

MMBF2201N, NVF2201N

Power MOSFET 300 mAmps, 20 Volts

N-Channel SC-70/SOT-323

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 SC-70/SOT-323 Surface Mount Package Saves Board Space
- NVF 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 ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	20	Vdc
Gate-to-Source Voltage - Continuous	V_{GS}	± 20	Vdc
Drain Current			mAdc
- Continuous @ $T_A = 25^\circ\text{C}$	I_D	300	
- Continuous @ $T_A = 70^\circ\text{C}$	I_D	240	
- Pulsed Drain Current ($t_p \leq 10 \mu\text{s}$)	I_{DM}	750	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1) Derate above 25°C	P_D	150 1.2	mW mW/ $^\circ\text{C}$
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	833	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, for 10 seconds	T_L	260	$^\circ\text{C}$

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. Mounted on G10/FR4 glass epoxy board using minimum recommended footprint.

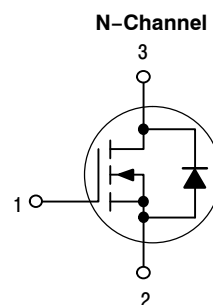


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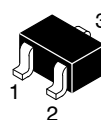
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300 mAmps, 20 Volts

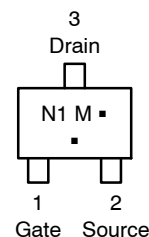
$R_{DS(on)} = 1 \Omega$



MARKING DIAGRAM AND PIN ASSIGNMENT



SC-70/SOT-323
CASE 419
STYLE 8



N1 = Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
MMBF2201NT1G	SOT-323 (Pb-Free)	3000 / Tape & Reel
NVF2201NT1G*	SOT-323 (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.

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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) (V _{DS} = 16 Vdc, V _{GS} = 0 Vdc, T _J = 125°C)	I _{DSS}	-	-	1.0 10	μAdc	
Gate-Body Leakage Current (V _{GS} = ± 20 Vdc, V _{DS} = 0)	I _{GSS}	-	-	±100	nAdc	
ON CHARACTERISTICS (Note 2)						
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) (V _{GS} = 4.5 Vdc, I _D = 100 mAdc)	r _{DS(on)}	-	0.75 1.0	1.0 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 3)						
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 3)	V _{SD}	-	0.85	-	V	

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

TYPICAL CHARACTERISTICS

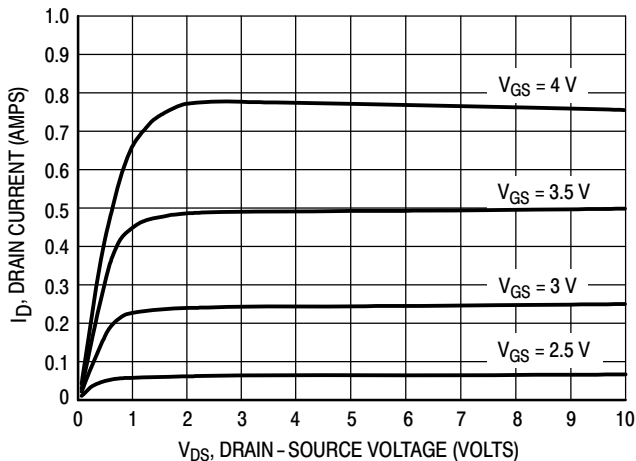


Figure 1. Typical Drain Characteristics

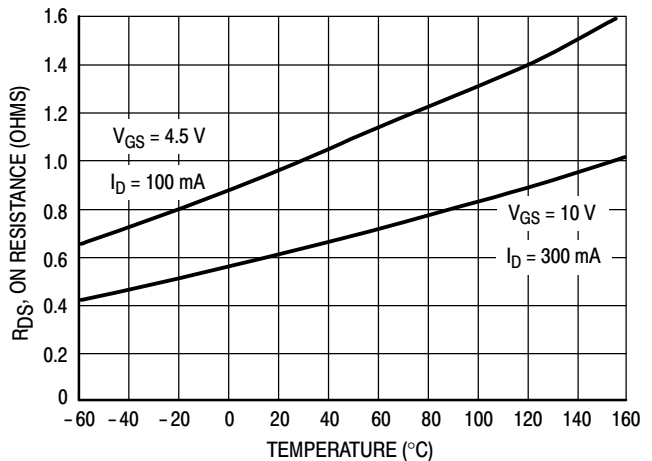


Figure 2. On Resistance versus Temperature

MMBF2201N, NVF2201N

TYPICAL CHARACTERISTICS

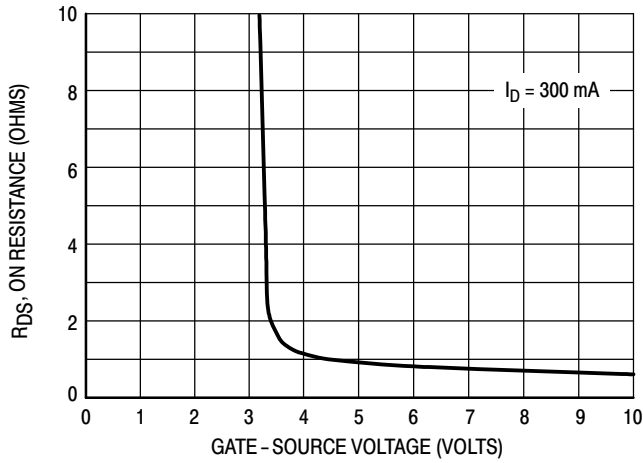


Figure 3. On Resistance versus Gate-Source Voltage

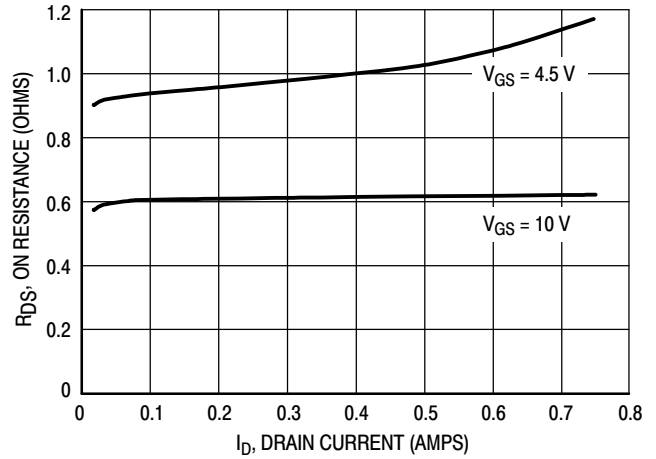


Figure 4. On Resistance versus Drain Current

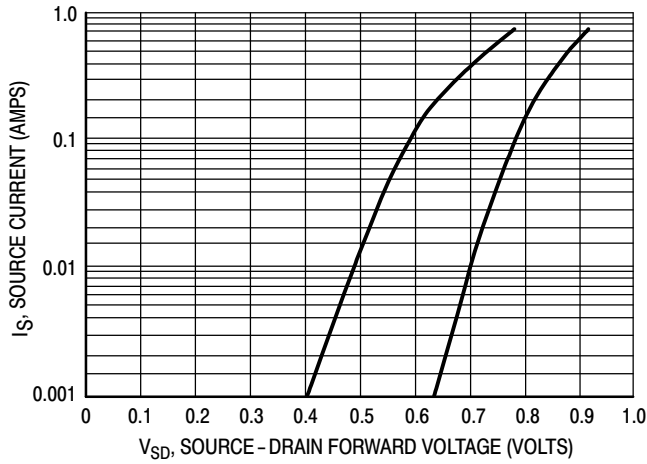


Figure 5. Source-Drain Forward Voltage

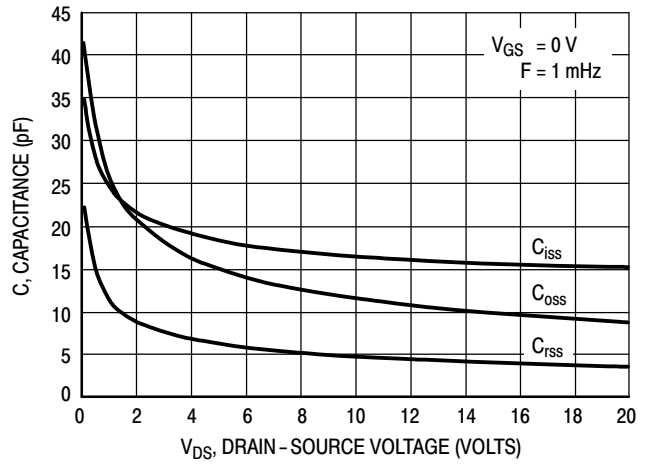


Figure 6. Capacitance Variation

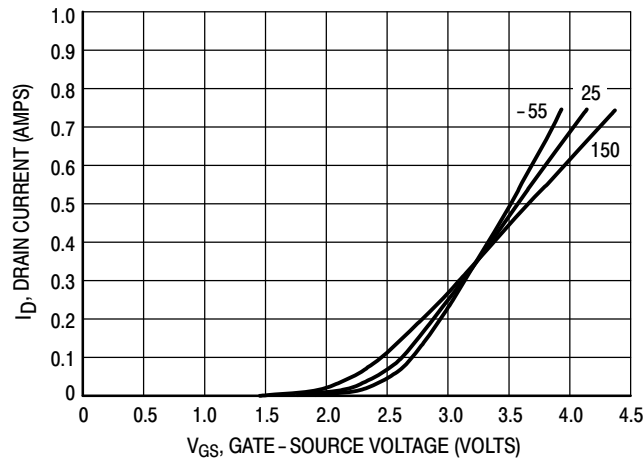
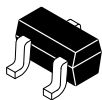


Figure 7. Transfer Characteristics

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

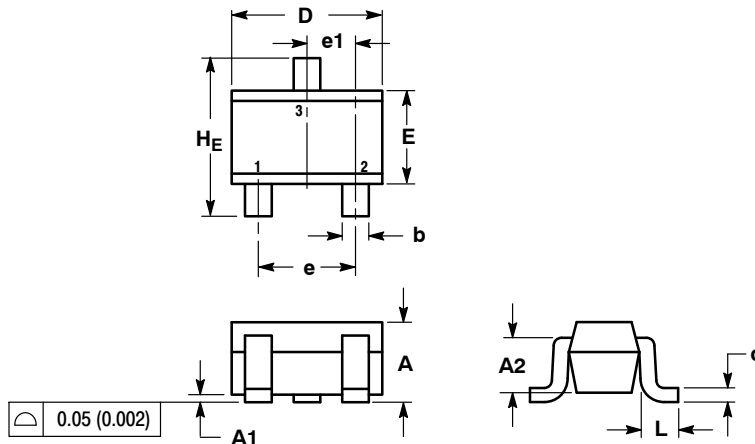
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SCALE 4:1

SC-70 (SOT-323)
CASE 419-04
ISSUE N

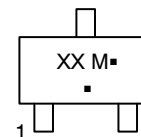
DATE 11 NOV 2008



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.56	0.008	0.015	0.022
HE	2.00	2.10	2.40	0.079	0.083	0.095

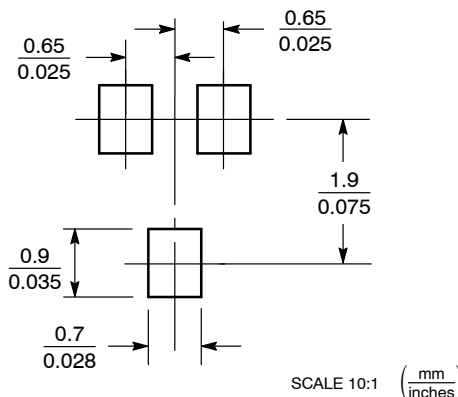
GENERIC MARKING DIAGRAM



XX = Specific Device Code
M = Date Code
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

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.

STYLE 1: CANCELLED	STYLE 2: PIN 1. ANODE 2. N.C. 3. CATHODE	STYLE 3: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. CATHODE	
STYLE 6: PIN 1. EMITTER 2. BASE 3. COLLECTOR	STYLE 7: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 8: PIN 1. GATE 2. SOURCE 3. DRAIN	STYLE 9: PIN 1. ANODE 2. CATHODE 3. CATHODE-ANODE	STYLE 10: PIN 1. CATHODE 2. ANODE 3. ANODE-CATHODE	STYLE 11: PIN 1. CATHODE 2. CATHODE 3. CATHODE

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