

Power MOSFET

300 mAmps, 20 Volts

N-Channel SC-70/SOT-323

MMBF2201N, NVF2201N

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)

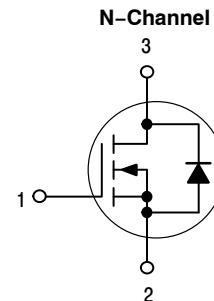
Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	20	Vdc
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	Vdc
Drain Current			mAdc
– Continuous @ $T_A = 25^\circ\text{C}$	I_D	300	
– Continuous @ $T_A = 70^\circ\text{C}$	I_D	240	
– Pulsed Drain Current ($t_p \leq 10 \mu\text{s}$)	I_{DM}	750	
Total 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.

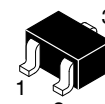
1. Mounted on G10/FR4 glass epoxy board using minimum recommended footprint.

300 mAMPS, 20 VOLTS

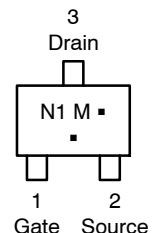
$$R_{DS(on)} = 1 \Omega$$



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.

MMBF2201N, NVF2201N

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

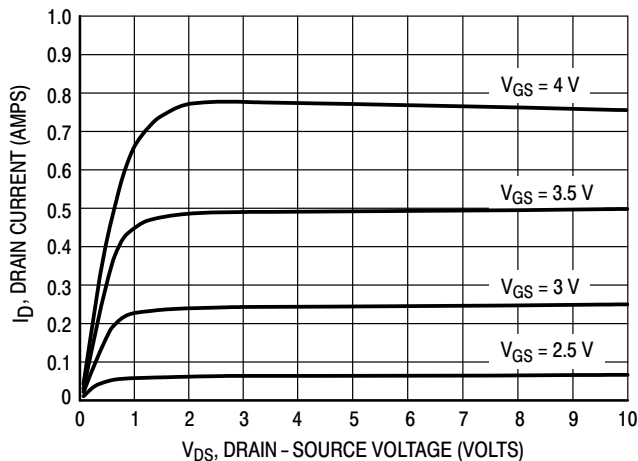


Figure 1. Typical Drain Characteristics

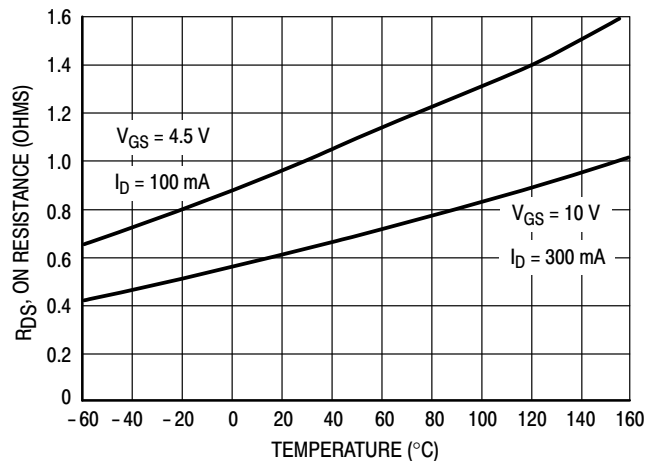


Figure 2. On Resistance versus Temperature

TYPICAL CHARACTERISTICS

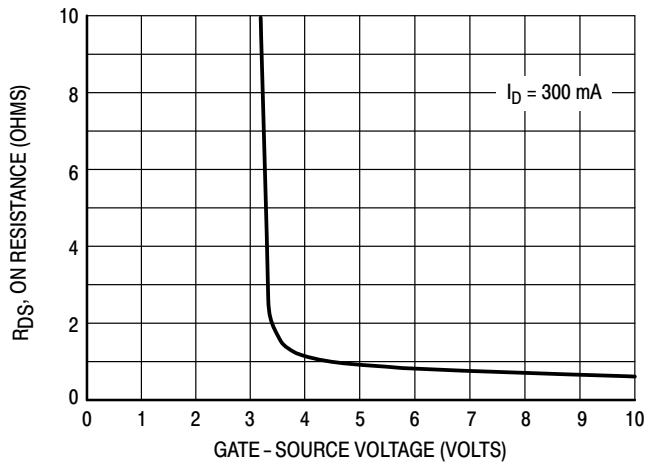


Figure 3. On Resistance versus Gate-Source Voltage

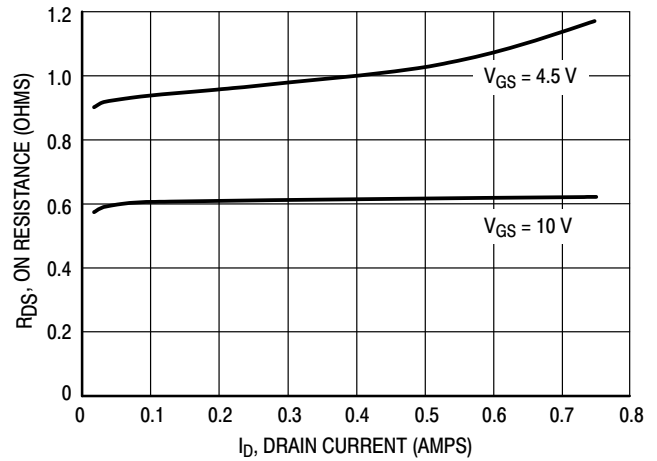


Figure 4. On Resistance versus Drain Current

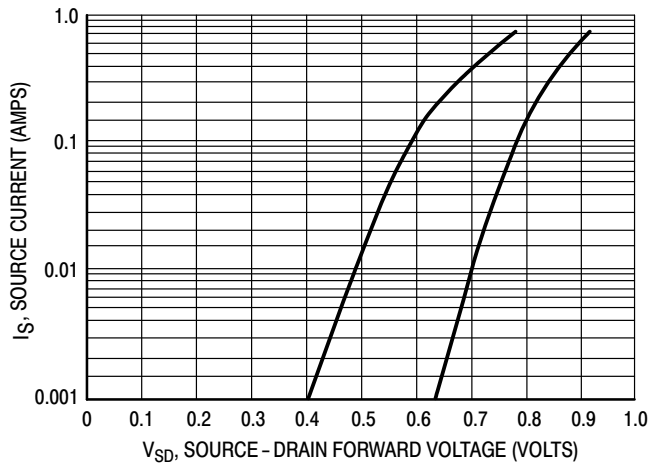


Figure 5. Source-Drain Forward Voltage

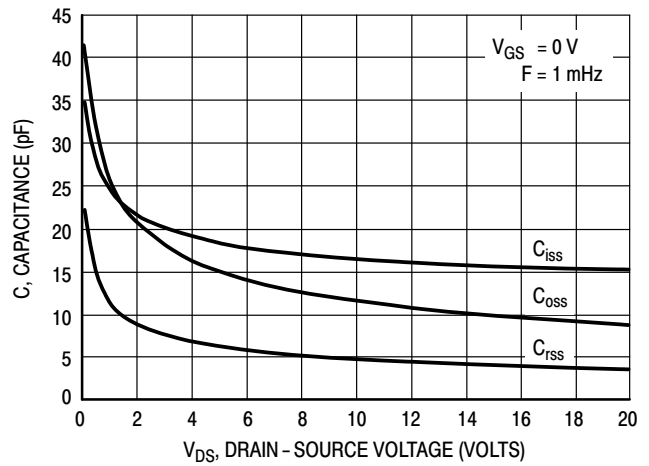


Figure 6. Capacitance Variation

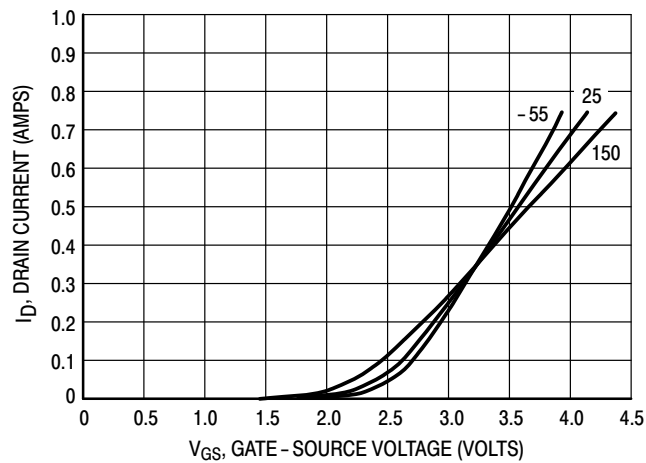


Figure 7. Transfer Characteristics



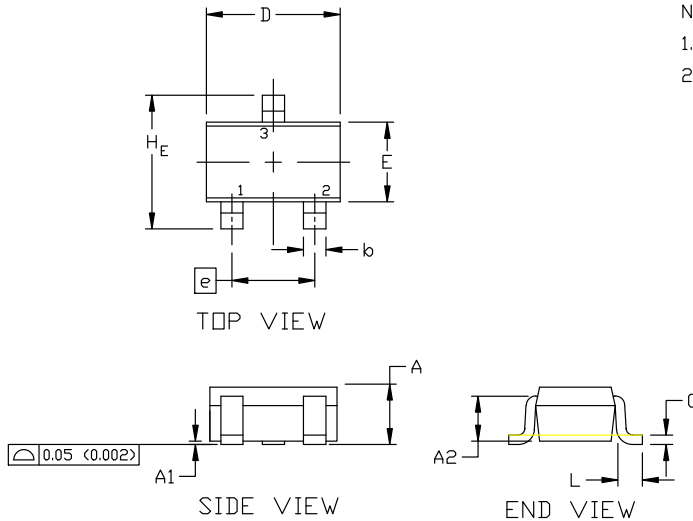
SCALE 4:1

SC-70 (SOT-323)
CASE 419
ISSUE R

DATE 11 OCT 2022

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME 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 BSC		
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	2.00	2.20	0.071	0.080	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
H_E	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. Some products may not follow the Generic Marking.



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

SOLDERING FOOTPRINT

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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