

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \text{ max}}$	$I_D$ $T_A = 25^\circ\text{C}$
-40V	11m $\Omega$ @ $V_{GS} = -10\text{V}$	-17.0A
	15m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-14.5A

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- "Green" component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

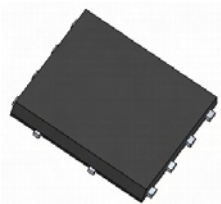
## Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

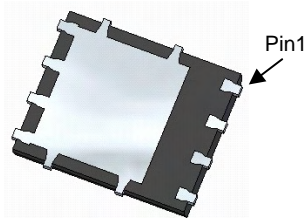
- DC-DC Converters
- Power management functions
- Analog Switch

## Mechanical Data

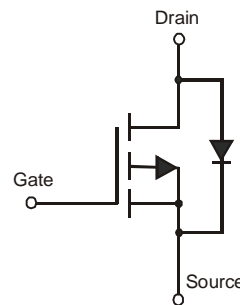
- Case: POWERDI®5060-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – 100% matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.097 grams (approximate)



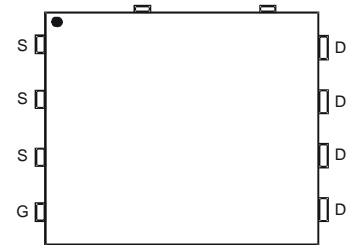
Top View



Bottom View



Internal Schematic



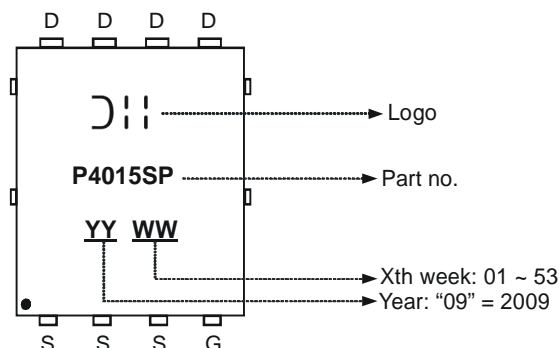
Top View  
Pin Configuration

## Ordering Information (Note 2)

Part Number	Case	Packaging
DMP4015SPS-13	POWERDI®5060-8	2500 / Tape & Reel

- Notes: 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2). All applicable RoHS exemptions applied.  
2. For packaging details, go to our website at <http://www.diodes.com>.

## Marking Information



**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	-40	V
Gate-Source Voltage			$V_{GSS}$	$\pm 25$	V
Continuous Drain Current (Note 3) $V_{GS} = -10\text{V}$	Steady State	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	-8.5 -6.8	A
	$t < 10\text{s}$	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	-13.0 -10.5	A
Continuous Drain Current (Note 4) $V_{GS} = -10\text{V}$	Steady State	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	-11.0 -8.7	A
	$t < 10\text{s}$	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	-17.0 -13.5	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	-100	A
Maximum Body Diode Continuous Current (Note 4)			$I_S$	-3.5	A
Avalanche Current (Note 5)			$I_{AS}$	-22	A
Avalanche Energy (Note 5)			$E_{AS}$	242	mJ

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 3)	$T_A = 25^\circ\text{C}$	$P_D$	1.3	W
	$T_A = 70^\circ\text{C}$		0.8	
Thermal Resistance, Junction to Ambient (Note 3)	Steady state	$R_{\theta JA}$	96.4	$^\circ\text{C/W}$
	$t < 10\text{s}$		40.6	$^\circ\text{C/W}$
Total Power Dissipation (Note 4)	$T_A = 25^\circ\text{C}$	$P_D$	2.1	W
	$T_A = 70^\circ\text{C}$		1.4	
Thermal Resistance, Junction to Ambient (Note 4)	Steady state	$R_{\theta JA}$	55.0	$^\circ\text{C/W}$
	$t < 10\text{s}$		24.0	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 4)		$R_{\theta JC}$	4.15	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-40	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -40\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 25\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-1.5	-2.0	-2.5	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	7	11	m $\Omega$	$V_{GS} = -10\text{V}, I_D = -9.8\text{A}$
		—	9	15		$V_{GS} = -4.5\text{V}, I_D = -9.8\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	26	—	S	$V_{DS} = -20\text{V}, I_D = -9.8\text{A}$
Diode Forward Voltage	$V_{SD}$	—	-0.7	-1.0	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	—	4234	—	pF	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	1036	—		
Reverse Transfer Capacitance	$C_{rss}$	—	526	—		
Gate Resistance	$R_G$	—	7.77	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge	$Q_g$	—	47.5	—	nC	$V_{DS} = -20\text{V}, V_{GS} = -5\text{V}$ $I_D = -9.8\text{A}$
Gate-Source Charge	$Q_{gs}$	—	14.2	—		
Gate-Drain Charge	$Q_{gd}$	—	13.5	—		
Turn-On Delay Time	$t_{D(on)}$	—	13.2	—	ns	$V_{GS} = -10\text{V}, V_{DD} = -20\text{V}, R_G = 6\Omega,$ $I_D = -1\text{A}, R_L = 20\Omega$
Turn-On Rise Time	$t_r$	—	10.0	—		
Turn-Off Delay Time	$t_{D(off)}$	—	302.7	—		
Turn-Off Fall Time	$t_f$	—	137.9	—		

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate
  - UIS in production with  $L = 0.1\text{mH}$ ,  $T_J = 25^\circ\text{C}$
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

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DMP4015SPS

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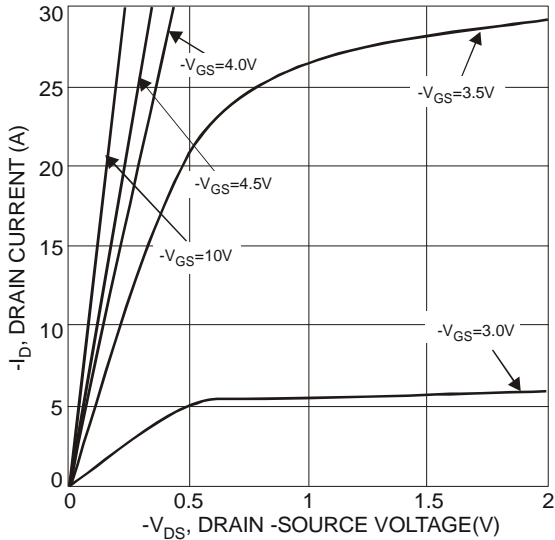


Fig. 1 Typical Output Characteristics

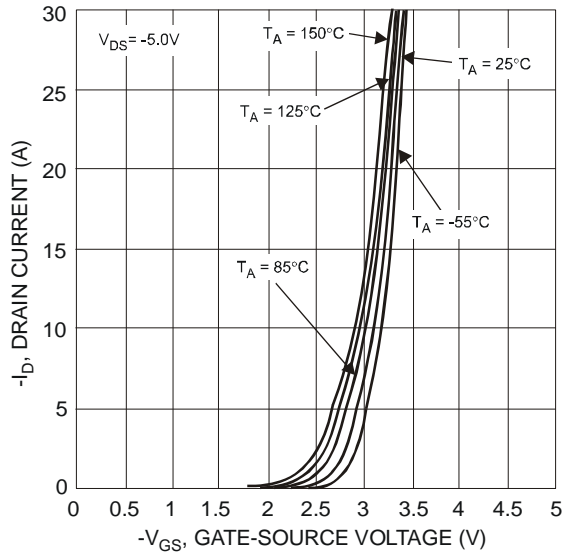


Fig. 2 Typical Transfer Characteristics

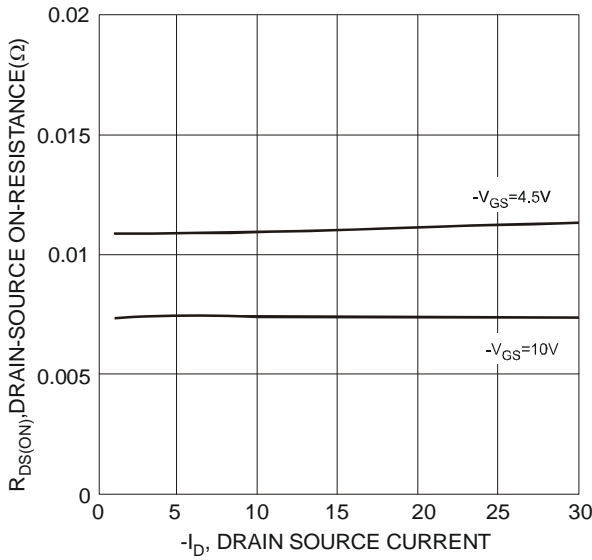


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

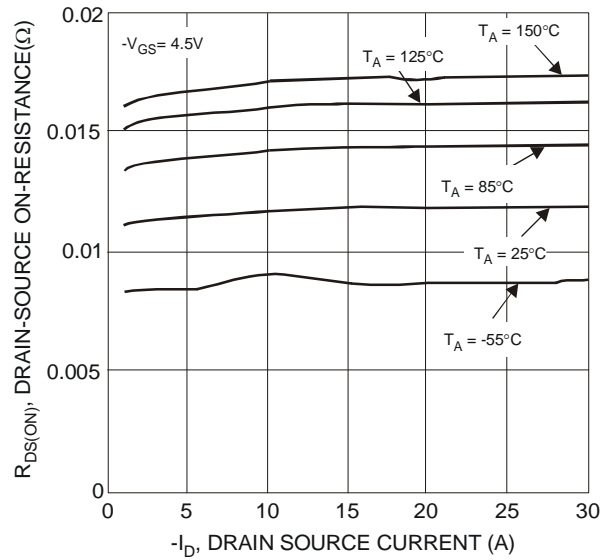


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

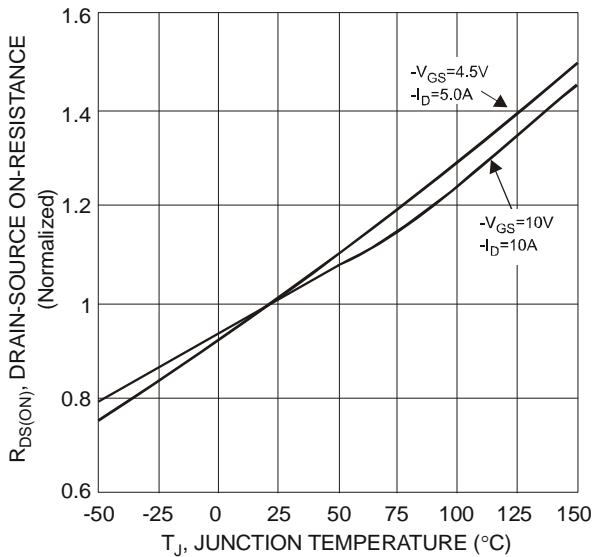


Fig. 5 On-Resistance Variation with Temperature

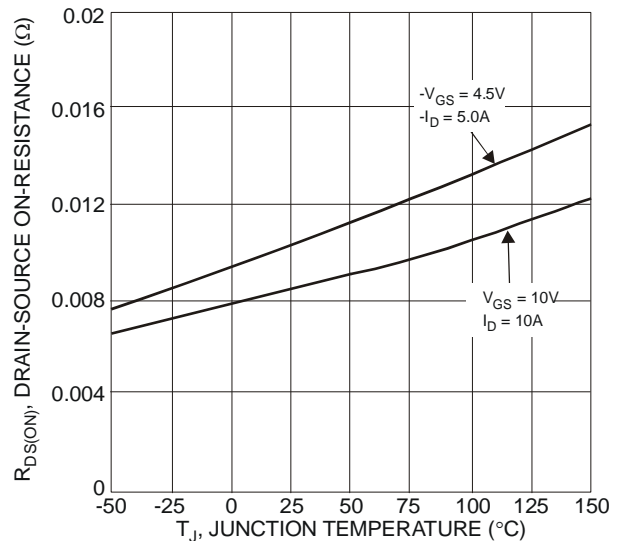


Fig. 6 On-Resistance Variation with Temperature

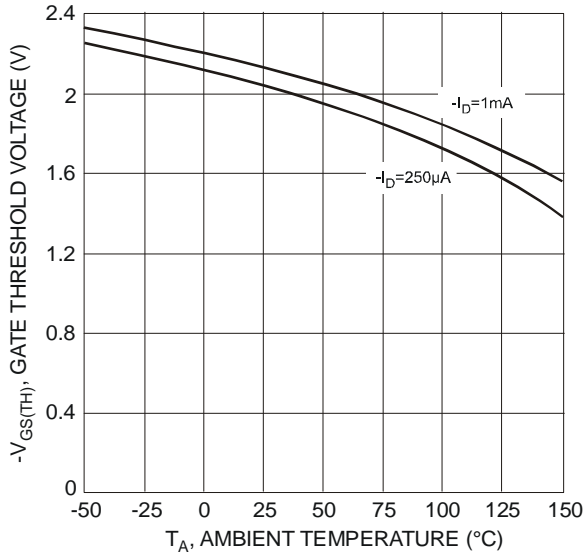


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

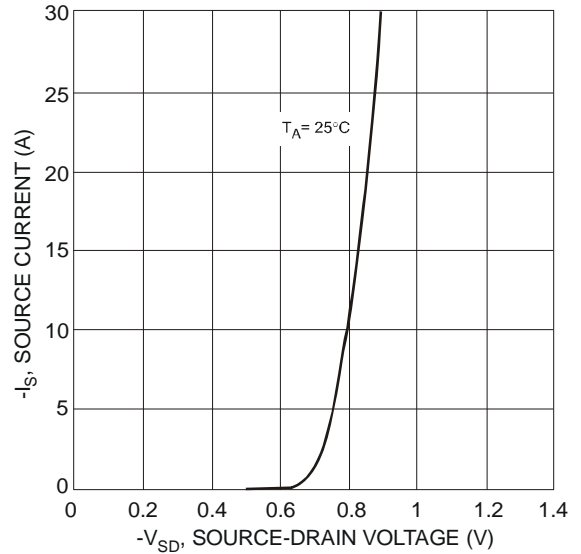


Fig. 8 Diode Forward Voltage vs. Current

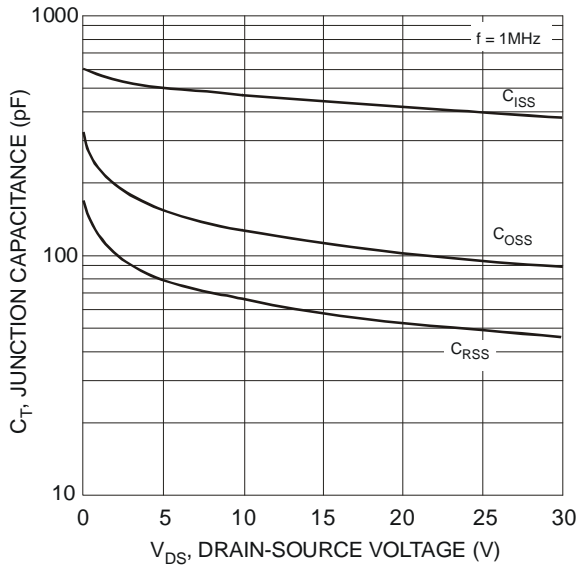


Fig. 9 Typical Junction Capacitance

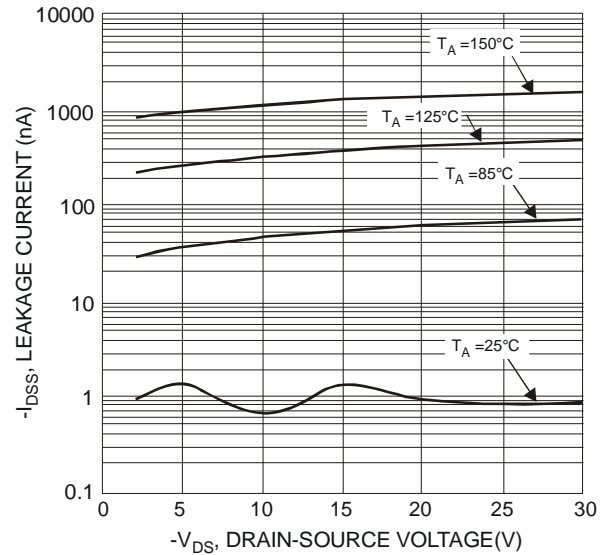


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

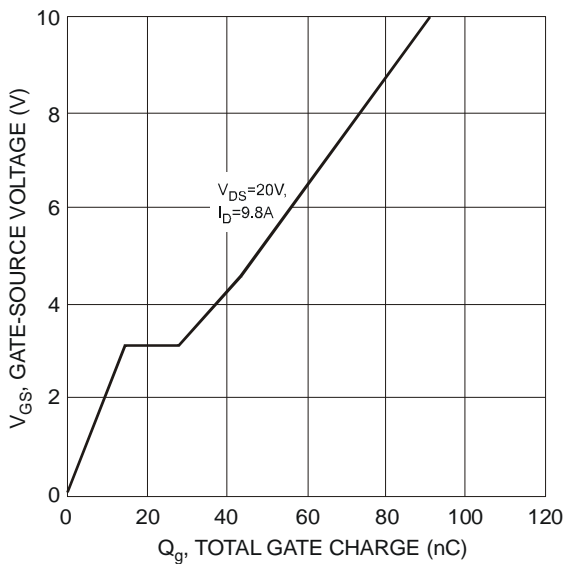


Fig. 11 Gate-Charge Characteristics

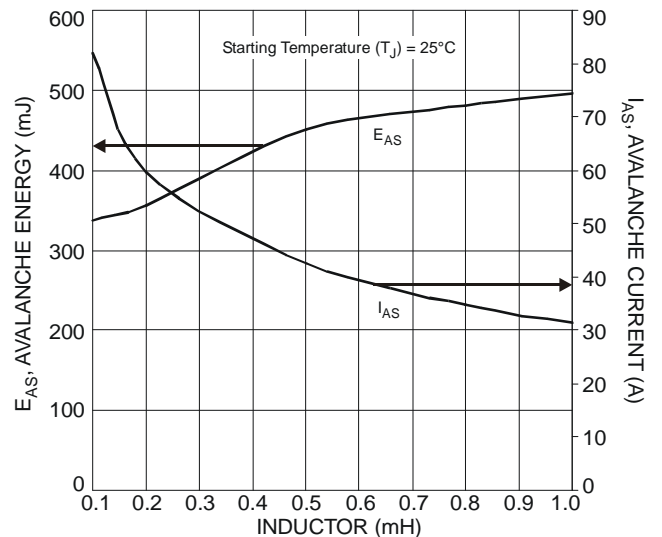
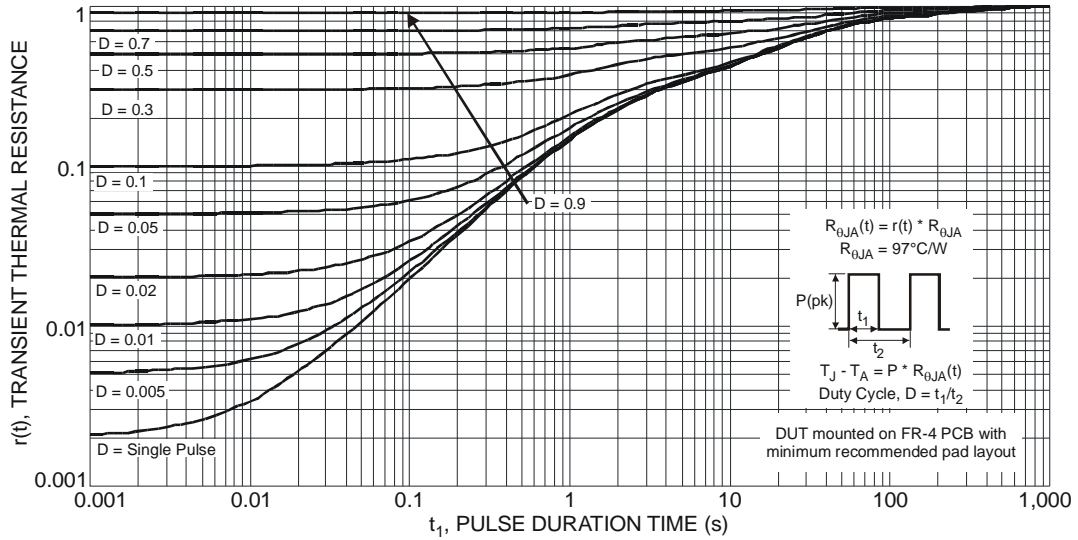
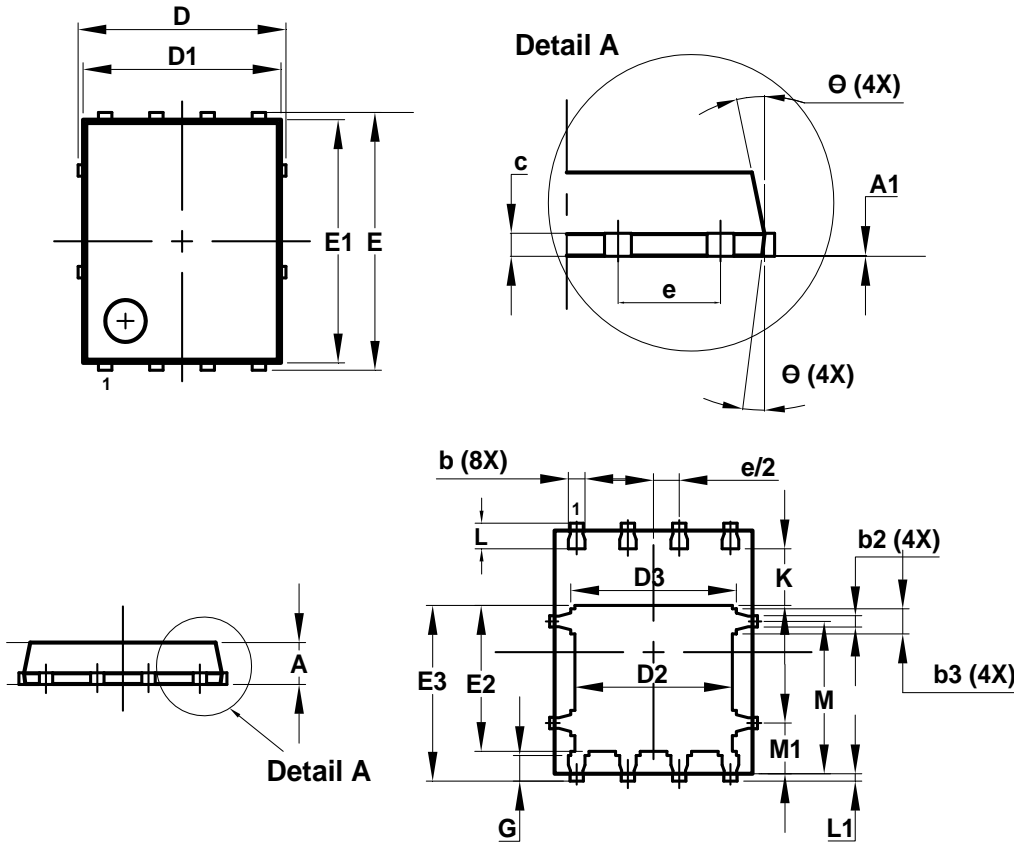


Fig. 12 Single-Pulse Avalanche Tested

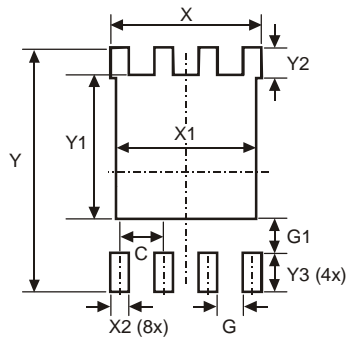


**Package Outline Dimensions**



POWERDI <sup>®</sup> 5060-8			
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	0.050	0.20	0.175
M	3.235	4.035	3.635
M1	1.00	1.40	1.21
θ	10°	12°	11°
θ1	6°	8°	7°
<b>All Dimensions in mm</b>			

## Suggested Pad Layout



Dimensions	Value (in mm)
C	1.270
G	0.660
G1	0.820
X	4.420
X1	4.100
X2	0.610
Y	6.610
Y1	3.810
Y2	1.020
Y3	1.270

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