

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D $T_A = +25^\circ C$
60V	40mΩ @ $V_{GS} = 10V$	5.0A
	55mΩ @ $V_{GS} = 4.5V$	4.4A

Features and Benefits


- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **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 new generation 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.

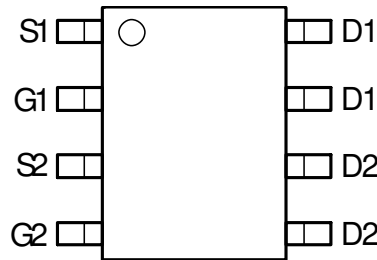
- DC-DC Converters
- Power Management Functions
- Backlighting

Mechanical Data

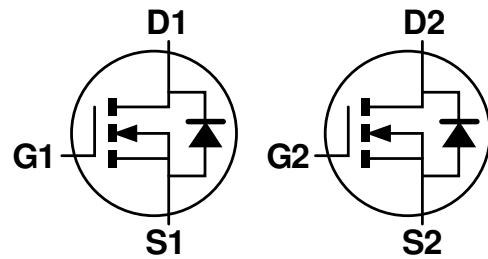
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208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



Top View



Top View
Pin Configuration



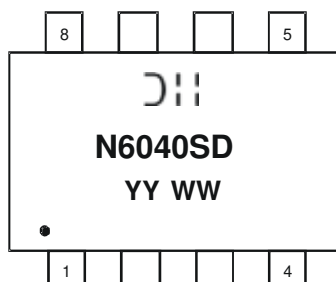
Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMN6040SSDQ-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> 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. Refer to http://www.diodes.com/product_compliance_definitions.html
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



⌐ = Manufacturer's Marking
 N6040SD = Product Type Marking Code
 YYWW = Date Code Marking
 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}	60	V	
Gate-Source Voltage		V _{GSS}	±20	V	
Continuous Drain Current (Note 7) V _{GS} = 10V	Steady State	I _D	T _A = +25°C T _A = +70°C	5.0 4.1	A
	t < 10s		T _A = +25°C T _A = +70°C	6.6 5.3	A
Maximum Body Diode Forward Current (Note 7)		I _S	2.5	A	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I _{DM}	30	A	
Pulsed Body Diode Forward Current (10µs pulse, duty cycle = 1%)		I _{SM}	30	A	
Avalanche Current (Note 8) L = 0.1mH		I _{AS}	14.2	A	
Avalanche Energy (Note 8) L = 0.1mH		E _{AS}	10	mJ	

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.3	W
	T _A = +70°C		0.8	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	102	°C/W
	t < 10s		61	
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	1.7	W
	T _A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	75	°C/W
	t < 10s		50	
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	14.5	
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 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	100	nA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	3	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	30	40	mΩ	V _{GS} = 10V, I _D = 4.5A
		—	35	55		V _{GS} = 4.5V, I _D = 3.5A
Forward Transfer Admittance	Y _{FS}	—	4.5	—	S	V _{DS} = 10V, I _D = 4.3A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}	—	1,287	—	pF	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{OSS}	—	57	—		
Reverse Transfer Capacitance	C _{RSS}	—	44	—		
Gate Resistance	R _G	—	1.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 10V)	Q _G	—	22.4	—	nC	V _{DS} = 30V, I _D = 4.3A
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	10.4	—		
Gate-Source Charge	Q _{GS}	—	4.9	—		
Gate-Drain Charge	Q _{GD}	—	3.0	—		
Turn-On Delay Time	t _{D(ON)}	—	6.6	—	ns	V _{GS} = 10V, V _{DD} = 30V, R _G = 6Ω, I _D = 4.3A
Turn-On Rise Time	t _R	—	8.1	—		
Turn-Off Delay Time	t _{D(OFF)}	—	20.1	—		
Turn-Off Fall Time	t _F	—	4.0	—		
Body Diode Reverse Recovery Time	t _{RR}	—	18	—	ns	I _S = 4.3A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q _{RR}	—	11.9	—	nC	I _S = 4.3A, di/dt = 100A/µs

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 - 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.

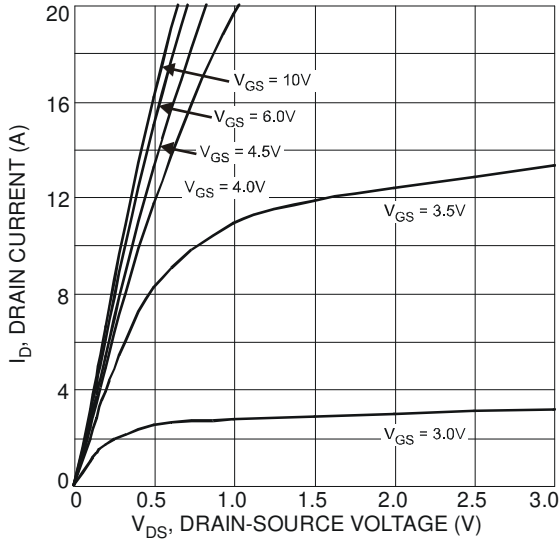


Fig. 1 Typical Output Characteristic

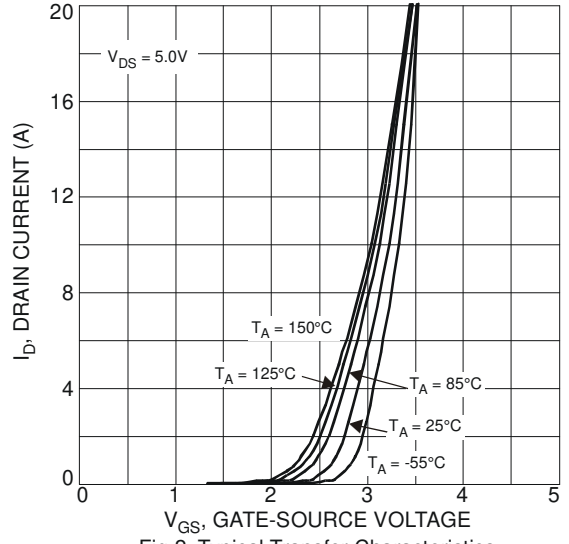


Fig. 2 Typical Transfer Characteristics

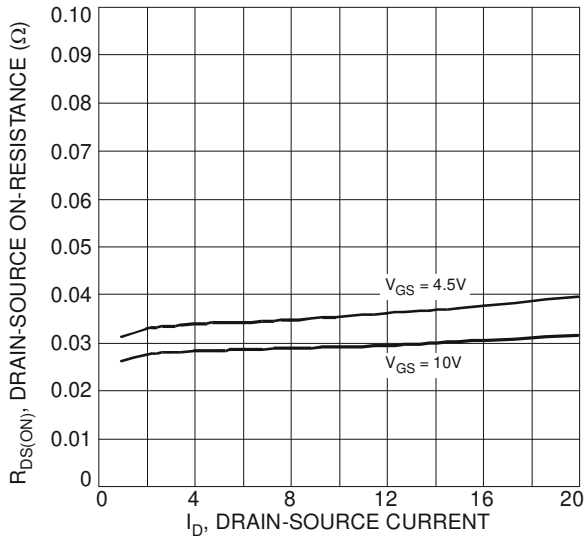


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

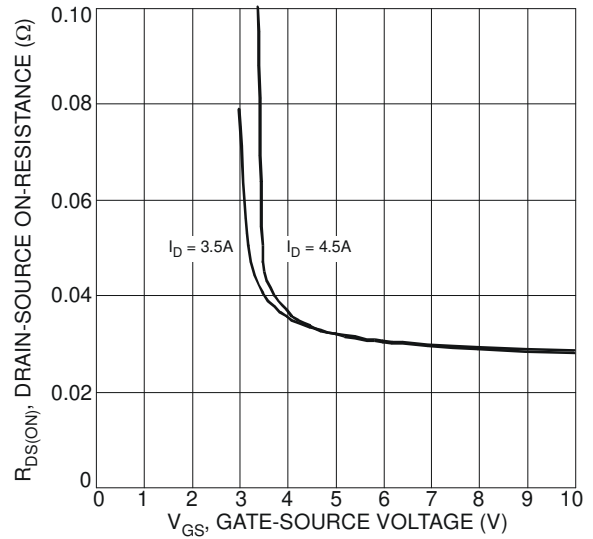


Fig. 4 Typical On-Resistance vs. Drain Current and Gate Voltage

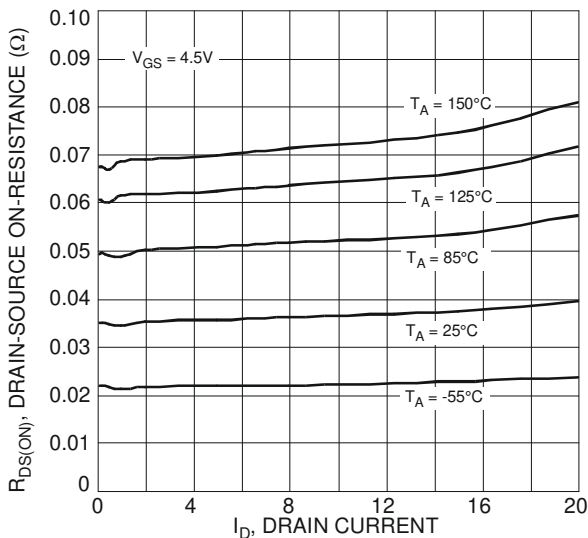


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

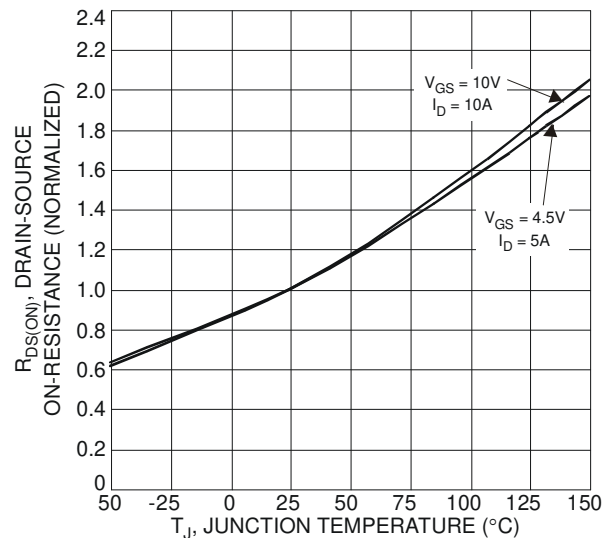


Fig. 6 On-Resistance Variation with Temperature

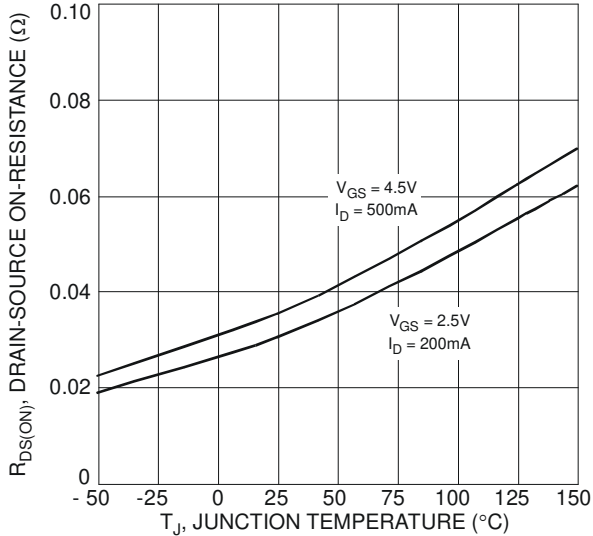


Fig. 7 On-Resistance Variation with Temperature

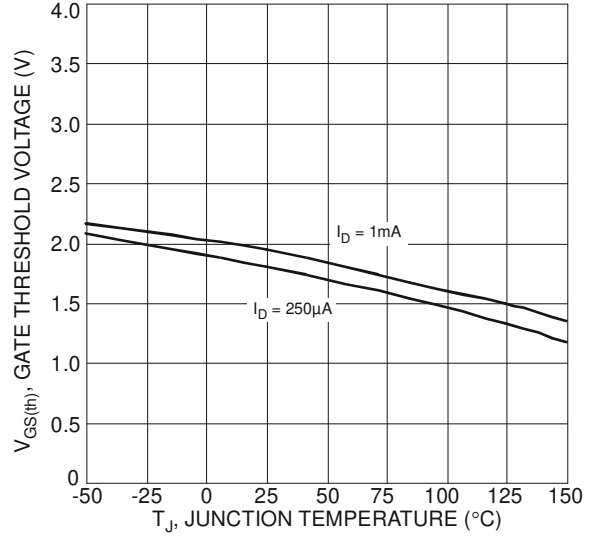


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

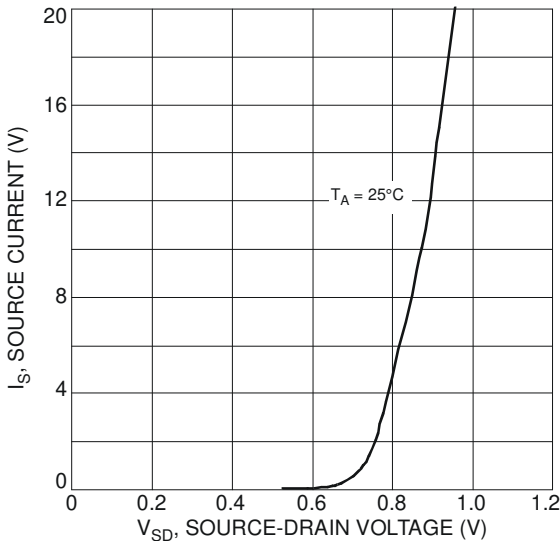


Fig.9 Diode Forward Voltage vs. Current

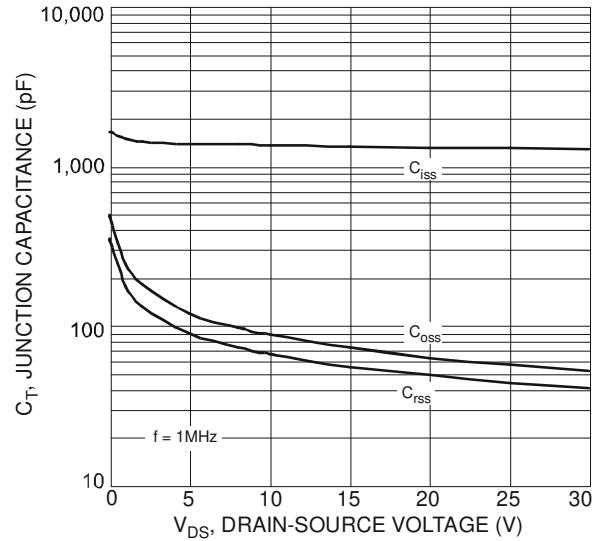


Fig. 10 Typical Junction Capacitance

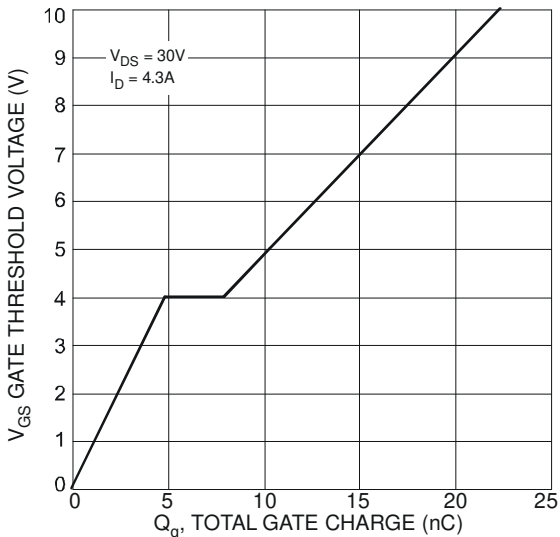


Fig. 11 Gate Charge

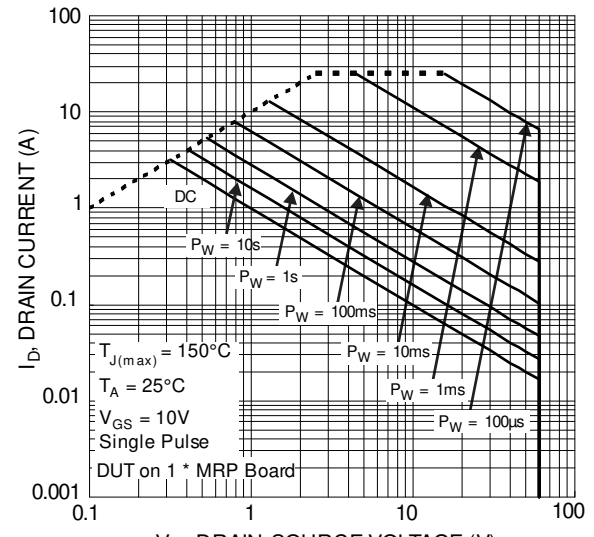
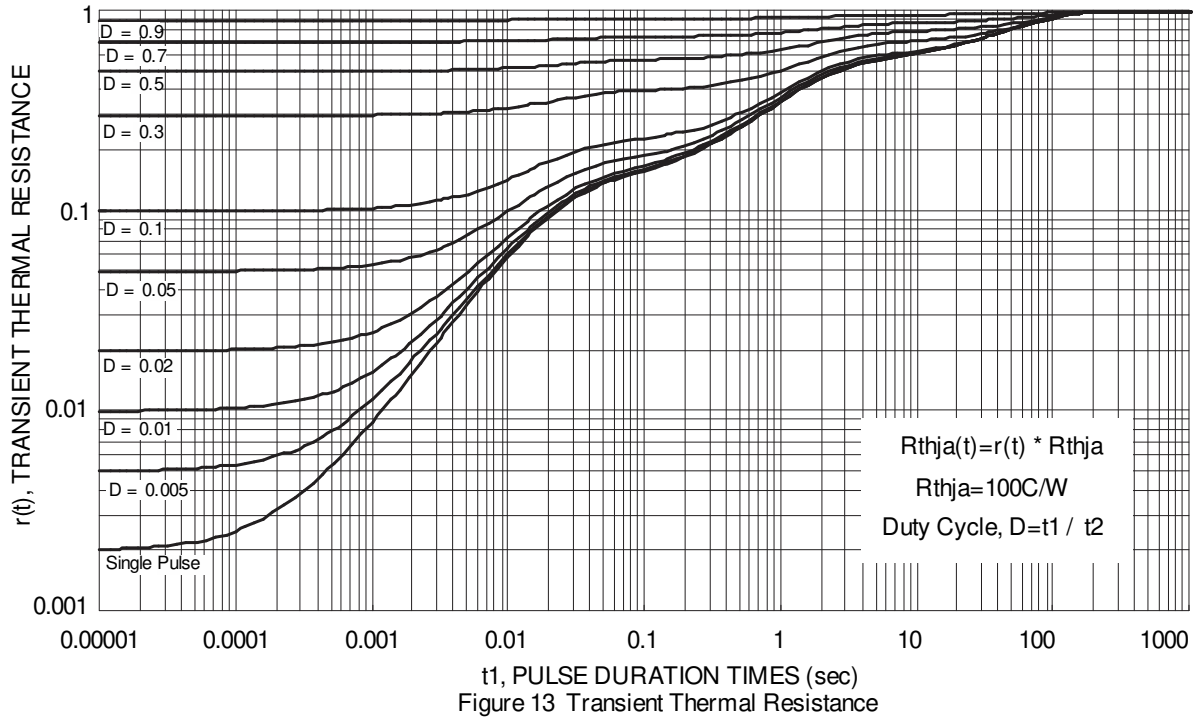


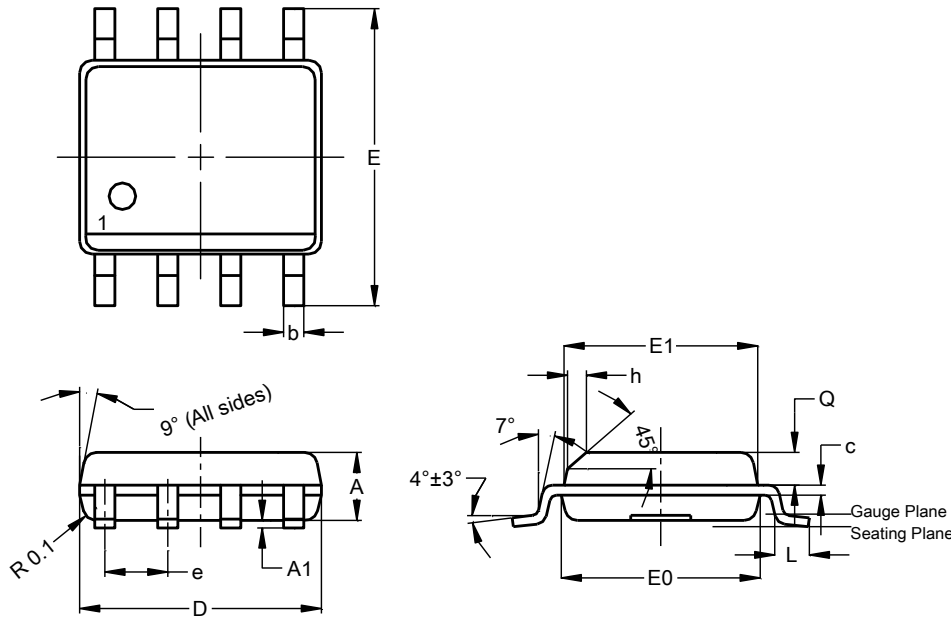
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

SO-8

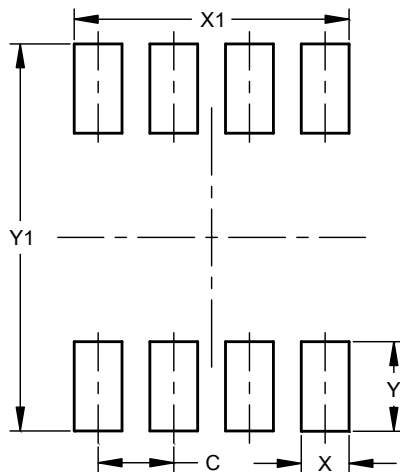


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

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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