

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max $T_A = +25^\circ\text{C}$
60V	$2\Omega @ V_{GS} = 5V$	380mA
	$2.5\Omega @ V_{GS} = 2.5V$	340mA

Description

This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.


Applications

- Motor Control
- Power Management Functions
- Backlighting

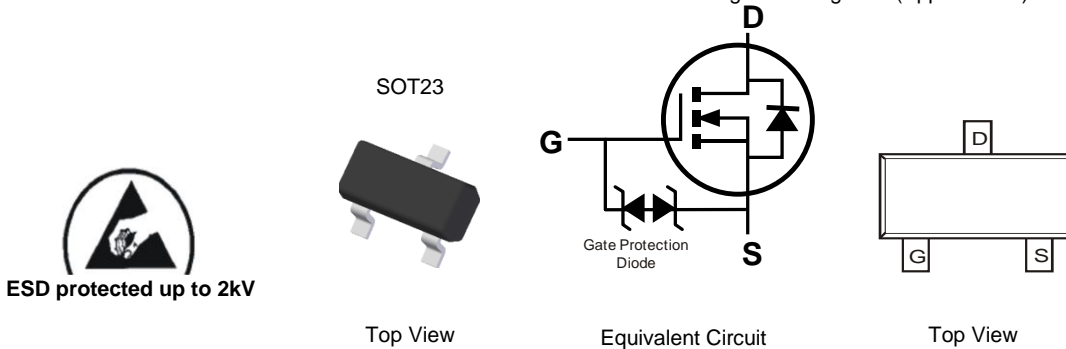
Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Up To 2kV**
- **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**

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.008 grams (Approximate)

NEW PRODUCT

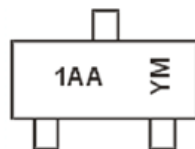


Ordering Information (Note 4)

Part Number	Case	Packaging
DMN61D9U-7	SOT23	3000/Tape & Reel
DMN61D9U-13	SOT23	10000/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



1AA = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: C = 2015)
 M = Month (ex: 9 = September)

Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	B	C	D	E	F	G	H	I	J	K	L	M

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current (Note 6) $V_{GS} = 5.0\text{V}$	Steady State $T_A = +25^\circ\text{C}$	380	mA
	$T_A = +70^\circ\text{C}$	300	
	$t < 5\text{s}$ $T_A = +25^\circ\text{C}$	430	mA
		$T_A = +70^\circ\text{C}$	
Maximum Continuous Body Diode Forward Current (Note 6)	I_S	0.4	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) (Note 6)	I_{DM}	1.2	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	370	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady State	351
		$t < 5\text{s}$	292
Total Power Dissipation (Note 6)	P_D	540	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	Steady State	221
		$t < 5\text{s}$	197
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0	μA	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	$V_{DS} = 10\text{V}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.2	2.0	Ω	$V_{GS} = 5.0\text{V}, I_D = 0.05\text{A}$
			1.6	2.5		$V_{GS} = 2.5\text{V}, I_D = 0.05\text{A}$
			2.5	3.5		$V_{GS} = 1.8\text{V}, I_D = 0.05\text{A}$
Forward Transconductance	$ Y_{fs} $	200	—	—	mS	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$
Diode Forward Voltage	V_{SD}	—	0.75	1.4	V	$V_{GS} = 0\text{V}, I_S = 115\text{mA}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	28.5	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	3.9	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.5	—	pF	
Gate Resistance	R_g	—	65	—	Ω	$f = 1\text{MHz}, V_{GS} = 0\text{V}, V_{DS} = 0\text{V}$
Total Gate Charge	Q_g	—	0.4	—	nC	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V},$ $I_D = 250\text{mA}$
Gate-Source Charge	Q_{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	2.1	—	ns	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V},$ $R_G = 25\Omega, I_D = 200\text{mA}$
Turn-On Rise Time	t_R	—	1.8	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	14.4	—	ns	
Turn-Off Fall Time	t_F	—	8.4	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
 - Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

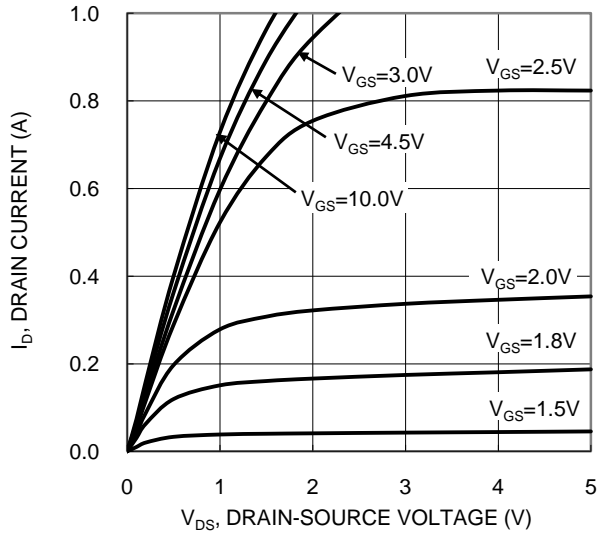


Figure 1. Typical Output Characteristic

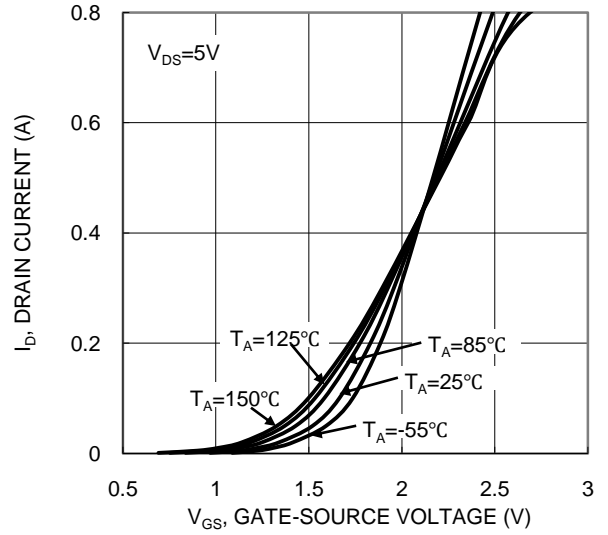


Figure 2. Typical Transfer Characteristic

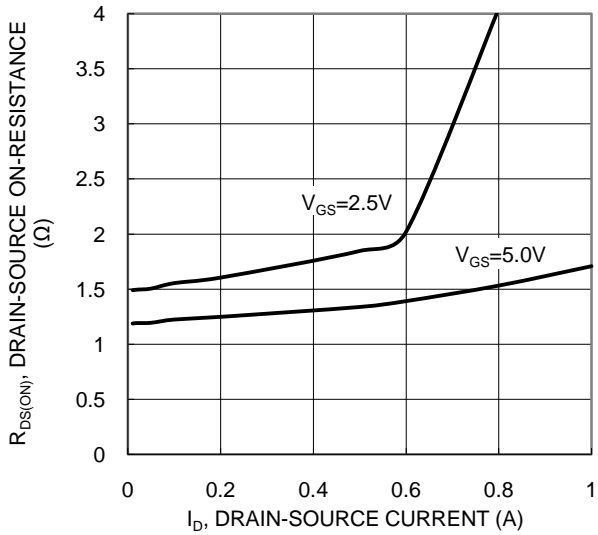


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

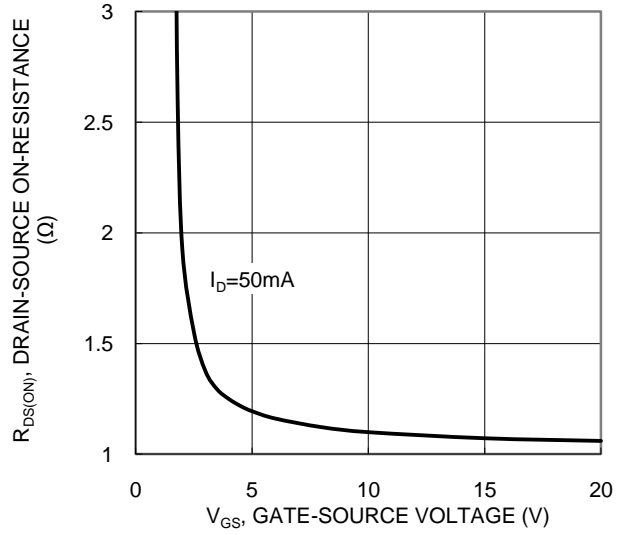


Figure 4. Typical Transfer Characteristic

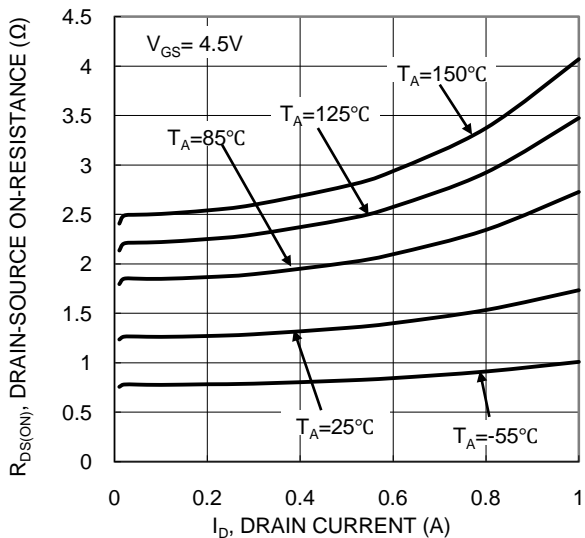


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

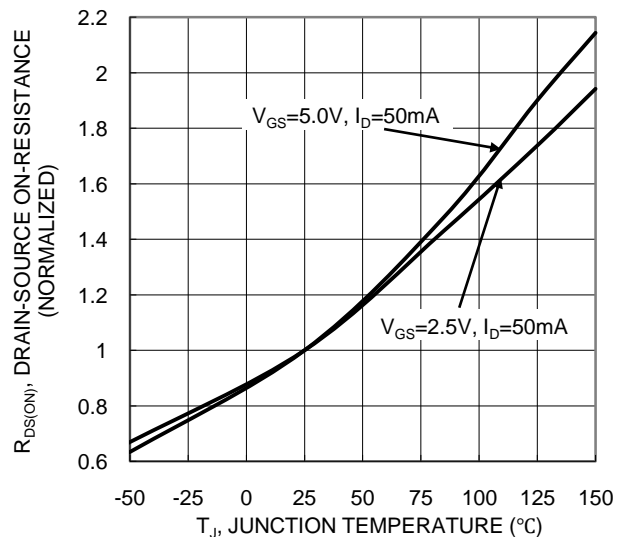


Figure 6. On-Resistance Variation with Junction Temperature

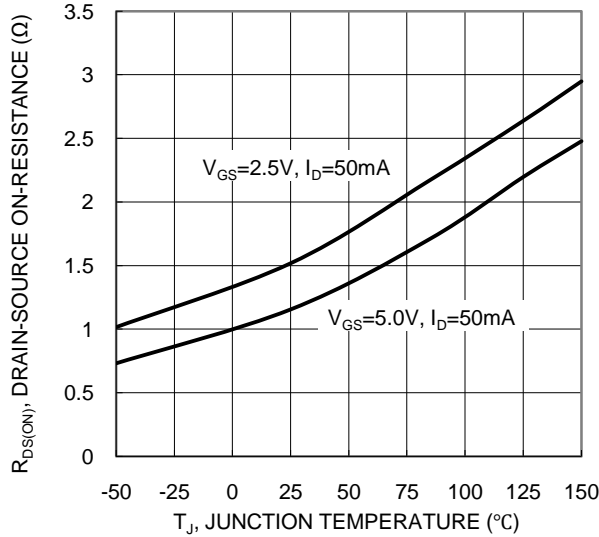


Figure 7. On-Resistance Variation with Junction Temperature

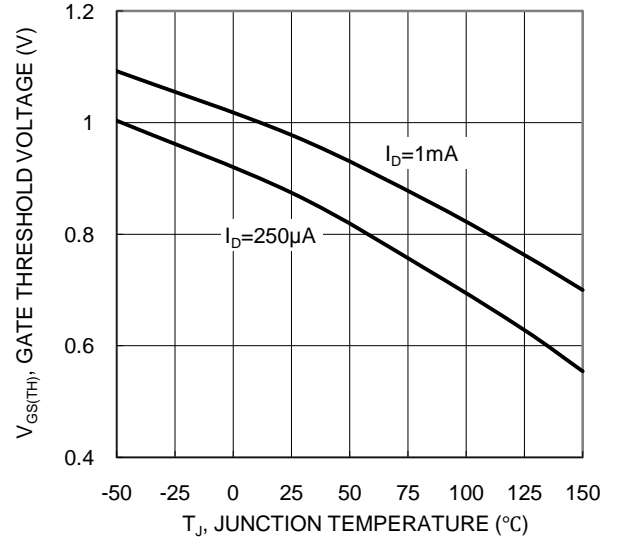


Figure 8. Gate Threshold Variation vs. Junction Temperature

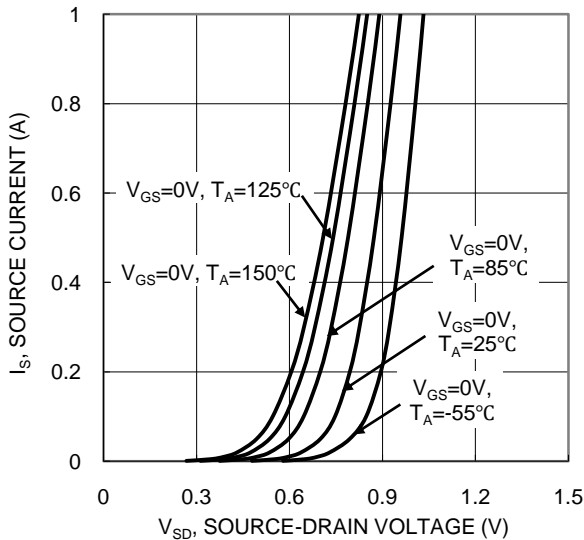


Figure 9. Diode Forward Voltage vs. Current

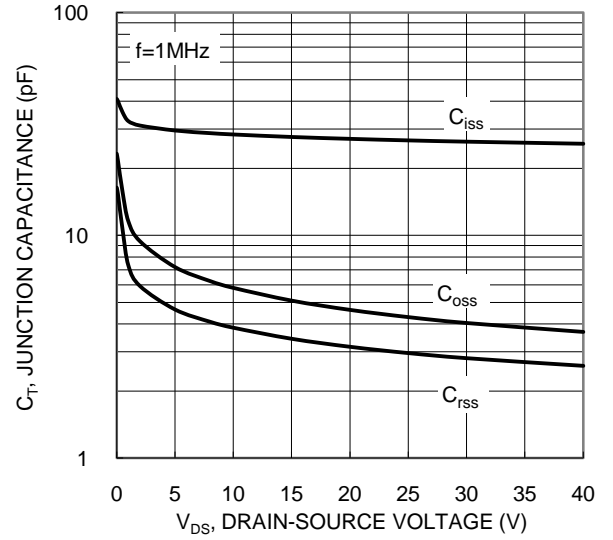


Figure 10. Typical Junction Capacitance

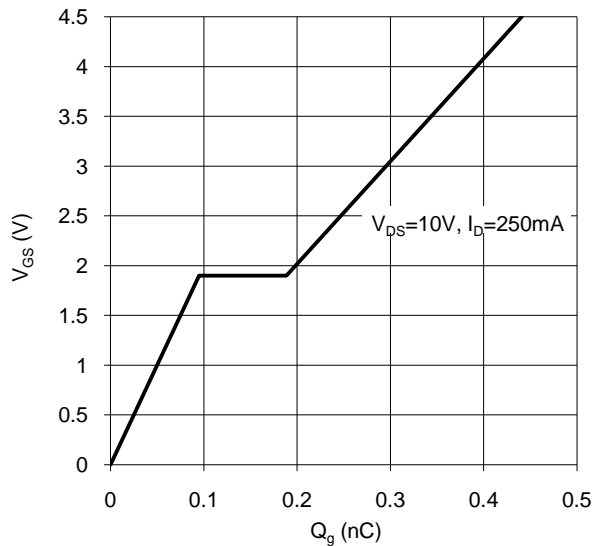


Figure 11. Gate Charge

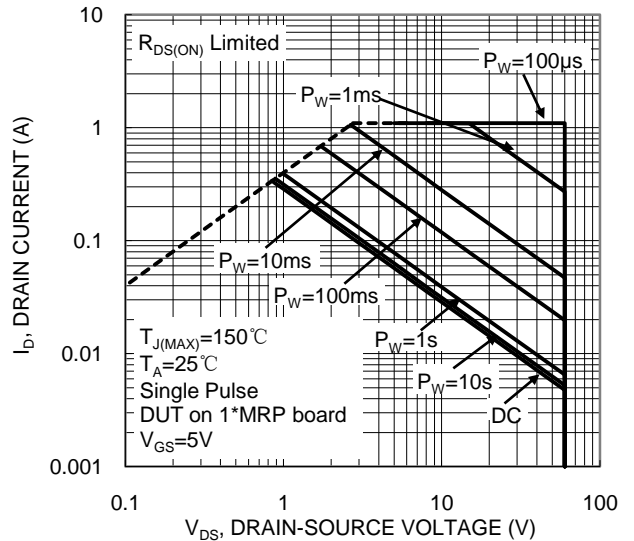


Figure 12. SOA, Safe Operation Area

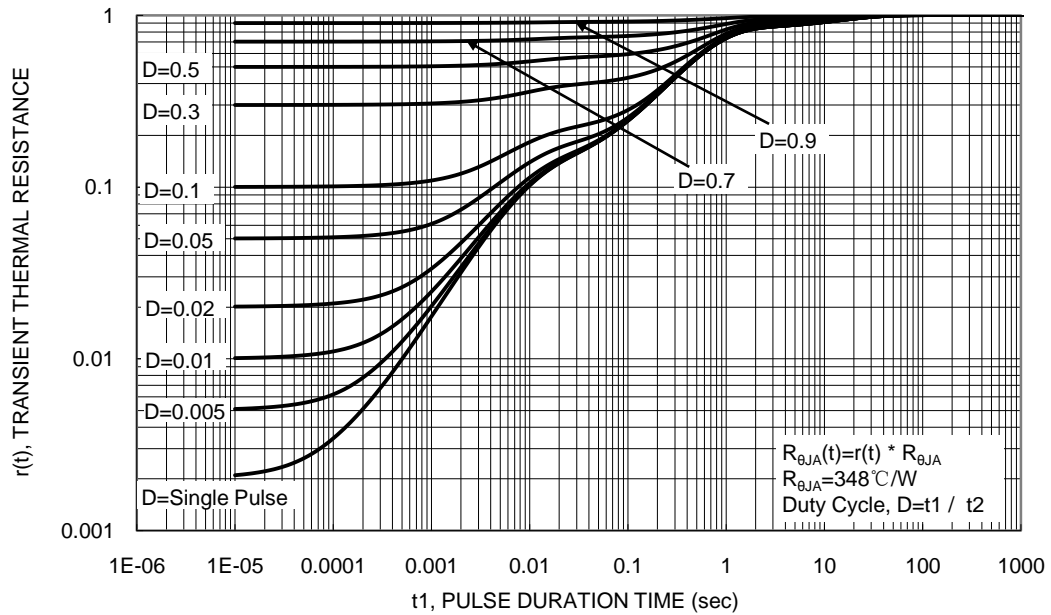
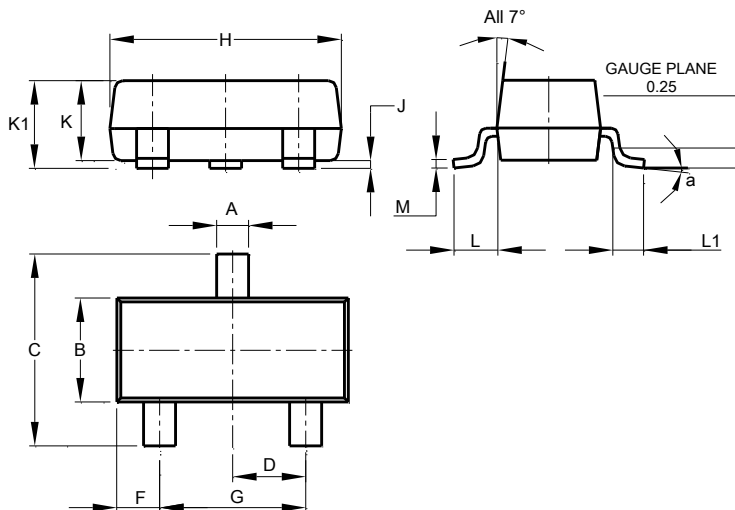


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

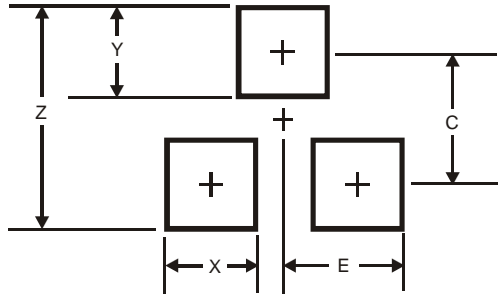
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

NEW PRODUCT

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