

Product Summary

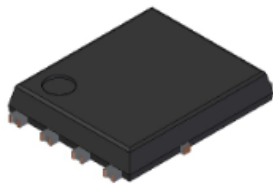
BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
60V	23mΩ @ V _{GS} = 10V	44A
	28mΩ @ V _{GS} = 4.5V	40A

Description and Applications

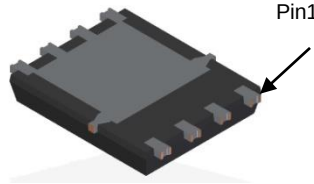
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Backlighting
- Power Management Functions
- DC-DC Converters

PowerDI5060-8 (SWP) (Type UX)



Top View



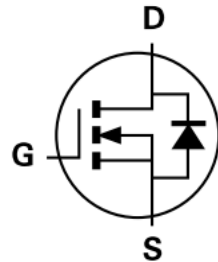
Bottom View

Features and Benefits

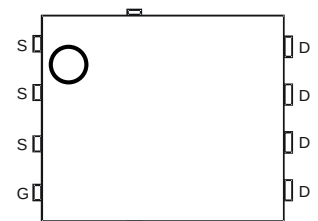
- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- Wettable Flank for Improved Optical Inspection
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- The DMNH6021SPSWQ 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/>

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 (B)
- Weight: 0.097 grams (Approximate)



Internal Schematic



Top View
Pin Configuration

Ordering Information (Note 4)

Part Number	Case	Packaging
DMNH6021SPSWQ-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/>.

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	44 31	A
Maximum Continuous Body Diode Forward Current (Note 7)	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

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:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

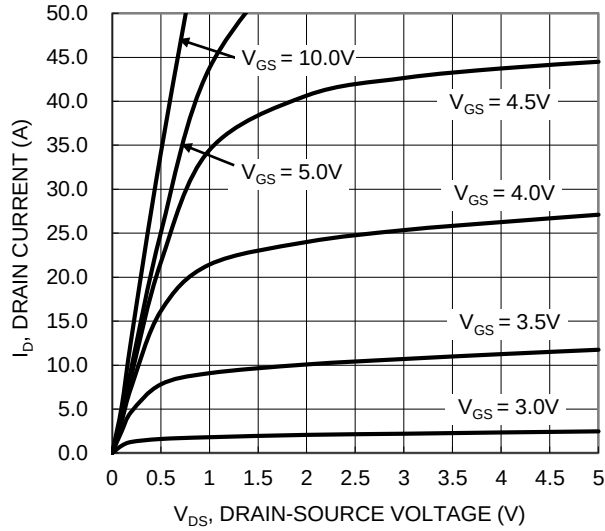


Figure 1. Typical Output Characteristic

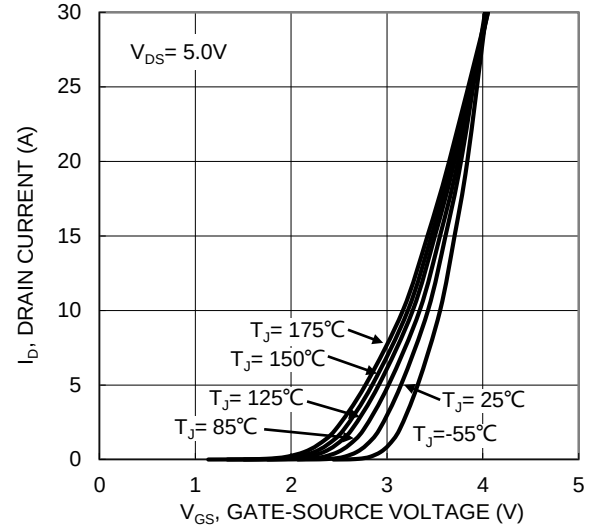


Figure 2. Typical Transfer Characteristic

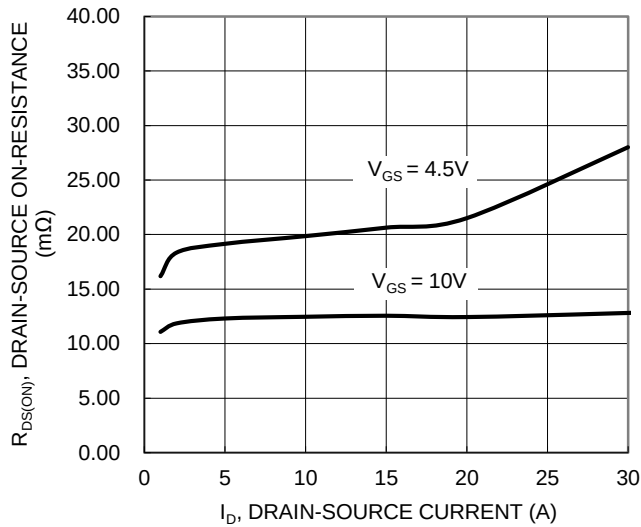


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

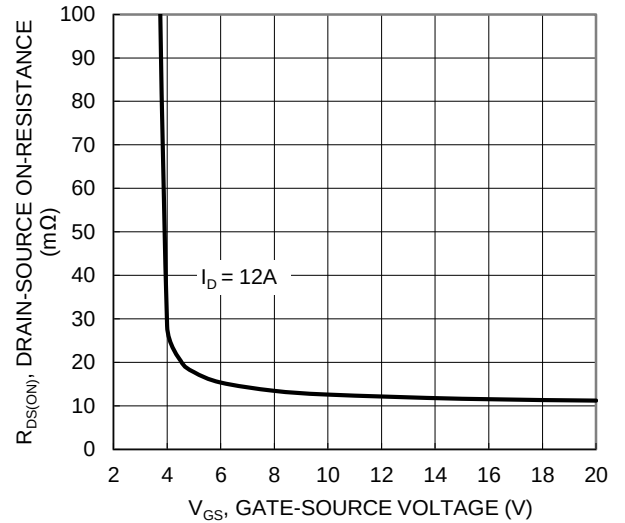


Figure 4. Typical Transfer Characteristic

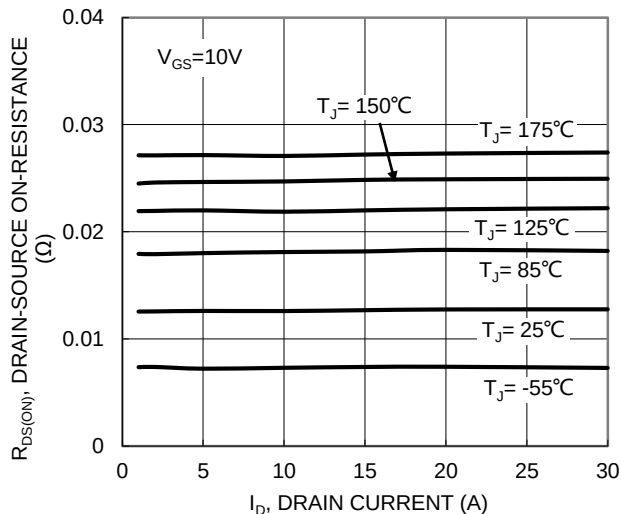


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

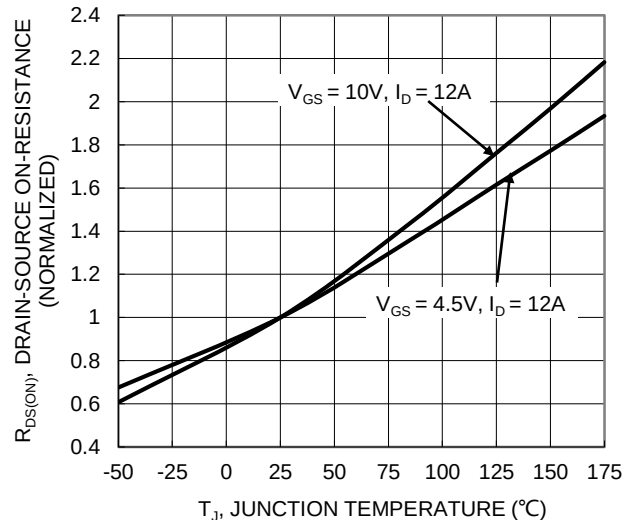


Figure 6. On-Resistance Variation with Temperature

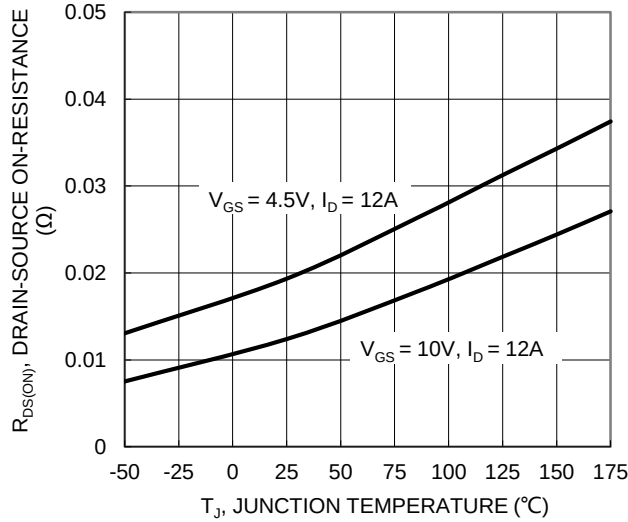


Figure 7. On-Resistance Variation with Temperature

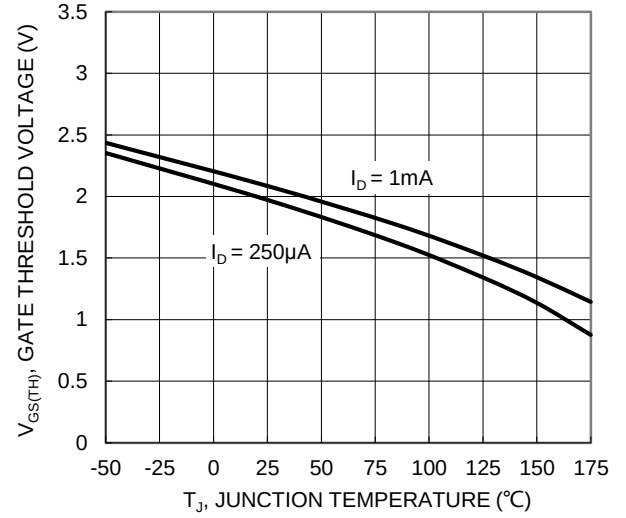


Figure 8. Gate Threshold Variation vs. Junction Temperature

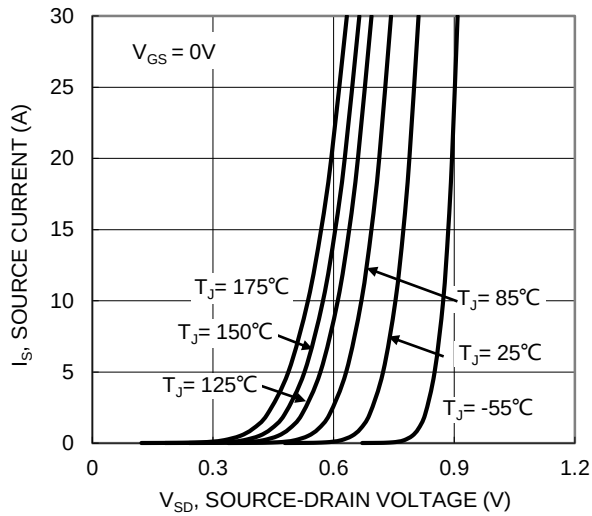


Figure 9. Diode Forward Voltage vs. Current

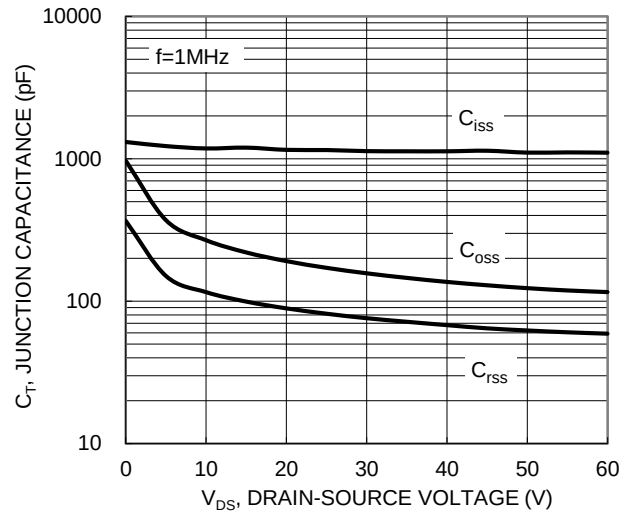


Figure 10. Typical Junction Capacitance

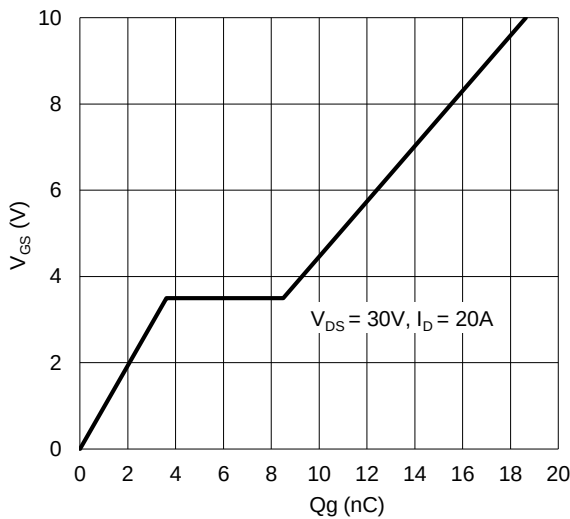


Figure 11. Gate Charge

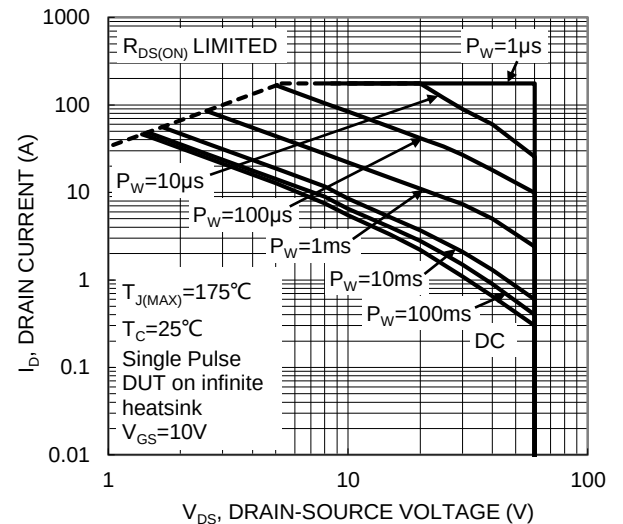


Figure 12. SOA, Safe Operation Area

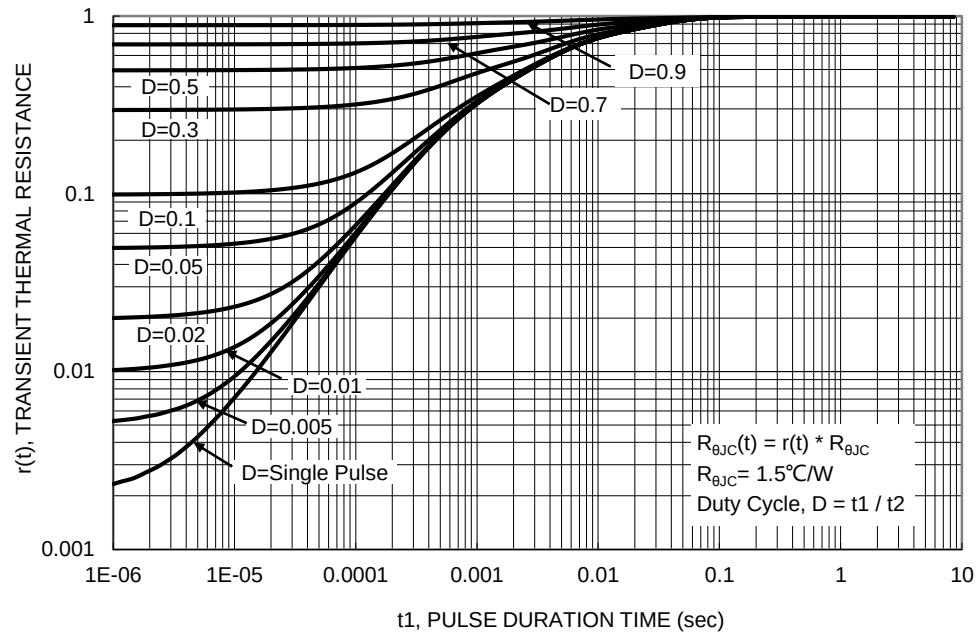
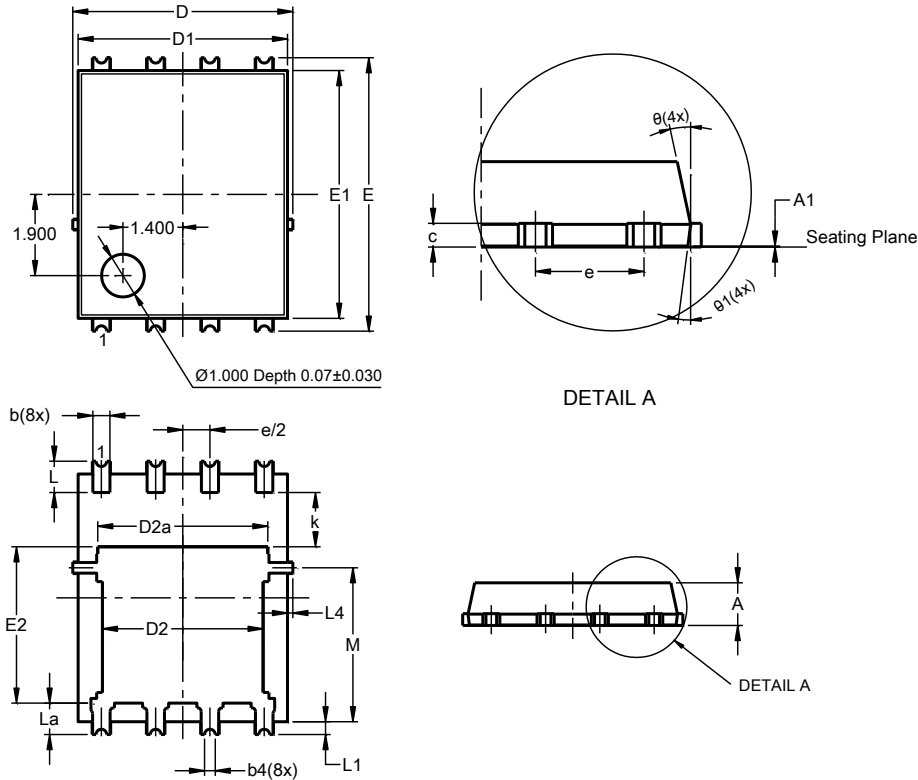


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8 (SWP) (Type UX)

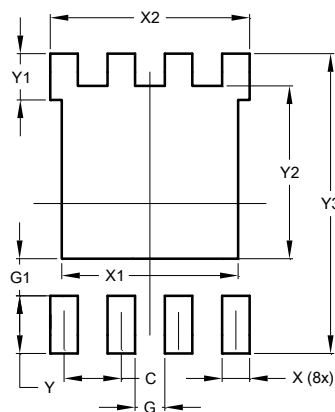


PowerDI5060-8 (SWP) (Type UX)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05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