DMT10H010SPS

100V N-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI5060-8

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C (Note 9)
100V	8.8mΩ @ V_{GS} = 10V	100A
	11.5mΩ @ V_{GS} = 6V	98A

Features

- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – Minimizes On-State Losses
- 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 refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**

Description

This new generation N-channel enhancement mode MOSFET is designed to minimize $R_{DS(ON)}$, yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switches.

Applications

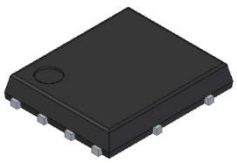
- Motor controls
- DC-DC converters
- Power management

Mechanical Data

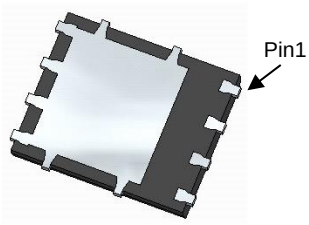
- Package: PowerDI®5060-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminal Finish - Matte Tin Annealed over Copper Lead-Frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.097 grams (Approximate)

Site 1:

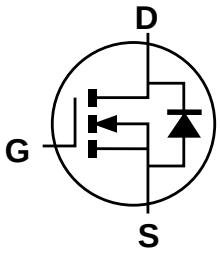
PowerDI5060-8



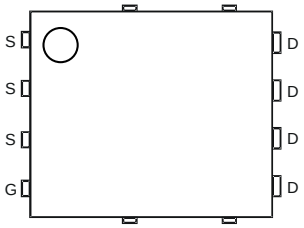
Top View



Bottom View



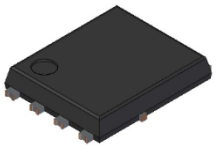
Internal Schematic



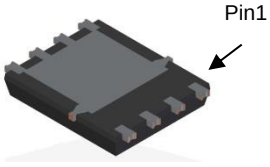
Top View
Pin Configuration

Site 2:

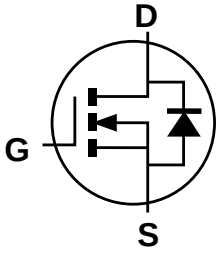
PowerDI5060-8 (SWP) (Type UX)



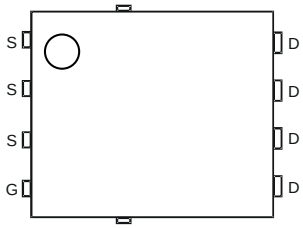
Top View



Bottom View



Internal Schematic



Top View
Pin Configuration

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.

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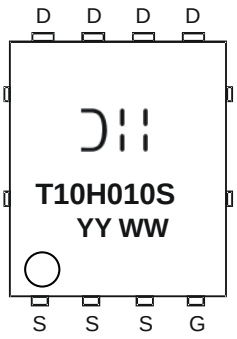
Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Quantity	Carrier
DMT10H010SPS-13	PowerDI5060-8	2,500	Tape & Reel
DMT10H010SPS-13	PowerDI5060-8 (SWP) (Type UX)	2,500	Tape & Reel

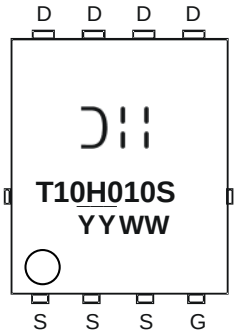
Notes: 4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

PowerDI5060-8



PowerDI5060-8/SWP (Type UX)



= Manufacturer's Marking
T10H010S = Product Type Marking Code
YYWW or $\overline{YY}$WW= Date Code Marking
YY or $\overline{YY}$ = Last Two Digits of Year (ex: 23 = 2023)
WW = Week Code (01 to 53)

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, V_{GS} = 10V (Note 5)	T_A = +25°C T_A = +70°C	I_D	14 11	A
Continuous Drain Current, V_{GS} = 10V (Note 6)	T_C = +25°C (Note 9) T_C = +70°C	I_D	100 90	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I_{DM}	250	A
Maximum Continuous Body Diode Forward Current		I_S	100	A
Avalanche Current, L=0.3mH		I_{AS}	25	A
Avalanche Energy, L=0.3mH		E_{AS}	93.7	mJ
Avalanche Current (Note 8), L=3mH		I_{AS}	14.3	A
Avalanche Energy (Note 8), L=3mH		E_{AS}	307	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	2.5	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	49	°C/W
Total Power Dissipation (Note 6)	T_C = +25°C	P_D	139	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	0.9	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.
9. Package limited.

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Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	100	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 80V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	2	—	4	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	6.6	8.8	mΩ	V_{GS} = 10V, I_D = 13A
		—	8.5	11.5		V_{GS} = 6V, I_D = 13A
Diode Forward Voltage	V_{SD}	—	0.8	1.3	V	V_{GS} = 0V, I_S = 13A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{ISS}	—	4,468	—	pF	V_{DS} = 50V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{OSS}	—	746	—		
Reverse Transfer Capacitance	C_{RSS}	—	32	—		
Gate Resistance	R_G	—	0.91	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_G	—	56.4	—	nC	V_{DD} = 50V, I_D = 13A, V_{GS} = 10V
Gate-Source Charge	Q_{GS}	—	15.4	—		
Gate-Drain Charge	Q_{GD}	—	14	—		
Turn-On Delay Time	$t_{D(ON)}$	—	18.6	—	ns	V_{DD} = 50V, V_{GS} = 10V, I_D = 13A, R_g = 6Ω
Turn-On Rise Time	t_R	—	22.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	44.8	—		
Turn-Off Fall Time	t_F	—	29.5	—		
Reverse Recovery Time	t_{RR}	—	54.5	—	ns	I_F = 13A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	106.4	—	nC	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

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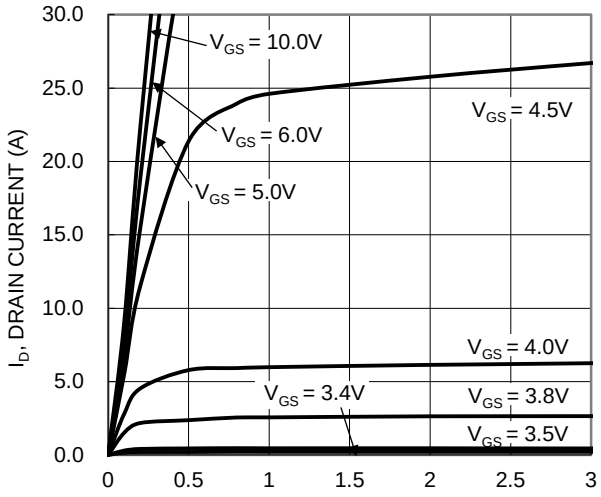


Figure 1.Typical Output Characteristic

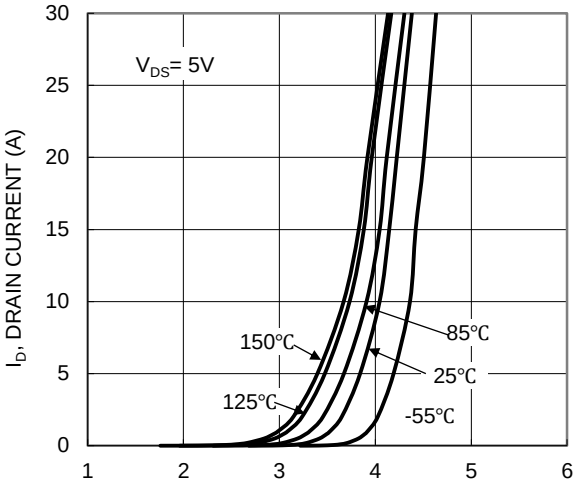


Figure 2. Typical Transfer Characteristic

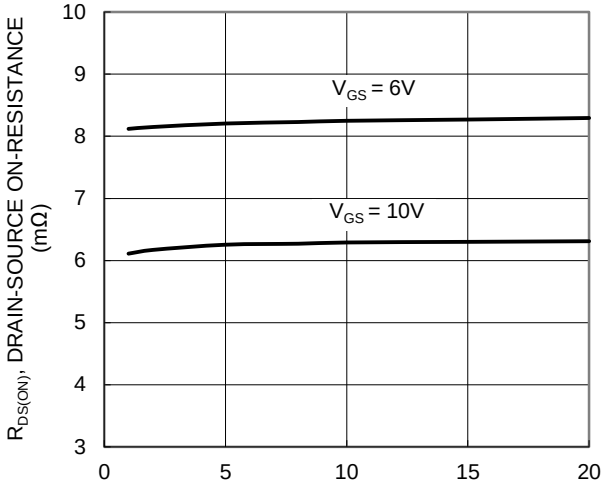


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

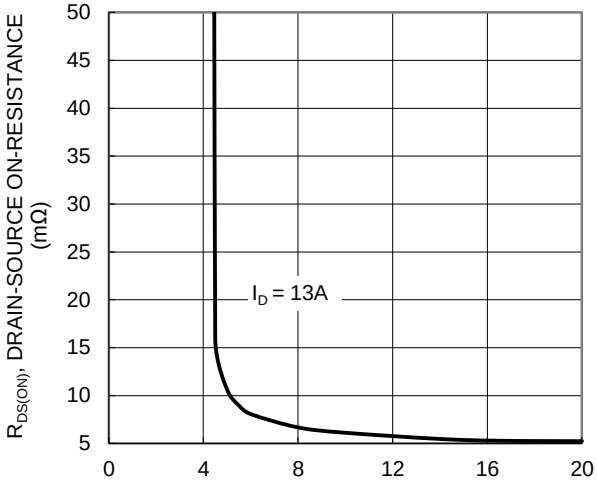


Figure 4. Typical Transfer Characteristic

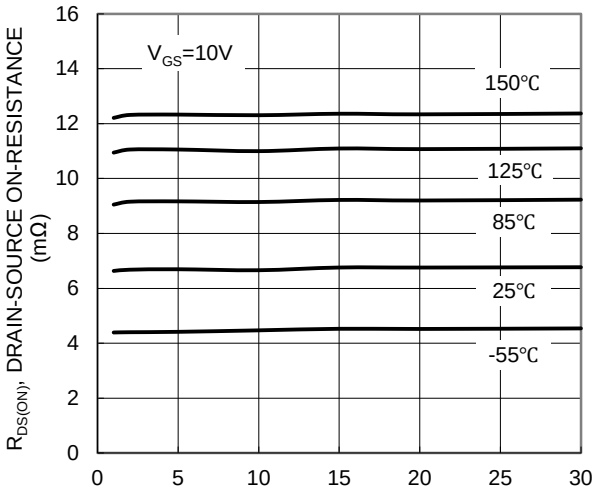


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

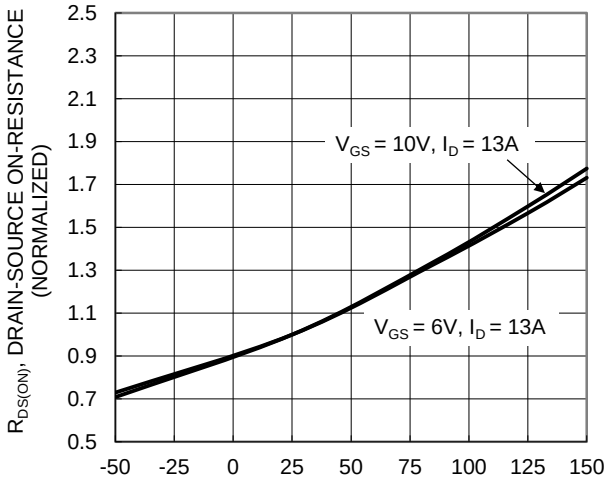


Figure 6. On-Resistance Variation with JunctionTemperature

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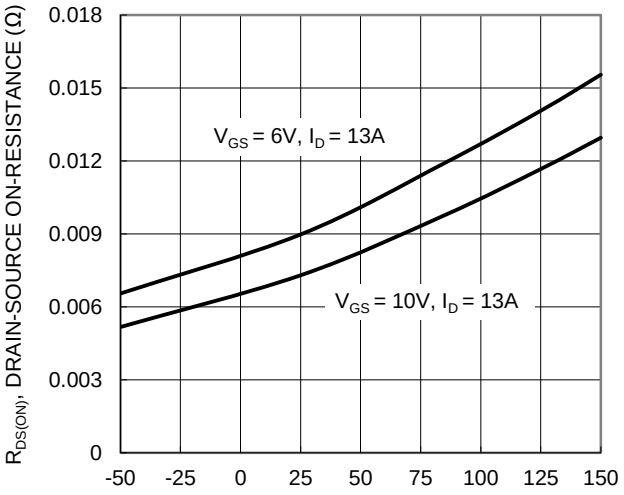


Figure 7. On-Resistance Variation with Junction Temperature

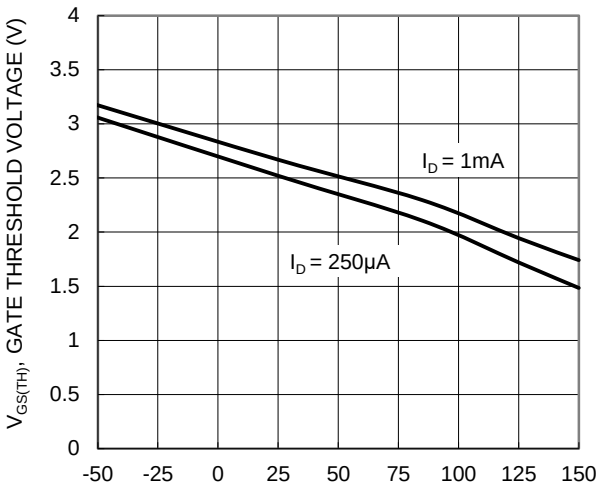


Figure 8. Gate Threshold Variation vs. JunctionTemperature

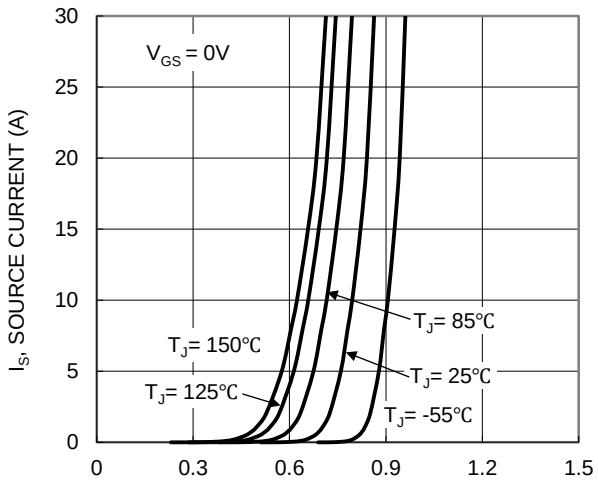


Figure 9. Diode Forward Voltage vs. Current

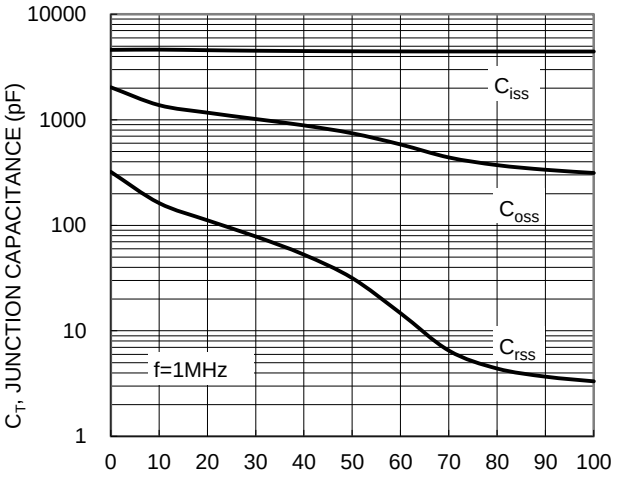


Figure 10. Typical Junction Capacitance

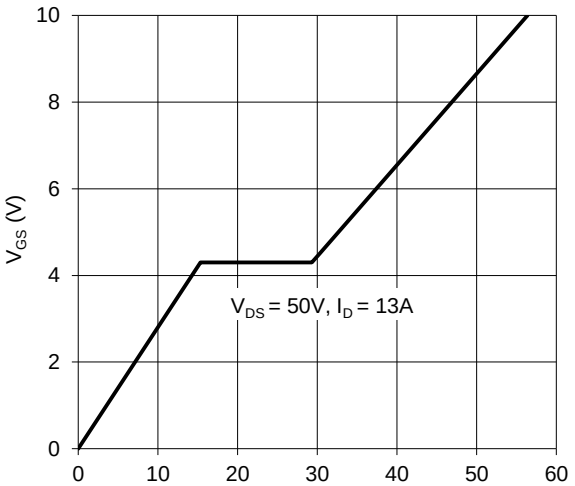


Figure 11. Gate Charge

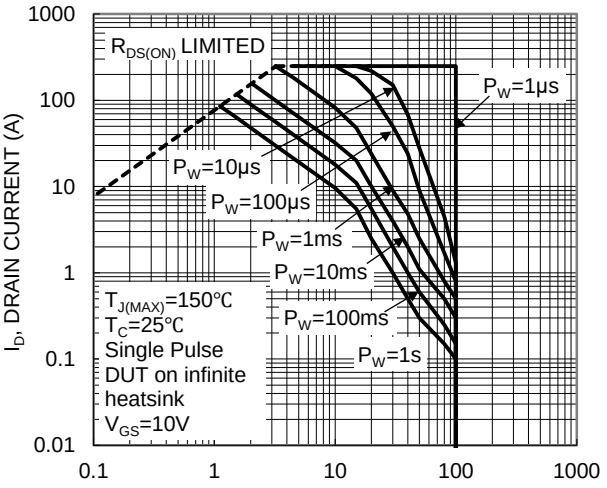


Figure 12. SOA, Safe Operation Area

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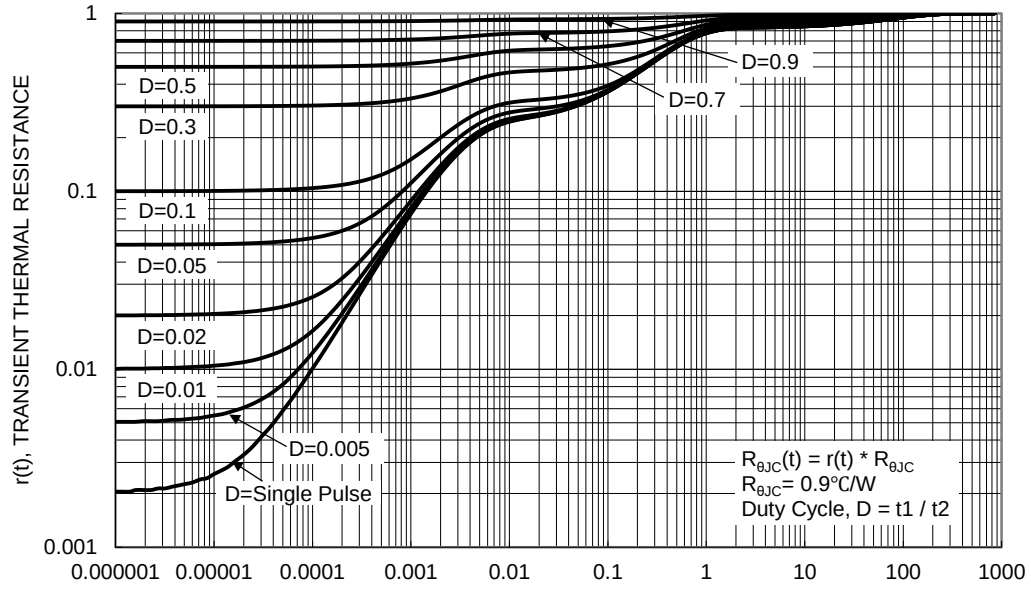


Figure 13. Transient Thermal Resistance

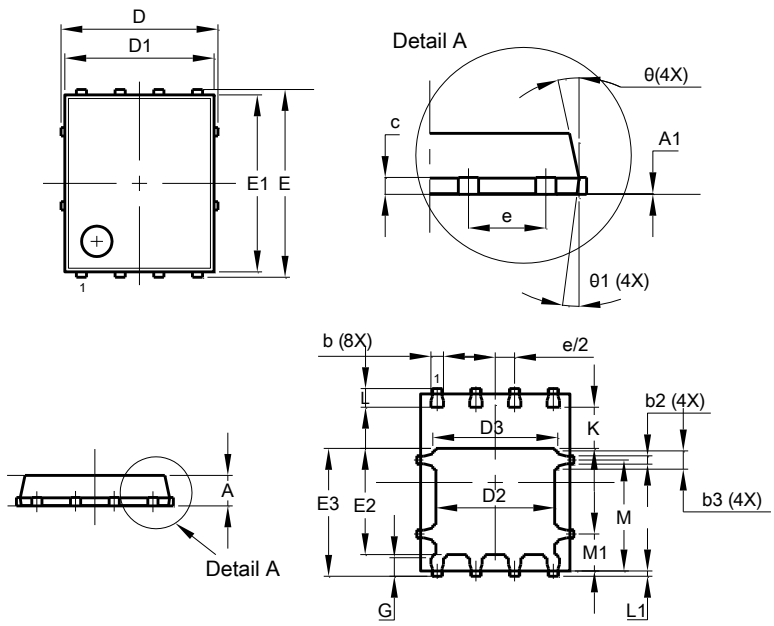
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Package Outline Dimensions

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

Site 1:

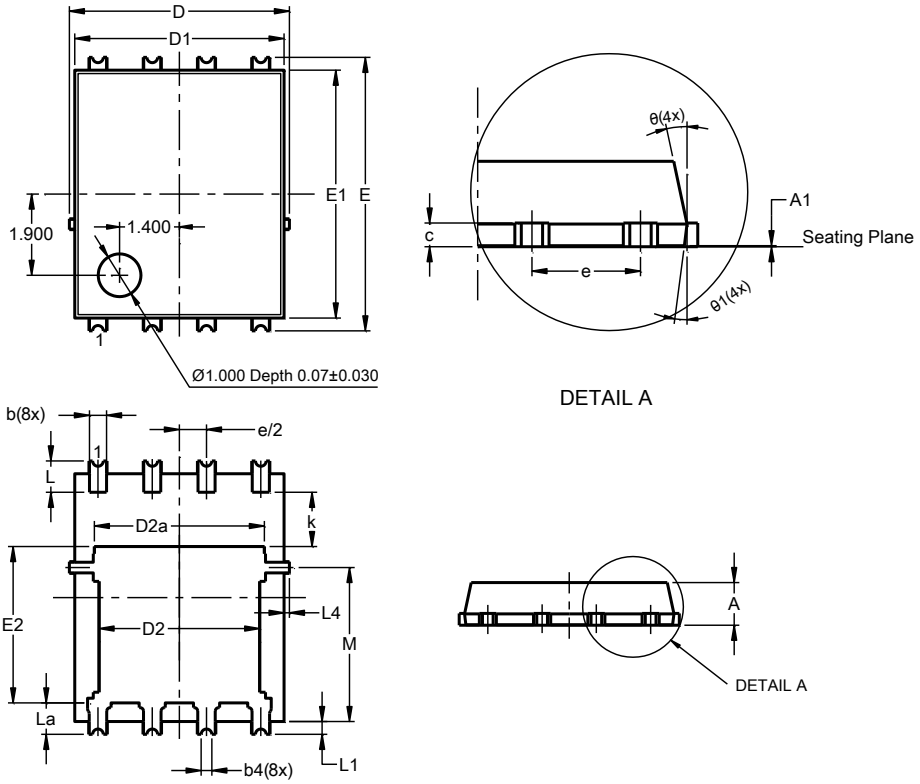
PowerDI5060-8



PowerDI5060-8			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.10	1.00
A1	0.00	0.05	–
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
K	0.51	–	–
L	0.51	0.71	0.61
L1	0.100	0.200	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
Θ	10º	12º	11º
Θ1	6º	8º	7º
All Dimensions in mm			

Site 2:

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			

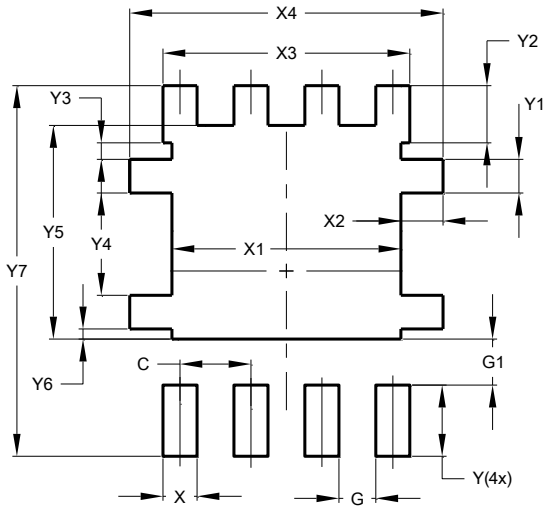
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Suggested Pad Layout

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Site 1

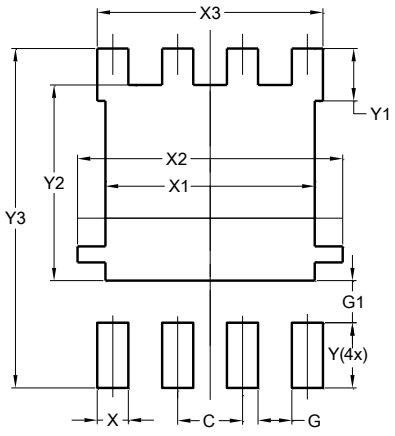
PowerDI5060-8



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	4.100
X2	0.755
X3	4.420
X4	5.610
Y	1.270
Y1	0.600
Y2	1.020
Y3	0.295
Y4	1.825
Y5	3.810
Y6	0.180
Y7	6.610

Site 2:

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	5.190
X3	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

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