

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> T <sub>A</sub> = +25°C
-12V	31mΩ @ V <sub>GS</sub> = -4.5V	-5.2A
	45mΩ @ V <sub>GS</sub> = -2.5V	-4.3A

## 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:

- DC-DC Converters
- BLDC Motors
- Load 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

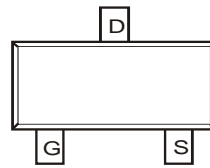
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208<sup>(3)</sup>
- Weight: 0.009 grams (Approximate)



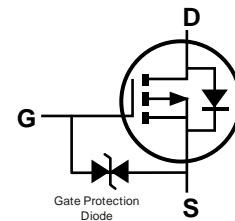
ESD Protected Gate



Top View



Pin Configuration



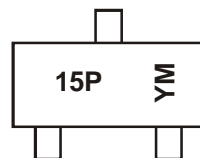
Internal Schematic

## Ordering Information (Note 5)

Part Number	Compliance	Case	Packaging
DMP1045UQ-7	Automotive	SOT23	3,000/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/product-compliance-definitions/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



15P = Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: E = 2017)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2013	~	2017	2018	2019	2020
Code	A	~	E	F	G	H

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	-12	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-4.0	A
		T <sub>A</sub> = +70°C		-3.1	
Continuous Drain Current (Note 6) V <sub>GS</sub> = -2.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-3.3	A
		T <sub>A</sub> = +70°C		-2.6	
Continuous Drain Current (Note 7) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-5.2	A
		T <sub>A</sub> = +70°C		-4.2	
Continuous Drain Current (Note 7) V <sub>GS</sub> = -2.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-4.3	A
		T <sub>A</sub> = +70°C		-3.4	
Maximum Continuous Body Diode Forward Current (Note 7)			I <sub>S</sub>	-2	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) (Note 6)			I <sub>DM</sub>	-40	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P <sub>D</sub>	0.8	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	168	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	1.3	W
Thermal Resistance, Junction to Ambient (Note 7)	R <sub>θJA</sub>	99	°C/W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	14.8	°C/W
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>	-12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1.0	μA	T <sub>J</sub> = +25°C, V <sub>DS</sub> = -12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	μA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.3	-0.55	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	26	31	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.0A
			31	45		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.5A
			45	75		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.7A
Forward Transfer Admittance	Y <sub>fs</sub>	—	12	—	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.6	—	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iSS</sub>	—	1357	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	504	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	235	—	pF	
Gate Resistance	R <sub>g</sub>	—	14.1	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
<b>SWITCHING CHARACTERISTICS (Note 9)</b>						
Total Gate Charge	Q <sub>g</sub>	—	15.8	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -4A
Gate-Source Charge	Q <sub>gs</sub>	—	2.0	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	3.9	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	15.7	—	ns	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 2.5Ω, R <sub>G</sub> = 3.0Ω
Turn-On Rise Time	t <sub>R</sub>	—	23.3	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	91.2	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	106.9	—	ns	

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

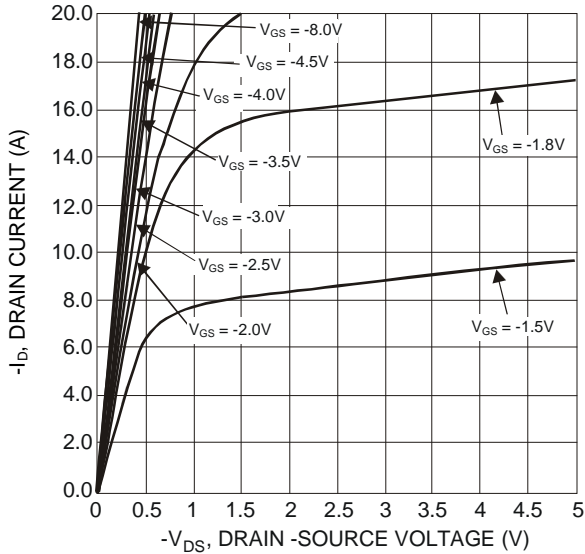


Fig. 1 Typical Output Characteristics

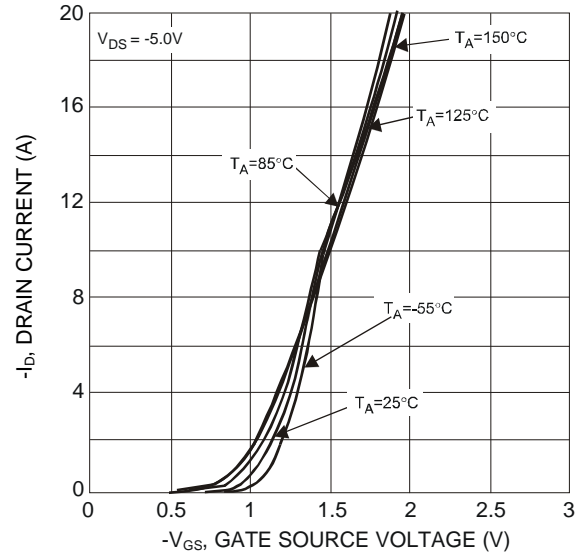


Fig. 2 Typical Transfer Characteristics

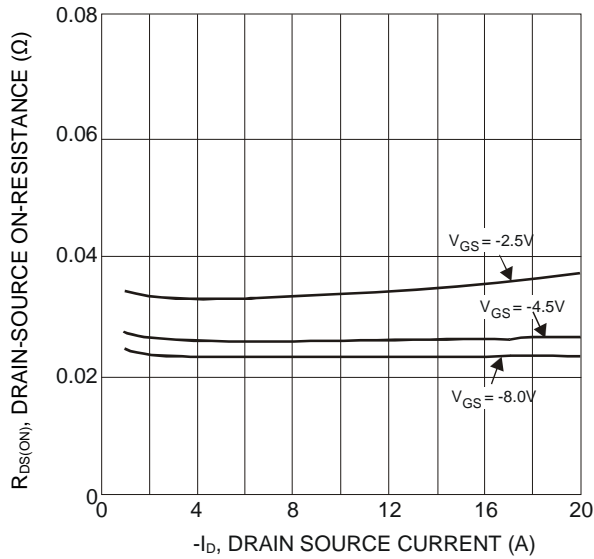


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

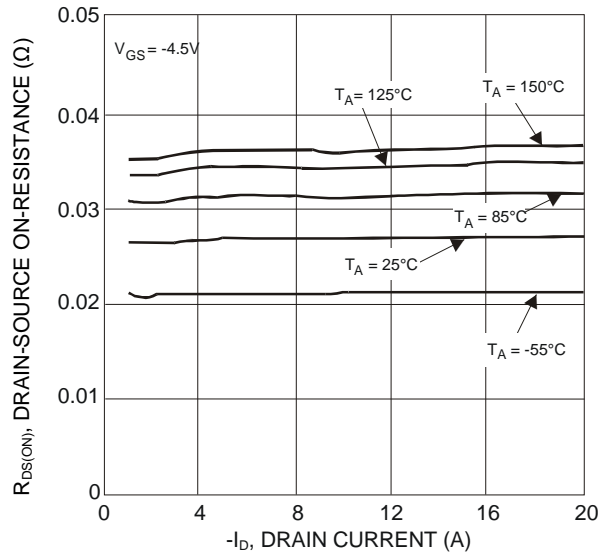


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

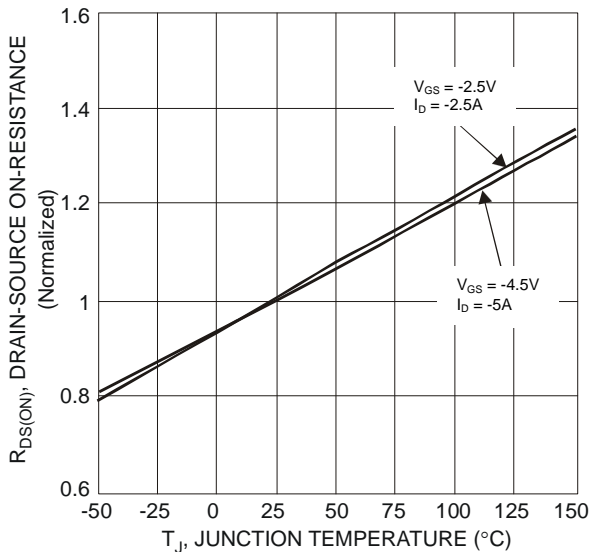


Fig. 5 On-Resistance Variation with Temperature

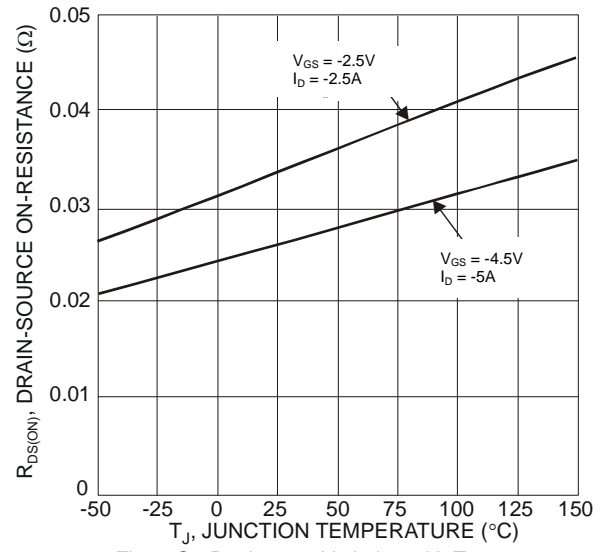


Fig. 6 On-Resistance Variation with Temperature

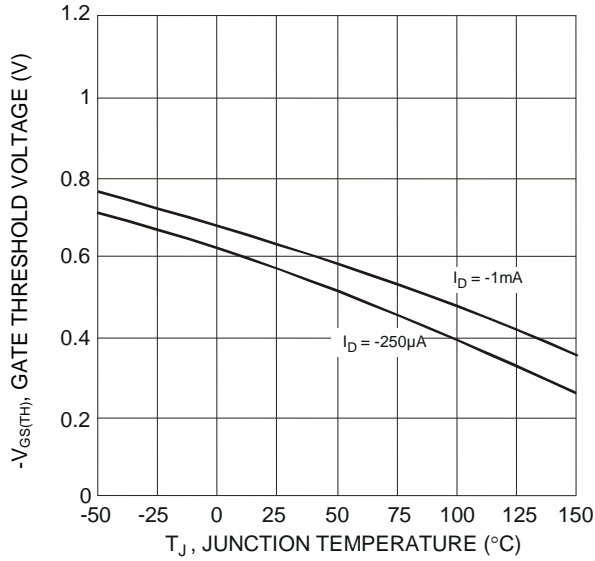


Fig. 7 Gate Threshold Variation vs. Junction Temperature

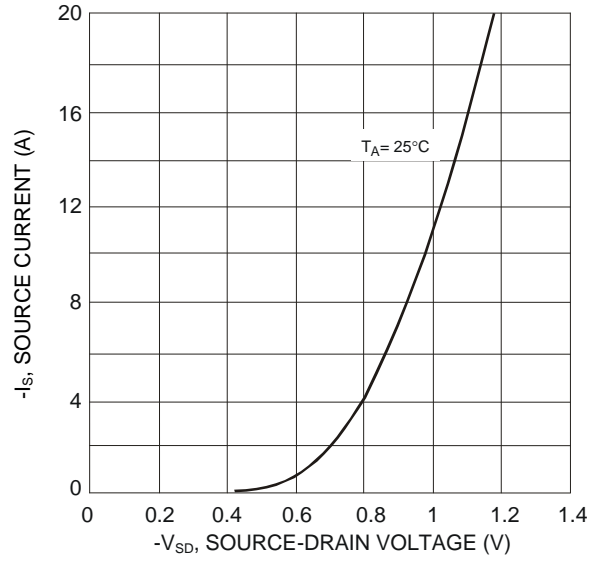


Fig. 8 Diode Forward Voltage vs. Current

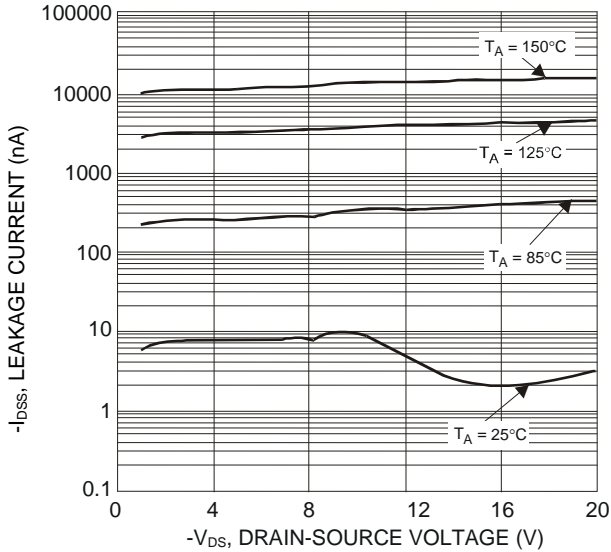


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

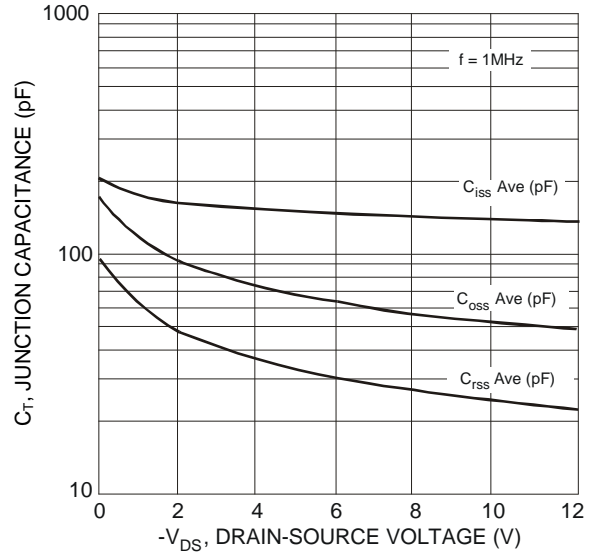


Fig. 10 Typical Junction Capacitance

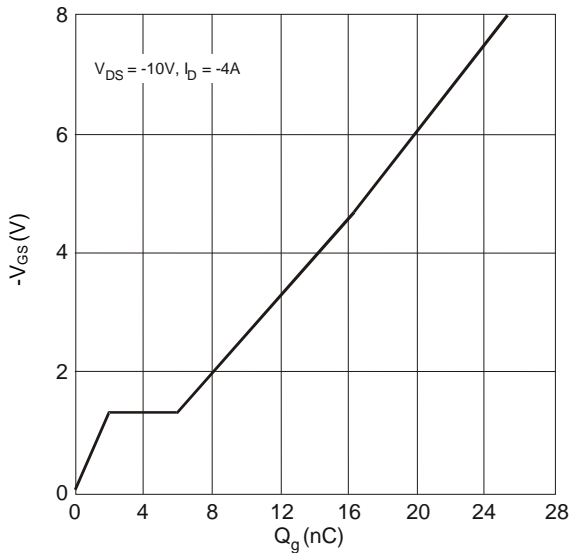


Fig. 11 Gate Charge Characteristics

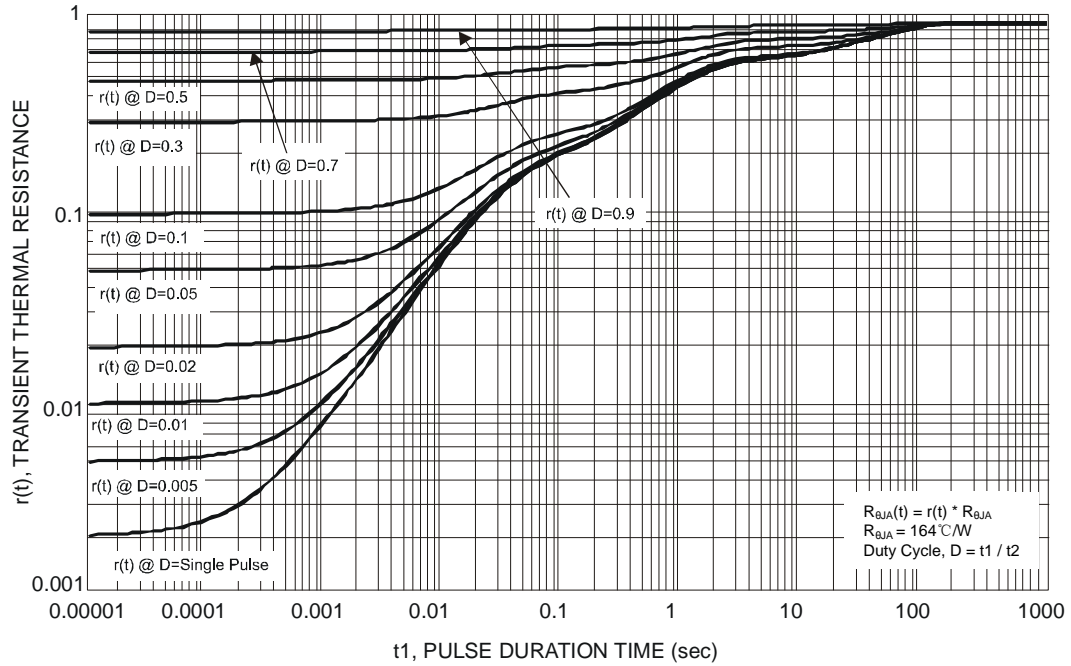
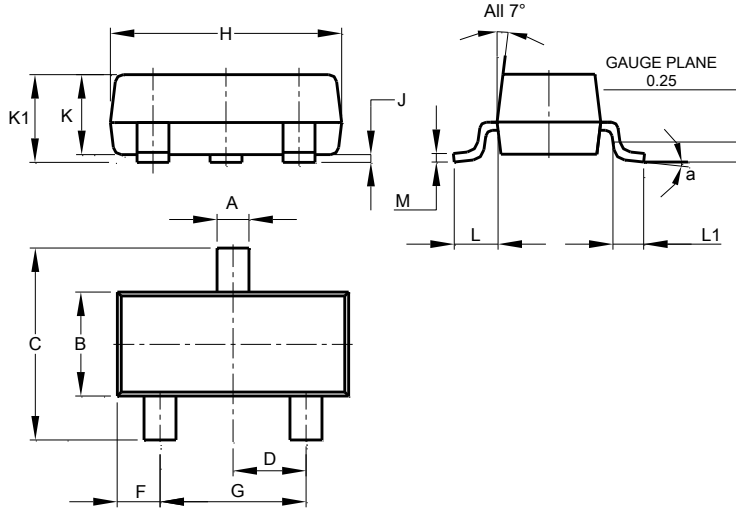


Fig. 12 Transient Thermal Resistance

**Package Outline Dimensions**

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

**SOT23**

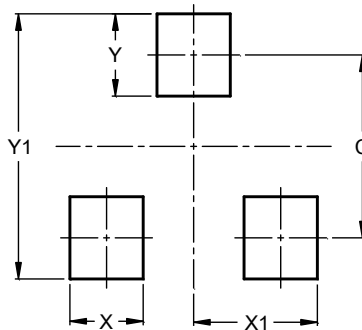


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**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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