

**60V DUAL N-CANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

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

**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)**

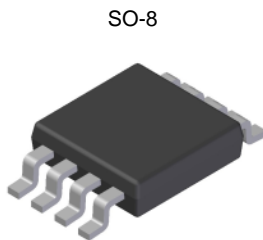
**Description and Applications**

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.

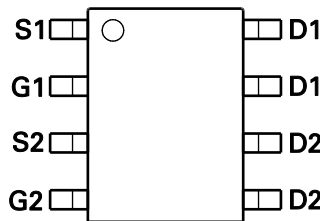
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

**Mechanical Data**

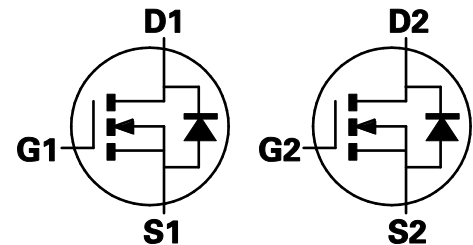
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)



Top View



Top View



Equivalent Circuit

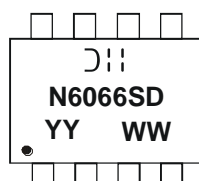
**Ordering Information** (Notes 4 & 5)

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](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/](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



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

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

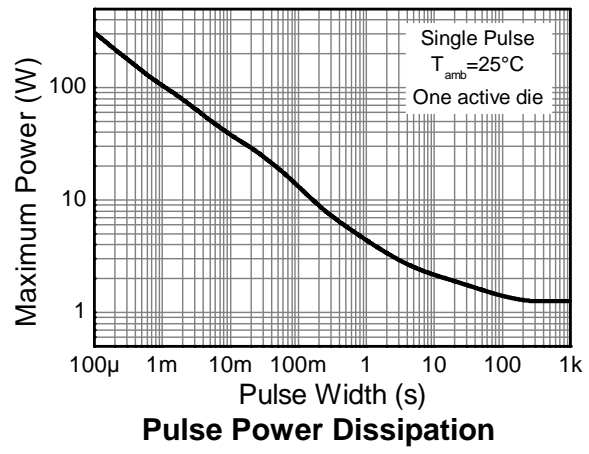
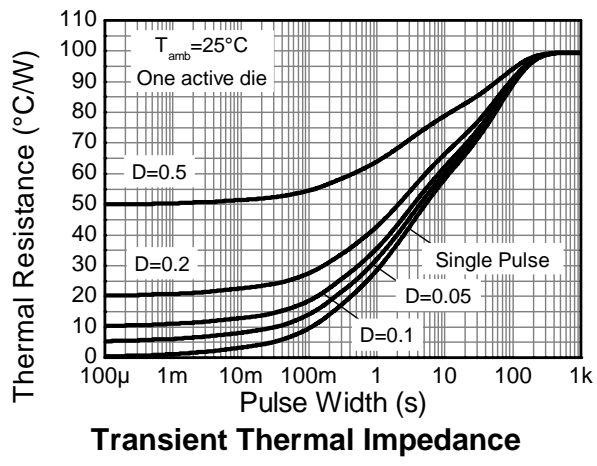
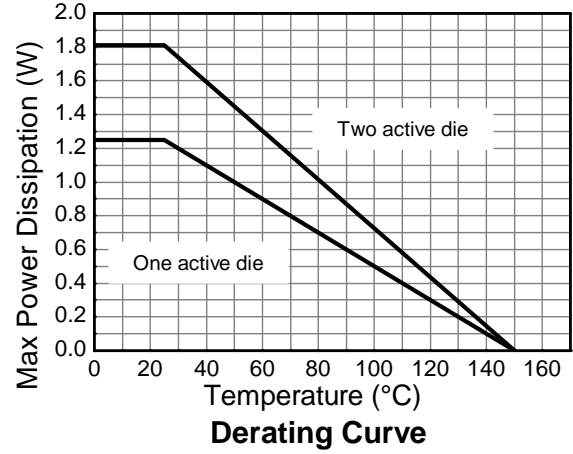
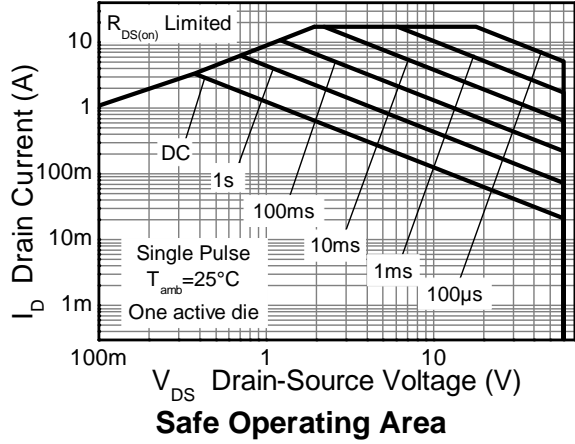
Characteristic		Symbol	Value	Unit	
Drain-Source Voltage		V <sub>DSS</sub>	60	V	
Gate-Source Voltage	(Note 6)	V <sub>GS</sub>	±20	V	
Single Pulsed Avalanche Energy	(Note 13)	E <sub>AS</sub>	37.5	mJ	
Single Pulsed Avalanche Current	(Note 13)	I <sub>AS</sub>	5.0	A	
Continuous Drain Current	V <sub>GS</sub> = 10V	I <sub>D</sub>	(Note 8)	4.4	A
			T <sub>A</sub> = +70°C (Note 8)	3.5	
			(Note 7)	3.3	
Pulsed Drain Current	V <sub>GS</sub> = 10V	I <sub>DM</sub>	17.0	A	
Continuous Source Current (Body diode)		I <sub>S</sub>	3.2	A	
Pulsed Source Current (Body diode)		I <sub>SM</sub>	17.0	A	

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

Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Notes 7 & 10)	P <sub>D</sub>	1.25	W mW/°C
			10	
	(Notes 7 & 11)		1.8	
			14.3	
Thermal Resistance, Junction to Ambient	(Notes 8 & 10)	R <sub>θJA</sub>	2.14	°C/W
			17.2	
	(Notes 7 & 10)		100	
Thermal Resistance, Junction to Ambient	(Notes 7 & 11)	R <sub>θJA</sub>	70	°C/W
	(Notes 8 & 10)		58	
Thermal Resistance, Junction to Lead	(Notes 10 & 12)	R <sub>θJL</sub>	55	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

- Notes:
6. AEC-Q101 V<sub>GS</sub> maximum is ±16V.
  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 ≤ 10 sec.
  9. Same as note (3), except the device is pulsed with D = 0.02 and pulse width 300µs. 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 = 3.0mH, I<sub>AS</sub> = 5.0A, R<sub>G</sub> = 25Ω, V<sub>DD</sub> = 50V, starting T<sub>J</sub> = +25°C.

**Thermal Characteristics**

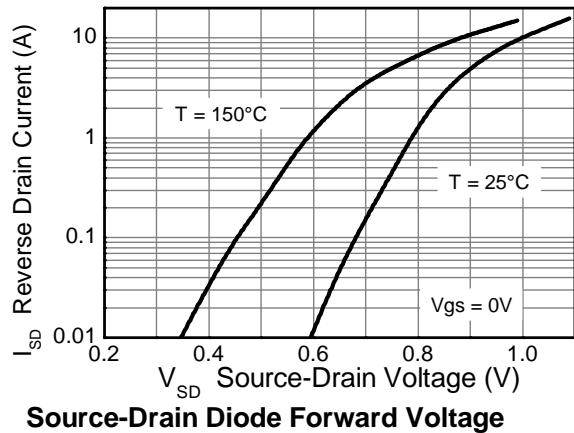
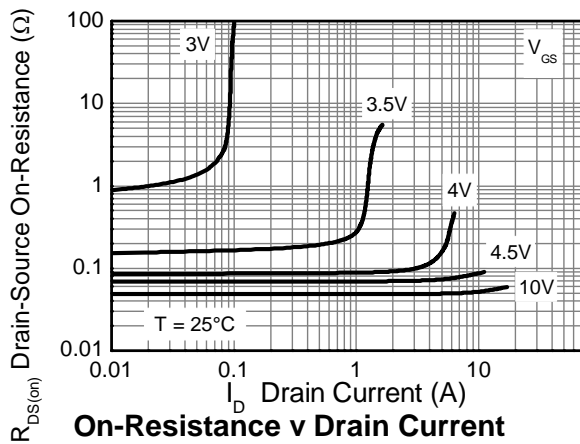
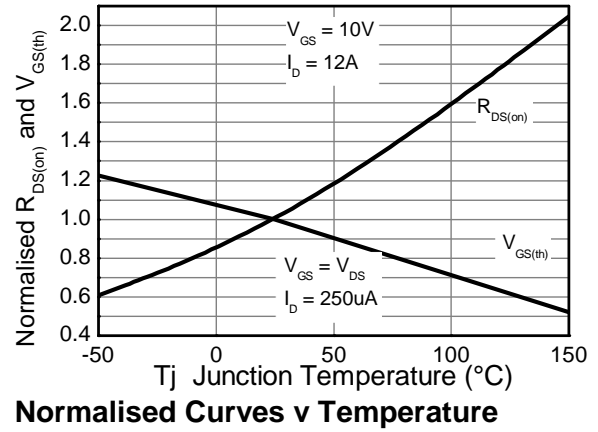
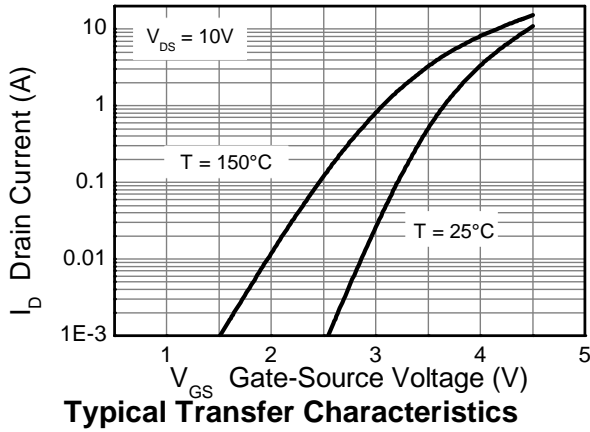
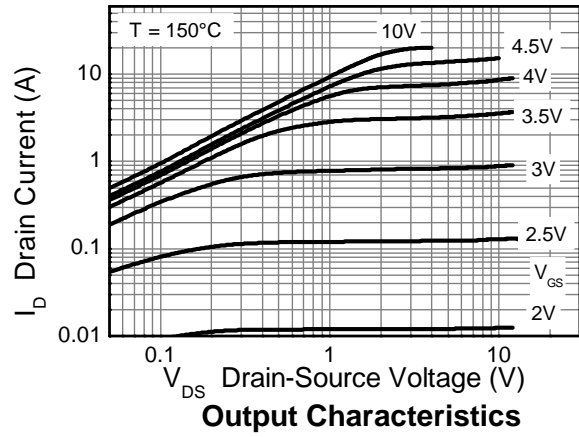
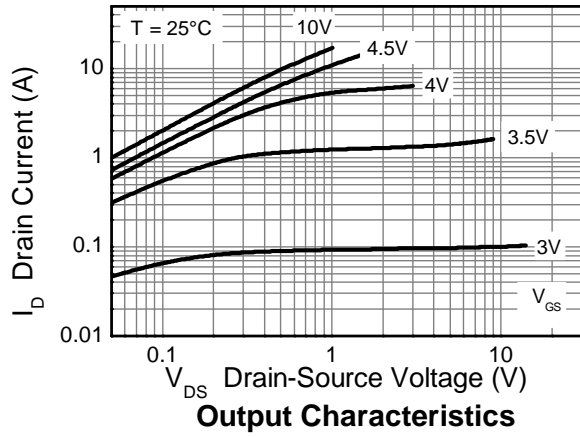


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

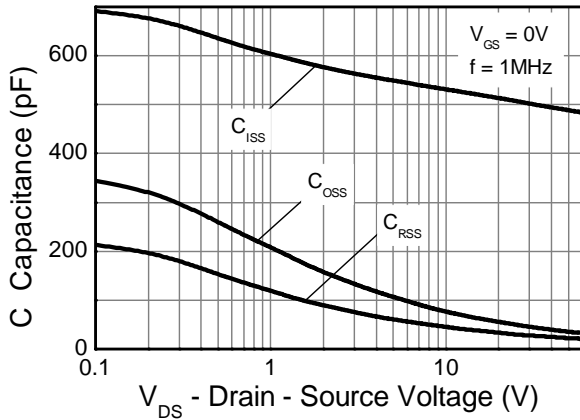
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	0.5	$\mu\text{A}$	$V_{DS} = 60\text{V}$ , $V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	$I_D = 250\mu\text{A}$ , $V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 14)	$R_{DS(on)}$	—	0.048	0.066	$\Omega$	$V_{GS} = 10\text{V}$ , $I_D = 4.5\text{A}$
			0.068	0.097		$V_{GS} = 4.5\text{V}$ , $I_D = 3.5\text{A}$
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	
<b>DYNAMIC CHARACTERISTICS (Note 15)</b>						
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	
Turn-On Delay Time (Note 16)	$t_{D(on)}$	—	2.7	—	ns	$V_{DD} = 30\text{V}$ , $V_{GS} = 10\text{V}$ $I_D = 1\text{A}$ , $R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 16)	$t_r$	—	2.4	—	ns	
Turn-Off Delay Time (Note 16)	$t_{D(off)}$	—	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.

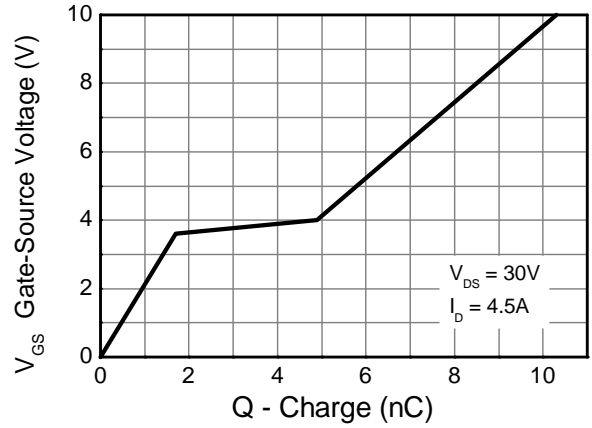
**Typical Characteristics**



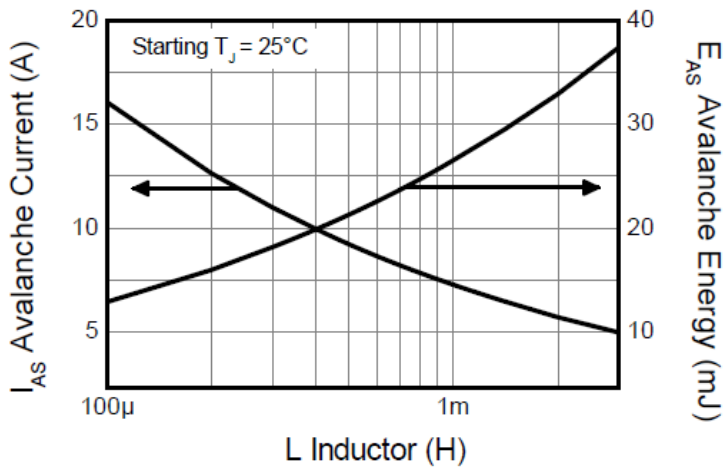
**Typical Characteristics** (continued)



**Capacitance v Drain-Source Voltage**

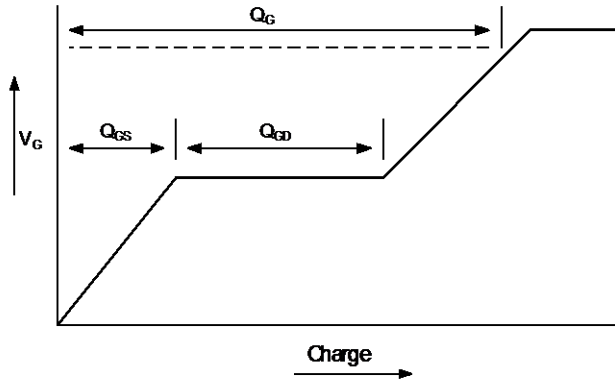


**Gate-Source Voltage v Gate Charge**

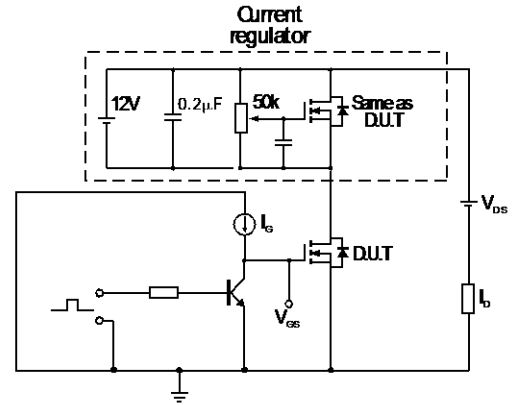


**Single-Pulsed Avalanche Rating**

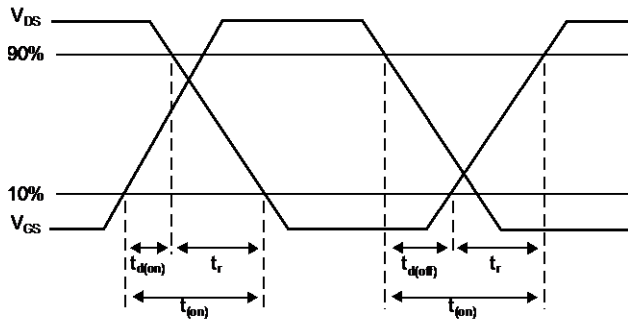
**Test Circuits**



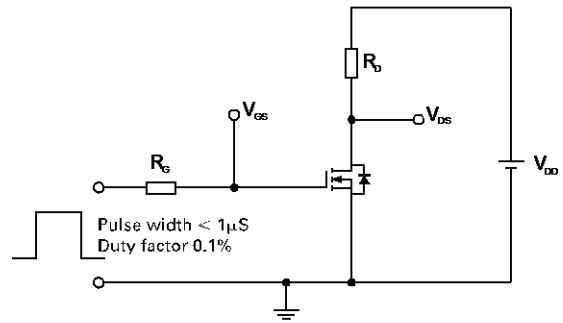
**Basic gate charge waveform**



**Gate charge test circuit**



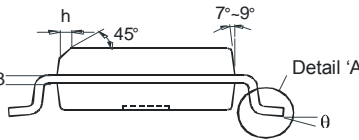
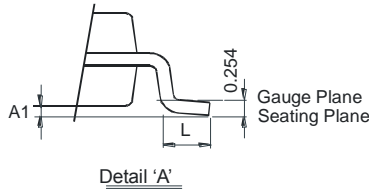
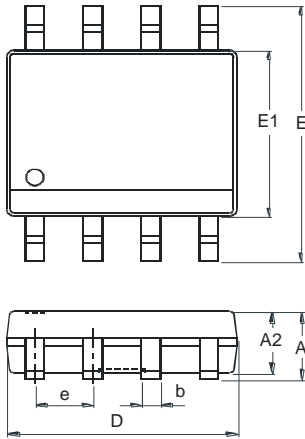
**Switching time waveforms**



**Switching time test circuit**

**Package Outline Dimensions**

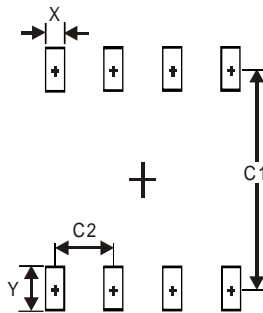
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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
$\theta$	0°	8°
<b>All Dimensions in mm</b>		

**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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