

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
30V	5.5mΩ @ V <sub>GS</sub> = 10V	15
	7.5mΩ @ V <sub>GS</sub> = 4.5V	13

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN39M1LSSQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

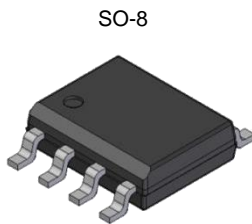
## Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

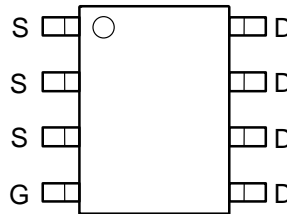
- Motor controls
- Backlighting
- Power-management functions
- DC-DC converters

## Mechanical Data

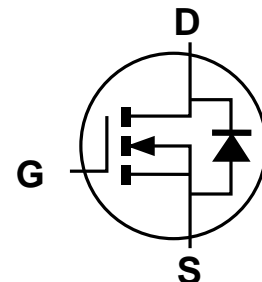
- Package: SO-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections Indicator: See Diagram Below
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.074 grams (Approximate)



Top View



Top View



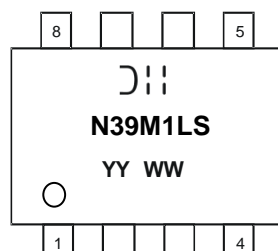
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN39M1LSSQ-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) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



DII = Manufacturer's Marking  
 N39M1LS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or YY = Year (ex: 23 = 2023)  
 WW = Week (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	30	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>	15	A
		T <sub>A</sub> = +70°C		12	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	128	A
Maximum Continuous Body Diode Forward Current (Note 5)			I <sub>S</sub>	2.2	A
Avalanche Current (Note 6) L = 0.1mH			I <sub>AS</sub>	38	A
Avalanche Energy (Note 6) L = 0.1mH			E <sub>AS</sub>	72	mJ

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

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 7)	Steady State	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient (Note 7)			R <sub>θJA</sub>	84	°C/W
Total Power Dissipation (Note 5)	Steady State	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.9	W
Thermal Resistance, Junction to Ambient (Note 5)			R <sub>θJA</sub>	62	°C/W
Thermal Resistance, Junction to Case (Note 5)			R <sub>θJC</sub>	7.5	
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 (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	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> = 30V, 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 (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	1.4	2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	3.8	5.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 15A
		—	5.0	7.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 15A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	2311	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	304	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	242	—	pF	
Gate Resistance	R <sub>g</sub>	—	2.4	—	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>	—	21	—	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 15A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	42	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	7	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	7	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.7	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V R <sub>G</sub> = 3.3Ω, I <sub>D</sub> = 15A
Turn-On Rise Time	t <sub>r</sub>	—	16.3	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	45.4	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	20.9	—	ns	
Reverse Recovery Time	t <sub>RR</sub>	—	20.5	—	ns	I <sub>F</sub> = 15A, di/dt = 100A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	9.0	—	nC	

- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

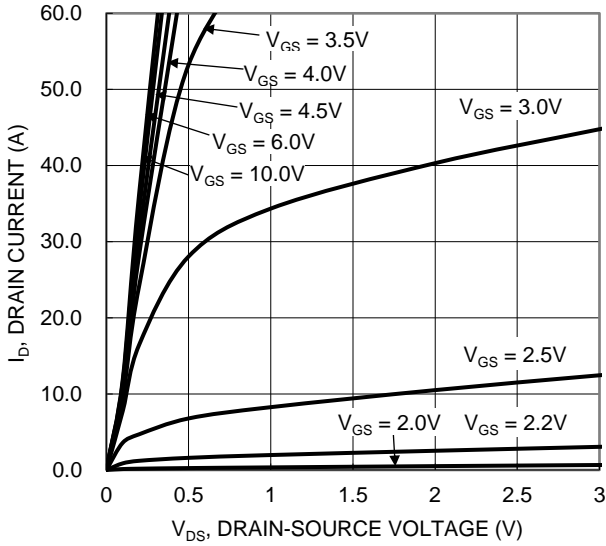


Figure 1. Typical Output Characteristic

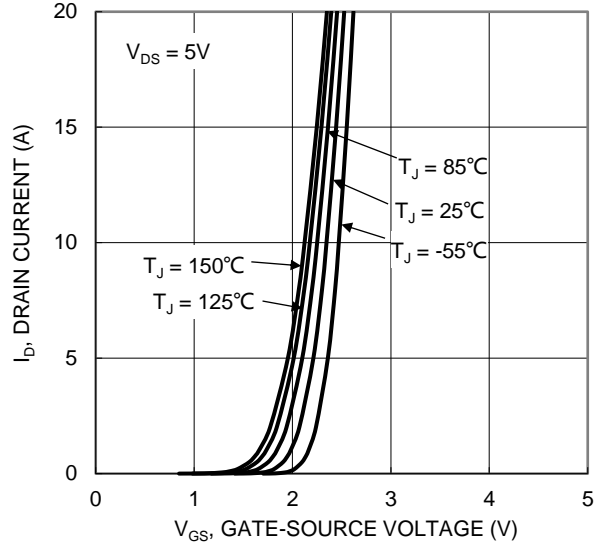


Figure 2. Typical Transfer Characteristic

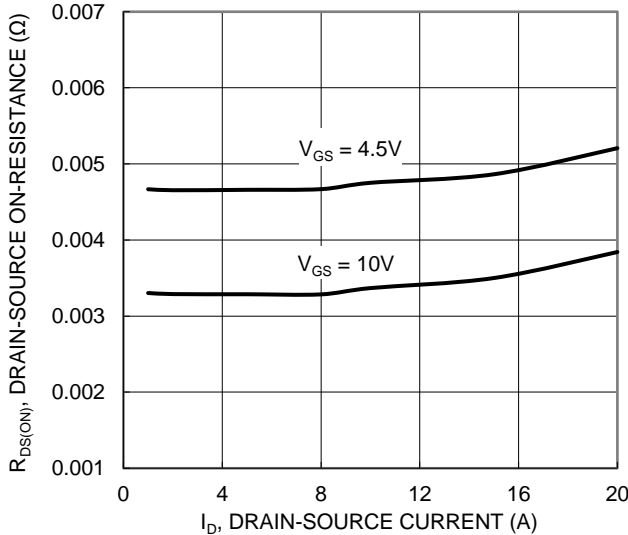


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

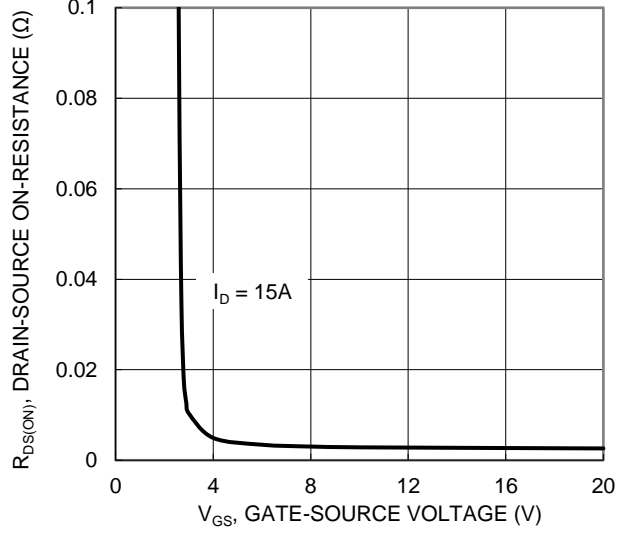


Figure 4. Typical Transfer Characteristic

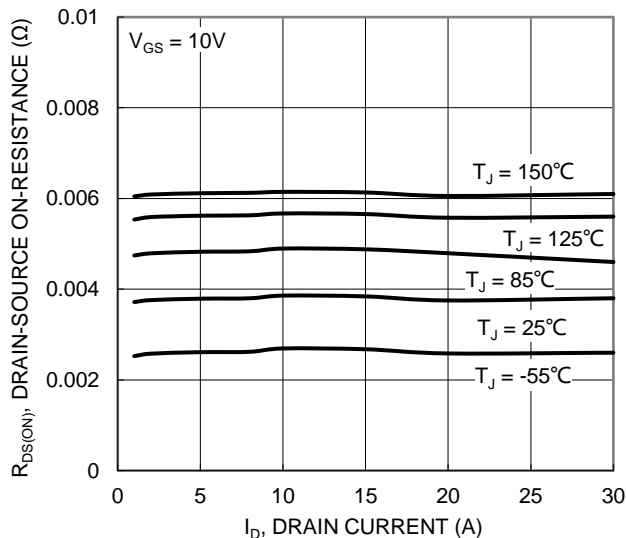


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

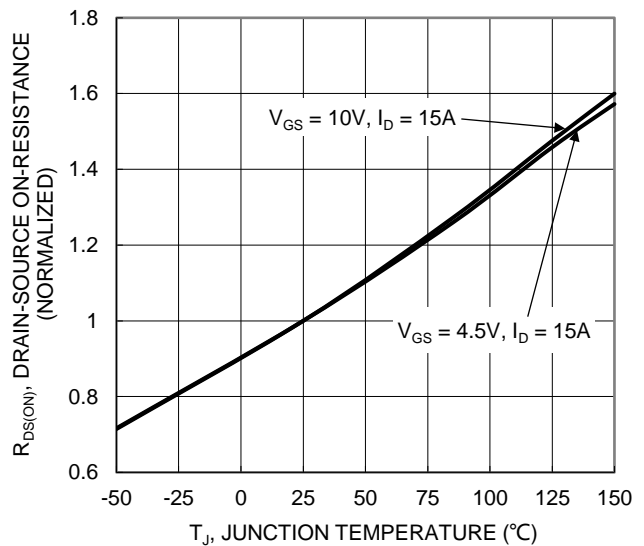


Figure 6. On-Resistance Variation with Junction Temperature

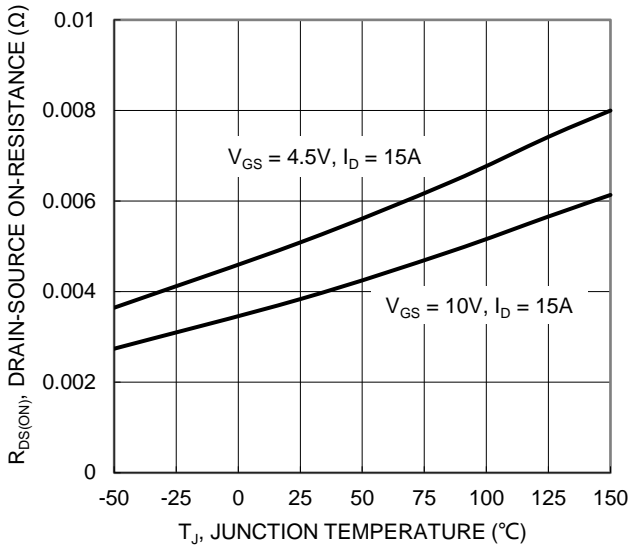


Figure 7. On-Resistance Variation with Junction Temperature

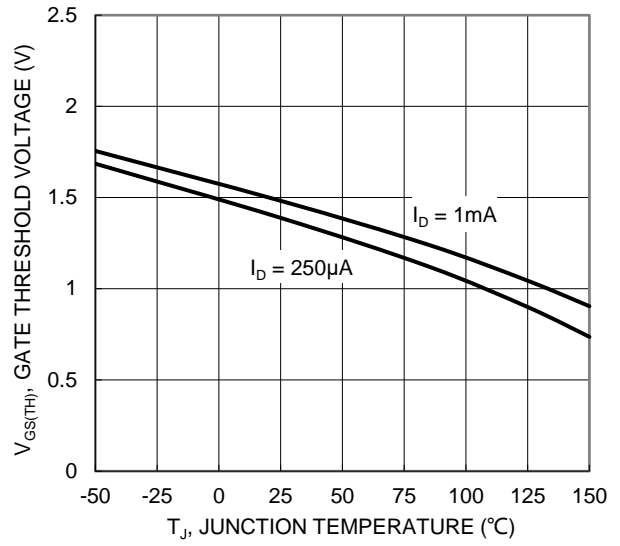


Figure 8. Gate Threshold Variation vs. Junction Temperature

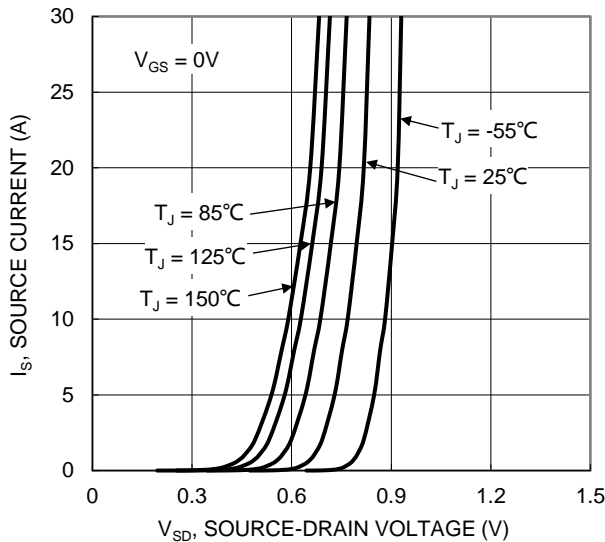


Figure 9. Diode Forward Voltage vs. Current

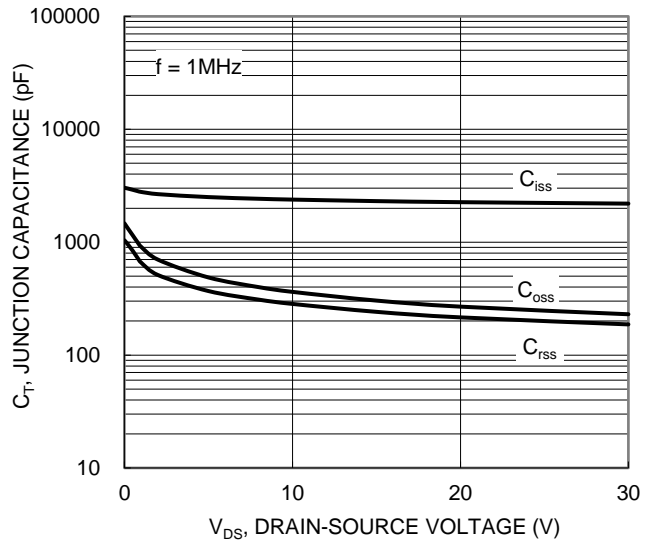


Figure 10. Typical Junction Capacitance

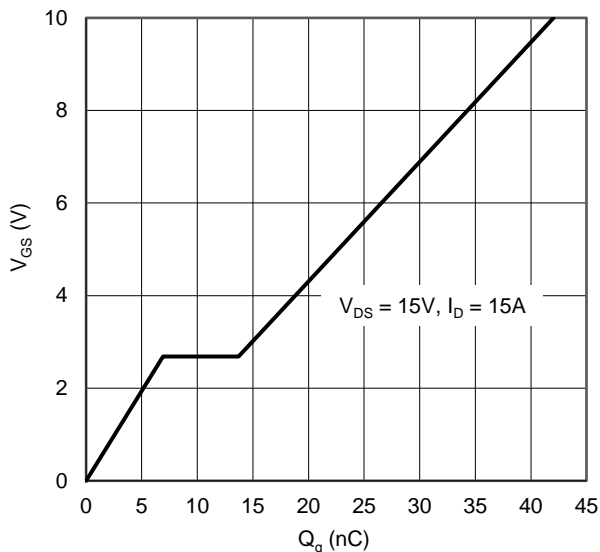


Figure 11. Gate Charge

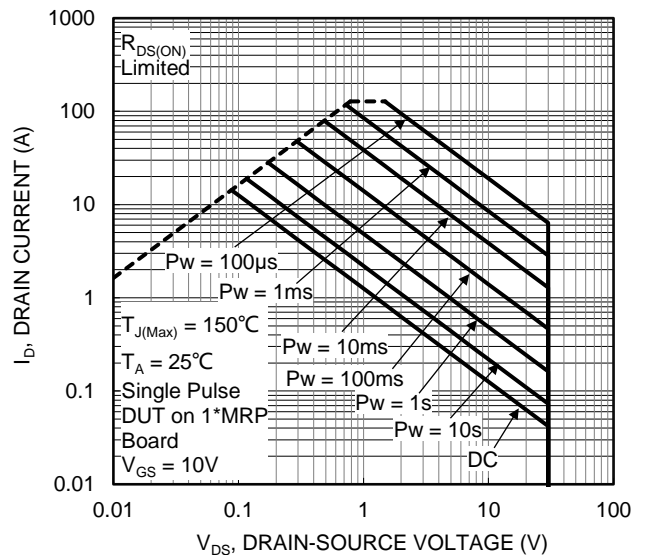


Figure 12. SOA, Safe Operation Area

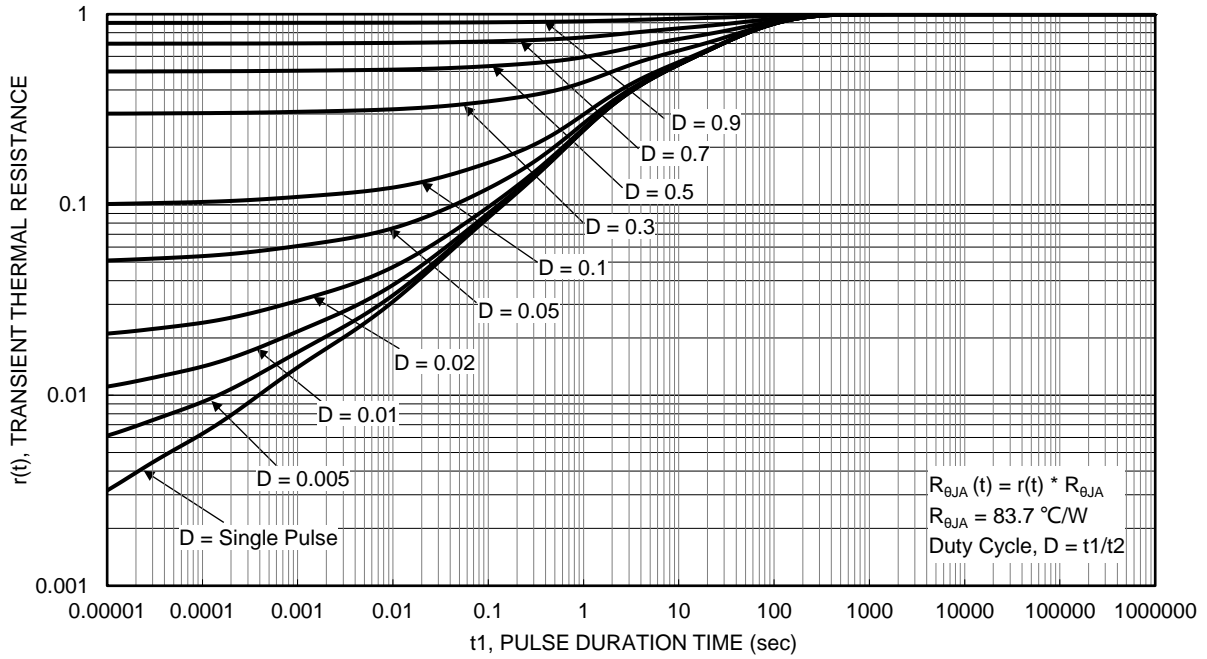
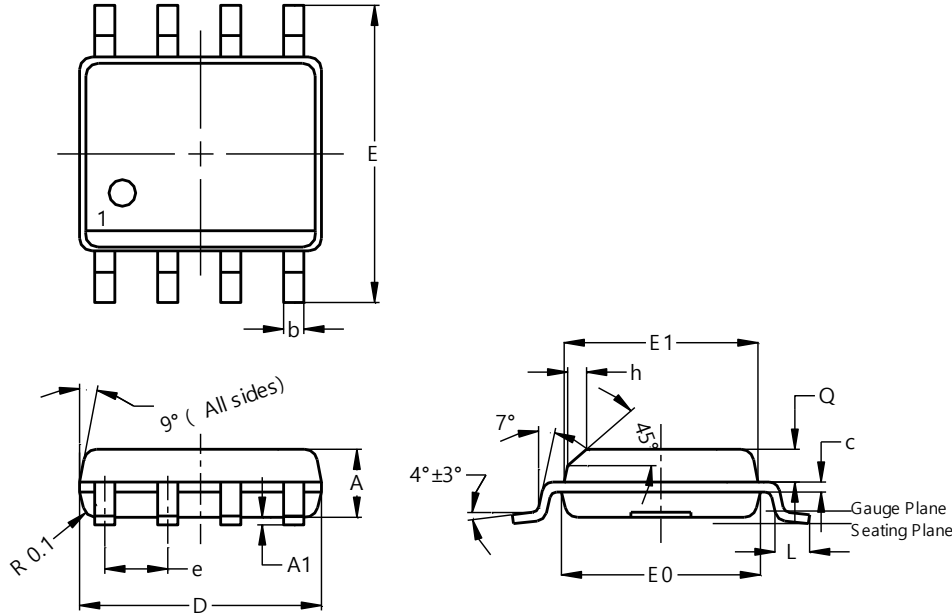


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**SO-8**

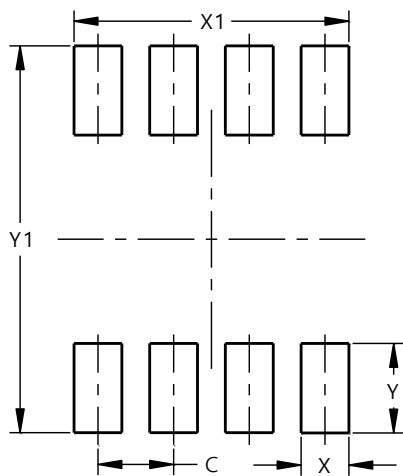


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	--	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

**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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