

Product Summary

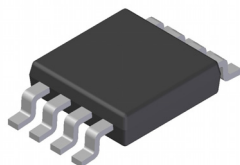
| MOSFET | | |
|----------------|--------------------------|-------|
| $V_{(BR)DSS}$ | $R_{DS(on) max}$ | I_D |
| -20V | 85mΩ @ $V_{GS} = -10V$ | -3.3A |
| | 125mΩ @ $V_{GS} = -4.5V$ | -2.8A |
| SCHOTTKY DIODE | | |
| V_R | $V_F max$ | I_O |
| 20V | 400mV @ $I_F = 0.5A$ | 1.0A |
| | 470mV @ $I_F = 1.0A$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

Description

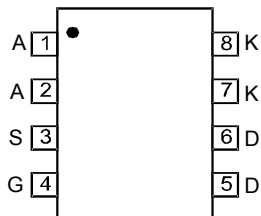
This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

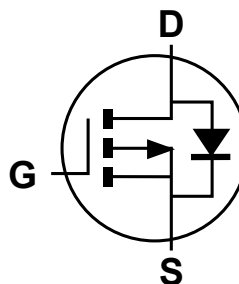
- DC-DC Converters
- Power Management Functions
- Backlighting



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

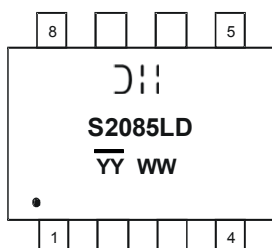
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe Solderable per MIL-STD-202, Method 208 e3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

Ordering Information (Note 4)

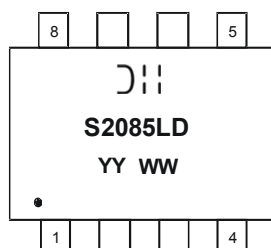
| Part Number | Case | Packaging |
|---------------|------|-------------------|
| DMS2085LSD-13 | SO-8 | 2,500/Tape & Reel |

- 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 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_A = +25°C, unless otherwise specified.)

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

Maximum Ratings – SCHOTTKY – D1 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|-------------------|-------|------|
| Peak Repetitive Reverse Voltage | V _R RM | 20 | V |
| Working Peak Reverse Voltage | V _R WM | | |
| DC Blocking Voltage | V _R | | |
| Average Rectified Output Current (Note 7, t<10s) | I _O | 1 | A |
| Peak Repetitive Forward Current (Note 7, t<10s) | I _{FRM} | 2 | A |
| Non-Repetitive Peak Forward Surge Current (Note 7, t<10s) Single half sine-wave superimposed on rated load | I _{FSM} | 20 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

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

Electrical Characteristics P-Channel Q1 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|------|------|------|------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -20 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1 | μA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -0.5 | -1.5 | -2.2 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 70 | 85 | mΩ | 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 |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| 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 | — | Ω | 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 = 15Ω V _{GS} = -10V, R _G = 6Ω |
| 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/μs |
| Body Diode Reverse Recovery Charge | Q _{rr} | — | 46 | — | nC | I _S = -3.05A, dI/dt = 100A/μs |

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

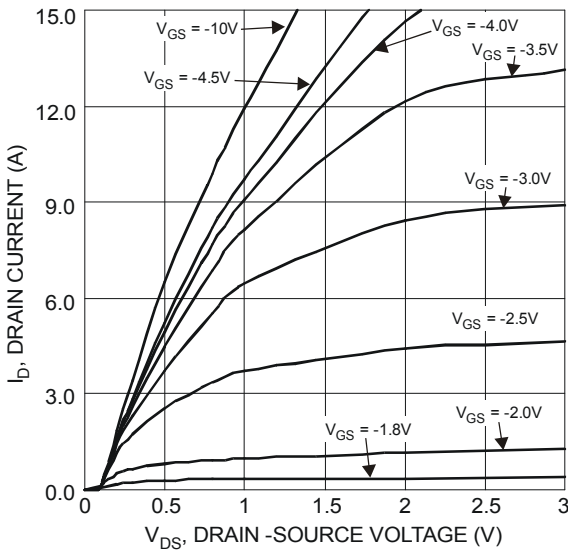


Figure 1 Typical Output Characteristics

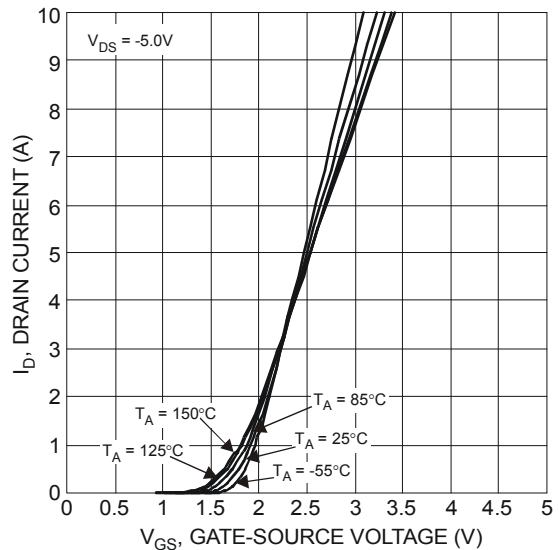


Figure 2 Typical Transfer Characteristics

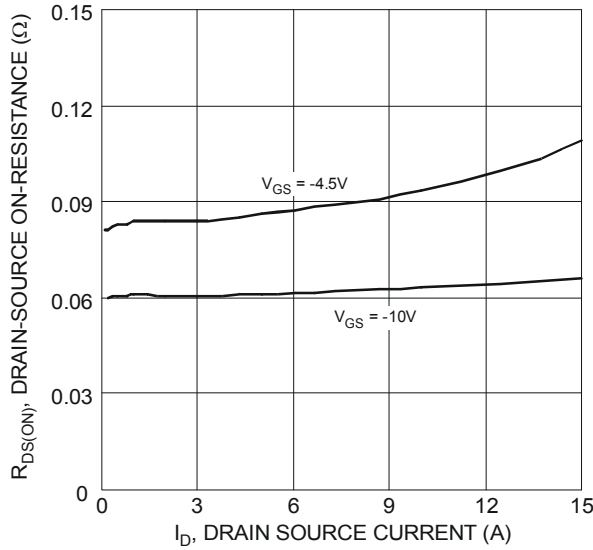


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

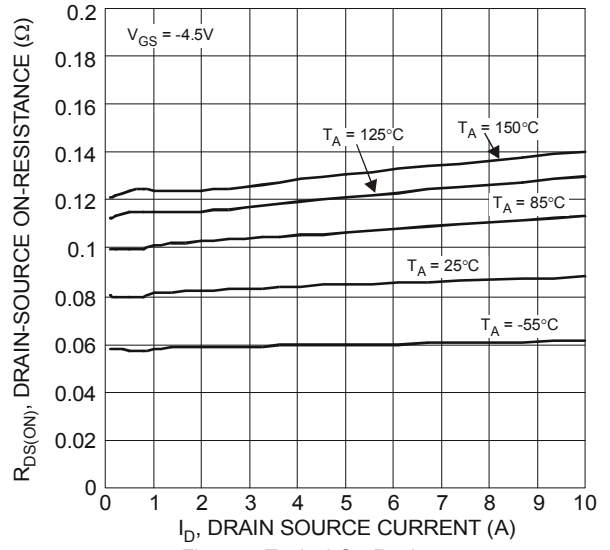


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

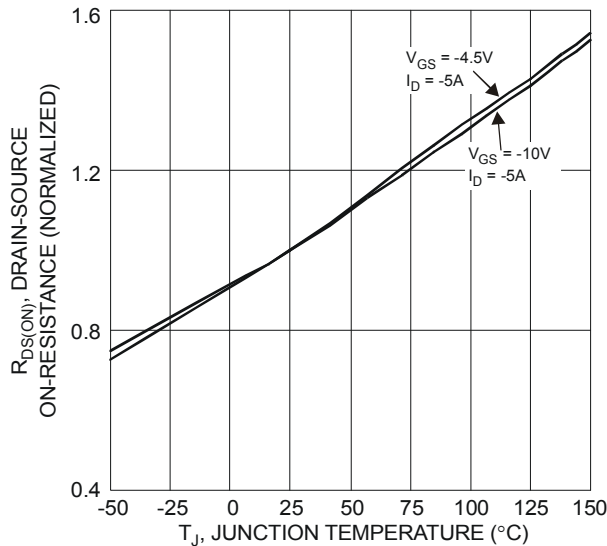


Figure 5 On-Resistance Variation with Temperature

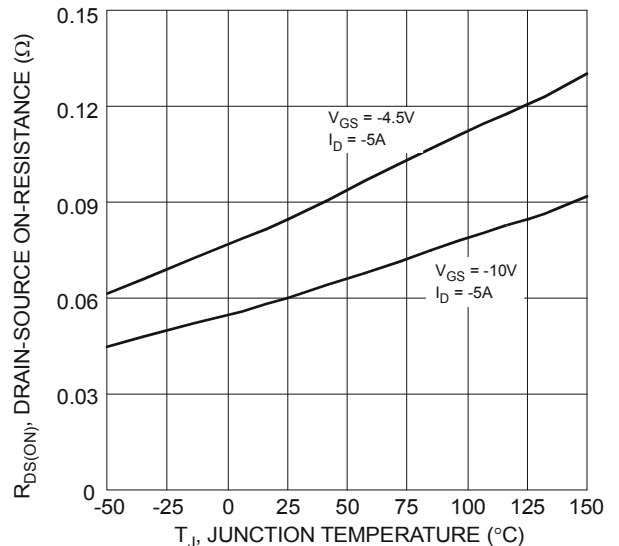


Figure 6 On-Resistance Variation with Temperature

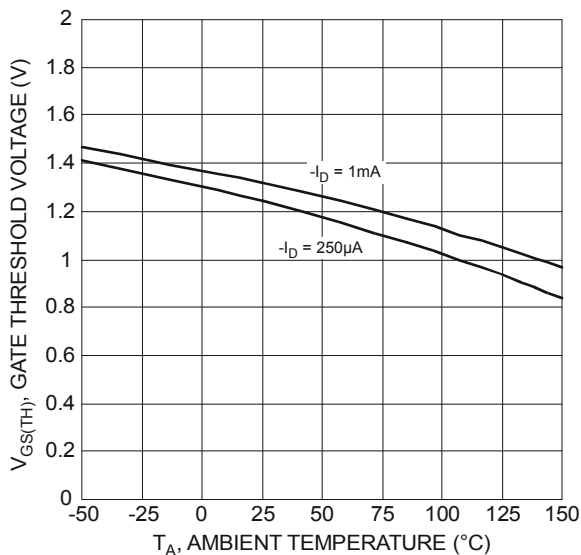


Figure 7 Gate Threshold Variation vs. Ambient Temperature

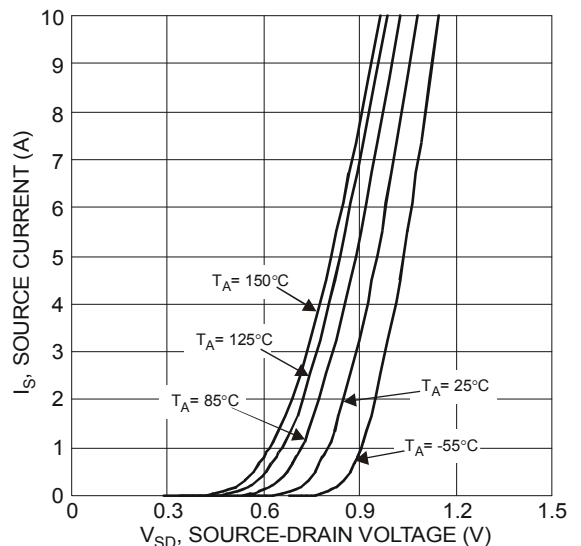
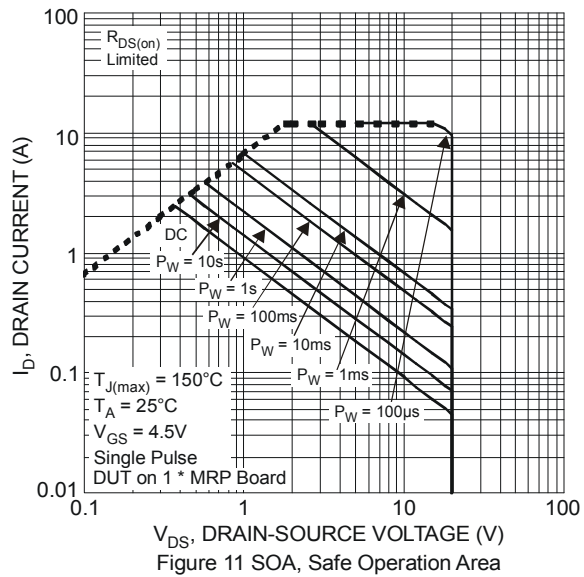
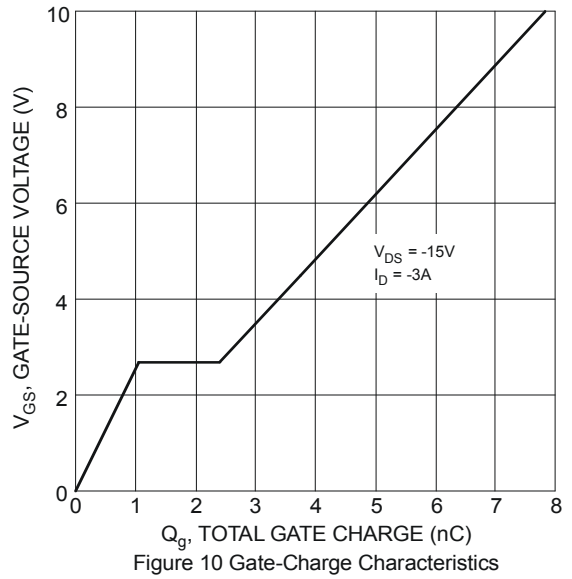
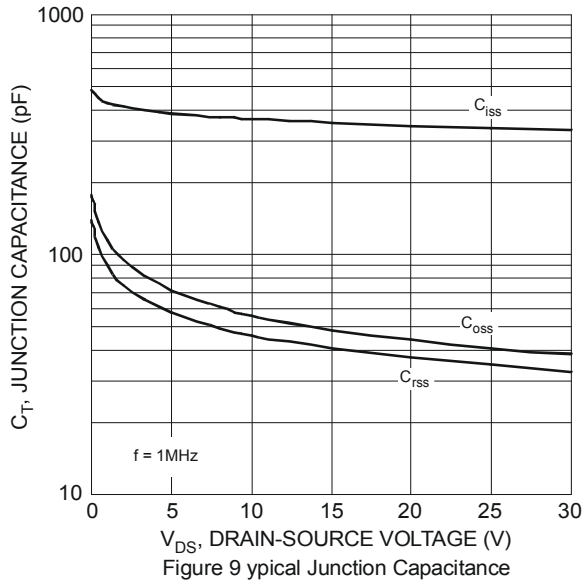


Figure 8 Diode Forward Voltage vs. Current



Electrical Characteristics – SCHOTTKY – D1 (@T_A = +25°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 = 1mA |
| Forward Voltage (Note 8) | V _F | — | — | 0.40 0.47 | V | I _F = 0.5A I _F = 1.0A |
| Reverse Current (Note 8) | I _R | — | 30 | 80 | μA | V _R = 20V |

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

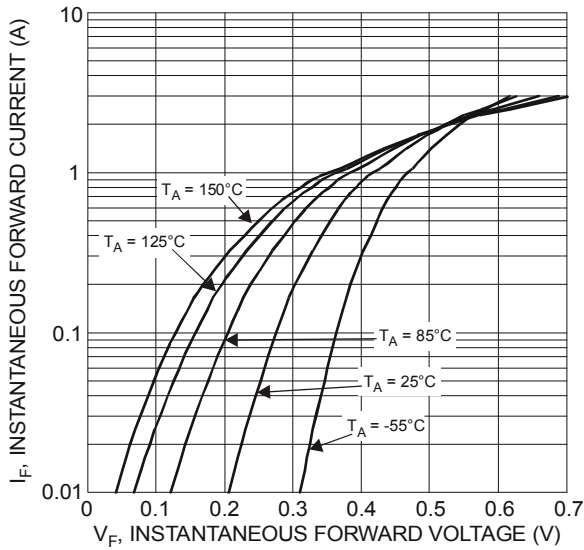


Figure 12 Typical Forward Characteristics

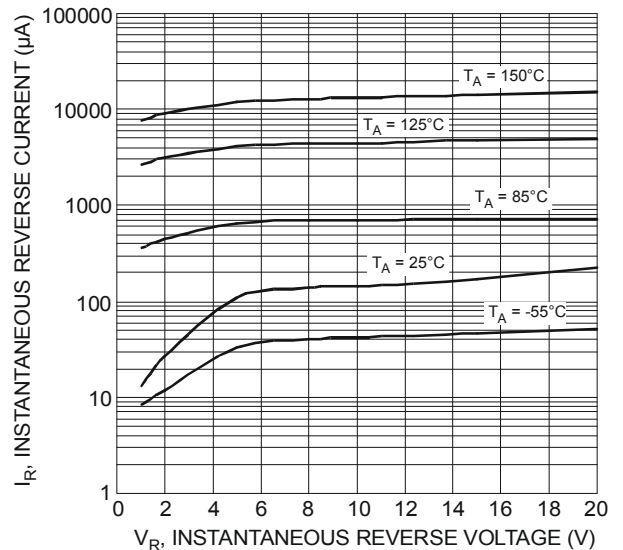
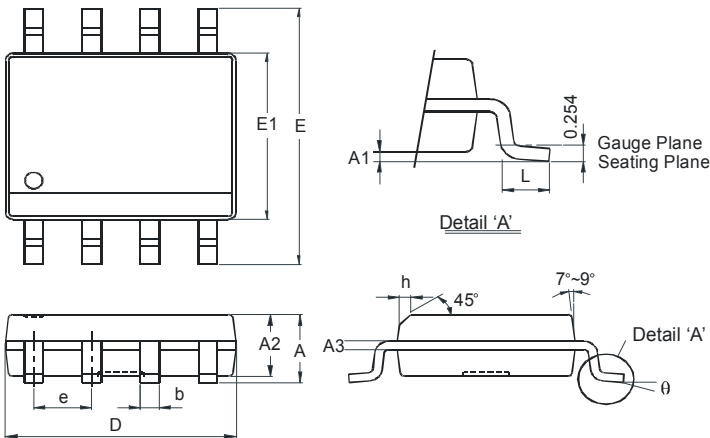


Figure 13 Typical Reverse Characteristics

Package Outline Dimensions

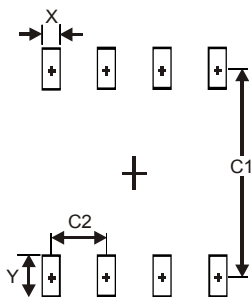
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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 |
| 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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