



P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
201/	160mΩ @ V _{GS} = -4.5V	-2.4A
-20V	210mΩ @ V _{GS} = -2.5V	-2.1A

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)
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at

https://www.diodes.com/products/automotive/automotive-products/.

 This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.

https://www.diodes.com/quality/product-definitions/

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 controls

Mechanical Data

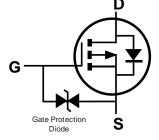
- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound.
 UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
 Solderable per MIL-STD-202, Method 208 (3)
- Terminals Connections: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



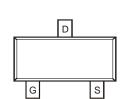




Top View



Internal Schematic



Top View

Ordering Information (Note 4)

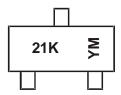
Part Number	Package	Packing		
Fait Number	Fackage	Qty.	Carrier	
DMG2301LK-7	SOT23 (Standard)	3,000	Tape & Reel	
DMG2301LK-13	SOT23 (Standard)	10,000	Tape & Reel	

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- 2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.



Marking Information



21K = Product Type Marking Code YM = Date Code Marking Y or \overline{Y} = Year (ex: J = 2022) M = Month (ex: 9 = September)

Date Code Key

Year	2016		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	D		J	K	L	М	N	0	Р	R	S	Т
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Maximum Ratings (@ $T_A = +25^{\circ}C$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit		
Drain-Source Voltage	V _{DSS}	-20	V		
Gate-Source Voltage	Vgss	±12	V		
Continuous Drain Current (Note 5) V _{GS} = -4.5V	I _D	-2.4 -1.9	А		
Maximum Continuous Body Diode Forward Current	Is	-1.12	Α		
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-8	А

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)		PD	0.84	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	Reja	150	°C/W
Total Power Dissipation (Note 5)		PD	1.40	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	Reja	91	°C/W
Operating and Storage Temperature Range		TJ, TSTG	-55 to +150	°C

5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. copper, single sided. 6. Device mounted on FR-4 PCB, with minimum recommended pad layout. Notes:



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

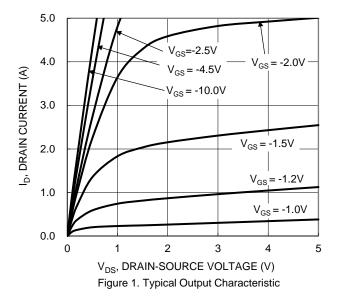
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)				•		
Drain-Source Breakdown Voltage	BV _{DSS}	-20	_	_	V	V _G S = 0V, I _D = -250μA
Zero Gate Voltage Drain Current (T _J = +25°C)	IDSS	_	_	-10	μΑ	V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	Igss	_	_	±10	μA	Vgs = ±10V, Vps = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	-0.3	-0.6	-1.0	V	V _{DS} = V _{GS} , I _D = -250μA
			136	160		Vgs = -4.5V, ID = -1.0A
Static Drain-Source On-Resistance	R _{DS(ON)}	_	183	210	mΩ	$V_{GS} = -2.5V, I_D = -1.0A$
			229	298		V _G S = -1.8V, I _D = -0.2A
Diode Forward Voltage	VsD	_	-0.8	-1.2	V	VGS = 0V, IS = -1.0A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	Ciss	_	156	_	pF	
Output Capacitance	Coss	_	36	_	pF	V _{DS} = -6V, V _{GS} = 0V -f = 1.0MHz
Reverse Transfer Capacitance	Crss	_	28	_	pF	1 = 1.0WHZ
Gate Resistance	Rg	_	41	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$
Total Gate Charge (VGS = -4.5V)	Qg	_	1.6	_	nC	
Total Gate Charge (VGS = -10V)	Qg	1	3.4	_	nC	$V_{DS} = -6V$
Gate-Source Charge	Qgs		0.3	_	nC	I _D = -2.2A
Gate-Drain Charge	Q_{gd}	_	0.4	_	nC	
Turn-On Delay Time	td(ON)	_	3.2	_	ns	
Turn-On Rise Time	t _R	_	7.4	_	ns	$V_{DS} = -6V, V_{GS} = -4.5V$
Turn-Off Delay Time	t _{D(OFF)}	_	11.0	_	ns	$R_{GEN} = 6\Omega$, $I_D = -1A$
Turn-Off Fall Time	tF	1	10.5	_	ns	
Reverse Recovery Time	t _{RR}	1	6.5	_	ns	I 1 00 dl/dt 1000///2
Reverse Recovery Charge	Qrr		0.8	_	nC	IF = -1.0A, dI/dt = 100A/μs

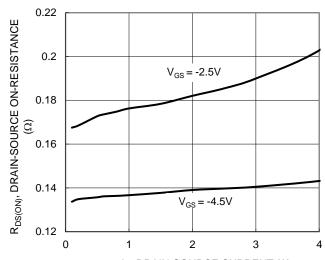
Notes:

^{7.} Short duration pulse test used to minimize self-heating effect. 8. Guaranteed by design. Not subject to product testing.









I_D, DRAIN-SOURCE CURRENT (A) Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

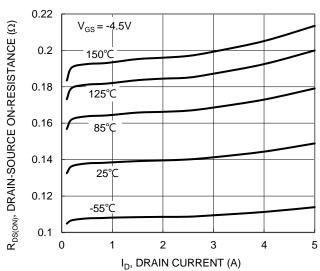
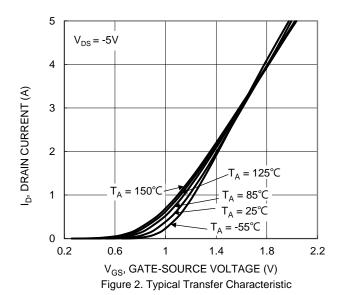
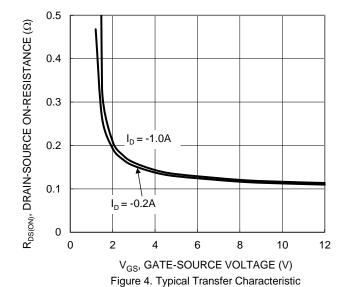


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature





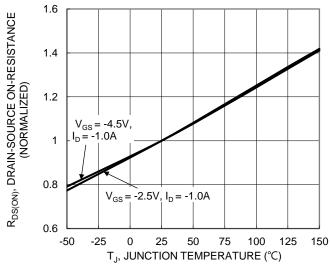
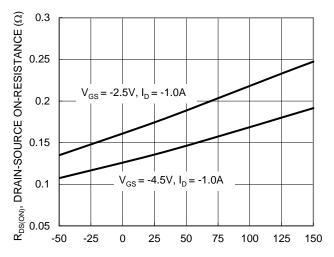
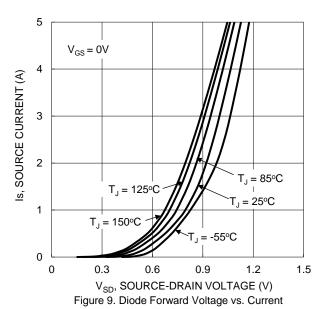


Figure 6. On-Resistance Variation with Junction Temperature





T_J, JUNCTION TEMPERATURE (°C) Figure 7. On-Resistance Variation with Junction Temperature



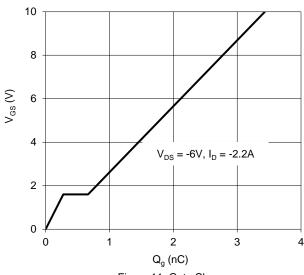
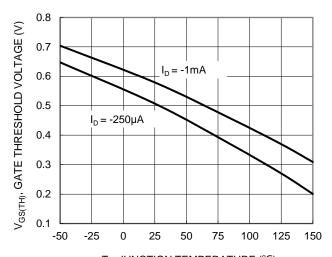


Figure 11. Gate Charge



 $\rm T_{J},\,JUNCTION\,TEMPERATURE\,(^{\circ}C)$ Figure 8. Gate Threshold Variation vs. Junction Temperature

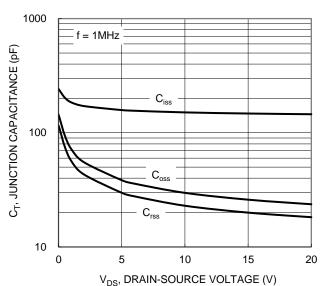
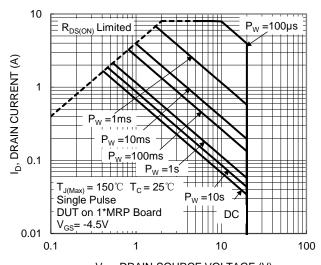


Figure 10. Typical Junction Capacitance



V_{DS}, DRAIN-SOURCE VOLTAGE (V) Figure 12. SOA, Safe Operation Area



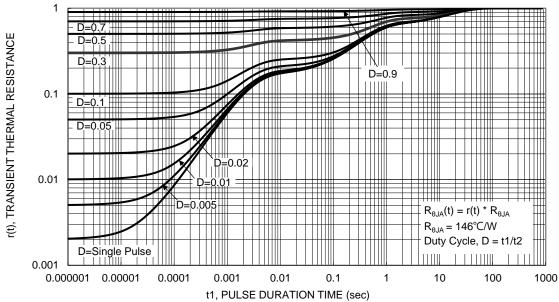


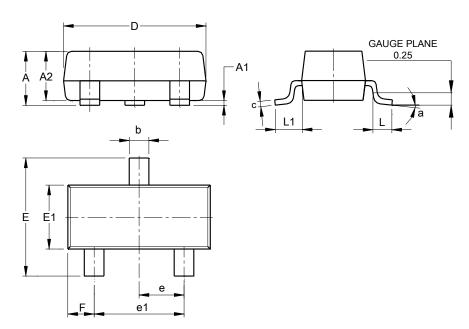
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23 (Standard)

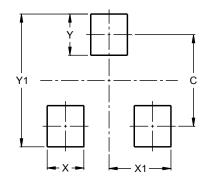


S	SOT23 (Standard)								
Dim	Min	Max	Тур						
Α	0.90	1.15	1.025						
A1	0.00	0.10	0.05						
A2	0.85	1.10	0.975						
b	0.30	0.51	0.40						
С	0.080	0.202	0.11						
D	2.80	3.00	2.90						
Е	2.25	2.55	2.40						
E1	1.20	1.40	1.30						
е	0.89	1.03	0.915						
e1	1.78	2.05	1.83						
F	0.40	0.60	0.535						
L1	0.45	0.61	0.55						
L	0.25	0.55	0.40						
а	0°	8°							
All Dimensions in mm									

Suggested Pad Layout

 $\label{prop:lease} Please see \ http://www.diodes.com/package-outlines.html \ for \ the \ latest \ version.$

SOT23 (Standard)



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



IMPORTANT NOTICE

- 1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).
- 2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.
- 3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.
- 4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.
- Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
- 6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.
- 7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.
- 8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.
- 9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

DIODES is a trademark of Diodes Incorporated in the United States and other countries. The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries. © 2022 Diodes Incorporated. All Rights Reserved.

www.diodes.com