



## 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

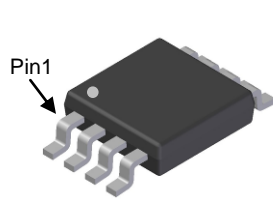
- DC-DC Converters
- Power Management Functions
- Backlighting

## Features and Benefits

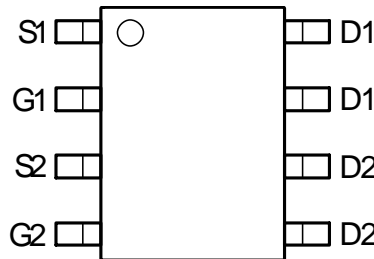
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate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

## Mechanical Data

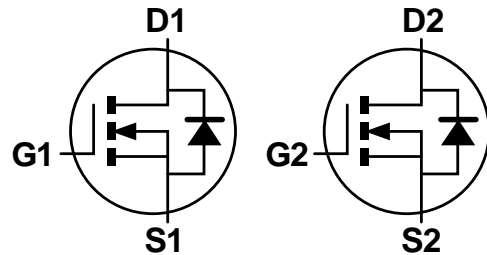
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208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



Top View



Top View  
Pin Configuration



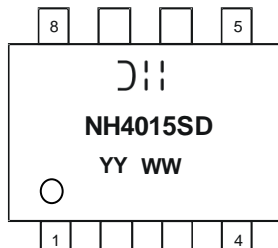
Equivalent Circuit

## 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](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			$V_{GSS}$	$\pm 20$	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 $\mu\text{s}$ 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<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> = 250μA
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	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	10	15	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A
		—	12	20		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	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>	—	1,938	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>OSS</sub>	—	156	—		
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	126	—		
Gate Resistance	R <sub>G</sub>	—	1.8	—	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>	—	15	—	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 12A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>G</sub>	—	33	—		
Gate-Source Charge	Q <sub>GS</sub>	—	4.4	—		
Gate-Drain Charge	Q <sub>GD</sub>	—	5.9	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.4	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V, R <sub>L</sub> = 1.25Ω, R <sub>G</sub> = 3Ω,
Turn-On Rise Time	t <sub>R</sub>	—	10.5	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	12.3	—		
Turn-Off Fall Time	t <sub>F</sub>	—	5.7	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	11	—	ns	I <sub>S</sub> = 12A, di/dt = 500A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	7.6	—	nC	

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

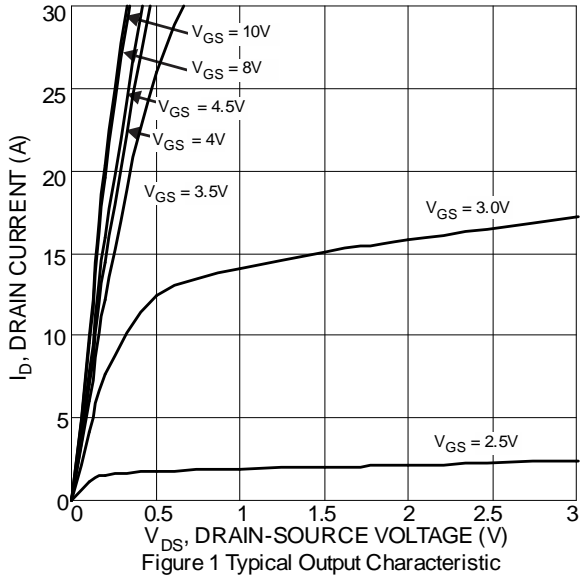


Figure 1 Typical Output Characteristic

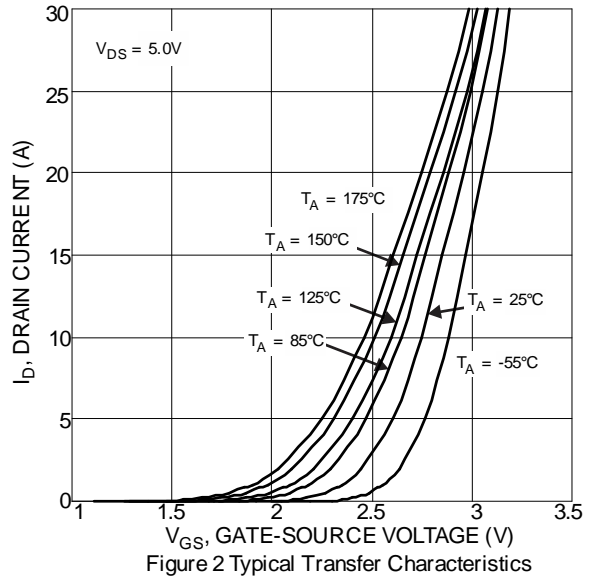


Figure 2 Typical Transfer Characteristics

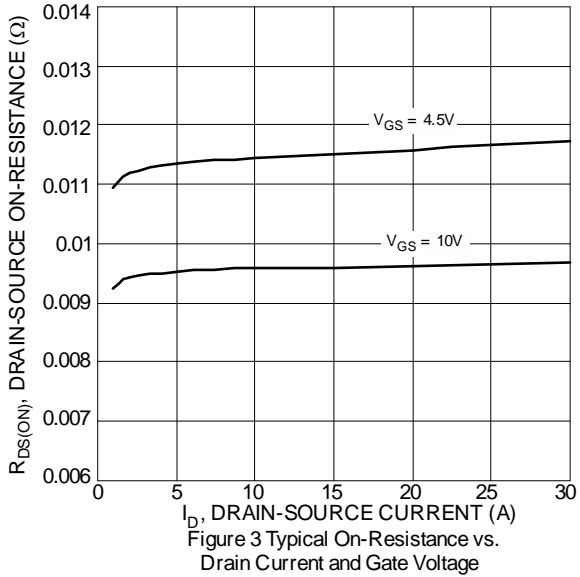


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

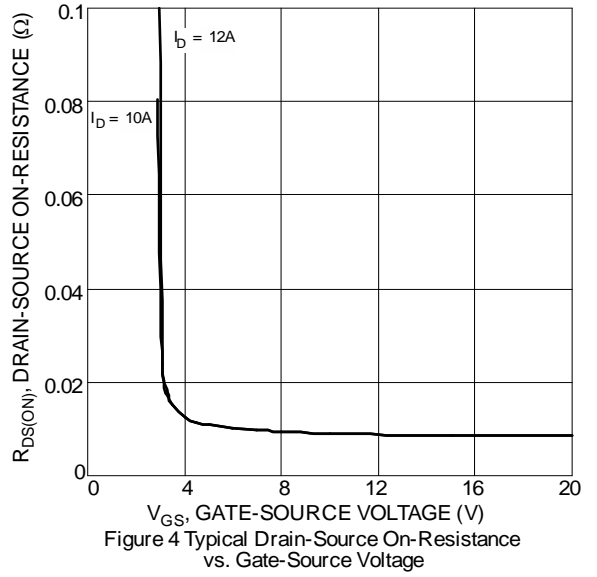


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

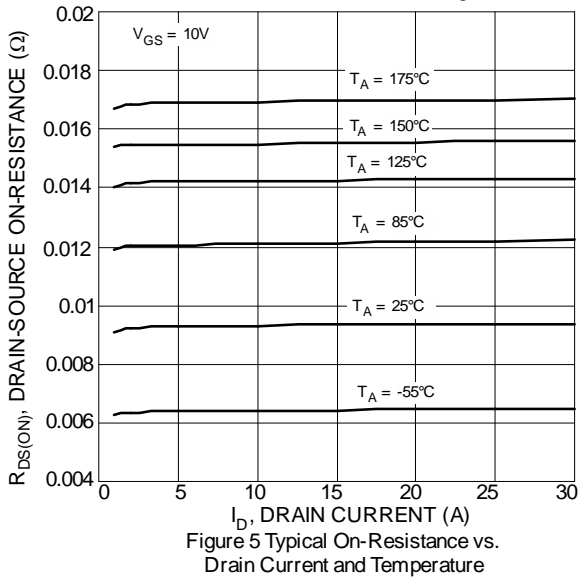


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

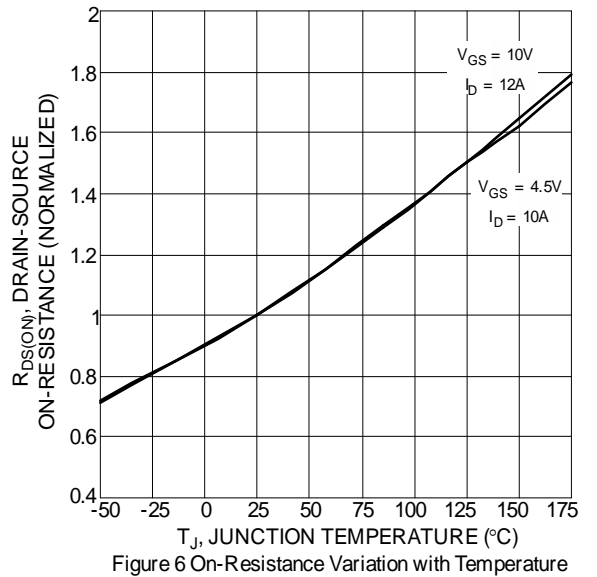


Figure 6 On-Resistance Variation with Temperature

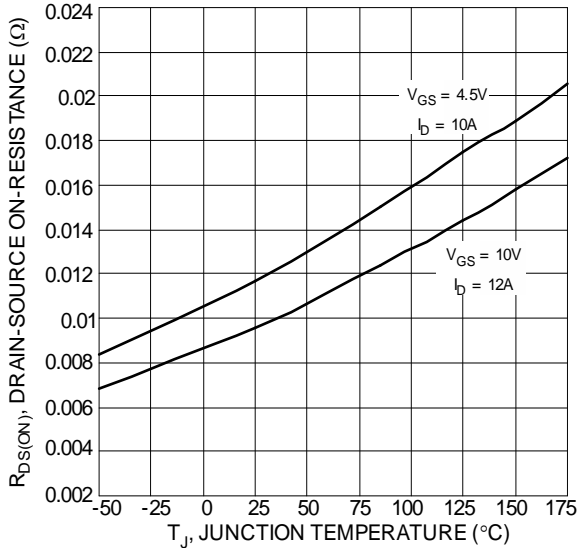


Figure 7 On-Resistance Variation with Temperature

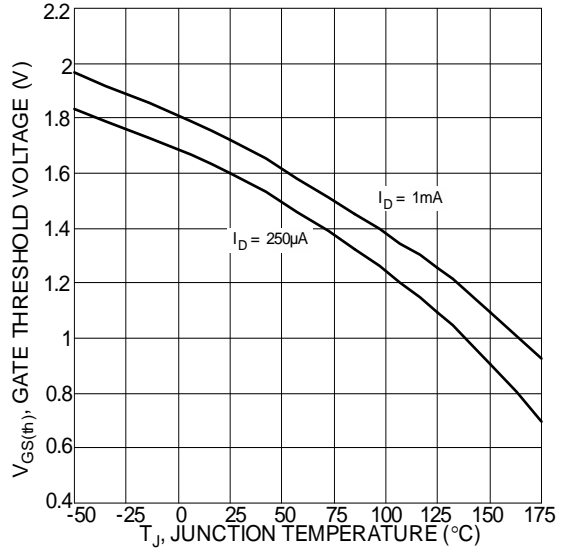


Figure 8 Gate Threshold Variation vs. Ambient Temperature

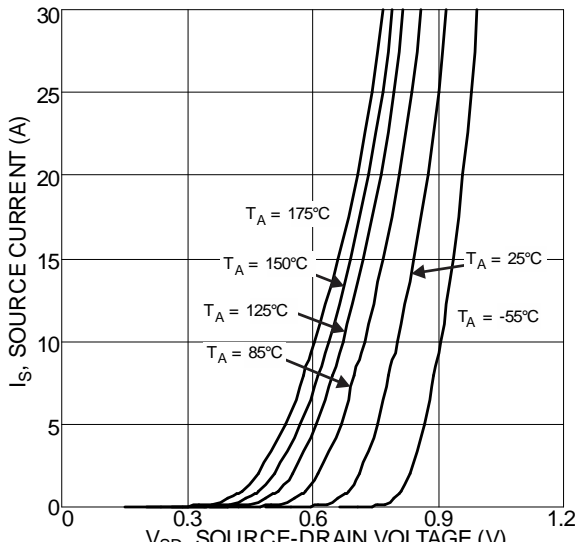


Figure 9 Diode Forward Voltage vs. Current

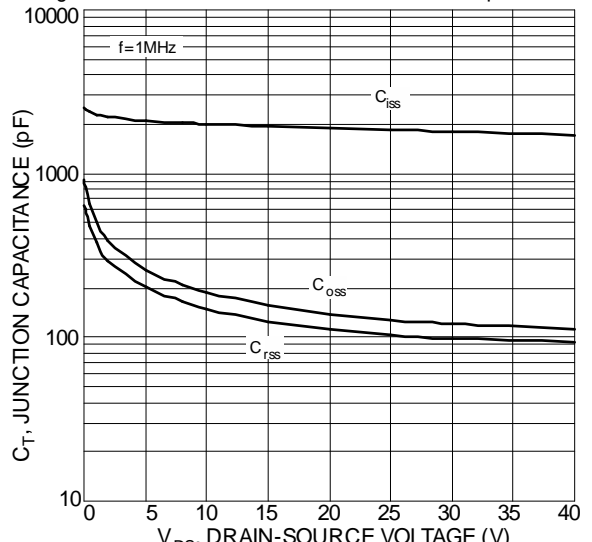


Figure 10 Typical Junction Capacitance

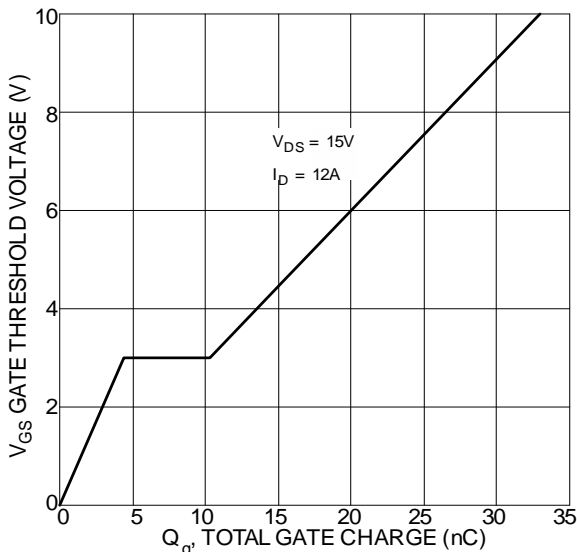


Figure 11 Gate Charge

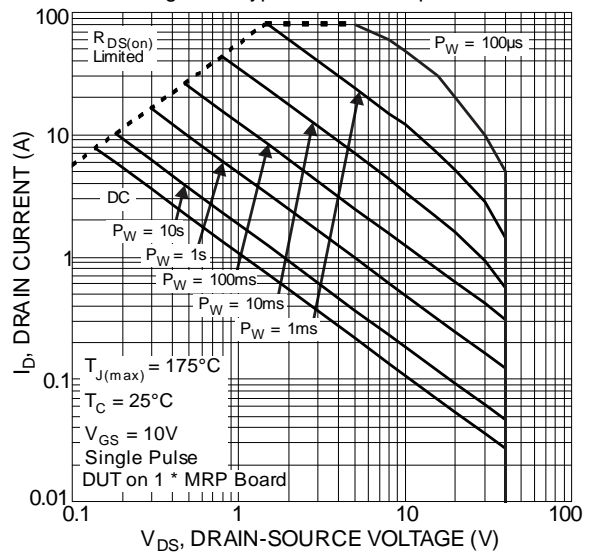
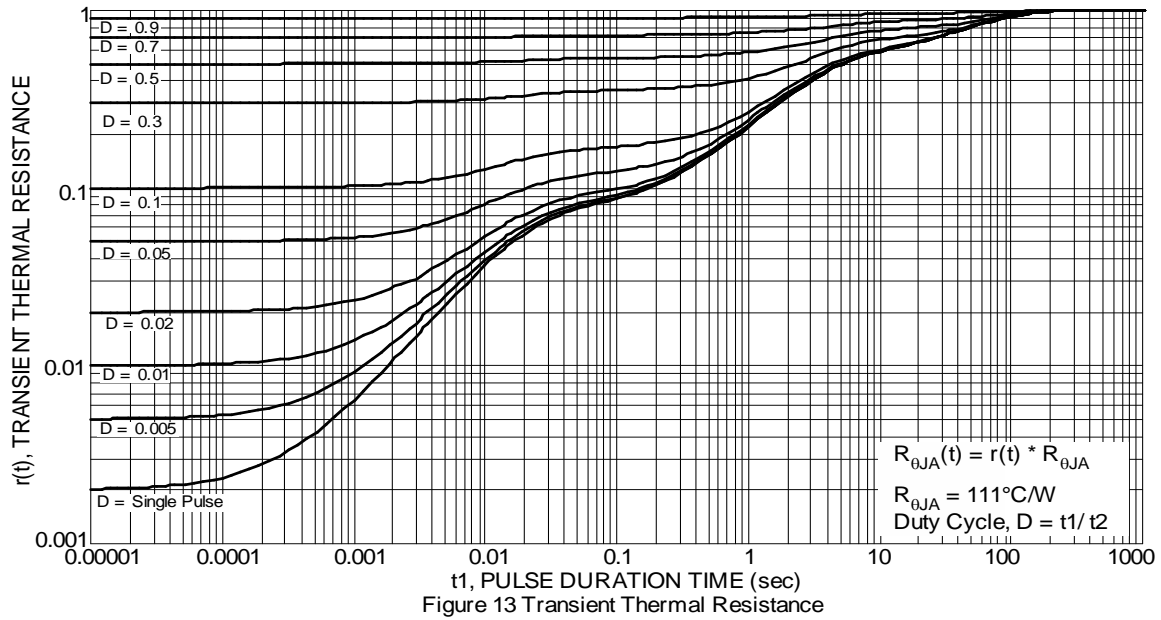


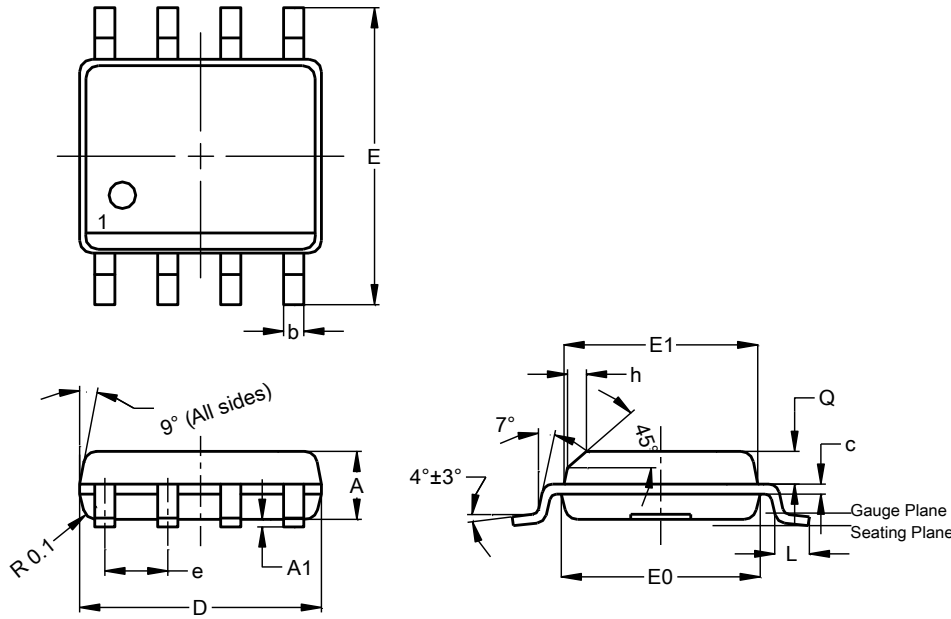
Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

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

SO-8



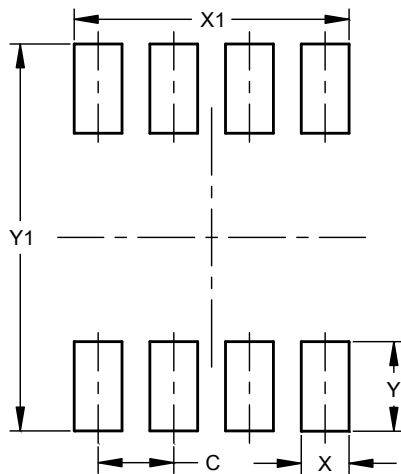
SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65

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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