60V DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°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)**
- **The DMN6066SSDQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Description and Applications

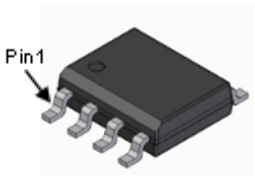
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Motor controls
- Backlighting
- DC-DC converters
- Power-management functions

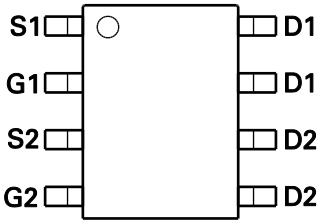
Mechanical Data

- Package: SO-8
- Package 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)

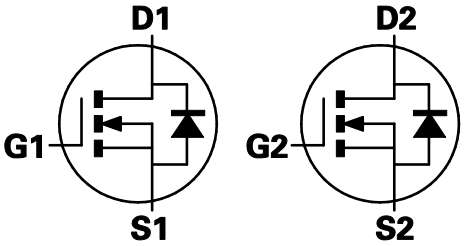
SO-8



Top View



Top View



Equivalent Circuit

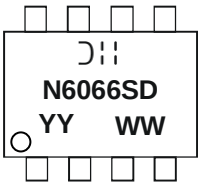
Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMN6066SSDQ-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) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SO-8



= Manufacturer's Marking
N6066SD = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 24 = 2024)
WW = Week (01 to 53)

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

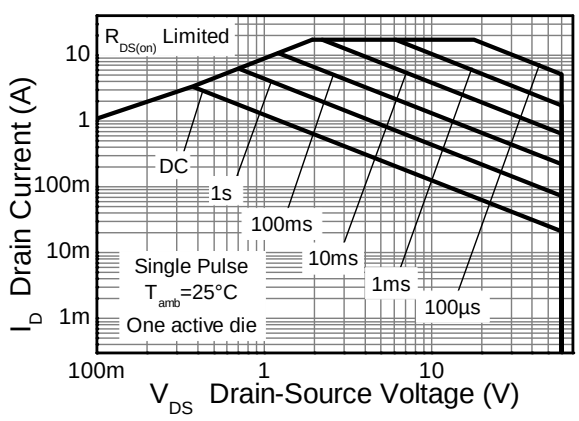
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage		(Note 5)	V_{GS}	±20	V
Single Pulsed Avalanche Energy		(Note 12)	E_{AS}	37.5	mJ
Single Pulsed Avalanche Current		(Note 12)	I_{AS}	5.0	A
Continuous Drain Current	V_{GS} = 10V	(Note 8)	I_D	4.4	A
		T_A = +70°C (Note 8)		3.5	
		(Note 6)		3.3	
Pulsed Drain Current	V_{GS} = 10V	(Note 8)	I_{DM}	17.0	A
Continuous Source Current (Body Diode)		(Note 7)	I_S	3.2	A
Pulsed Source Current (Body Diode)		(Note 7)	I_{SM}	17.0	A

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

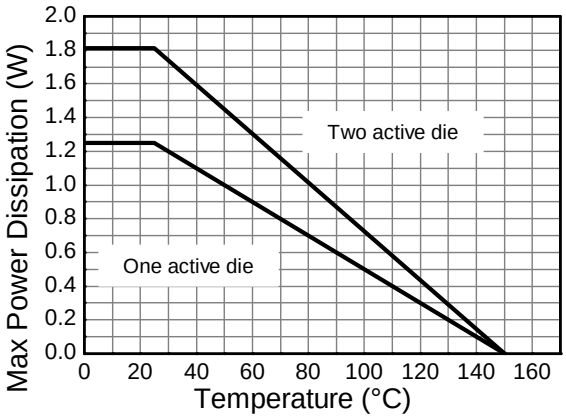
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Notes 6 & 9)	P_D	1.25 10	W mW/°C
	(Notes 6 & 10)		1.8 14.3	
	(Notes 7 & 9)		2.14 17.2	
Thermal Resistance, Junction to Ambient	(Notes 6 & 9)	$R_{\theta JA}$	100	°C/W
	(Notes 6 & 10)		70	
	(Notes 7 & 9)		58	
Thermal Resistance, Junction to Lead	(Notes 9 & 11)	$R_{\theta JL}$	55	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
5. AEC-Q101 V_{GS} maximum is ±16V.
6. 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.
7. Same as Note 6, except the device is measured at t ≤ 10 sec.
8. Same as Note 6, except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
9. For a dual device with one active die.
10. For a device with two active dies running at equal power.
11. Thermal resistance from junction to solder-point (at the end of the drain lead).
12. UIS in production with L = 3.0mH, I_{AS} = 5.0A, R_G = 25Ω, V_{DD} = 50V, starting T_J = +25°C.

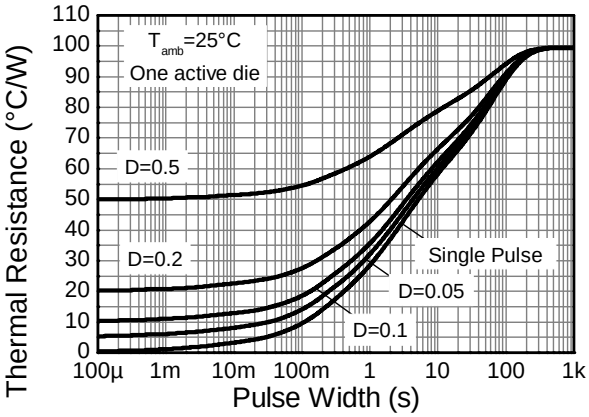
Thermal Characteristics



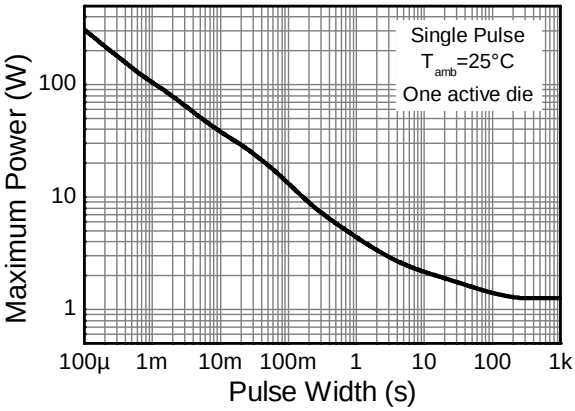
Safe Operating Area



Derating Curve



Transient Thermal Impedance



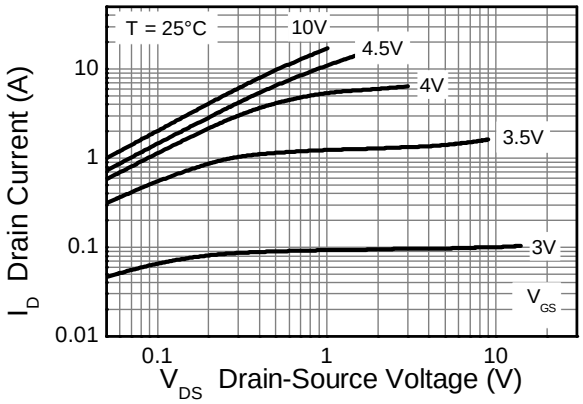
Pulse Power Dissipation

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

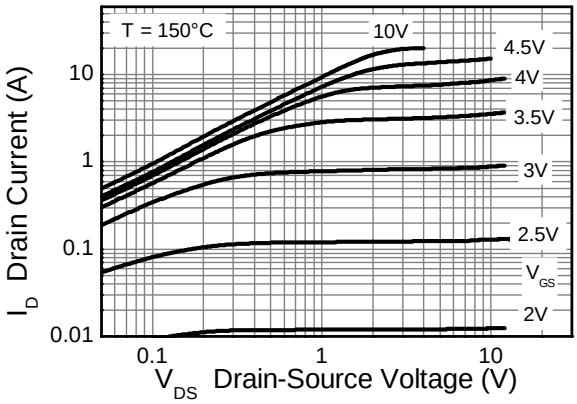
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	I_D = 250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	0.5	µA	V_{DS} = 60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D = 250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 13)	$R_{DS(ON)}$	—	48	66	mΩ	V_{GS} = 10V, I_D = 4.5A
			68	97		V_{GS} = 4.5V, I_D = 3.5A
Forward Transconductance (Notes 13 & 14)	g_{fs}	—	19.2	—	S	V_{DS} = 15V, I_D = 6A
Diode Forward Voltage (Note 13)	V_{SD}	—	0.89	1.15	V	I_S = 4.5A, V_{GS} = 0V
Reverse-Recovery Time (Note 14)	t_{rr}	—	22.2	—	ns	I_S = 1.9A, di/dt = 100A/µs
Reverse-Recovery Charge (Note 14)	Q_{rr}	—	16.9	—	nC	
DYNAMIC CHARACTERISTICS (Note 14)						
Input Capacitance	C_{iss}	—	502	—	pF	V_{DS} = 30V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	45.7	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	27.1	—	pF	
Total Gate Charge (Note 15)	Q_g	—	5.4	—	nC	V_{GS} = 4.5V
Total Gate Charge (Note 15)	Q_g	—	10.3	—	nC	V_{GS} = 10V V_{DS} = 30V I_D = 4.5A
Gate-Source Charge (Note 15)	Q_{gs}	—	1.7	—	nC	
Gate-Drain Charge (Note 15)	Q_{gd}	—	3.2	—	nC	
Turn-On Delay Time (Note 15)	$t_{D(on)}$	—	2.7	—	ns	V_{DD} = 30V, V_{GS} = 10V I_D = 1A, $R_G \cong$ 6.0Ω
Turn-On Rise Time (Note 15)	t_r	—	2.4	—	ns	
Turn-Off Delay Time (Note 15)	$t_{D(off)}$	—	14.7	—	ns	
Turn-Off Fall Time (Note 15)	t_f	—	5.4	—	ns	

Notes: 13. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
14. For design aid only, not subject to production testing.
15. Switching characteristics are independent of operating junction temperatures.

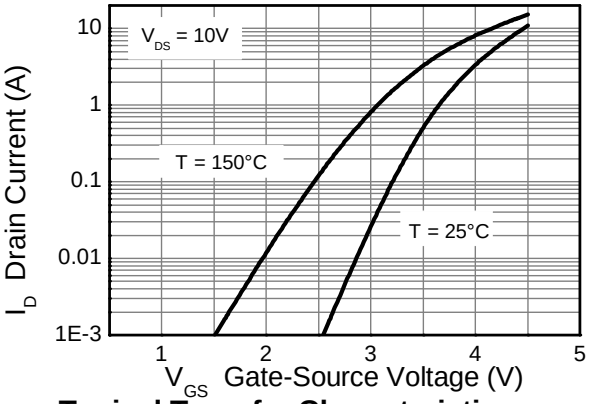
Typical Characteristics



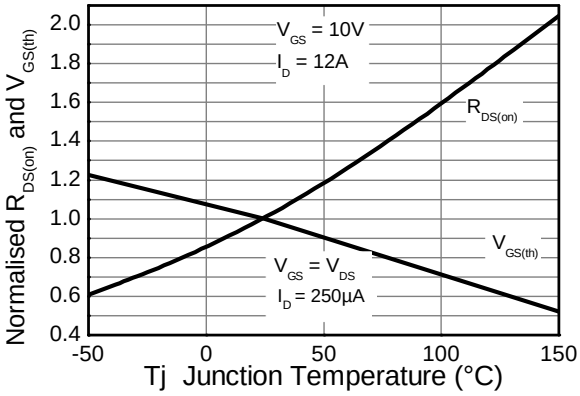
Output Characteristics



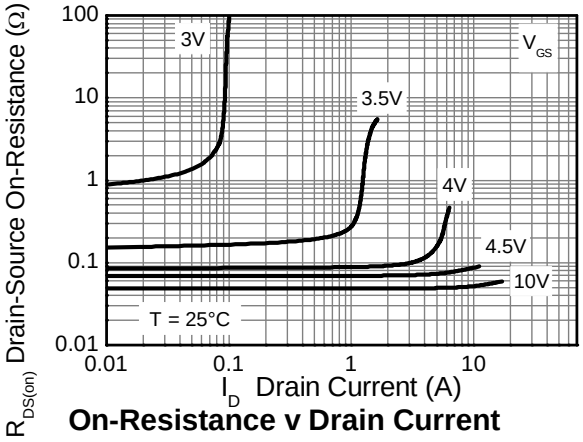
Output Characteristics



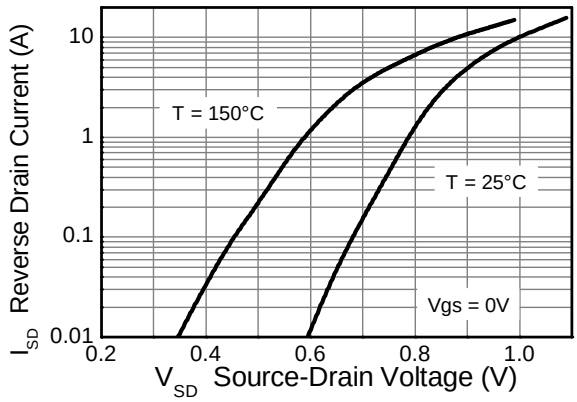
Typical Transfer Characteristics



Normalised Curves v Temperature

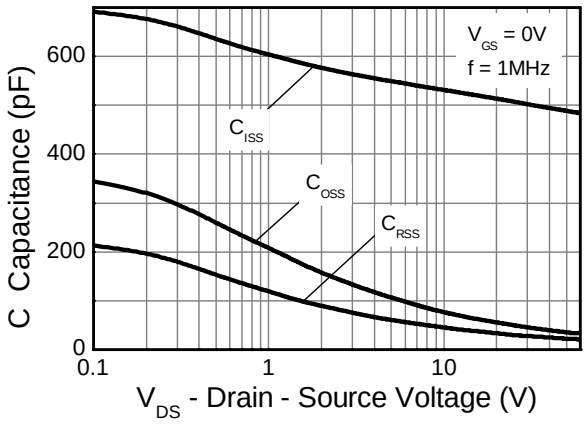


On-Resistance v Drain Current

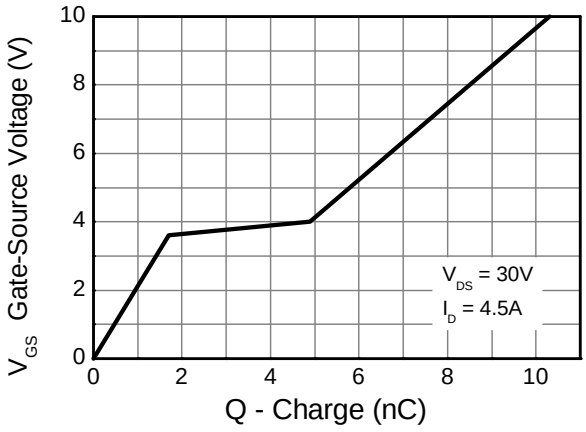


Source-Drain Diode Forward Voltage

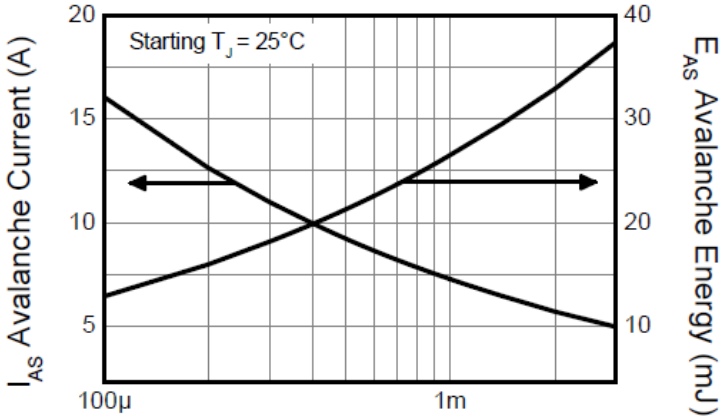
Typical Characteristics (continued)



Capacitance v Drain-Source Voltage

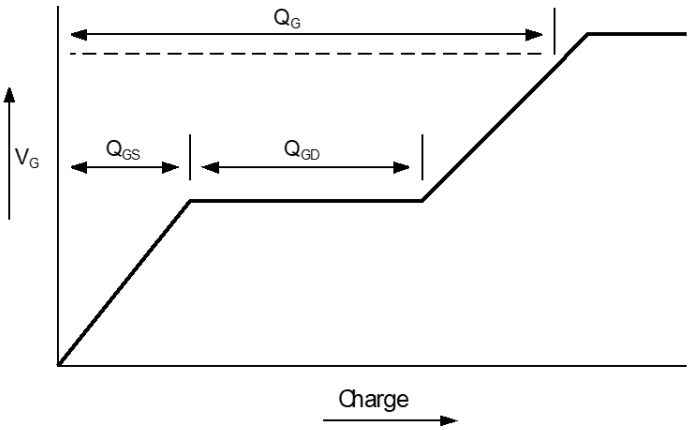


Gate-Source Voltage v Gate Charge

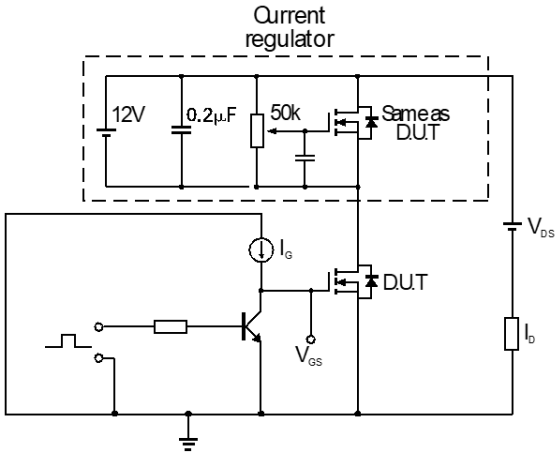


Single-Pulsed Avalanche Rating

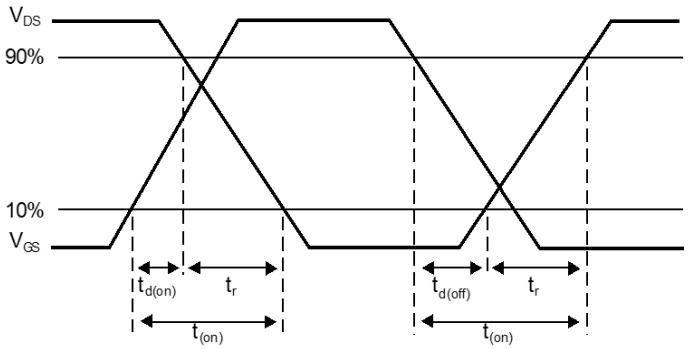
Test Circuits



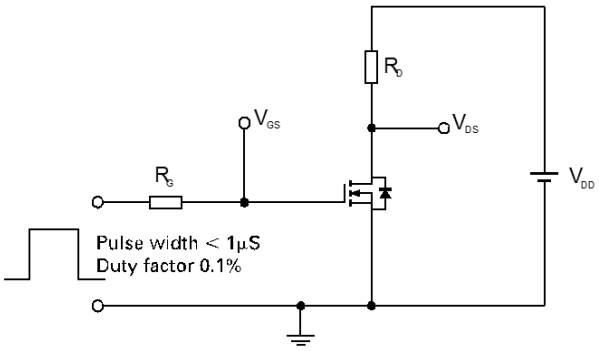
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

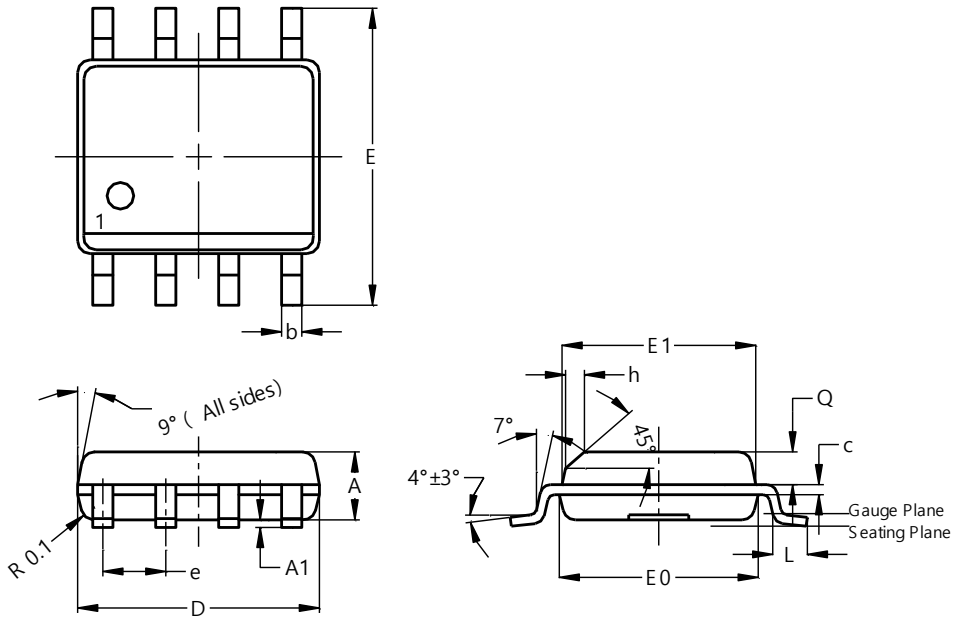


Switching time test circuit

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-8

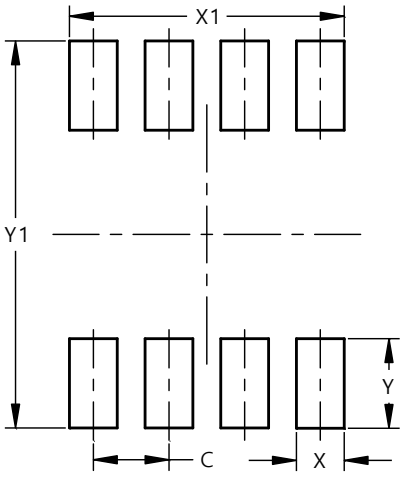


SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	--	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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