

Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	I_D $T_A = 25^\circ\text{C}$
-20V	95m Ω @ $V_{GS} = -4.5\text{V}$	3.0A
	130m Ω @ $V_{GS} = -2.5\text{V}$	2.5A

Features and Benefits

- 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**

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.

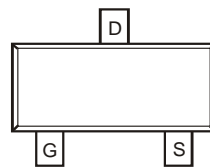
- DC-DC Converters
- Power management functions
- Analog Switch

Mechanical Data

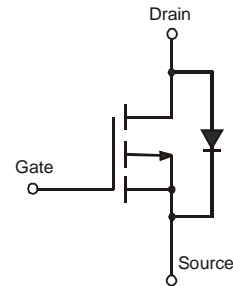
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0072 grams (approximate)

SOT23

Top View



Pin Configuration



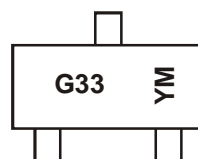
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMG3413L-7	SOT23	3,000/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



- G33 = Marking Code
 YM = Date Code Marking
 Y = Year (ex: X = 2010)
 M = Month (ex: 9 = September)

Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Code	X	Y	Z	A	B	C	D	E	F

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
Total Power Dissipation (Note 5)	P _D	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	184	°C/W
	t<10s	115	
Total Power Dissipation (Note 6)	P _D	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	94	°C/W
	t<10s	61	
Thermal Resistance, Junction to Case	R _{θJC}	25	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to 150	°C

Thermal Characteristics @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 6) V _{GS} = -4.5V	Steady State	T _A = 25°C	3.0
		T _A = 70°C	2.4
	t<10s	T _A = 25°C	3.7
		T _A = 70°C	2.9
Continuous Drain Current (Note 6) V _{GS} = -2.5V	Steady State	T _A = 25°C	2.5
		T _A = 70°C	2.0
	t<10s	T _A = 25°C	3.2
		T _A = 70°C	2.5
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	1.9	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I _{DM}	20	A

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}	-20	-	-	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	-	-	-1.0	μA	V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	-	-	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(th)}	-0.6	-0.55	-1.3	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	-	73	95	mΩ	V _{GS} = -4.5V, I _D = -3.0A
			95	130		V _{GS} = -2.5V, I _D = -2.6A
			146	190		V _{GS} = -1.8V, I _D = -1A
Forward Transfer Admittance	Y _{fs}	-	8	-	S	V _{DS} = -5V, I _D = -3A
Diode Forward Voltage	V _{SD}	-	-0.8	-1.25	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	-	857	-	pF	V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	-	54	-	pF	
Reverse Transfer Capacitance	C _{rss}	-	49	-	pF	
Gate Resistnace	R _g	-	12.3	-	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q _g	-	9.0	-	nC	V _{GS} = -4.5V, V _{DS} = -15V, I _D = -4A
Gate-Source Charge	Q _{gs}	-	1.6	-	nC	
Gate-Drain Charge	Q _{gd}	-	1.1	-	nC	
Turn-On Delay Time	t _{D(on)}	-	9.7	-	ns	V _{DS} = -15V, V _{GS} = -10V, R _L = 15Ω, R _G = 6.0Ω, I _D = -1A
Turn-On Rise Time	t _r	-	17.7	-	ns	
Turn-Off Delay Time	t _{D(off)}	-	268.8	-	ns	
Turn-Off Fall Time	t _f	-	64.2	-	ns	

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

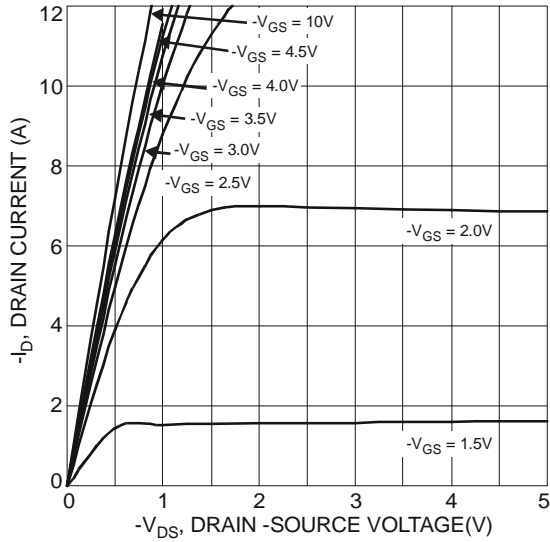


Fig. 1 Typical Output Characteristics

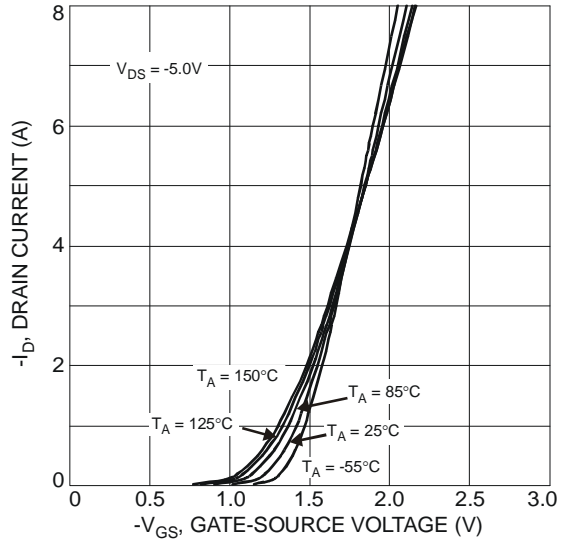


Fig. 2 Typical Transfer Characteristics

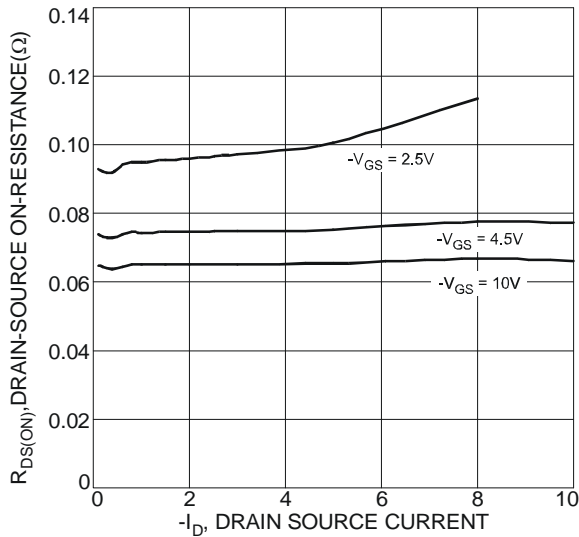


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

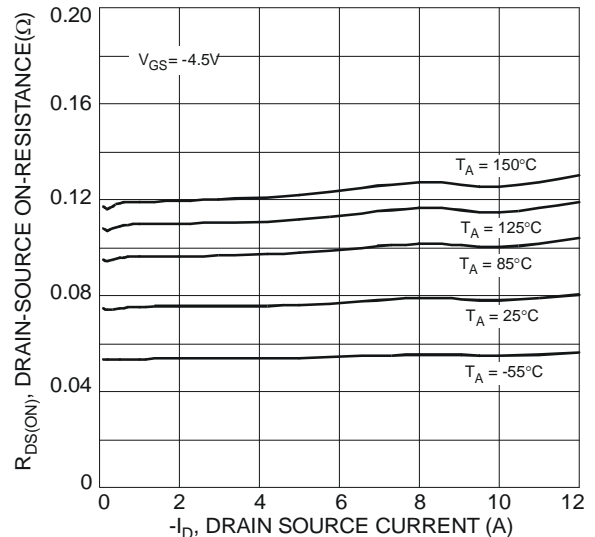


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

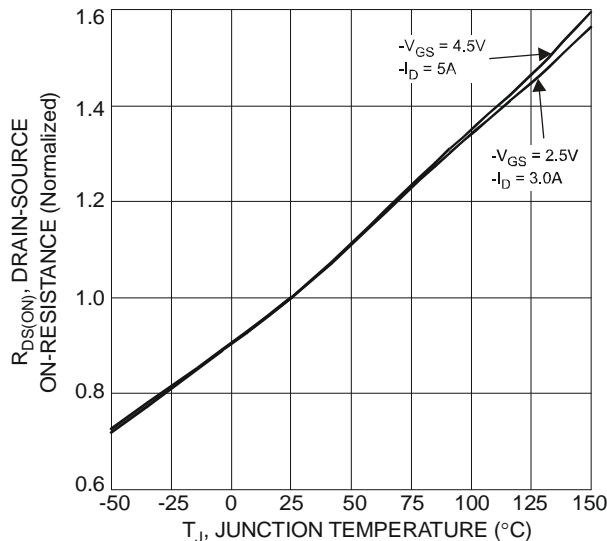


Fig. 5 On-Resistance Variation with Temperature

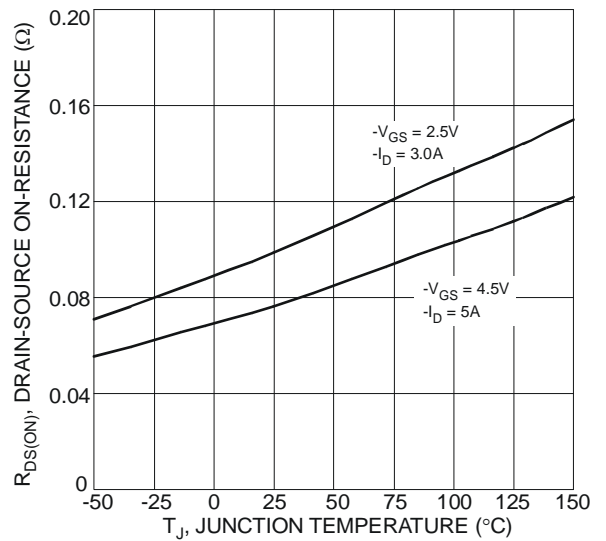


Fig. 6 On-Resistance Variation with Temperature

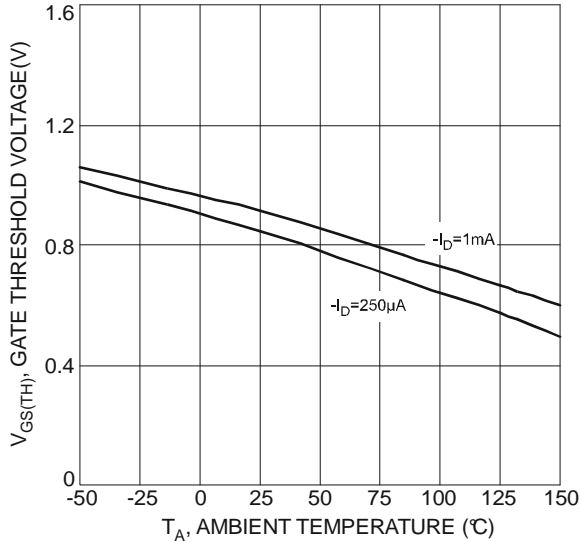


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

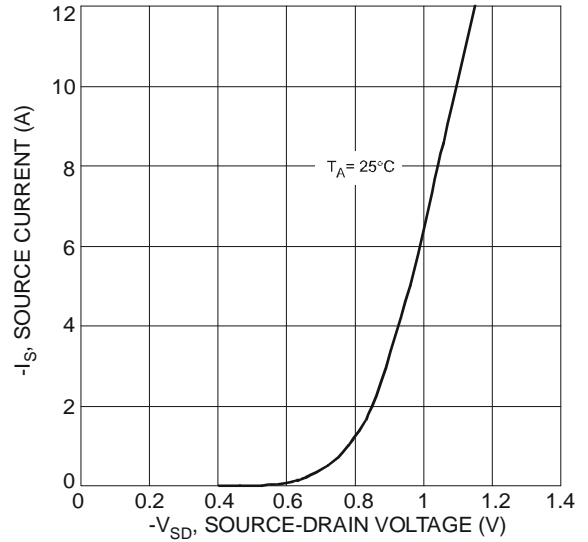


Fig. 8 Diode Forward Voltage vs. Current

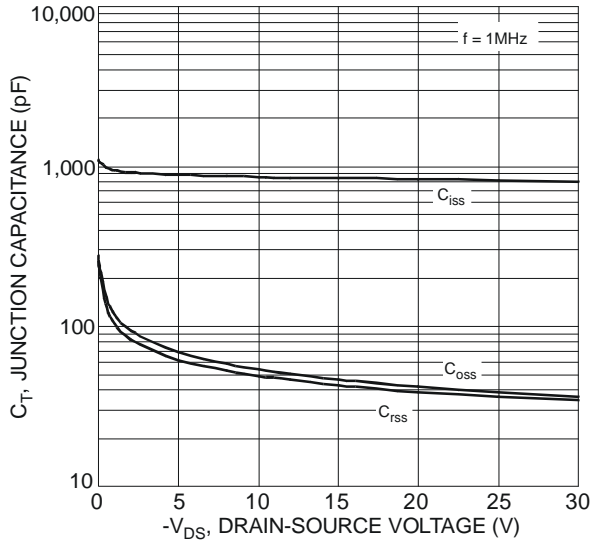


Fig. 9 Typical Junction Capacitance

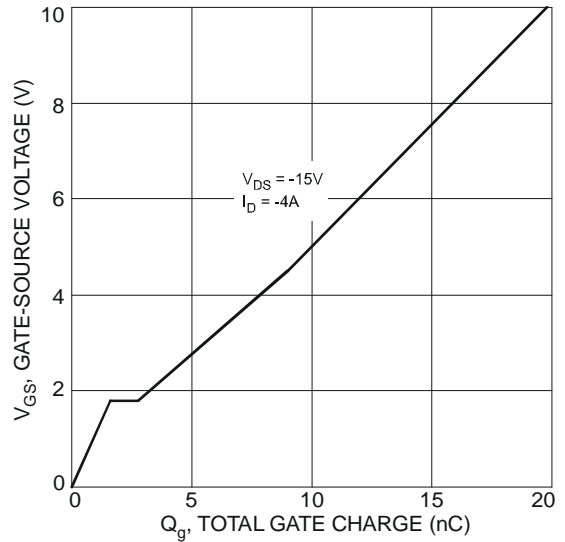


Fig. 10 Gate-Charge Characteristics

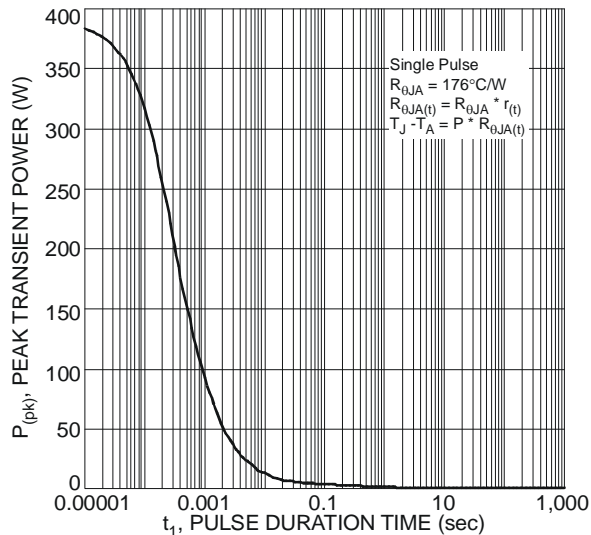


Fig. 11 Single Pulse Maximum Power Dissipation

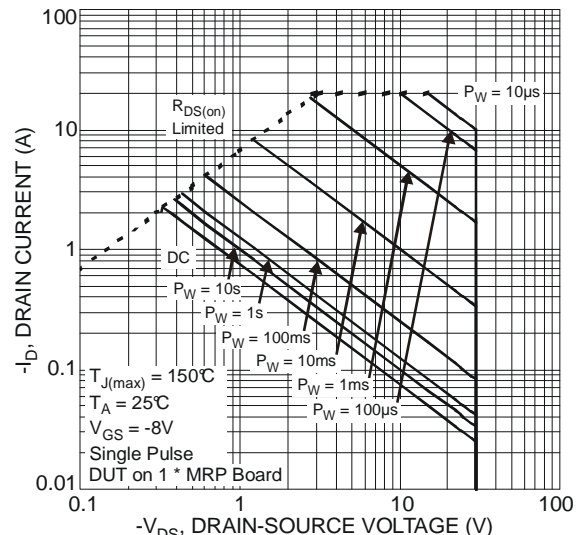
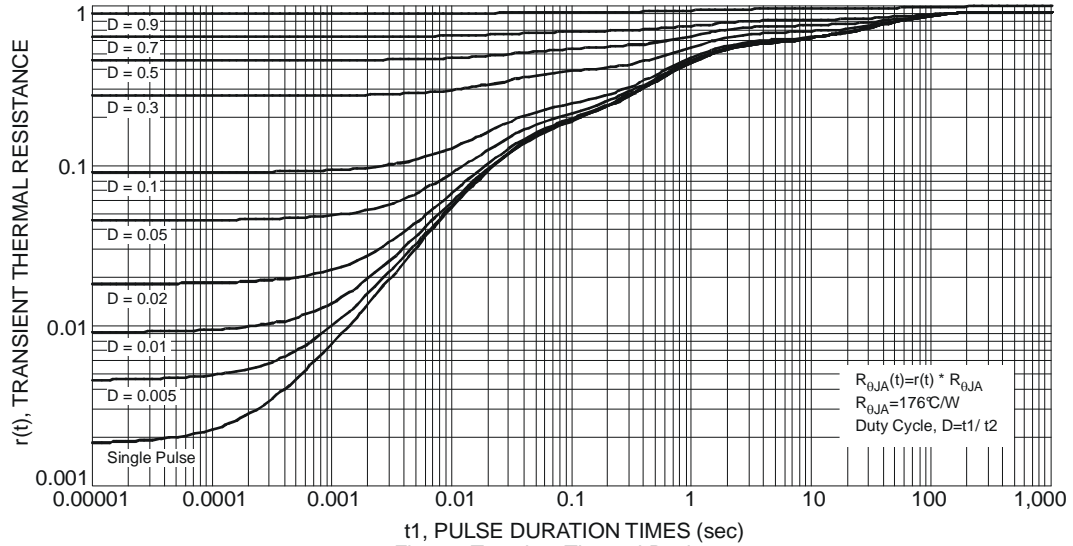
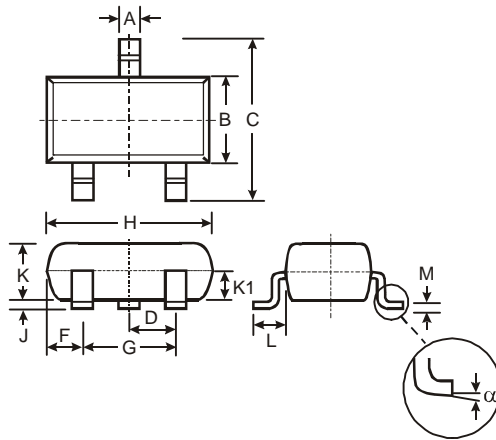


Fig. 12 SOA, Safe Operation Area

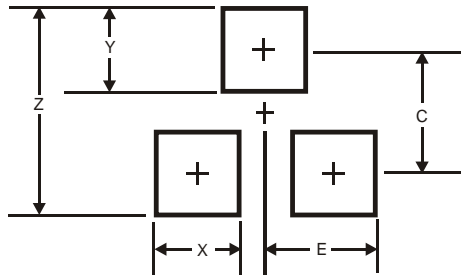


Package Outline Dimensions



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



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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