

**DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	$I_D$ Max $T_A = +25^\circ\text{C}$ (Note 5)
40V	31m $\Omega$ @ $V_{GS} = 10\text{V}$	7.0A
	50m $\Omega$ @ $V_{GS} = 4.5\text{V}$	5.6A

**Features and Benefits**

- Low On-Resistance
- Low Input/Output Leakage
- **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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMN4031SSDQ](#))**

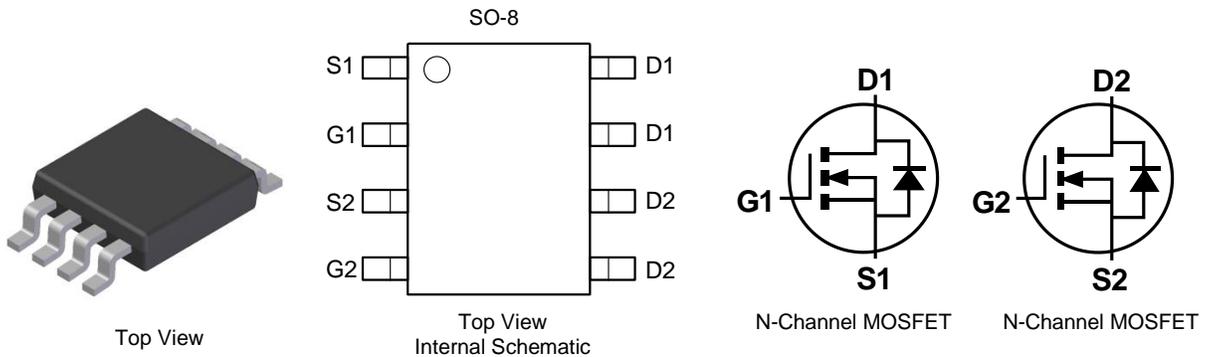
**Description and Applications**

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

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

**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 Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.072 grams (Approximate)

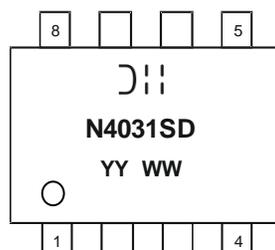


**Ordering Information (Note 4)**

Part Number	Case	Packaging
DMN4031SSD-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**



☺|| = Manufacturer's Marking  
 N4031SD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or YY = Year (ex: 16 = 2016)  
 WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	40	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 5) (V <sub>GS</sub> = 10V)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	5.2	A
		T <sub>A</sub> = +70°C		4.1	
Continuous Drain Current (Note 5) (V <sub>GS</sub> = 4.5V)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	4.3	A
		T <sub>A</sub> = +70°C		3.4	
Continuous Drain Current (Note 6) (V <sub>GS</sub> = 10V)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	7.0	A
		T <sub>A</sub> = +70°C		5.6	
Continuous Drain Current (Note 6) (V <sub>GS</sub> = 4.5V)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	5.8	A
		T <sub>A</sub> = +70°C		4.7	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	40	A
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	2.2	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)			I <sub>SM</sub>	40	A
Avalanche Current, L = 0.1mH (Note 7)			I <sub>AS</sub>	11	A
Avalanche Energy, L = 0.1mH (Note 7)			E <sub>AS</sub>	18	mJ

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.42	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	88	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	2.6	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	48	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	40	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 10mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1.6	2.4	3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
On-state drain current	I <sub>D(ON)</sub>	20	—	—	A	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 5A
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	19	31	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 6A
		—	44	50		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A
Forward Transfer Admittance	Y <sub>FS</sub>	—	11	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 6A
Diode Forward Voltage	V <sub>SD</sub>	—	0.74	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>ISS</sub>	—	945	—	pF	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	69	—	pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	58	—	pF	
Gate resistance	R <sub>G</sub>	—	1.45	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>G</sub>	—	8.4	—	nC	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 20V, I <sub>D</sub> = 12A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>G</sub>	—	18.6	—	nC	
Gate-Source Charge	Q <sub>GS</sub>	—	3.3	—	nC	
Gate-Drain Charge	Q <sub>GD</sub>	—	2.2	—	nC	
Turn-On Delay Time	T <sub>D(ON)</sub>	—	6.4	—	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 20V, R <sub>L</sub> = 1.6Ω, R <sub>G</sub> = 3Ω
Turn-On Rise Time	T <sub>R</sub>	—	9.7	—	ns	
Turn-Off Delay Time	T <sub>D(OFF)</sub>	—	19.8	—	ns	
Turn-Off Fall Time	T <sub>F</sub>	—	3.1	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout. The value in any given application depends on user's specific board design
  - Device mounted on 1" x 1" FR-4PCB with high coverage 1 oz. copper, single sided.
  - I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

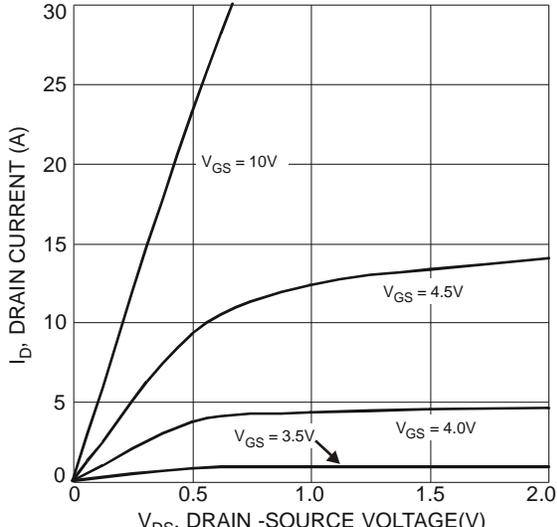


Fig. 1 Typical Output Characteristics

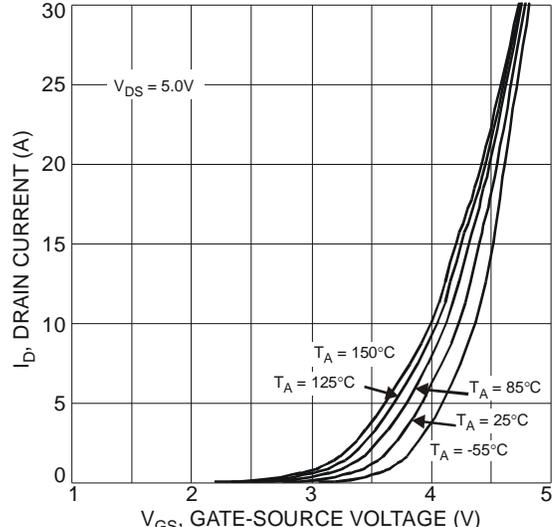


Fig. 2 Typical Transfer Characteristics

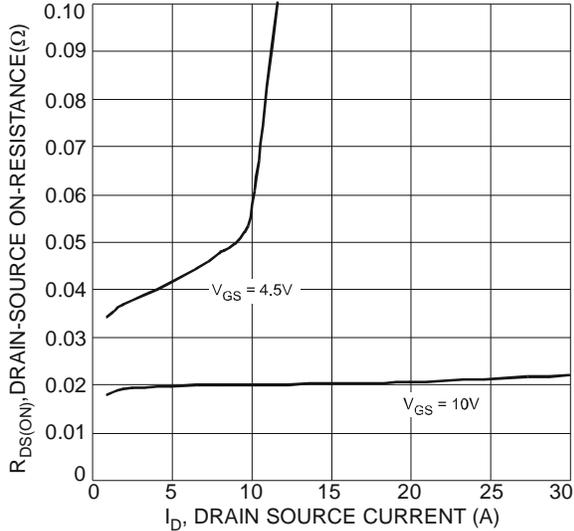


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

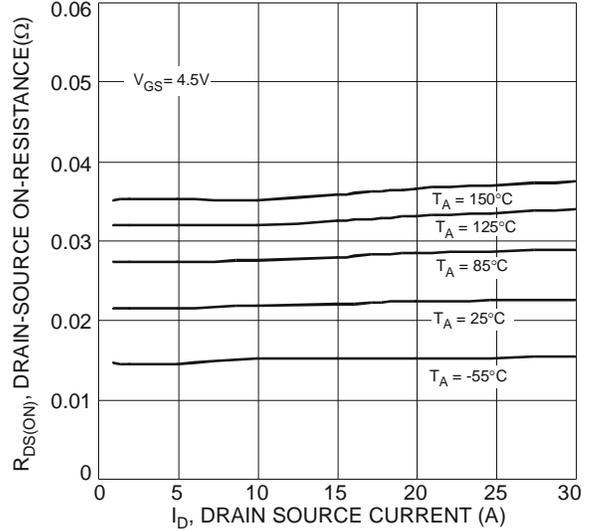


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

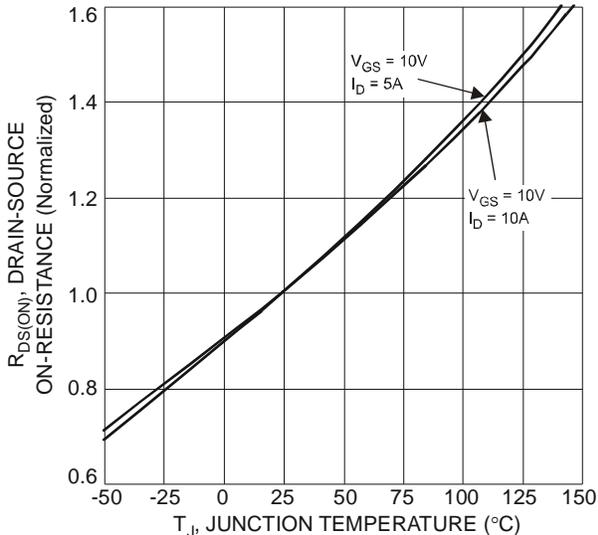


Fig. 5 On-Resistance Variation with Temperature

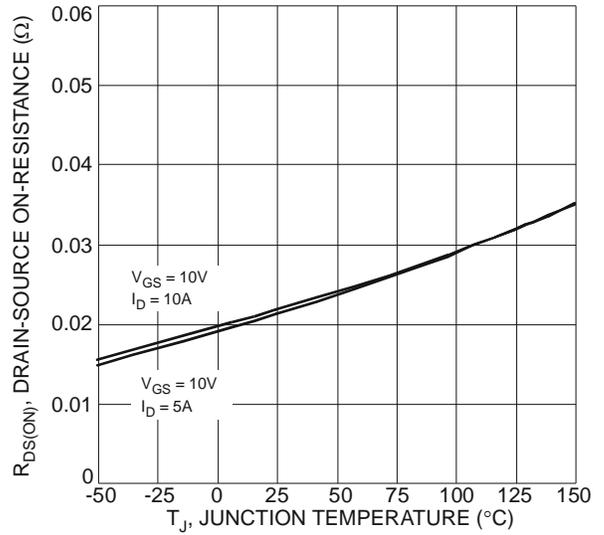


Fig. 6 On-Resistance Variation with Temperature

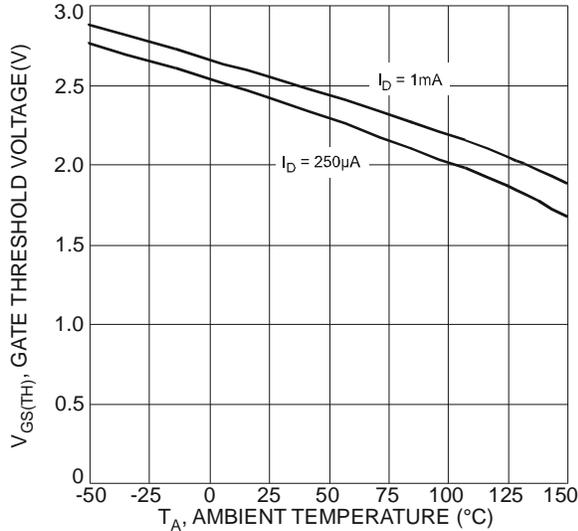


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

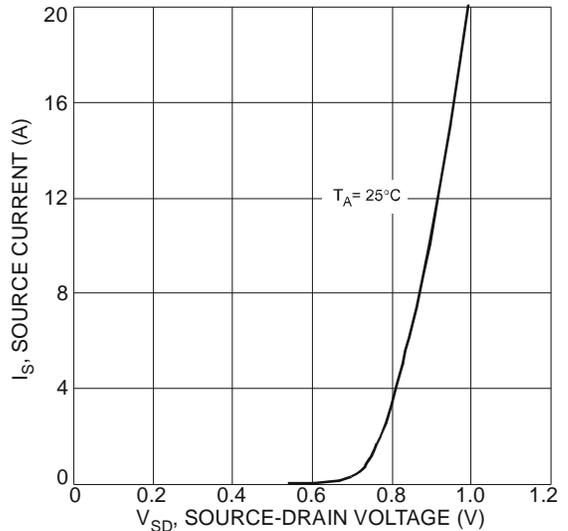


Fig. 8 Diode Forward Voltage vs. Current

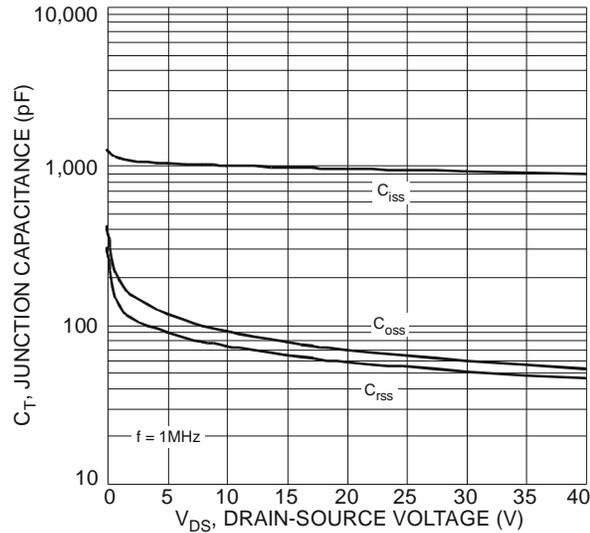


Fig. 9 Typical Junction Capacitance

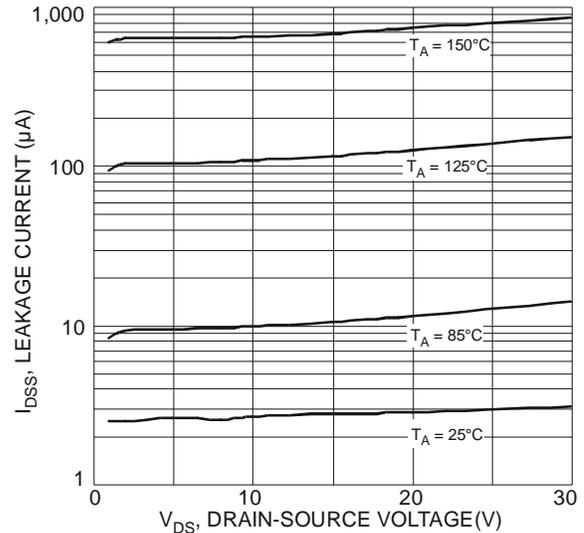


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

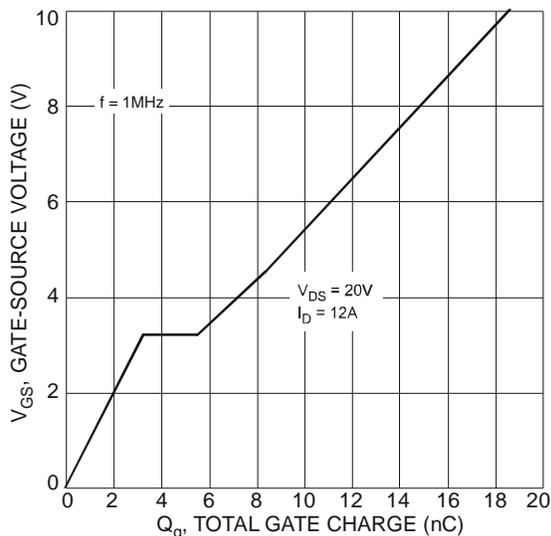


Fig. 11 Gate-Charge Characteristics

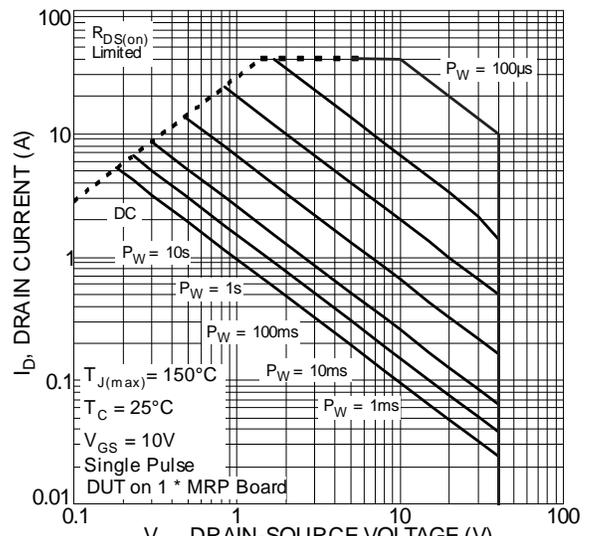
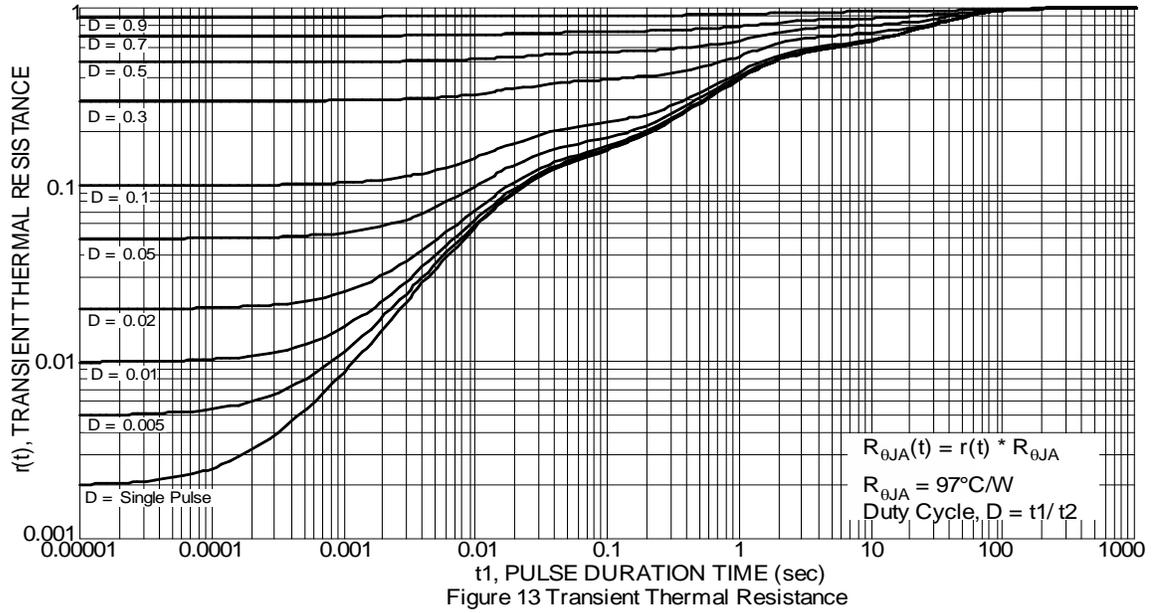


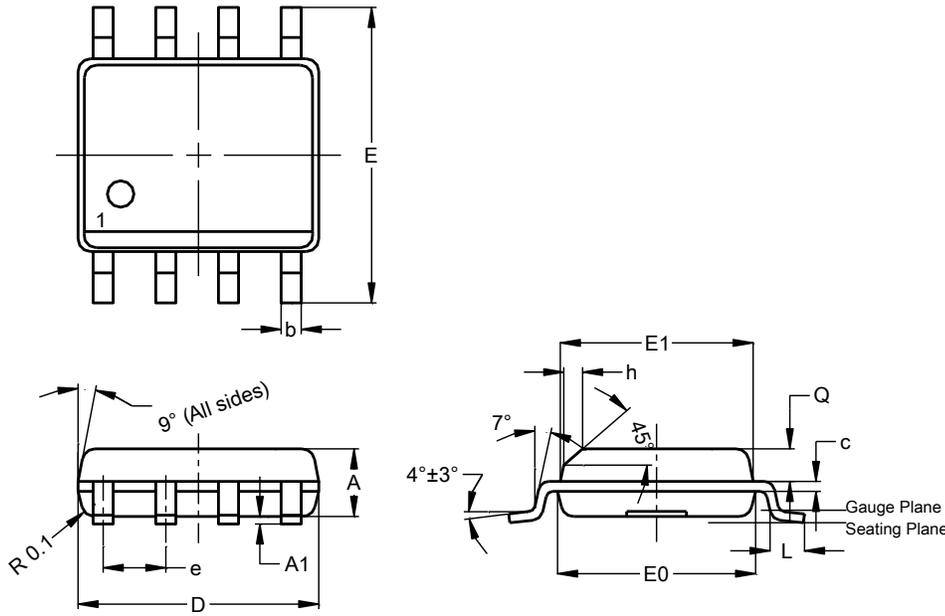
Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

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

SO-8

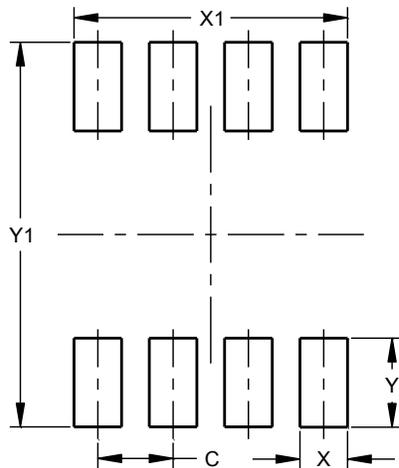


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	—	—	1.27
h	—	—	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

**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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