

# MMBF170LT1

## Power MOSFET 500 mA, 60 V N-Channel SOT-23

### Features

- Pb-Free Packages are Available

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	Vdc
Drain-Gate Voltage	$V_{DGS}$	60	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$	Vdc
– Continuous	$V_{GSM}$	$\pm 40$	Vpk
– Non-repetitive ( $t_p \leq 50 \mu s$ )			
Drain Current – Continuous	$I_D$	0.5	Adc
– Pulsed	$I_{DM}$	0.8	

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1.) $T_A = 25^\circ C$ Derate above $25^\circ C$	$P_D$	225 1.8	mW mW/ $^\circ C$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ C/W$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ C$

1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.

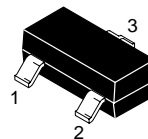
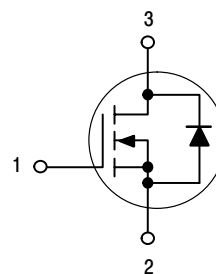


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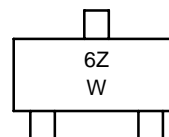
500 mA, 60 V  
 $R_{DS(on)} = 5 \Omega$

N-Channel



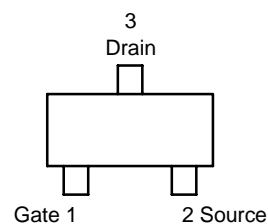
SOT-23  
CASE 318  
STYLE 21

### MARKING DIAGRAM



6Z = Device Code  
W = Work Week

### PIN ASSIGNMENT



### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit	
<b>OFF CHARACTERISTICS</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 100 μA)	V <sub>(BR)DSS</sub>	60	-	Vdc	
Gate-Body Leakage Current, Forward (V <sub>GSF</sub> = 15 Vdc, V <sub>DS</sub> = 0)	I <sub>GSS</sub>	-	10	nAdc	
<b>ON CHARACTERISTICS (Note 1)</b>					
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.0 mA)	V <sub>GS(th)</sub>	0.8	3.0	Vdc	
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 200 mA)	r <sub>DS(on)</sub>	-	5.0	Ω	
On-State Drain Current (V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0)	I <sub>D(off)</sub>	-	0.5	μA	
<b>DYNAMIC CHARACTERISTICS</b>					
Input Capacitance (V <sub>DS</sub> = 10 Vdc, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>iss</sub>	-	60	pF	
<b>SWITCHING CHARACTERISTICS (Note 1)</b>					
Turn-On Delay Time	(V <sub>DD</sub> = 25 Vdc, I <sub>D</sub> = 500 mA, R <sub>gen</sub> = 50 Ω) Figure 1	t <sub>d(on)</sub>	-	10	ns
Turn-Off Delay Time		t <sub>d(off)</sub>	-	10	

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## ORDERING INFORMATION

Device	Package	Shipping†
MMBF170LT1	SOT-23 (TO-236)	10,000 Tape & Reel
MMBF170LT1G	SOT-23 (TO-236) (Pb-Free)	3,000 Tape & Reel
MMBF170LT3	SOT-23 (TO-236)	10,000 Tape & Reel
MMBF170LT3G	SOT-23 (TO-236) (Pb-Free)	3,000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

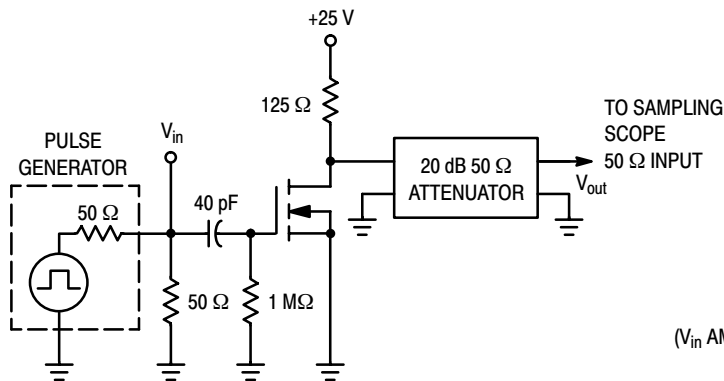


Figure 1. Switching Test Circuit

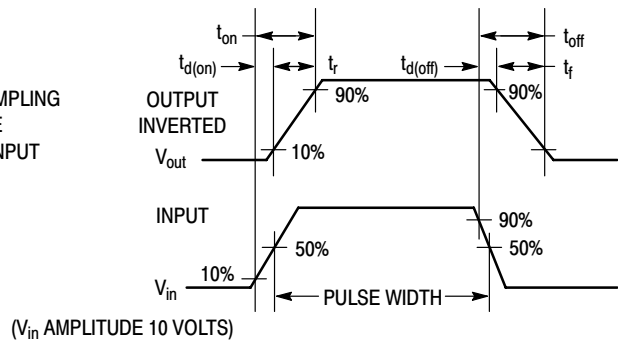


Figure 2. Switching Waveform

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## TYPICAL ELECTRICAL CHARACTERISTICS

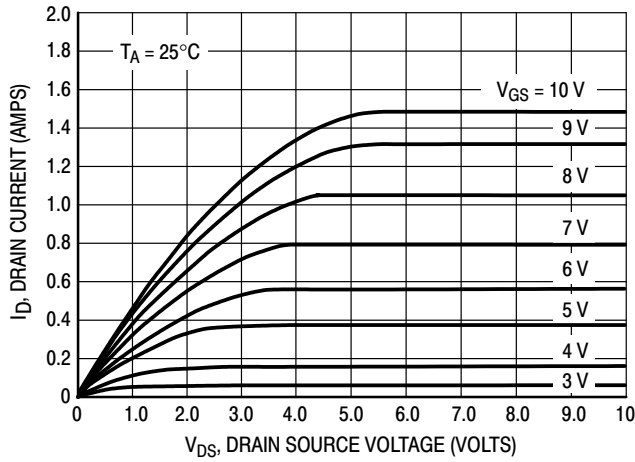


Figure 3. Ohmic Region

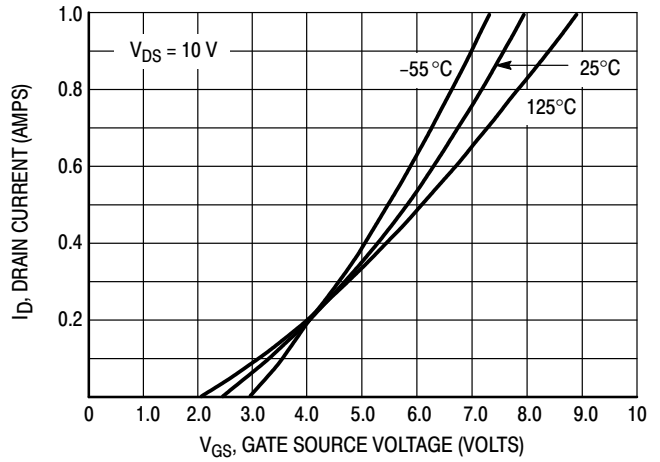


Figure 4. Transfer Characteristics

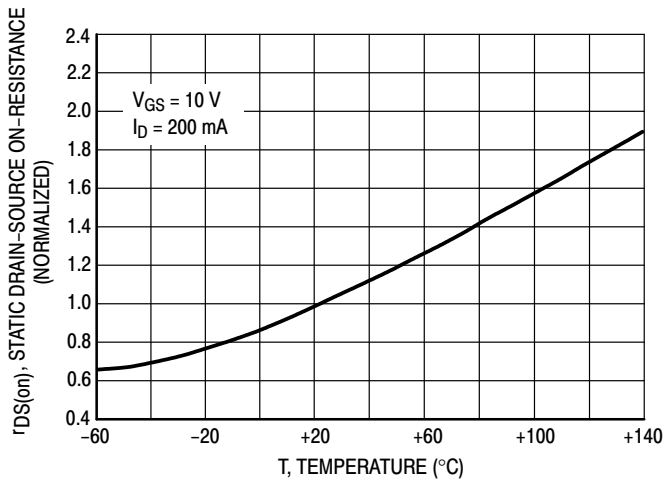


Figure 5. Temperature versus Static Drain-Source On-Resistance

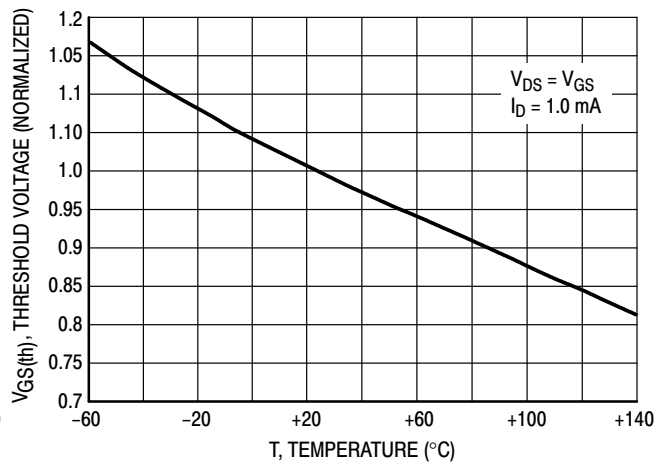
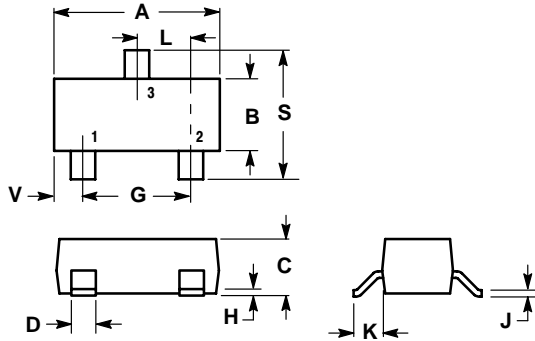


Figure 6. Temperature versus Gate Threshold Voltage

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## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AH



NOTES:

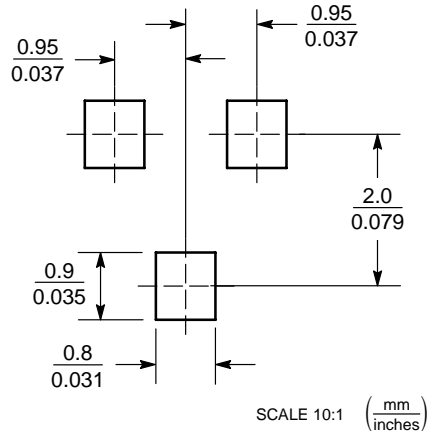
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-03 AND -07 OBSOLETE, NEW STANDARD 318-08.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

STYLE 21:

- PIN 1. GATE
- SOURCE
- DRAIN

### SOLDERING FOOTPRINT\*



### SOT-23

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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