

Product Summary

| BV _{DSS} | R _{DS(on)} Max | I _D Max T _A = +25°C |
|-------------------|-------------------------------|--|
| 60V | 5.0Ω @ V _{GS} = 10V | 200mA |
| | 5.3Ω @ V _{GS} = 4.5V | 190mA |

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- 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)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, 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/>**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([MMBF170Q](#))**

Description and Applications

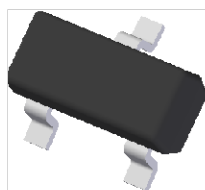
This MOSFET is designed to minimize the on-state resistance (R_{DS(on)}) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor Control
- Power Management Functions

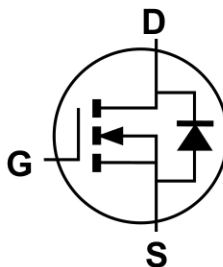
Mechanical Data

- Case: SOT23 (Standard)
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 ⁽³⁾
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)

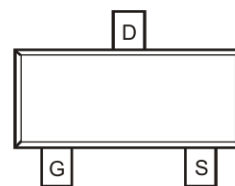
SOT23 (Standard)



Top View



Equivalent Circuit



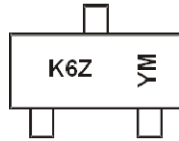
Top View

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|--------------|------------------|--------------------|
| MMBF170-7-F | SOT23 (Standard) | 3,000/Tape & Reel |
| MMBF170-13-F | 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



K6Z = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: I = 2021)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 1998 | | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Code | J | | I | J | K | L | M | N | O | P | R | S |

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

| Characteristic | Symbol | Value | Units |
|--|-----------|----------|-------|
| Drain-Source Voltage | V_{DSS} | 60 | V |
| Drain-Gate Voltage $R_{GS} \leq 1.0\text{M}\Omega$ | V_{DGR} | 60 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Continuous Pulsed (Note 7) | | ± 40 | |
| Continuous Drain Current (Note 5) | I_D | 200 | mA |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | I_{DM} | 800 | mA |

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Units |
|--|-----------------|-------------|---------------------------|
| Total Power Dissipation (Note 5) | P_D | 300 | mW |
| Derating above $T_A = +25^\circ\text{C}$ | | 1.80 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|-----|-----|----------|---------------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 60 | 70 | — | V | $V_{GS} = 0\text{V}, I_D = 100\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1.0 | μA | $V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Body Leakage | I_{GSS} | — | — | ± 10 | nA | $V_{GS} = \pm 15\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.8 | 2.1 | 3.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 2.2 | 5.0 | Ω | $V_{GS} = 10\text{V}, I_D = 200\text{mA}$ $V_{GS} = 4.5\text{V}, I_D = 50\text{mA}$ |
| | | — | 3.2 | 5.3 | | |
| Forward Transconductance | g_{FS} | 80 | — | — | mS | $V_{DS} = 10\text{V}, I_D = 0.2\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C_{iss} | — | 22 | 40 | pF | $V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 11 | 30 | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 2 | 5 | pF | |
| Turn-On Delay Time | $t_{D(on)}$ | — | — | 10 | ns | $V_{DD} = 25\text{V}, I_D = 0.5\text{A},$ $V_{GS} = 10\text{V}, R_{GEN} = 50\Omega$ |
| Turn-Off Delay Time | $t_{D(off)}$ | — | — | 10 | ns | |

Notes: 5. Device mounted on FR-4 PCB 1.0 x 0.75 x 0.062 inch pad layout, which can be found on our website at www.diodes.com/package-outlines.html.
 6. Short duration pulse test used to minimize self-heating effect.
 7. Guaranteed by design. Not subject to product testing.

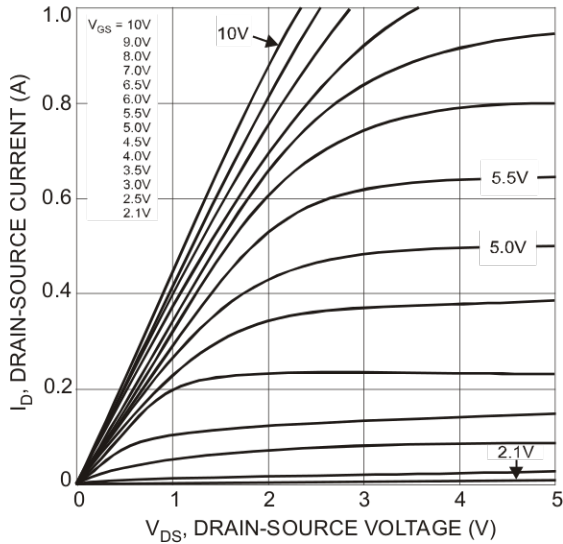


Fig. 1 On-Region Characteristics

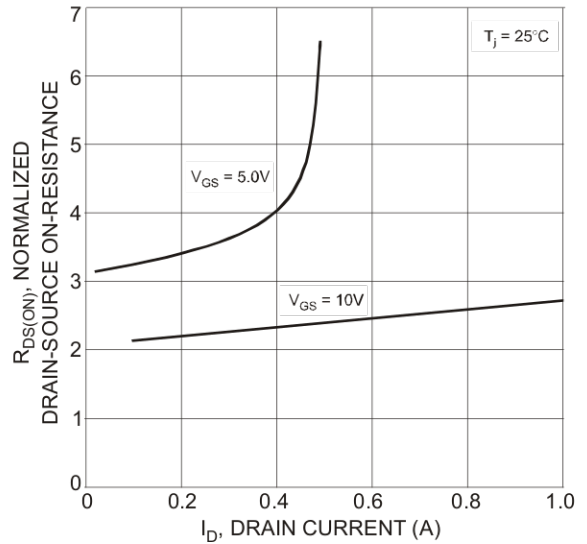


Fig. 2 On-Resistance vs. Drain Current

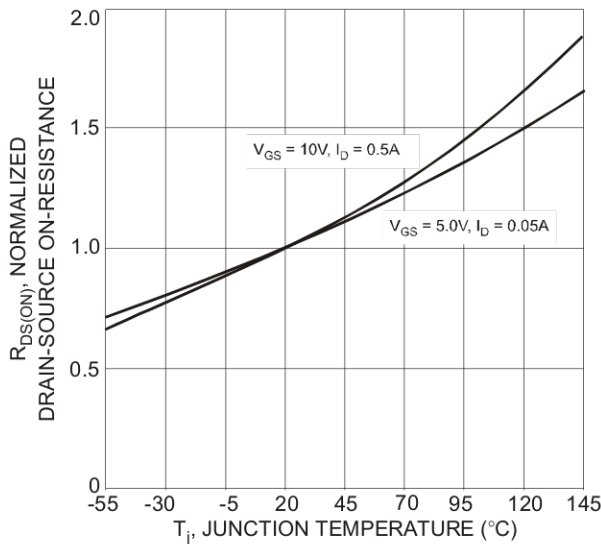


Fig. 3 On-Resistance vs. Junction Temperature

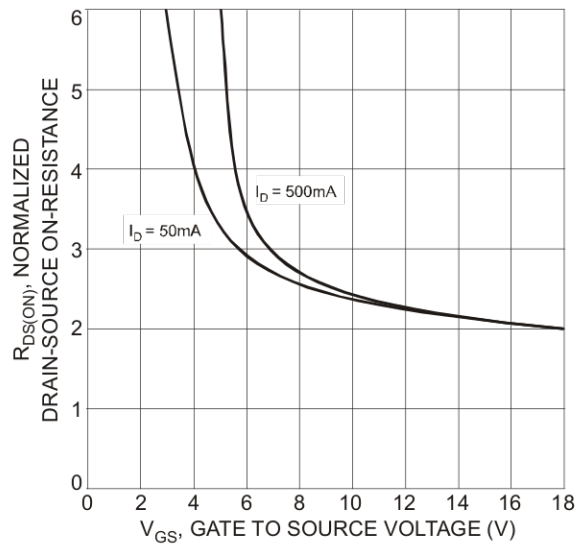


Fig. 4 On-Resistance vs. Gate-Source Voltage

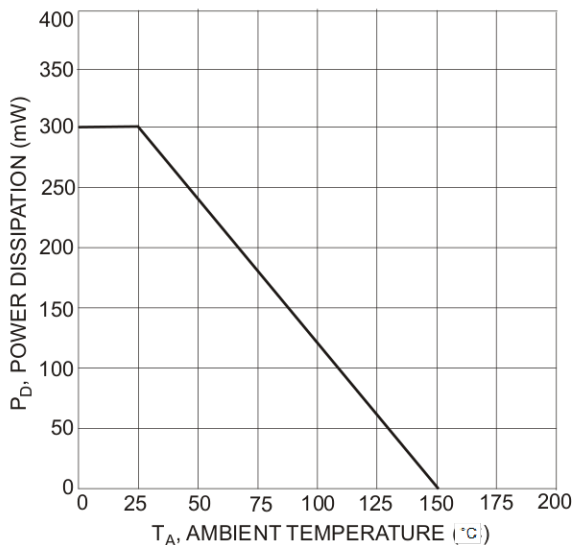
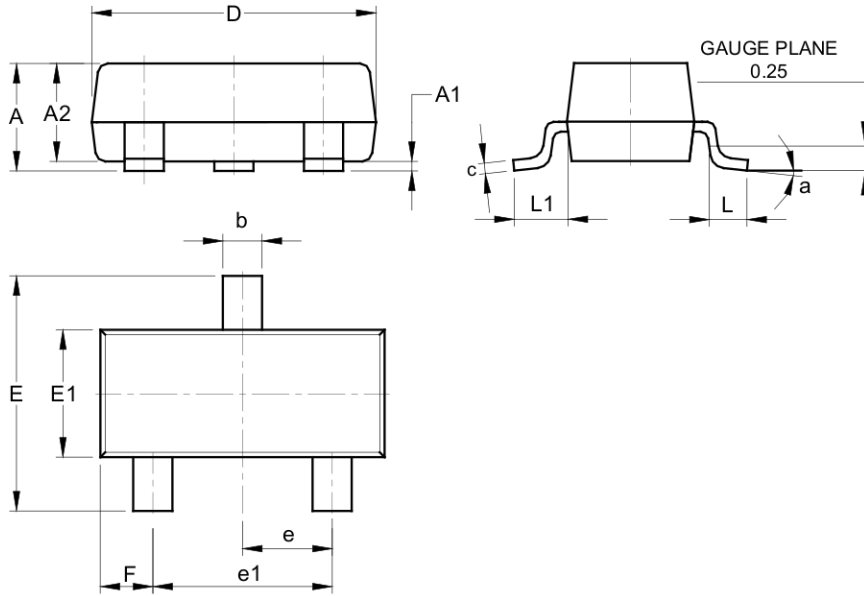


Fig. 5 Max Power Dissipation vs. Ambient Temperature

Package Outline Dimensions

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

SOT23 (Standard)

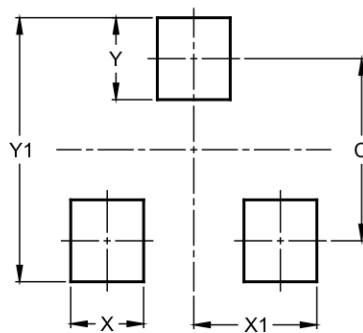


| SOT23 (Standard) | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.15 | 1.025 |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.85 | 1.10 | 0.975 |
| b | 0.30 | 0.51 | 0.40 |
| c | 0.080 | 0.202 | 0.11 |
| D | 2.80 | 3.00 | 2.90 |
| E | 2.25 | 2.55 | 2.40 |
| E1 | 1.20 | 1.40 | 1.30 |
| e | 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 |
| a | 0° | 8° | — |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT23 (Standard)



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

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