P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	Package	I_D T_A = +25°C
-20V	0.9Ω @ V_{GS} = -4.5V	SOT23	-600mA
	2.0Ω @ V_{GS} = -1.8V		-420mA

Description

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) 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
- Very Low Gate Threshold Voltage $V_{GS(TH)}$ < 1V
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMP2004KQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Mechanical Data

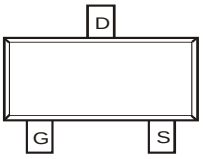
- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)



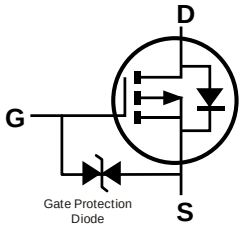
SOT23



Top View



Top View
Internal Schematic



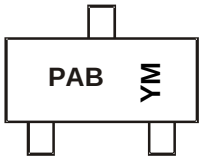
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP2004K-7	SOT23	3,000	Tape & Reel
DMP2004KQ-7	SOT23	3,000	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



PAB = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: L = 2024)
M = Month (ex: 9 = September)

Date Code Key

Year	2006	…	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	T	…	L	M	N	P	R	S	T	U	V	W

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	Unit
Drain-Source Voltage	V_{DSS}	-20	V
Gate-Source Voltage	V_{GSS}	±8	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	I_D	-600	mA
Pulsed Drain Current	I_{DM}	-1.9	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	550	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	227	°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}	—	—	±1.0	µA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.5	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.7	0.9	Ω	V_{GS} = -4.5V, I_D = -430mA
		—	1.1	1.4		V_{GS} = -2.5V, I_D = -300mA
		—	1.7	2.0		V_{GS} = -1.8V, I_D = -150mA
Forward Transfer Admittance	$\|Y_{fs}\|$	200	—	—	ms	V_{DS} = -10V, I_D = -0.2A
Diode Forward Voltage (Note 6)	V_{SD}	-0.5	—	-1.2	V	V_{GS} = 0V, I_S = -115mA
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	—	175	pF	V_{DS} = -16V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	—	30	pF	
Reverse Transfer Capacitance	C_{rss}	—	—	20	pF	
Turn-On Delay Time	$t_{D(ON)}$	—	8.5	—	ns	V_{DD} = -3V, V_{GS} = -2.5V, R_L = 300Ω, R_g = 25Ω, I_D = -100mA
Turn-On Rise Time	t_R	—	4.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	20.2	—	ns	
Turn-Off Fall Time	t_F	—	19.2	—	ns	

Notes: 5. Device mounted on FR-4 PCB.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

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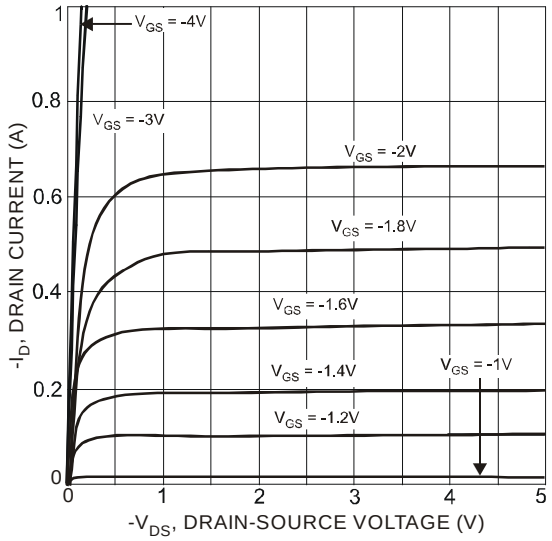


Figure 1 Typical Output Characteristics

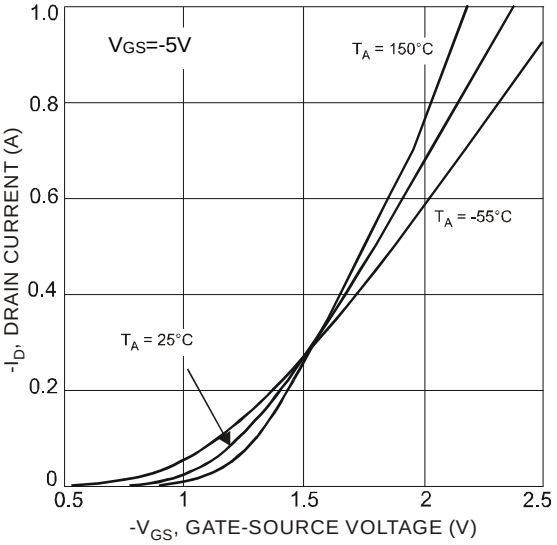


Figure 2 Typical Transfer Characteristics

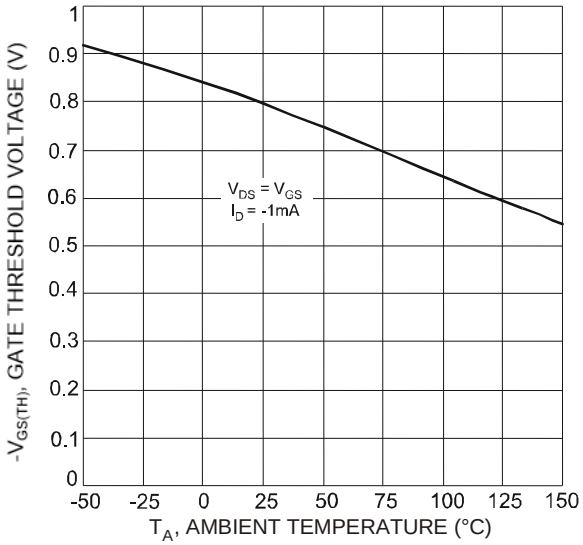


Figure 3 Gate Threshold Voltage vs. Ambient Temperature

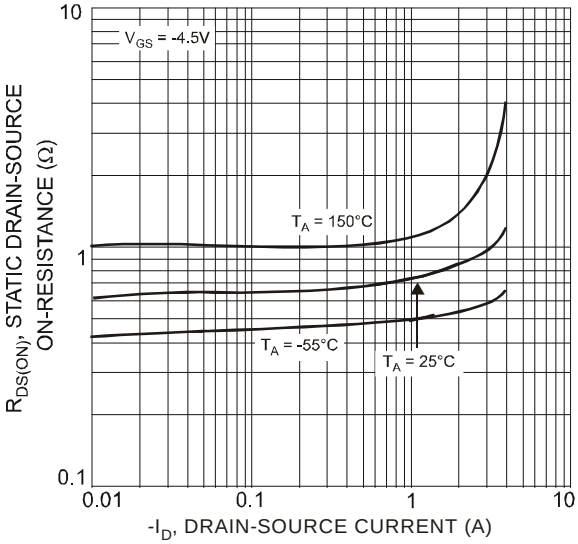


Figure 4 Static Drain-Source On-Resistance vs. Drain Current

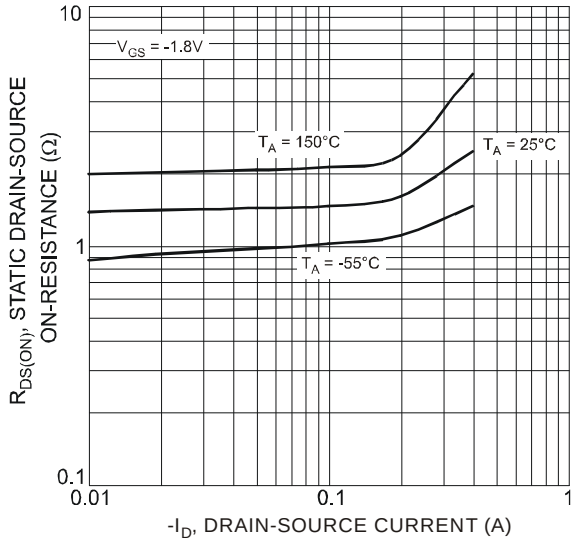


Figure 5 Static Drain-Source On-Resistance vs. Drain Current

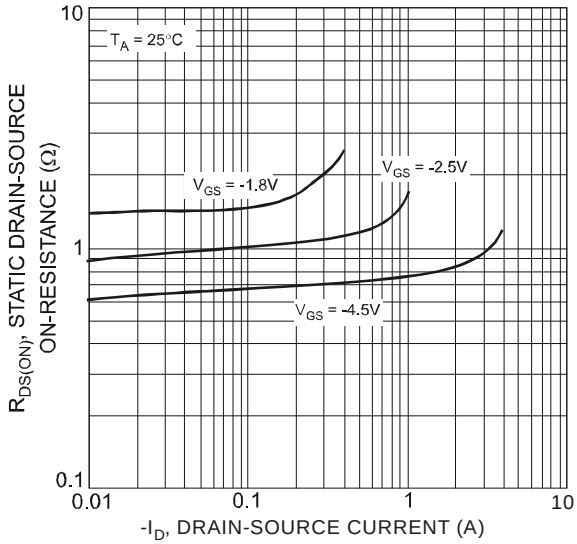


Figure 6 Static Drain-Source On-Resistance vs. Drain-Source Current

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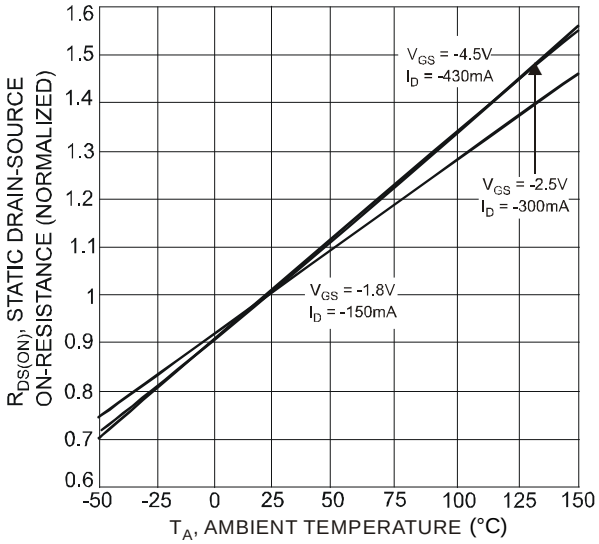


Figure 7 Static Drain-Source On-State Resistance vs. Ambient Temperature

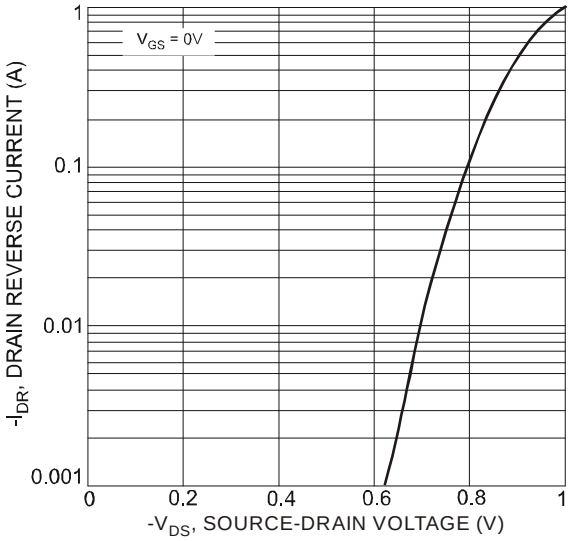


Figure 8 Reverse Drain Current vs. Source-Drain Voltage

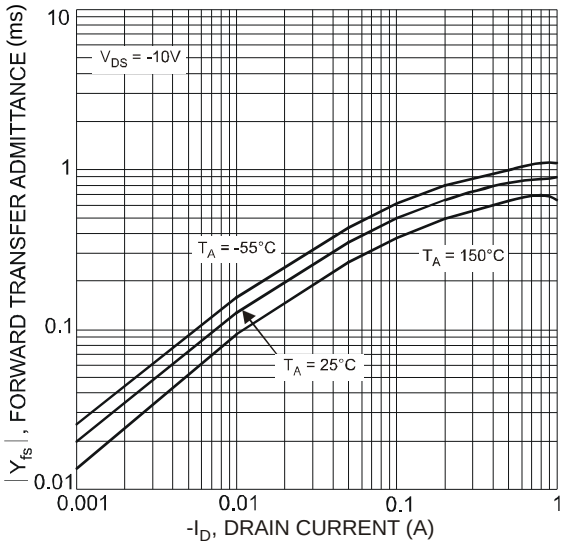


Figure 9 Forward Transfer Admittance vs. Drain Current

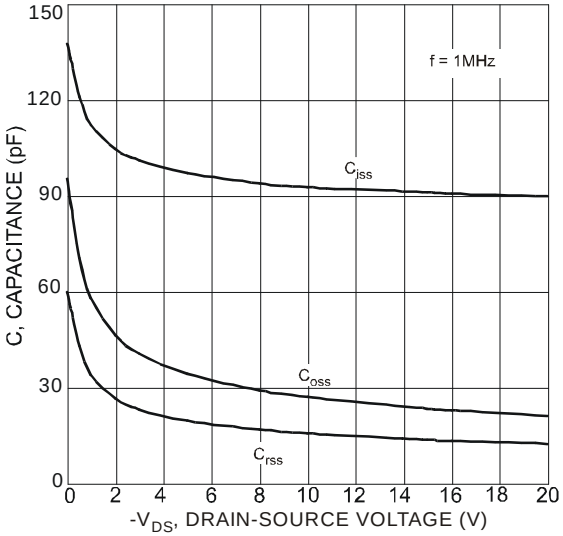


Figure 10 Typical Capacitance

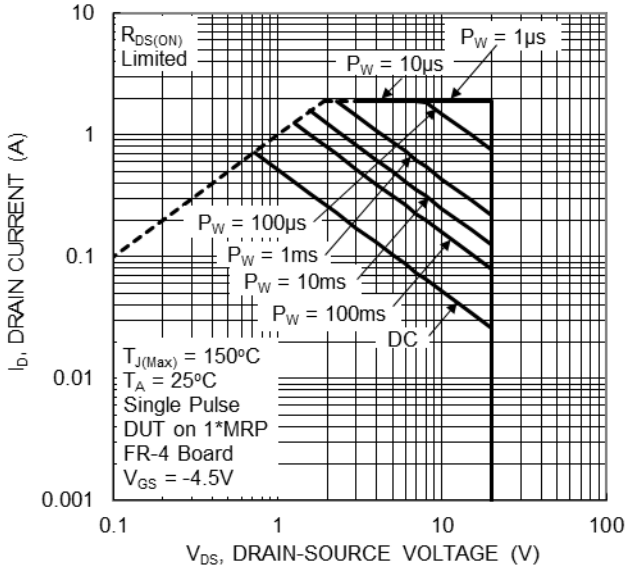


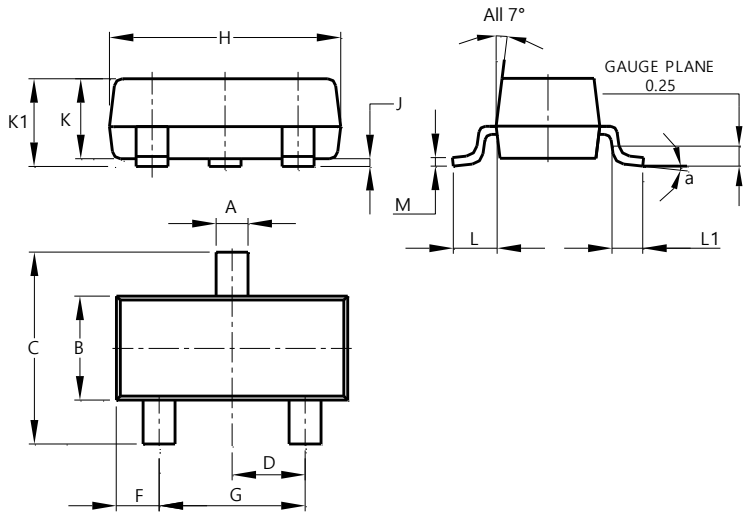
Figure 11 SOA, Safe Operation Area

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Package Outline Dimensions

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

SOT23

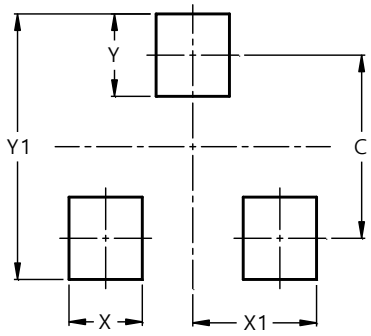


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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