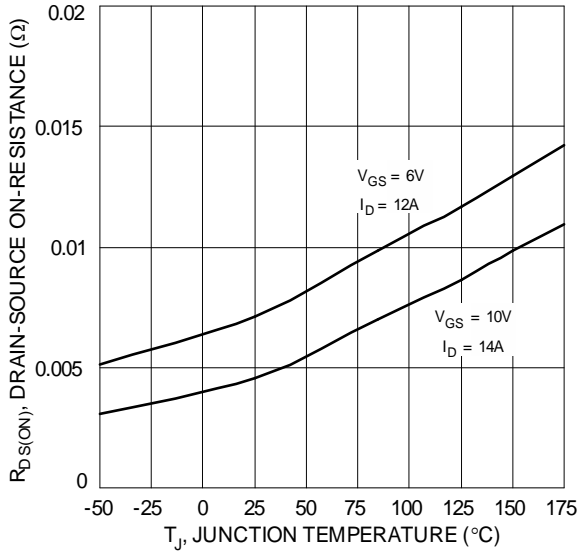


Figure 7 On-Resistance Variation with Temperature

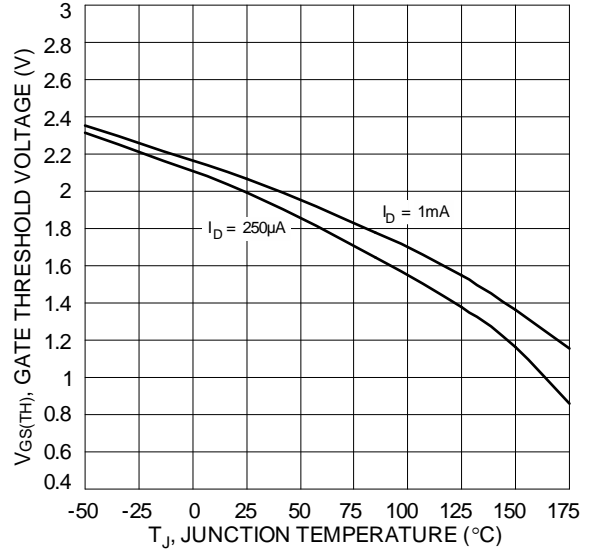


Figure 8 Gate Threshold Variation vs. Junction Temperature

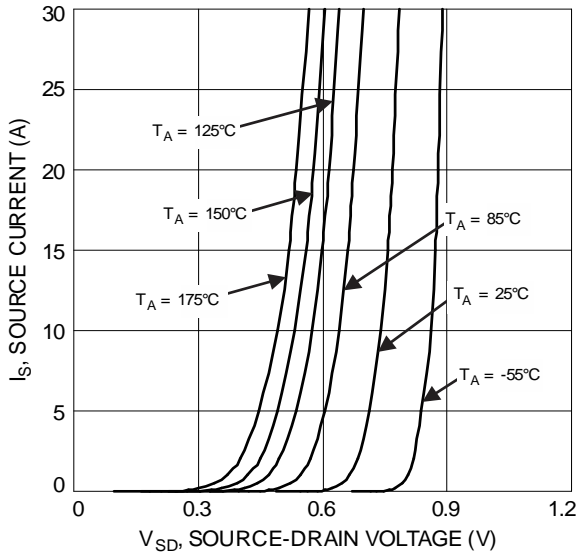


Figure 9 Diode Forward Voltage vs. Current

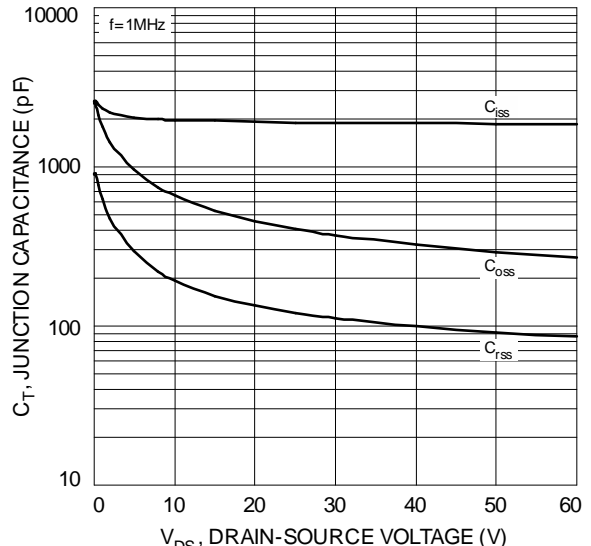


Figure 10 Typical Junction Capacitance

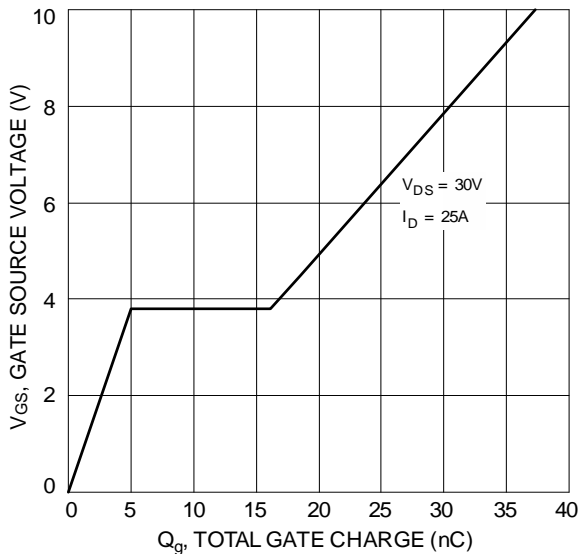


Figure 11 Gate Charge

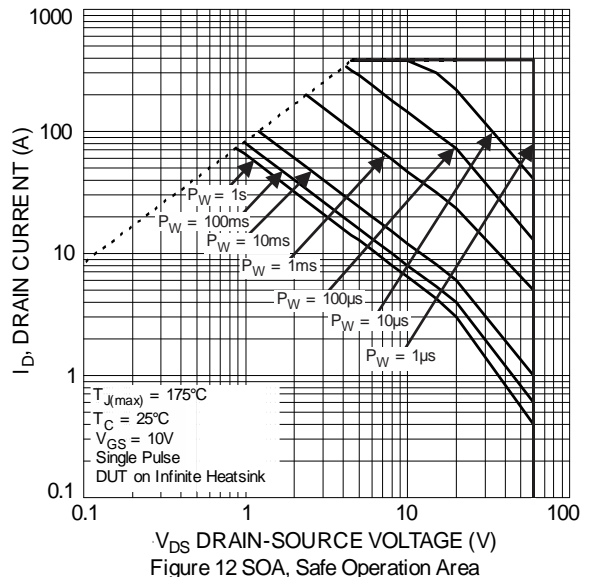
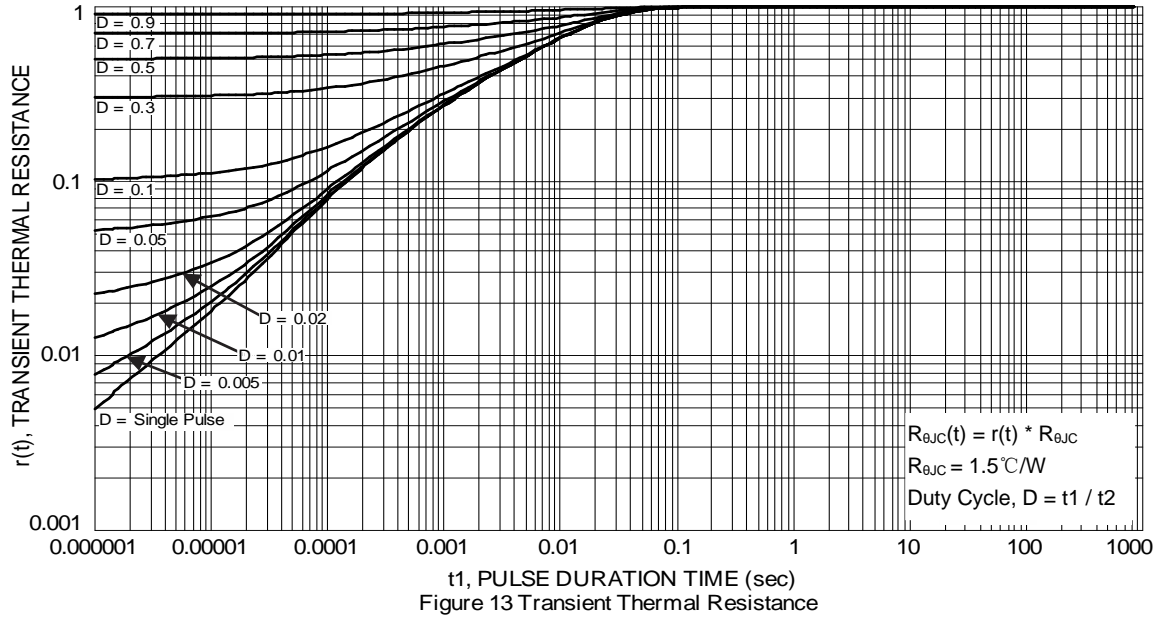


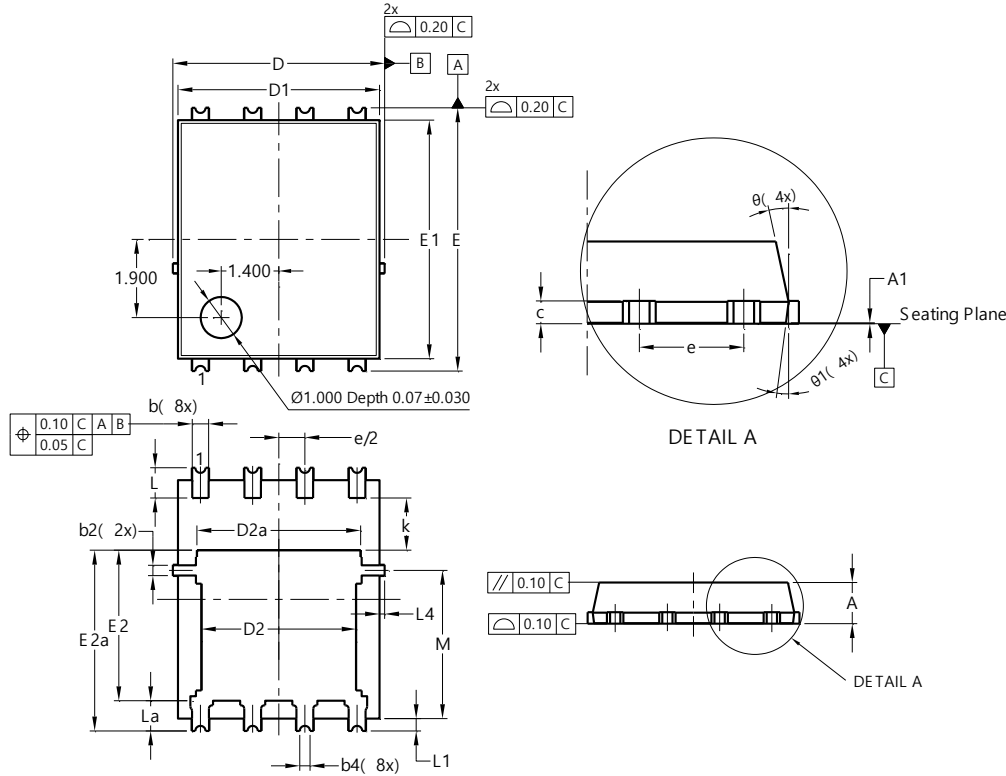
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

PowerDI5060-8/SWP (Type UX)

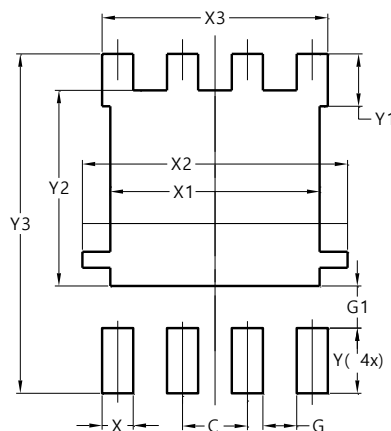


PowerDI5060-8/SWP (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
L	0.635	0.835	0.735
La	0.635	0.835	0.735
L1	0.200	0.400	0.300
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	5.190
X3	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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