

## Features

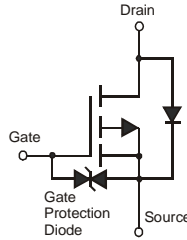
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free By Design/RoHS Compliant (Note 1)
- **ESD Protected Up To 3KV**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**



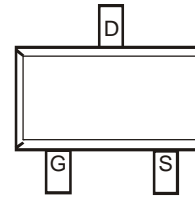
ESD PROTECTED



Top View



Equivalent Circuit



Top View

## Mechanical Data

- Case: SOT-323
- 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 Below
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 2
- Ordering Information: See Page 2
- Weight: 0.006 grams (approximate)

## Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	-20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 6$	V
Continuous Drain Current (Note 3)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	-0.82	A
		$T_A = 85^\circ\text{C}$		-0.54	
Pulsed Drain Current (Note 4)			$I_{DM}$	-6	A

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3)	$P_D$	0.31	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 3)	$R_{\theta JA}$	398	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
1. No purposefully added lead.
  2. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  3. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  4. 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 5)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C	I <sub>DSS</sub>	-	-	-100	nA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±2.0	μA	V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 5)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.5	-	-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>	-	0.5	0.75	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -430mA
		-	0.7	1.05		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -300mA
		-	1.0	1.5		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -150mA
Forward Transfer Admittance	Y <sub>fs</sub>	-	0.9	-	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Diode Forward Voltage	V <sub>SD</sub>	-	-0.8	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -150mA
<b>DYNAMIC CHARACTERISTICS (Note 6)</b>						
Input Capacitance	C <sub>iss</sub>	-	59.76	-	pF	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	12.07	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	6.36	-	pF	
Total Gate Charge	Q <sub>g</sub>	-	622.4	-	pC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Gate-Source Charge	Q <sub>gs</sub>	-	100.3	-	pC	
Gate-Drain Charge	Q <sub>gd</sub>	-	132.2	-	pC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	5.1	-	ns	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 47Ω, R <sub>G</sub> = 10Ω, I <sub>D</sub> = -200mA
Turn-On Rise Time	t <sub>r</sub>	-	8.1	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	28.4	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	20.7	-	ns	

Notes: 5. Short duration pulse test used to minimize self-heating effect.  
6. Guaranteed by design. Not subject to production testing.

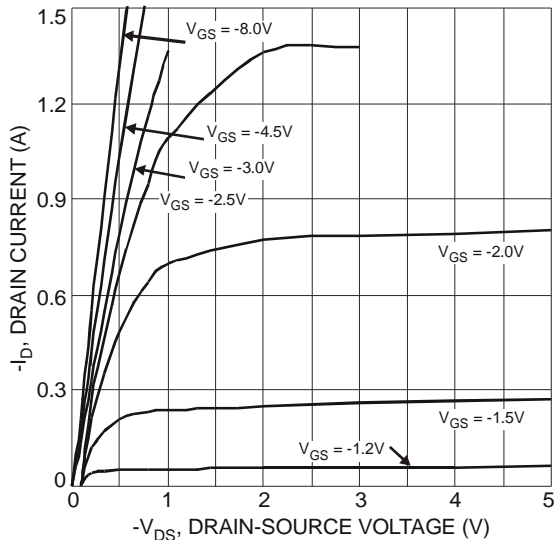


Fig. 1 Typical Output Characteristic

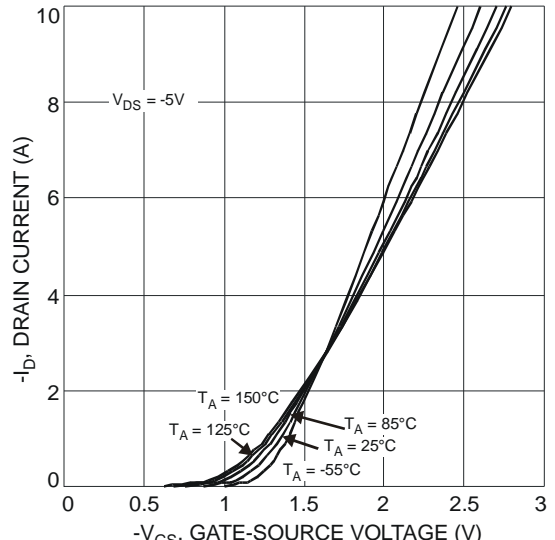


Fig. 2 Typical Transfer Characteristic

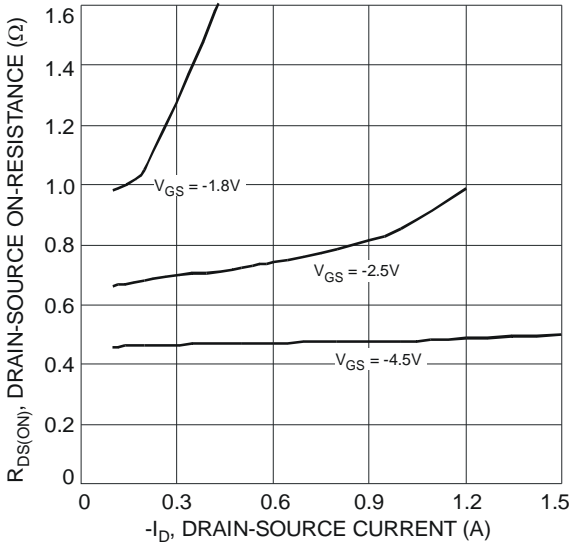


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

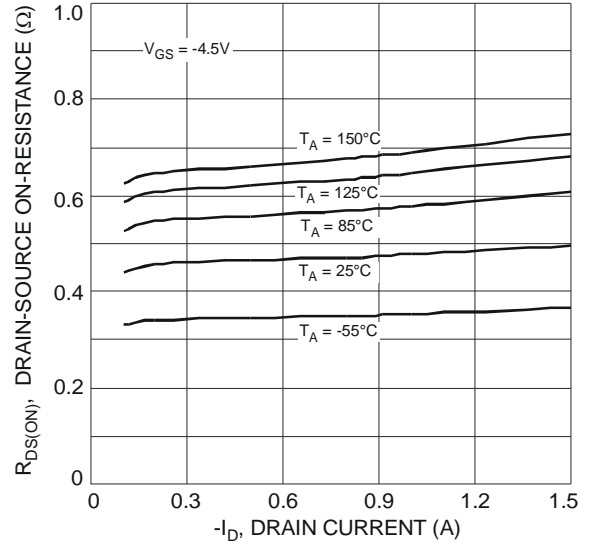


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

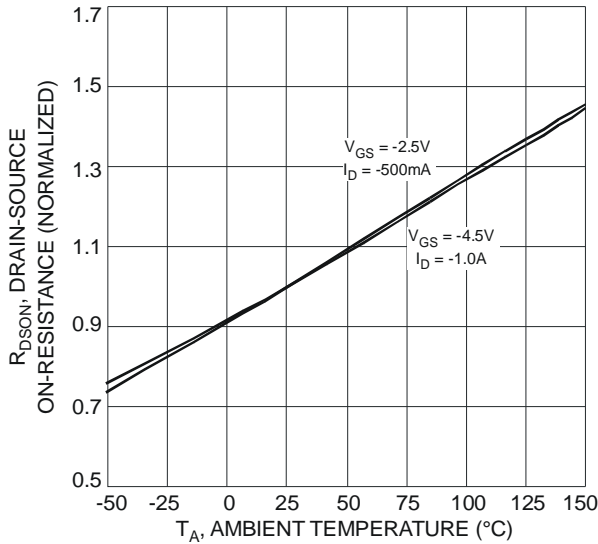


Fig. 5 On-Resistance Variation with Temperature

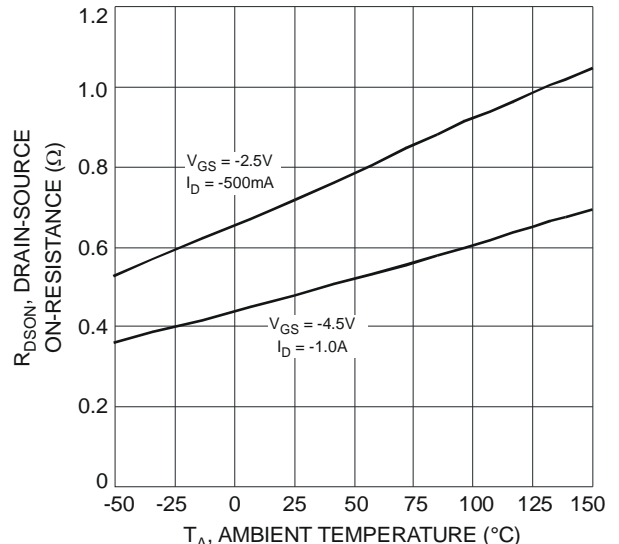


Fig. 6 On-Resistance Variation with Temperature

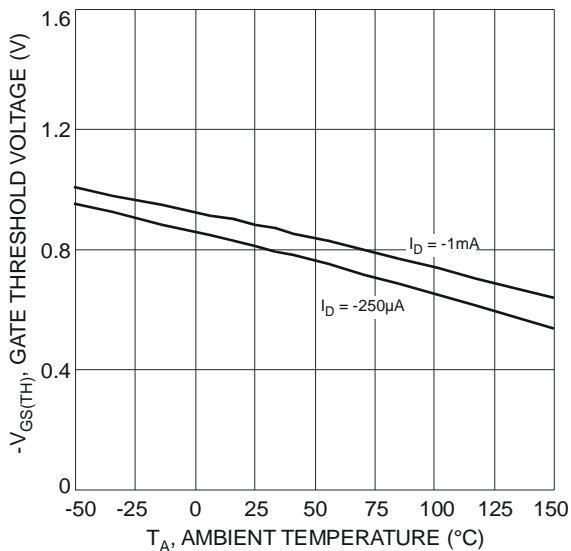


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

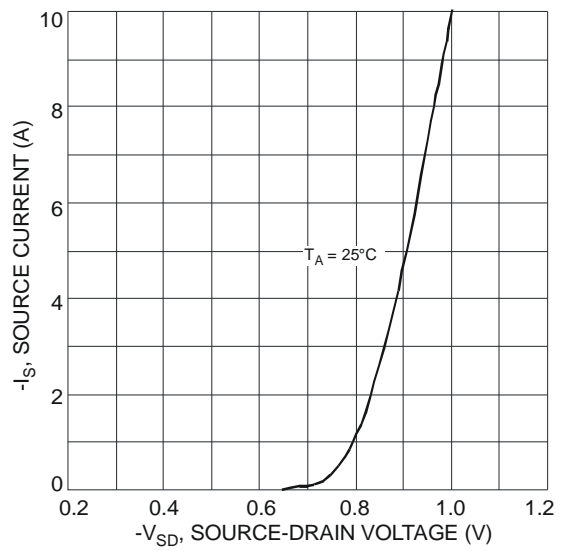
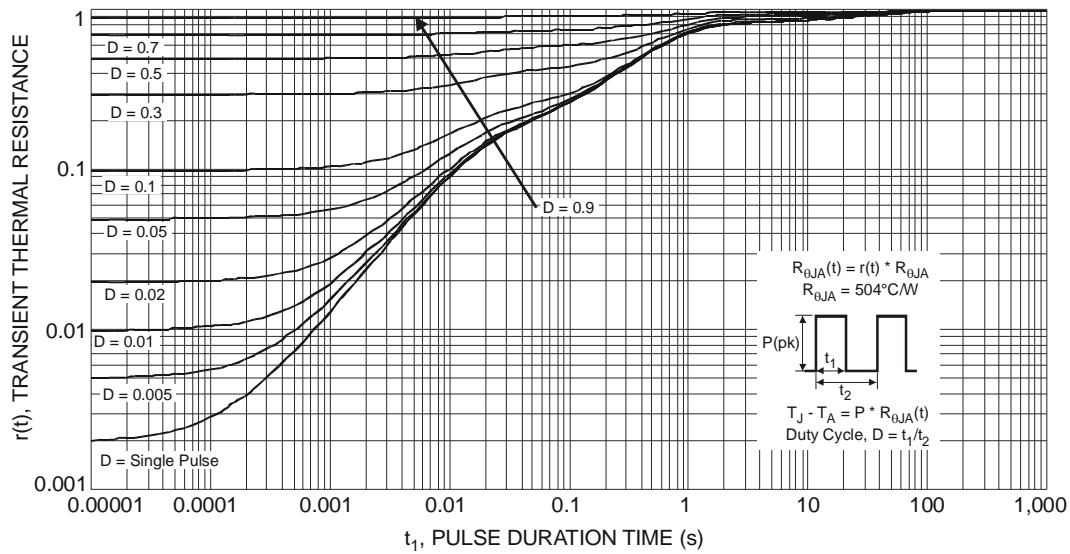
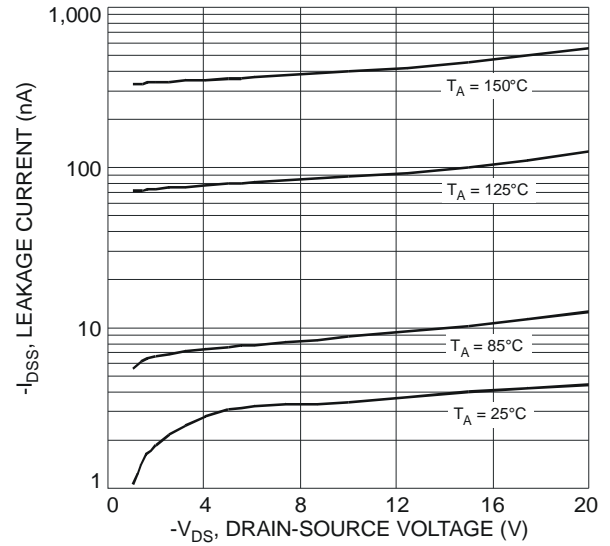
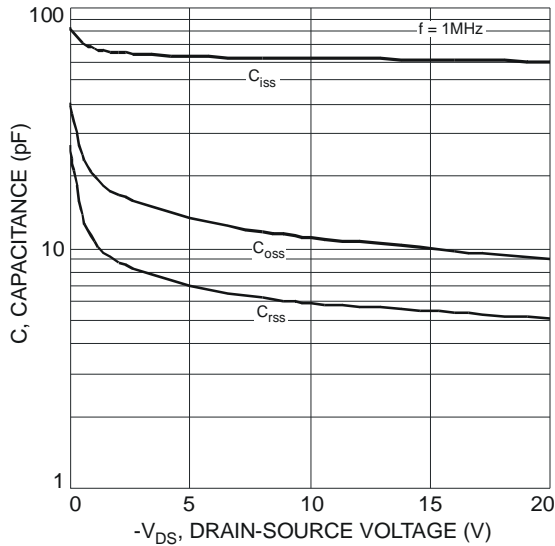


Fig. 8 Diode Forward Voltage vs. Current

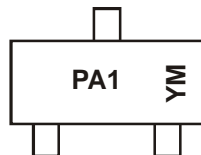


**Ordering Information** (Note 7)

Part Number	Case	Packaging
DMG1013UW-7	SOT-323	3000 / Tape & Reel

Notes: 7. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



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

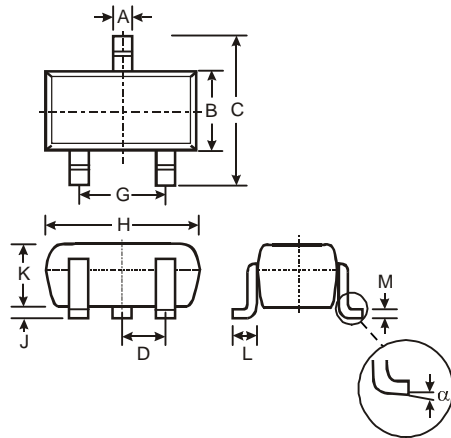
Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015
Code	V	W	X	Y	Z	A	B	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

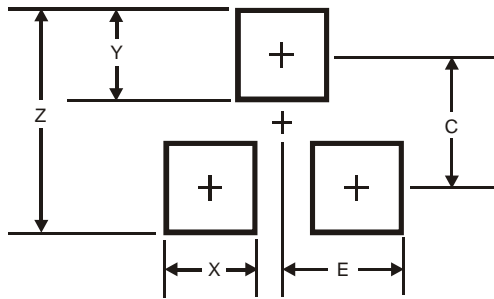
**Package Outline Dimensions**



SOT-323			
Dim	Min	Max	Typ
A	0.25	0.40	0.30
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	-	-	0.65
G	1.20	1.40	1.30
H	1.80	2.20	2.15
J	0.0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.18	0.11
$\alpha$	0°	8°	-

All Dimensions in mm

**Suggested Pad Layout**



Dimensions	Value (in mm)
Z	2.8
X	0.7
Y	0.9
C	1.9
E	1.0

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