Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25°C$
-20V	700mΩ @ V_{GS} = -4.5V	-460mA
	900mΩ @ V_{GS} = -2.5V	-420mA
	1300mΩ @ V_{GS} = -1.8V	-350mA

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Up To 3kV**
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 standards for High Reliability**

Description and Applications

This new generation MOSFET has been 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.

- DC-DC Converters
- Load switch
- Power management functions

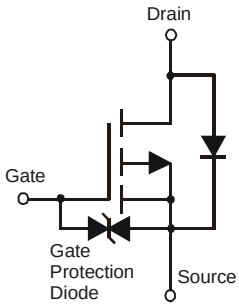
Mechanical Data

- Case: SOT523
- 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
- Terminal Connections: See Diagram
- Weight: 0.002 grams (approximate)

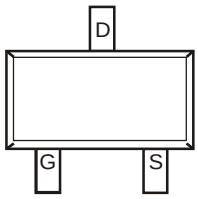
ESD PROTECTED TO 3kV

SOT523

Top View



Equivalent Circuit



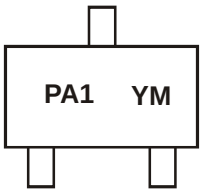
Top View

Ordering Information (Note 3)

Part Number	Case	Packaging
DMG1013T-7	SOT523	3000/Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free.
2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



PA1 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: W = 2009)
M = Month (ex: 9 = September)

Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015	2015	2015
Code	W	X	Y	Z	A	B	C	C	C

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°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±6	V
Drain Current (Note 4)	Steady State	T_A = 25°C T_A = 85°C	I_D	-0.46 -0.33	A
Pulsed Drain Current (Note 5)			I_{DM}	-6	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P_D	0.27	W
Thermal Resistance, Junction to Ambient (Note 4)	$R_{\theta JA}$	461	°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 6)						
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}	-	-	±2.0	µA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.5	-	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	0.5	0.7	Ω	V_{GS} = -4.5V, I_D = -350mA
			0.7	0.9		V_{GS} = -2.5V, I_D = -300mA
			1.0	1.3		V_{GS} = -1.8V, I_D = -150mA
Forward Transfer Admittance	$\|Y_{fs}\|$	-	0.9	-	S	V_{DS} = -10V, I_D = -250mA
Diode Forward Voltage	V_{SD}		-0.8	-1.2	V	V_{GS} = 0V, I_S = -150mA
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	-	59.76	-	pF	V_{DS} = -16V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	12.07	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	6.36	-	pF	
Total Gate Charge	Q_g	-	580	-	pC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -250mA
Gate-Source Charge	Q_{gs}	-	104	-	pC	
Gate-Drain Charge	Q_{gd}	-	125	-	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	-	8.1	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	28.4	-	ns	
Turn-Off Fall Time	t_f	-	20.7	-	ns	

Notes:
4. For a device surface mounted on a minimum recommended pad layout of an FR4 PCB, in still air conditions; the device is measured when operating in steady-state condition.
5. Same as note 4, except the device is pulsed at duty cycle of 1% for a pulse width of 10µs.
6. Measured under pulsed conditions to minimize self-heating effect. Pulse width ≤ 300µs; duty cycle ≤ 2%
7. For design aid only, not subject to production testing.

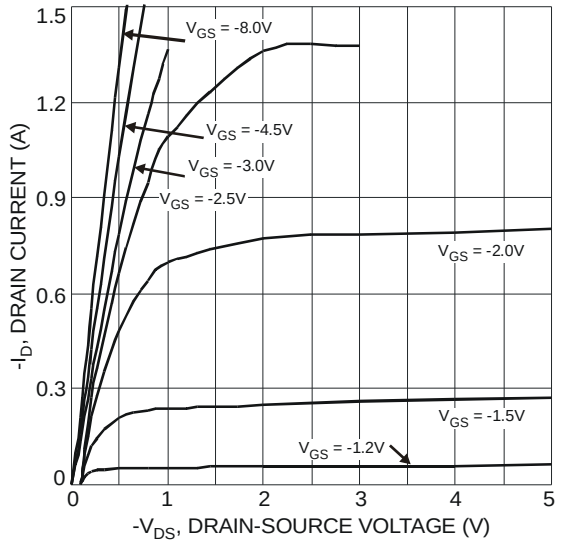


Fig. 1 Typical Output Characteristic

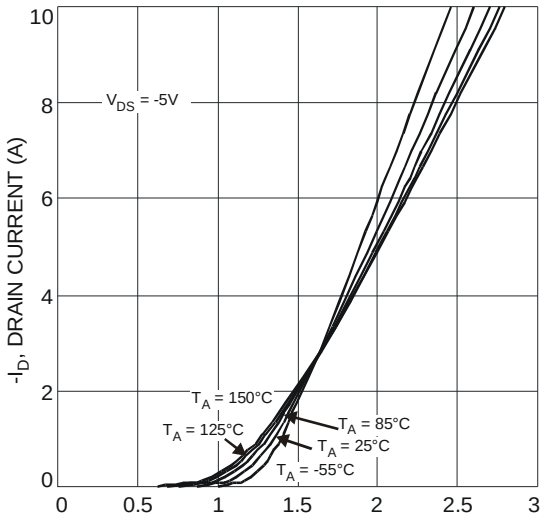


Fig. 2 Typical Transfer Characteristic

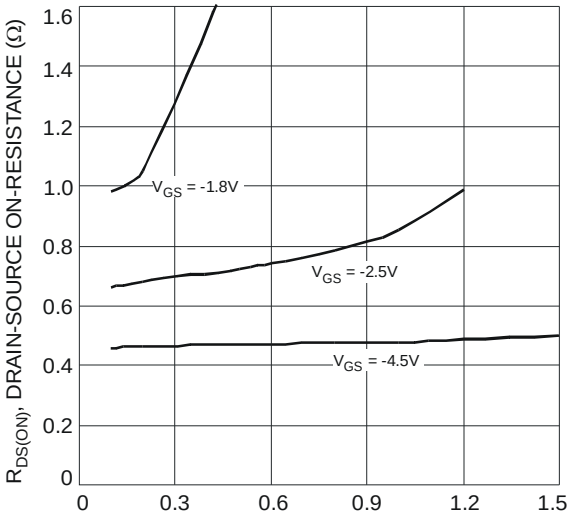


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

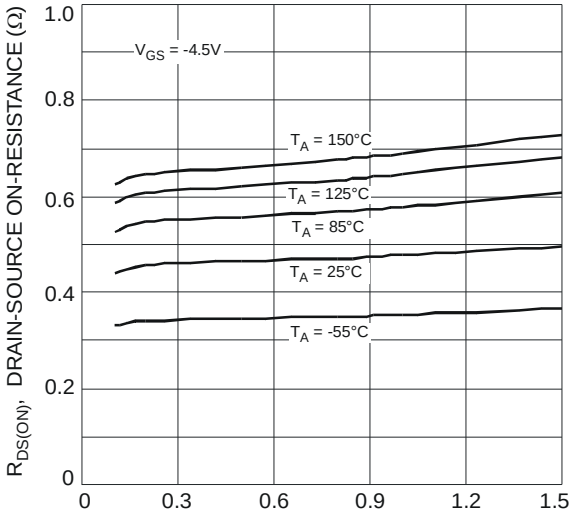


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

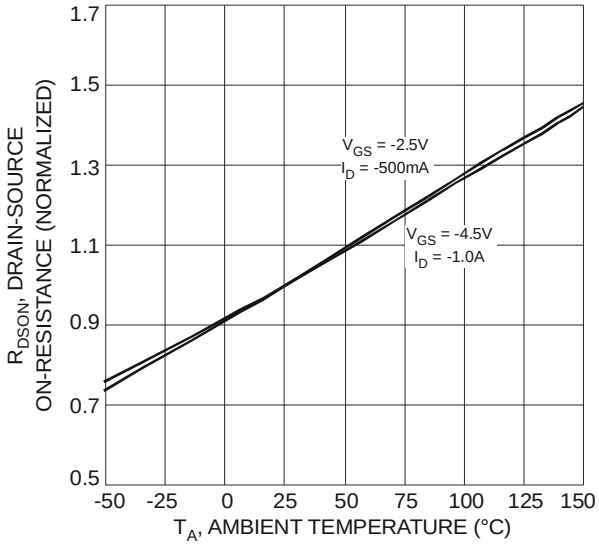


Fig. 5 On-Resistance Variation with Temperature

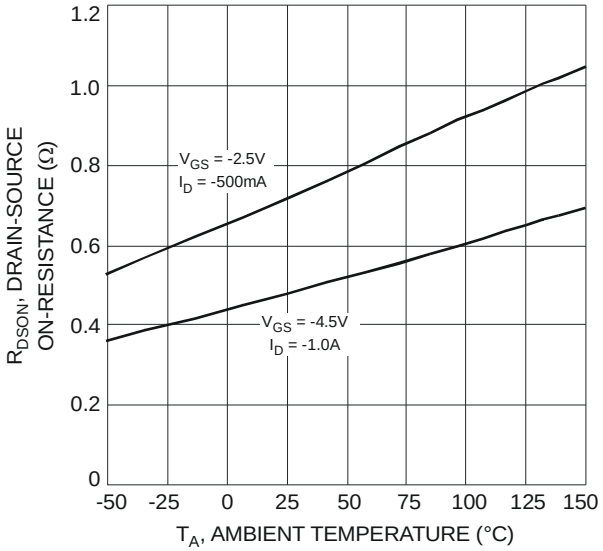


Fig. 6 On-Resistance Variation with Temperature

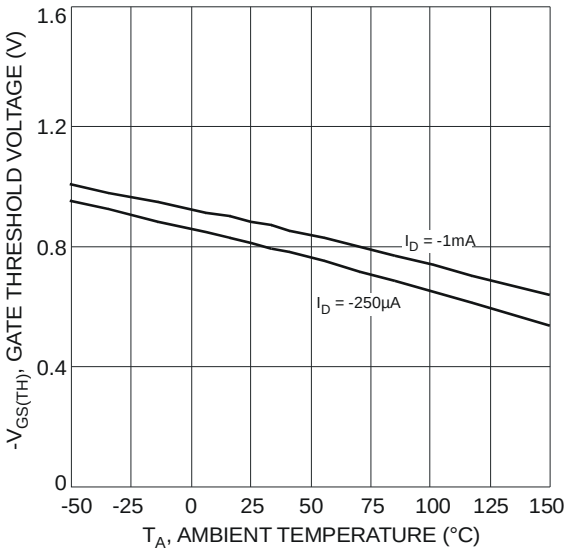


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

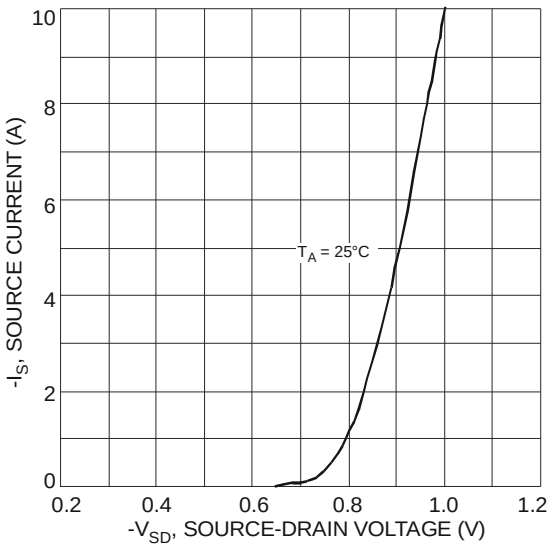


Fig. 8 Diode Forward Voltage vs. Current

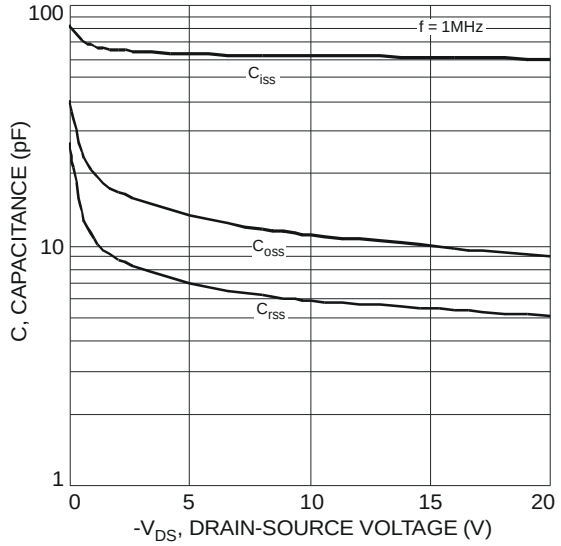


Fig. 9 Typical Total Capacitance

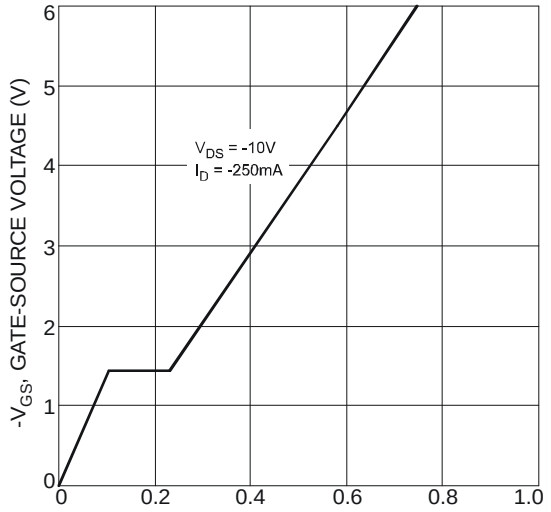


Fig. 10 Gate-Charge Characteristics

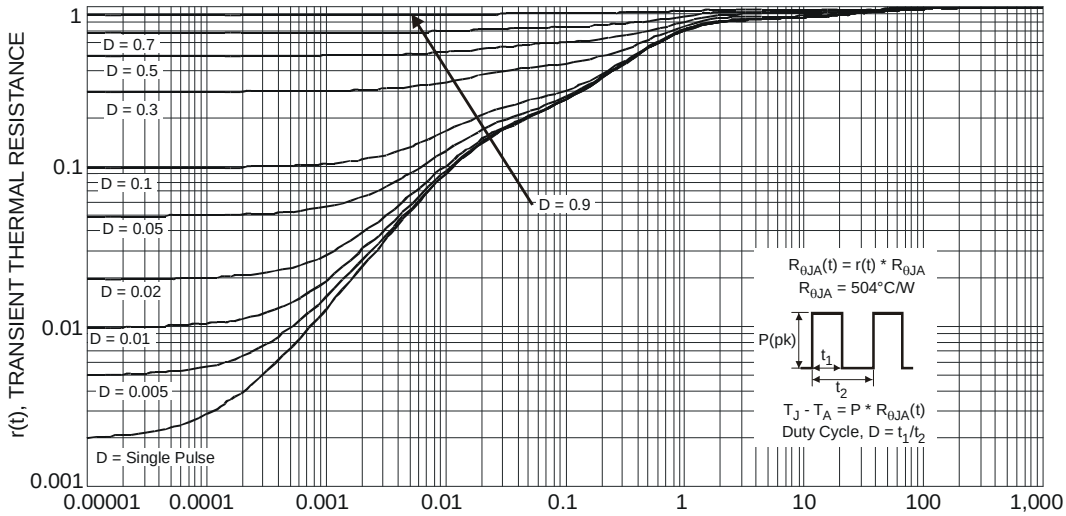
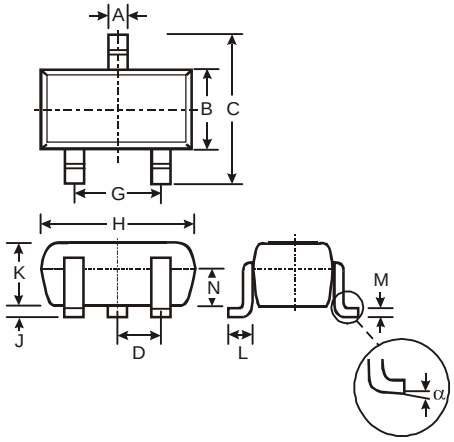


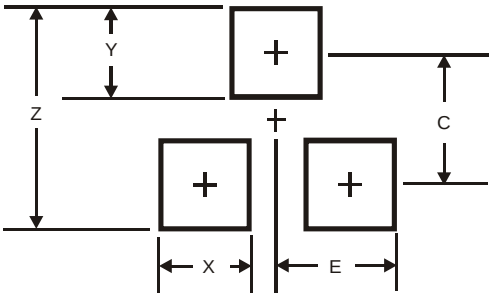
Fig. 11 Transient Thermal Response

Package Outline Dimensions



SOT523			
Dim	**Min**	**Max**	**Typ**
A	0.15	0.30	0.22
B	0.75	0.85	0.80
C	1.45	1.75	1.60
D	—	—	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
J	0.00	0.10	0.05
K	0.60	0.80	0.75
L	0.10	0.30	0.22
M	0.10	0.20	0.12
N	0.45	0.65	0.50
α	0°	8°	—
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.8
X	0.4
Y	0.51
C	1.3
E	0.7

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