

Product Summary

BV _{bss}	R _{DS(ON)} Max	I _D Max T _c = +25°C
60V	19mΩ @ V _{GS} = 10V	33.2A
	28mΩ @ V _{GS} = 4.5V	28A

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
<https://www.diodes.com/quality/product-definitions/>
- **An automotive-compliant part is available under separate datasheet (DMTH6016LPDQ)**

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.

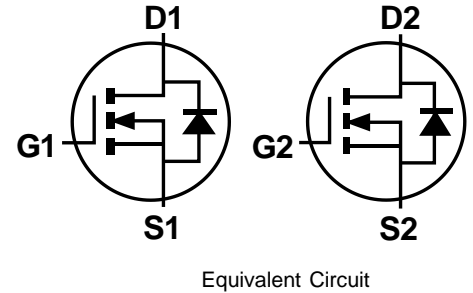
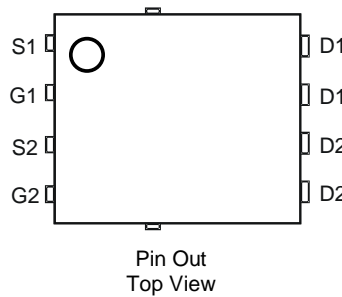
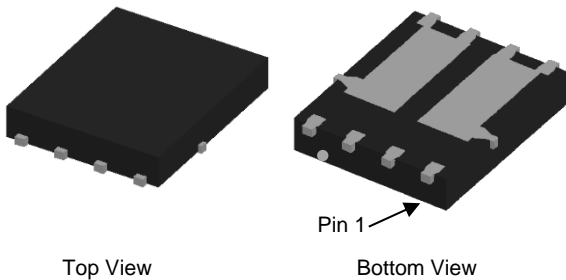
- Engine-management systems
- Body control electronics
- DC-DC converters

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
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.097 grams (Approximate)

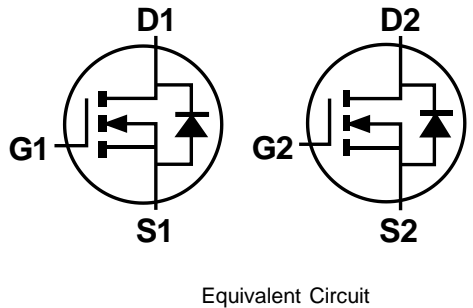
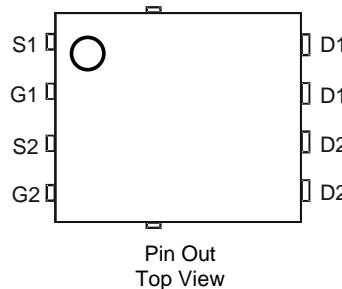
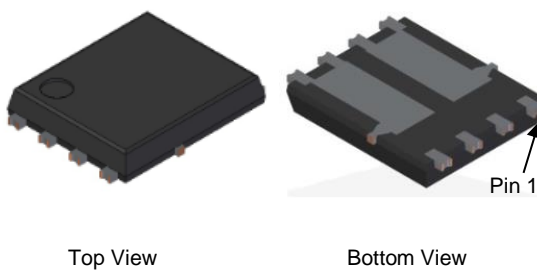
Site 1:

PowerDI5060-8 (Type C)



Site 2:

PowerDI5060-8/SWP (Type UXD)



- 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.

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMTH6016LPD-13	PowerDI5060-8 (Type C)	2,500	Tape & Reel
	PowerDI5060-8/SWP (Type UXD)	2,500	Tape & Reel

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

Marking Information


⤴⤵ = Manufacturer's Marking
 TH6016LD = Product Type Marking Code
 YYWW = Date Code Marking
 YY or YY = Year (ex: 23 = 2023)
 WW = Week (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current (Note 5)	I_D	$T_C = +25^\circ\text{C}$	33.2
		$T_C = +100^\circ\text{C}$	23.7
Continuous Drain Current (Note 6)	I_D	$T_A = +25^\circ\text{C}$	9.2
		$T_A = +100^\circ\text{C}$	6.5
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	50	A
Maximum Continuous Body Diode Forward Current (Note 5)	I_S	31	A
Avalanche Current, $L = 0.1\text{mH}$	I_{AS}	15.3	A
Avalanche Energy, $L = 0.1\text{mH}$	E_{AS}	11.7	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P_D	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	58	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)	P_D	37.5	W
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	4	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

Notes: 5. Thermal resistance from junction to soldering point (on the exposed drain pad).
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

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}	60	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 48V, 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)}	1	—	2.5	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	14.5	19	mΩ	V _{GS} = 10V, I _D = 10A
		—	20.9	28		V _{GS} = 4.5V, I _D = 6A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	864	—	pF	V _{DS} = 30V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	282	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	27	—	pF	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Gate Resistance	R _g	—	1.3	—	Ω	
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	8.4	—	nC	V _{DS} = 30V, I _D = 10A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	17	—	nC	
Gate-Source Charge	Q _{gs}	—	3.1	—	nC	
Gate-Drain Charge	Q _{gd}	—	4.3	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.4	—	ns	V _{DD} = 30V, V _{GS} = 10V I _D = 10A, R _g = 6Ω
Turn-On Rise Time	t _R	—	5.2	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	13	—	ns	
Turn-Off Fall Time	t _F	—	7	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	22	—	ns	I _F = 10A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	11	—	nC	

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

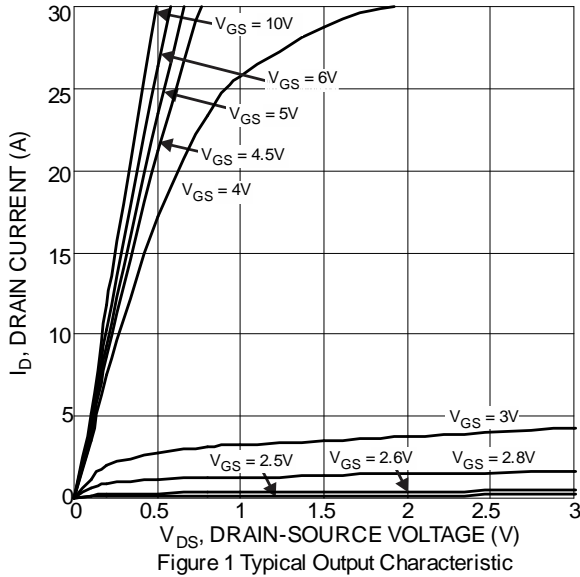


Figure 1 Typical Output Characteristic

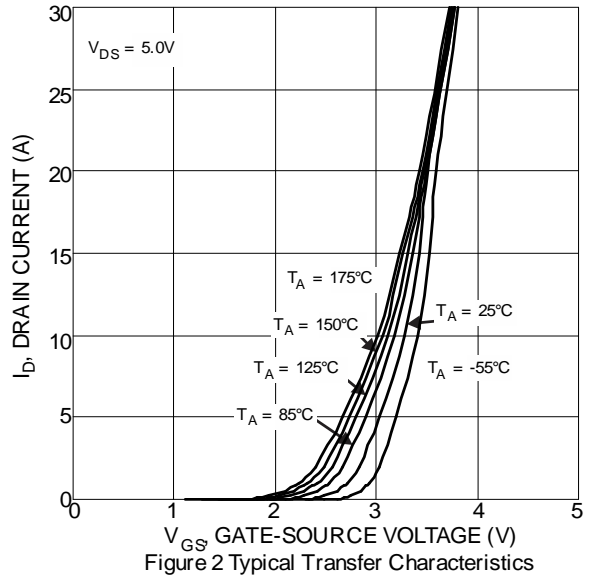


Figure 2 Typical Transfer Characteristics

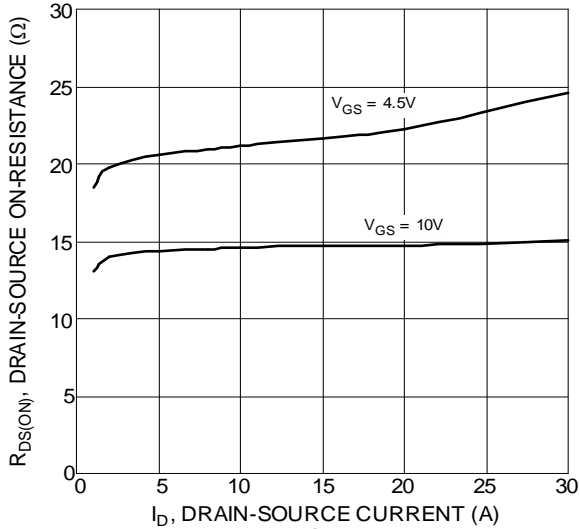


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

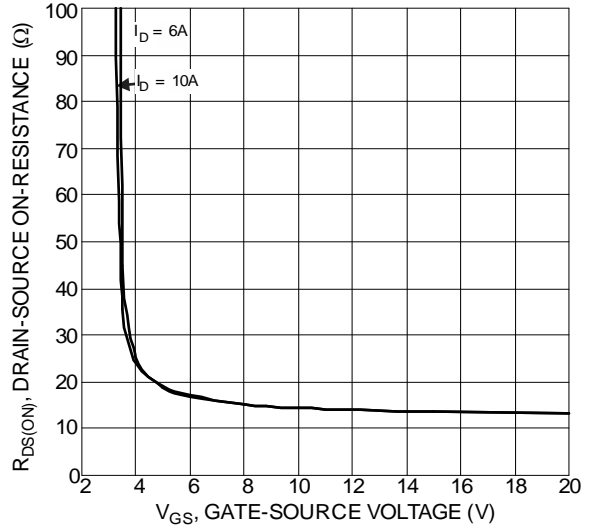


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

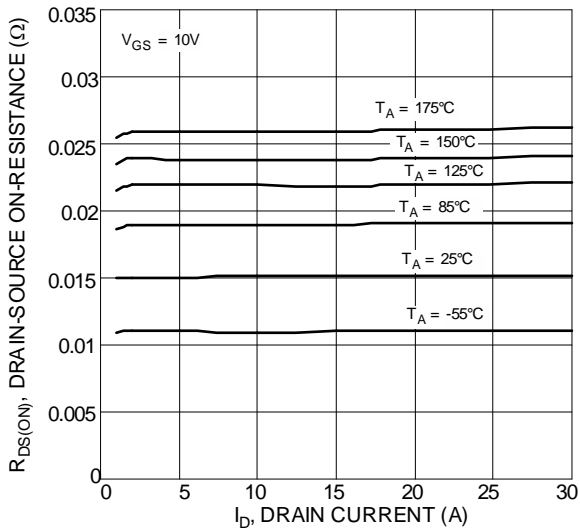


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

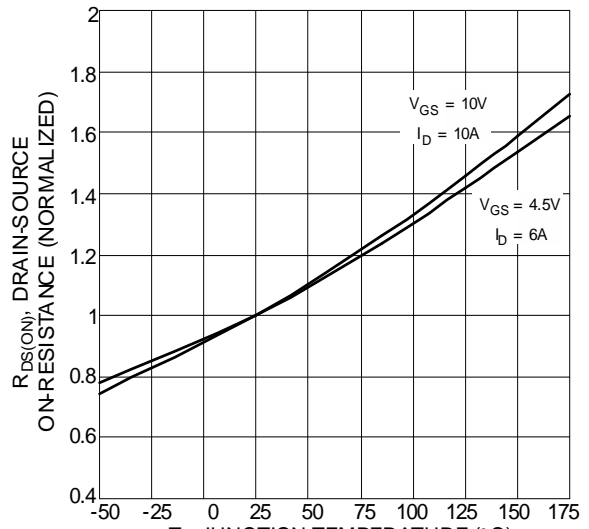


Figure 6 On-Resistance Variation with Temperature

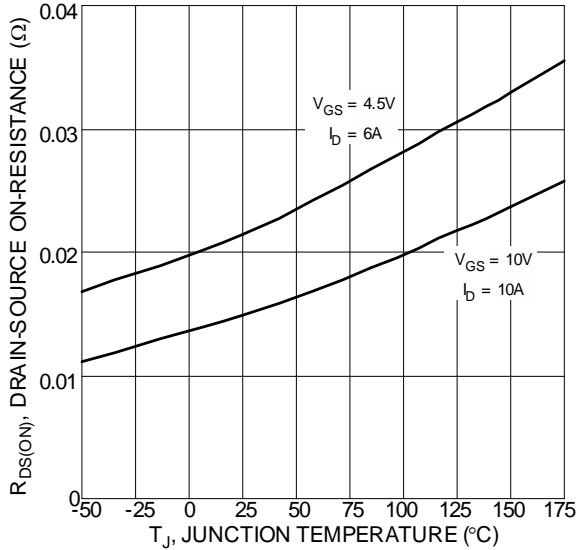


Figure 7 On-Resistance Variation with Temperature

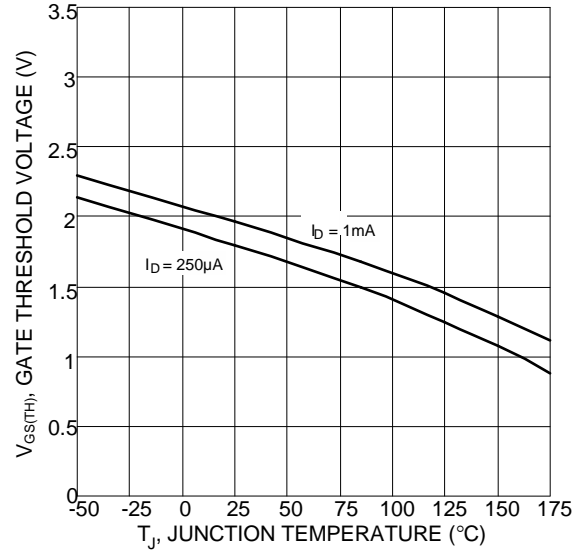


Figure 8 Gate Threshold Variation vs. Junction Temperature

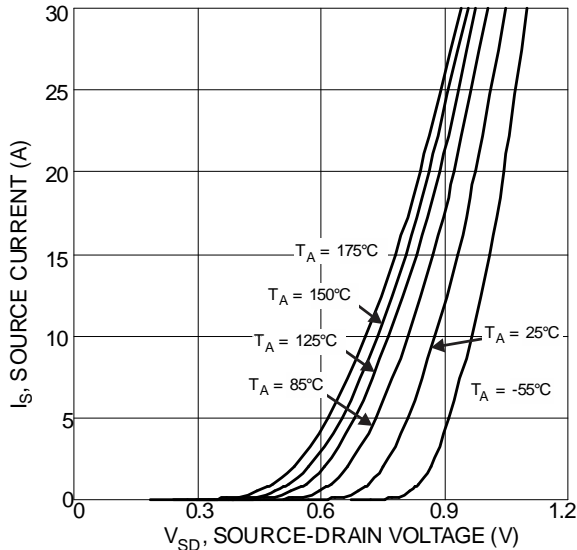


Figure 9 Diode Forward Voltage vs. Current

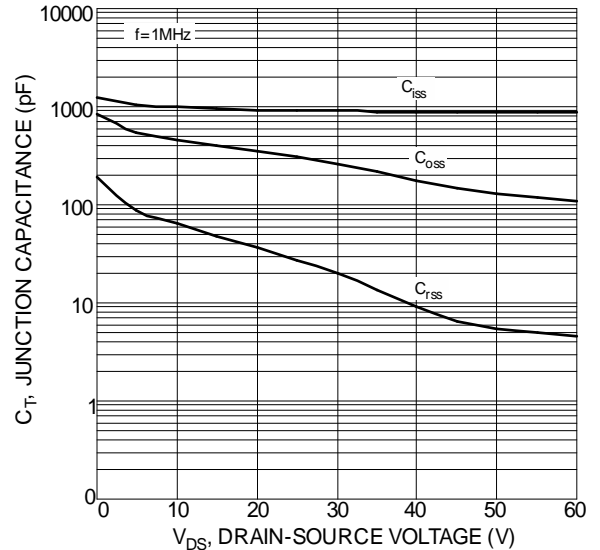


Figure 10 Typical Junction Capacitance

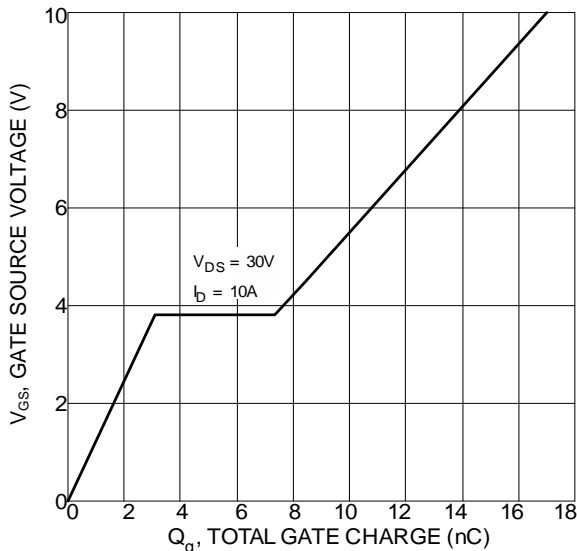


Figure 11 Gate Charge

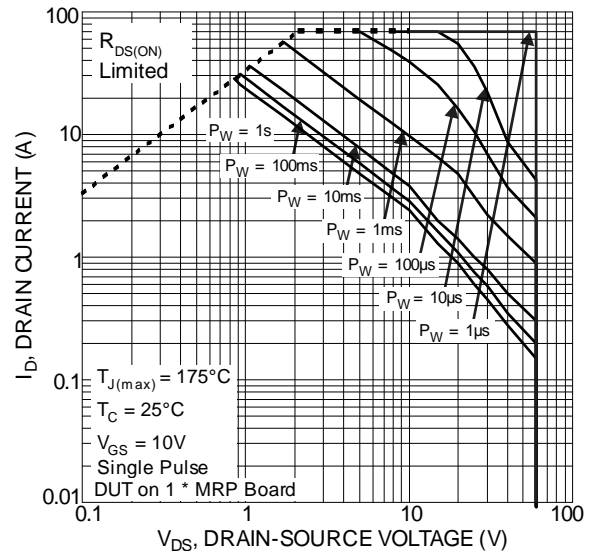


Figure 12 SOA, Safe Operation Area

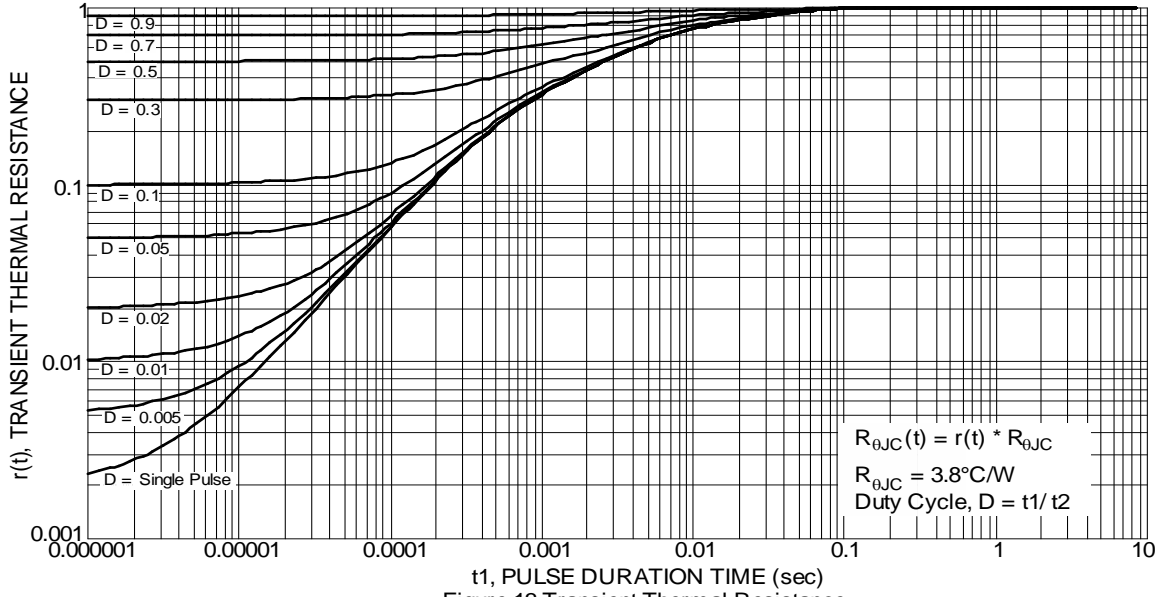


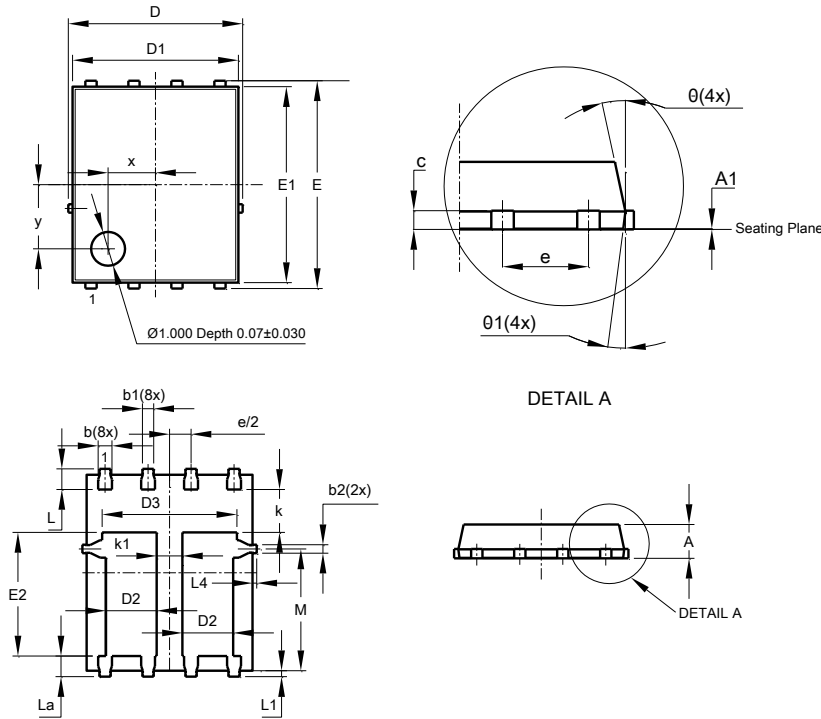
Figure 13 Transient Thermal Resistance

Package Outline Dimensions

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

Site 1:

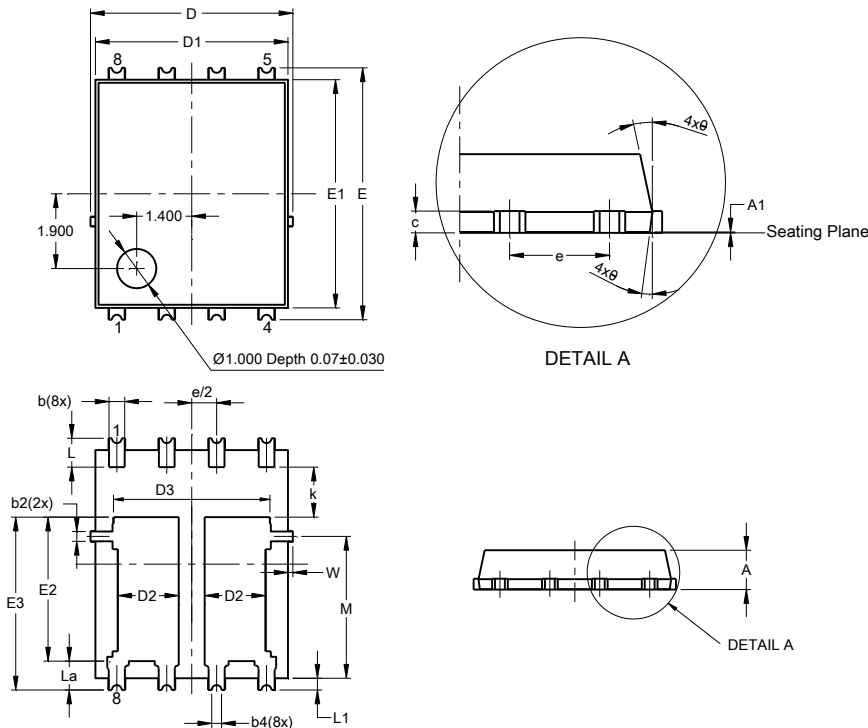
PowerDI5060-8 (Type C)



PowerDI5060-8 (Type C)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	1.40	1.60	1.50
D3	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.76	3.66
e	1.27BSC		
k	-	-	1.27
k1	0.56	-	-
L	0.51	0.71	0.61
La	0.51	0.71	0.61
L1	0.05	0.20	0.175
L4	-	-	0.125
M	3.50	3.71	3.605
x	-	-	1.400
y	-	-	1.900
θ	10°	12°	11°
θ1	6°	8°	7°
All Dimensions in mm			

Site 2:

PowerDI5060-8/SWP (Type UXD)



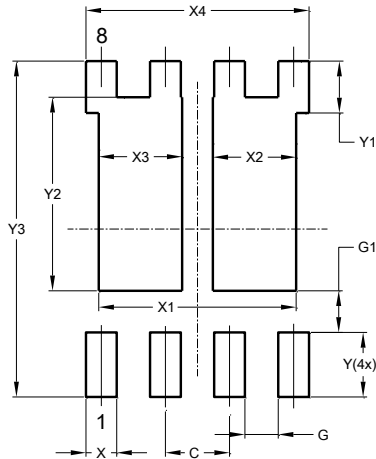
PowerDI5060-8/SWP (Type UXD)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	--
b	0.30	0.50	0.41
b2	0.20	0.35	0.25
b4	0.25REF		
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	1.46	1.66	1.55
D3	3.78	4.18	3.98
E	6.40 BSC		
E1	5.60	6.00	5.80
E2	3.46	3.86	3.66
E2a	4.195	4.595	4.395
e	1.27BSC		
k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

Suggested Pad Layout

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

Site 1:

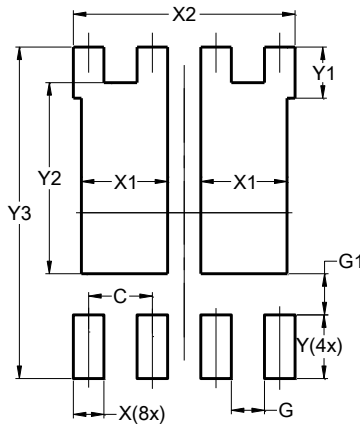
PowerDI5060-8 (Type C)



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	0.610
X1	3.910
X2	1.650
X3	1.650
X4	4.420
Y	1.270
Y1	1.020
Y2	3.810
Y3	6.610

Site 2:

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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