

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 Ω @ $V_{GS} = 10\text{V}$	7.0A
	50m Ω @ $V_{GS} = 4.5\text{V}$	5.6A

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.

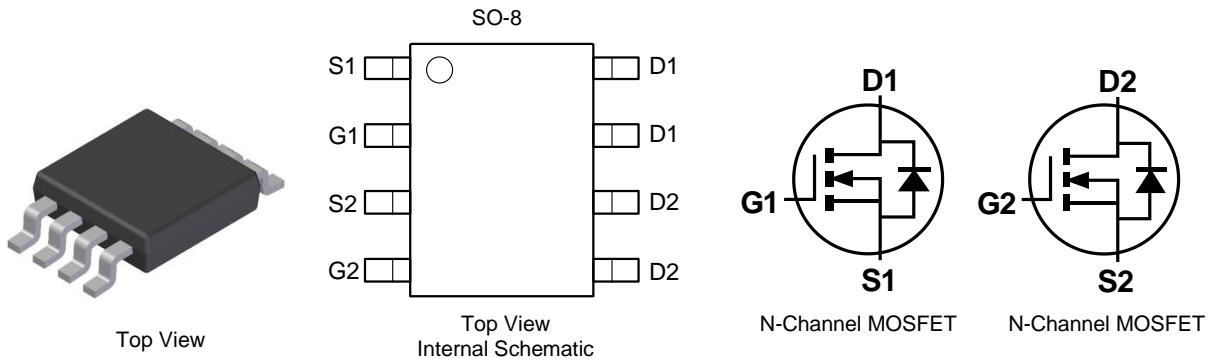
- Motor Control
- Backlighting
- Power Management Functions
- DC-DC Converters

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](#))

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)

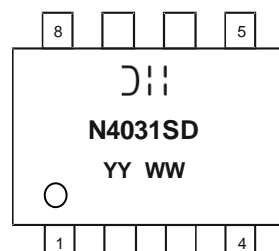


Ordering Information (Note 4)

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 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



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

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

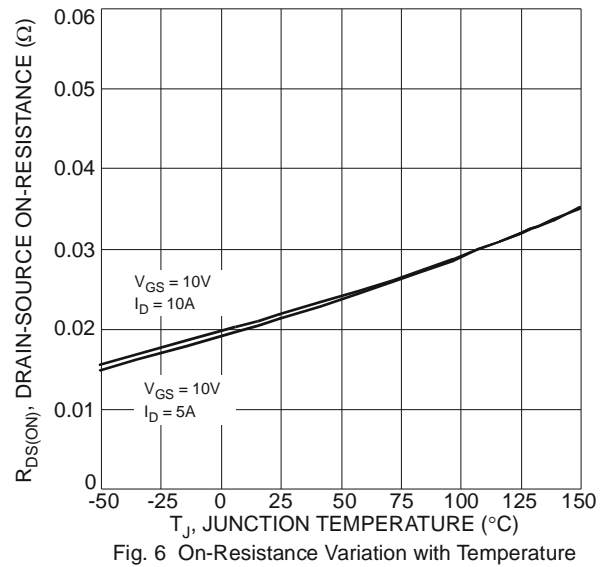
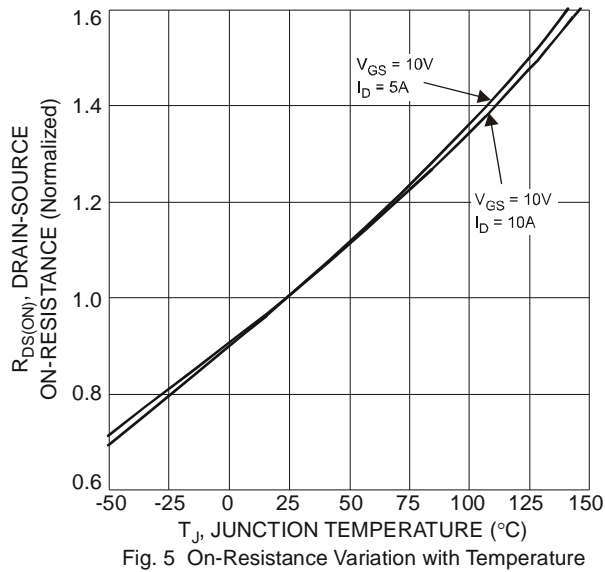
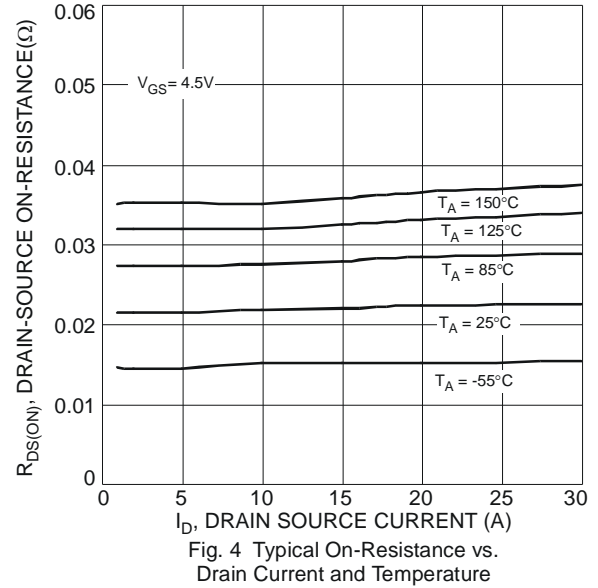
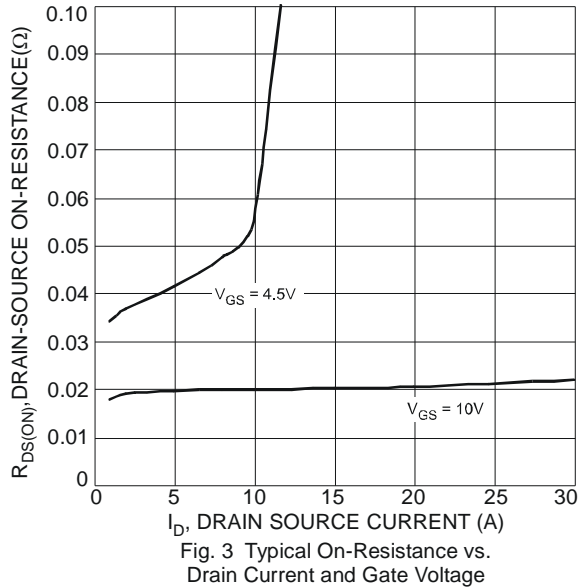
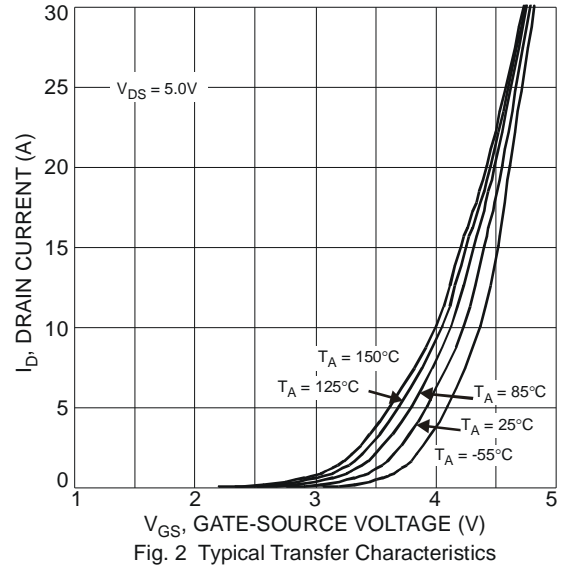
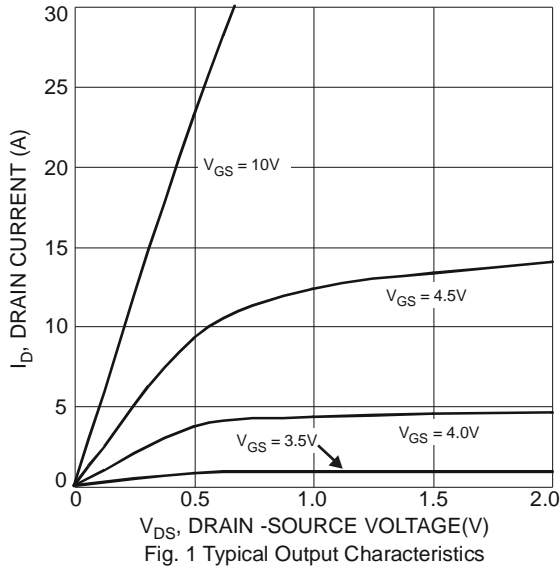
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P _D	1.42	W
Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 5)	R _{θJA}	88	°C/W
Total Power Dissipation (Note 6)	P _D	2.6	W
Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 6)	R _{θJA}	48	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics (@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}	40	—	—	V	V _{GS} = 0V, I _D = 10mA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	µA	V _{DS} = 40V, 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)}	1.6	2.4	3.0	V	V _{DS} = V _{GS} , I _D = 250µA
On-state drain current	I _{D(ON)}	20	—	—	A	V _{GS} = 10V, V _{DS} = 5A
Static Drain-Source On-Resistance	R _{DS(ON)}	—	19	31	mΩ	V _{GS} = 10V, I _D = 6A
		—	44	50		V _{GS} = 4.5V, I _D = 5A
Forward Transfer Admittance	Y _{FS}	—	11	—	S	V _{DS} = 5V, I _D = 6A
Diode Forward Voltage	V _{SD}	—	0.74	1.0	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{ISS}	—	945	—	pF	V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	69	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	58	—	pF	
Gate resistance	R _G	—	1.45	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	8.4	—	nC	V _{GS} = 10V, V _{DS} = 20V, I _D = 12A
Total Gate Charge (V _{GS} = 10V)	Q _G	—	18.6	—	nC	
Gate-Source Charge	Q _{GS}	—	3.3	—	nC	
Gate-Drain Charge	Q _{GD}	—	2.2	—	nC	
Turn-On Delay Time	T _{D(ON)}	—	6.4	—	ns	V _{GS} = 10V, V _{DS} = 20V, R _L = 1.6Ω, R _G = 3Ω
Turn-On Rise Time	T _R	—	9.7	—	ns	
Turn-Off Delay Time	T _{D(OFF)}	—	19.8	—	ns	
Turn-Off Fall Time	T _F	—	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_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.



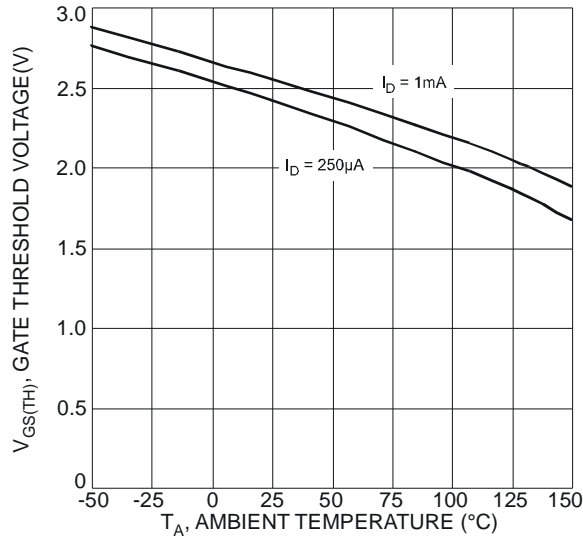


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

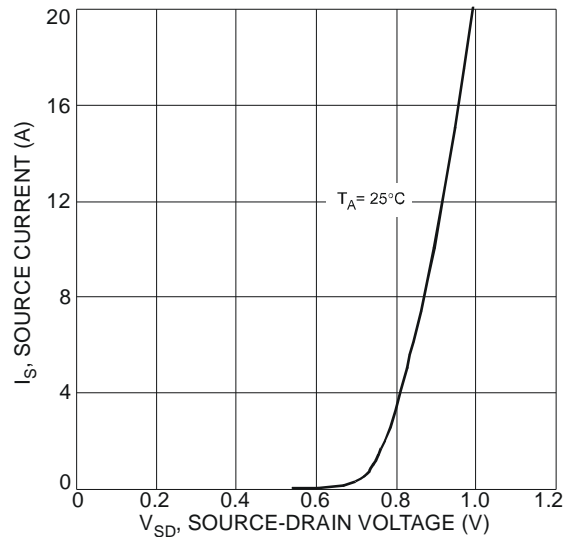


Fig. 8 Diode Forward Voltage vs. Current

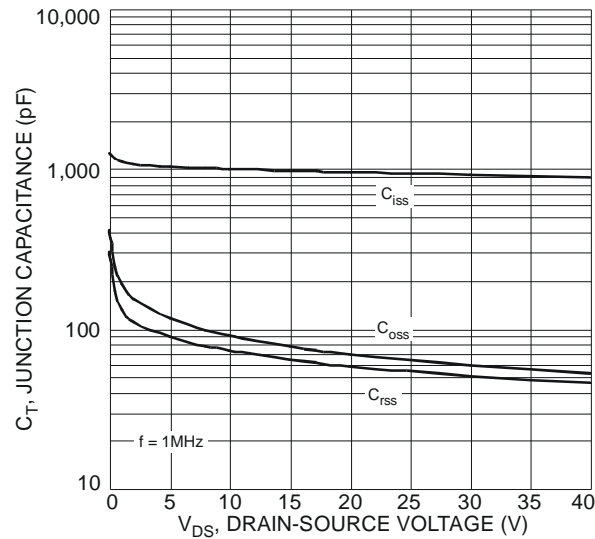


Fig. 9 Typical Junction Capacitance

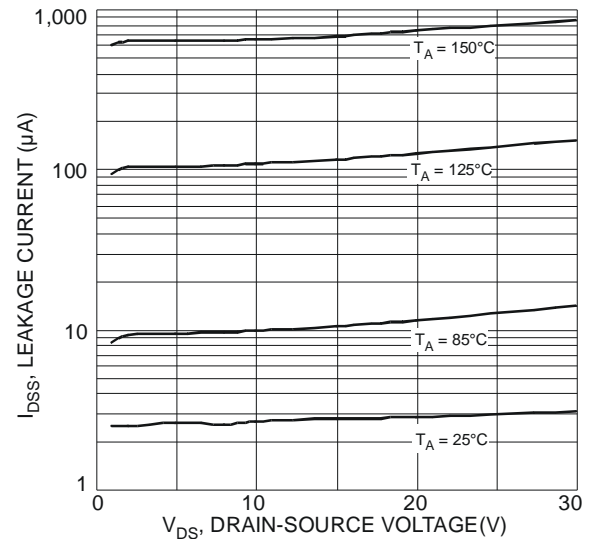


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

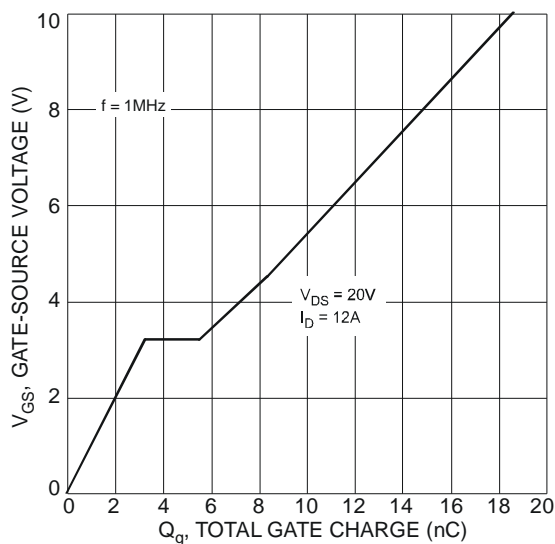


Fig. 11 Gate-Charge Characteristics

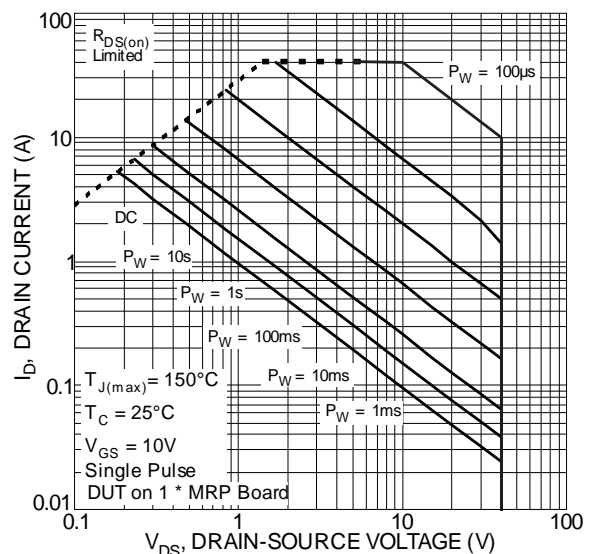
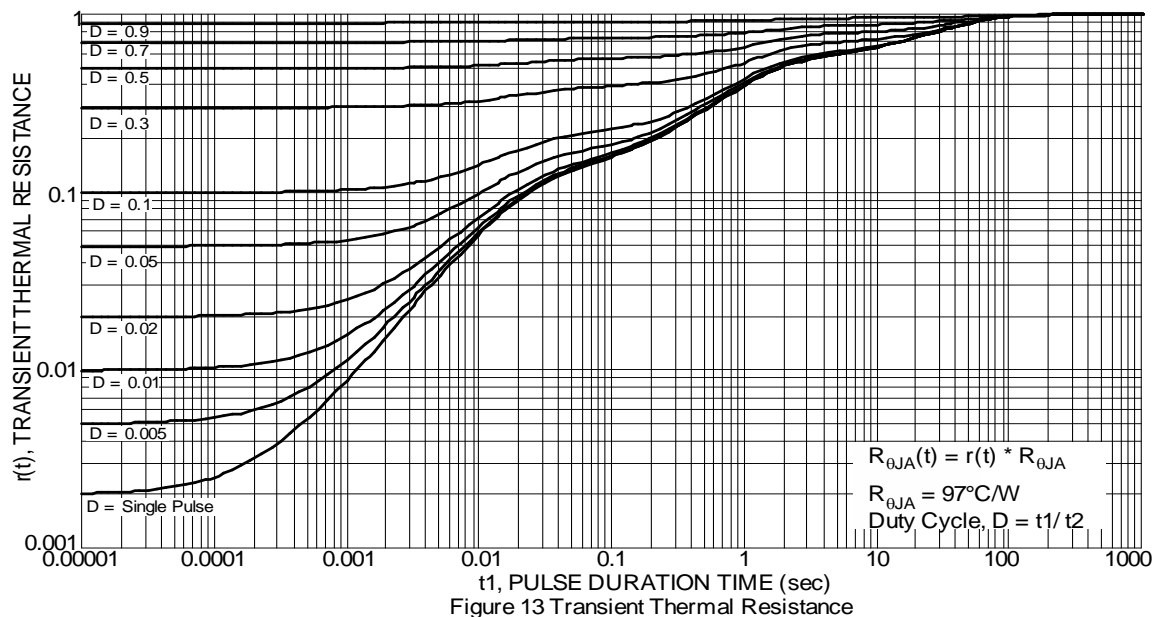


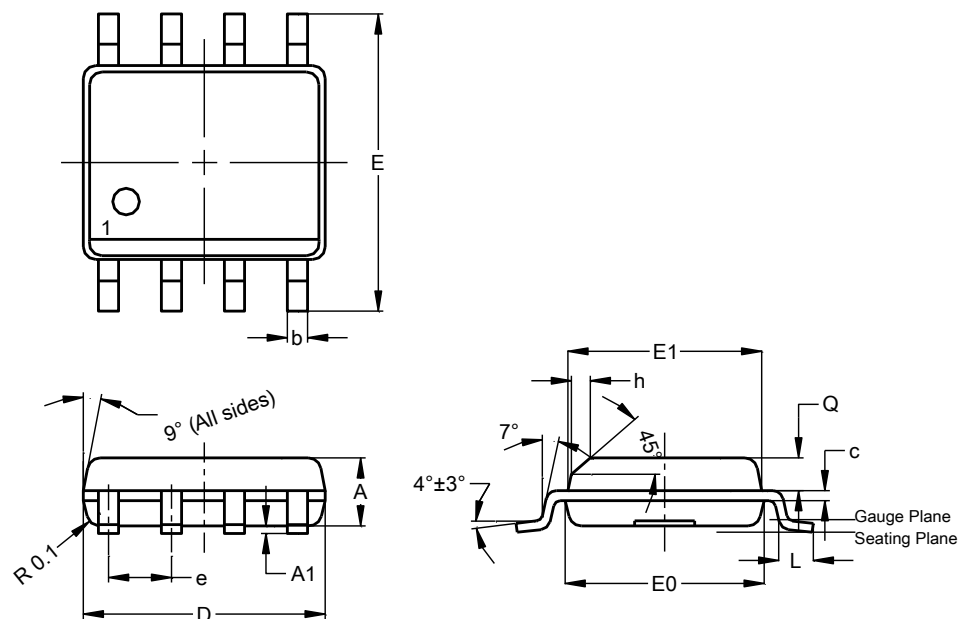
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

SO-8

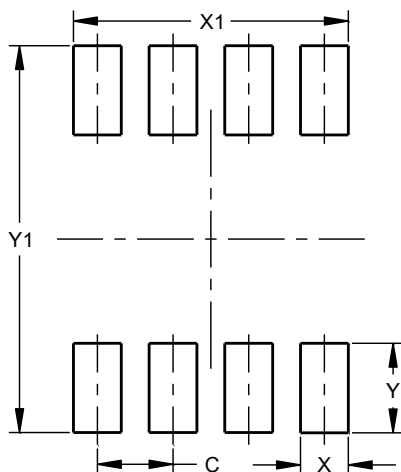


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	—	—	1.27
h	—	—	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

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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