# MMBF0201NL, MVMBF0201NL

# Power MOSFET 300 mAmps, 20 Volts

## N−Channel SOT−23

These miniature surface mount MOSFETs low $R_{DS(on)}$ assure minimal power loss and conserve energy, making these devices ideal for use in small power management circuitry. Typical applications are dc−dc converters, power management in portable and battery−powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

### Features

- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SOT−23 Surface Mount Package Saves Board Space
- MVMBF 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** ($T_J$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain−to−Source Voltage | $V_{DSS}$ | 20 | Vdc |
| Gate−to−Source Voltage − Continuous | $V_{GS}$ | ± 20 | Vdc |
| Drain Current<br>− Continuous @ $T_A$ = 25°C<br>− Continuous @ $T_A$ = 70°C<br>− Pulsed Drain Current ($t_p \le 10$ μs) | <br>$I_D$<br>$I_D$<br>$I_{DM}$ | <br>300<br>240<br>750 | mAdc |
| Total Power Dissipation @ $T_A$ = 25°C | $P_D$ | 225 | mW |
| Operating and Storage Temperature Range | $T_J$, $T_{stg}$ | − 55 to 150 | °C |
| Thermal Resistance, Junction−to−Ambient | $R_{\theta JA}$ | 556 | °C/W |
| Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds | $T_L$ | 260 | °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.

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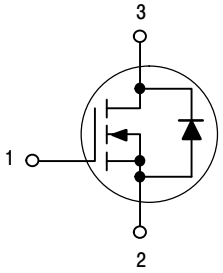
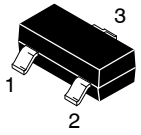
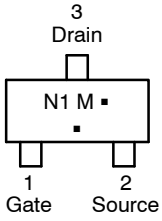
**300 mAMPS − 20 VOLTS**
**$R_{DS(on)}$ = 1 Ω**

**N−Channel**




**MARKING DIAGRAM AND PIN ASSIGNMENT**




**SOT−23**
**CASE 318**
**STYLE 21**

N1 = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)
*Date Code orientation and/or overbar may vary depending upon manufacturing location.

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| MMBF0201NLT1G | SOT−23 (Pb−Free) | 3000 / Tape & Reel |
| MVMBF0201NLT1G* | SOT−23 (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.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain−to−Source Breakdown Voltage ($V_{GS}$ = 0 Vdc, $I_D$ = 10 μA) | | $V_{(BR)DSS}$ | 20 | – | – | Vdc |
| Zero Gate Voltage Drain Current ($V_{DS}$ = 16 Vdc, $V_{GS}$ = 0 Vdc)<br>($V_{DS}$ = 16 Vdc, $V_{GS}$ = 0 Vdc, $T_J$ = 125°C) | | $I_{DSS}$ | –<br>– | –<br>– | 1.0<br>10 | μAdc |
| Gate−Body Leakage Current ($V_{GS}$ = ± 20 Vdc, $V_{DS}$ = 0) | | $I_{GSS}$ | – | – | ±100 | nAdc |
| **ON CHARACTERISTICS** (Note 1) | | | | | | |
| Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 250 μAdc) | | $V_{GS(th)}$ | 1.0 | 1.7 | 2.4 | Vdc |
| Static Drain−to−Source On−Resistance ($V_{GS}$ = 10 Vdc, $I_D$ = 300 mAdc)<br>($V_{GS}$ = 4.5 Vdc, $I_D$ = 100 mAdc) | | $r_{DS(on)}$ | –<br>– | 0.75<br>1.0 | 1.0<br>1.4 | Ω |
| Forward Transconductance ($V_{DS}$ = 10 Vdc, $I_D$ = 200 mAdc) | | $g_{FS}$ | – | 450 | – | mMhos |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | ($V_{DS}$ = 5.0 V) | $C_{iss}$ | – | 45 | – | pF |
| Output Capacitance | ($V_{DS}$ = 5.0 V) | $C_{oss}$ | – | 25 | – | |
| Transfer Capacitance | ($V_{DG}$ = 5.0 V) | $C_{rss}$ | – | 5.0 | – | |
| **SWITCHING CHARACTERISTICS** (Note 2) | | | | | | |
| Turn−On Delay Time | ($V_{DD}$ = 15 Vdc, $I_D$ = 300 mAdc, $R_L$ = 50 Ω) | $t_{d(on)}$ | – | 2.5 | – | ns |
| Rise Time | | $t_r$ | – | 2.5 | – | |
| Turn−Off Delay Time | | $t_{d(off)}$ | – | 15 | – | |
| Fall Time | | $t_f$ | – | 0.8 | – | |
| Gate Charge (See Figure 5) | | $Q_T$ | – | 1400 | – | pC |
| **SOURCE−DRAIN DIODE CHARACTERISTICS** | | | | | | |
| Continuous Current | | $I_S$ | – | – | 0.3 | A |
| Pulsed Current | | $I_{SM}$ | – | – | 0.75 | |
| Forward Voltage (Note 2) | | $V_{SD}$ | – | 0.85 | – | V |

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperature.

## TYPICAL ELECTRICAL CHARACTERISTICS

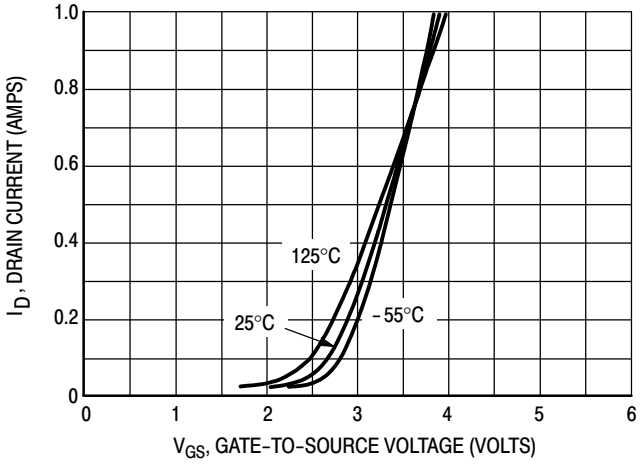



**Figure 1. Transfer Characteristics**

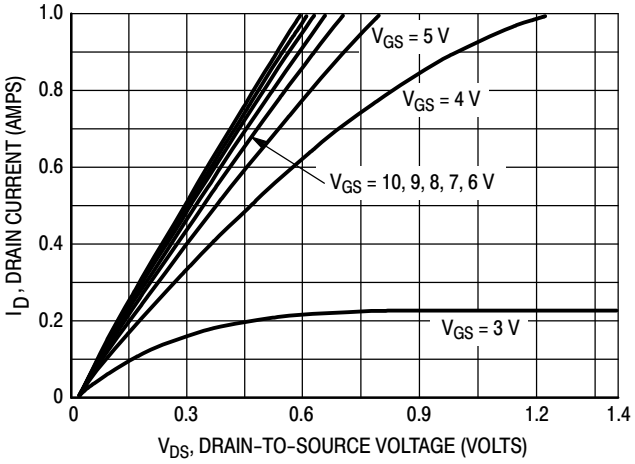



**Figure 2. On−Region Characteristics**

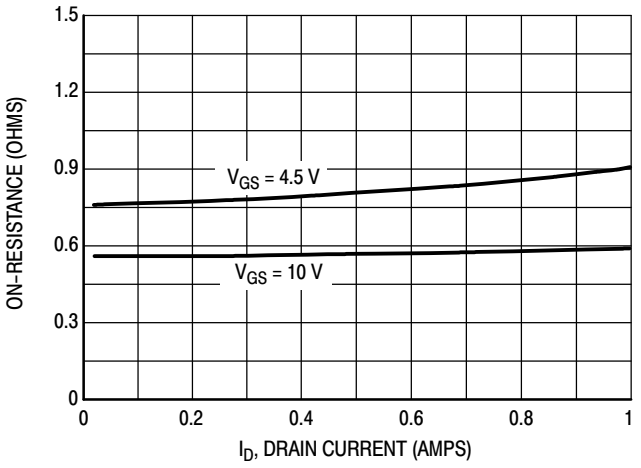



**Figure 3. On−Resistance versus Drain Current**

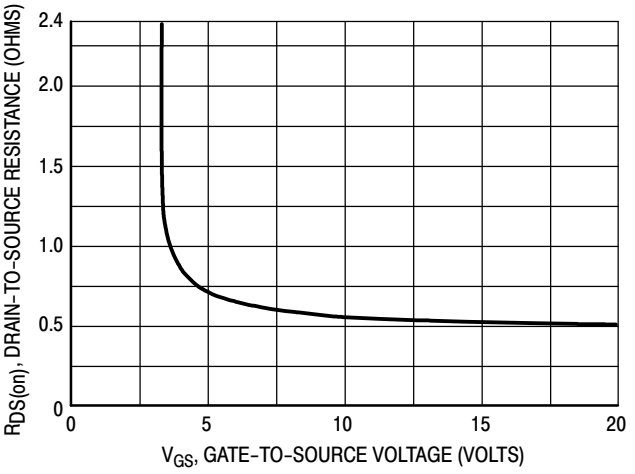



**Figure 4. On−Resistance versus Gate−to−Source Voltage**

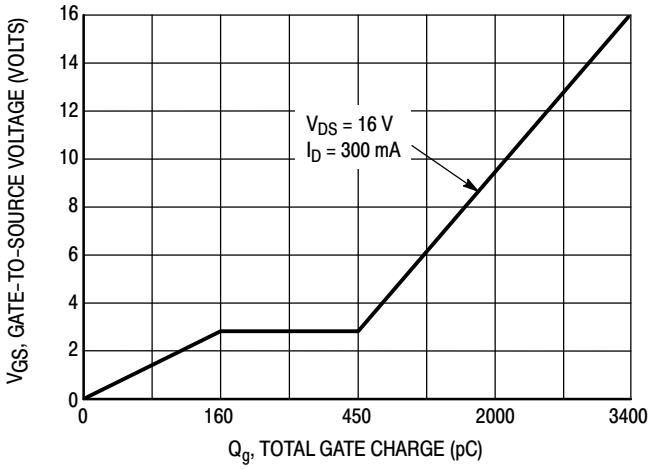



**Figure 5. Gate Charge**

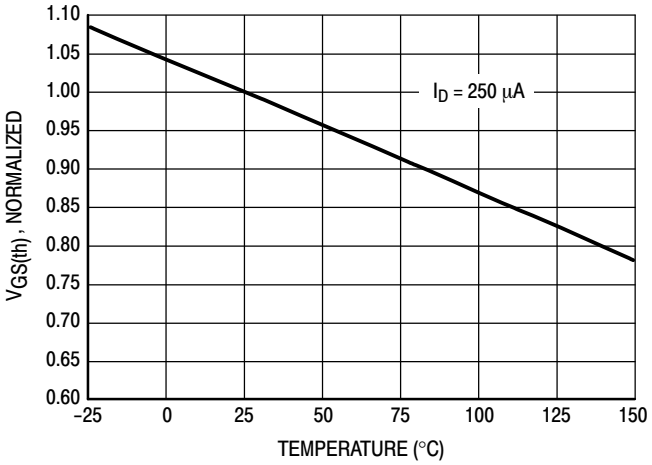



**Figure 6. Threshold Voltage Variance Over Temperature**

## TYPICAL ELECTRICAL CHARACTERISTICS

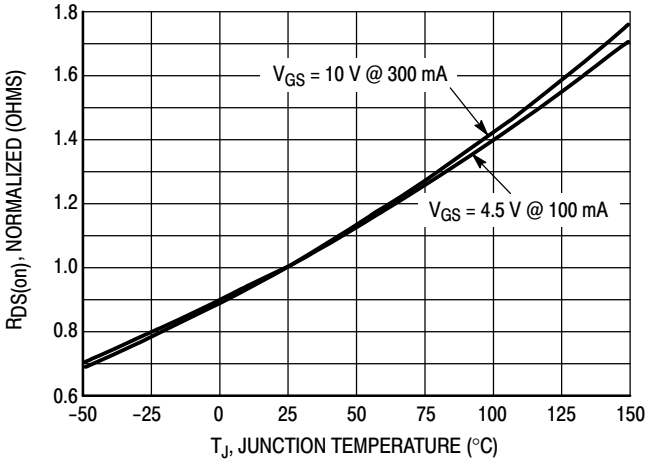



**Figure 7. On−Resistance versus Junction Temperature**

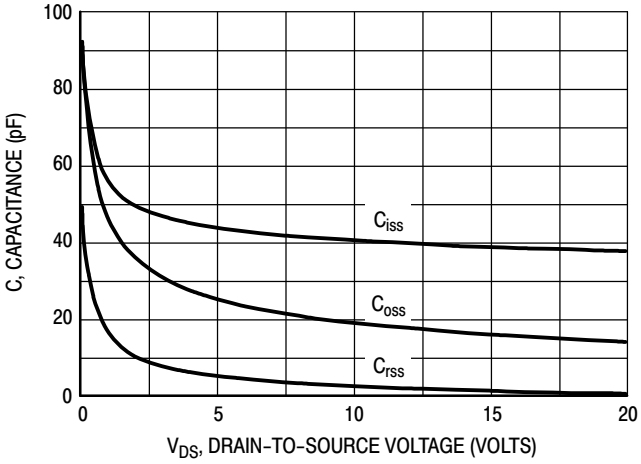



**Figure 8. Capacitance**

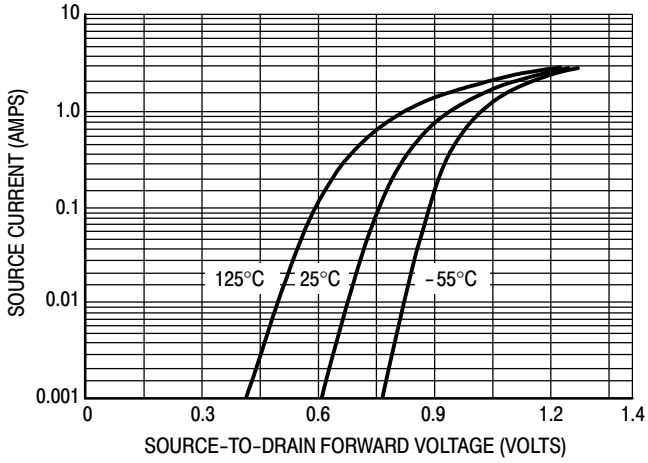
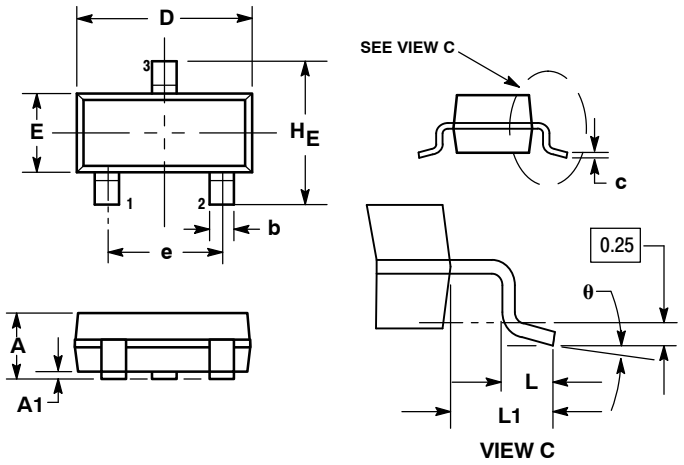



**Figure 9. Source−to−Drain Forward Voltage versus Continuous Current ($I_S$)**

## PACKAGE DIMENSIONS

**SOT−23 (TO−236)**
CASE 318−08
ISSUE AP

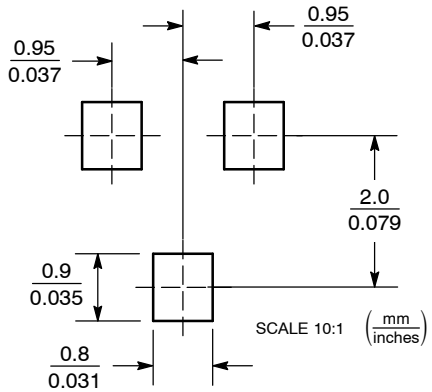



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | 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 |
| θ | 0° | −−− | 10° | 0° | −−− | 10° |

STYLE 21:
PIN 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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