

MMBF170L, NVBF170L

Power MOSFET

500 mA, 60 V, N-Channel SOT-23

Features

- NVBF Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

MAXIMUM RATINGS

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

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	$^\circ C$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

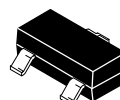


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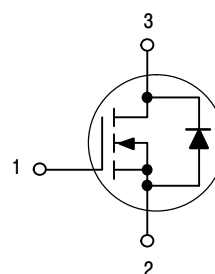
500 mA, 60 V

$R_{DS(on)} = 5 \Omega$

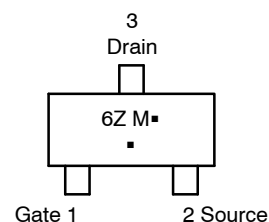


SOT-23
CASE 318
STYLE 21

N-Channel



MARKING DIAGRAM & PIN ASSIGNMENT



6Z = Specific Device Code
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 100\ \mu\text{A}$)	$V_{(BR)DSS}$	60	–	Vdc
Gate-Body Leakage Current, Forward ($V_{GSF} = 15\ \text{Vdc}$, $V_{DS} = 0$)	I_{GSS}	–	10	nAdc

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 1.0\ \text{mA}$)	$V_{GS(th)}$	0.8	3.0	Vdc
Static Drain-Source On-Resistance ($V_{GS} = 10\ \text{Vdc}$, $I_D = 200\ \text{mA}$)	$r_{DS(on)}$	–	5.0	Ω
On-State Drain Current ($V_{DS} = 25\ \text{Vdc}$, $V_{GS} = 0$)	$I_{D(off)}$	–	0.5	μA

DYNAMIC CHARACTERISTICS

Input Capacitance ($V_{DS} = 10\ \text{Vdc}$, $V_{GS} = 0\ \text{V}$, $f = 1.0\ \text{MHz}$)	C_{iss}	–	60	pF
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SWITCHING CHARACTERISTICS (Note 1)

Turn-On Delay Time	$(V_{DD} = 25\ \text{Vdc}$, $I_D = 500\ \text{mA}$, $R_{gen} = 50\ \Omega$) Figure 1	$t_{d(on)}$	–	10	ns
Turn-Off Delay Time		$t_{d(off)}$	–	10	

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

ORDERING INFORMATION

Device	Package	Shipping [†]
MMBF170LT1G	SOT-23 (TO-236) (Pb-Free)	3000 / Tape & Reel
MMBF170LT3G	SOT-23 (TO-236) (Pb-Free)	10000 / Tape & Reel
NVBF170LT1G*	SOT-23 (TO-236) (Pb-Free)	3000 / 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.

*NVBF Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

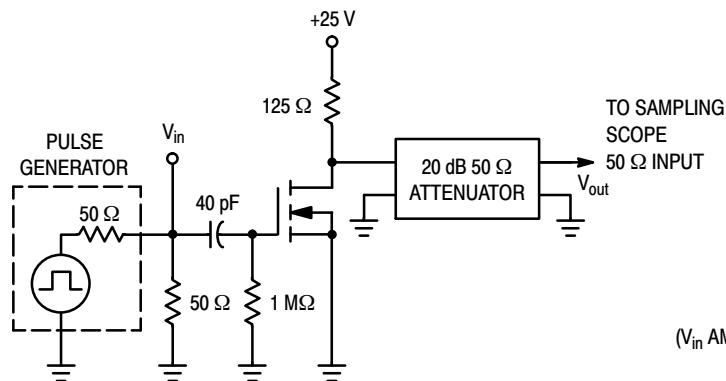


Figure 1. Switching Test Circuit

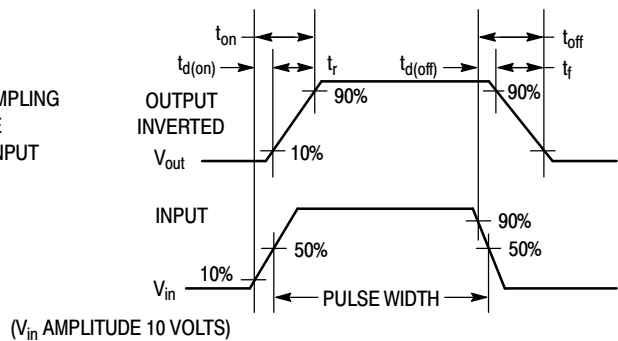


Figure 2. Switching Waveform

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TYPICAL ELECTRICAL CHARACTERISTICS

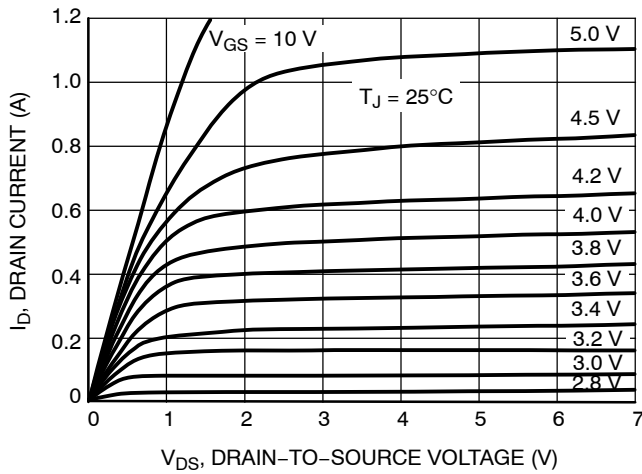


Figure 3. On-Region Characteristics

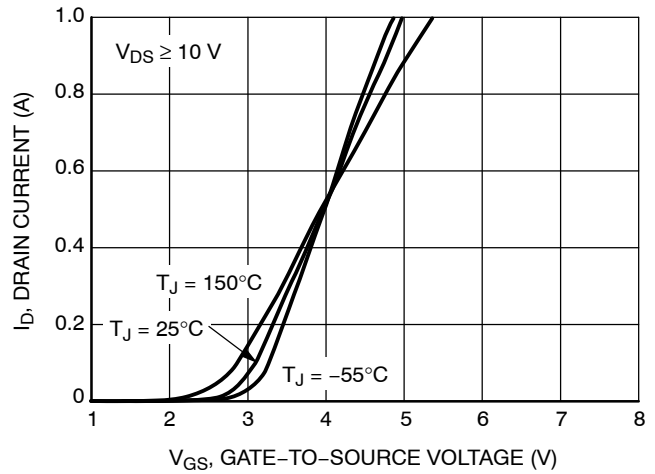


Figure 4. Transfer Characteristics

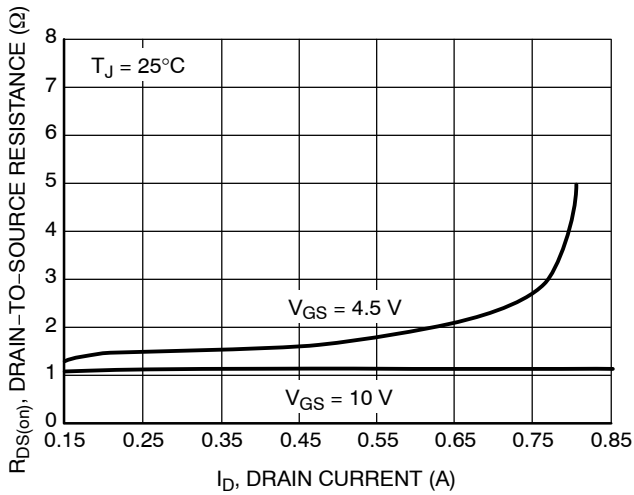


Figure 5. On-Resistance vs. Drain Current and Gate Voltage

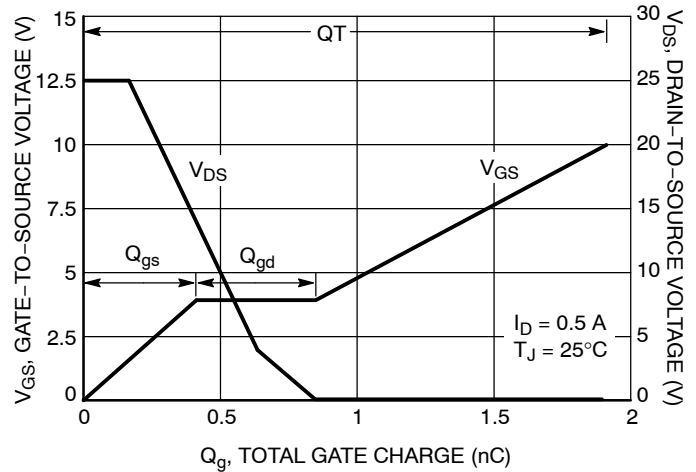


Figure 6. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

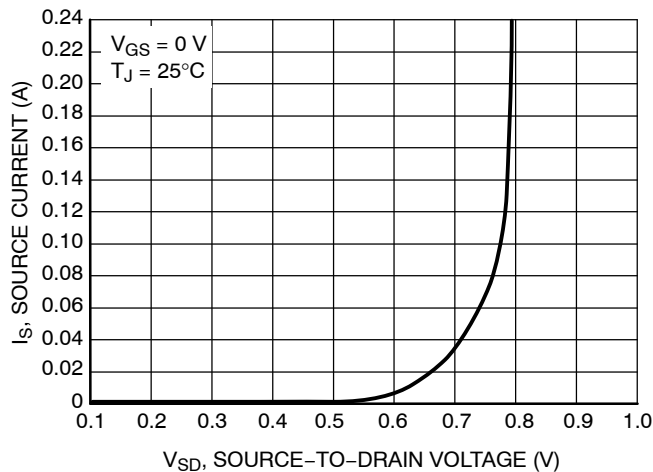


Figure 7. Diode Forward Voltage vs. Current

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TYPICAL ELECTRICAL CHARACTERISTICS

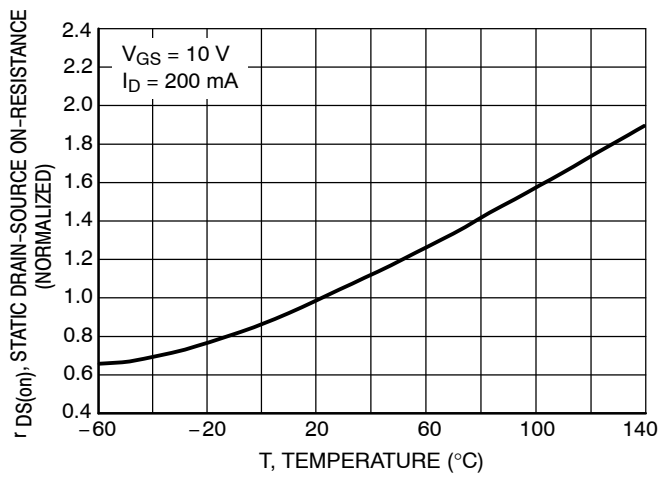


Figure 8. Temperature versus Static Drain-Source On-Resistance

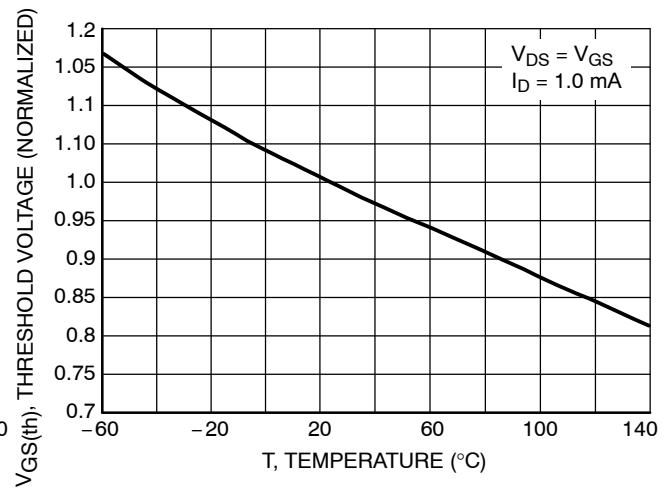


Figure 9. Temperature versus Gate Threshold Voltage

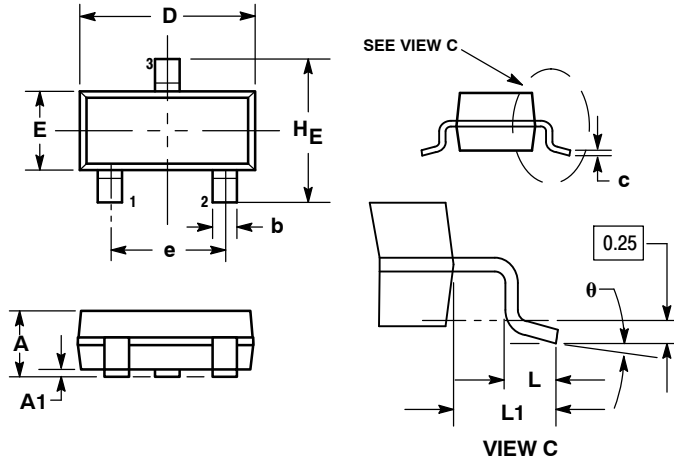
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PACKAGE DIMENSIONS

SOT-23 (TO-236)

CASE 318-08

ISSUE AP



NOTES:

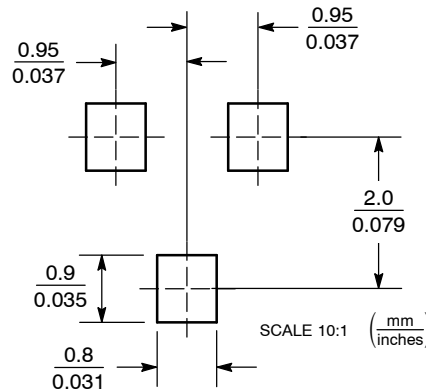
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104
theta	0°	---	10°	0°	---	10°

STYLE 21:

1. GATE
2. SOURCE
3. DRAIN

SOLDERING FOOTPRINT*



*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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