

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | Package | I _D T _A = +25°C |
|-------------------|--------------------------------|---------|--|
| -20V | 0.9Ω @ V _{GS} = -4.5V | SOT23 | -430mA |
| | 2.0Ω @ V _{GS} = -1.8V | | -150mA |

Description

This new generation MOSFET is 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
- Very Low Gate Threshold Voltage V_{GS(TH)} <1V
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate
- Qualified to AEC-Q101 standards for High Reliability
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

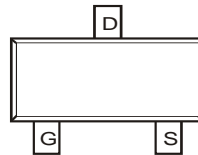
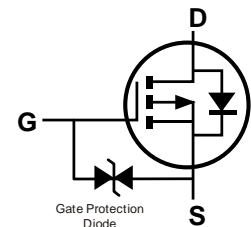
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Terminal Connections: See Diagram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



SOT23



Top View


 Top View
Internal Schematic


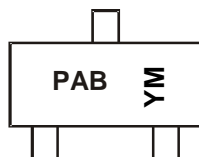
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Compliance | Case | Packaging |
|-------------|------------|-------|-------------------|
| DMP2004K-7 | Standard | SOT23 | 3,000/Tape & Reel |
| DMP2004KQ-7 | Automotive | 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: F = 2018)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2008 | 2009 | ~ | 2018 | 2019 | 2020 | 2021 | 2022 |
|------|------|------|---|------|------|------|------|------|
| Code | V | W | ~ | F | G | H | I | J |

| 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 | 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 _{θJA} | 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.

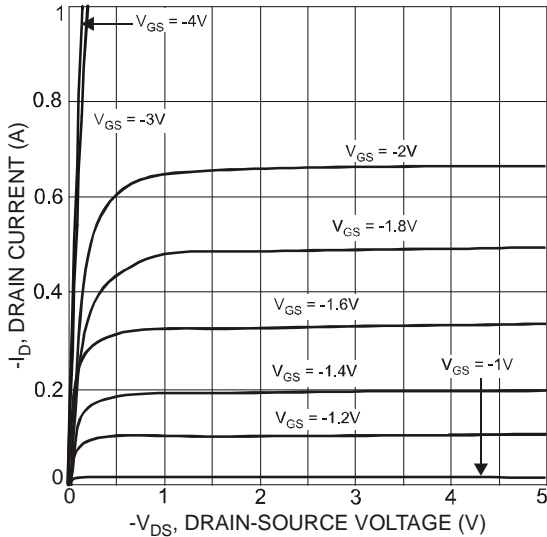


Figure 1 Typical Output Characteristics

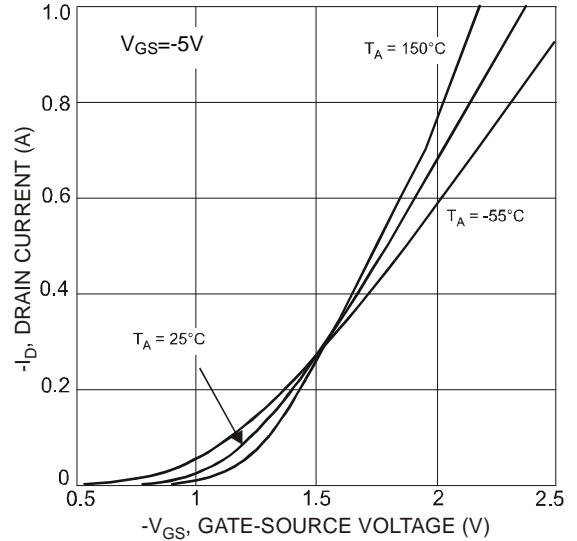


Figure 2 Typical Transfer Characteristics

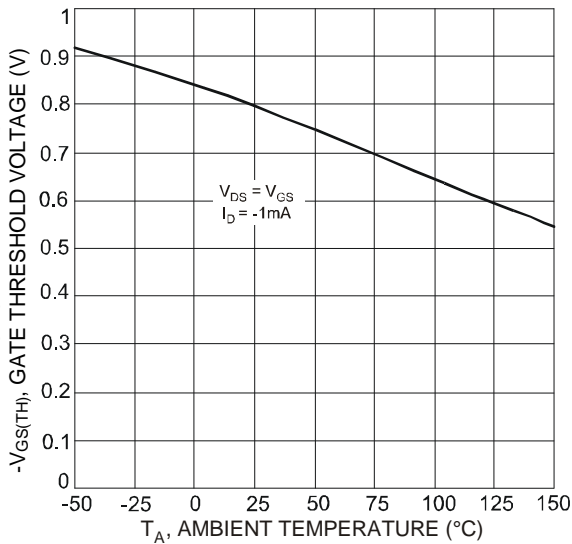


Figure 3 Gate Threshold Voltage vs. Ambient Temperature

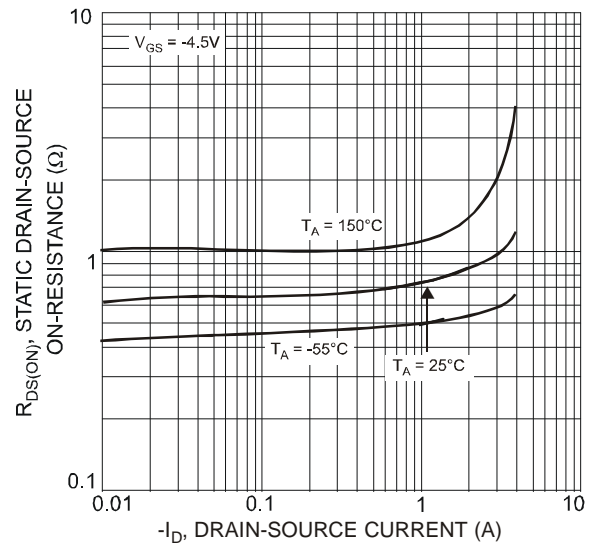


Figure 4 Static Drain-Source On-Resistance vs. Drain Current

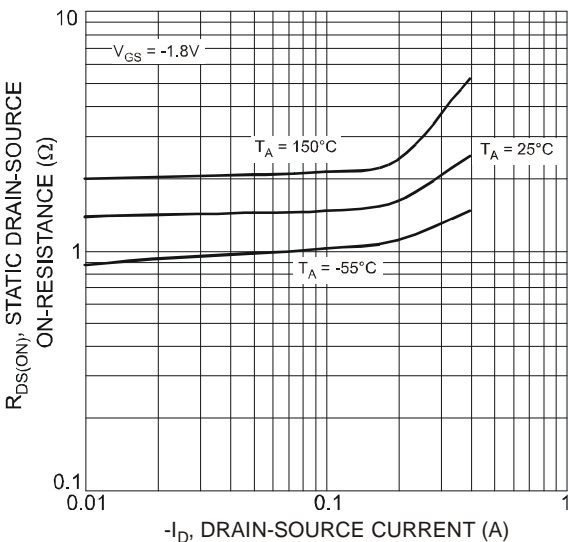


Figure 5 Static Drain-Source On-Resistance vs. Drain Current

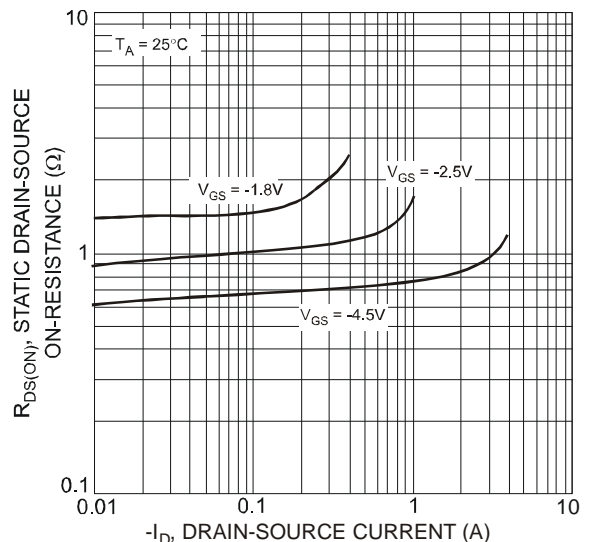


Figure 6 Static Drain-Source On-Resistance vs. Drain-Source Current

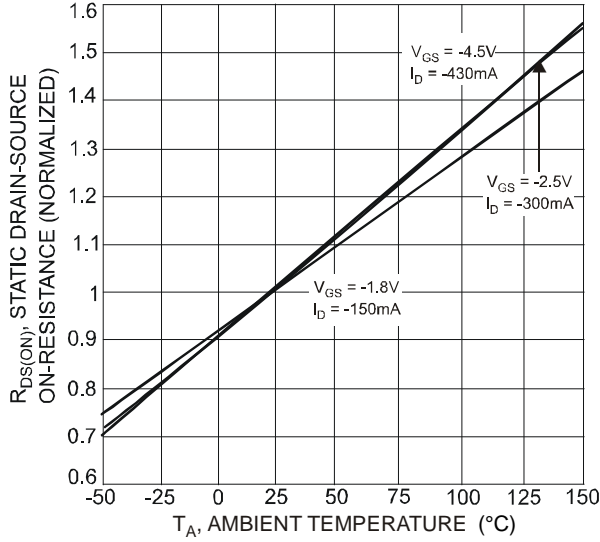


Figure 7 Static Drain-Source On-State Resistance vs. Ambient Temperature

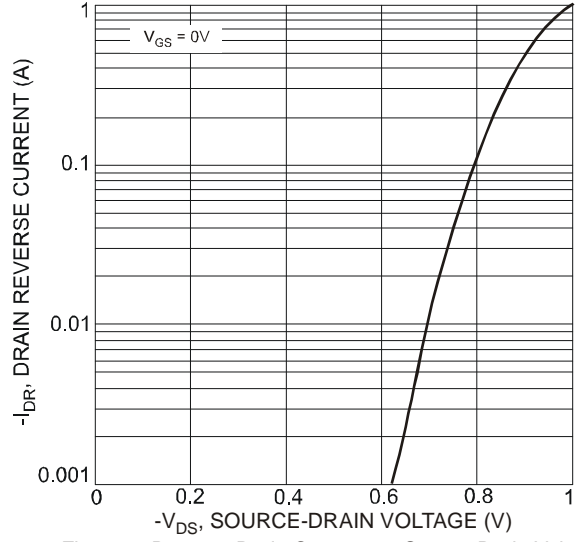


Figure 8 Reverse Drain Current vs. Source-Drain Voltage

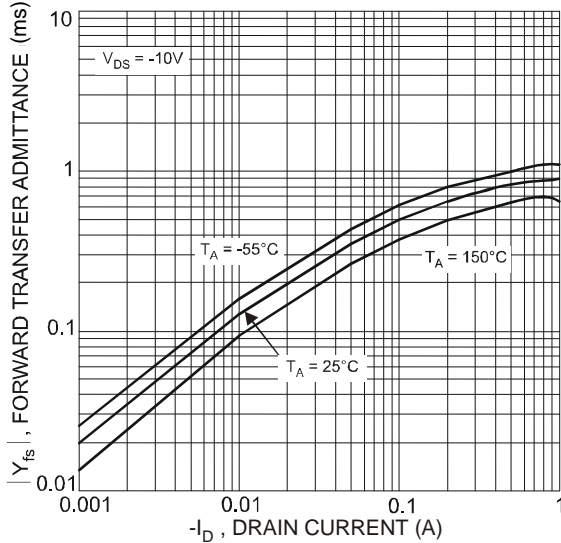


Figure 9 Forward Transfer Admittance vs. Drain Current

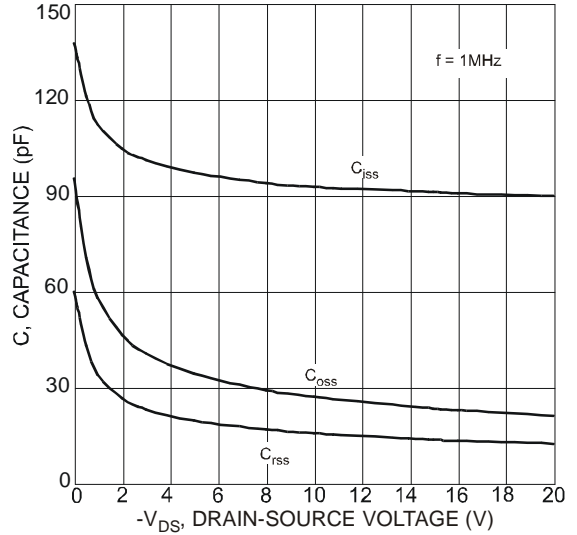
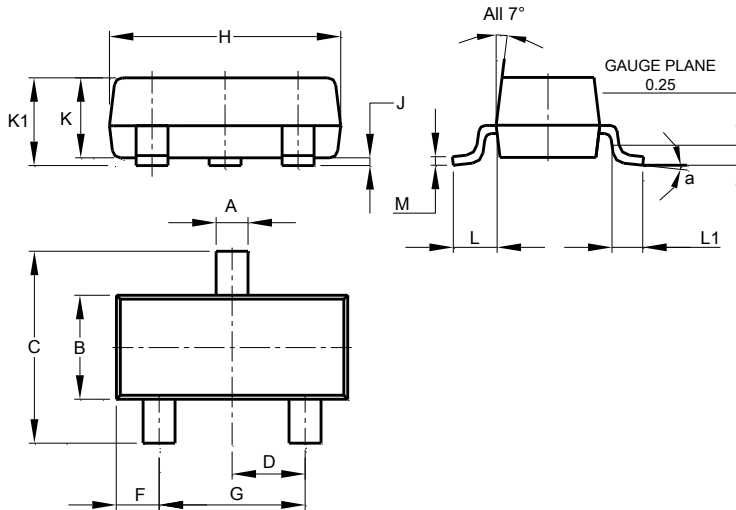


Figure 10 Typical Capacitance

Package Outline Dimensions

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

SOT23

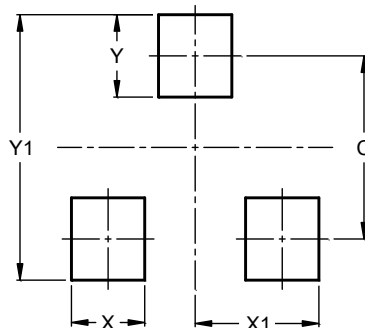


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 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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