

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ\text{C}$
20V	90m $\Omega$ @ $V_{GS} = 4.5\text{V}$	4.2A
	120m $\Omega$ @ $V_{GS} = 2.5\text{V}$	2.7A

## Description and Applications

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.

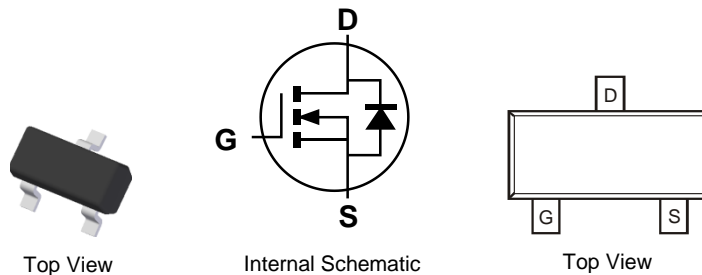
- General Purpose Interfacing Switch
- Power Management Functions
- Boost Application
- Analog Switch

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **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
- Weight: 0.008 grams (Approximate)

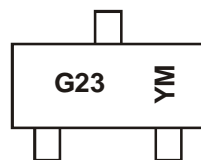


## Ordering Information (Note 5)

Part Number	Case	Packaging
DMG2302UQ-7	SOT-23	3,000/Tape & Reel
DMG2302UQ-13	SOT-23	10,000/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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



G23 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Code	W	X	Y	Z	A	B	C	D	E	F	G	
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	Units
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 6)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	4.2	A
		T <sub>A</sub> = +70°C		3.4	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	27	A

**Thermal Characteristics**

Characteristic			Symbol	Value	Unit
Power Dissipation (Note 6)	T <sub>A</sub> = +25°C		P <sub>D</sub>	0.8	W
	T <sub>A</sub> = +70°C			0.5	
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C			R <sub>θJA</sub>	156	°C/W
Operating and Storage Temperature Range			T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.  
7. Repetitive rating, pulse width limited by junction temperature.

**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>	20	–	–	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	–	–	1.0	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	–	–	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.4	–	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 50μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	–	–	90	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.6A
				120		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.1A
Forward Transfer Admittance	Y <sub>fs</sub>	–	13	–	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 3.6A
Diode Forward Voltage	V <sub>SD</sub>	–	0.75	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	–	594.3	–	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	–	64.5	–	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	–	57.7	–	pF	
Gate Resistance	R <sub>g</sub>	–	1.5	–	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	–	7.0	–	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 3.6A
Gate-Source Charge	Q <sub>gs</sub>	–	0.9	–	nC	
Gate-Drain Charge	Q <sub>gd</sub>	–	1.4	–	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	–	7.4	–	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 2.78Ω, R <sub>G</sub> = 1.0Ω
Turn-On Rise Time	t <sub>r</sub>	–	9.8	–	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	–	28.1	–	ns	
Turn-Off Fall Time	t <sub>f</sub>	–	6.7	–	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to production testing.

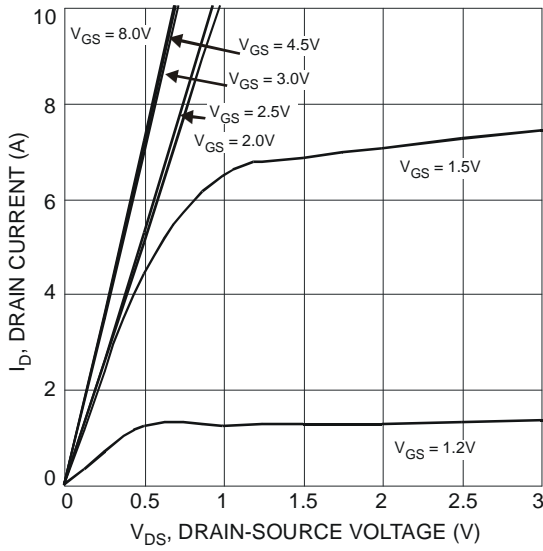


Fig. 1 Typical Output Characteristics

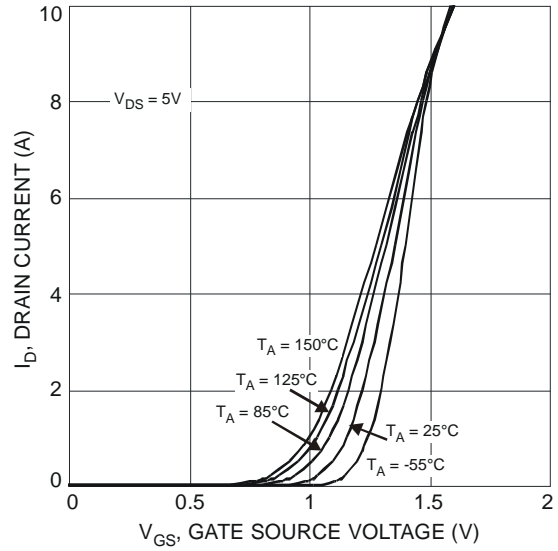


Fig. 2 Typical Transfer Characteristics

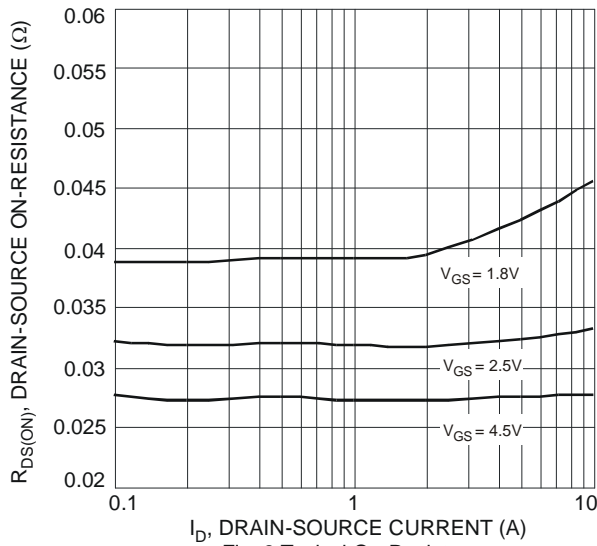


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

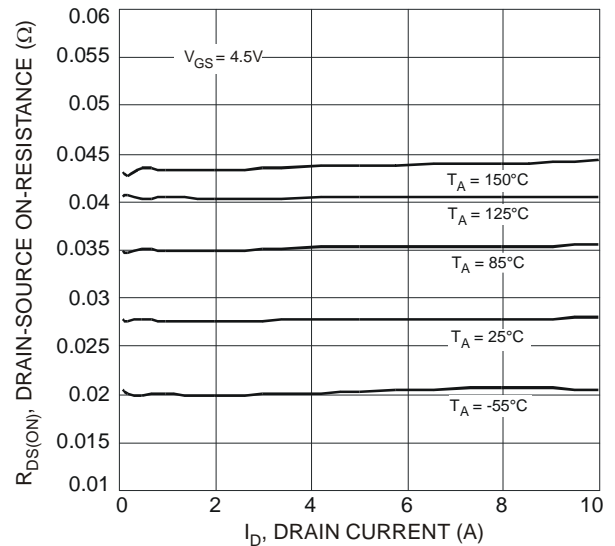


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

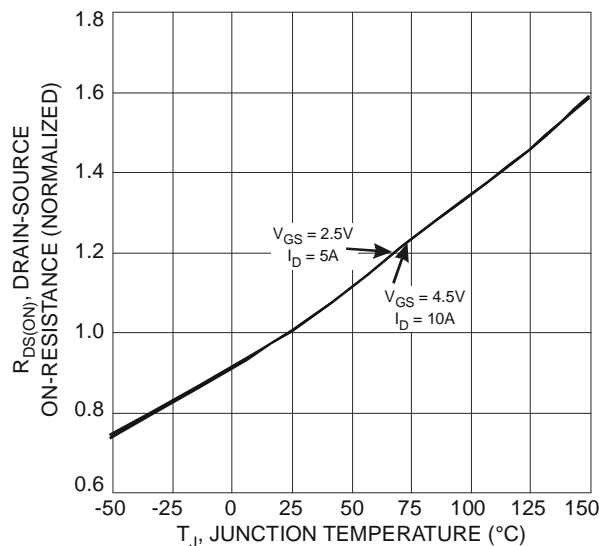


Fig. 5 On-Resistance Variation with Temperature

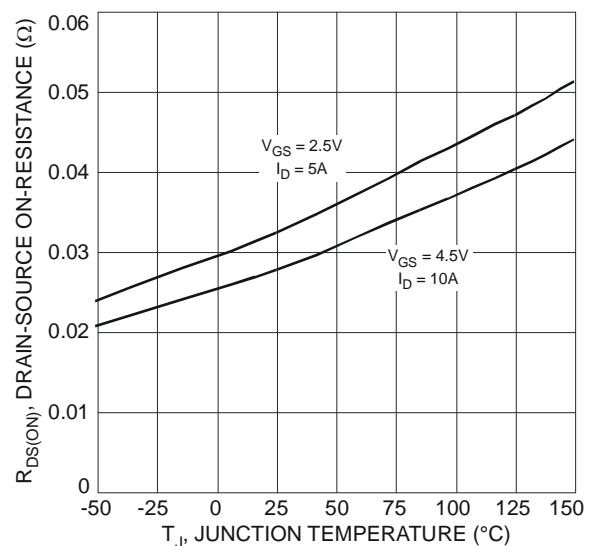


Fig. 6 On-Resistance Variation with Temperature

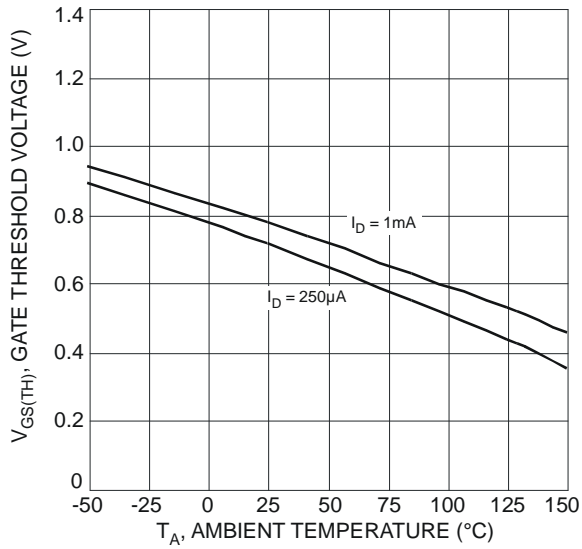


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

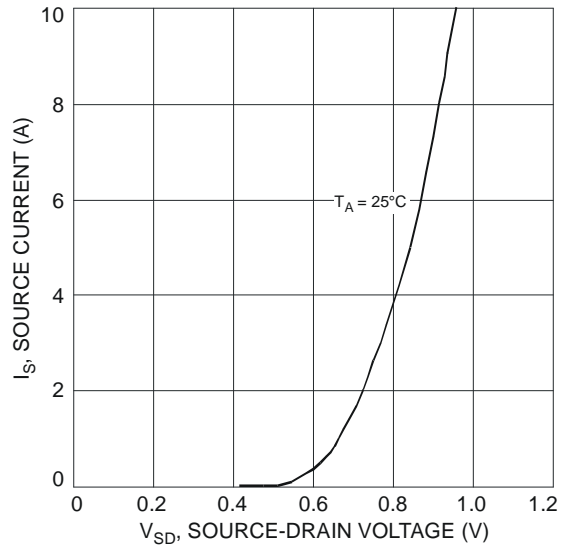


Fig. 8 Diode Forward Voltage vs. Current

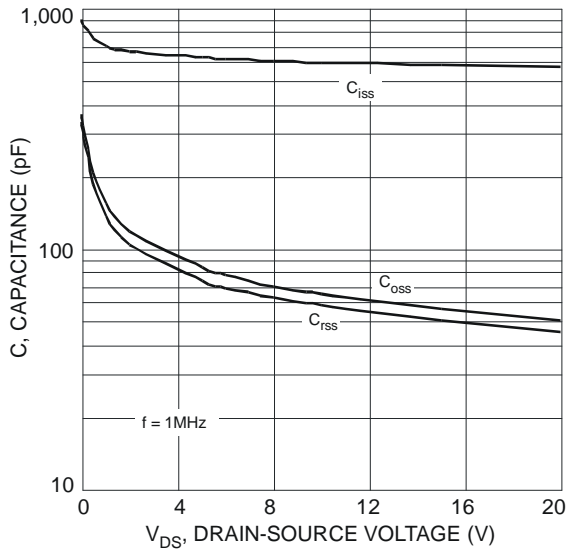


Fig. 9 Typical Capacitance

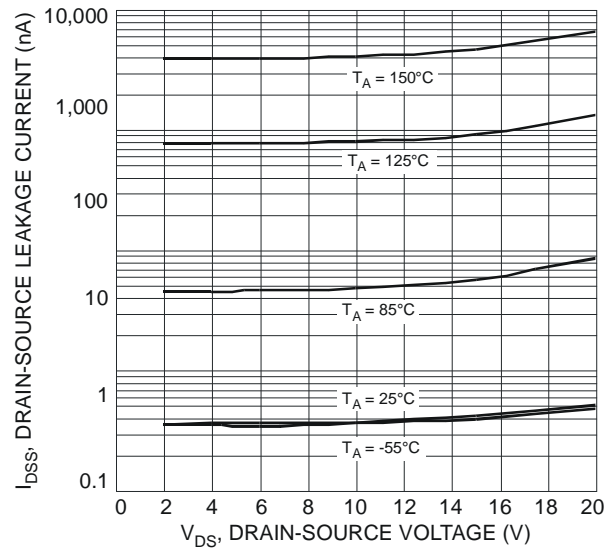


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

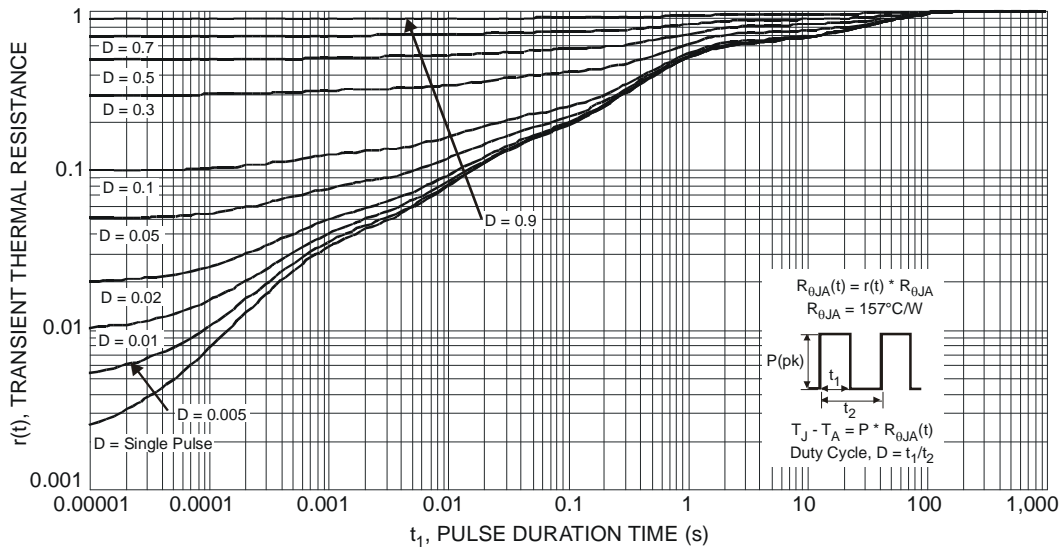
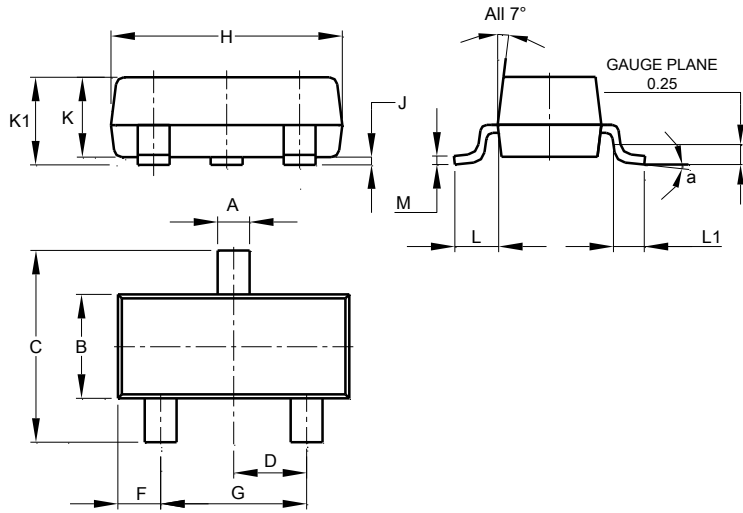


Fig. 11 Transient Thermal Response

**Package Outline Dimensions**

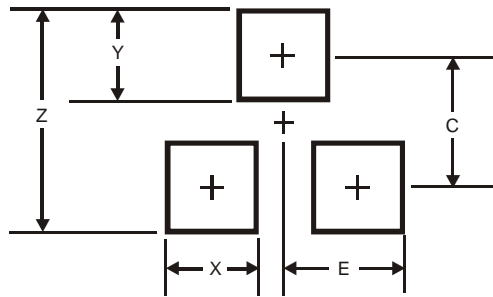
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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
α	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

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