

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D $T_A = +25^\circ C$
40V	15mΩ @ $V_{GS} = 10V$	8.6A
	20mΩ @ $V_{GS} = 4.5V$	7.5A

Description

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.

Applications

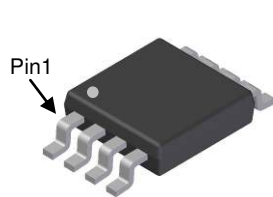
- DC-DC Converters
- Power Management Functions
- Backlighting

Features and Benefits

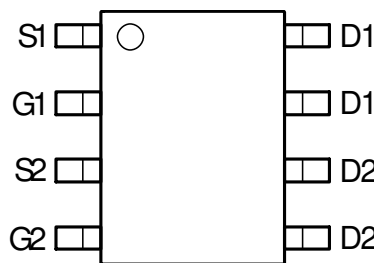
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Data Sheet ([DMNH4015SSDQ](#))**

Mechanical Data

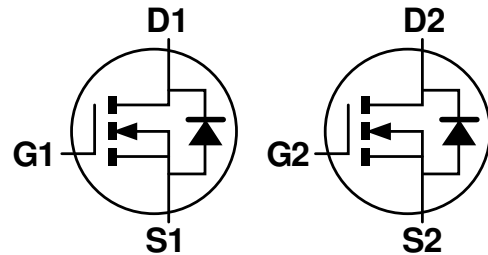
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208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



Top View



Top View
Pin Configuration



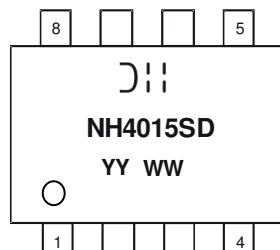
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMNH4015SSD-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



J; ; = Manufacturer's Marking
 NH4015SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 16 = 2016)
 WW = Week (01 - 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, 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 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	8.6 6.9	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	11.0 8.8	A
Maximum Body Diode Forward Current (Note 6)			I_S	2.2	A
Pulsed Drain Current (380 μs Pulse, Duty Cycle = 1%)			I_{DM}	80	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			I_{AS}	25	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			E_{AS}	33	mJ

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

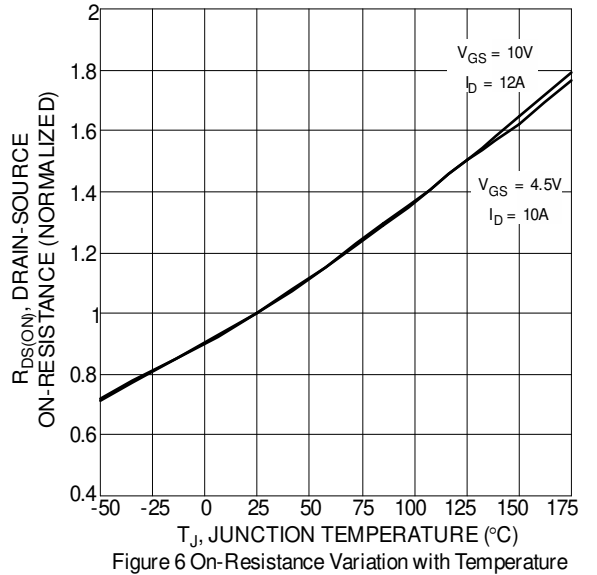
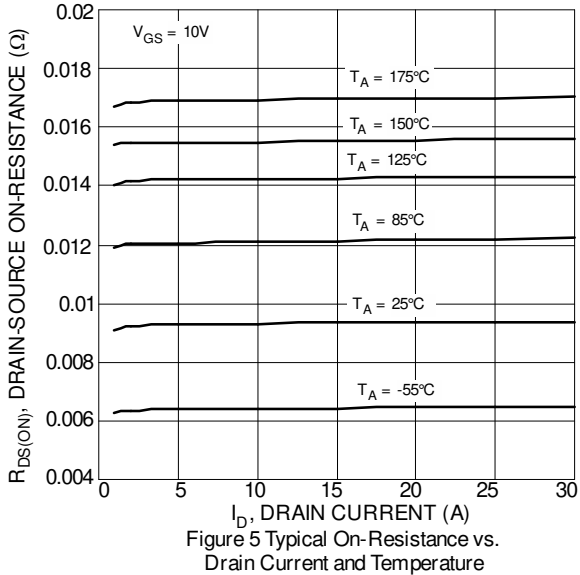
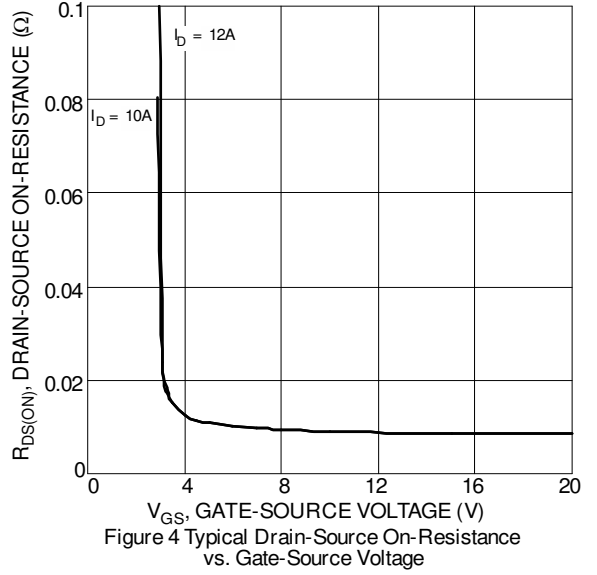
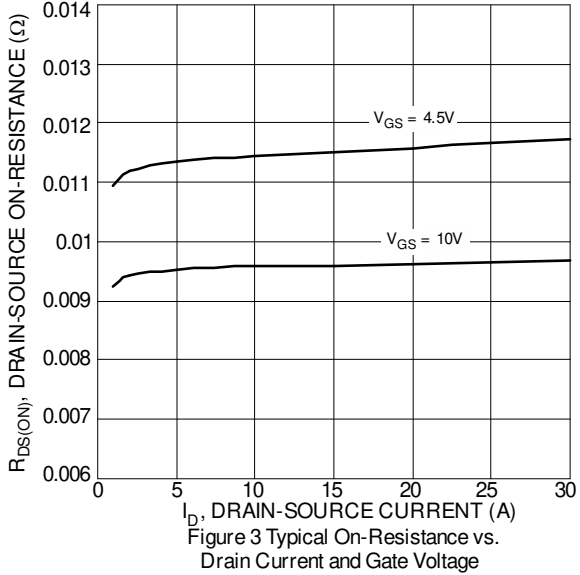
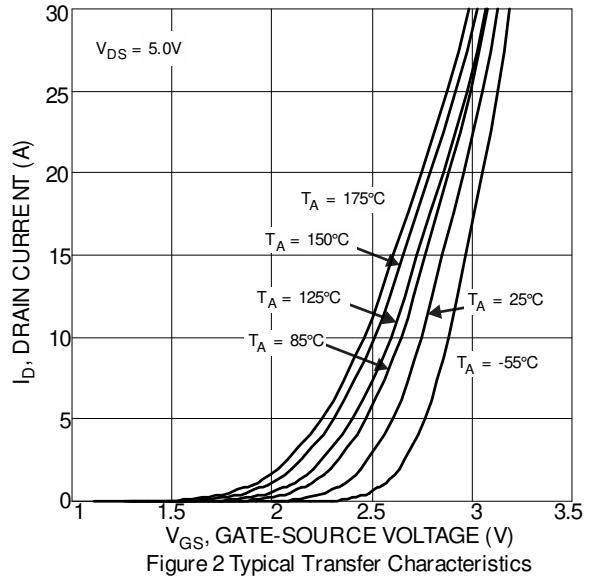
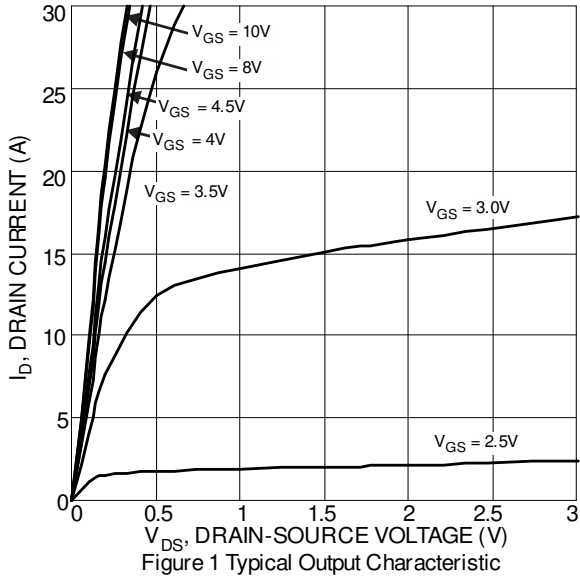
Characteristic			Symbol	Value	Units
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$		P_D	1.4	W
	$T_A = +70^\circ\text{C}$			0.9	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State		$R_{\theta JA}$	111	$^\circ\text{C/W}$
	$t < 10\text{s}$			66	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$		P_D	2.0	W
	$T_A = +70^\circ\text{C}$			1.2	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		$R_{\theta JA}$	75	$^\circ\text{C/W}$
	$t < 10\text{s}$			45	
Thermal Resistance, Junction to Case (Note 6)			$R_{\theta JC}$	13	
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.

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 = 250μA
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	—	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	10	15	mΩ	V _{GS} = 10V, I _D = 12A
		—	12	20		V _{GS} = 4.5V, I _D = 10A
Diode Forward Voltage	V _{SD}	—	0.7	1.0	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{ISS}	—	1,938	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	156	—		
Reverse Transfer Capacitance	C _{RSS}	—	126	—		
Gate Resistance	R _G	—	1.8	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	15	—	nC	V _{DS} = 15V, I _D = 12A
Total Gate Charge (V _{GS} = 10V)	Q _G	—	33	—		
Gate-Source Charge	Q _{GS}	—	4.4	—		
Gate-Drain Charge	Q _{GD}	—	5.9	—		
Turn-On Delay Time	t _{D(ON)}	—	4.4	—	ns	V _{DD} = 15V, V _{GS} = 10V, R _L = 1.25Ω, R _G = 3Ω,
Turn-On Rise Time	t _R	—	10.5	—		
Turn-Off Delay Time	t _{D(OFF)}	—	12.3	—		
Turn-Off Fall Time	t _F	—	5.7	—		
Body Diode Reverse Recovery Time	t _{RR}	—	11	—	ns	I _S = 12A, di/dt = 500A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	7.6	—	nC	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.



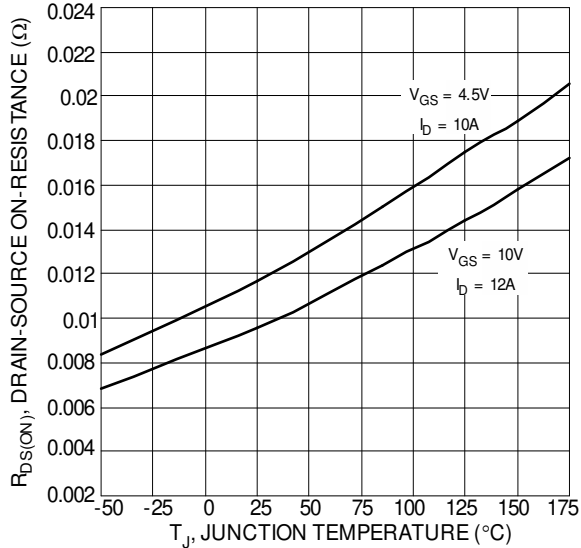


Figure 7 On-Resistance Variation with Temperature

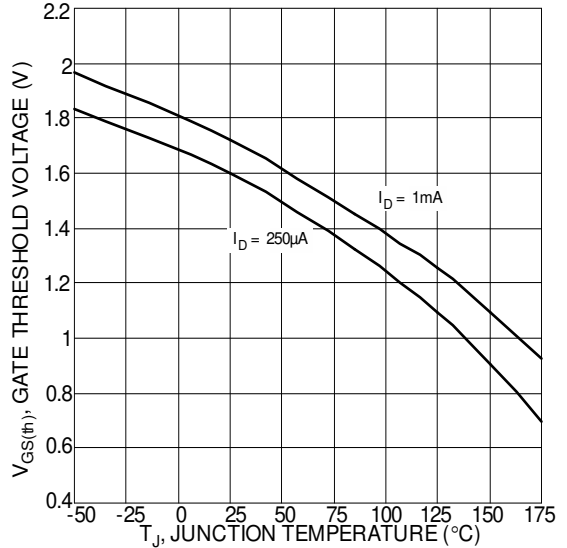


Figure 8 Gate Threshold Variation vs. Ambient Temperature

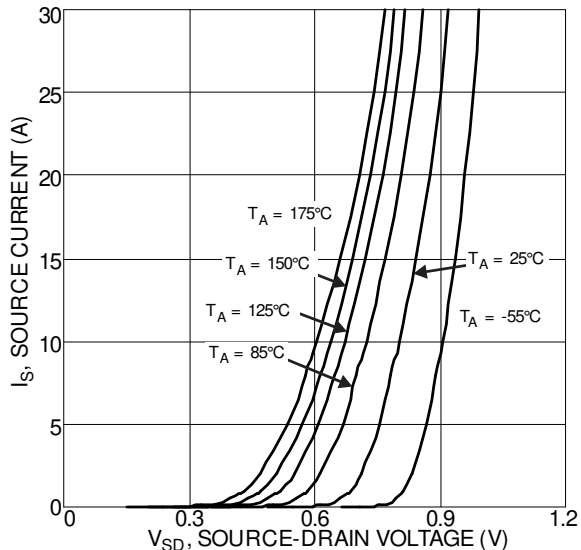


Figure 9 Diode Forward Voltage vs. Current

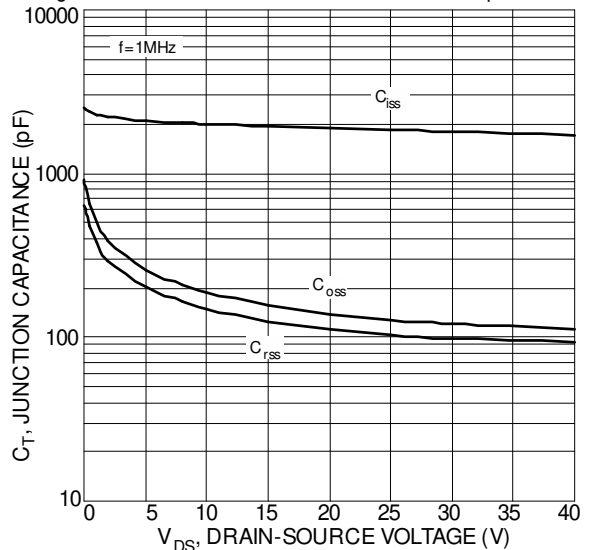


Figure 10 Typical Junction Capacitance

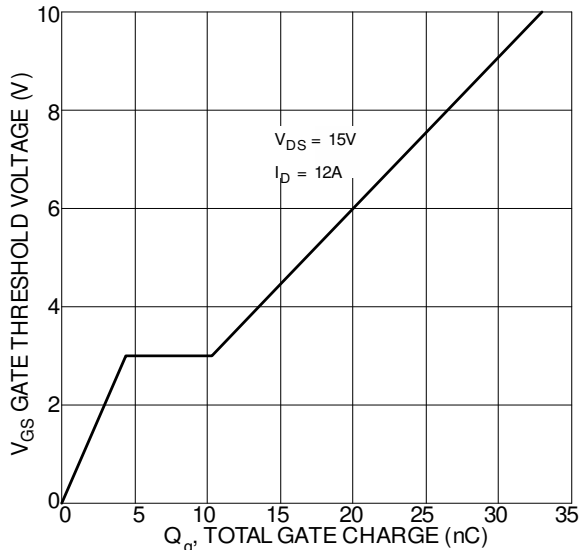


Figure 11 Gate Charge

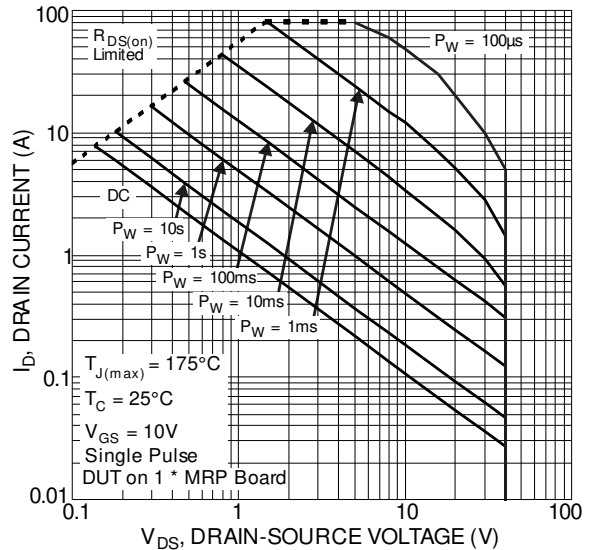
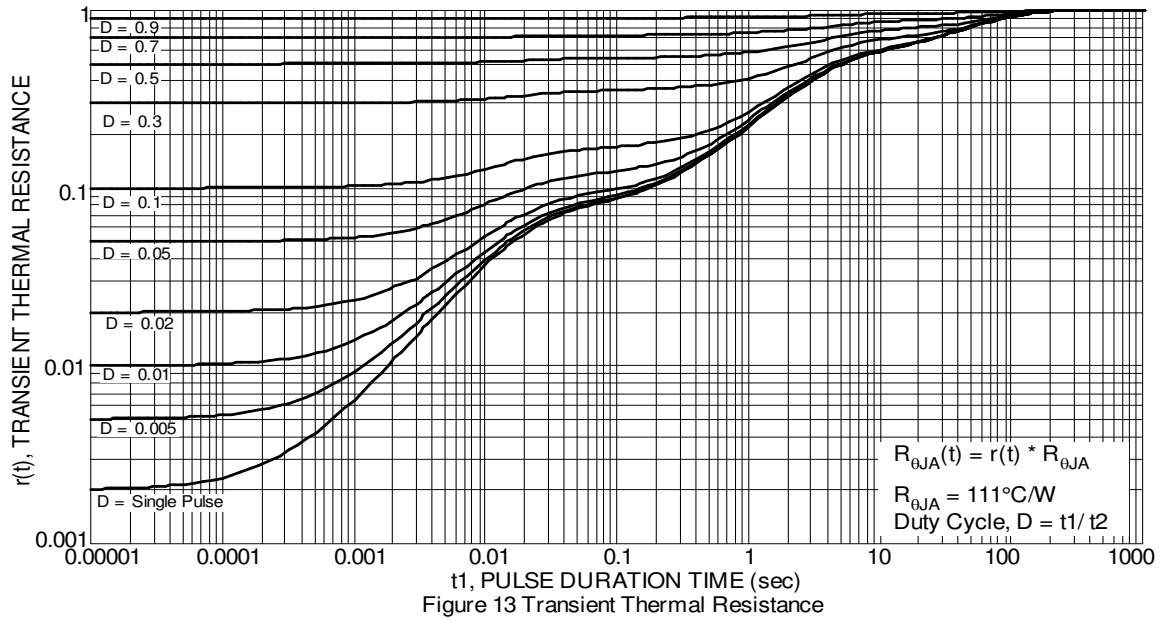


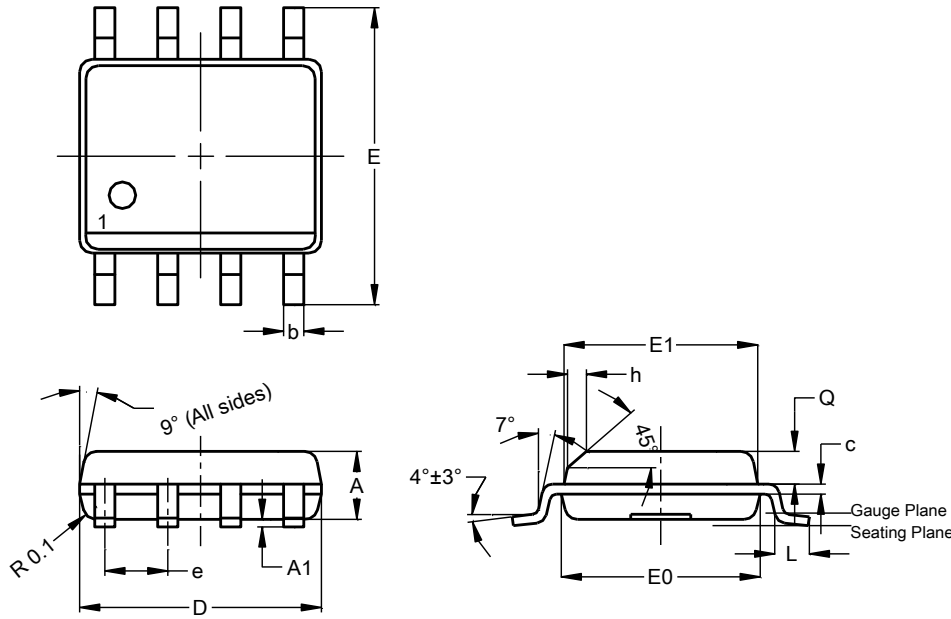
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

SO-8



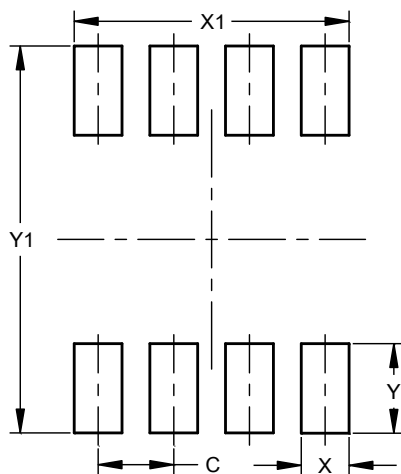
SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65

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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