

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _c = +25°C
60V	23mΩ @ V _{GS} = 10V	44A
	28mΩ @ V _{GS} = 4.5V	40A

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.

- Backlighting
- Power Management Functions
- DC-DC Converters

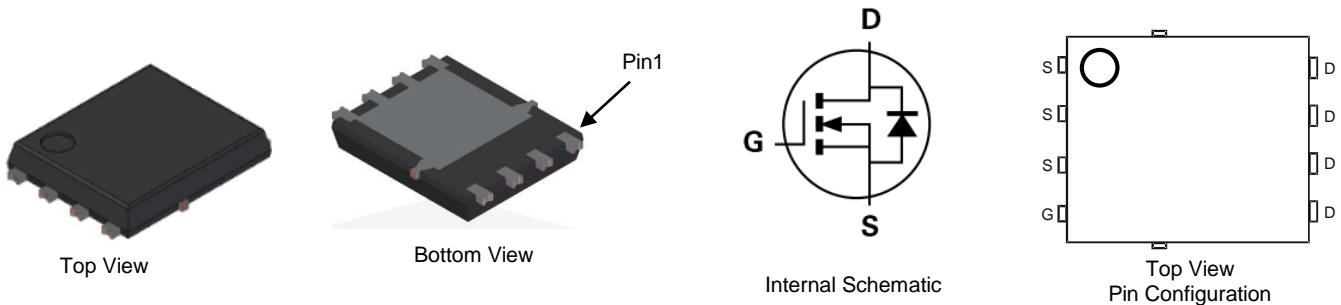
Features and Benefits

- 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
- Wettable Flank for Improved Optical Inspection
- **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-Q100/101/200, 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

- 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 Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 **Ⓔ3**
- Weight: 0.097 grams (Approximate)

PowerDI5060-8 (SWP) (Type UX)



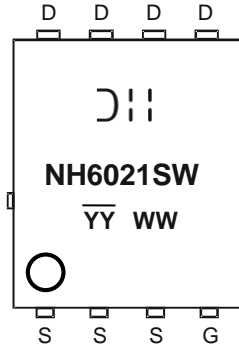
Ordering Information (Note 4)

Part Number	Case	Packaging
DMNH6021SPSW-13	PowerDI5060-8 (SWP) (Type UX)	2,500 / 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/>.

PowerDI is a registered trademark of Diodes Incorporated.

Marking Information



D|| = Manufacturer's Marking
 NH6021SW = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 20 = 2020)
 WW = Week (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, V _{GS} = 10V (Note 7)	I _D	T _C = +25°C	44
		T _C = +100°C	31
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	44	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	176	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	176	A
Avalanche Current, L = 0.1mH	I _{AS}	35.7	A
Avalanche Energy, L = 0.1mH	E _{AS}	64	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	1.6	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	96	°C/W
Total Power Dissipation (Note 6)	P _D	3.0	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	50	°C/W
Total Power Dissipation (Note 7)	P _D	100	W
Thermal Resistance, Junction to Case (Note 7)	R _{θJC}	1.5	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C

Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 7. 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}	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 8)						
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
		—	20	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 9)						
Input Capacitance	C _{iss}	—	1,132	—	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	157	—		
Reverse Transfer Capacitance	C _{rss}	—	75	—		
Gate Resistance	R _g	—	2.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	9.7	—	nC	V _{DS} = 30V, I _D = 20A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	20.1	—		
Gate-Source Charge	Q _{gs}	—	4.3	—		
Gate-Drain Charge	Q _{gd}	—	5.5	—		
Turn-On Delay Time	t _{D(ON)}	—	4.4	—	ns	V _{DD} = 30V, V _{GS} = 10V, I _D = 20A, R _G = 4.7Ω
Turn-On Rise Time	t _R	—	6.0	—		
Turn-Off Delay Time	t _{D(OFF)}	—	14.2	—		
Turn-Off Fall Time	t _F	—	5.4	—		
Body Diode Reverse Recovery Time	t _{RR}	—	21.2	—	ns	I _F = 20A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	15.2	—	nC	

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

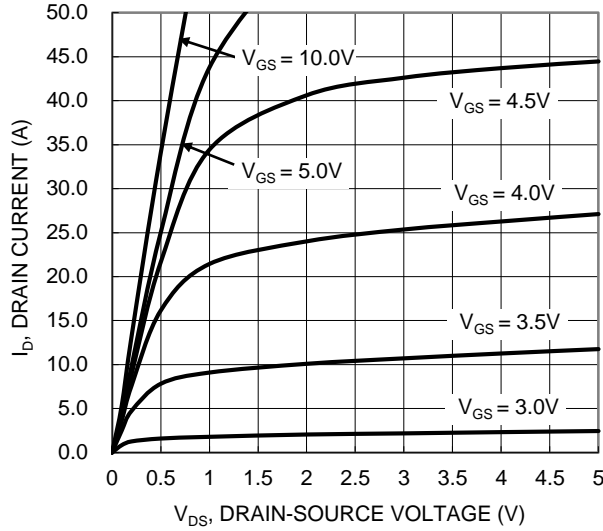


Figure 1. Typical Output Characteristic

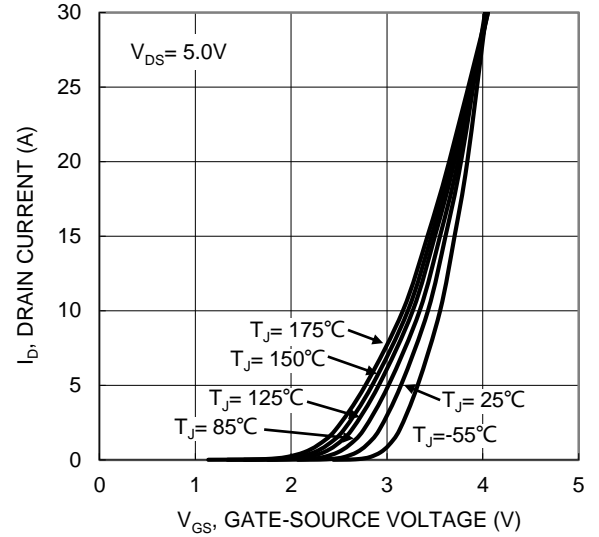


Figure 2. Typical Transfer Characteristic

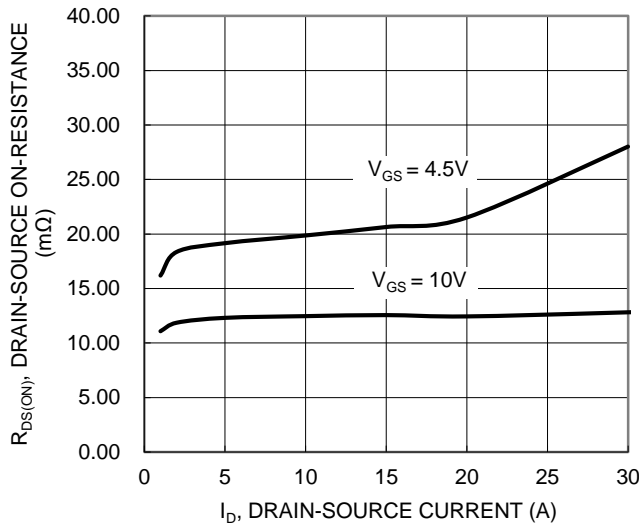


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

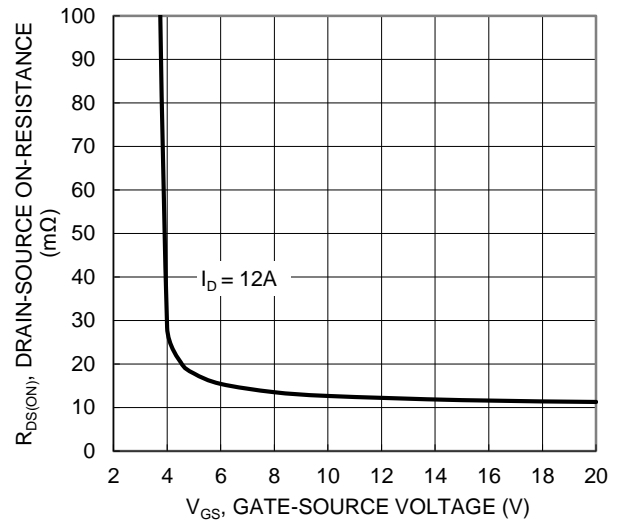


Figure 4. Typical Transfer Characteristic

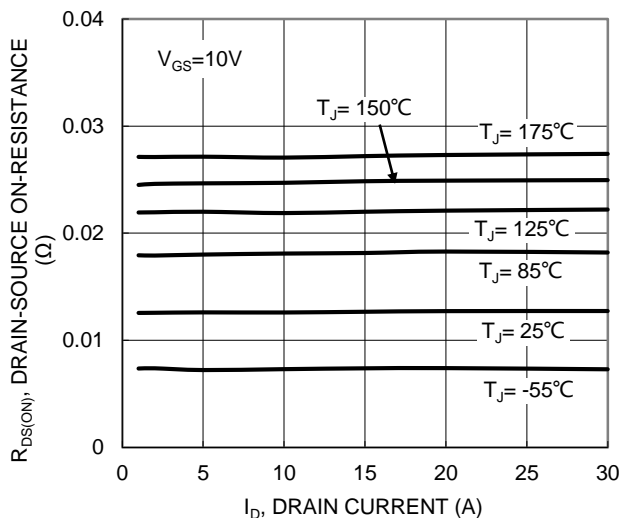


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

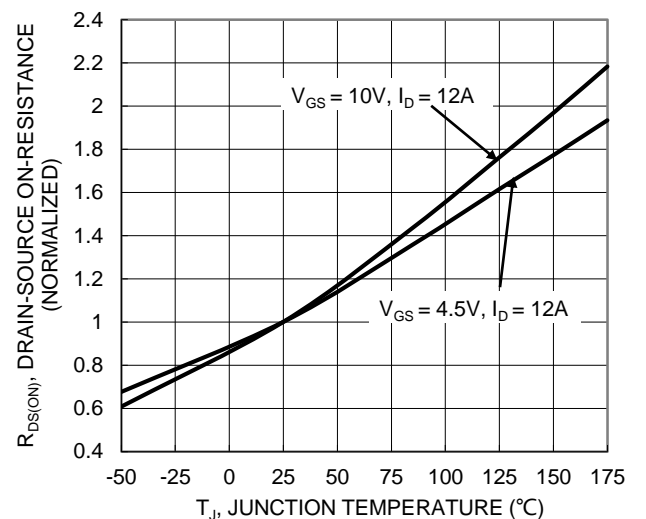
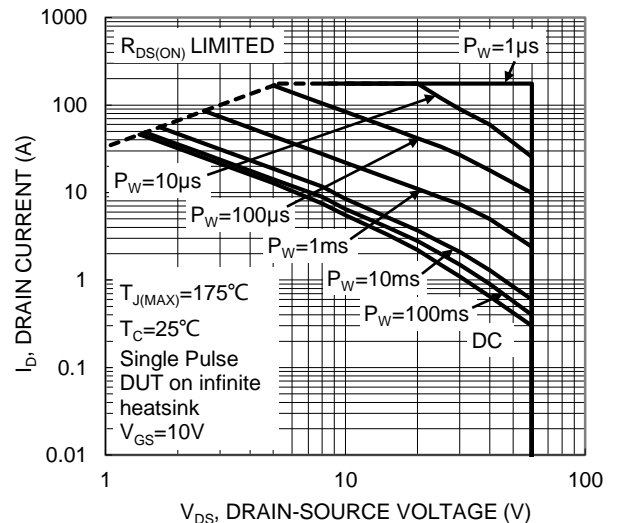
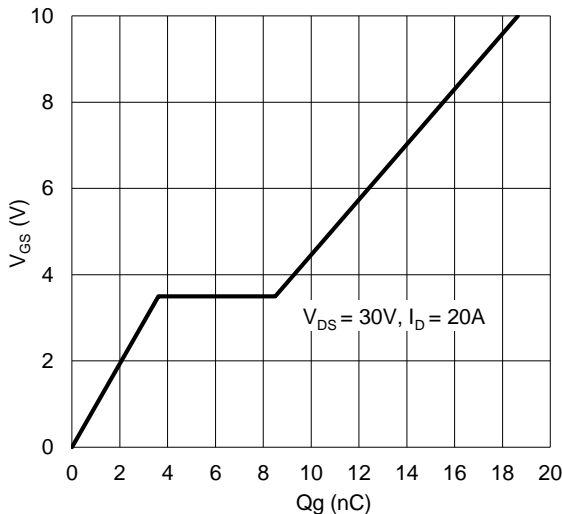
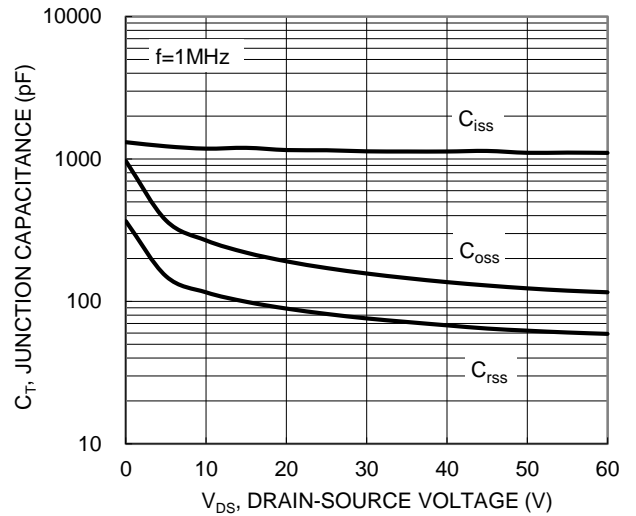
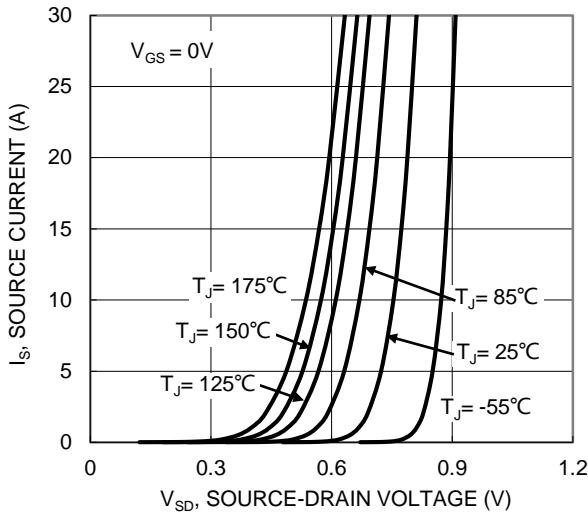
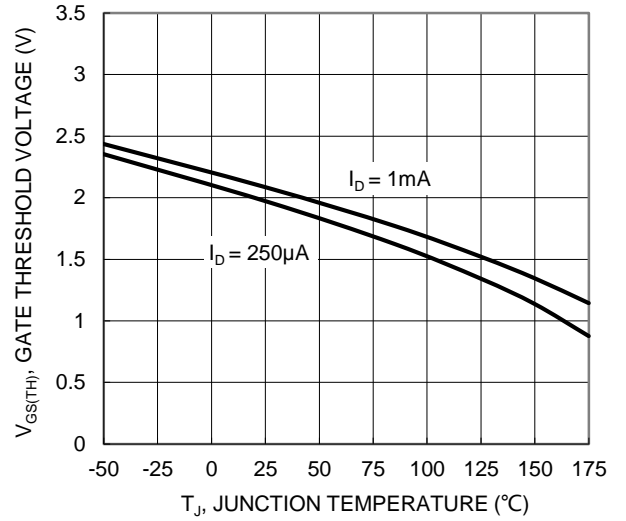
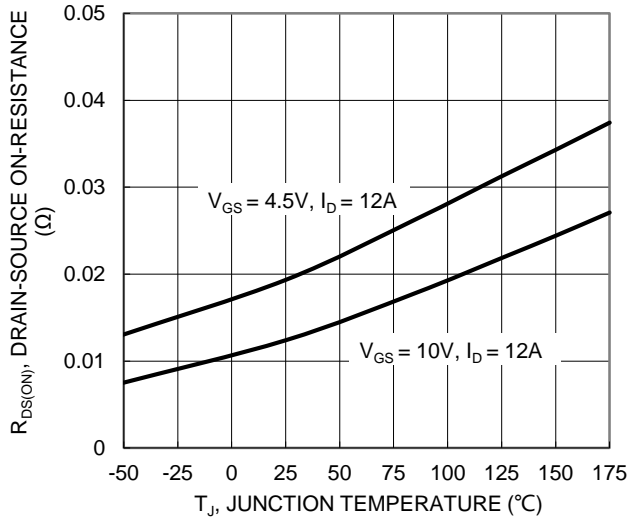


Figure 6. On-Resistance Variation with Temperature



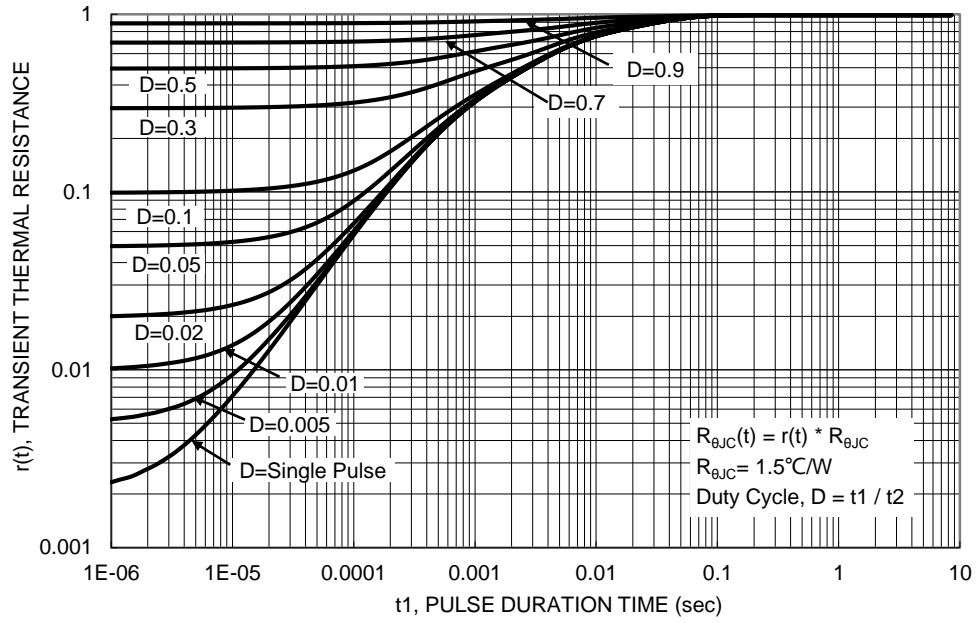
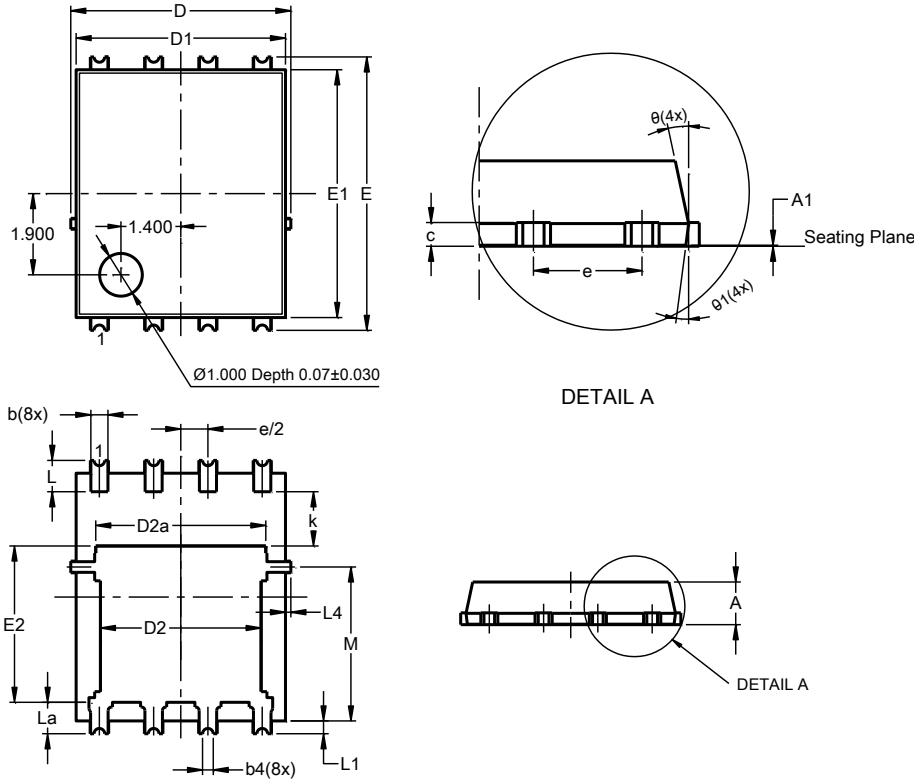


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8 (SWP) (Type UX)

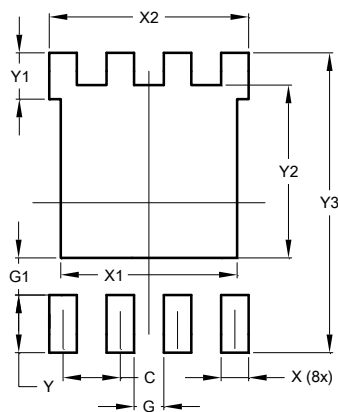


PowerDI5060-8 (SWP) (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05	--	--
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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