

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D T _A = +25°C
-12V	31mΩ @ V _{GS} = -4.5V	-5.4A
	45mΩ @ V _{GS} = -2.5V	-4.5A

Description

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) while maintaining superior switching performance, which makes the device ideal for high-efficiency power-management applications.

Applications

- DC-DC Converters
- Power Management Functions
- Analog Switch

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMP1070UQ 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

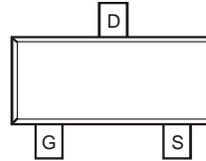
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish—Matte Tin Annealed Over Copper Lead-Frame. Solderable per MIL-STD-202, Method 208 E3
- Weight: 0.009 grams (Approximate)



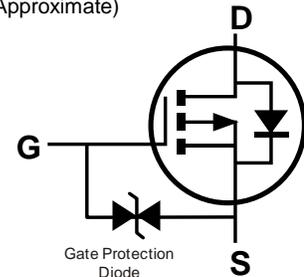
SOT23



Top View



Pin Configuration



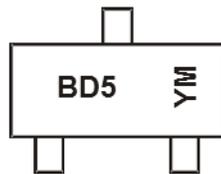
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1070UQ-7	SOT23	3,000/Tape & Reel
DMP1070UQ-13	SOT23	10,000/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



BD5 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: 1 = 2021)
 M = Month (ex: 9 = September)

Date Code Key

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	I	J	K	L	M	N	O	P	R	S	T	U

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}	-12	V
Gate-Source Voltage			V_{GSS}	± 8	V
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-5.4	A
		$T_A = +70^\circ\text{C}$		-4.3	
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-1.8	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-33	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	0.89	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	140	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	P_D	1.4	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	89	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	17	$^\circ\text{C/W}$
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}	-12	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current ($T_J = +25^\circ\text{C}$)	I_{DSS}	—	—	-1.0	μA	$V_{DS} = -12\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.3	—	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	23	31	m Ω	$V_{GS} = -4.5\text{V}, I_D = -4.0\text{A}$
			33	45		$V_{GS} = -2.5\text{V}, I_D = -3.5\text{A}$
			46	75		$V_{GS} = -1.8\text{V}, I_D = -2.7\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.6	-1.0	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	143	—	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	123	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	16	—	pF	
Gate Resistance	R_G	—	401	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge	Q_G	—	11.5	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}, I_D = -4\text{A}$
Gate-Source Charge	Q_{gs}	—	1.4	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.9	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	125	—	ns	$V_{DS} = -10\text{V}, V_{GS} = -4.5\text{V},$ $R_L = 2.5\Omega, R_G = 3.0\Omega$
Turn-On Rise Time	t_R	—	192	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	685	—	ns	
Turn-Off Fall Time	t_F	—	950	—	ns	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

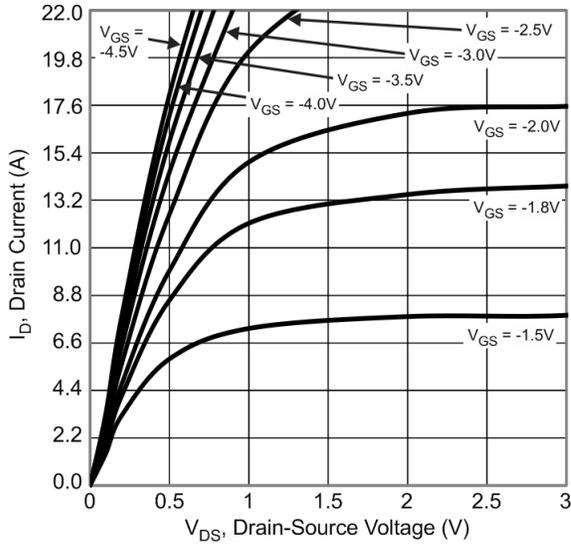


Fig. 1 Typical Output Characteristic

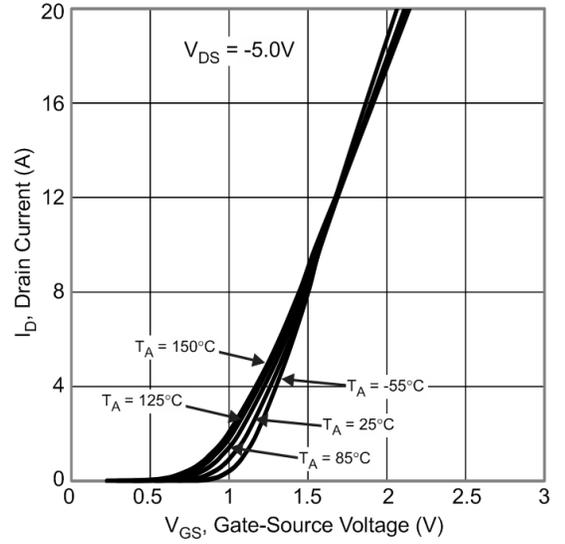


Fig. 2 Typical Transfer Characteristic

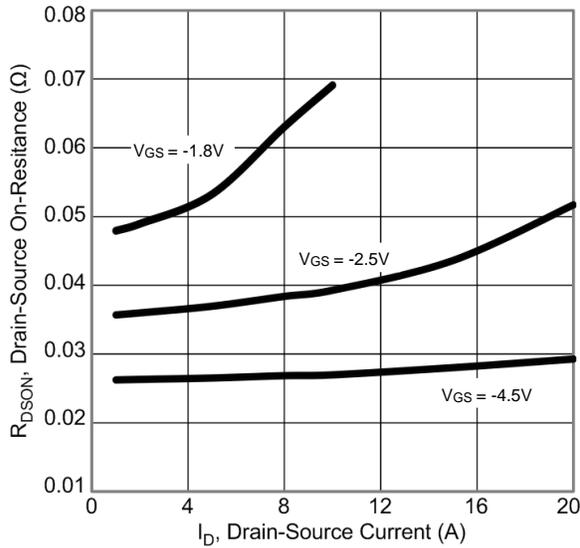


Fig. 3 Typical On-Resistance vs Drain Current and Gate Voltage

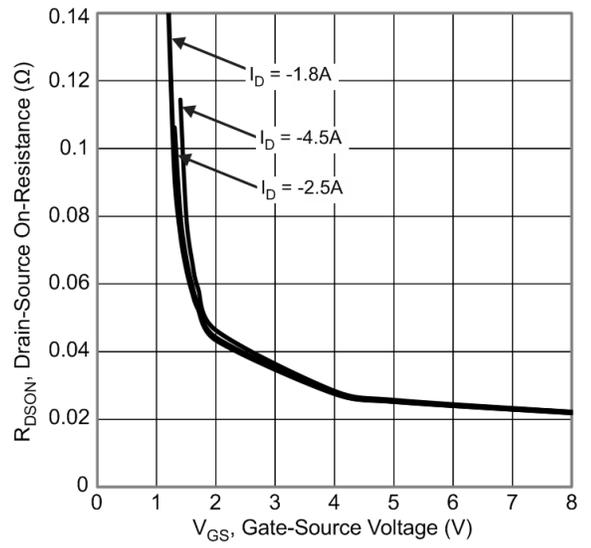


Fig. 4 Typical Transfer Characteristic

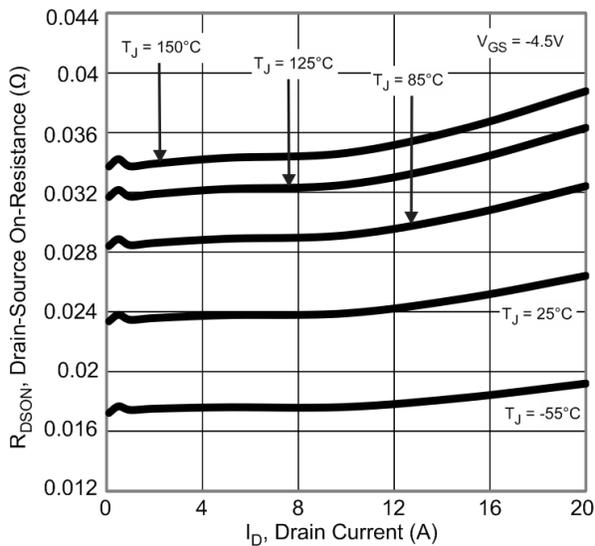


Fig. 5 Typical On-Resistance vs Drain Current and Junction Temperature

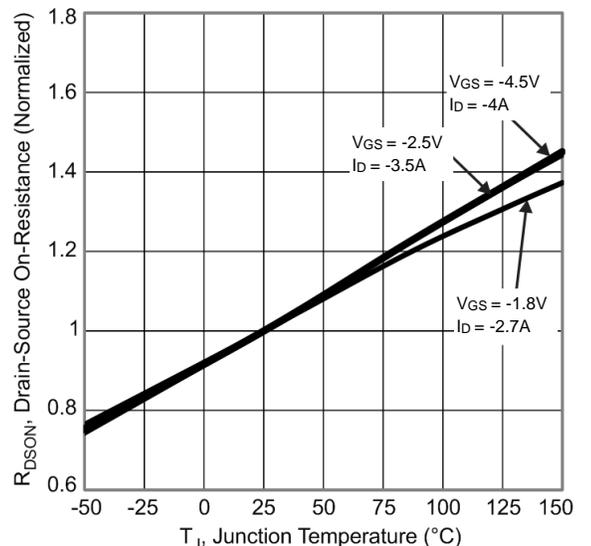


Fig. 6 On-Resistance Variation with Junction Temperature

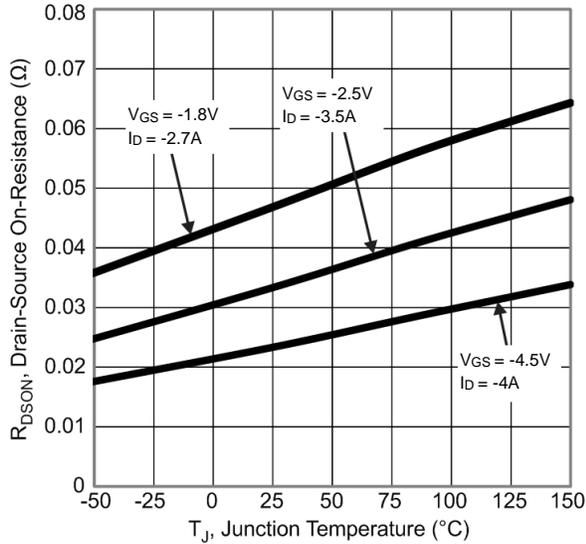


Fig. 7 On-Resistance Variation with Junction Temperature

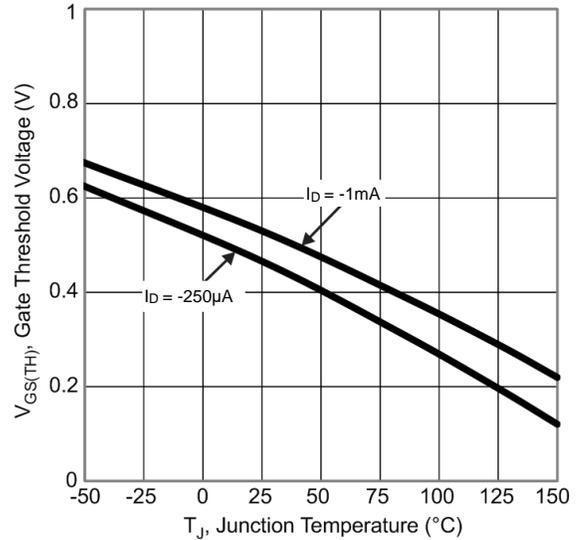


Fig. 8 Gate Threshold Variation vs Junction Temperature

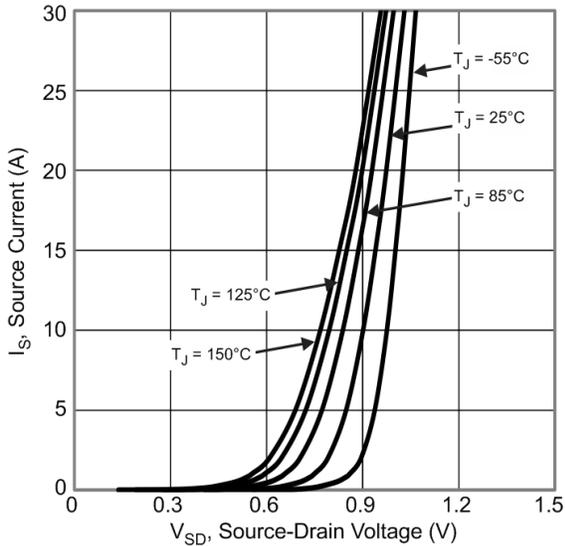


Fig. 9 Diode Forward Voltage vs Current

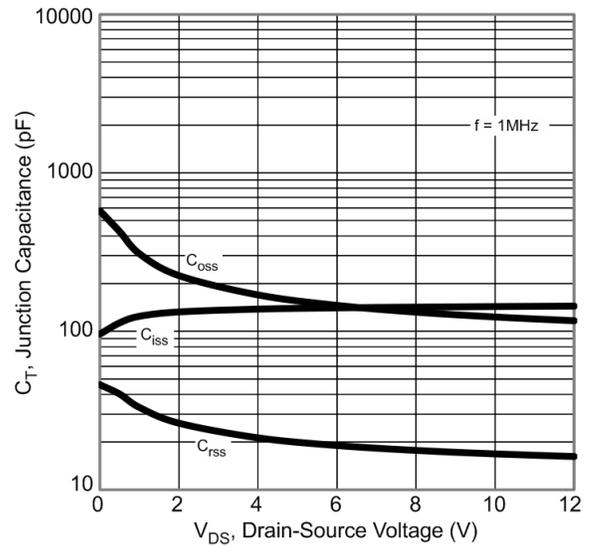


Fig. 10 Typical Junction Capacitance

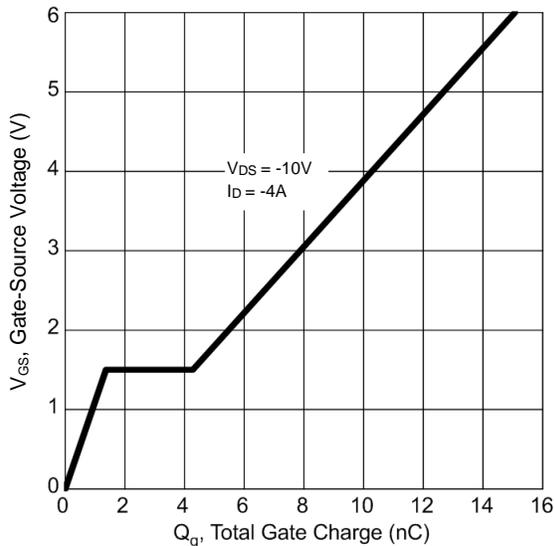


Fig. 11 Gate Charge

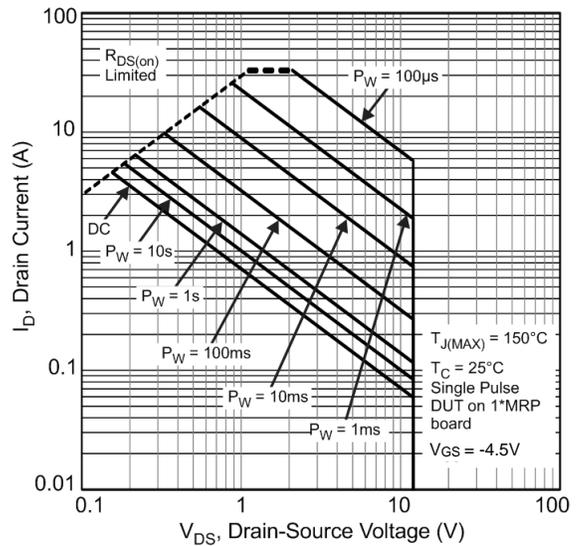


Fig. 12 SOA, Safe Operation Area

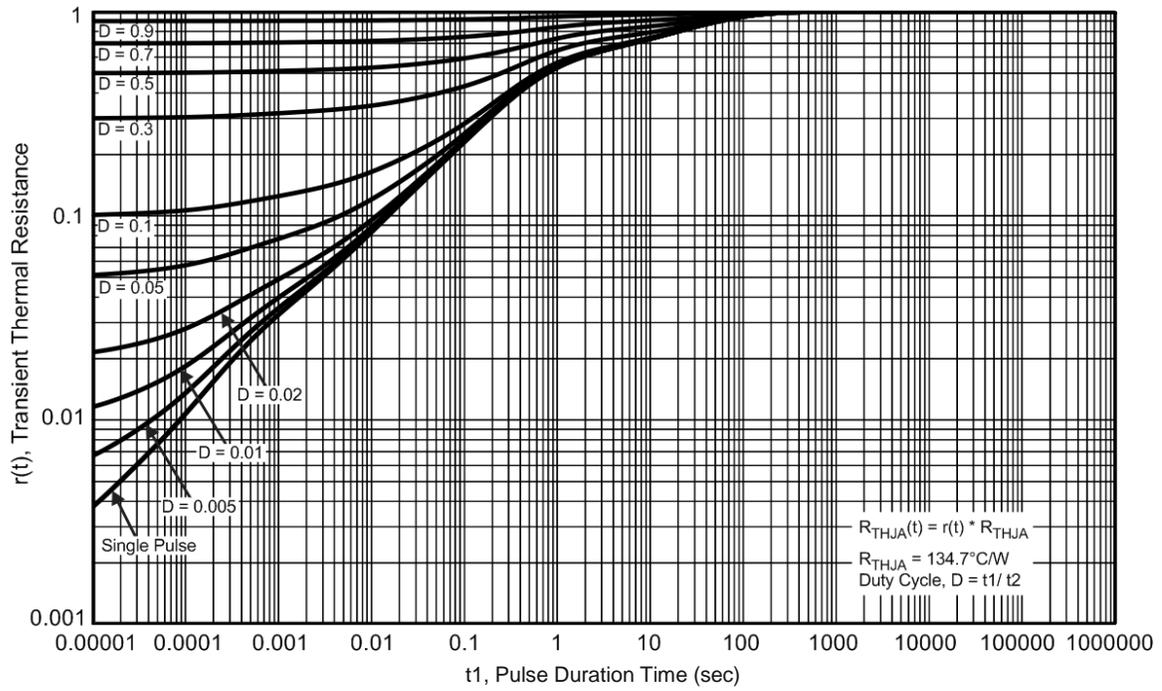
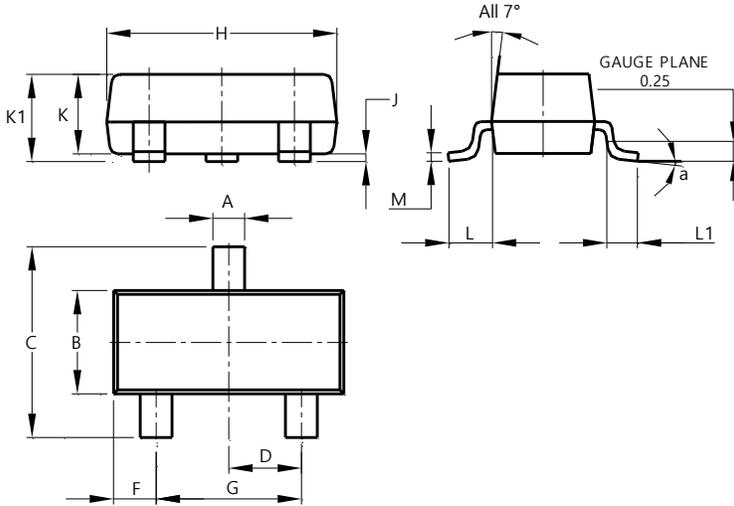


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

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

SOT23

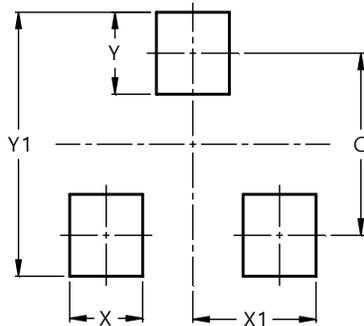


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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