

Product Summary

BV _{DSS}	R _{DS(on)}	I _D T _C = +25°C
-30V	18mΩ @ V _{GS} = -10V	-39 A
	28mΩ @ V _{GS} = -5V	-31 A

Features

- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low R_{DS(on)} – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- Wettable Flank for Improved Optical Inspection
- **ESD Protected Gate**
- **Totally Lead-Free & Fully 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 [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

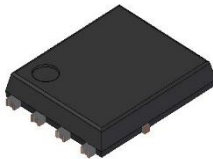
Description and Applications

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.

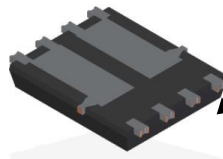
- Wireless charging
- DC-DC converters
- Power management

Mechanical Data

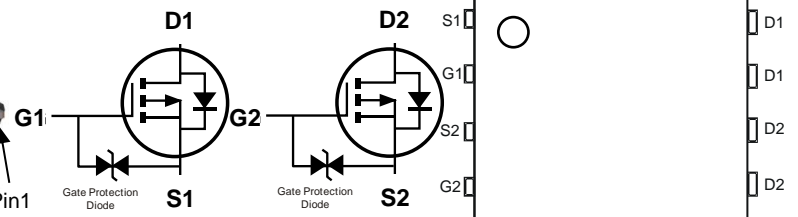
- Package: PowerDI[®]5060-8
- Packing Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208
- Weight: 0.097 grams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



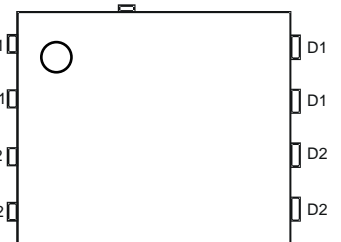
Top View



Bottom View



Internal Schematic

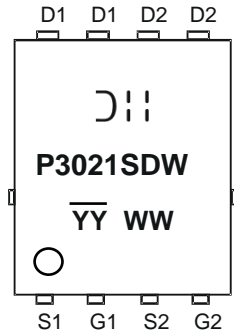

 Top View
 Pin Configuration


Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP3021SPDW-13	PowerDI5060-8/SWP (Type UXD)	2500	Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 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
 P3021SDW = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 22 = 2022)
 WW = Week Code (01 to 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	± 25	V
Continuous Drain Current (Note 7) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-10	A
		$T_A = +70^\circ\text{C}$		-8	
Continuous Drain Current (Note 8) $V_{GS} = -10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$	I_D	-39	A
		$T_C = +70^\circ\text{C}$		-31	
Maximum Continuous Body Diode Forward Current (Note 8)			I_S	-2.7	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-153	A
Pulsed Body Diode Forward Current (10 μs Pulse, Duty Cycle = 1%)			I_{SM}	-153	A
Avalanche Current (Note 9) $L = 1\text{mH}$			I_{AS}	-14	A
Avalanche Energy (Note 9) $L = 1\text{mH}$			E_{AS}	98	mJ

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	4.7	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	82	$^\circ\text{C/W}$
Total Power Dissipation (Note 7)	$T_A = +25^\circ\text{C}$	P_D	2.7	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	46	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 8)		$R_{\theta JC}$	3	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -30V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 25V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	-2.5	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	9.8	18	m Ω	$V_{GS} = -10V, I_D = -8A$
		—	14.3	28		$V_{GS} = -5V, I_D = -5A$
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	$V_{GS} = 0V, I_S = -1A$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1799	—	pF	$V_{DS} = -15V, V_{GS} = 0V,$ $f = 1.0MHz$
Output Capacitance	C_{oss}	—	259	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	225	—	pF	
Gate Resistance	R_g	—	2.1	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$
Total Gate Charge ($V_{GS} = -5V$)	Q_g	—	17.4	—	nC	$V_{DS} = -15V, I_D = -10A$
Total Gate Charge ($V_{GS} = -10V$)	Q_g	—	34	—	nC	
Gate-Source Charge	Q_{gs}	—	5.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	8.4	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6.5	—	ns	$V_{DD} = -15V, V_{GS} = -10V,$ $R_G = 3\Omega, I_D = -10A$
Turn-On Rise Time	t_R	—	18.3	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	35.8	—	ns	
Turn-Off Fall Time	t_F	—	23.7	—	ns	
Reverse Recovery Time	t_{RR}	—	14.9	—	ns	$I_S = -8A, di/dt = 500A/\mu s$
Reverse Recovery Charge	Q_{RR}	—	15	—	nC	

- 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 1-inch square copper plate.
 7. Thermal resistance from junction to soldering point (on the exposed drain pad).
 8. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to product testing.

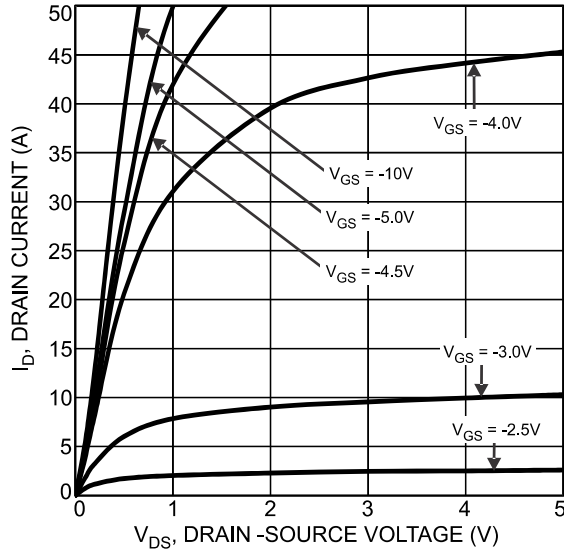


Fig. 1 Typical Output Characteristics

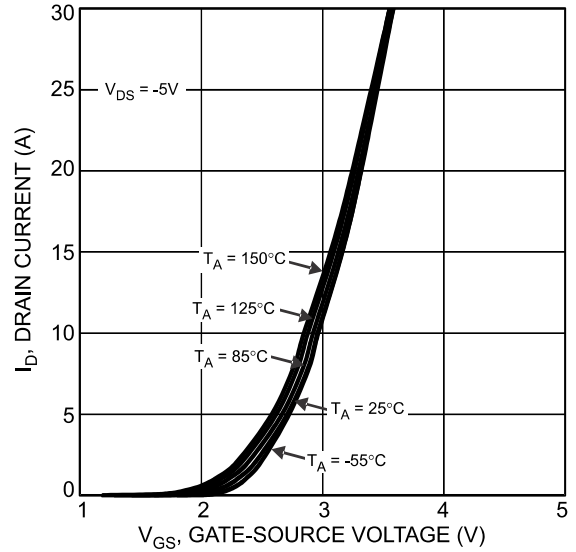


Fig. 2 Typical Transfer Characteristics

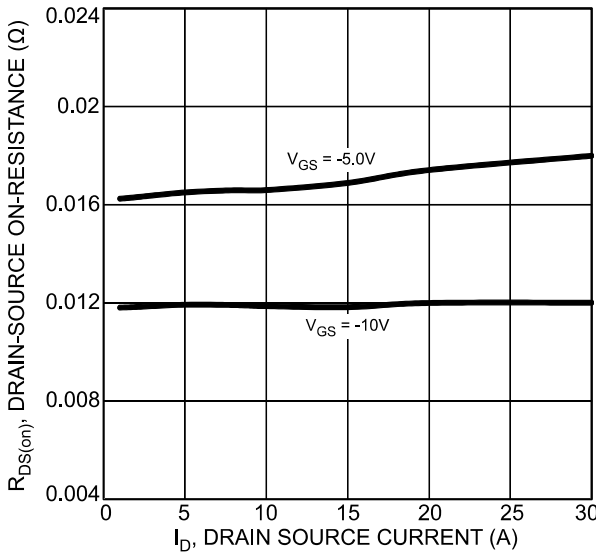


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

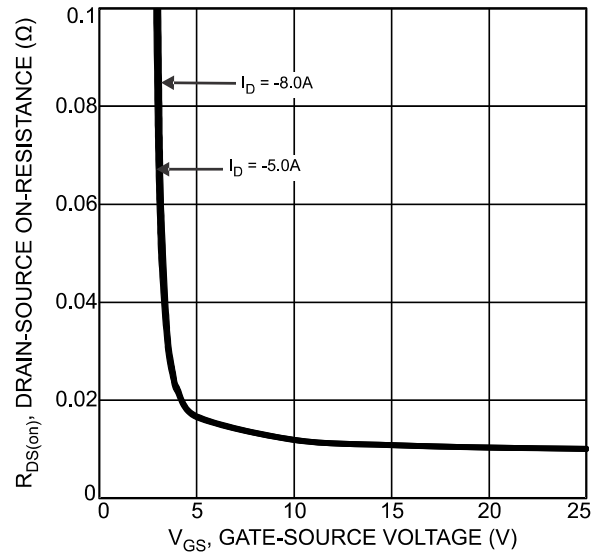


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

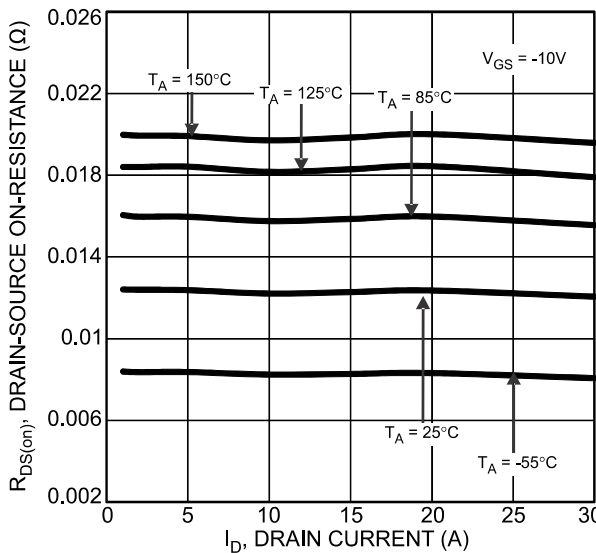


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

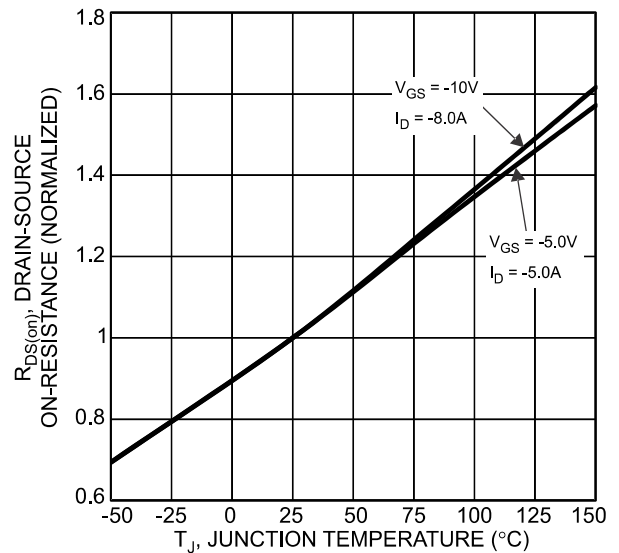


Fig. 6 On-Resistance Variation with Junction Temperature

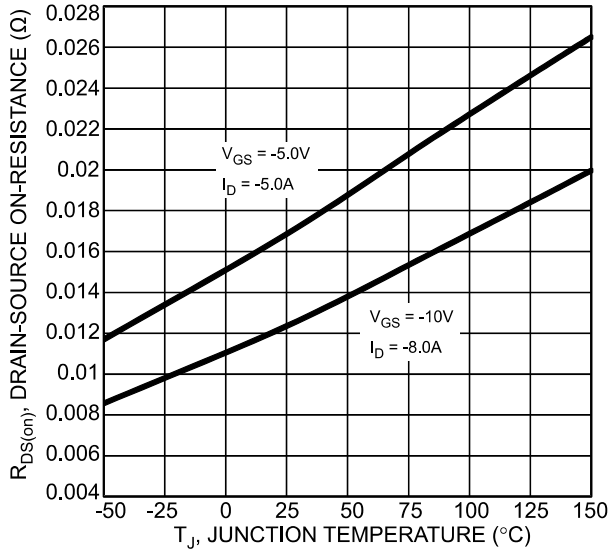


Fig. 7 On-Resistance Variation with Junction Temperature

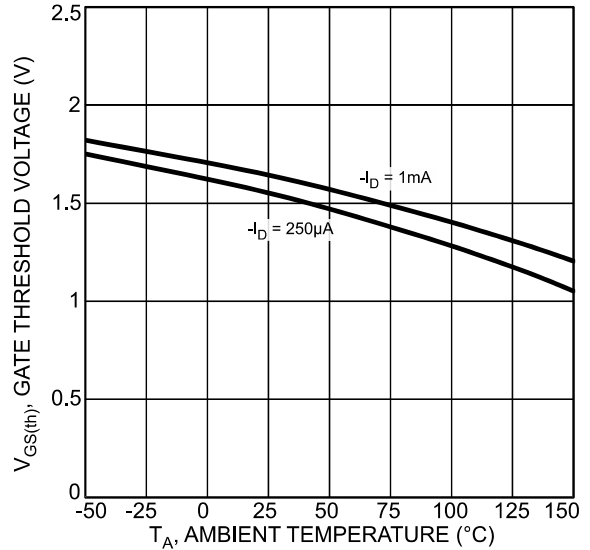


Fig. 8 Gate Threshold Variation vs. Junction Temperature

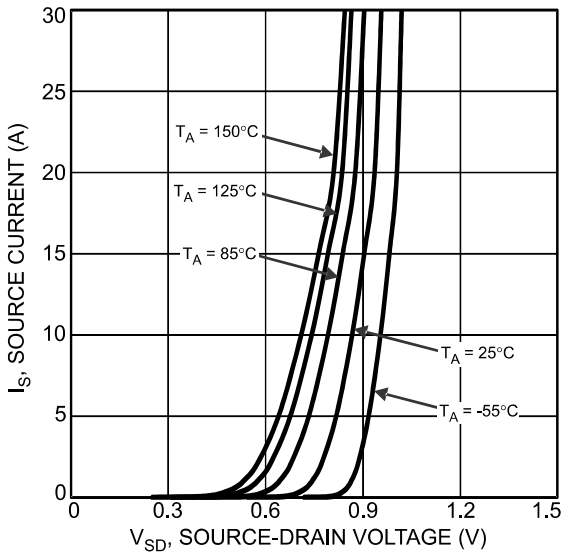


Fig. 9 Diode Forward Voltage vs. Current

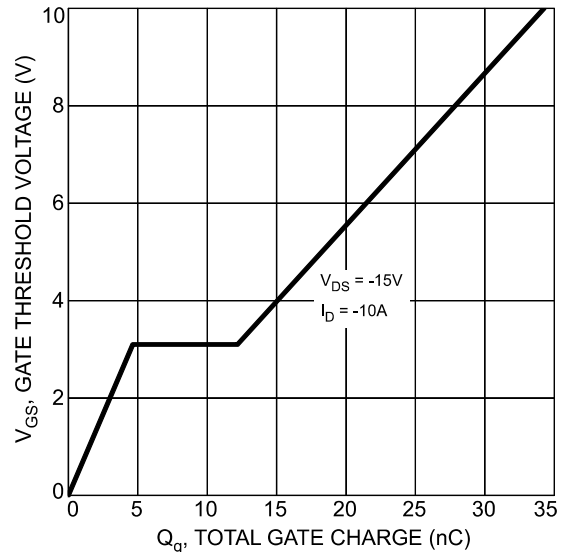


Fig. 10 Gate Charge

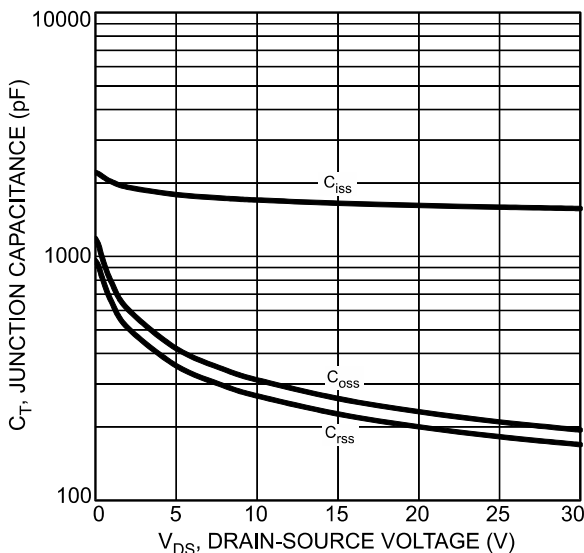


Fig. 11 Typical Junction Capacitance

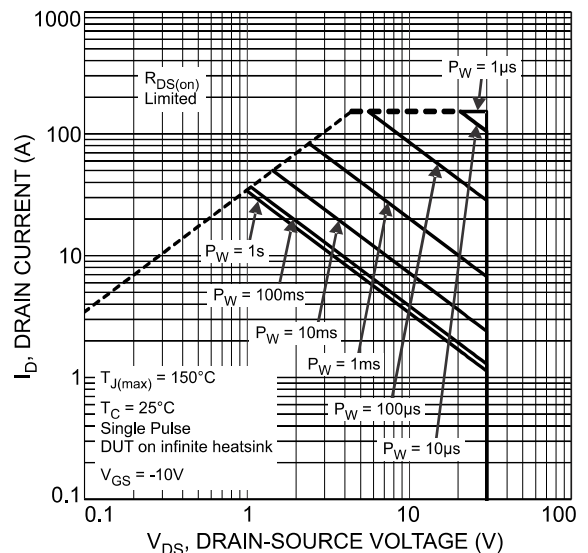


Fig. 12 SOA, Safe Operation Area

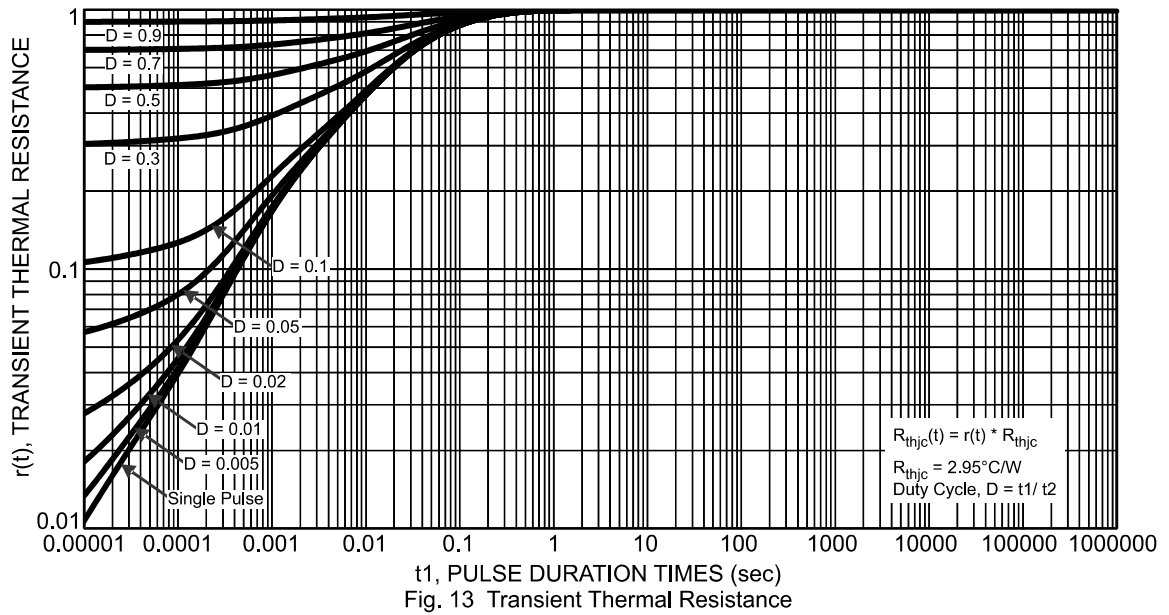
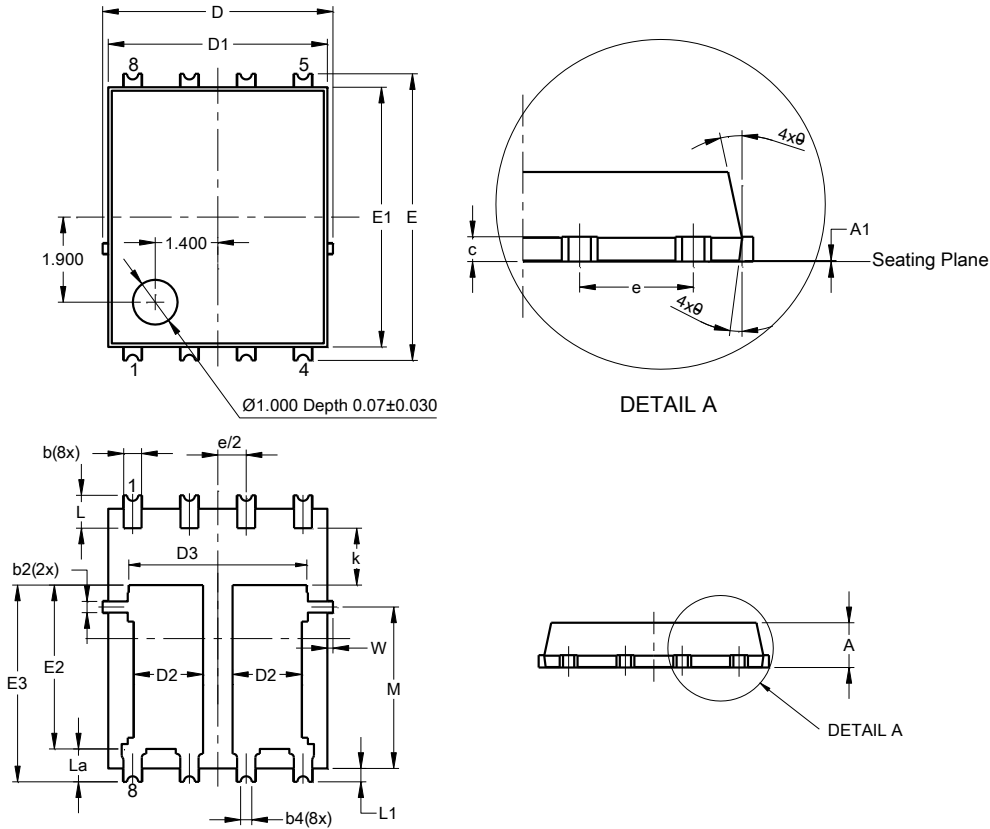


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8/SWP (Type UXD)

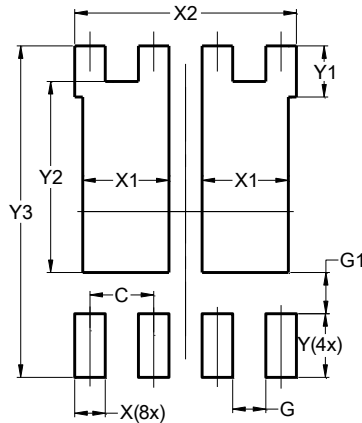


PowerDI5060-8/SWP (Type UXD)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	1.46	1.66	1.55
D3	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	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			

Suggest 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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