



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



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 those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

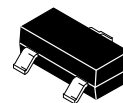


ON Semiconductor®

www.onsemi.com

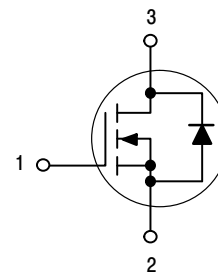
500 mA, 60 V

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

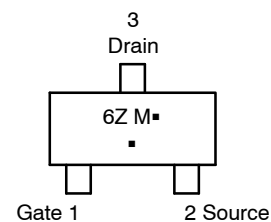


SOT-23
CASE 318
STYLE 21

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.

MMBF170L, NVBF170L

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

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 |
|--|-----------|---|----|----|

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 | |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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.

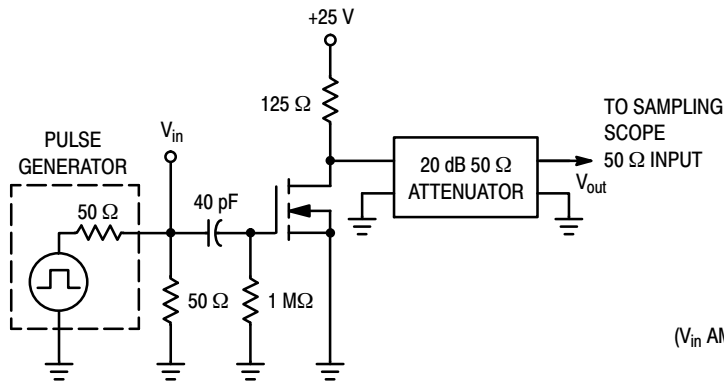


Figure 1. Switching Test Circuit

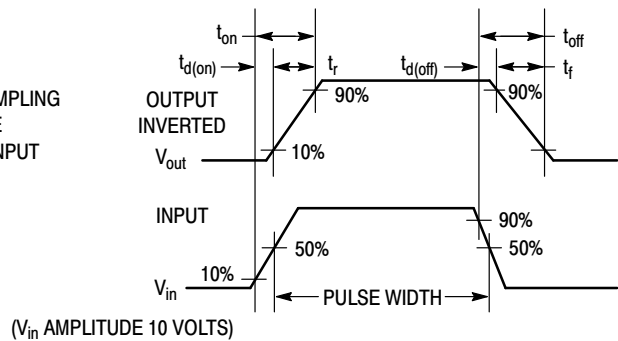


Figure 2. Switching Waveform

MMBF170L, NVBF170L

TYPICAL ELECTRICAL CHARACTERISTICS

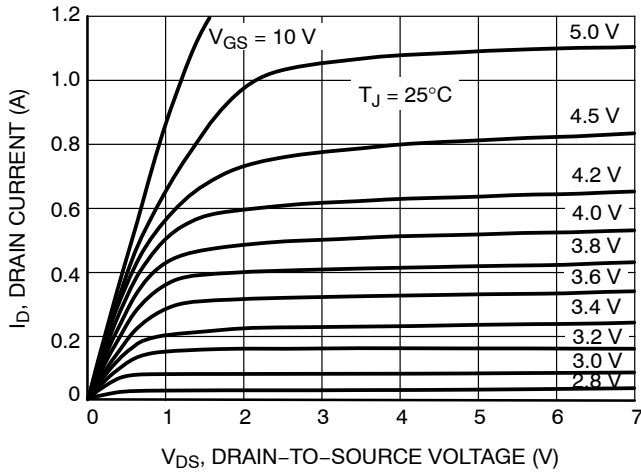


Figure 3. On-Region Characteristics

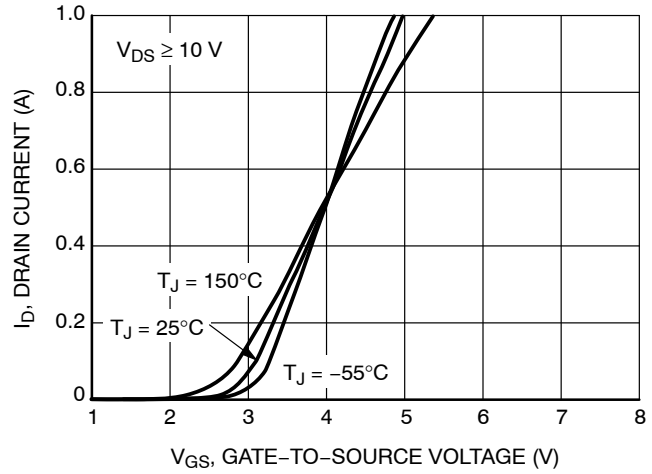


Figure 4. Transfer Characteristics

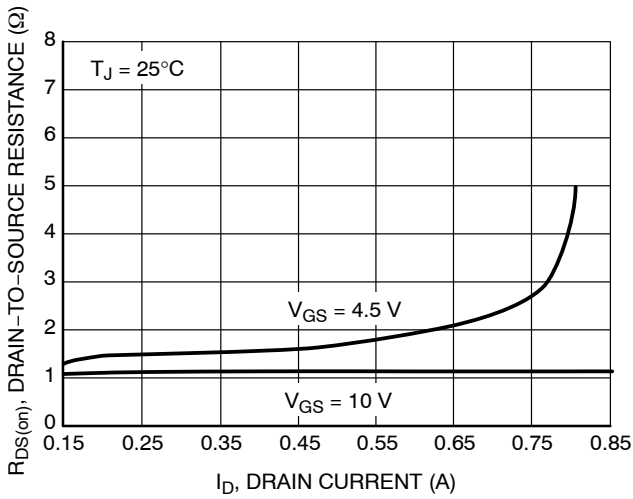


Figure 5. On-Resistance vs. Drain Current and Gate Voltage

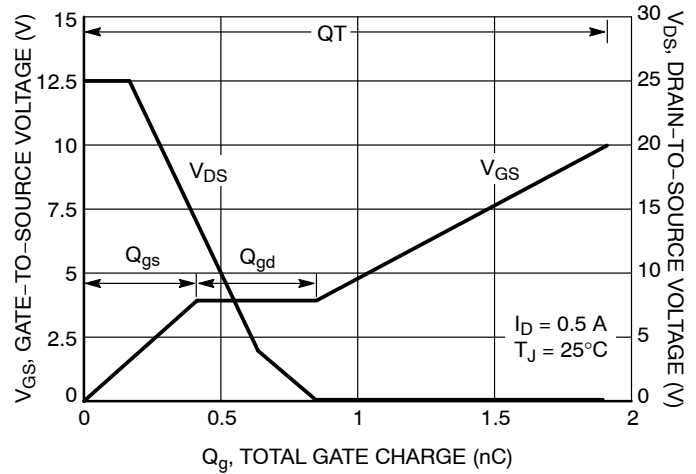


Figure 6. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

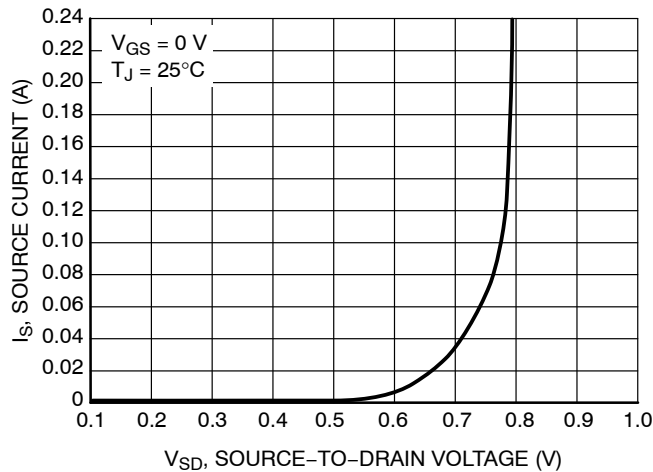


Figure 7. Diode Forward Voltage vs. Current

MMBF170L, NVBF170L

TYPICAL ELECTRICAL CHARACTERISTICS

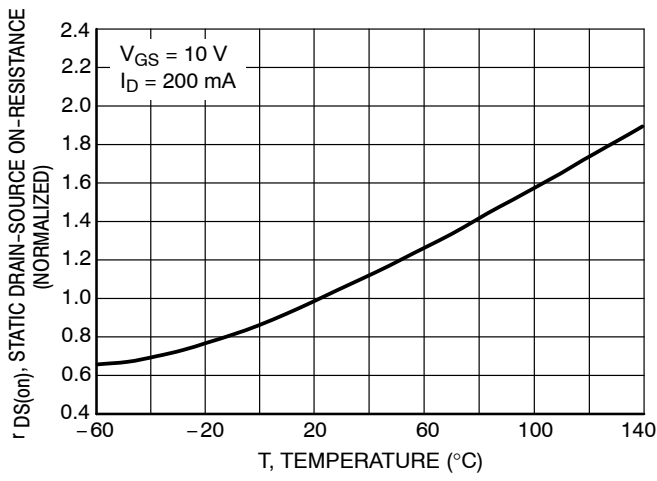


Figure 8. Temperature versus Static Drain-Source On-Resistance

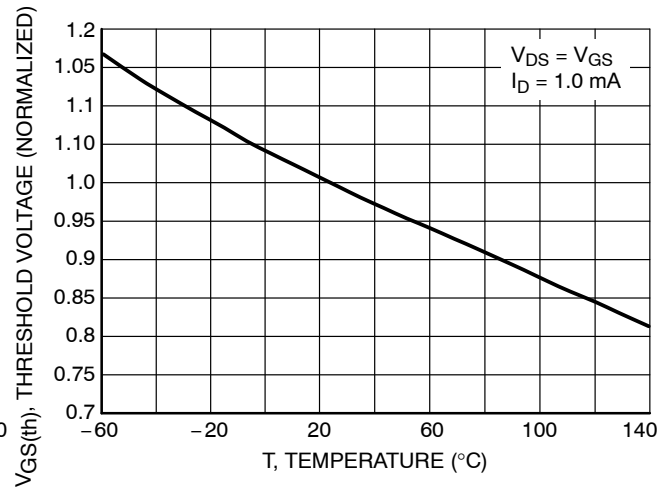
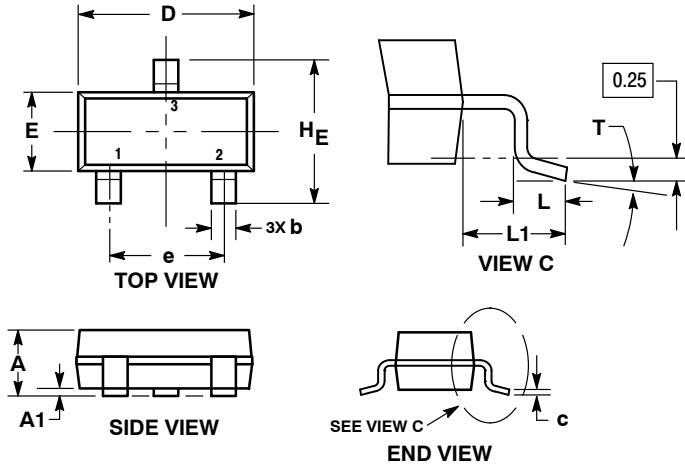


Figure 9. Temperature versus Gate Threshold Voltage

MMBF170L, NVBF170L

PACKAGE DIMENSIONS

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



NOTES:

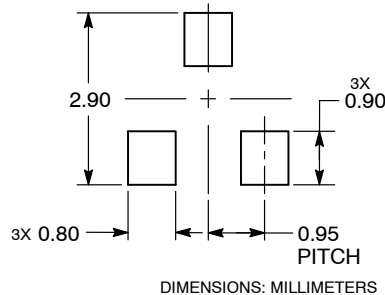
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.039 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.017 | 0.020 |
| c | 0.08 | 0.14 | 0.20 | 0.003 | 0.006 | 0.008 |
| 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 | 0.080 |
| L | 0.30 | 0.43 | 0.55 | 0.012 | 0.017 | 0.022 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.027 |
| HE | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |
| T | 0° | --- | 10° | 0° | --- | 10° |

STYLE 21:

- PIN 1. GATE
- SOURCE
- DRAIN

RECOMMENDED SOLDERING FOOTPRINT*



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

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative