



#### N-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
	90mΩ @ V <sub>GS</sub> = 4.5V	2.8A
20V	120mΩ @ V <sub>GS</sub> = 2.5V	2.4A

## **Description and Applications**

This MOSFET is designed to minimize the on-state resistance (RDS(ON)), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- **Power Management Functions**
- **DC-DC Converters**
- Motor Control

## **Features and Benefits**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **ESD Protected Gate**
- 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**

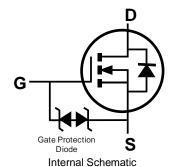
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)

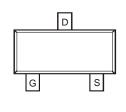






Top View





Top View

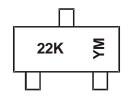
#### **Ordering Information** (Note 4)

Part Number	Case	Packaging
DMG2302UK-7	SOT23	3,000/Tape & Reel
DMG2302UK-13	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**



22K = Product Type Marking Code YM = Date Code Marking Y or  $\overline{Y}$ = Year (ex: C = 2015) M = Month (ex: 9 = September)

Date Code Kev

Date Code Rey												
Year	2015		2016	2017		2018	2019		2020	2021		2022
Code	С		D	Е		F	G		Н	ı		J
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	N	D



# **Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Drain-Source Voltage		$V_{DSS}$	20	V
Gate-Source Voltage		$V_{GSS}$	±12	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	I <sub>D</sub>	2.8 2.2	А	
Maximum Continuous Body Diode Forward Curre	ent (Note 6)	Is	1.1	Α
Pulsed Drain Current (10µs Pulse, Duty Cycle =	1%)	I <sub>DM</sub>	12	Α

# **Thermal Characteristics**

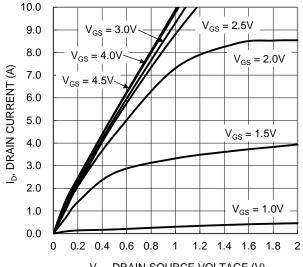
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		$P_{D}$	0.66	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	192	°C/W
Total Power Dissipation (Note 6)		$P_{D}$	1.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	115	°C/W
Operating and Storage Temperature Range		T <sub>J,</sub> T <sub>STG</sub>	-55 to +150	°C

# **Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)				•	•		
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	_		10	μΑ	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V	
Gate-Source Leakage	$I_{GSS}$	_	_	±10	μA	$V_{GS} = \pm 10V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)	_						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.3	0.6	1.0	V	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	
Static Drain-Source On-Resistance			61	90	mΩ	$V_{GS} = 4.5V, I_D = 3.6A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	_	80	120	11177	V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.1A	
Diode Forward Voltage	$V_{SD}$	_	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.0A	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C <sub>ISS</sub>	_	130	_	pF	10)/ )/	
Output Capacitance	Coss	_	26	_	pF	$V_{DS} = 10V, V_{GS} = 0V$ -f = 1.0MHz	
Reverse Transfer Capacitance	C <sub>RSS</sub>	_	18	_	pF	1 = 1.01/11 12	
Gate Resistance	Rg	_	2.7	_	Ω	$V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	$Q_G$	_	1.4	_	nC		
Total Gate Charge (V <sub>GS</sub> = 10V)	$Q_G$	_	2.8	_	nC	101/1 0.04	
Gate-Source Charge	Q <sub>GS</sub>	_	0.1	_	nC	$V_{DS} = 10V, I_D = 3.6A$	
Gate-Drain Charge	$Q_{GD}$	_	0.5	_	nC	1	
Turn-On Delay Time	t <sub>D(ON)</sub>	_	0.6	_	ns		
Turn-On Rise Time	t <sub>R</sub>	_	2.7	_	ns	$V_{DS} = 10V, V_{GS} = 4.5V,$	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	_	4.2	_	ns	$R_G = 1\Omega$ , $R_L = 2.78\Omega$	
Turn-Off Fall Time	t <sub>F</sub>	_	1.7	_	ns	1	
Reverse Recovery Time	t <sub>RR</sub>	_	5.3	_	ns	$I_F = 3.6A$ , di/dt = 100A/ $\mu$ s	
Reverse Recovery Charge	Q <sub>RR</sub>	_	0.5	_	nC	$I_F = 3.6A$ , di/dt = 100A/ $\mu$ s	

- 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  7. Short duration pulse test used to minimize self-heating effect.
- 8. Guaranteed by design. Not subject to product testing.





 $V_{\rm DS}$ , DRAIN-SOURCE VOLTAGE (V) Figure 1. Typical Output Characteristic

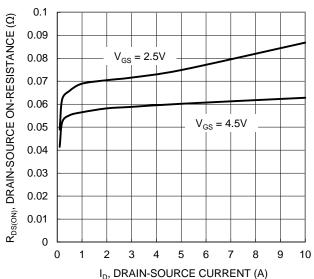


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

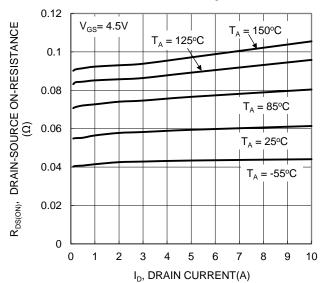
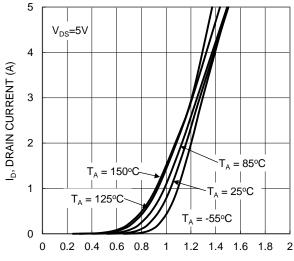


Figure 5. Typical On-Resistance vs Drain Current and Junction Temperature



 $V_{GS}$ , GATE-SOURCE VOLTAGE (V) Figure 2. Typical Transfer Characteristic

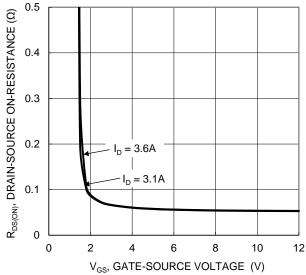


Figure 4. Typical Transfer Characteristic

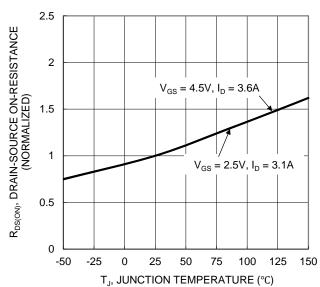


Figure 6. On-Resistance Variation with Junction Temperature



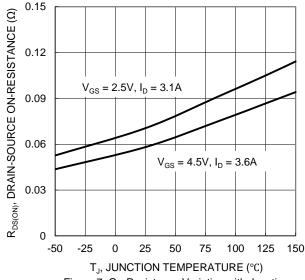
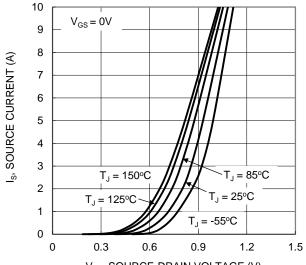


Figure 7. On-Resistance Variation with Junction Temperature



 $\rm V_{SD},$  SOURCE-DRAIN VOLTAGE (V) Figure 9. Diode Forward Voltage vs. Current

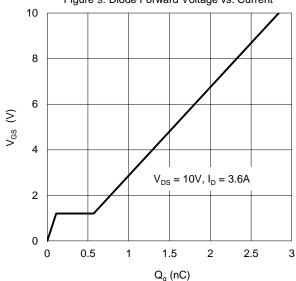


Figure 11. Gate Charge

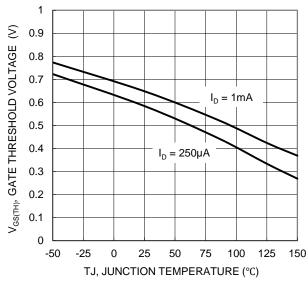


Figure 8. Gate Threshold Variation vs Junction Temperature

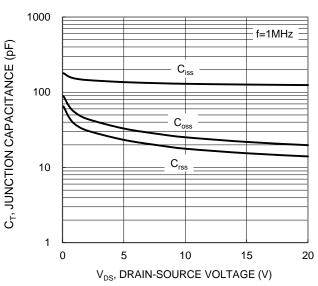
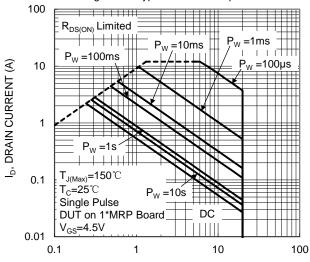


Figure 10. Typical Junction Capacitance



V<sub>DS</sub>, DRAIN-SOURCE VOLTAGE (V) Figure 12. SOA, Safe Operation Area



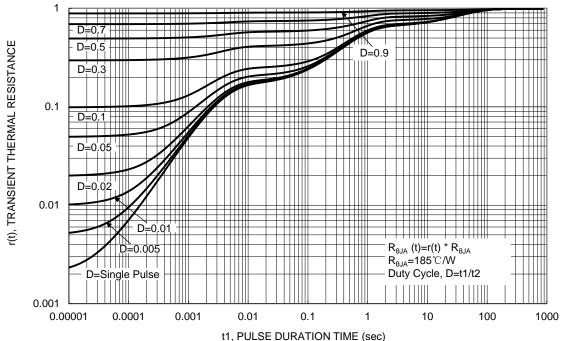


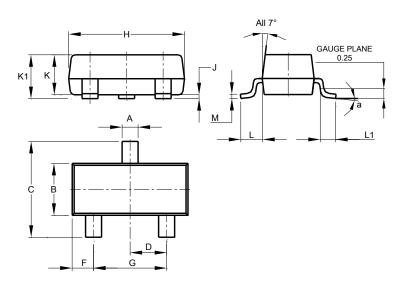
Figure 13. Transient Thermal Resistance



# **Package Outline Dimensions**

Please see AP02001 at http://www.diodes.com/\_files/datasheets/ap02001.pdf for the latest version.

#### SOT23

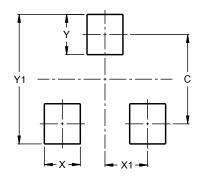


SOT23							
Dim	Min	Max	Тур				
Α	0.37	0.51	0.40				
В	1.20	1.40	1.30				
С	2.30	2.50	2.40				
D	0.89	1.03	0.915				
F	0.45	0.60	0.535				
G	1.78	2.05	1.83				
Н	2.80	3.00	2.90				
J	0.013	0.10	0.05				
K	0.890	1.00	0.975				
K1	0.903	1.10	1.025				
L	0.45	0.61	0.55				
L1	0.25	0.55	0.40				
М	0.085	0.150	0.110				
а	0°	8°	_				
All Dimensions in mm							

# **Suggested Pad Layout**

Please see AP02001 at http://www.diodes.com/\_files/datasheets/ap02001.pdf for the latest version.

#### SOT23



Dimensions	Value (in mm)			
С	2.0			
Х	0.8			
X1	1.35			
Y	0.9			
Y1	2.9			

January 2016



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многоканальный

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