

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
-30V	7.5m $\Omega$ @ $V_{GS} = -10\text{V}$	-36A
	10m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-31A

## Description

This new generation 30V P-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 loadswitch.

## Applications

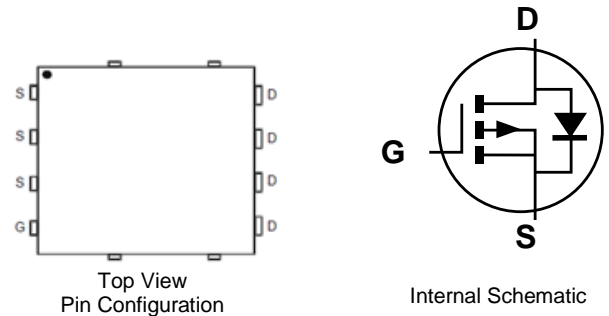
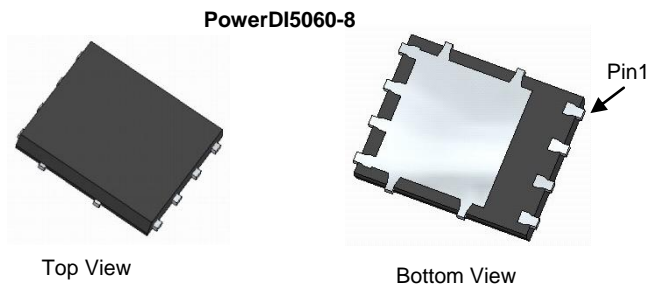
- Notebook Battery Power Management
- DC-DC Converters
- Loadswitch

## Features

- Thermally Efficient Package – Cooler Running Applications
- High Conversion Efficiency
- Low  $R_{DS(ON)}$  – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- <1.1mm Package Profile – Ideal for Thin Applications
- ESD HBM Protected up to 1kV
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Available (Note 4)**

## Mechanical Data

- Case: PowerDI<sup>®</sup> 5060-8
- Case 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 – 100% Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>Ⓔ</sup>
- Weight: 0.097 grams (Approximate)

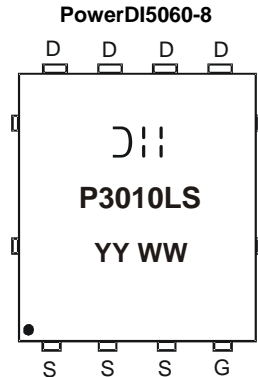


## Ordering Information (Note 5)

Part Number	Qualification	Case	Packaging
DMP3010LPSQ-13	Automotive	PowerDI5060-8	2,500/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



Ⓜ = Manufacturer's Marking  
 P3010LS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 15 = 2015)  
 WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	-30	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 8) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	-36 -29	A
Continuous Drain Current (Note 8) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	-31 -25	A
Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	-14.5 -11.5	A
Pulsed Drain Current (Notes 7 & 10)			$I_{DM}$	-100	A
Avalanche Current (Notes 11 & 12)			$I_{AS}$	-17.5	A
Avalanche Energy (Notes 11 & 12) $L = 1\text{mH}$			$E_{AS}$	153	mJ

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	$P_D$	1.26	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	97	$^\circ\text{C/W}$
Power Dissipation (Note 7)	$P_D$	2.18	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 7)	$R_{\theta JA}$	55	$^\circ\text{C/W}$
Power Dissipation (Note 8)	$P_D$	14.37	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 8)	$R_{\theta JA}$	8.7	$^\circ\text{C/W}$
Power Dissipation (Notes 8 & 9)	$P_D$	58.7	W
Thermal Resistance, Junction to Case @ $T_C = +25^\circ\text{C}$ (Notes 8 & 9)	$R_{\theta JC}$	2.13	$^\circ\text{C/W}$
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 minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Device mounted on FR-4 PCB with infinite heatsink.
  - $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.
  - Repetitive rating, pulse width limited by junction temperature, 10 $\mu\text{s}$  pulse, duty cycle = 1%.
  - $I_{AS}$  and  $E_{AS}$  rating are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$ .

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 12)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 12)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.1	-1.6	-2.1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	5.7	7.5	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A
		—	7.2	10		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A
Forward Transfer Admittance	Y <sub>fs</sub>	—	30	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.65	-1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS</b> (Note 13)						
Input Capacitance	C <sub>iss</sub>	—	6,234	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	1,500	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	774	—	pF	
Gate Resistance	R <sub>g</sub>	—	1.28	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	126.2	—	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	59.2	—	nC	V <sub>DS</sub> = -15V, V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A
Gate-Source Charge	Q <sub>gs</sub>	—	16.1	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	15.7	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	11.4	—	ns	V <sub>DS</sub> = -15V, V <sub>GEN</sub> = -10V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	—	9.4	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	260.7	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	99.3	—	ns	

Notes: 12. Short duration pulse test used to minimize self-heating effect.  
13. Guaranteed by design. Not subject to product testing.

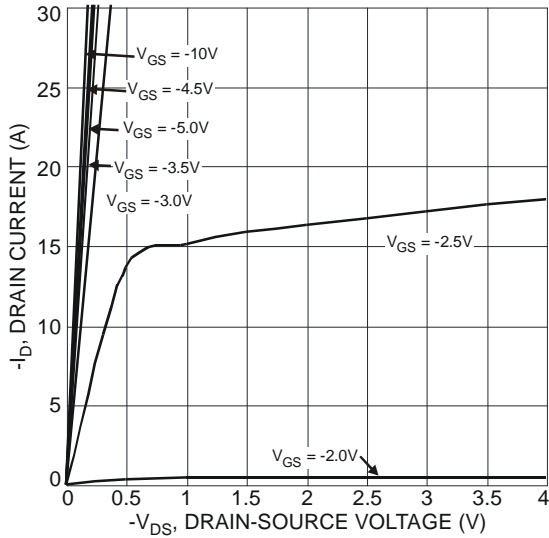


Fig. 1 Typical Output Characteristic

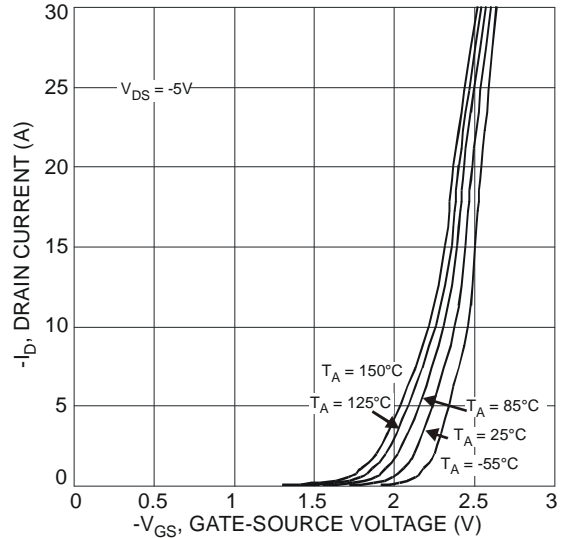


Fig. 2 Typical Transfer Characteristic

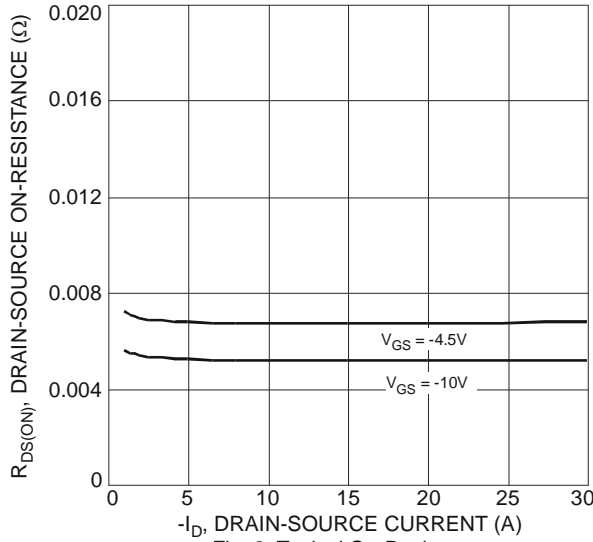


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

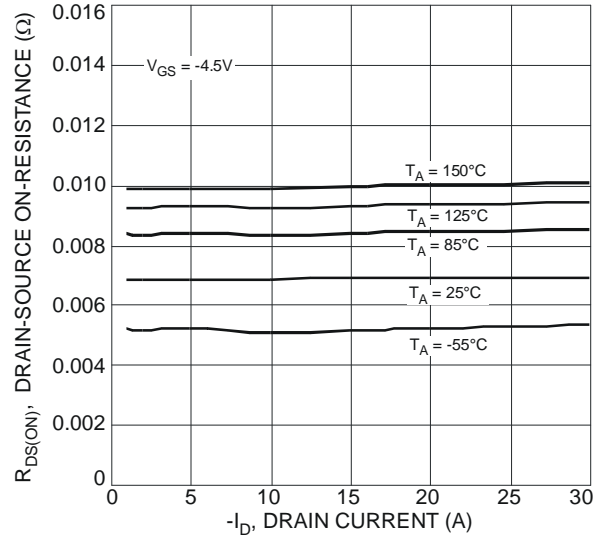


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

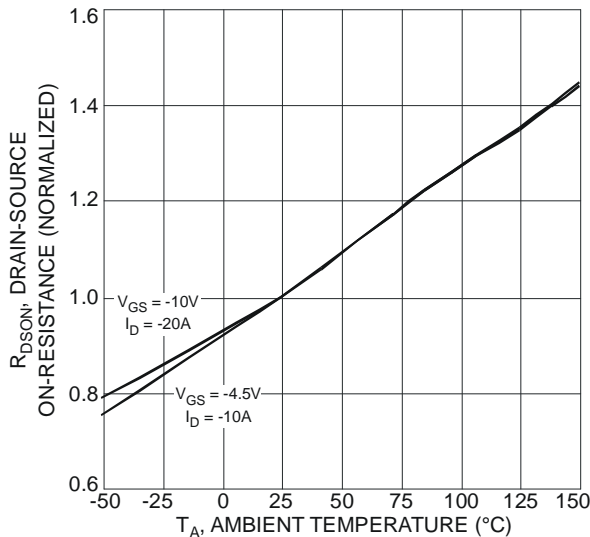


Fig. 5 On-Resistance Variation with Temperature

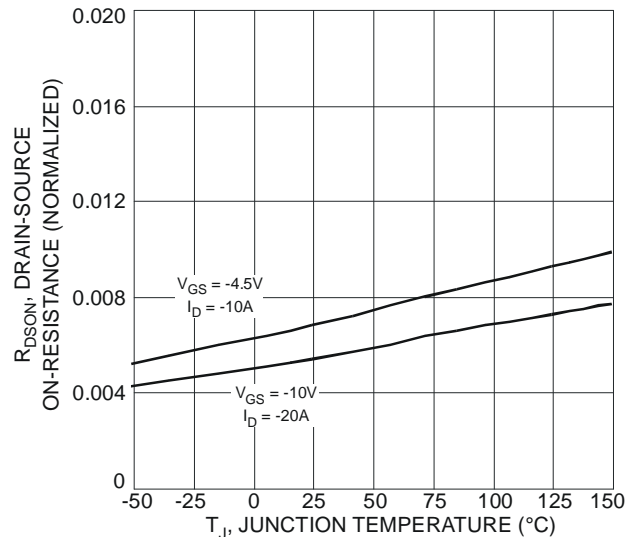


Fig. 6 On-Resistance Variation with Temperature

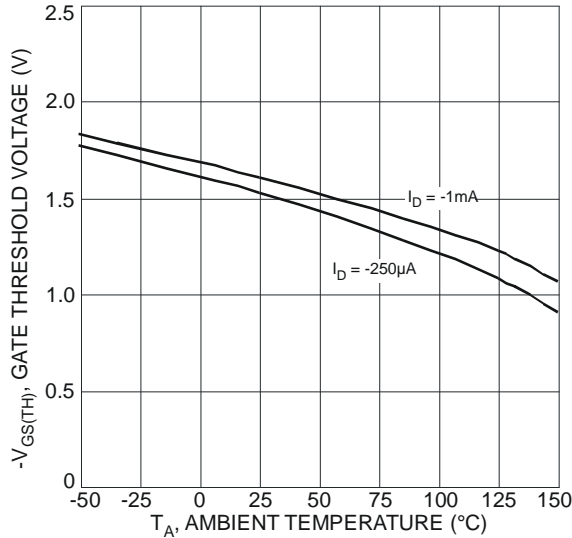


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

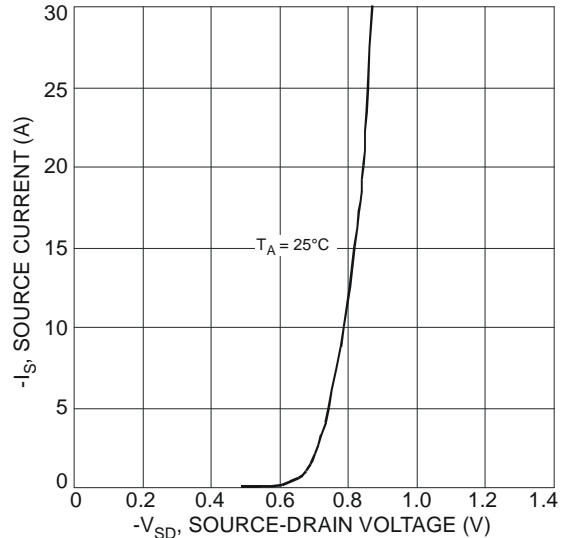


Fig. 8 Diode Forward Voltage vs. Current

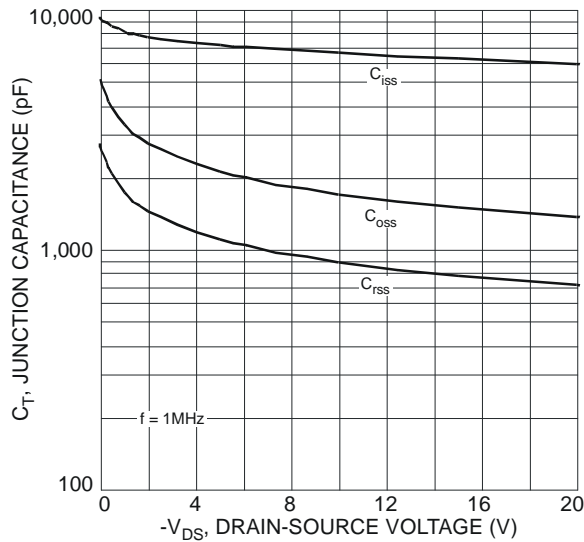


Fig. 9 Typical Total Capacitance

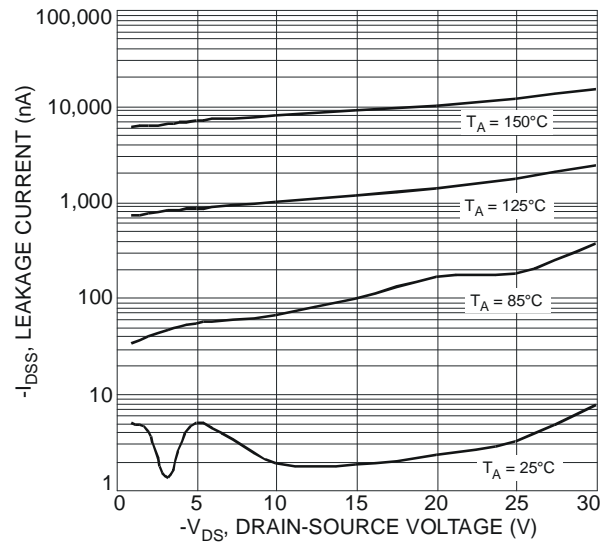


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

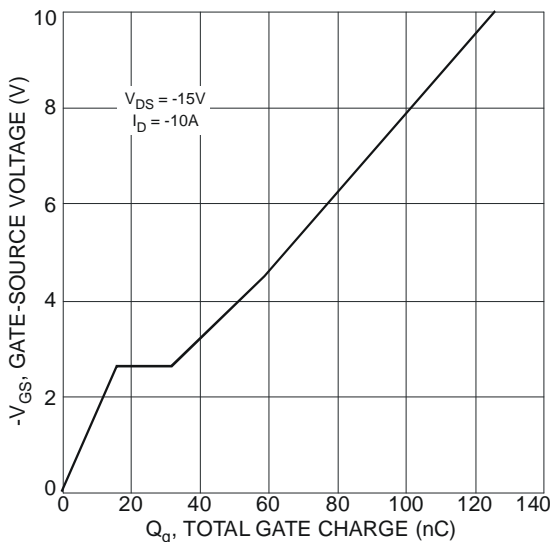


Fig. 11 Gate-Source Voltage vs. Total Gate Charge

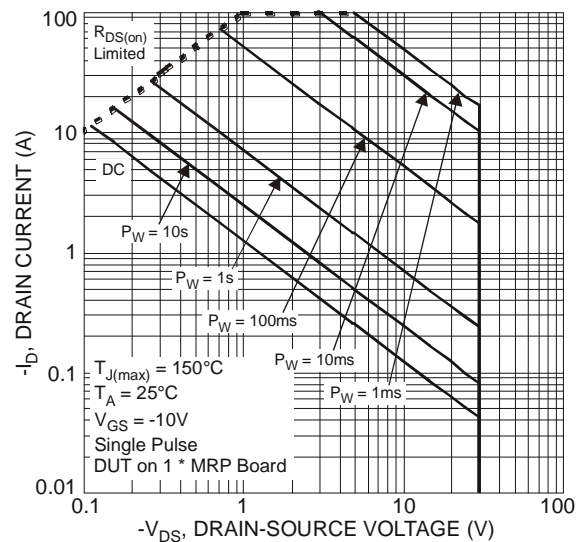
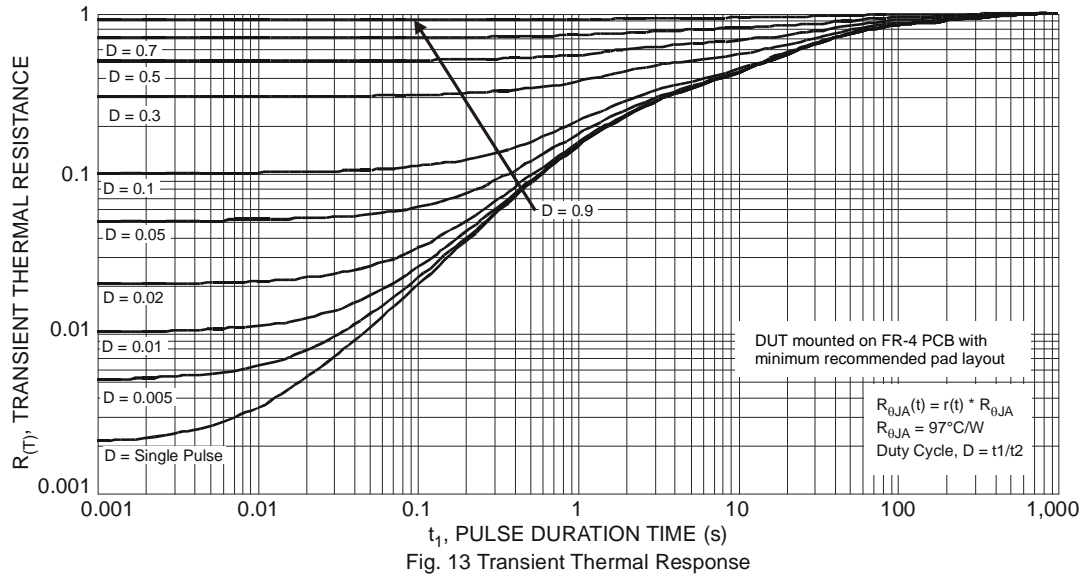


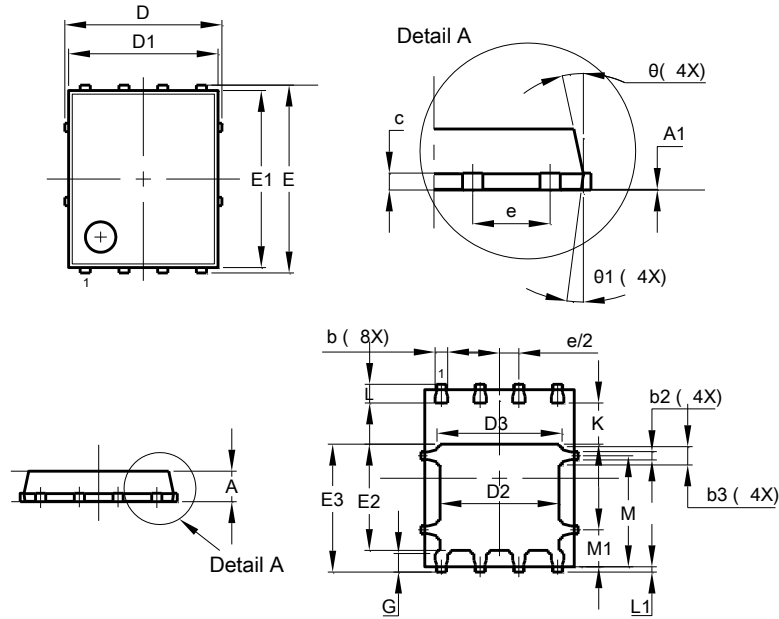
Fig. 12 SOA, Safe Operation Area



**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

**PowerDI5060-8**

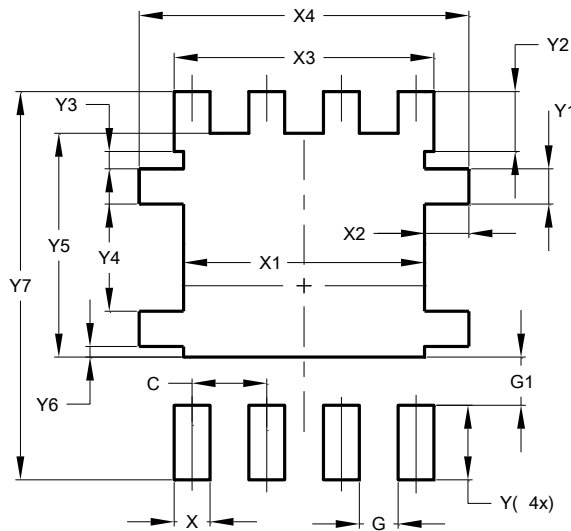


PowerDI5060-8			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	-
b	0.33	0.51	0.41
b2	0.200	0.350	0.273
b3	0.40	0.80	0.60
c	0.230	0.330	0.277
D	5.15 BSC		
D1	4.70	5.10	4.90
D2	3.70	4.10	3.90
D3	3.90	4.30	4.10
E	6.15 BSC		
E1	5.60	6.00	5.80
E2	3.28	3.68	3.48
E3	3.99	4.39	4.19
e	1.27 BSC		
G	0.51	0.71	0.61
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
$\theta$	10°	12°	11°
$\theta_1$	6°	8°	7°
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

**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

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