

Product Summary

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

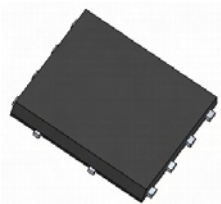
Description and Applications

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.

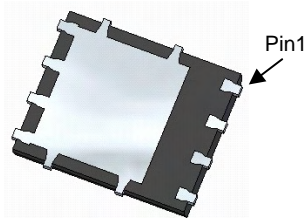
- DC-DC Converters
- Power management functions
- Analog Switch

Mechanical Data

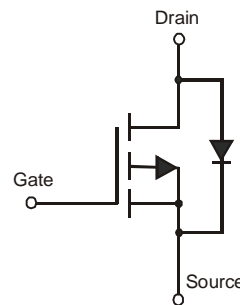
- Case: POWERDI®5060-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – 100% matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202,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



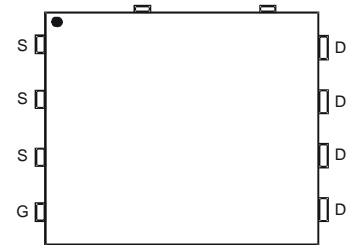
Top View



Bottom View



Internal Schematic



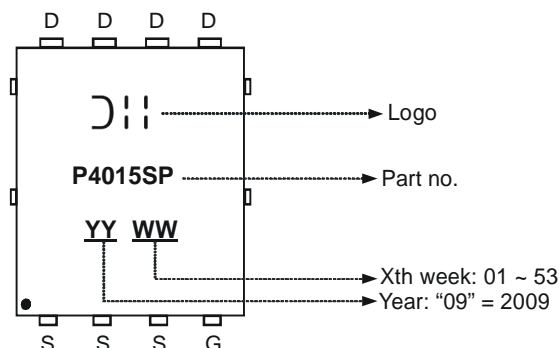
Top View
Pin Configuration

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°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-40	V
Gate-Source Voltage			V _{GSS}	±25	V
Continuous Drain Current (Note 3) V _{GS} = -10V	Steady State	T _A = 25°C T _A = 70°C	I _D	-8.5 -6.8	A
	t < 10s	T _A = 25°C T _A = 70°C	I _D	-13.0 -10.5	A
Continuous Drain Current (Note 4) V _{GS} = -10V	Steady State	T _A = 25°C T _A = 70°C	I _D	-11.0 -8.7	A
	t < 10s	T _A = 25°C T _A = 70°C	I _D	-17.0 -13.5	A
Pulsed Drain Current (10μs 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°C unless otherwise specified

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 3)	T _A = 25°C	P _D	1.3	W
	T _A = 70°C		0.8	
Thermal Resistance, Junction to Ambient (Note 3)	Steady state	R _{θJA}	96.4	°C/W
	t < 10s		40.6	°C/W
Total Power Dissipation (Note 4)	T _A = 25°C	P _D	2.1	W
	T _A = 70°C		1.4	
Thermal Resistance, Junction to Ambient (Note 4)	Steady state	R _{θJA}	55.0	°C/W
	t < 10s		24.0	°C/W
Thermal Resistance, Junction to Case (Note 4)		R _{θJC}	4.15	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -40V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±25V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(th)}	-1.5	-2.0	-2.5	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	7	11	mΩ	V _{GS} = -10V, I _D = -9.8A
		—	9	15		V _{GS} = -4.5V, I _D = -9.8A
Forward Transfer Admittance	Y _{fs}	—	26	—	S	V _{DS} = -20V, I _D = -9.8A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.0	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	—	4234	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	1036	—		
Reverse Transfer Capacitance	C _{rss}	—	526	—		
Gate Resistance	R _G	—	7.77	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q _g	—	47.5	—	nC	V _{DS} = -20V, V _{GS} = -5V I _D = -9.8A
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} = -10V, V _{DD} = -20V, R _G = 6Ω, I _D = -1A, R _L = 20Ω
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:
3. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 4. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate
 5. UIS in production with L = 0.1mH, T_J = 25°C
 6. Short duration pulse test used to minimize self-heating effect.
 7. Guaranteed by design. Not subject to production testing.

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DMP4015SPS

Document number: DS35518 Rev. 6 - 2

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 February 2012
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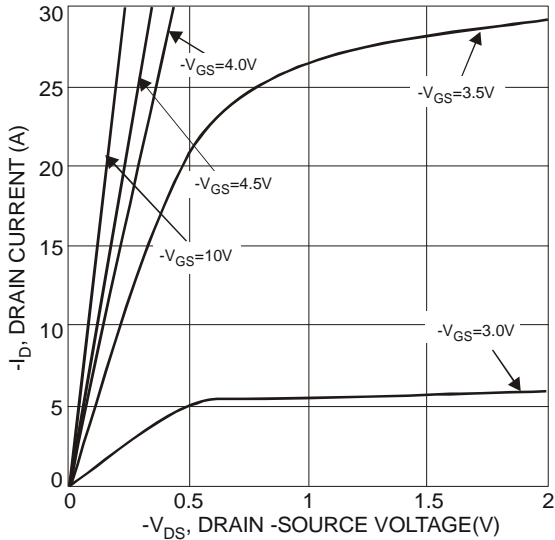


Fig. 1 Typical Output Characteristics

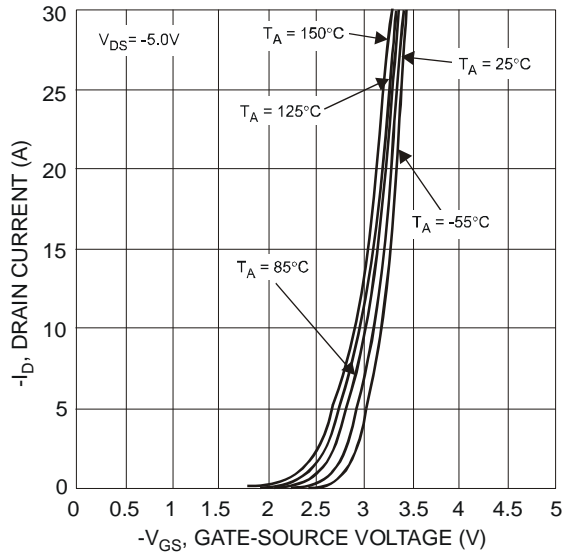


Fig. 2 Typical Transfer Characteristics

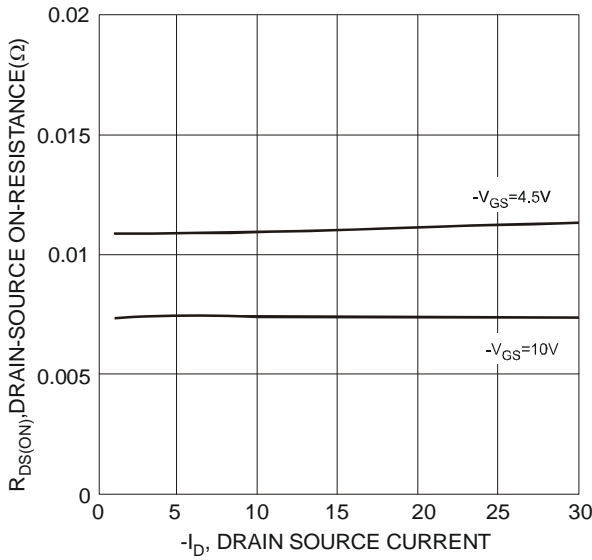


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

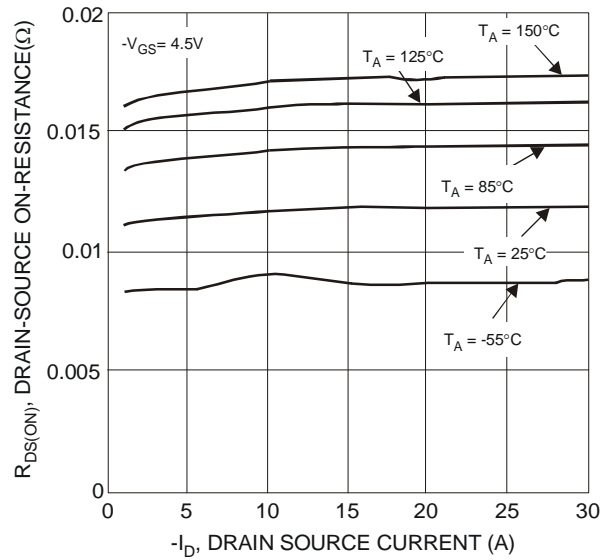


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

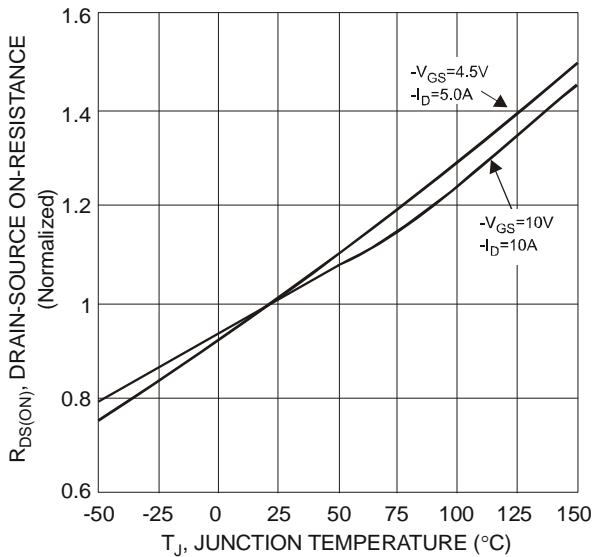


Fig. 5 On-Resistance Variation with Temperature

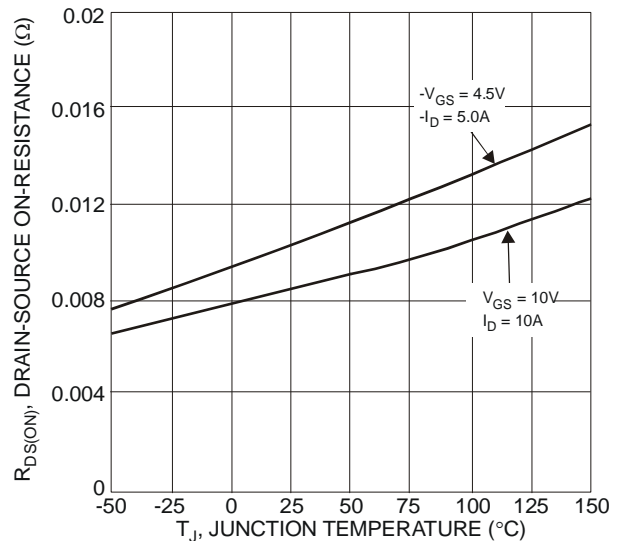


Fig. 6 On-Resistance Variation with Temperature

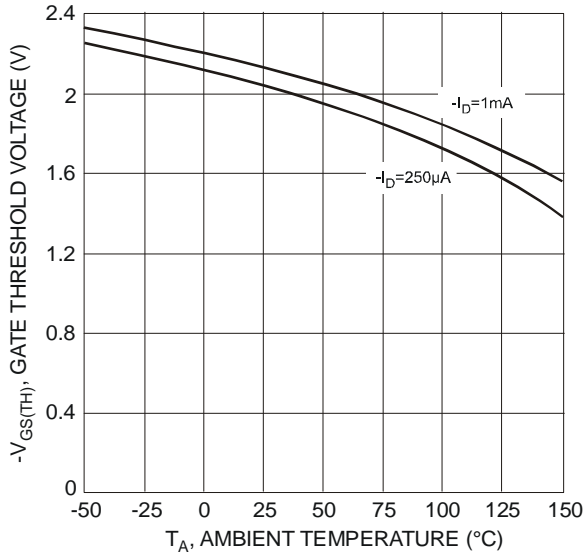


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

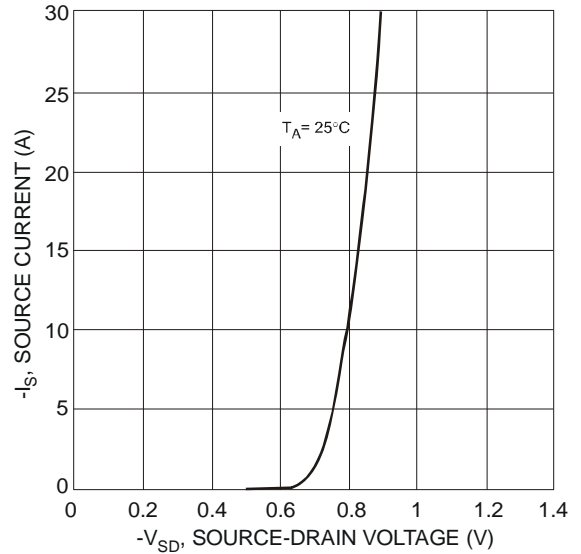


Fig. 8 Diode Forward Voltage vs. Current

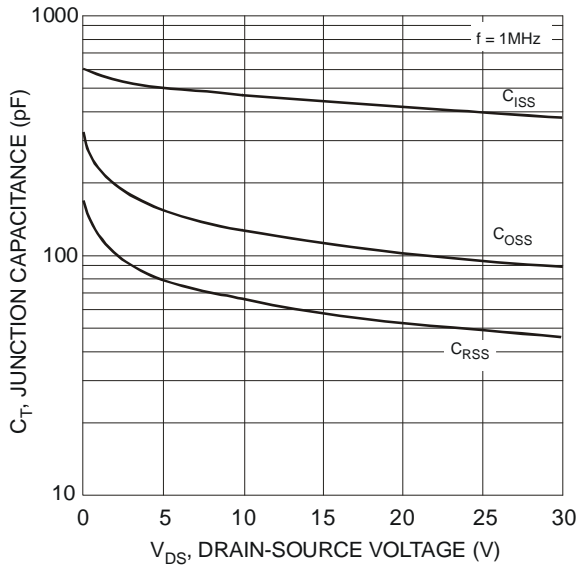


Fig. 9 Typical Junction Capacitance

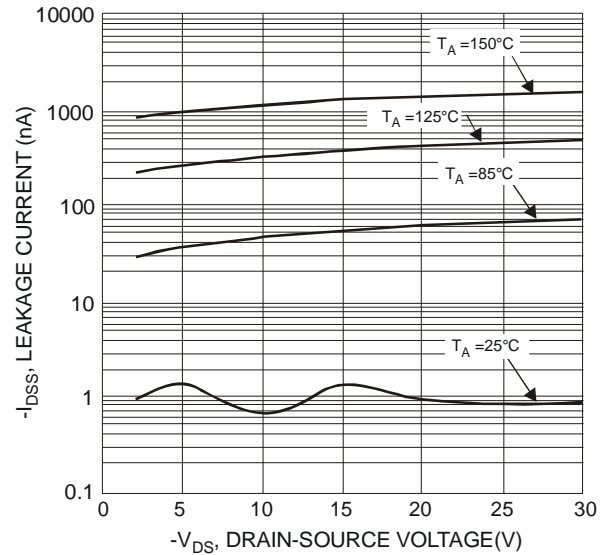


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

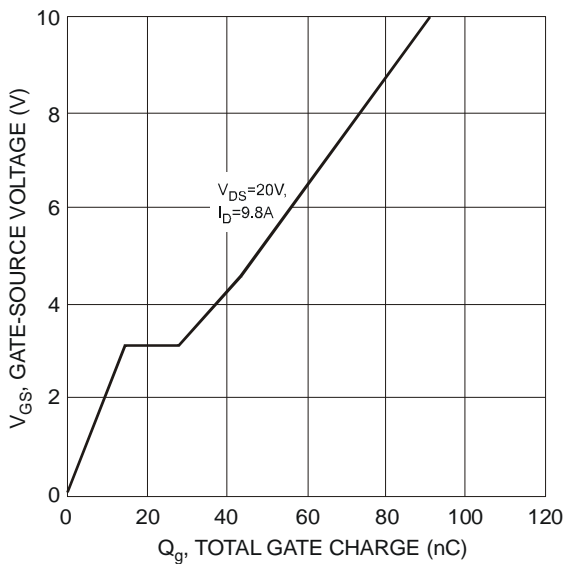


Fig. 11 Gate-Charge Characteristics

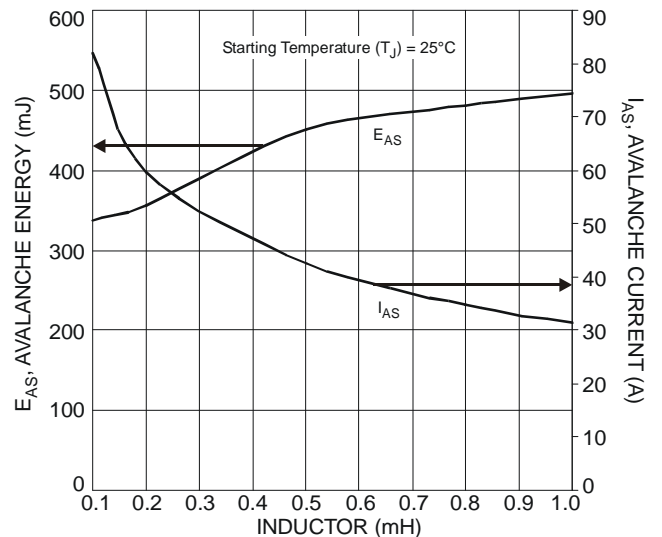
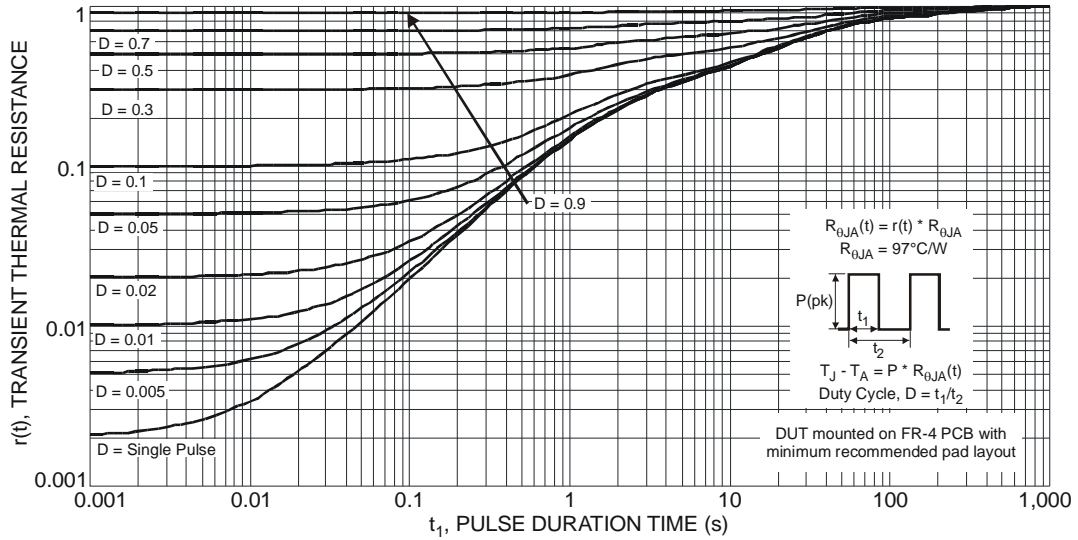
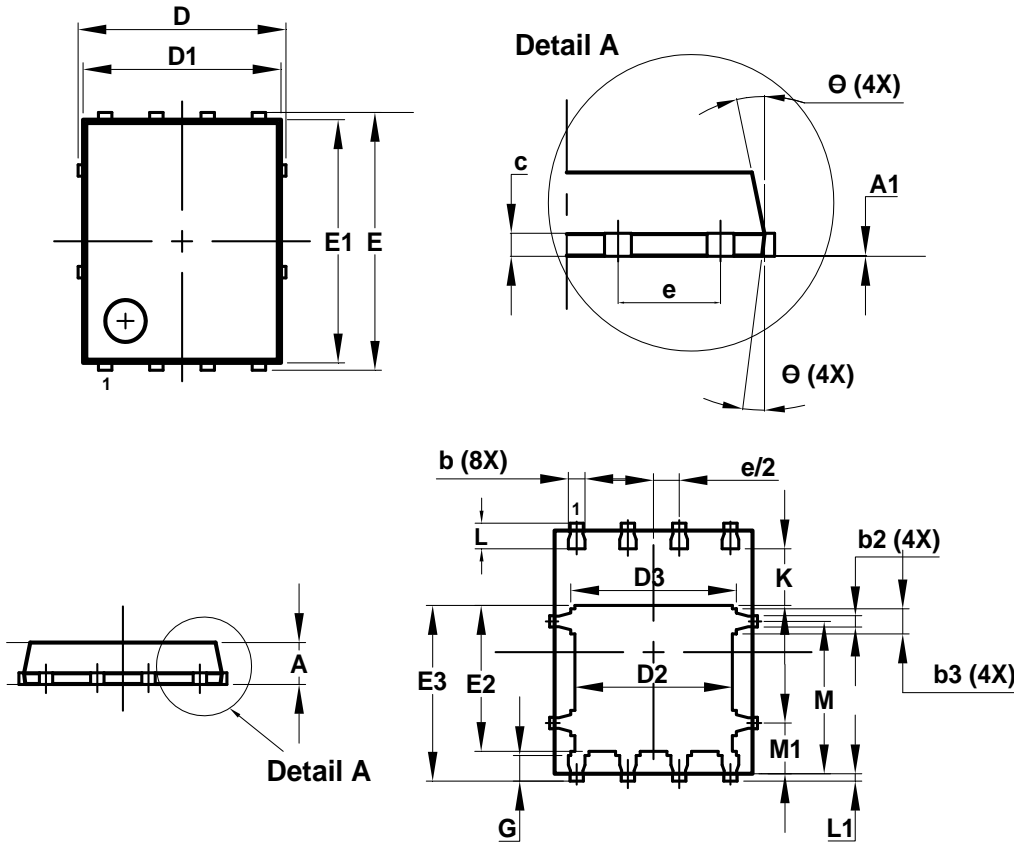


Fig. 12 Single-Pulse Avalanche Tested

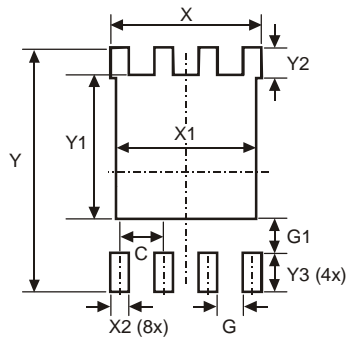


Package Outline Dimensions



POWERDI [®] 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°
All Dimensions in mm			

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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