

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
60V	19mΩ @ V <sub>GS</sub> = 10V	33.2A
	28mΩ @ V <sub>GS</sub> = 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Data Sheet ([DMTH6016LPDQ](#))**

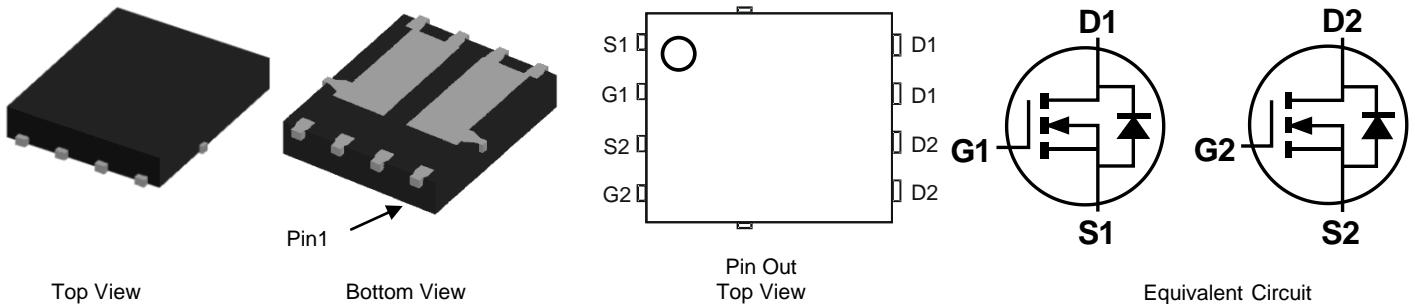
## Description and Applications

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>), yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Engine Management Systems
- Body Control Electronics
- DCDC Converters

## Mechanical Data

- Case: PowerDI<sup>®</sup>5060-8 (Type C)
- Case 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
- Weight: 0.097 grams (Approximate)

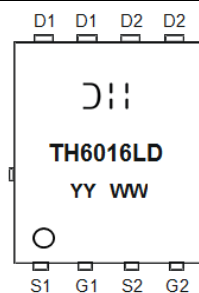


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH6016LPD-13	PowerDI5060-8 (Type C)	2,500/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  
 TH6016LD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 18 = 2018)  
 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	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6)	$I_D$	$T_C = +25^\circ\text{C}$	33.2
		$T_C = +100^\circ\text{C}$	23.7
Continuous Drain Current (Note 5)	$I_D$	$T_A = +25^\circ\text{C}$	9.2
		$T_A = +100^\circ\text{C}$	6.5
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	50	A
Maximum Continuous Body Diode Forward Current (Note 6)	$I_S$	31	A
Avalanche Current, L = 0.1mH	$I_{AS}$	15.3	A
Avalanche Energy, L = 0.1mH	$E_{AS}$	11.7	mJ

**Thermal Characteristics**

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

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 7)						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 48V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
<b>ON CHARACTERISTICS</b> (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	14.5	19	m $\Omega$	$V_{GS} = 10V, I_D = 10A$
		—	20.9	28		$V_{GS} = 4.5V, I_D = 6A$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0V, I_S = 20A$
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	$C_{iss}$	—	864	—	pF	$V_{DS} = 30V, V_{GS} = 0V,$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	282	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	27	—	pF	
Gate Resistance	$R_g$	—	1.3	—	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$
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	$V_{DD} = 30V, V_{GS} = 10V,$ $I_D = 10A, R_g = 6\Omega$
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	$I_F = 10A, di/dt = 100A/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{RR}$	—	11	—	nC	

- 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.

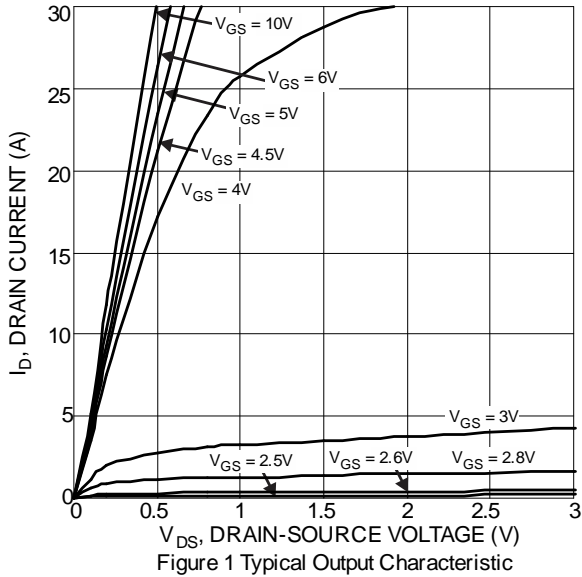


Figure 1 Typical Output Characteristic

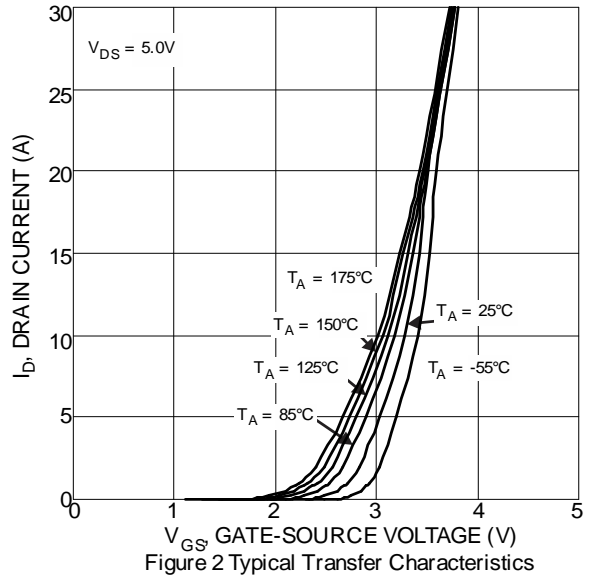


Figure 2 Typical Transfer Characteristics

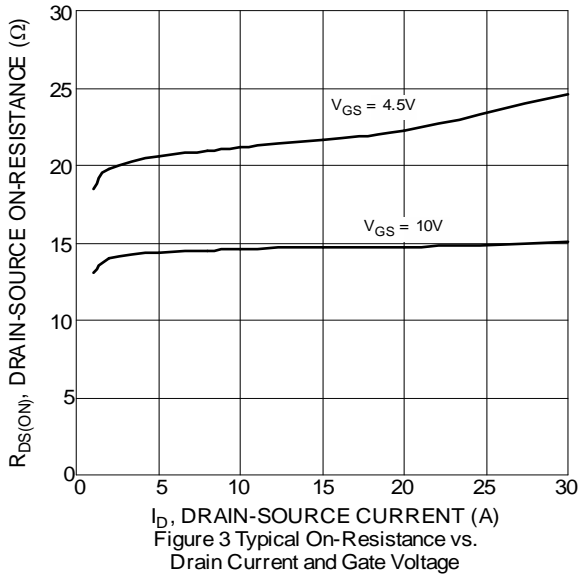


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

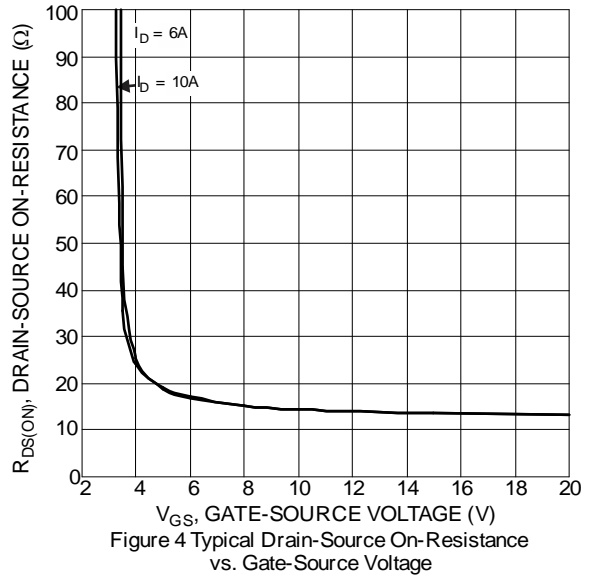


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

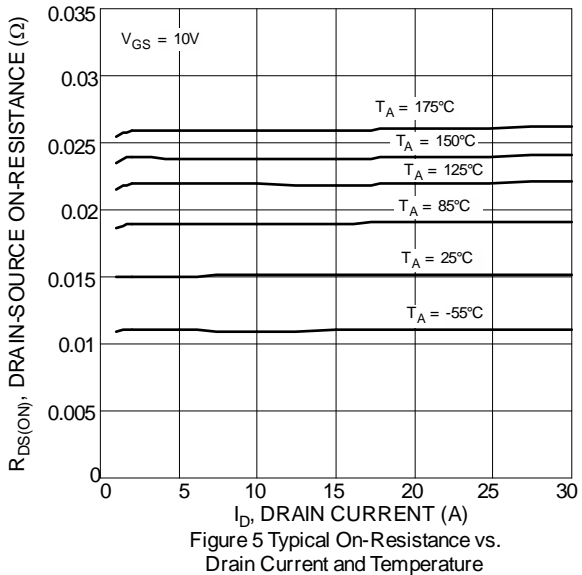


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

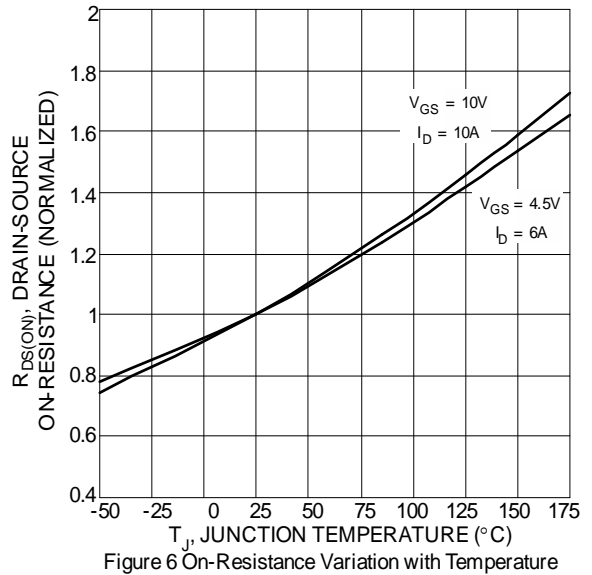


Figure 6 On-Resistance Variation with Temperature

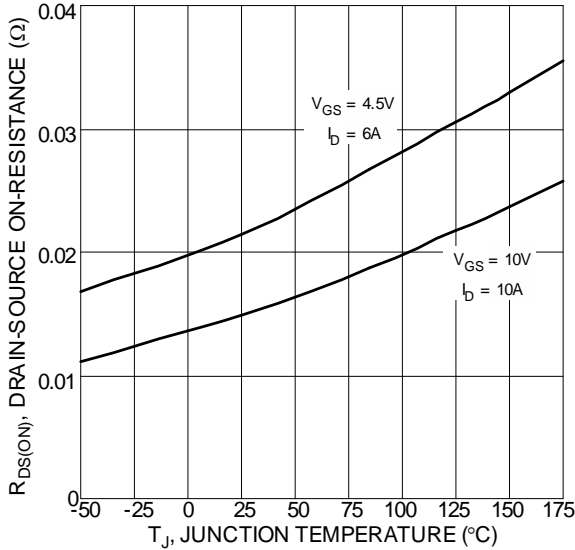


Figure 7 On-Resistance Variation with Temperature

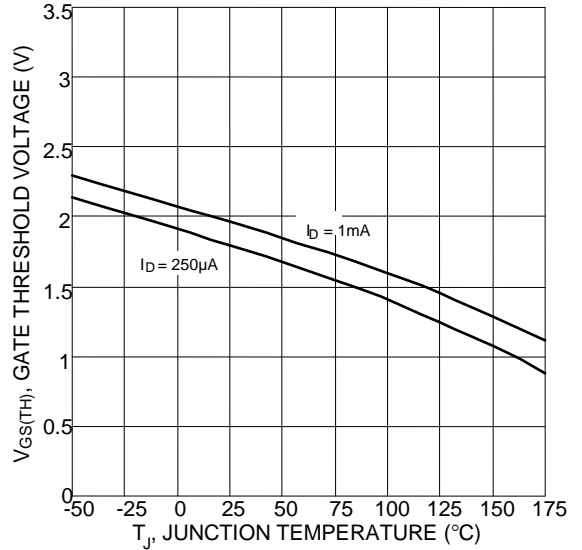


Figure 8 Gate Threshold Variation vs. Junction Temperature

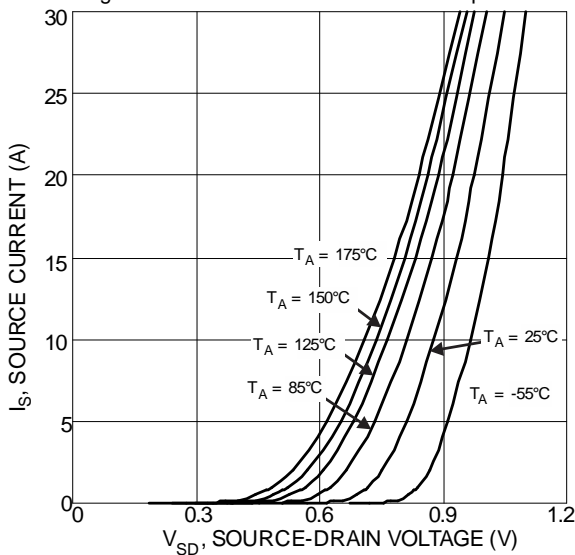


Figure 9 Diode Forward Voltage vs. Current

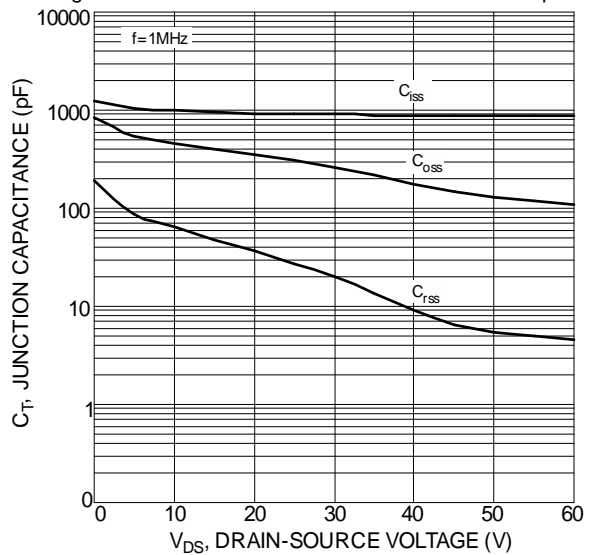


Figure 10 Typical Junction Capacitance

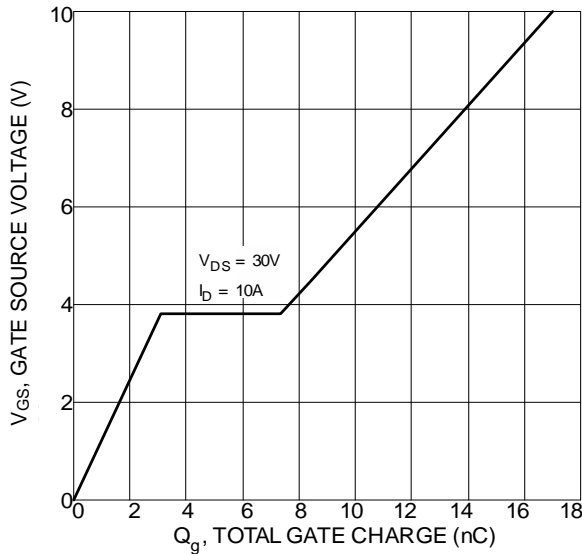


Figure 11 Gate Charge

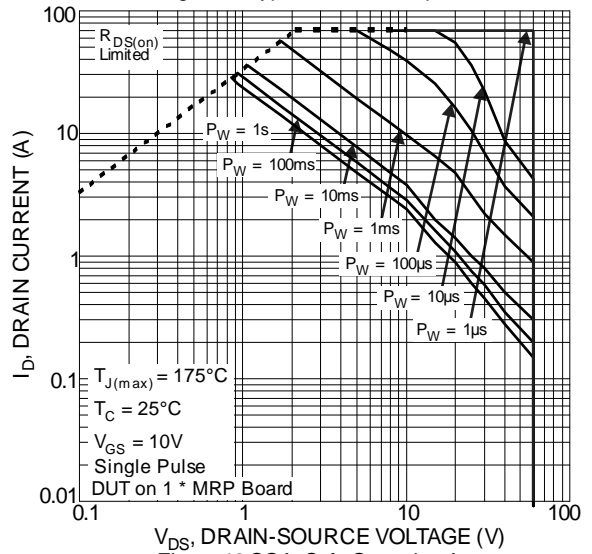
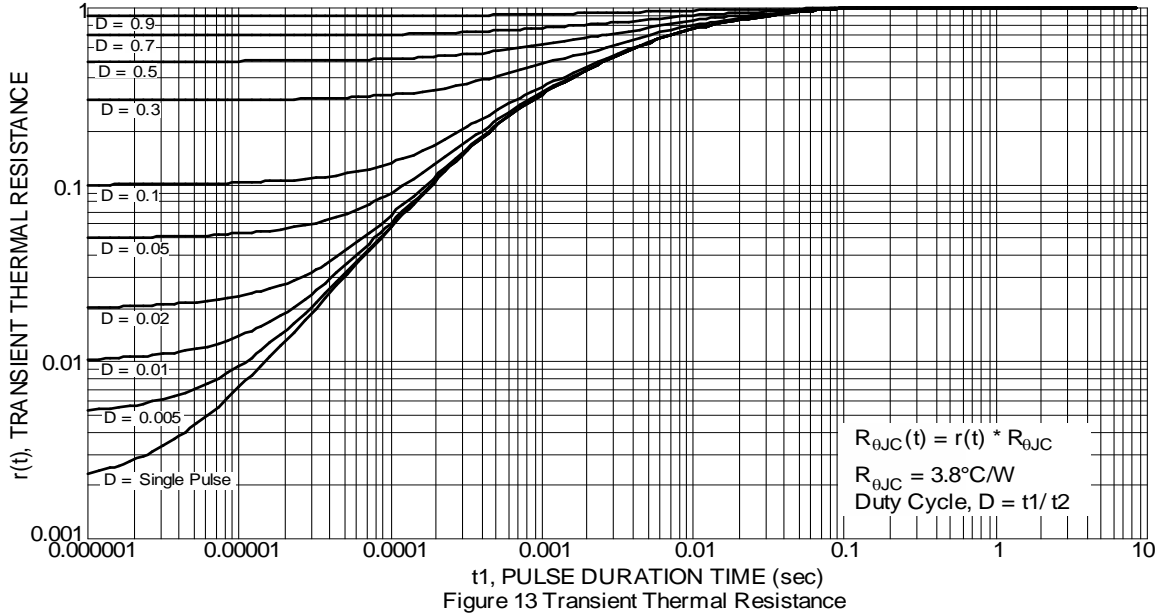


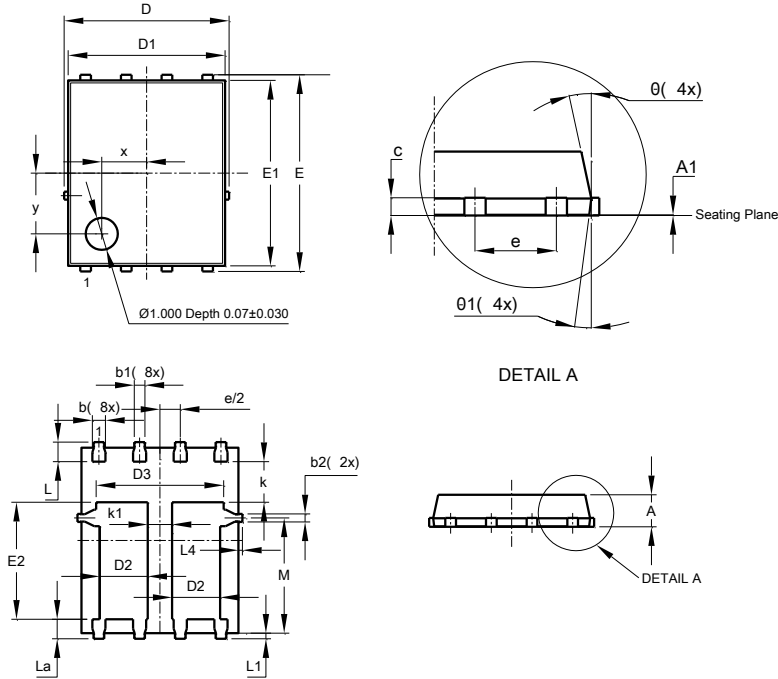
Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

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

**PowerDI5060-8 (Type C)**

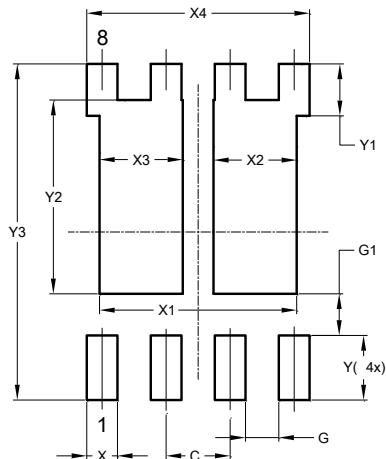


PowerDI5060-8 (Type C)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0	0.05	0.02
b	0.33	0.51	0.41
b1	0.300	0.366	0.333
b2	0.20	0.35	0.25
c	0.23	0.33	0.277
D	5.15 BSC		
D1	4.85	4.95	4.90
D2	1.40	1.60	1.50
D3	-	-	3.98
E	6.15 BSC		
E1	5.75	5.85	5.80
E2	3.56	3.76	3.66
e	1.27BSC		
k	-	-	1.27
k1	0.56	-	-
L	0.51	0.71	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			

**Suggested Pad Layout**

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

**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

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