

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D $T_A = +25^\circ C$ |
|---------------|--------------------------------|------------------------------|
| 60V | 66m Ω @ $V_{GS} = 10V$ | 4.4A |
| | 97m Ω @ $V_{GS} = 4.5V$ | 3.6A |

Description and Applications

This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

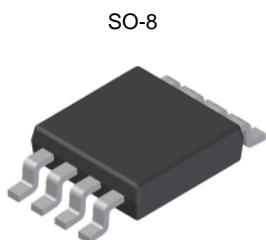
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

Features and Benefits

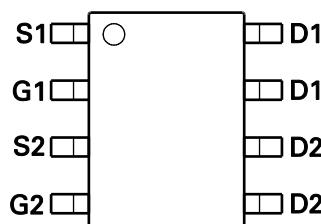
- Low on-resistance
- Fast switching speed
- 100% Unclamped Inductive Switch (UIS) test in production
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

Mechanical Data

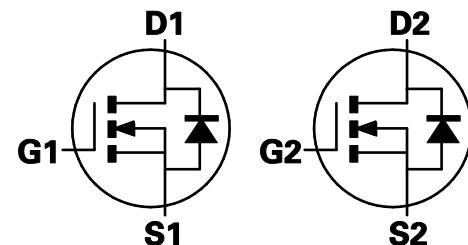
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.074 grams (Approximate)



Top View



Top View



Equivalent Circuit

Ordering Information (Notes 4 & 5)

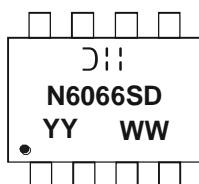
| Part Number | Compliance | Case | Packaging |
|----------------|------------|------|-------------------|
| DMN6066SSD-13 | Commercial | SO-8 | 2,500/Tape & Reel |
| DMN6066SSDQ-13 | Automotive | SO-8 | 2,500/Tape & Reel |

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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information

SO-8



DII = Manufacturer's Marking
 N6066SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 09 = 2009)
 WW = Week (01 - 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|--|-----------------------|-----------|----------|------|
| Drain-Source Voltage | | V_{DSS} | 60 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | V |
| Single Pulsed Avalanche Energy | | E_{AS} | 37.5 | mJ |
| Single Pulsed Avalanche Current | | I_{AS} | 5.0 | A |
| Continuous Drain Current | $V_{GS} = 10\text{V}$ | I_D | 4.4 | A |
| | | | 3.5 | |
| | | | 3.3 | |
| Pulsed Drain Current | $V_{GS} = 10\text{V}$ | I_{DM} | 17.0 | A |
| Continuous Source Current (Body diode) | | I_S | 3.2 | A |
| Pulsed Source Current (Body diode) | (Note 9) | I_{SM} | 17.0 | A |

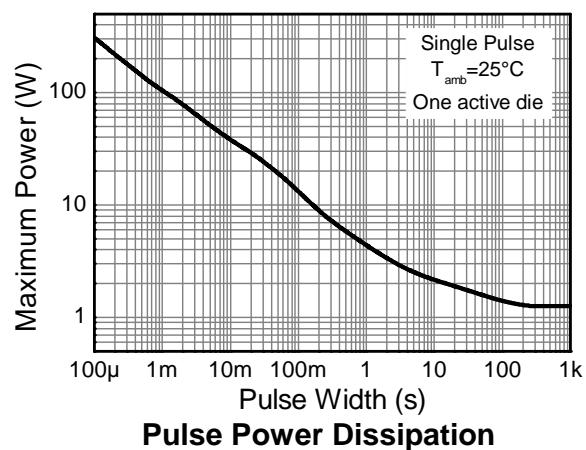
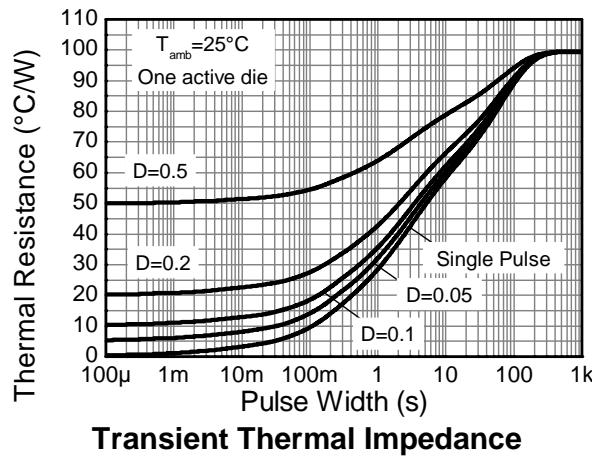
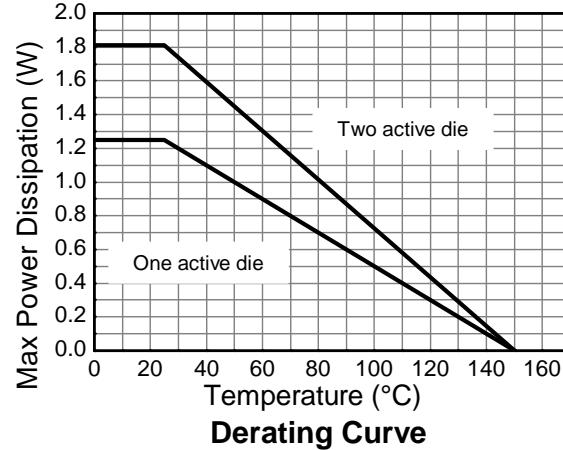
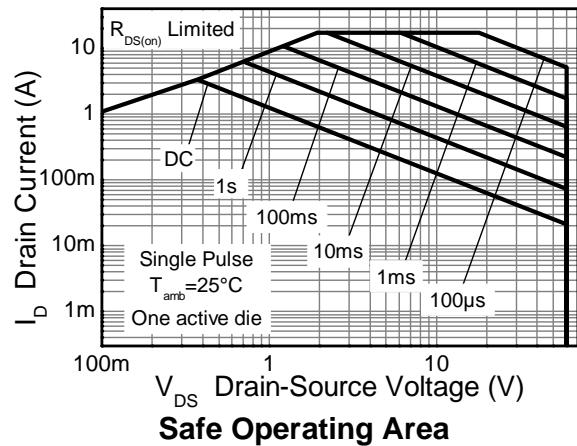
Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|-----------------|-----------------|--------------|------------|
| Power Dissipation Linear Derating Factor | (Notes 7 & 10) | P_D | 1.25 10 | W mW/°C |
| | (Notes 7 & 11) | | 1.8 14.3 | |
| | (Notes 8 & 10) | | 2.14 17.2 | |
| Thermal Resistance, Junction to Ambient | (Notes 7 & 10) | $R_{\theta JA}$ | 100 | °C/W |
| | (Notes 7 & 11) | | 70 | |
| | (Notes 8 & 10) | | 58 | |
| Thermal Resistance, Junction to Lead | (Notes 10 & 12) | $R_{\theta JL}$ | 55 | |
| Operating and Storage Temperature Range | | T_J, T_{STG} | -55 to 150 | °C |

Notes:

6. AEC-Q101 V_{GS} maximum is $\pm 16\text{V}$.
7. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
8. Same as note (3), except the device is measured at $t \leq 10$ sec.
9. Same as note (3), except the device is pulsed with $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.
10. For a dual device with one active die.
11. For a device with two active die running at equal power.
12. Thermal resistance from junction to solder-point (at the end of the drain lead).
13. UIS in production with $L = 3.0\text{mH}$, $I_{AS} = 5.0\text{A}$, $R_G = 25\Omega$, $V_{DD} = 50\text{V}$, starting $T_J = +25^\circ\text{C}$.

Thermal Characteristics



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

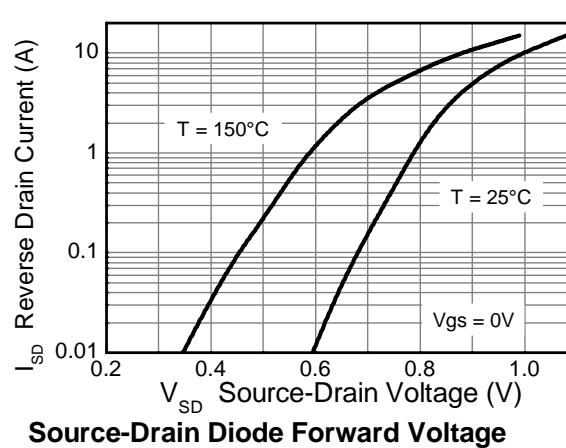
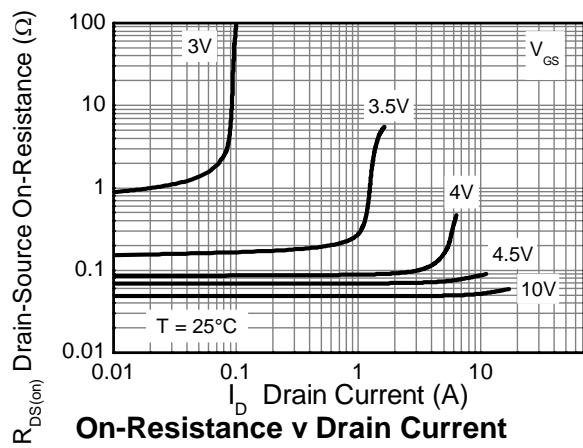
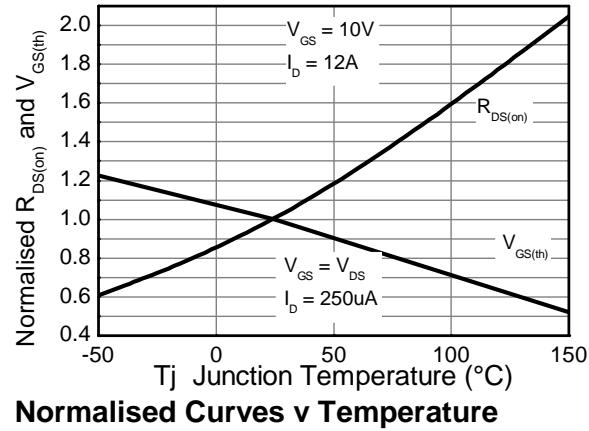
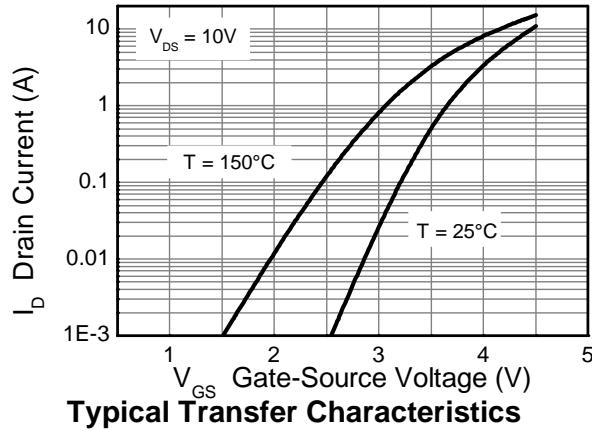
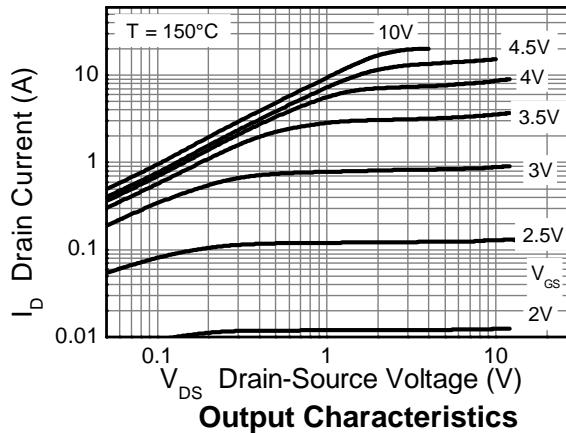
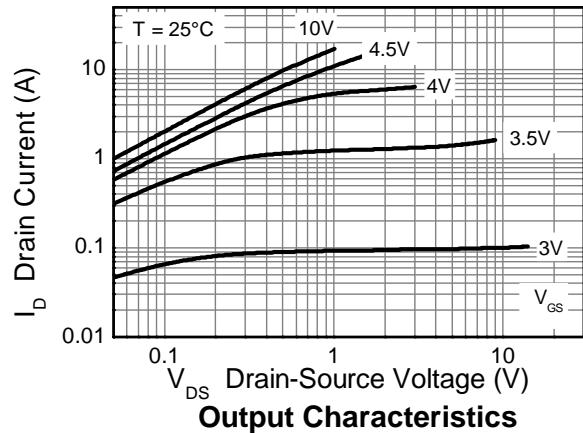
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------------------|-----|----------------|----------------|---------------|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 60 | — | — | V | $I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 0.5 | μA | $V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(\text{th})}$ | 1.0 | — | 3.0 | V | $I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$ |
| Static Drain-Source On-Resistance (Note 14) | $R_{DS(\text{ON})}$ | — | 0.048 0.068 | 0.066 0.097 | Ω | $V_{GS} = 10\text{V}$, $I_D = 4.5\text{A}$ $V_{GS} = 4.5\text{V}$, $I_D = 3.5\text{A}$ |
| Forward Transconductance (Notes 14 & 15) | g_{fs} | — | 19.2 | — | S | $V_{DS} = 15\text{V}$, $I_D = 6\text{A}$ |
| Diode Forward Voltage (Note 14) | V_{SD} | — | 0.89 | 1.15 | V | $I_S = 4.5\text{A}$, $V_{GS} = 0\text{V}$ |
| Reverse recovery time (Note 15) | t_{rr} | — | 22.2 | — | ns | $I_S = 1.9\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse recovery charge (Note 15) | Q_{rr} | — | 16.9 | — | nC | |
| DYNAMIC CHARACTERISTICS (Note 15) | | | | | | |
| Input Capacitance | C_{iss} | — | 502 | — | pF | $V_{DS} = 30\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 45.7 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 27.1 | — | pF | |
| Total Gate Charge (Note 16) | Q_g | — | 5.4 | — | nC | $V_{GS} = 4.5\text{V}$ |
| Total Gate Charge (Note 16) | Q_g | — | 10.3 | — | nC | $V_{GS} = 10\text{V}$ |
| Gate-Source Charge (Note 16) | Q_{gs} | — | 1.7 | — | nC | |
| Gate-Drain Charge (Note 16) | Q_{gd} | — | 3.2 | — | nC | $V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$ $I_D = 1\text{A}$, $R_G \geq 6.0\Omega$ |
| Turn-On Delay Time (Note 16) | $t_{D(\text{on})}$ | — | 2.7 | — | ns | |
| Turn-On Rise Time (Note 16) | t_r | — | 2.4 | — | ns | |
| Turn-Off Delay Time (Note 16) | $t_{D(\text{off})}$ | — | 14.7 | — | ns | |
| Turn-Off Fall Time (Note 16) | t_f | — | 5.4 | — | ns | |

Notes: 14. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

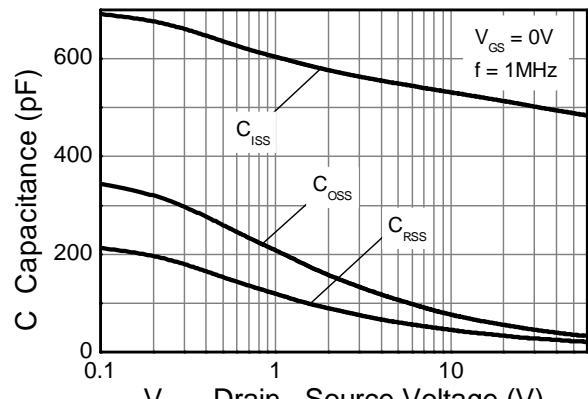
15. For design aid only, not subject to production testing.

16. Switching characteristics are independent of operating junction temperatures.

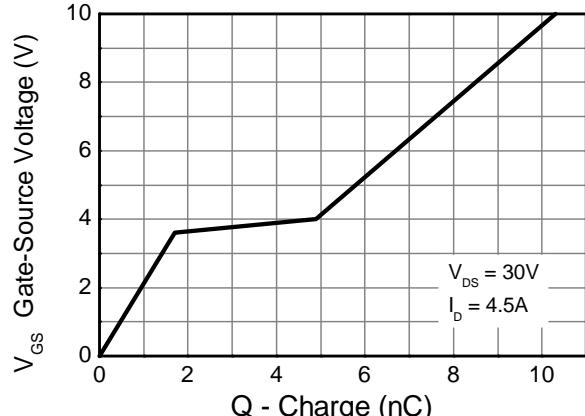
Typical Characteristics



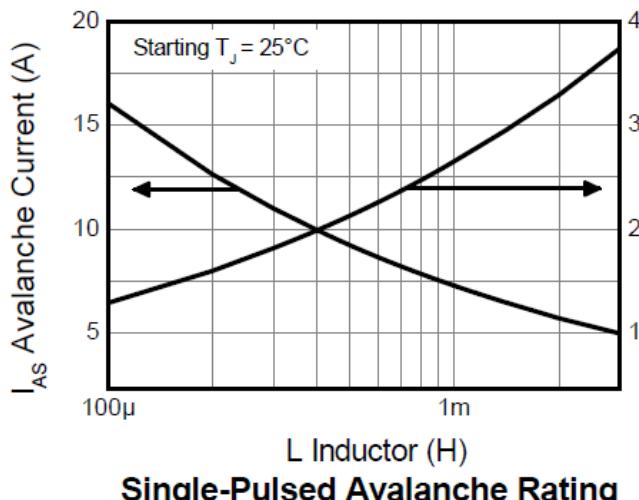
Typical Characteristics (continued)



Capacitance v Drain-Source Voltage

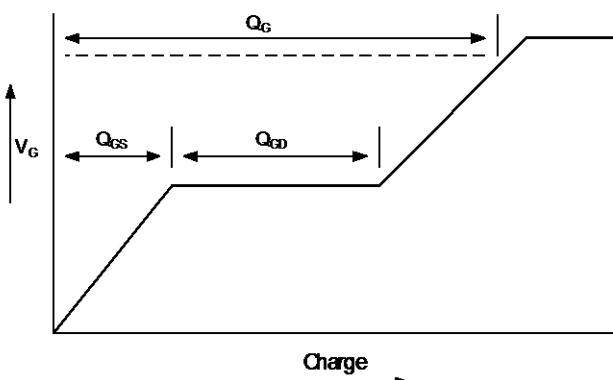


Gate-Source Voltage v Gate Charge

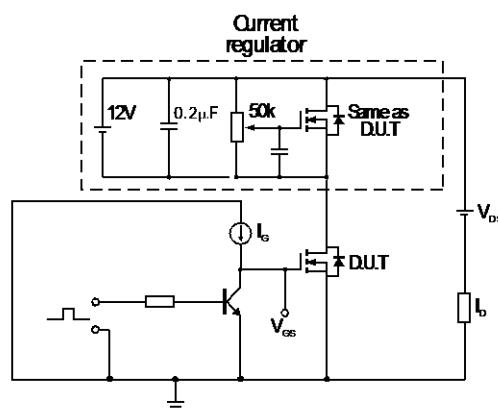


Single-Pulsed Avalanche Rating

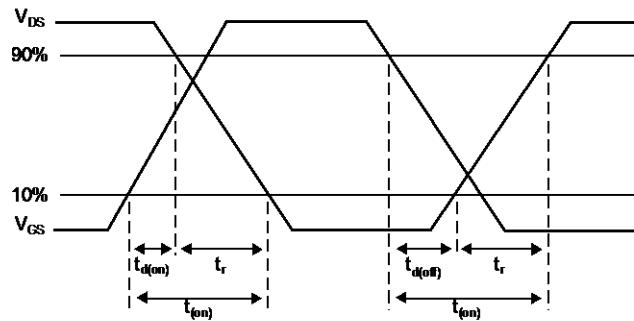
Test Circuits



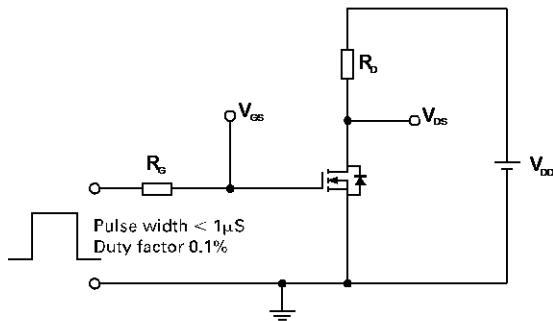
Basic gate charge waveform



Gate charge test circuit



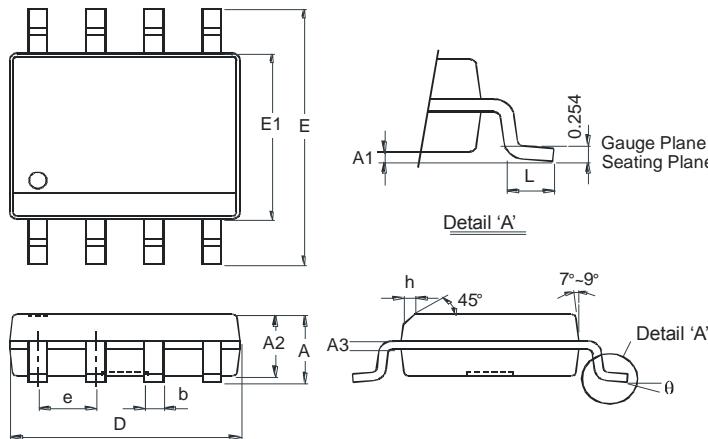
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

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

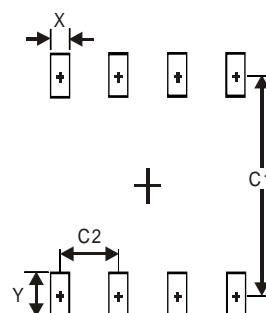


| SO-8 | | |
|------|------|------|
| Dim | Min | Max |
| A | - | 1.75 |
| A1 | 0.10 | 0.20 |
| A2 | 1.30 | 1.50 |
| A3 | 0.15 | 0.25 |
| b | 0.3 | 0.5 |
| D | 4.85 | 4.95 |
| E | 5.90 | 6.10 |
| E1 | 3.85 | 3.95 |
| e | 1.27 | Typ |
| h | - | 0.35 |
| L | 0.62 | 0.82 |
| θ | 0° | 8° |

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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