

Product Summary

BV_{DSS}	$R_{DS(on)}$ Max	I_D Max $T_A = +25^\circ\text{C}$ (Note 6)
40V	31m Ω @ $V_{GS} = 10\text{V}$	7.0A
	50m Ω @ $V_{GS} = 4.5\text{V}$	5.8A

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

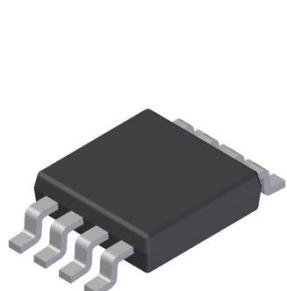
Features and Benefits

- Low On-Resistance
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)
- The DMN4031SSDQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.

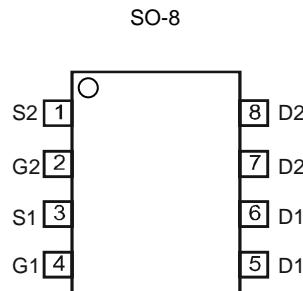
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

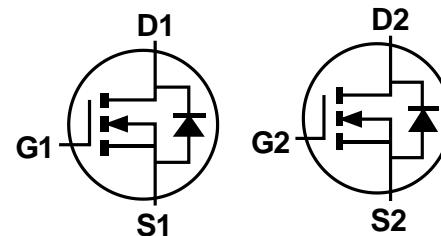
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.072 grams (Approximate)



Top View



Top View



N-channel MOSFET

N-channel MOSFET

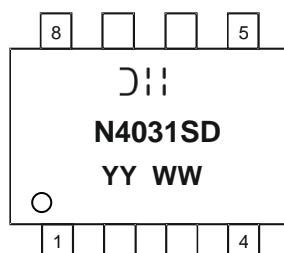
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN4031SSDQ-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

N4031SD = Product Type Marking Code

YYWW = Date Code Marking

YY or YY = Year (ex: 21 = 2021)

WW = Week (01 to 53)

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

Characteristic				Symbol	Value	Unit
Drain-Source Voltage				V_{DSS}	40	V
Gate-Source Voltage				V_{GSS}	± 20	V
Continuous Drain Current (Note 5)	$V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	5.2 4.1	A
Continuous Drain Current (Note 5)	$V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	4.3 3.4	A
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	7.0 5.6	A
Continuous Drain Current (Note 6)	$V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	5.8 4.7	A
Pulsed Drain Current (Note 7)				I_{DM}	40	A

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

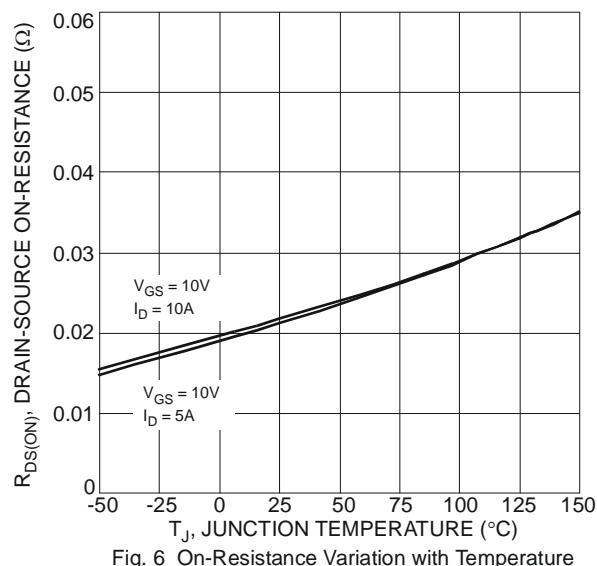
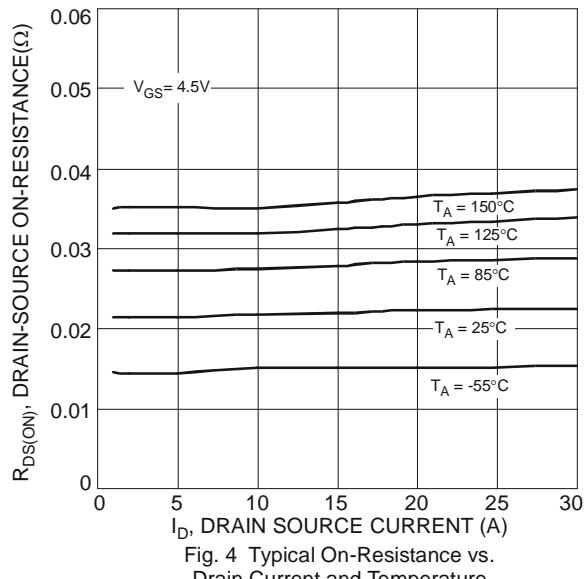
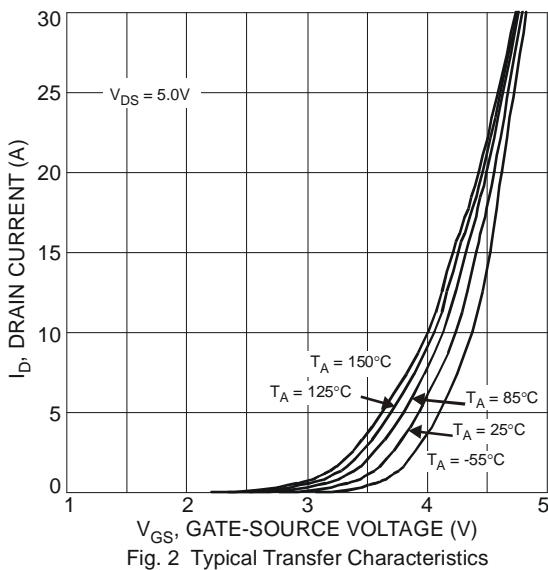
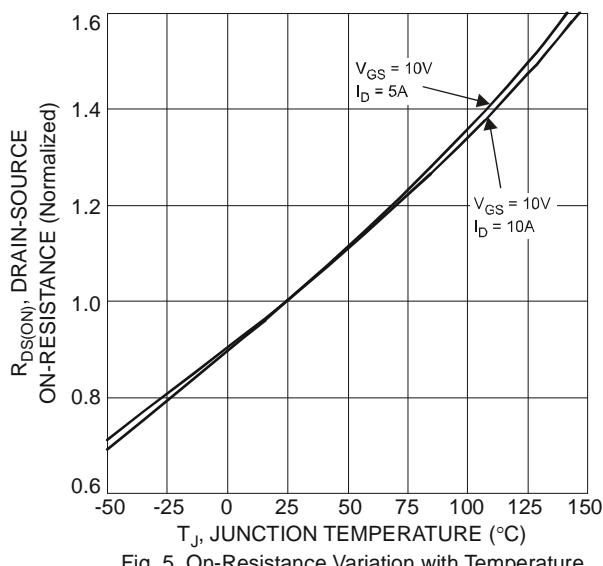
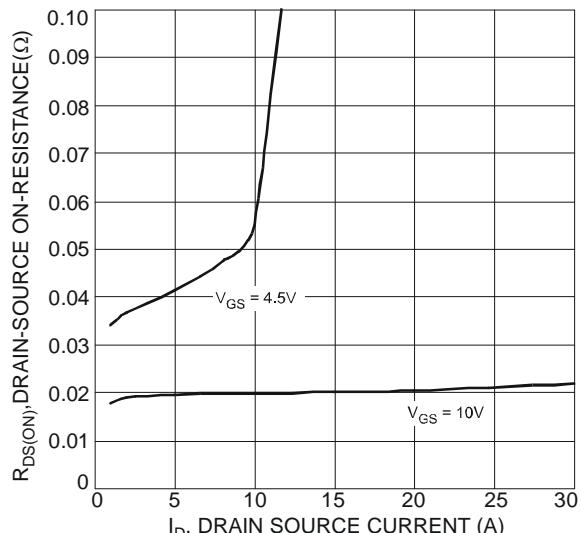
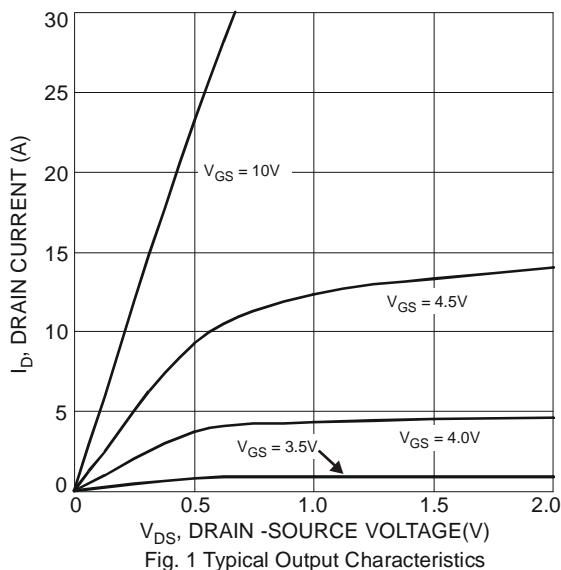
Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	1.42	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 5)	$R_{\theta JA}$	88	°C/W
Total Power Dissipation (Note 6)	P_D	2.6	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	48	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 10\text{mA}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.6	2.4	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
On-State Drain Current	$I_{D(ON)}$	20	—	—	A	$V_{GS} = 10\text{V}, V_{DS} = 5\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	19	31	mΩ	$V_{GS} = 10\text{V}, I_D = 6\text{A}$
		—	44	50		$V_{GS} = 4.5\text{V}, I_D = 5\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	11	—	S	$V_{DS} = 5\text{V}, I_D = 6\text{A}$
Diode Forward Voltage	V_{SD}	—	0.74	1.0	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	945	—	pF	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	69	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	58	—	pF	
Gate Resistance	R_g	—	1.45	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	8.4	—	nC	$V_{GS} = 4.5\text{V}, V_{DS} = 20\text{V}, I_D = 12\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_g	—	18.6	—	nC	$V_{GS} = 10\text{V}, V_{DS} = 20\text{V}, I_D = 12\text{A}$
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	$V_{GS} = 10\text{V}, V_{DS} = 20\text{V}, R_L = 1.6\Omega, R_G = 3\Omega$
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:

5. Device mounted on FR-4 PCB, with minimum recommended pad layout. The value in any given application depends on user's specific board design.
6. Device mounted on 1" x 1" FR-4 PCB with high coverage 1 oz. Copper, single sided.
7. Repetitive rating, pulse width limited by junction temperature.
8. Short duration pulse test used to minimize self-heating effect
9. Guaranteed by design. No subject to production testing.



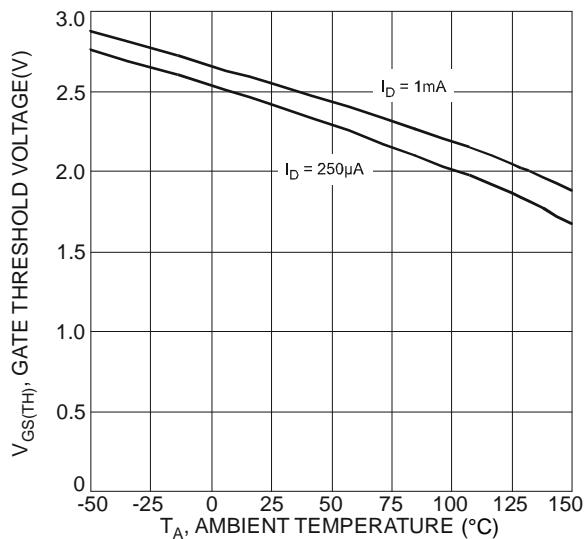


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

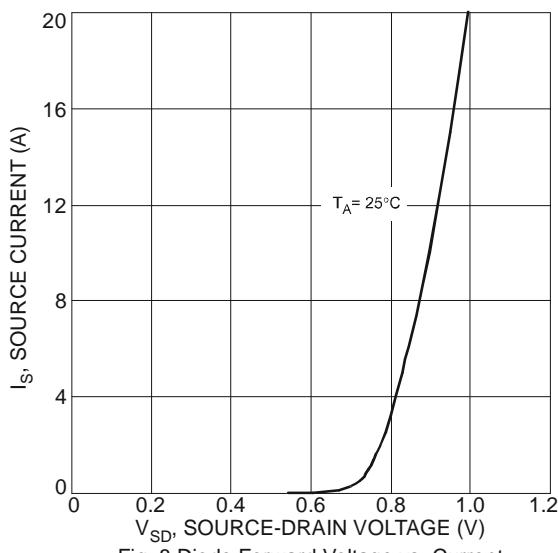


Fig. 8 Diode Forward Voltage vs. Current

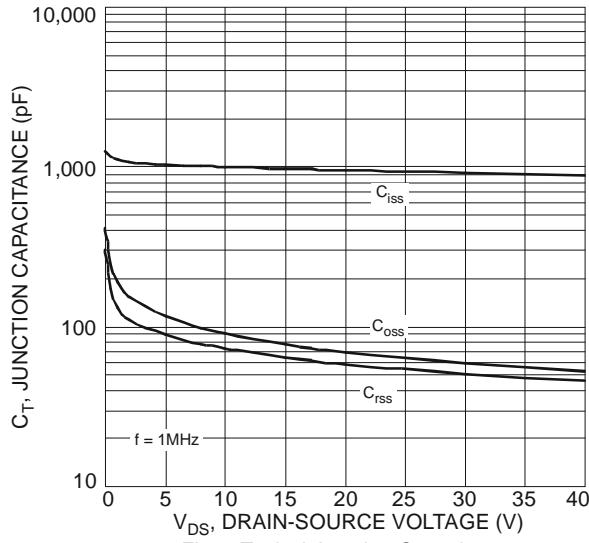


Fig. 9 Typical Junction Capacitance

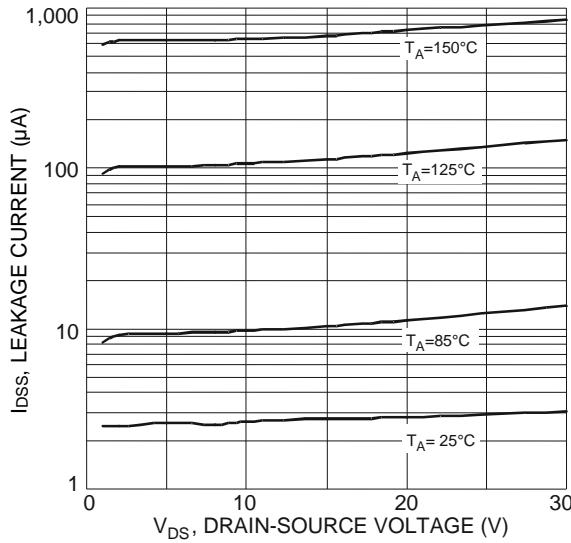


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

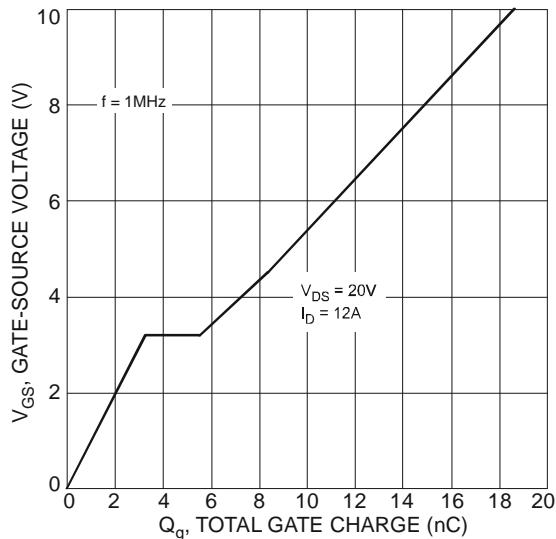


Fig. 11 Gate-Charge Characteristics

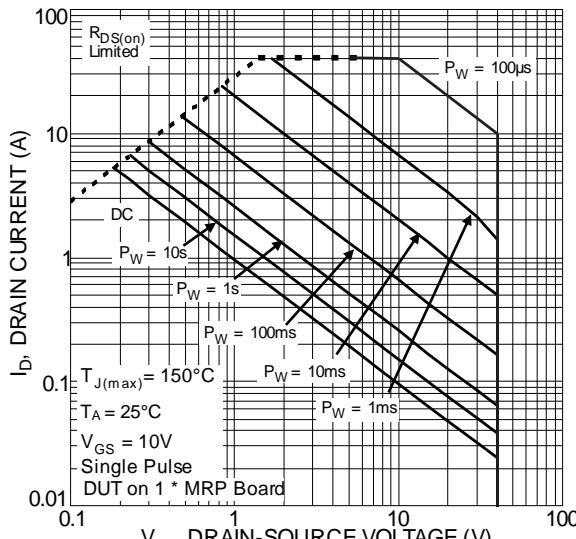


Fig. 12 SOA, Safe Operation Area

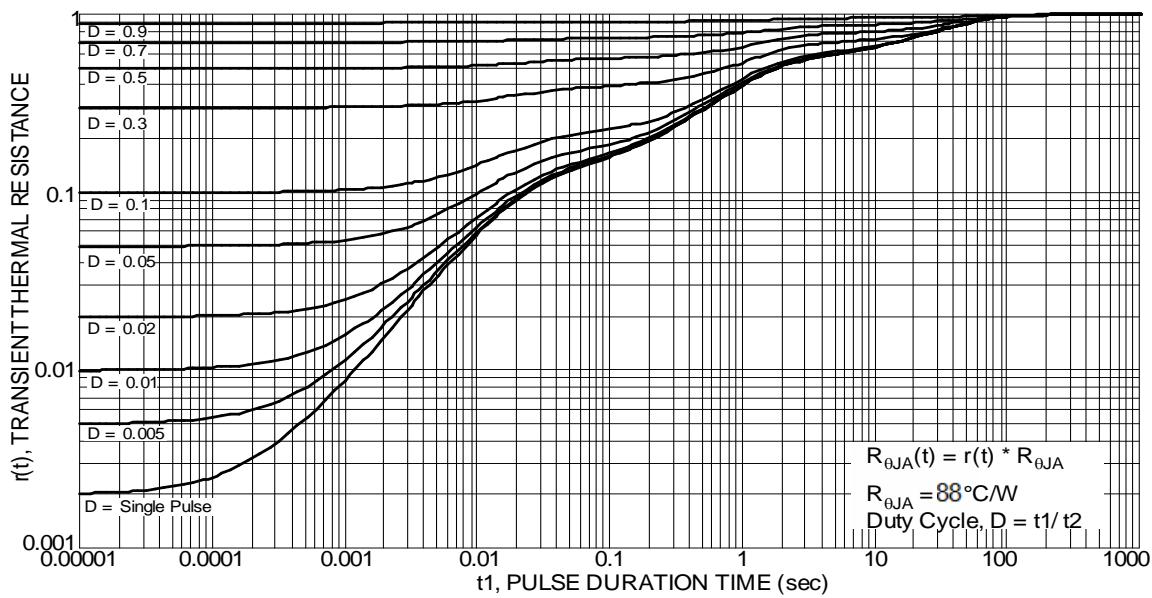
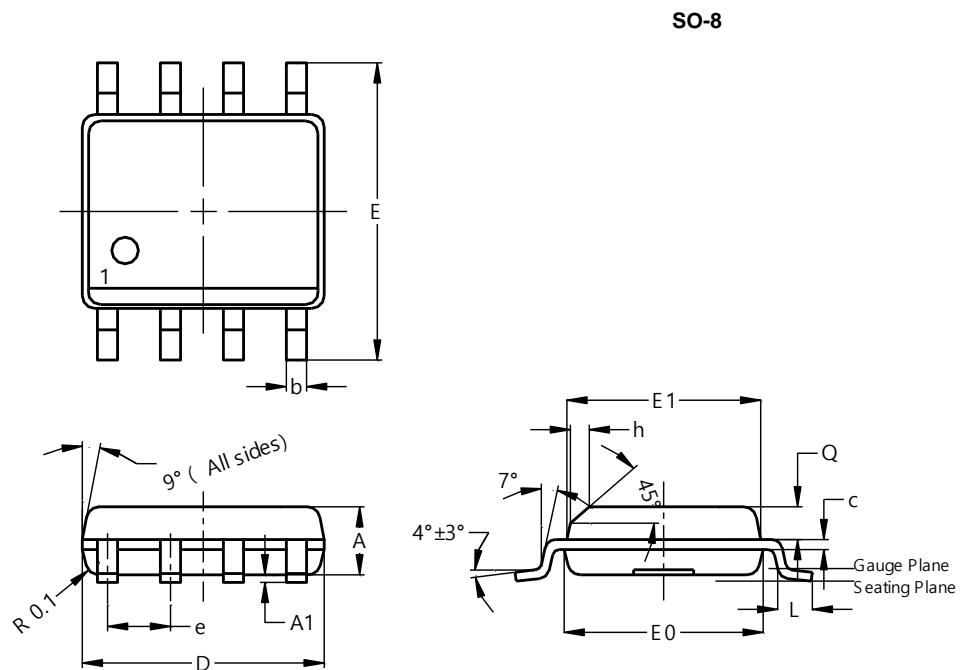


Figure 13 Transient Thermal Resistance

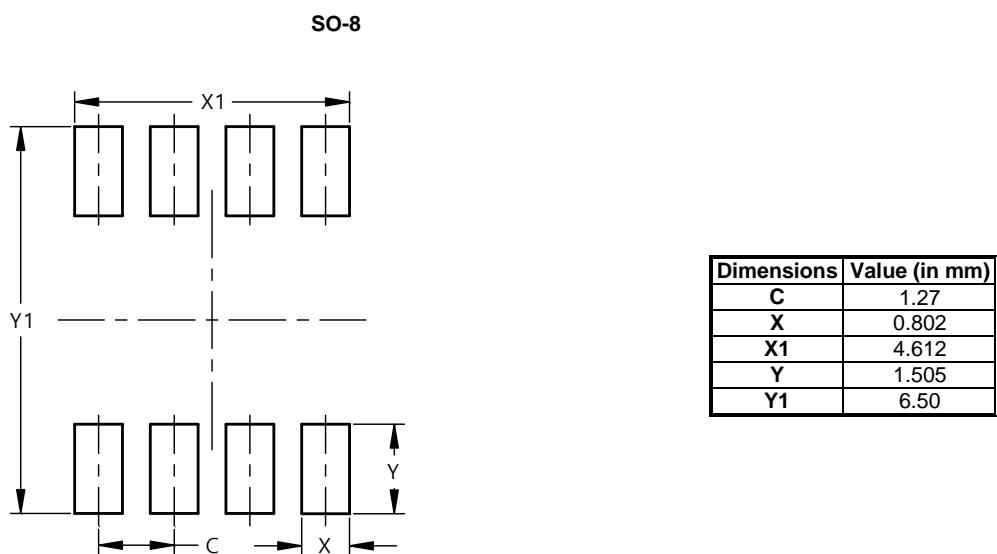
Package Outline Dimensions

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



Suggested Pad Layout

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