30V P-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI5060-8

Product Summary

BV_{DSS}	$R_{DS(on)}$	I_D T_C = +25°C
-30V	3.8mΩ @ V_{GS} = -10V	-100A
	10.0mΩ @ V_{GS} = -6V	-90A

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(on)}$ – Minimizes On State Losses < 1.1mm Package Profile – Ideal for Thin Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DIODES™ DMPH33M8SPSWQ 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/

Description

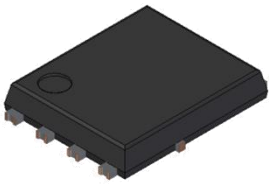
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Switches

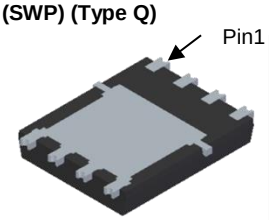
Mechanical Data

- 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 Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.097 grams (Approximate)

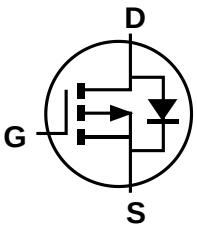
PowerDI5060-8 (SWP) (Type Q)



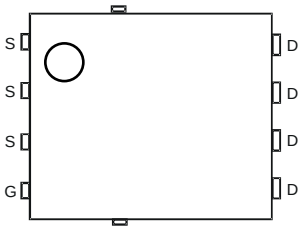
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMPH33M8SPSWQ-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/.

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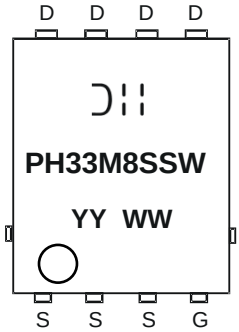

= Manufacturer's Marking
PH33M8SSW = Product Type Marking Code
YYWW or $\overline{YY}$WW = Date Code Marking
YY or $\overline{YY}$ = Last Two Digits of Year (ex: 22 = 2022)
WW = Week Code (01 to 53)

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, V_{GS} = -10V (Note 7) (Package Limited)	T_C = +25°C T_C = +100°C	I_D	-100 -90	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)		I_{DM}	-400	A
Maximum Continuous Body Diode Forward Current (Note 6)		I_S	-4.7	A
Pulsed Body Diode Forward Current (380µs Pulse, Duty Cycle = 1%)		I_{SM}	-400	A
Avalanche Current, L = 0.1mH (Note 8)		I_{AS}	-69	A
Avalanche Energy, L = 0.1mH (Note 8)		E_{AS}	241	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	1.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	90.1	°C/W
Total Power Dissipation (Note 6)		P_D	3.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	44	°C/W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	1.1	°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 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -24V, 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	-3	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	2.4	3.8	mΩ	V_{GS} = -10V, I_D = -20A
		—	4.6	10		V_{GS} = -6V, I_D = -20A
Diode Forward Voltage	V_{SD}	—	—	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	3,775	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	932	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	500	—	pF	
Gate Resistance	R_g	—	21	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (VGS = -4.5V)	Q_g	—	41	—	nC	V_{DS} = -15V, V_{GS} = -10V, I_D = -20A
Total Gate Charge (VGS = -10V)	Q_g	—	81	—	nC	
Gate-Source Charge	Q_{gs}	—	21.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	12.7	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6.9	—	ns	V_{DD} = -15V, V_{GEN} = -10V R_{GEN} = 3Ω, I_D = -20A
Turn-On Rise Time	t_R	—	4.0	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	372	—	ns	
Turn-Off Fall Time	t_F	—	160	—	ns	
Reverse Recovery Time	t_{RR}	—	26.5	—	ns	I_F = -20A, di/dt = 500A/µs
Reverse Recovery Charge	Q_{RR}	—	37.3	—	nC	

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch 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°C.
9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.

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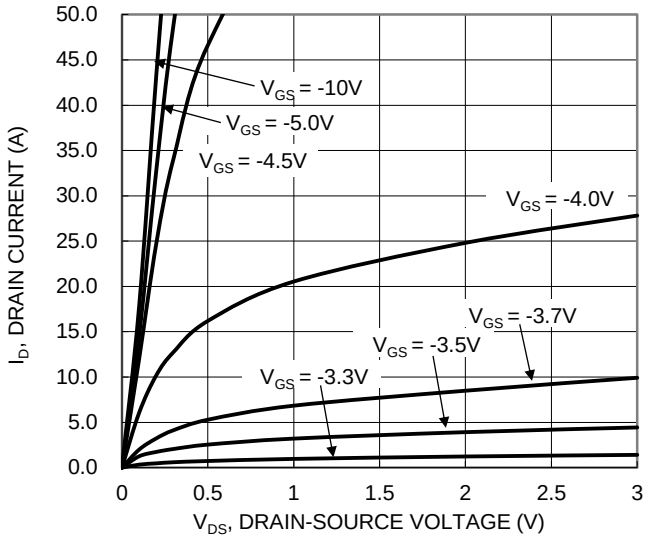

Figure 1. Typical Output Characteristic

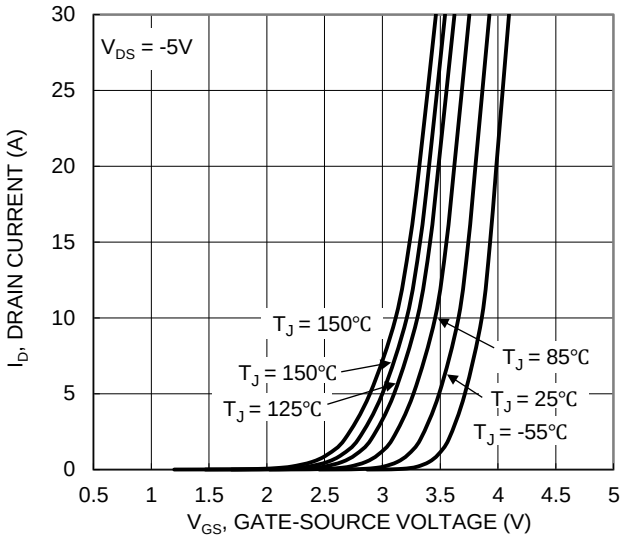

Figure 2. Typical Transfer Characteristic

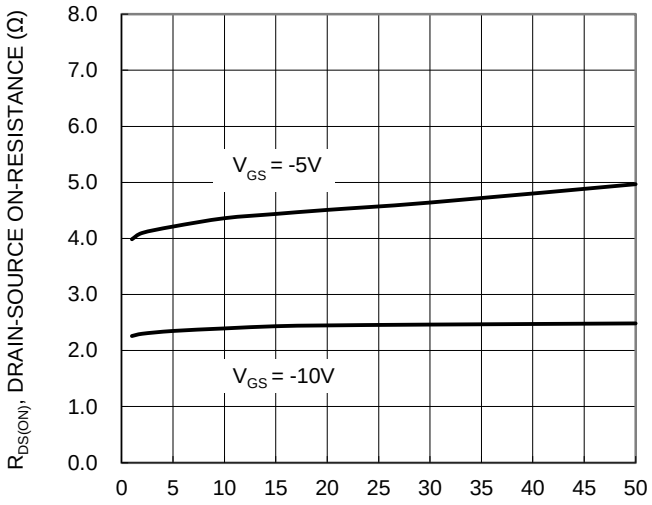

Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

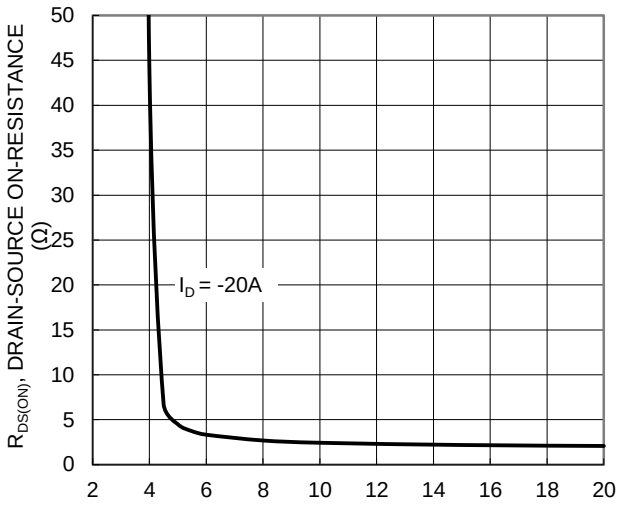

Figure 4. Typical Transfer Characteristic

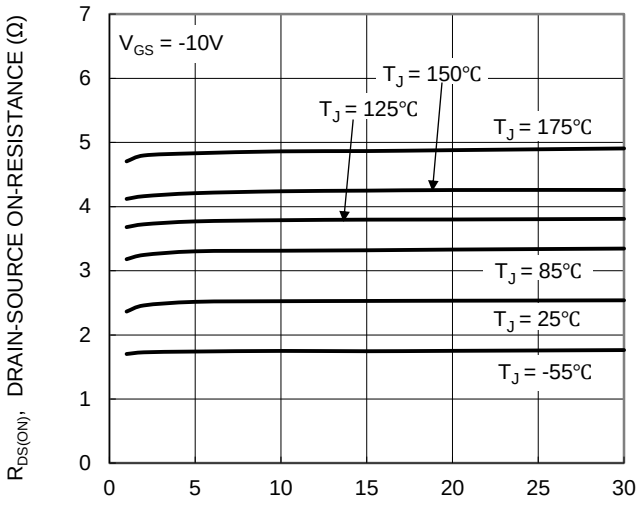

Figure 5. Typical On-Resistance vs. Drain Current and Temperature

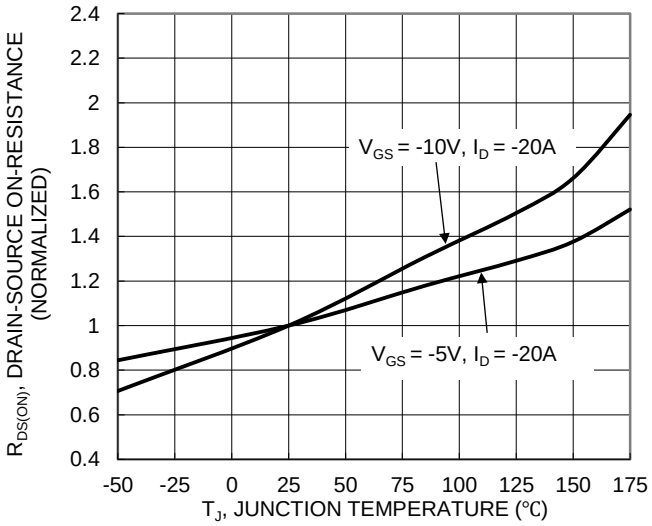

Figure 6. On-Resistance Variation with Temperature

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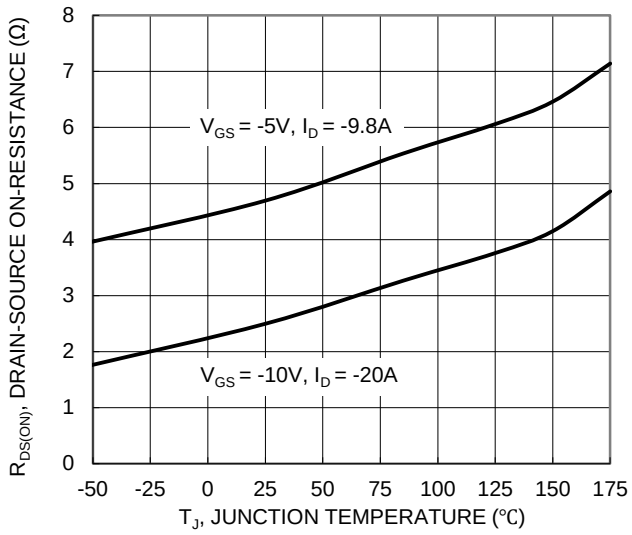

Figure 7. On-Resistance Variation with Temperature

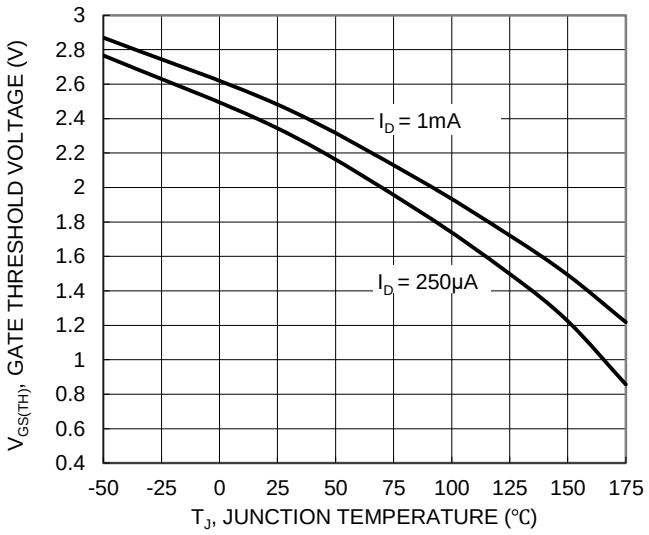

Figure 8. Gate Threshold Variation vs. Junction Temperature

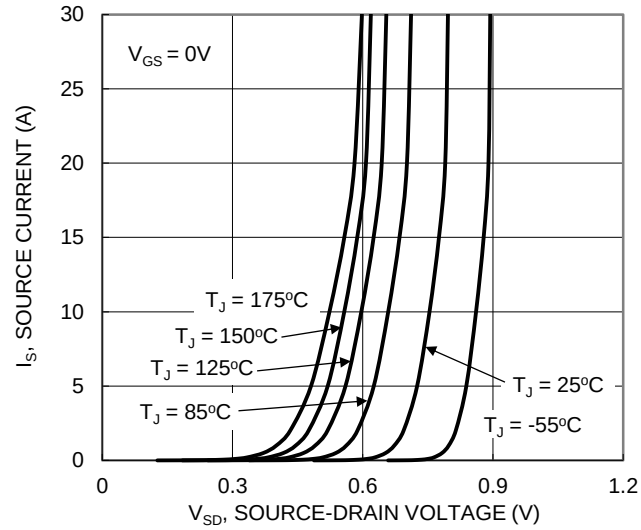

Figure 9. Diode Forward Voltage vs. Current

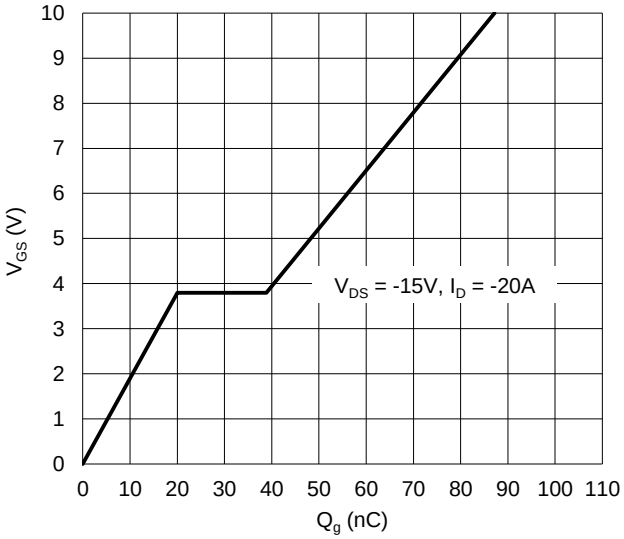

Figure 10. Gate Charge

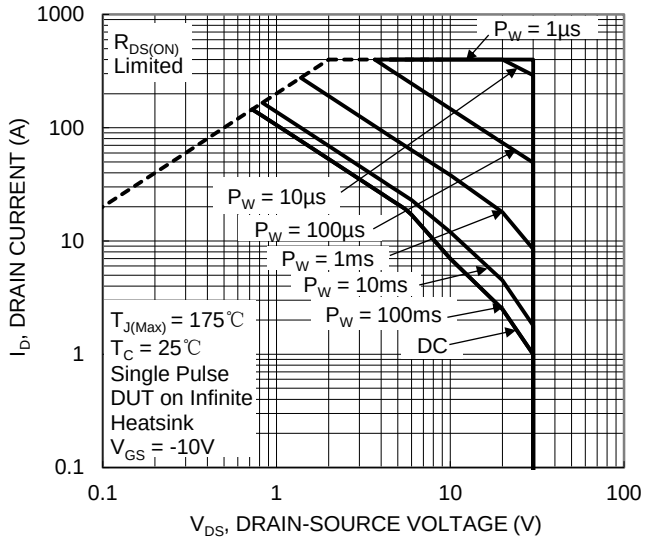

Figure 11. SOA, Safe Operation Area

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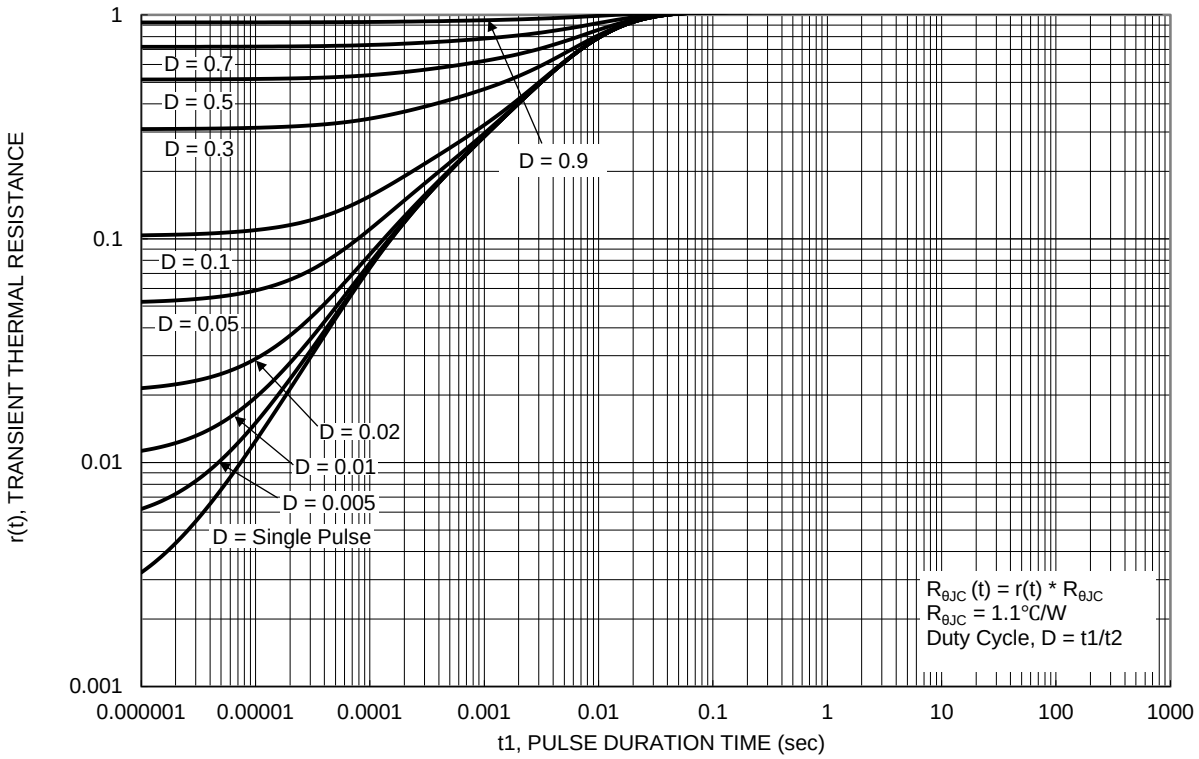

Figure 12. Transient Thermal Resistance

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Package Outline Dimensions

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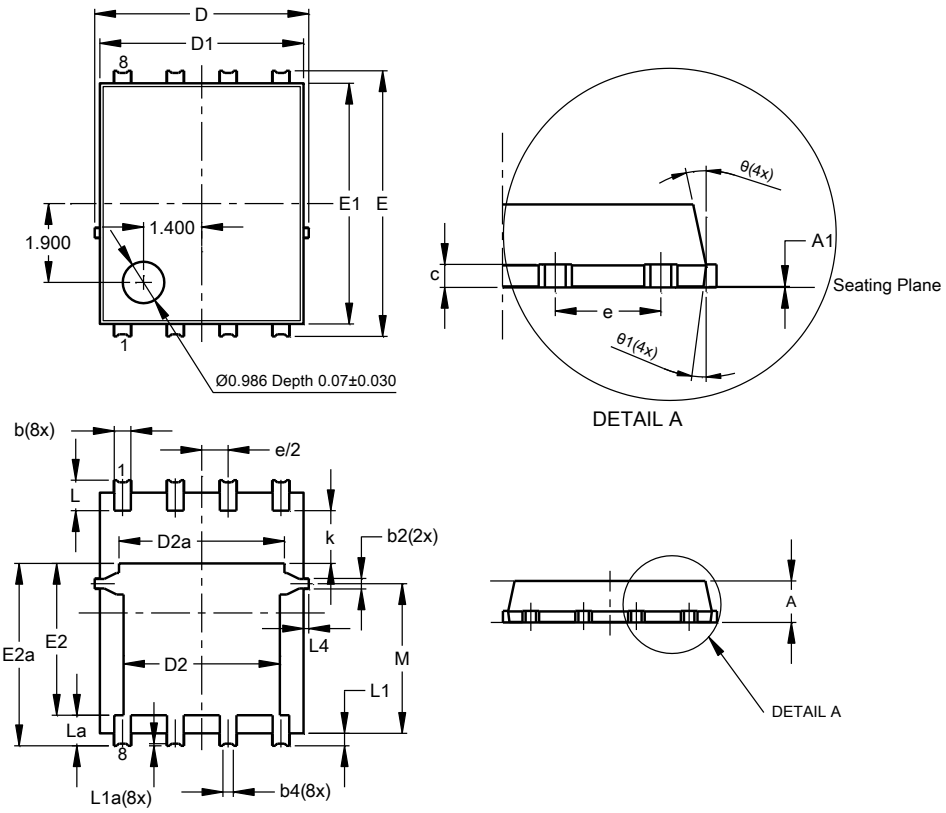
PowerDI5060-8 (SWP) (Type Q)

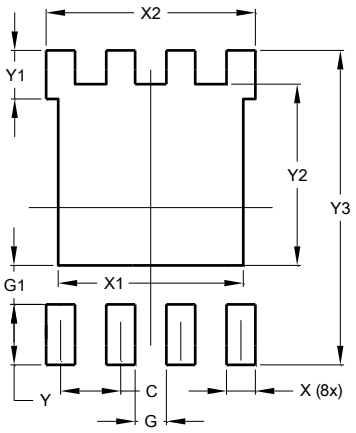


PowerDI5060-8 (SWP) (Type Q)			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.56	3.96	3.76
D2a	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC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