

Product Summary

BV _{DSS}	R _{DS(ON)}	I _D T _C = +25°C
-20V	1.9mΩ @ V _{GS} = -10V	-60A
	2.4mΩ @ V _{GS} = -4.5V	-60A
	3.8mΩ @ V _{GS} = -2.5V	-60A

Features

- Thermally Efficient Package-Cooler Running Applications
- < 1.1mm Package Profile – Ideal for Thin Applications
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- **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 [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

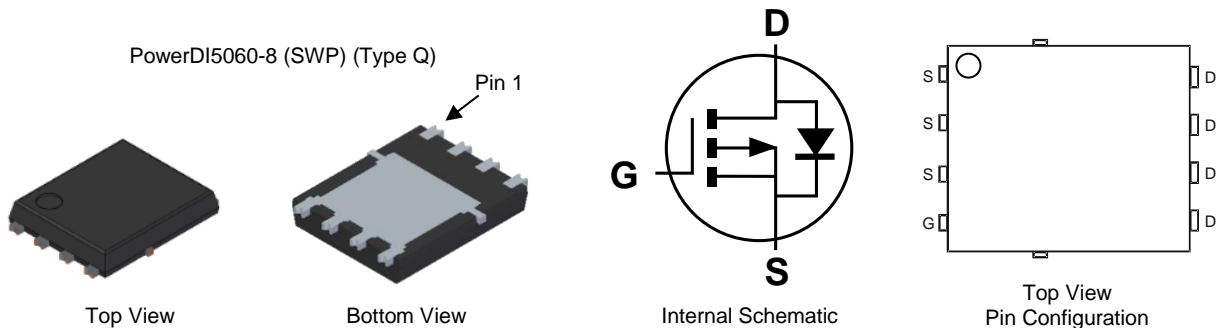
Description and Applications

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

- DC-DC converters
- Load switches

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 Lead-Frame. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.097 grams (Approximate)

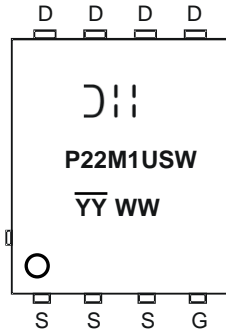


Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP22M1UPSW-13	PowerDI5060-8 (SWP) (Type Q)	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
 P22M1USW = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 24 = 2024)
 WW = Week (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	± 12	V
Continuous Drain Current, $V_{GS} = -10\text{V}$ (Note 5)	Steady State (Note 6)	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	I_D	-60 -60	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$		-42 -33.5	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) (Note 7)			I_{DM}	-100	A
Continuous Body Diode Forward Current (Note 5)	Steady State (Note 6)	$T_C = +25^\circ\text{C}$	I_S	-60	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$		-5.6	A
Pulsed Body Diode Forward Current (10 μs Pulse, Duty Cycle = 1%) (Note 7)			I_{SM}	-100	A
Avalanche Current, $L = 0.1\text{mH}$ (Note 8)			I_{AS}	-37	A
Avalanche Energy, $L = 0.1\text{mH}$ (Note 8)			E_{AS}	-69.8	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P_D	2.3	W
	$t < 10\text{s}$		6.25	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	55	$^\circ\text{C/W}$
	$t < 10\text{s}$		20	
Total Power Dissipation (Note 5)	Steady State	P_D	104	W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	0.9	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Package limited.
 - Silicon limited.
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.

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}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-0.5	—	-1.4	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	1.3	1.9	mΩ	V _{GS} = -10V, I _D = -25A
		—	1.5	2.4		V _{GS} = -4.5V, I _D = -15A
		—	2	3.8		V _{GS} = -2.5V, I _D = -10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	12826	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	2547	—		
Reverse Transfer Capacitance	C _{rss}	—	1924	—		
Gate Resistance	R _G	0.9	4.2	6.6	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = -10V)	Q _g	—	476	585	nC	V _{DD} = -10V, I _D = -20A
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	228	282		
Gate-Source Charge	Q _{gs}	—	24.8	—		
Gate-Drain Charge	Q _{gd}	—	61.9	—		
Turn-On Delay Time	t _{D(ON)}	—	14.2	28	ns	V _{DD} = -10V, V _{GEN} = -4.5V R _{GEN} = 1Ω, I _D = -10A
Turn-On Rise Time	t _R	—	35.4	70		
Turn-Off Delay Time	t _{D(OFF)}	—	361	578		
Turn-Off Fall Time	t _F	—	224	358		
Reverse Recovery Time	t _{RR}	—	63.3	—	ns	I _F = -10A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	63.8	—	nC	
BODY DIODE CHARACTERISTICS						
Continuous Body Diode Forward Current (Notes 5 & 6)	I _S	—	—	-60	A	T _C = +25°C
Diode Forward Voltage	V _{SD}	—	-0.58	-1.1	V	V _{GS} = 0V, I _S = -5A
Reverse Recovery Time (Note 10)	t _{RR}	—	137	219	ns	I _F = -10A, di/dt = 100A/μs
Reverse Recovery Charge (Note 10)	Q _{RR}	—	221	332	nC	
Reverse Recovery Fall Time (Note 10)	t _A	—	39	—	ns	
Reverse Recovery Raise Time (Note 10)	t _B	—	98	—		

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

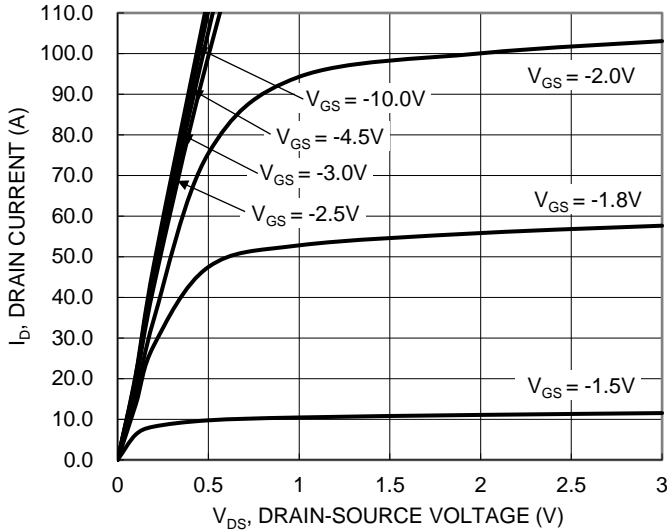


Figure 1. Typical Output Characteristic

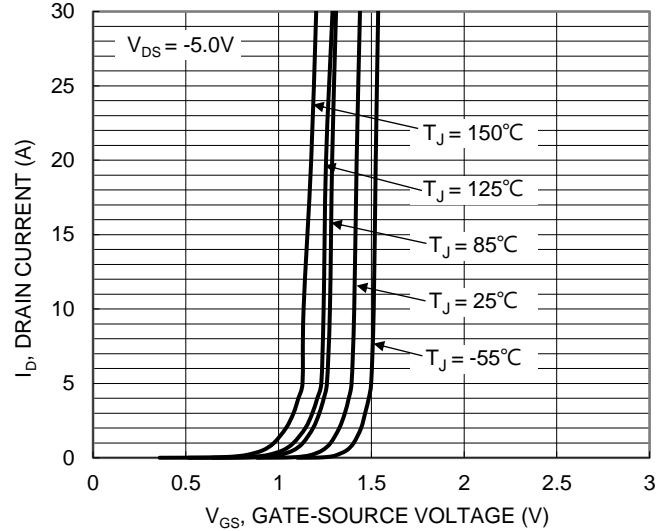


Figure 2. Typical Transfer Characteristic

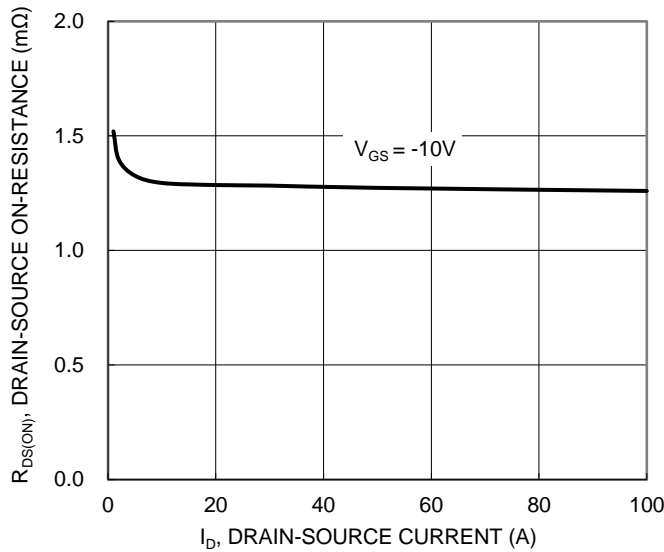


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

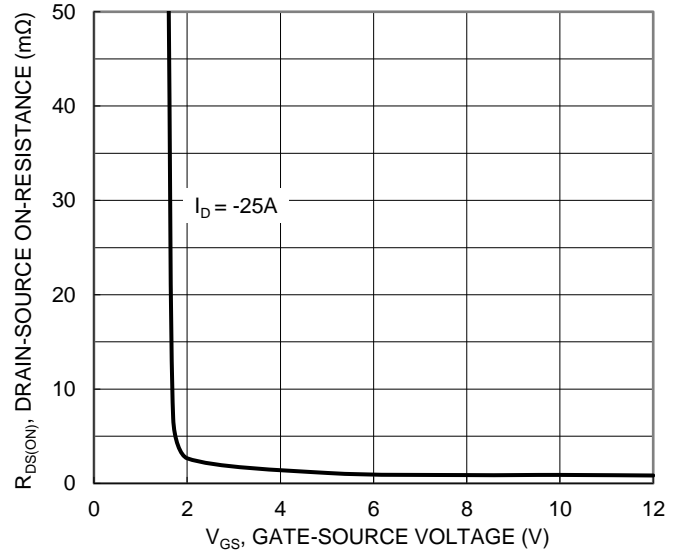


Figure 4. Typical Transfer Characteristic

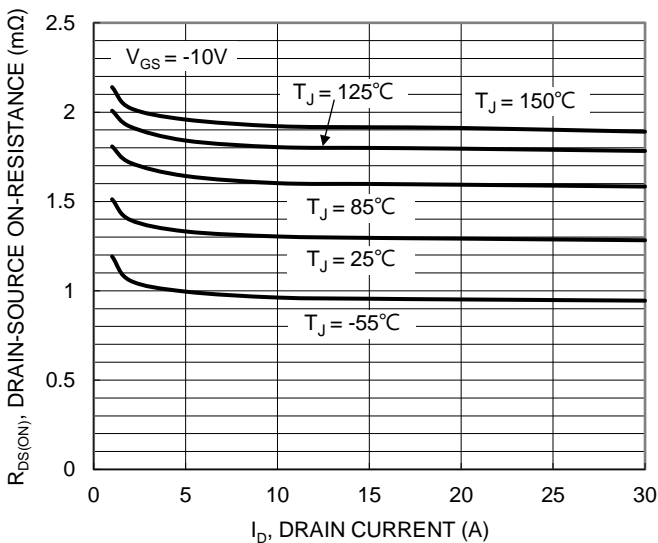


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

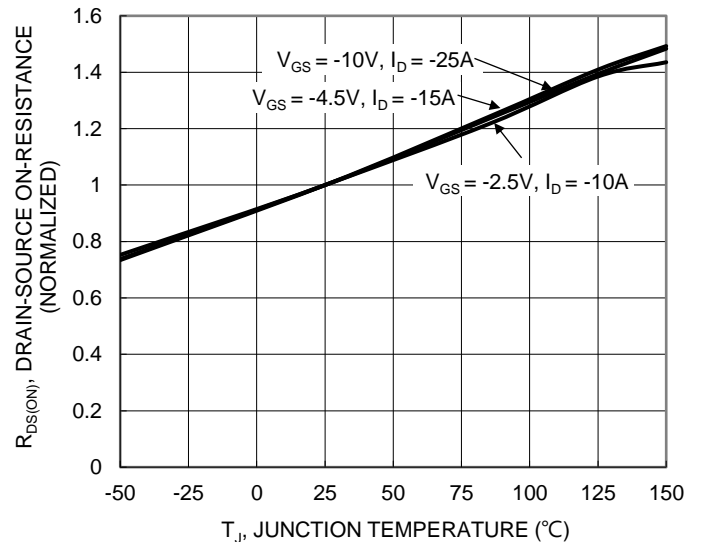


Figure 6. On-Resistance Variation with Temperature

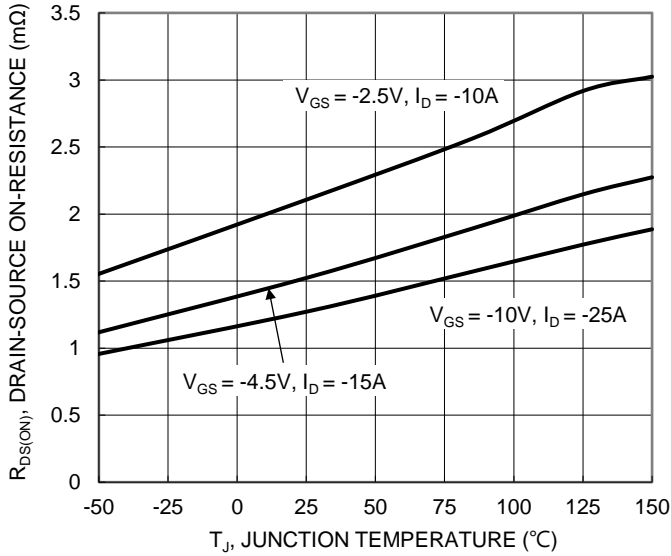


Figure 7. On-Resistance Variation with Temperature

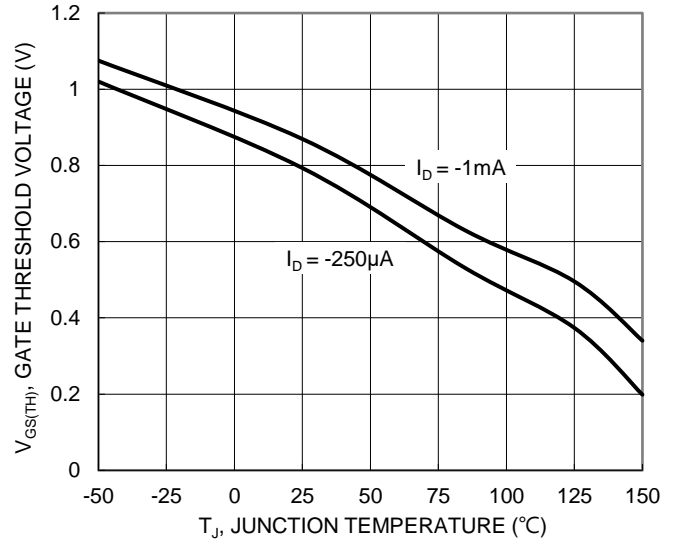


Figure 8. Gate Threshold Variation vs. Junction Temperature

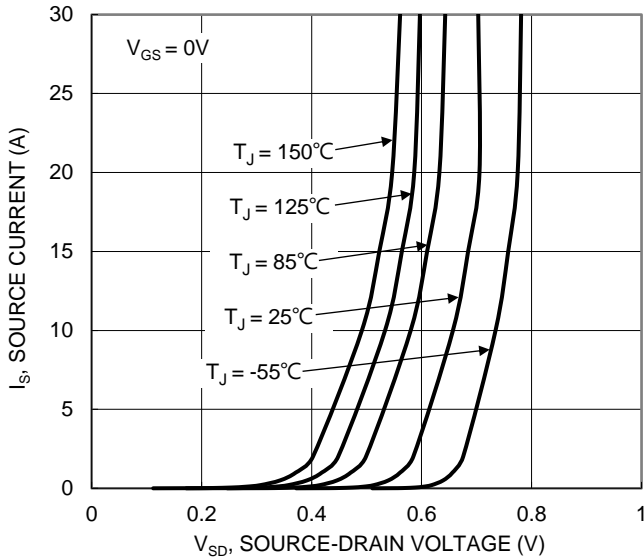


Figure 9. Diode Forward Voltage vs. Current

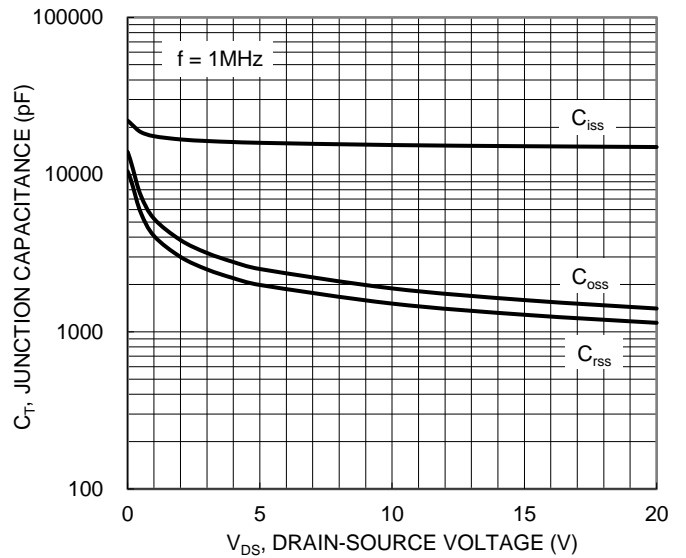


Figure 10. Typical Junction Capacitance

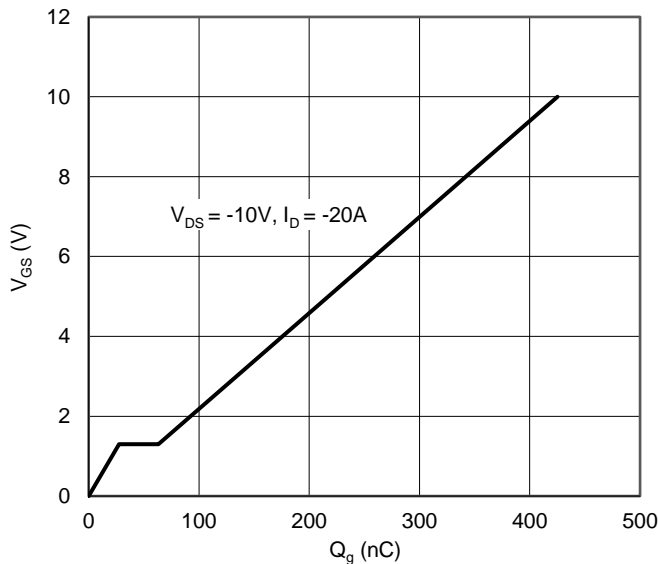


Figure 11. Gate Charge

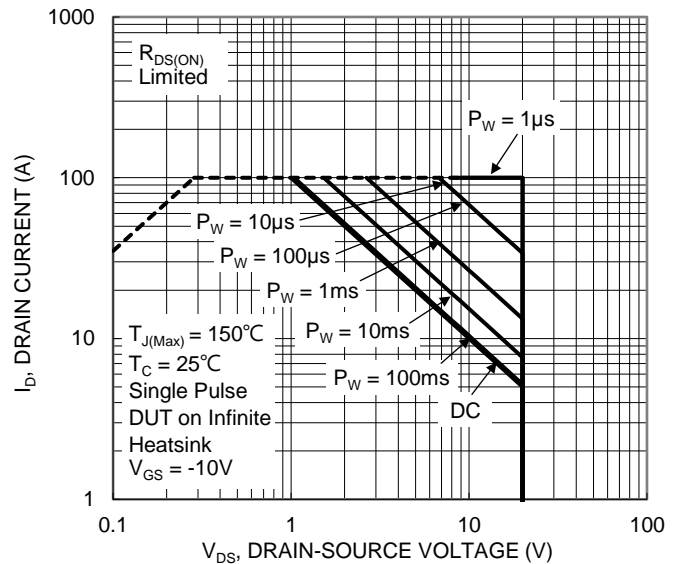


Figure 12. SOA, Safe Operation Area

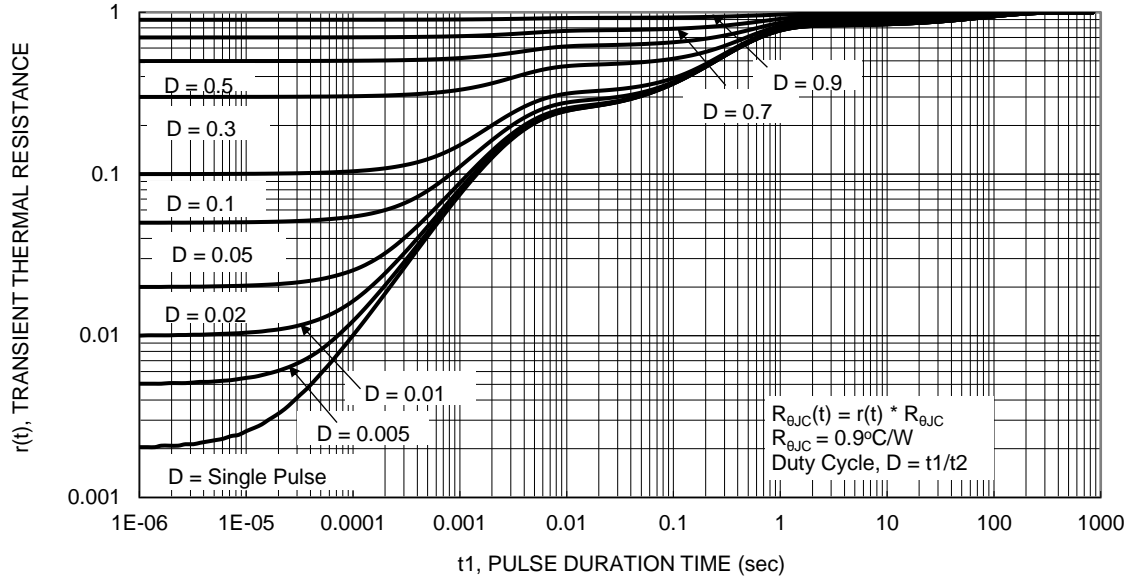
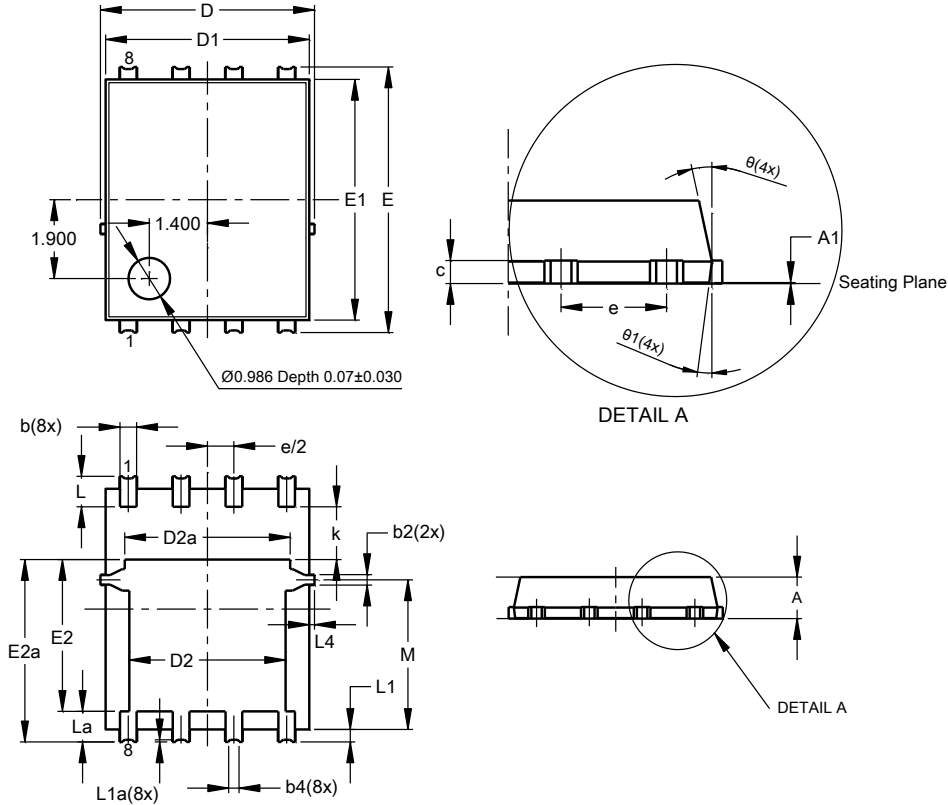


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8 (SWP) (Type Q)

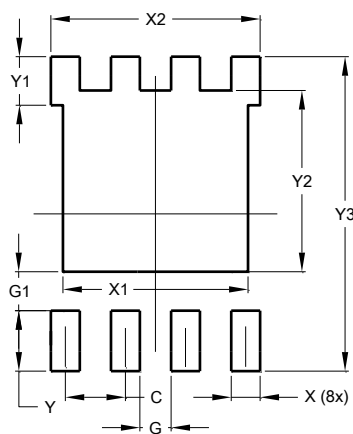


PowerDI5060-8 (SWP) (Type Q)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k	1.05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



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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