DMG3415U

P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D T_A = 25°C
-20V	42.5mΩ @ V_{GS} = -4.5V	-4.0A
	71mΩ @ V_{GS} = -1.8V	-2.0A

Description

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.

Applications

- DC-DC Converters
- Power management functions

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Up To 3kV**
- **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**

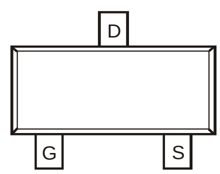
Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, “Green” Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin annealed over Copper leadframe.
- Solderable per MIL-STD-202, Method 208 e3
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (approximate)

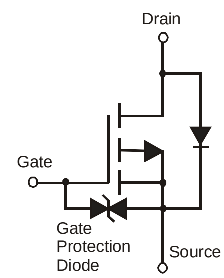
ESD PROTECTED TO 3kV

SOT23

Top View



Top View
Internal Schematic



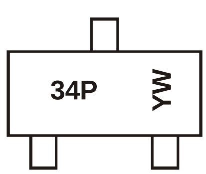
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Qualification	Case	Packaging
DMG3415U-7	Commercial	SOT23	3,000/Tape & Reel
DMG3415UQ-7	Automotive	SOT23	3,000/Tape & Reel
DMG3415U-13	Commercial	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 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.

Marking Information



DMG3415U-7

34P = Product Type Marking Code
YW = Date Code Marking
Y = Year (ex: W = 2009)
W = Week (ex: A ~ Z = Weeks 1 ~ 26
a ~ y = Weeks 27 ~ 51
z = Weeks 52 and 53)

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}	±8	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-4.0 -3.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	-30	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	139	°C/W
Thermal Resistance, Junction to case (Note 5)	$R_{\theta JC}$	32	°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	I_{DSS}	—	—	-1	µA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±8.0V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.3	–0.55	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	31	42.5	mΩ	V_{GS} = -4.5V, I_D = -4.0A
		—	40	53		V_{GS} = -2.5V, I_D = -3.5A
		—	51	71		V_{GS} = -1.8V, I_D = -2.0A
Forward Transfer Admittance	$\|Y_{fs}\|$		3	—	S	V_{DS} = -5V, I_D = -4A
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	—	294	—	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	104	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	25	—	pF	
Gate Resistnace	R_g		250		Ω	V_{DS} = 0V, VGS = 0V, f = 1.0MHz
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_g	—	9.1	—	nC	V_{GS} = -4.5V, V_{DS} = -10V I_D = -4A
Gate-Source Charge	Q_{gs}	—	1.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.7	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	71	—	ns	V_{DS} = -10V, V_{GS} = -4.5V, R_D = 2.5Ω, R_G = 3.0Ω, I_D = -1A
Turn-On Rise Time	t_r	—	117	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	795	—	ns	
Turn-Off Fall Time	t_f	—	393	—	ns	

Notes: 5. Device mounted on FR-4 substrate PC board, with minimum recommended pad layout.
6. Short duration pulse test used to minimize self-heating effect.
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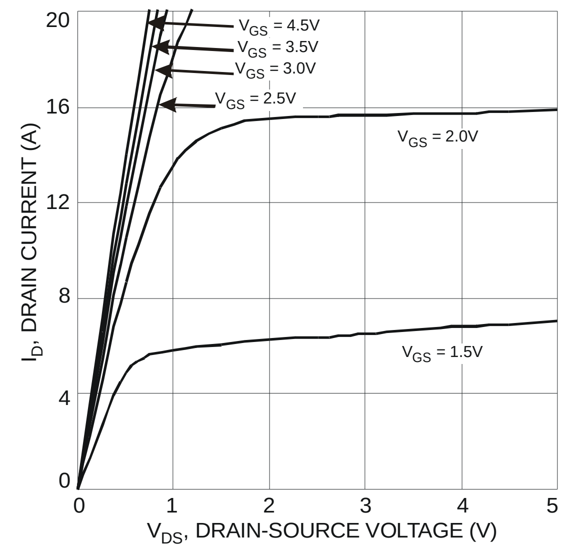


Fig. 1 Typical Output Characteristic

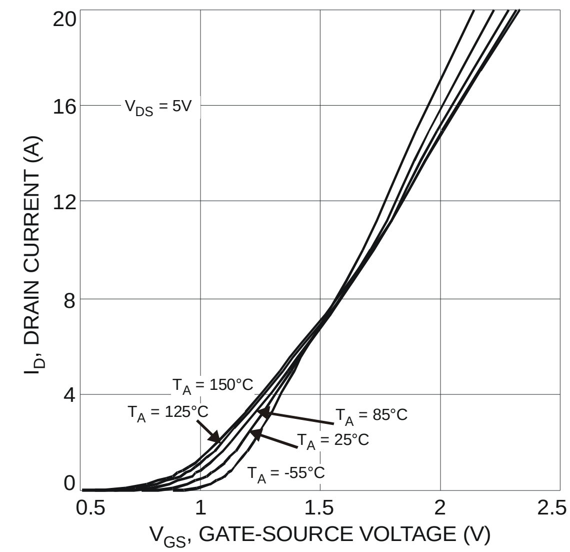


Fig. 2 Typical Transfer Characteristic

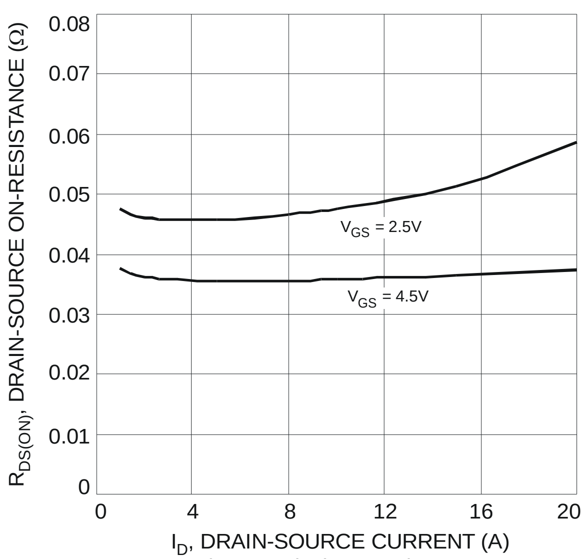


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

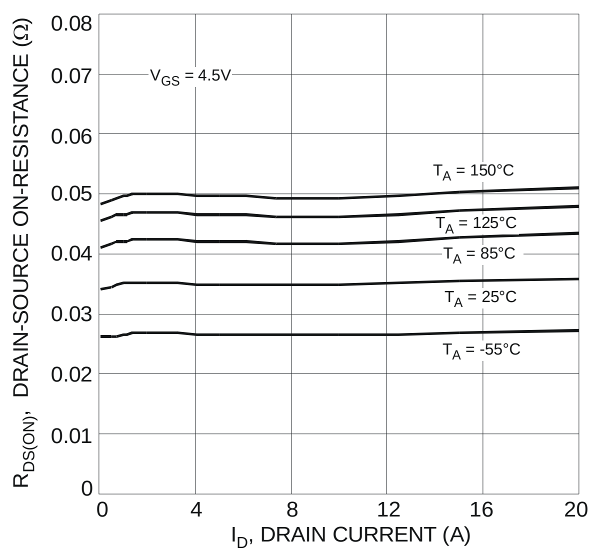


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

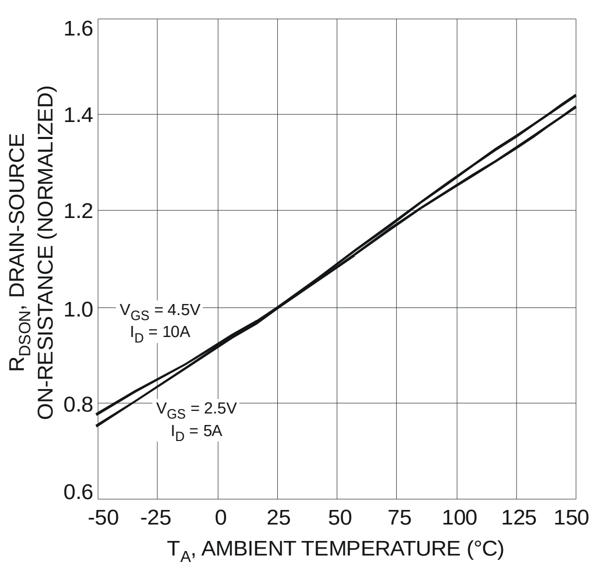


Fig. 5 On-Resistance Variation with Temperature

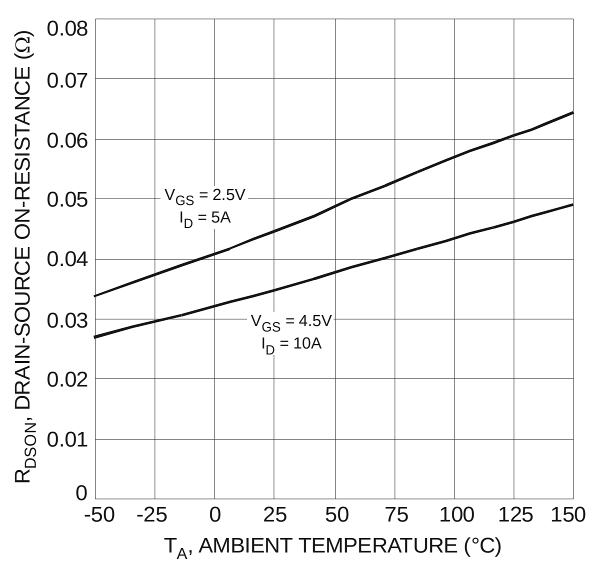


Fig. 6 On-Resistance Variation with Temperature

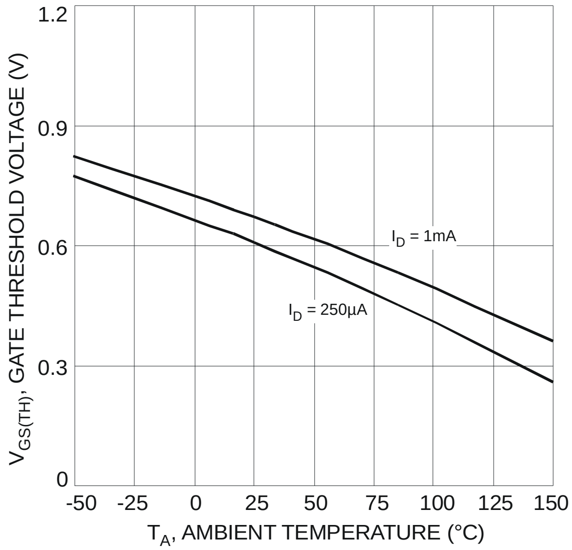


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

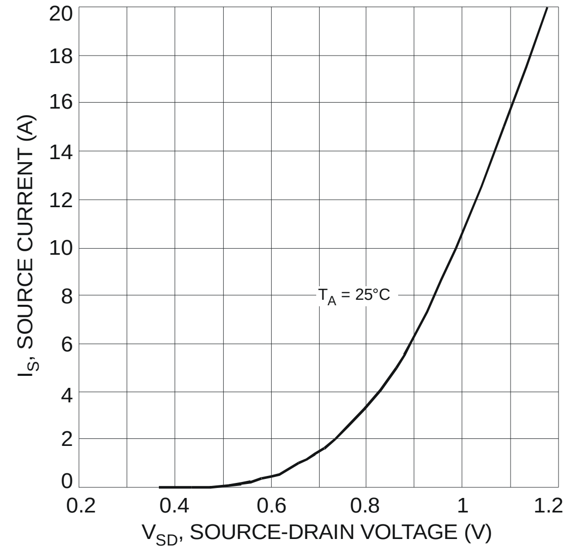


Fig. 8 Diode Forward Voltage vs. Current

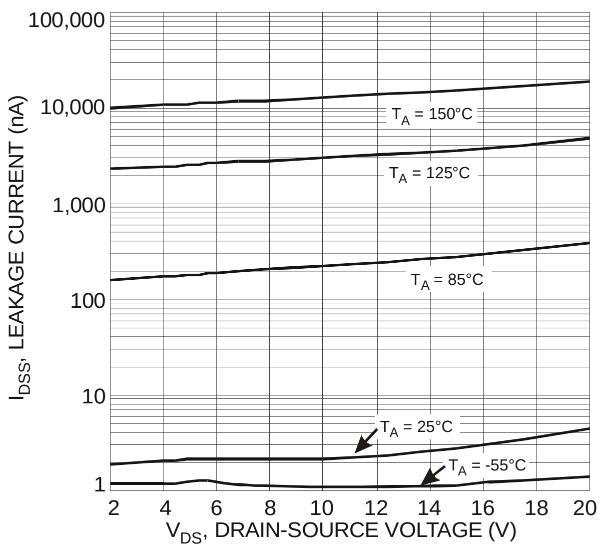


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

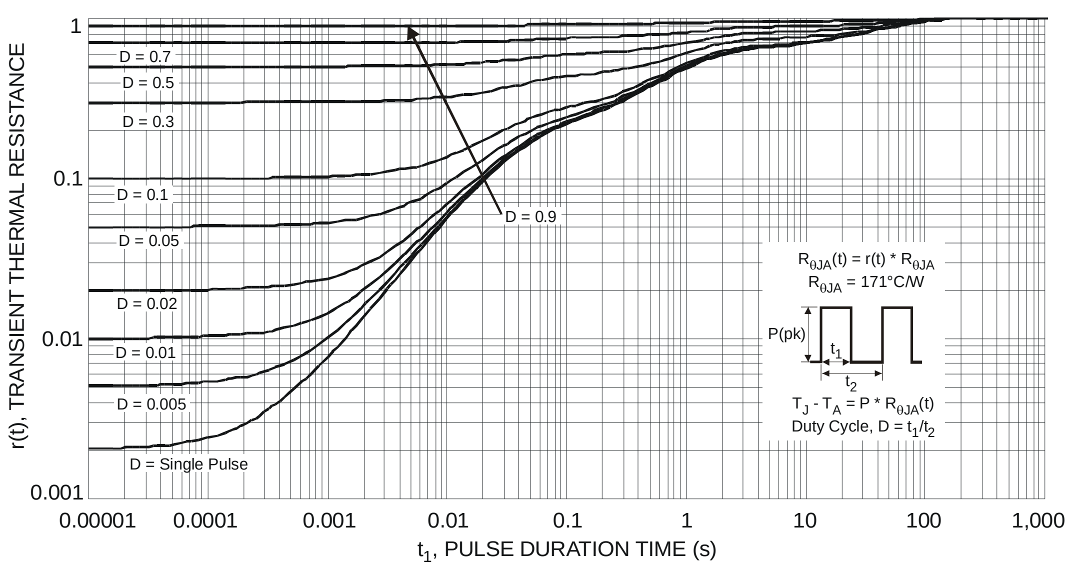
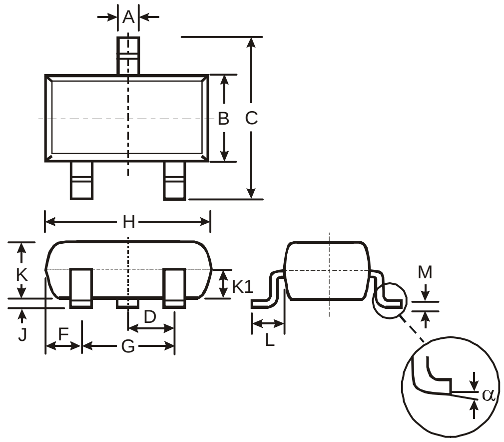


Fig. 10 Transient Thermal Response

Package Outline Dimensions

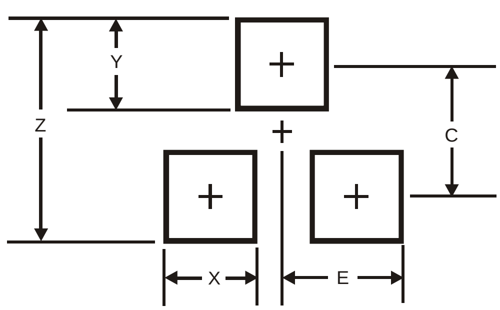
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	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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