Features

- Low On-Resistance
- Low Gate Threshold Voltage
- 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Mechanical Data

- Package: SOT523
- Package 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 Lead-Frame. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

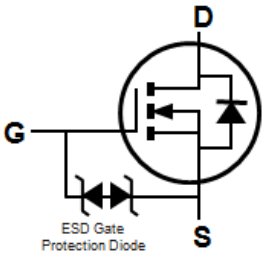


ESD PROTECTION TO 2kV

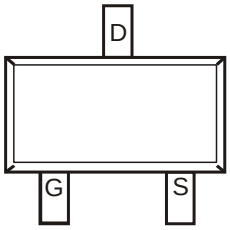
SOT523



Top View



Equivalent Circuit
(Note 5)



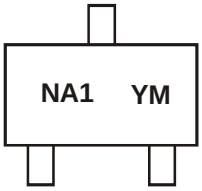
Top View

Ordering Information (Note 4)

Part Number	Qualification	Package	Packing	
			Qty.	Carrier
DMG1012T-7	Commercial	SOT523	3000	Tape & Reel
DMG1012T-13	Commercial	SOT523	10000	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/.
5. The ESD gate protection diode is only designed to protect against ESD events. No gate-source voltage greater than the maximum V_{GSS} rating (given on page 2) can be applied.

Marking Information



NA1 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: J = 2022)
M = Month (ex: 1 = January)

Date Code Key

Year	2009	…	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	W	…	J	K	L	M	N	O	P	R	S	T

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

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Maximum Ratings (@ T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±6	V
Continuous Drain Current (Note 6)	Steady State	T_A = +25°C T_A = +85°C	I_D	0.63 0.45	A
Pulsed Drain Current			I_{DM}	3	A

Thermal Characteristics (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P_D	0.28	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	452	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	100	nA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1.0	μA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.3	0.4	Ω	V_{GS} = 4.5V, I_D = 600mA
			0.4	0.5		V_{GS} = 2.5V, I_D = 500mA
			0.5	0.7		V_{GS} = 1.8V, I_D = 350mA
Forward Transfer Admittance	$\|Y_{fs}\|$	—	1.4	—	S	V_{DS} = 10V, I_D = 400mA
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 150mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	60.67	—	pF	V_{DS} = 16V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	9.68	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	5.37	—	pF	
Total Gate Charge	Q_g	—	736.6	—	pC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	—	93.6	—	pC	
Gate-Drain Charge	Q_{gd}	—	116.6	—	pC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.1	—	ns	V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47Ω, R_G = 10Ω, I_D = 200mA
Turn-On Rise Time	t_R	—	7.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	26.7	—	ns	
Turn-Off Fall Time	t_F	—	12.3	—	ns	

Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

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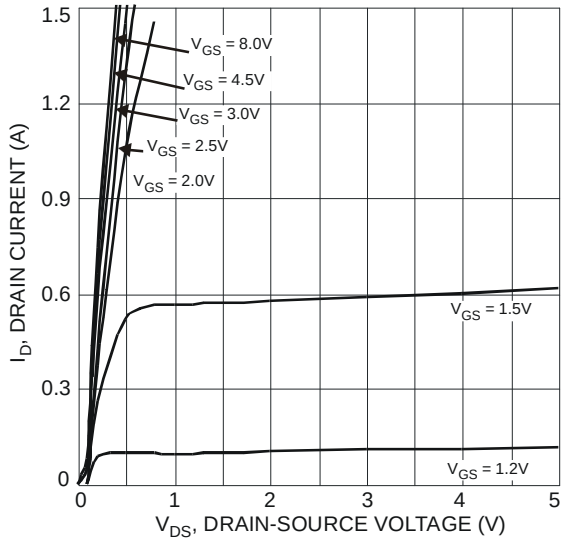

Fig. 1 Typical Output Characteristics

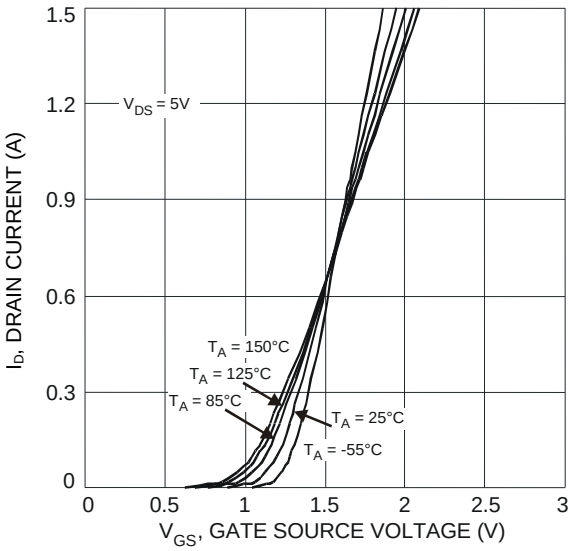

Fig. 2 Typical Transfer Characteristics

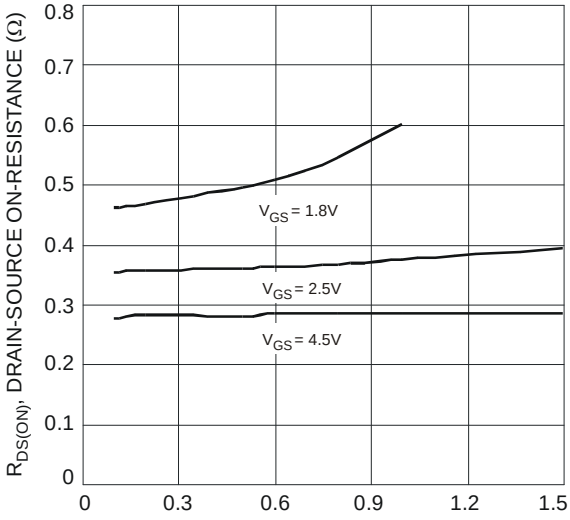

Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

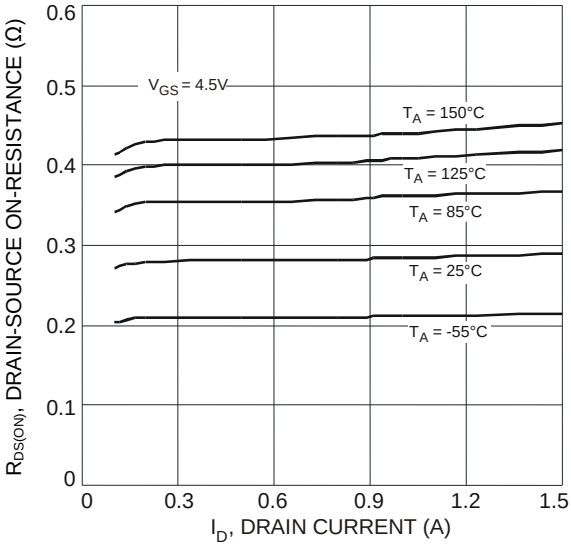

Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

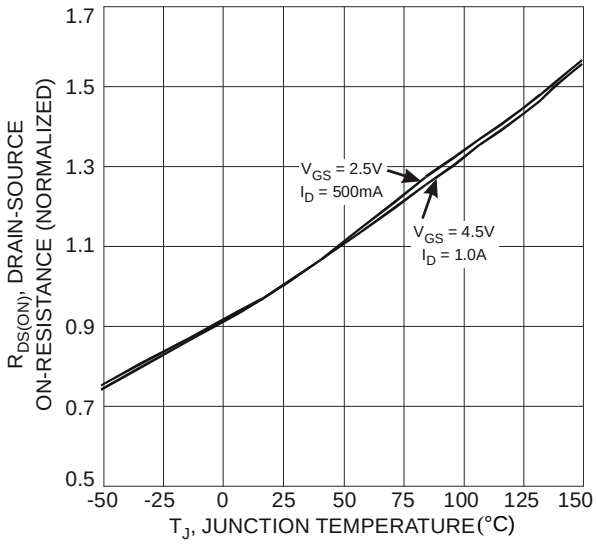

Fig. 5 On-Resistance Variation with Temperature

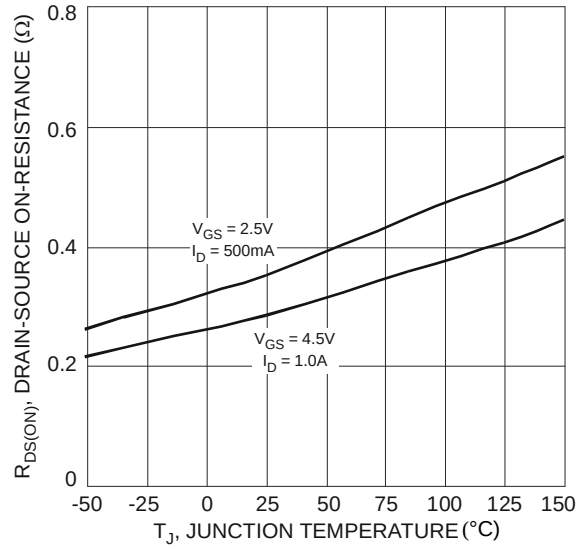

Fig. 6 On-Resistance Variation with Temperature

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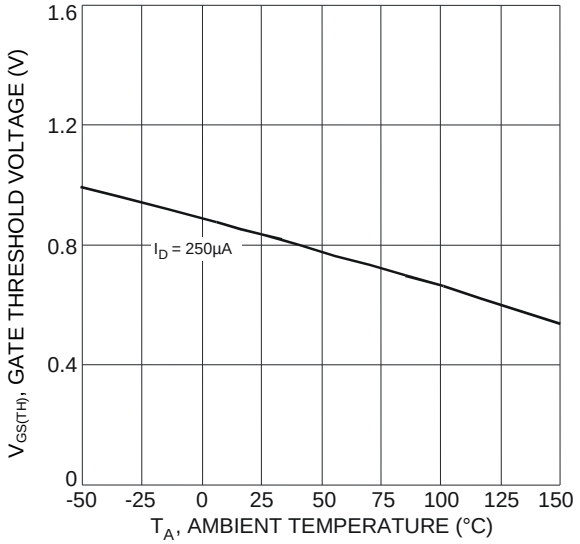

Fig. 7 Gate Threshold Variation vs. Ambient Temperature

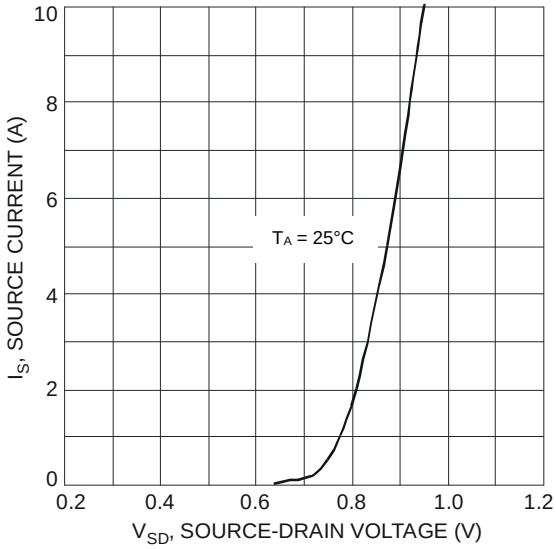

Fig. 8 Diode Forward Voltage vs. Current

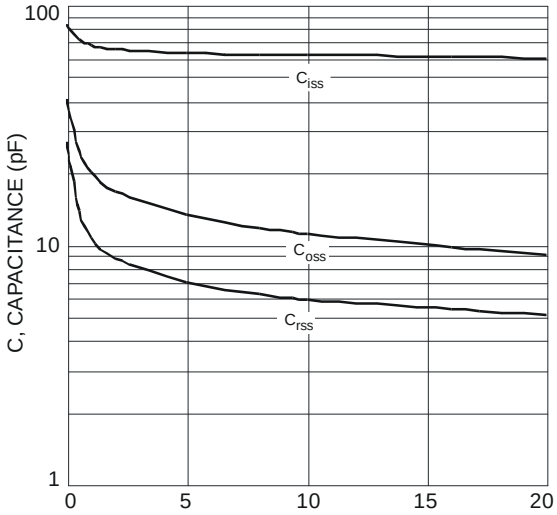

Fig. 9 Typical Capacitance

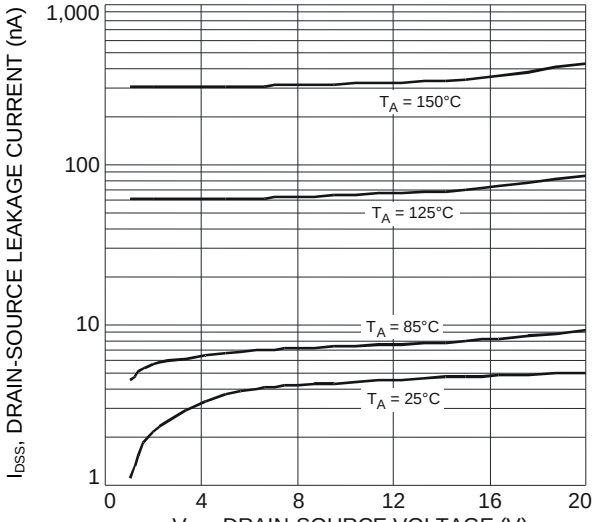

Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

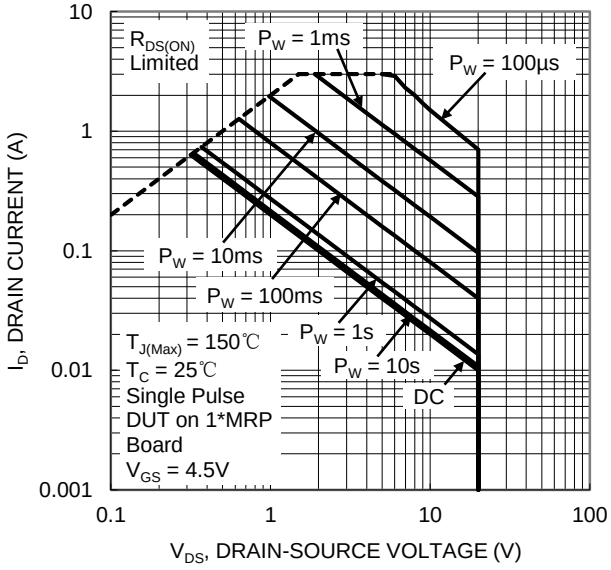

Fig. 11 SOA, Safe Operation Area

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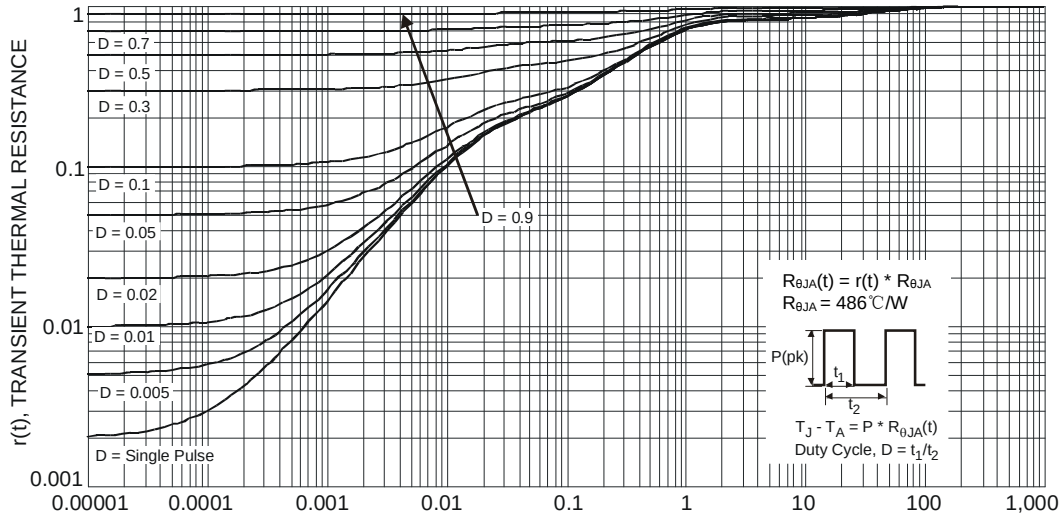

Fig. 12 Transient Thermal Response

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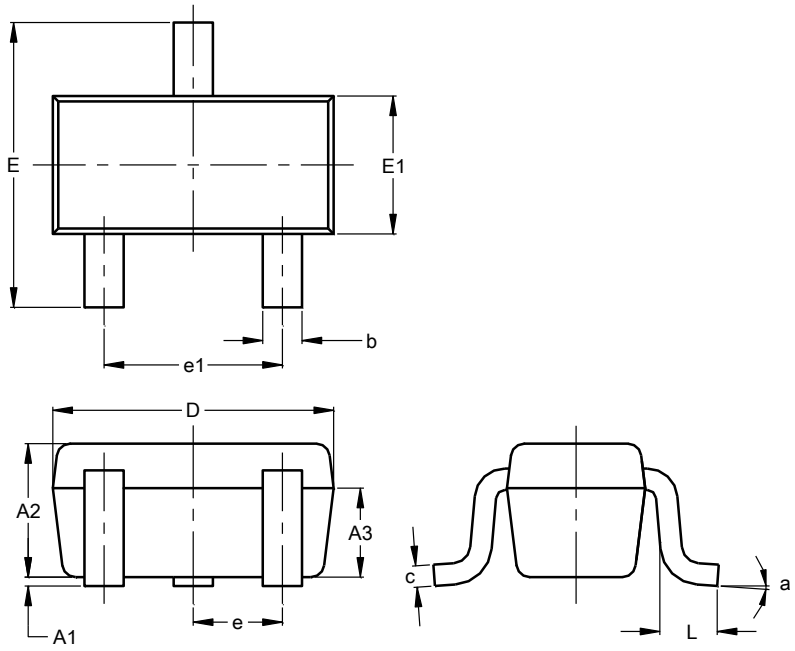
Package Outline Dimensions

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

SOT523

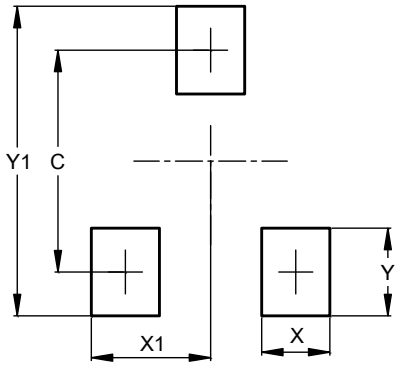


SOT523			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

Suggested Pad Layout

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

SOT523



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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