

## Product Summary

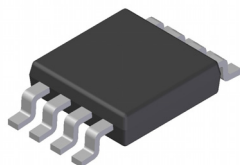
MOSFET		
$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D$
-20V	85mΩ @ $V_{GS} = -10V$	-3.3A
	125mΩ @ $V_{GS} = -4.5V$	-2.8A
SCHOTTKY DIODE		
$V_R$	$V_F \max$	$I_O$
20V	400mV @ $I_F = 0.5A$	1.0A
	470mV @ $I_F = 1.0A$	

## Description

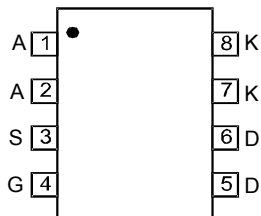
This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

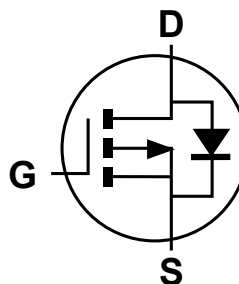
- DC-DC Converters
- Power Management Functions
- Backlighting



Top View



Top View  
Internal Schematic



Q1 P-Channel MOSFET



D1 Schottky Diode

## Features and Benefits

- Low Input Capacitance
- MOSFET with Low  $R_{DS(ON)}$  – Minimize Conduction Losses
- Schottky Diode with Low Forward Voltage Drop
- 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**

## Mechanical Data

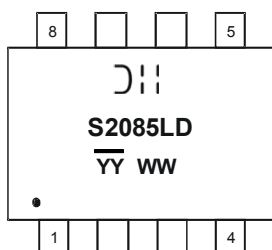
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.074 grams (approximate)

## Ordering Information (Note 4)

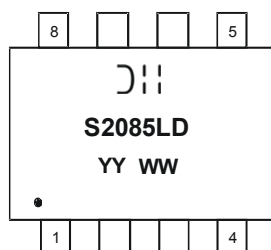
Part Number	Case	Packaging
DMS2085LSD-13	SO-8	2,500/Tape & Reel

- 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



Chengdu A/T Site



Shanghai A/T Site

- )|| = Manufacturer's Marking  
 S2085LD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or YY = Year (ex: 13 = 2013)  
 WW = Week (01 - 53)  
 YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 YY = Date Code Marking for CAT (Chengdu Assembly/ Test site)

**Maximum Ratings – P-CHANNEL MOSFET – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-3.3 -2.7	A
	t<10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-4.3 -3.4	A
Maximum Body Diode Forward Current (Note 6)			I <sub>S</sub>	-1.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-11.2	A
Avalanche Current (Notes 7) L = 5mH			I <sub>AR</sub>	-5	A
Avalanche Energy (Notes 7) L = 5mH			E <sub>AR</sub>	50	mJ

**Maximum Ratings – SCHOTTKY – D1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V <sub>RRM</sub>	20	V
Working Peak Reverse Voltage	V <sub>RWM</sub>		
DC Blocking Voltage	V <sub>R</sub>		
Average Rectified Output Current (Note 7, t<10s)	I <sub>O</sub>	1	A
Peak Repetitive Forward Current (Note 7, t<10s)	I <sub>FRM</sub>	2	A
Non-Repetitive Peak Forward Surge Current (Note 7, t<10s) Single half sine-wave superimposed on rated load	I <sub>FSM</sub>	20	A

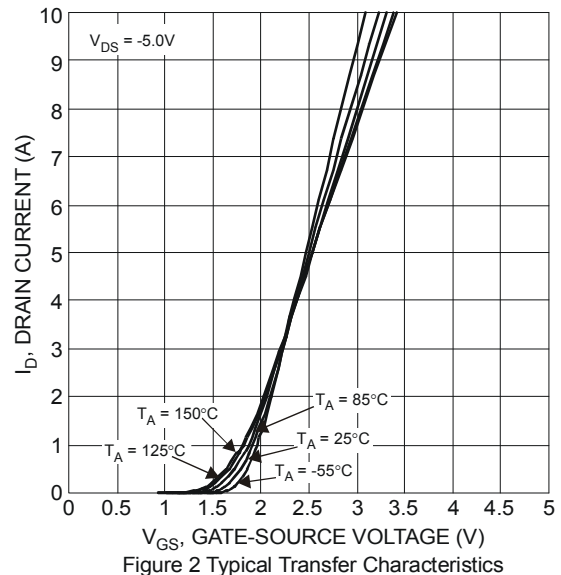
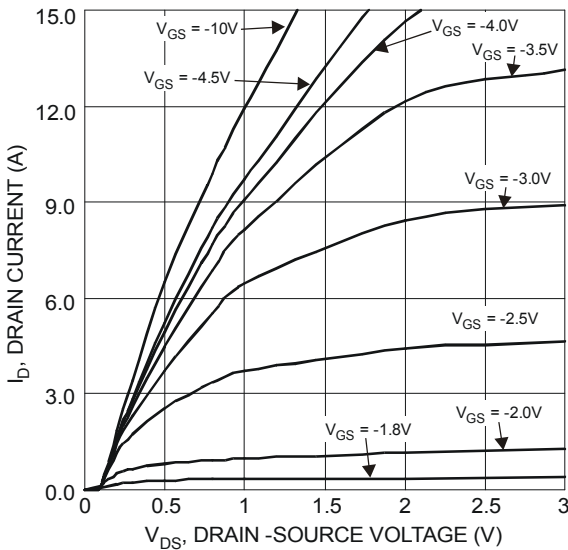
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C	1.1
		T <sub>A</sub> = +70°C	1.8
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady state	108
		t<10s	65
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	1.8
		T <sub>A</sub> = +70°C	2.3
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady state	78
		t<10s	50
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	22	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	

**Electrical Characteristics P-Channel Q1** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-20	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu A$	$V_{DS} = -20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.5	-1.5	-2.2	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	70	85	m $\Omega$	$V_{GS} = -10V, I_D = -3.05A$
		—	100	125		$V_{GS} = -4.5V, I_D = -1.50A$
Diode Forward Voltage	$V_{SD}$	—	-0.8	-1.0	V	$V_{GS} = 0V, I_S = -1.0A$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	353	—	pF	$V_{DS} = -15V, V_{GS} = 0V$ $f = 1.0MHz$
Output Capacitance	$C_{oss}$	—	49	—		
Reverse Transfer Capacitance	$C_{rss}$	—	41	—		
Gate Resistance	$R_G$	—	6.2	—	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$
Total Gate Charge ( $V_{GS} = -4.5V$ )	$Q_g$	—	3.7	—	nC	$V_{DS} = -15V, I_D = -3A$
Total Gate Charge ( $V_{GS} = -10V$ )	$Q_g$	—	7.8	—		
Gate-Source Charge	$Q_{gs}$	—	1.1	—		
Gate-Drain Charge	$Q_{gd}$	—	1.3	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.3	—	nS	$V_{DS} = -15V, R_L = 15\Omega$ $V_{GS} = -10V, R_G = 6\Omega$
Turn-On Rise Time	$t_r$	—	3.0	—		
Turn-Off Delay Time	$t_{D(off)}$	—	14	—		
Turn-Off Fall Time	$t_f$	—	6.8	—		
Body Diode Reverse Recovery Time	$t_{rr}$	—	33	—	nS	$I_S = -3.05A, dI/dt = 100A/\mu s$
Body Diode Reverse Recovery Charge	$Q_{rr}$	—	46	—	nC	$I_S = -3.05A, dI/dt = 100A/\mu s$

- 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.
  - $I_{AS}$  and  $E_{AS}$  rating are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.



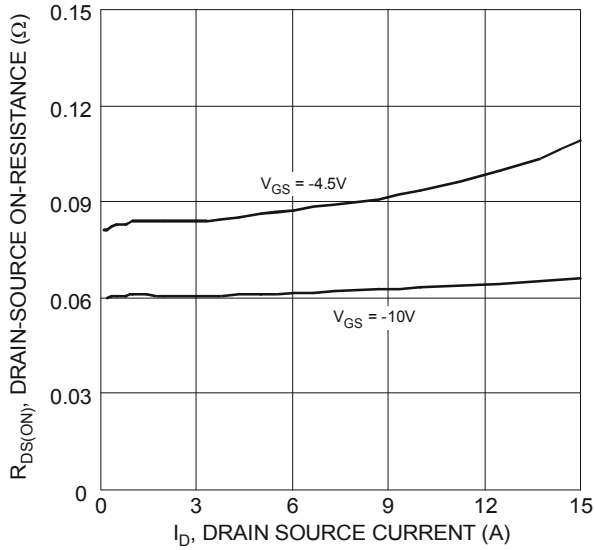


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

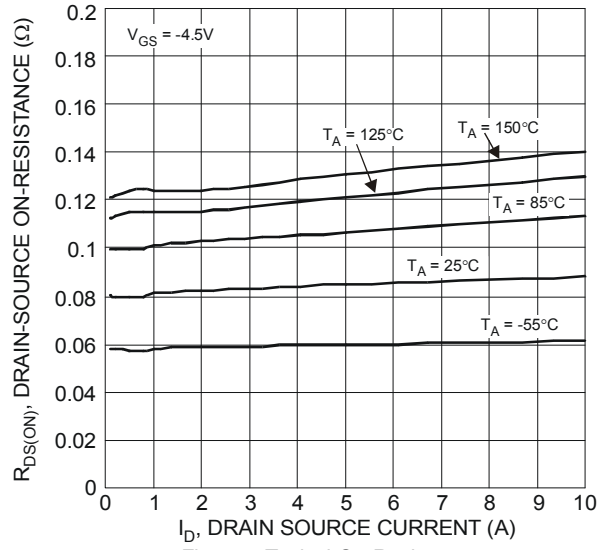


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

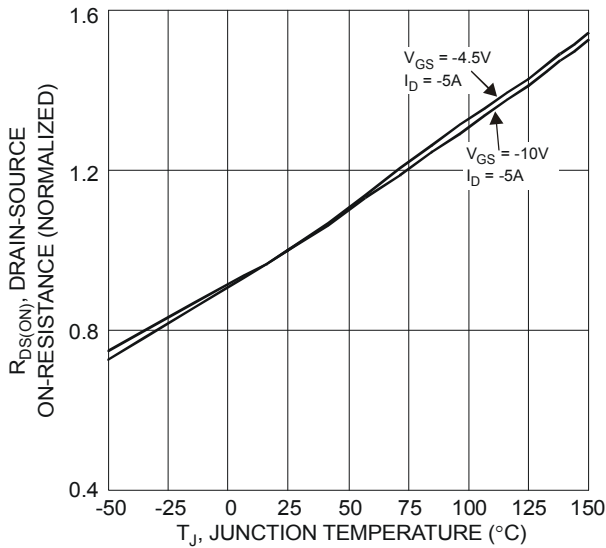


Figure 5 On-Resistance Variation with Temperature

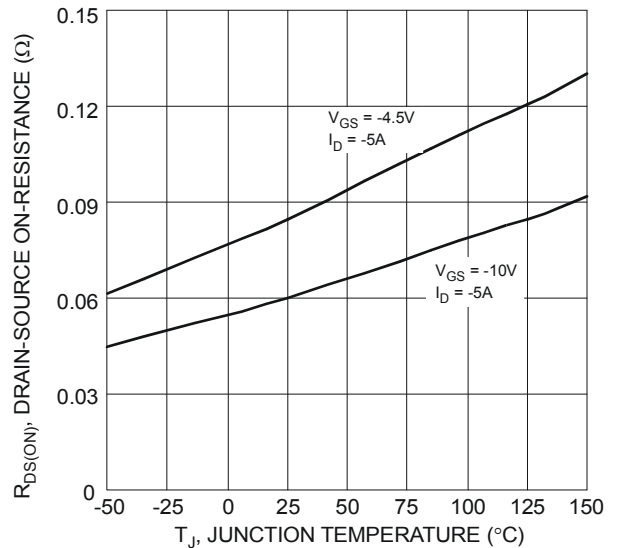


Figure 6 On-Resistance Variation with Temperature

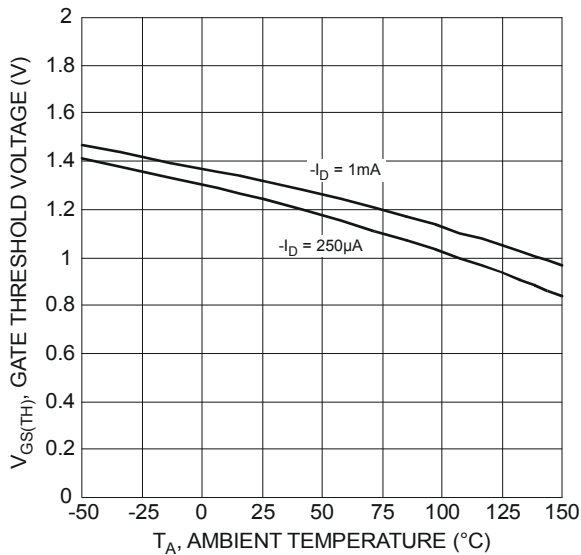


Figure 7 Gate Threshold Variation vs. Ambient Temperature

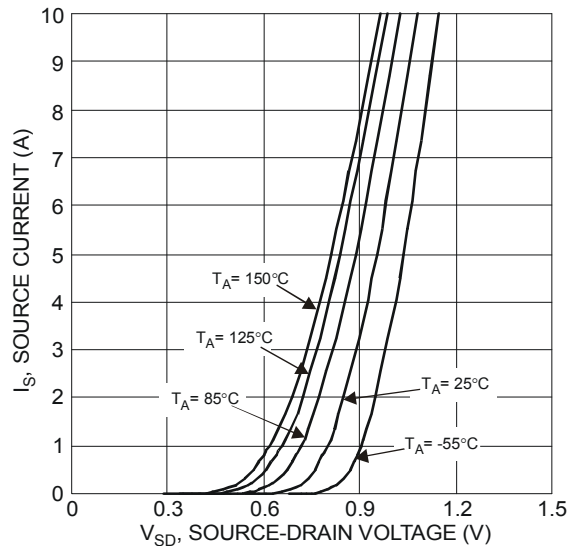
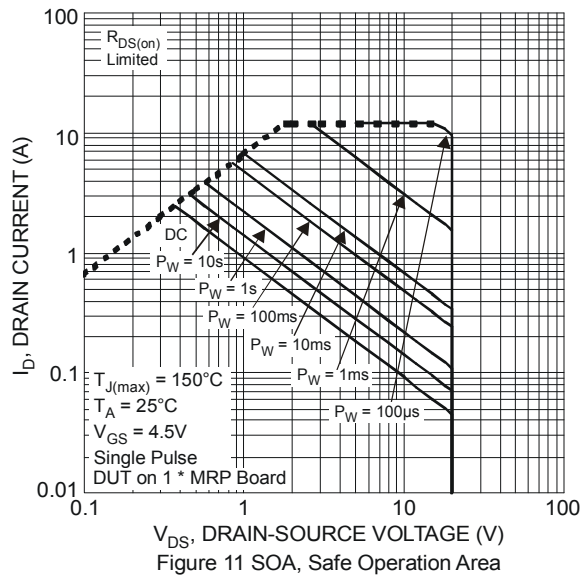
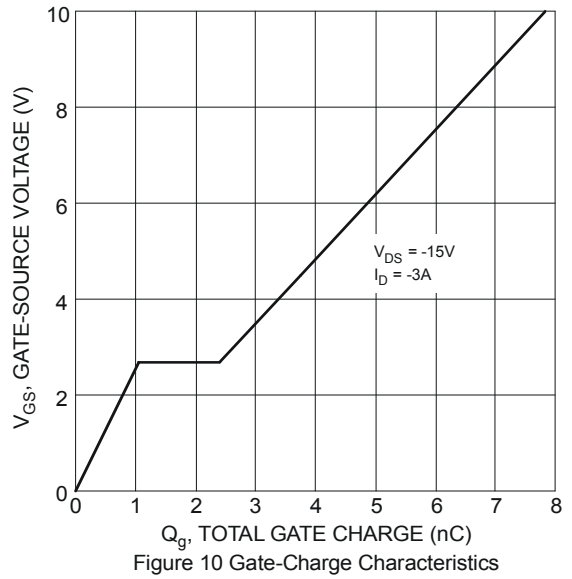
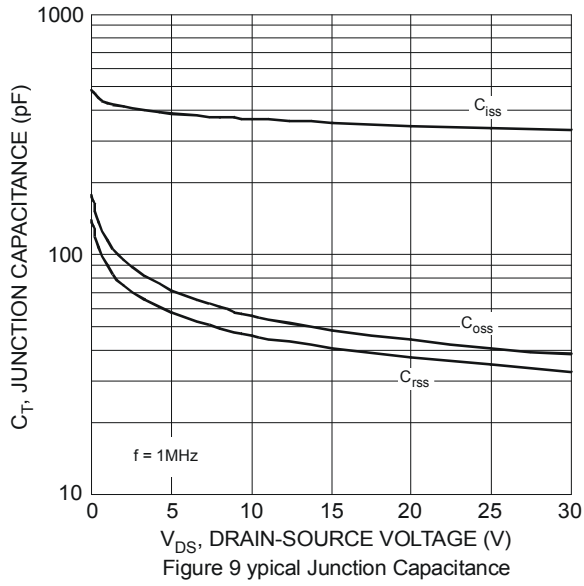


Figure 8 Diode Forward Voltage vs. Current



**Electrical Characteristics – SCHOTTKY – D1** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 8)	$V_{(BR)R}$	20	35	—	V	$I_R = 1\text{mA}$
Forward Voltage (Note 8)	$V_F$	—	—	0.40 0.47	V	$I_F = 0.5\text{A}$ $I_F = 1.0\text{A}$
Reverse Current (Note 8)	$I_R$	—	30	80	$\mu\text{A}$	$V_R = 20\text{V}$

Notes: 8. Short duration pulse test used to minimize self-heating effect.

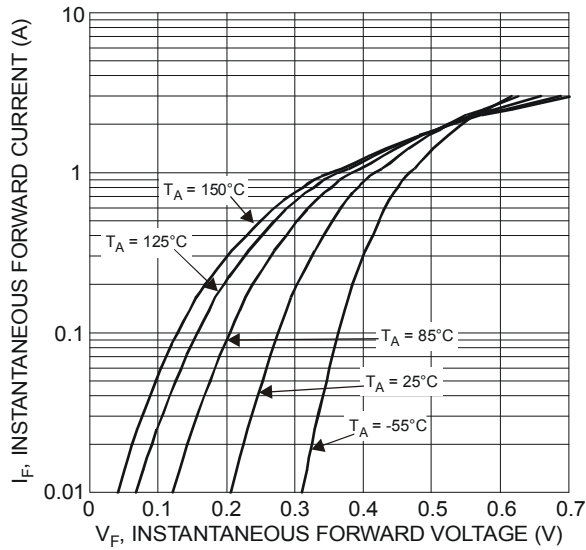


Figure 12 Typical Forward Characteristics

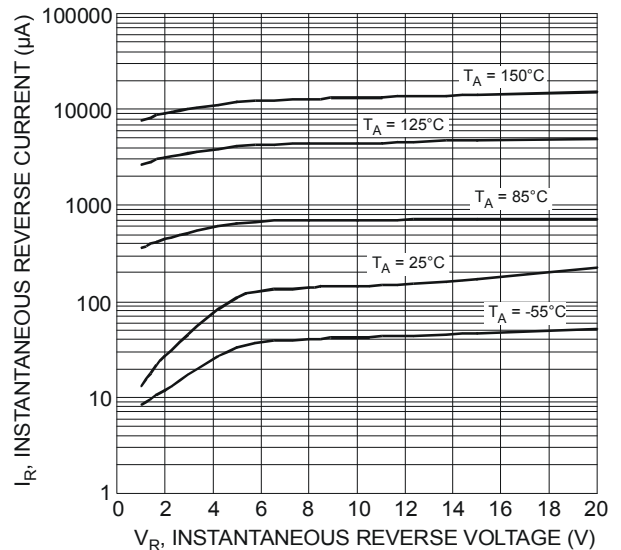
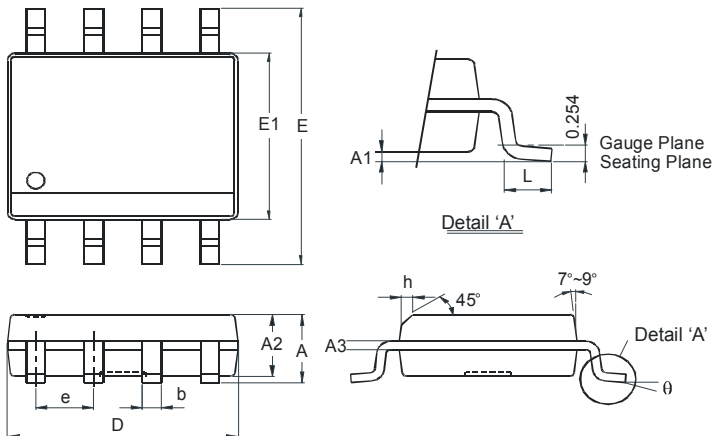


Figure 13 Typical Reverse Characteristics

**Package Outline Dimensions**

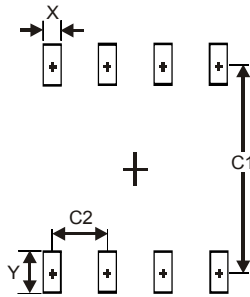
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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
$\theta$	$0^\circ$	$8^\circ$
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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