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Diodes Incorporated
DMG301NU-13

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Lead-free Green

DMG301NU

25V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = +25°C$
25V	4Ω @ V_{GS} = 4.5V	0.26A
	5Ω @ V_{GS} = 2.7V	0.23A

Description

This new generation 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.

Applications

- DC-DC Converters
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.

Features

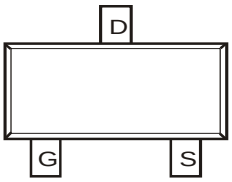
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Small Surface Mount Package
- ESD Protected Gate (>6kV Human Body Model)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

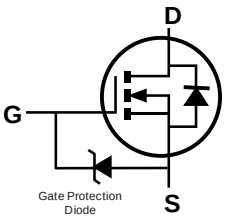
- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208 e3
- Lead Free Plating (Matte Tin Finish Annealed over Alloy 42 Leadframe).
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

ESD HBM >6kV

Top View



Top View
Pin Configuration



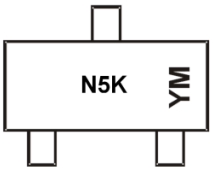
Equivalent Circuit

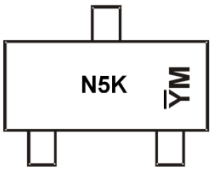
Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMG301NU-7	Standard	SOT23	3,000/Tape & Reel
DMG301NU-13	Standard	SOT23	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 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 http://www.diodes.com/products/packages.html.

Marking Information





N5K = Product Type Marking Code
YM = Date Code Marking for SAT (Shanghai Assembly/ Test Site)
$\overline{Y}$M = Date Code Marking for CAT (Chengdu Assembly/ Test Site)
Y or $\overline{Y}$ = Year (ex: A = 2013)
M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

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	Units
Drain-Source Voltage			V_{DSS}	25	V
Gate-Source Voltage			V_{GSS}	8	V
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	0.26 0.21	A
Continuous Drain Current (Note 6) V_{GS} = 2.7V	Steady State	T_A = +25°C T_A = +70°C	I_D	0.23 0.18	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	1.5	A
Maximum Body Diode Continuous Current (Note 6)			I_S	0.5	A

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation	(Note 5)	P_D	0.32	W
	(Note 6)		0.4	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	369	°C/W
	(Note 6)		296	
Thermal Resistance, Junction to Case	(Note 6)	$R_{\theta JC}$	115	
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}	25	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Body Leakage	I_{GSS}	—	—	100	nA	V_{GS} = 8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	0.7	—	1.1	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	4	Ω	V_{GS} = 4.5V, I_D = 0.4A
		—	—	5	Ω	V_{GS} = 2.7V, I_D = 0.2A
Forward Transconductance	g_{FS}	—	1	—	S	V_{DS} = 5V, I_D = 0.4A
Diode Forward Voltage	V_{SD}	—	0.76	1.2	V	V_{GS} = 0V, I_S = 0.29A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	27.9	42	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	6.1	9.2		
Reverse Transfer Capacitance	C_{rss}	—	2.0	3.0		
Gate Resistance	R_G	—	26.4	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	0.36	—	nC	V_{GS} = 4.5V, V_{DS} = 5V, I_D = 0.2A
Gate-Source Charge	Q_{gs}	—	0.06	—		
Gate-Drain Charge	Q_{gd}	—	0.04	—		
Turn-On Delay Time	$t_{D(on)}$	—	2.9	—	nS	V_{GS} = 4.5V, V_{DS} = 6V I_D = 0.5A, R_G = 50Ω
Turn-On Rise Time	t_r	—	1.8	—		
Turn-Off Delay Time	$t_{D(off)}$	—	6.6	—		
Turn-Off Fall Time	t_f	—	2.3	—		

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

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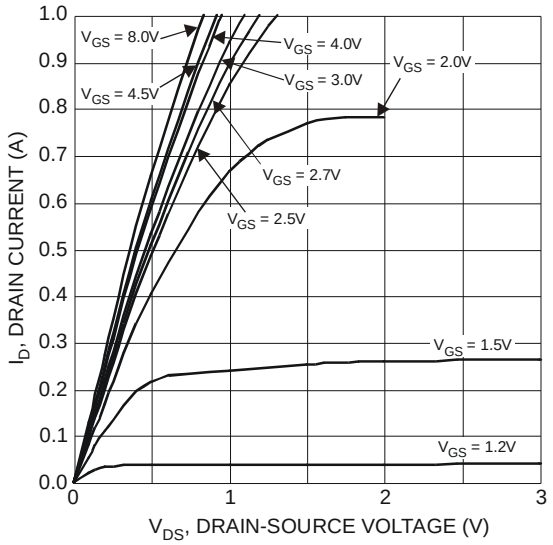

Figure 1 Typical Output Characteristics

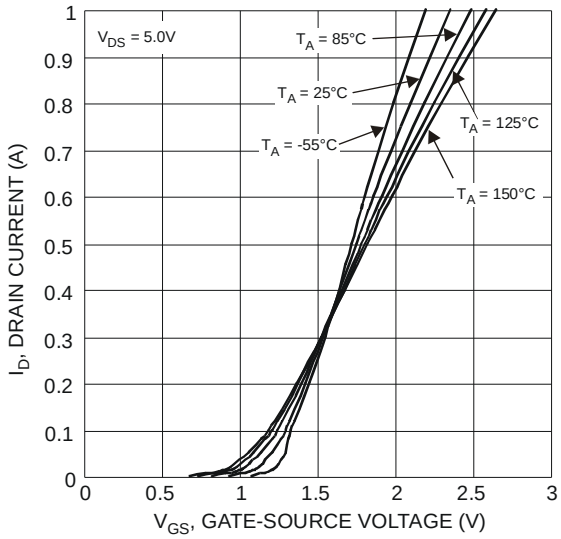

Figure 2 Typical Transfer Characteristics

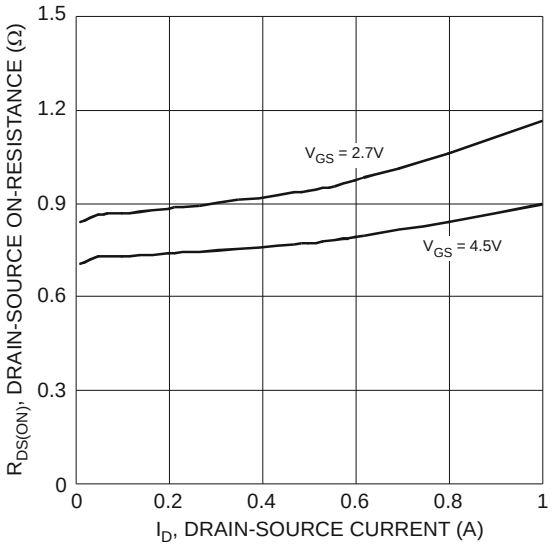

Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

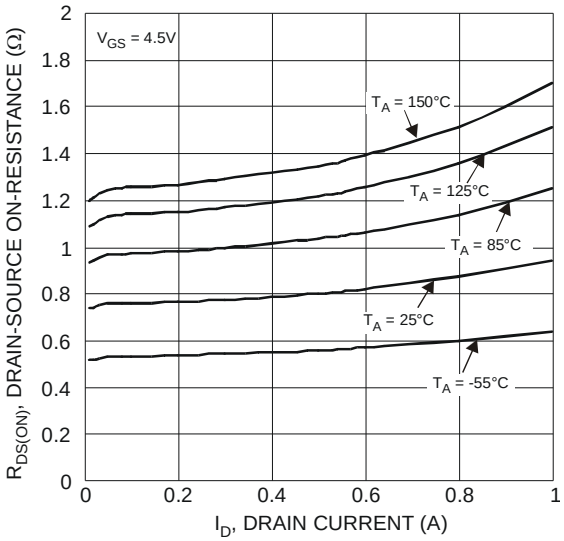

Figure 4 Typical On-Resistance vs. Drain Current and Temperature

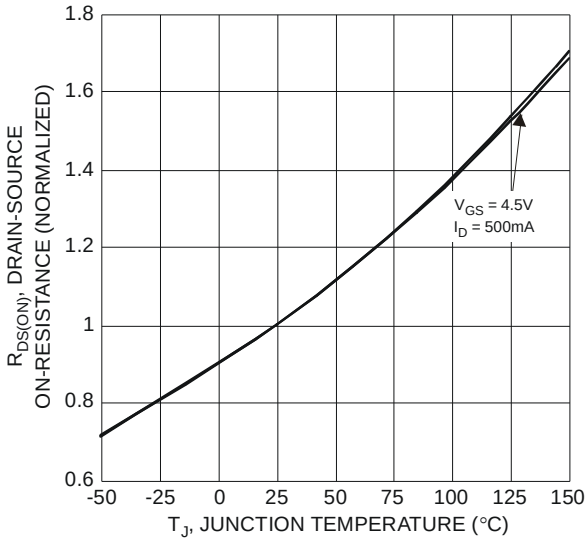

Figure 5 On-Resistance Variation with Temperature

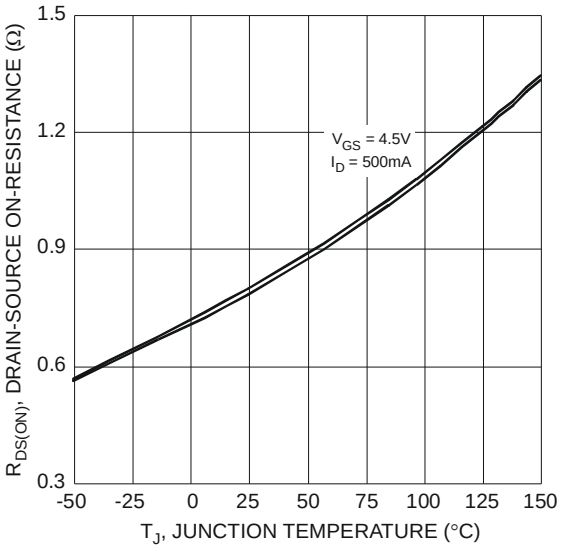

Figure 6 On-Resistance Variation with Temperature

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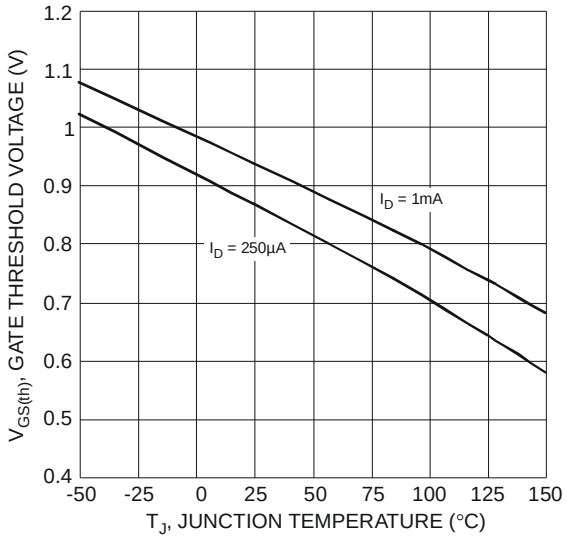

Figure 7 Gate Threshold Variation vs. Ambient Temperature

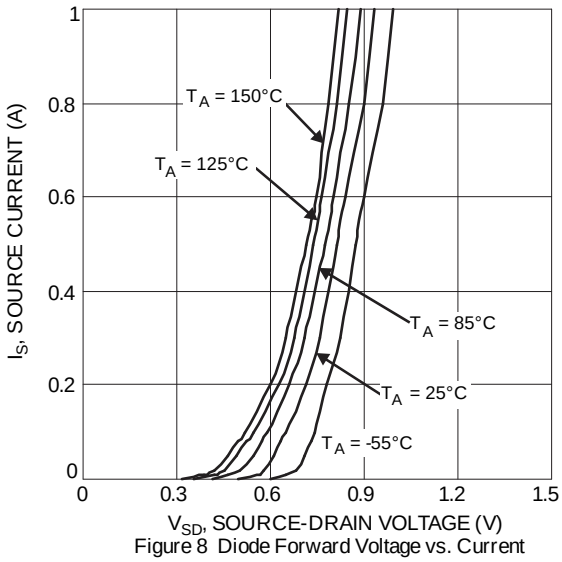

Figure 8 Diode Forward Voltage vs. Current

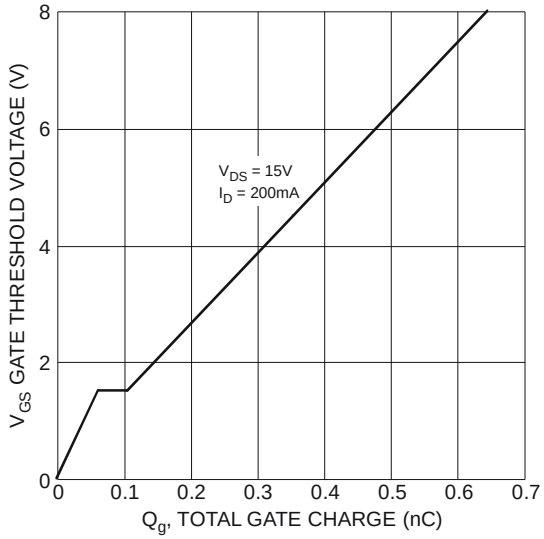

Figure 9 Gate Charge

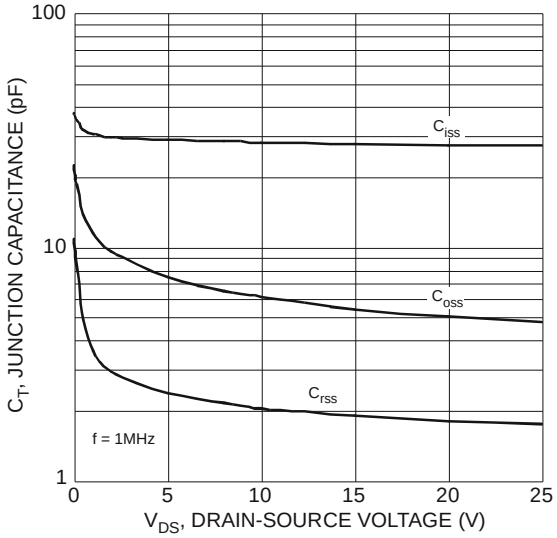

Figure 10 Typical Junction Capacitance

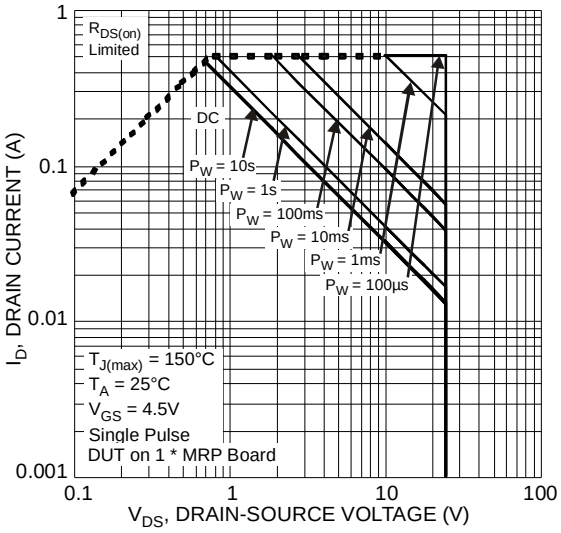

Figure 11 SOA, Safe Operation Area

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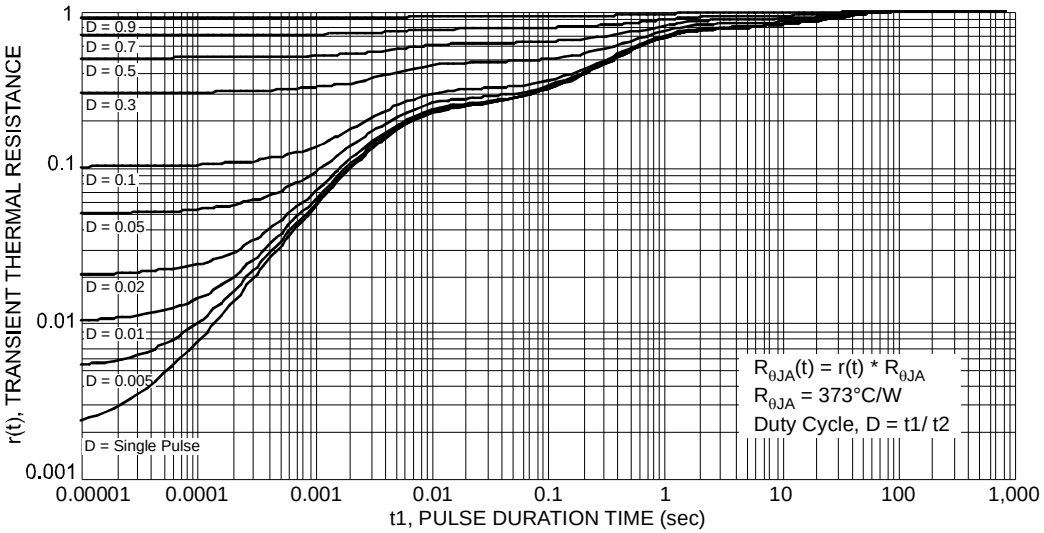
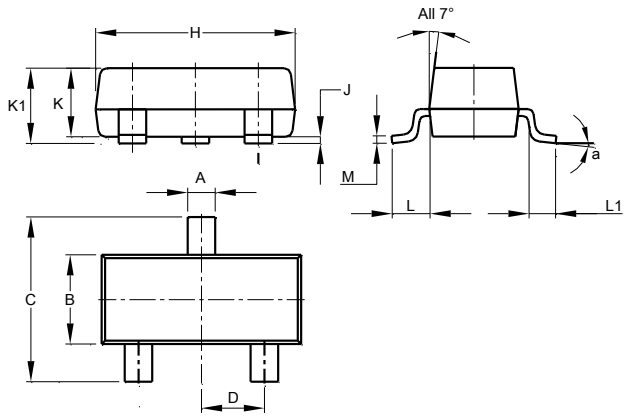


Figure 12 Transient Thermal Resistance

Package Outline Dimensions

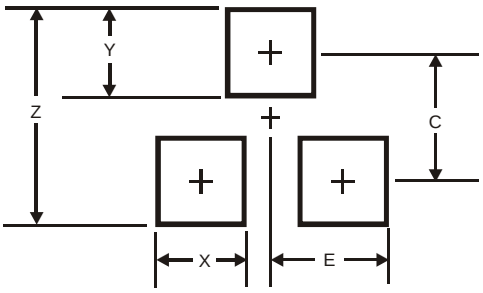
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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
a	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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