

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D$ $T_A = +25^\circ\text{C}$
-40V	11m $\Omega$ @ $V_{GS} = -10\text{V}$	-10.1A
	15m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-8.8A

## Description

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.

## Applications

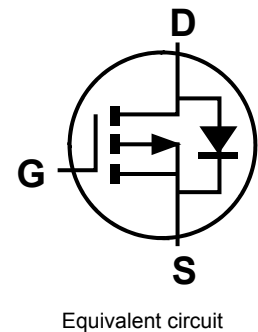
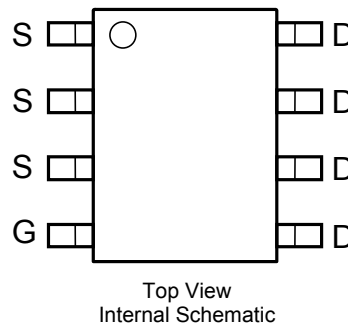
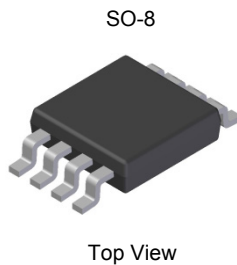
- DC-DC Converters
- Power management functions
- Analog Switch

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- Low Input Capacitance
- **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**

## Mechanical Data

- Case: SO-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 – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)

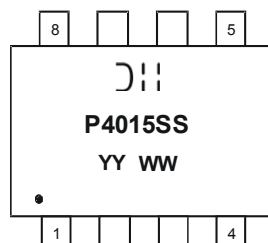
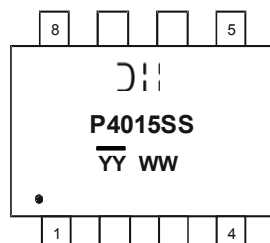


## Ordering Information (Note 4)

Part Number	Qualification	Case	Packaging
DMP4015SSS-13	Standard	SO-8	2,500/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



⌋:: = Manufacturer's Marking  
 P4015SS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or  $\overline{YY}$  = Year (ex: 13 = 2013)  
 WW = Week (01 - 53)  
 YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 $\overline{YY}$  = Date Code Marking for CAT (Chengdu Assembly/ Test site)

**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 5) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	-9.1	A
		$T_A = +70^\circ\text{C}$		-7.2	
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	-7.8	A
		$T_A = +70^\circ\text{C}$		-6.2	
Continuous Drain Current (Note 6) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	-10.1	A
		$T_A = +70^\circ\text{C}$		-8	
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	-8.8	A
		$T_A = +70^\circ\text{C}$		-7	
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	-100	A
Avalanche Current (Note 7)			$I_{AS}$	-22	A
Avalanche Energy (Note 7)			$E_{AS}$	242	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	$P_D$	1.45	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	88	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$P_D$	1.82	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	70	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	7.6	$^\circ\text{C/W}$
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 8)</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 8)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-1.5	-2	-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 (Note 5)	$V_{SD}$	—	-0.7	-1	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	4234	—	pF	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	1036	—		
Reverse Transfer Capacitance	$C_{rss}$	—	526	—		
Gate Resistance	$R_G$	—	7.77	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
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	—		
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 vias to bottom layer 1inch square copper plate
  - .UIS in production with  $L = 1\text{mH}, T_J = +25^\circ\text{C}$
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

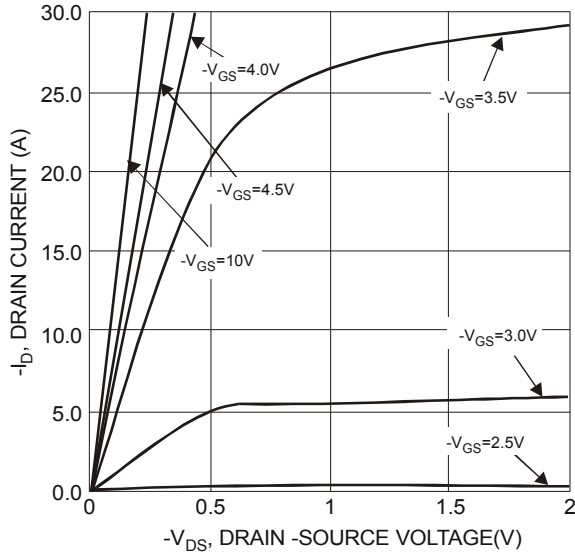


Fig. 1 Typical Output Characteristics

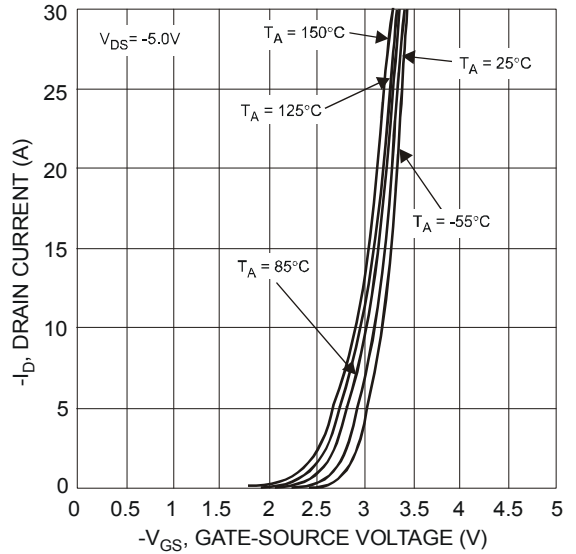


Fig. 2 Typical Transfer Characteristics

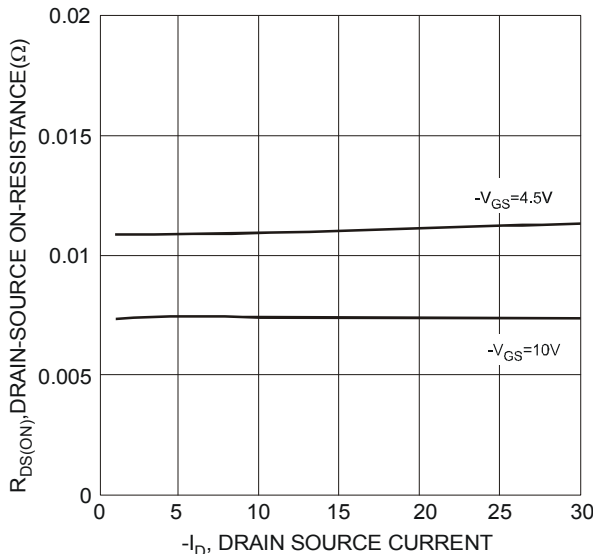


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

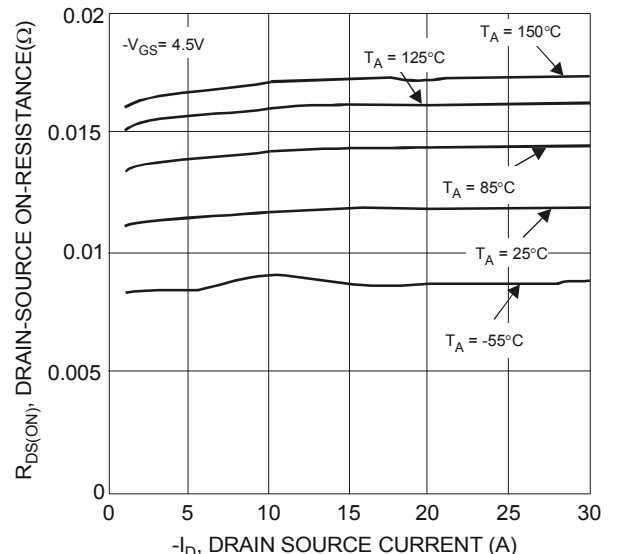


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

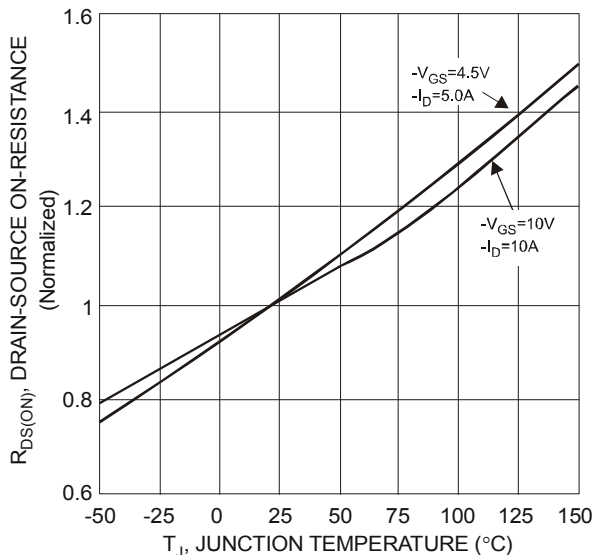


Fig. 5 On-Resistance Variation with Temperature

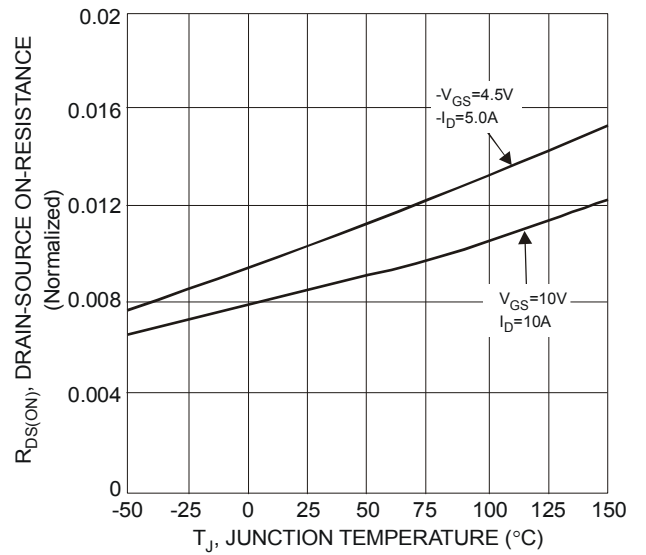


Fig. 6 On-Resistance Variation with Temperature



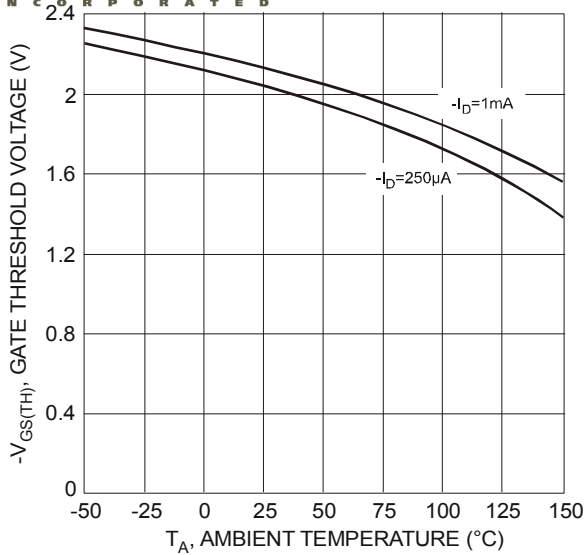


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

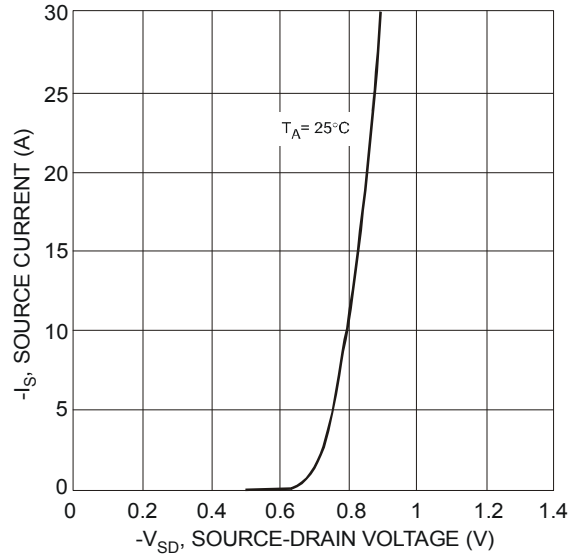


Fig. 8 Diode Forward Voltage vs. Current

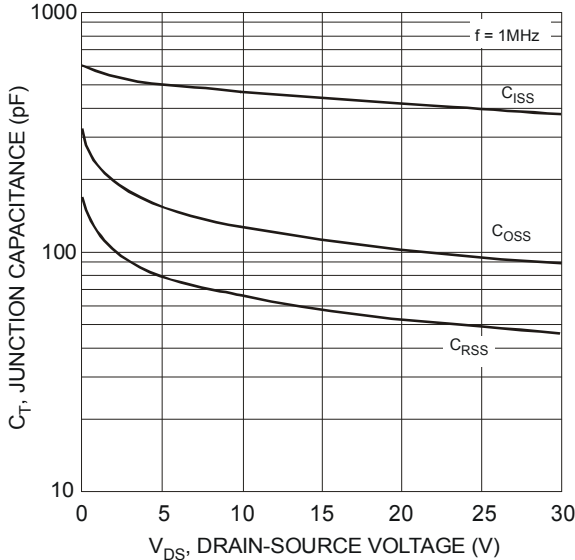


Fig. 9 Typical Junction Capacitance

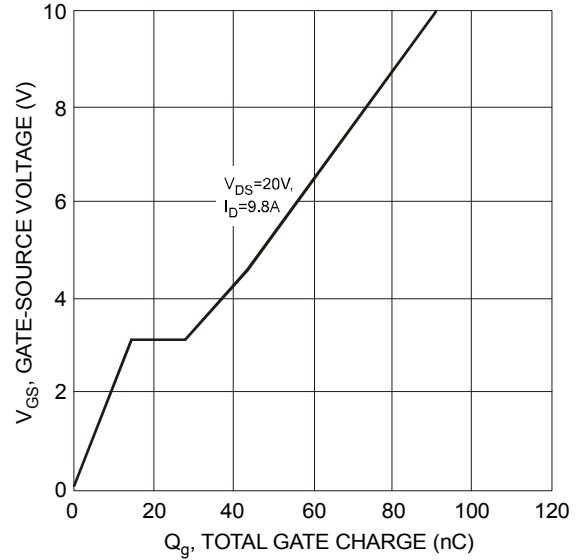


Fig. 10 Gate-Charge Characteristics

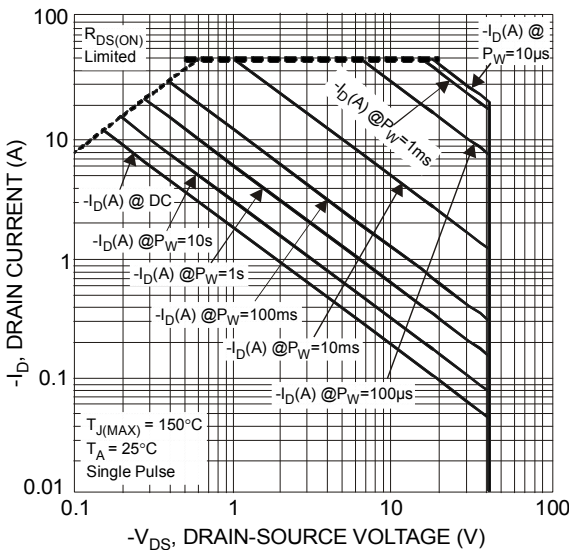


Fig. 11 SOA, Safe Operation Area

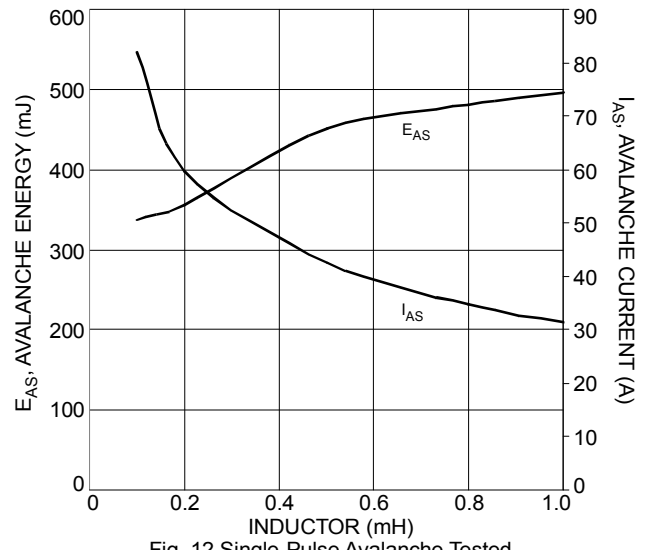
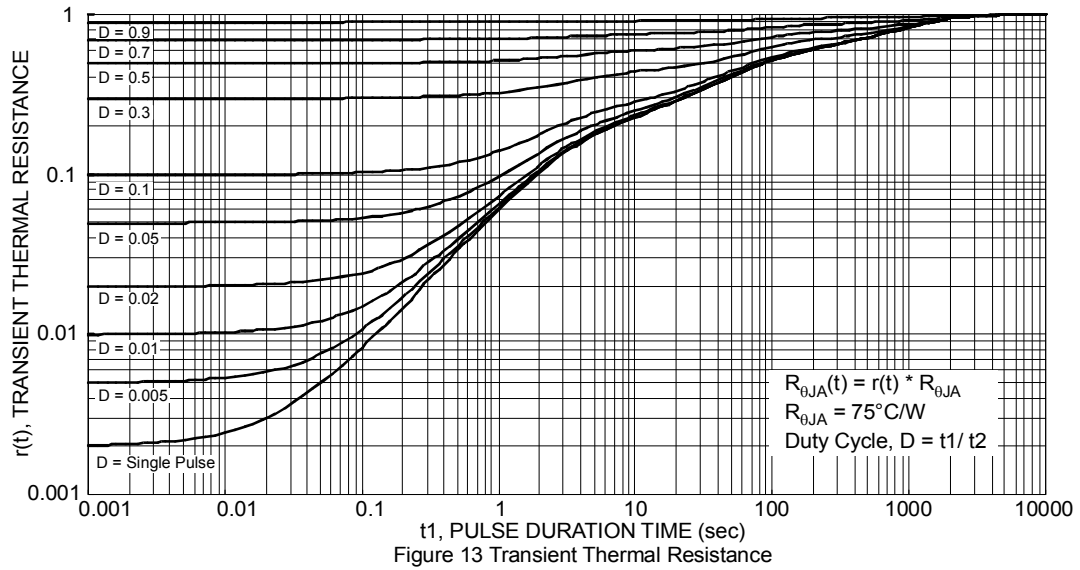
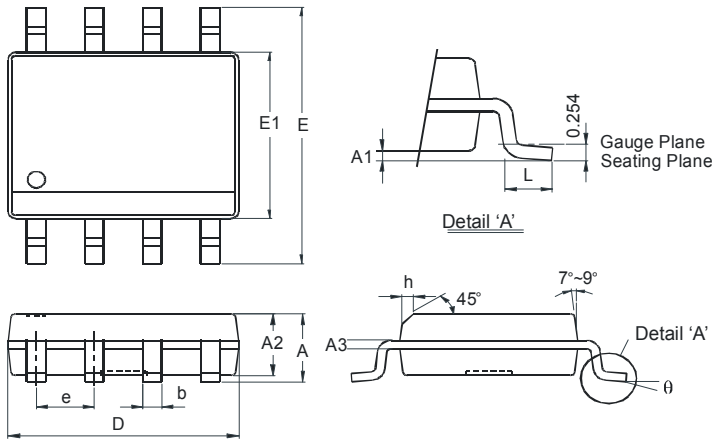


Fig. 12 Single-Pulse Avalanche Tested



**Package Outline Dimensions**

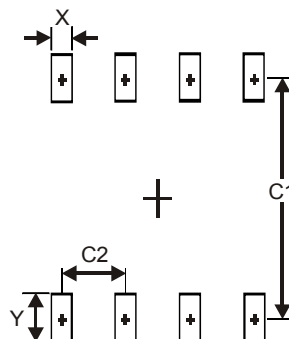
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SO-8		
Dim	Min	Max
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°
All Dimensions in mm		

**Suggested Pad Layout**

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



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27

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