



# THE DATASHEET OF MMBF170-7



## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
60V	5.0Ω @ V <sub>GS</sub> = 10V	200mA
	5.3Ω @ V <sub>GS</sub> = 4.5V	190mA

## Features and Benefits

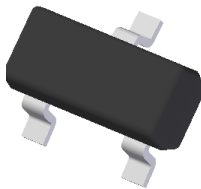
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references 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

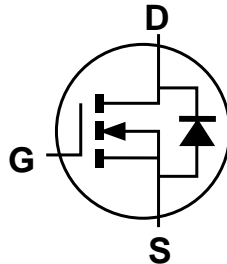
This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Motor controls
- Power-management functions

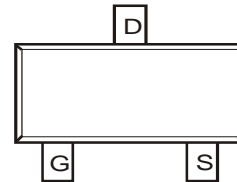
SOT23 (Standard)



Top View



Equivalent Circuit



Top View

## Mechanical Data

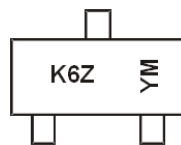
- Package: SOT23
- Package Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Alloy 42 Leadframe (Lead-Free Plating). Solderable per MIL-STD-202, Method 208 (e3)
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

## Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
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  $\bar{Y}$  or  $\underline{Y}$  = Year (ex: L = 2024)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

Year	2007	-	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	U	-	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

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

Characteristic	Symbol	Value	Unit
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	$V_{GSS}$	Continuous	$\pm 20$
		Pulsed (Note 7)	$\pm 40$
Continuous Drain Current (Note 5)	$I_D$	200	mA
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	800	mA

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

Characteristic	Symbol	Value	Unit
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
<b>OFF CHARACTERISTICS (Note 6)</b>						
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	$\mu\text{A}$	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$
Gate-Body Leakage	$I_{GSS}$	—	—	$\pm 10$	nA	$V_{GS} = \pm 15\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 6)</b>						
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	$\Omega$	$V_{GS} = 10\text{V}, I_D = 200\text{mA}$
		—	3.2	5.3		$V_{GS} = 4.5\text{V}, I_D = 50\text{mA}$
Forward Transconductance	$g_{FS}$	80	—	—	mS	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
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	$V_{DD} = 25\text{V}, I_D = 0.5\text{A}$
Turn-Off Delay Time	$t_{D(off)}$	—	—	10	ns	$V_{GS} = 10\text{V}, R_{GEN} = 50\Omega$

- 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](http://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.

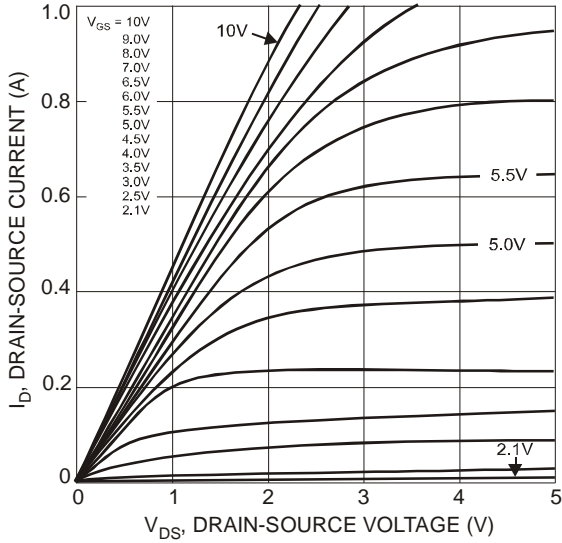


Fig. 1 On-Region Characteristics

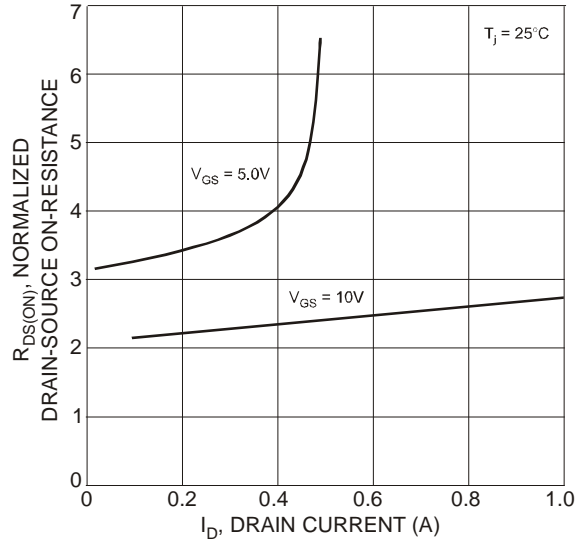


Fig. 2 On-Resistance vs. Drain Current

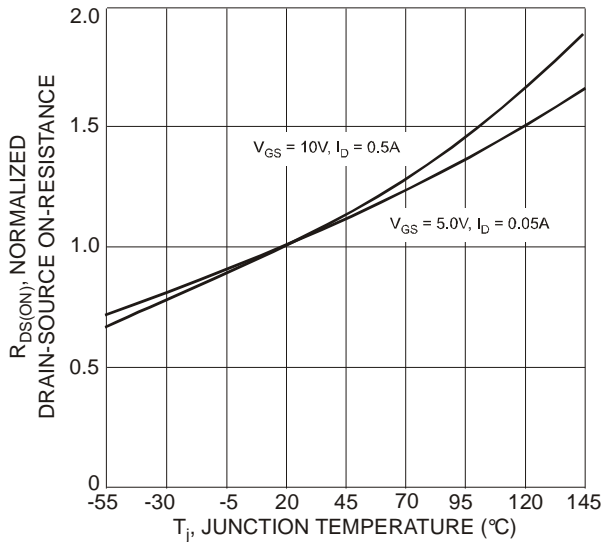


Fig. 3 On-Resistance vs. Junction Temperature

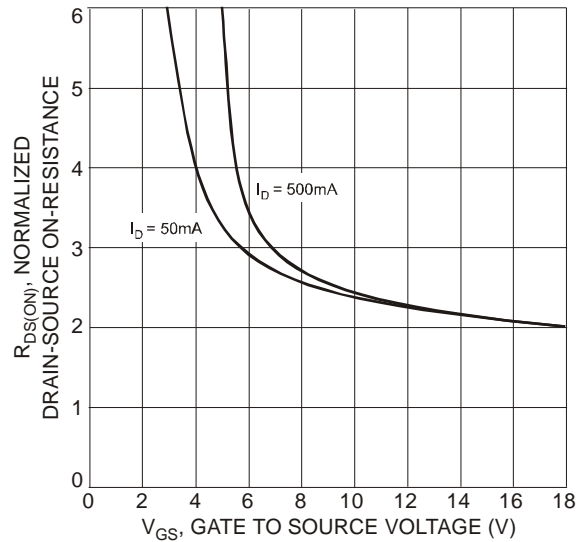


Fig. 4 On-Resistance vs. Gate-Source Voltage

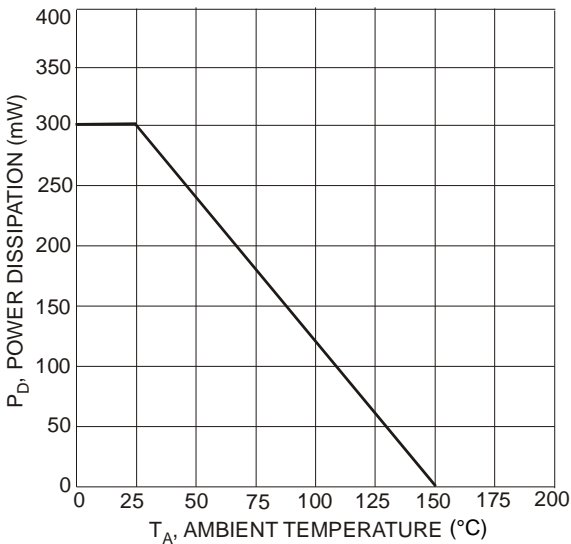
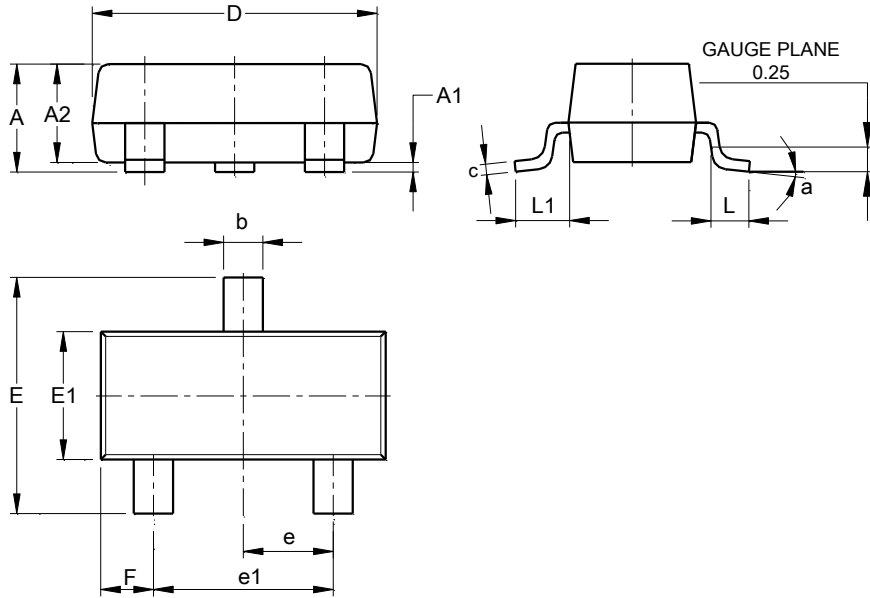


Fig. 5 Max Power Dissipation vs. Ambient Temperature

**Package Outline Dimensions**

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

**SOT23 (Standard)**

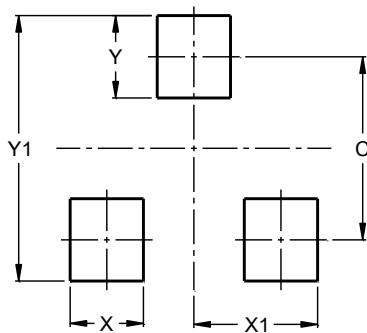


SOT23 (Standard)			
Dim	Min	Max	Typ
A	0.90	1.15	1.025
A1	0.00	0.10	0.05
A2	0.85	1.10	0.975
b	0.30	0.51	0.40
c	0.080	0.202	0.11
D	2.80	3.00	2.90
E	2.25	2.55	2.40
E1	1.20	1.40	1.30
e	0.89	1.03	0.915
e1	1.78	2.05	1.83
F	0.40	0.60	0.535
L1	0.45	0.61	0.55
L	0.25	0.55	0.40
a	0°	8°	--
All Dimensions in mm			

**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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