

# MMBF2202PT1

Preferred Device

## Power MOSFET 300 mAmps, 20 Volts

### P-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
- Pb-Free Package is Available

#### 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	$V_{GS}$	$\pm 20$	Vdc
Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ – Continuous @ $T_A = 70^\circ\text{C}$ – Pulsed Drain Current ( $t_p \leq 10 \mu\text{s}$ )	$I_D$ $I_D$ $I_{DM}$	300 240 750	mAdc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1) Derate above $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

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

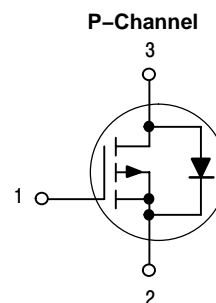


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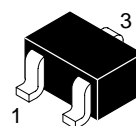
<http://onsemi.com>

300 mAMPS, 20 VOLTS

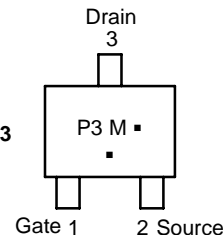
$R_{DS(on)} = 2.2 \Omega$



#### MARKING DIAGRAM AND PIN ASSIGNMENT



SC-70/SOT-323  
CASE 419  
STYLE 8



P3 = Specific 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†
MMBF2202PT1	SC-70/ SOT-323	3000 Tape & Reel
MMBF2202PT1G	SC-70/ 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.

Preferred devices are recommended choices for future use and best overall value.

# MMBF2202PT1

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-to-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 10 μA)	V <sub>(BR)DSS</sub>	20	–	–	Vdc
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 16 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 16 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	–	–	1.0 10	μAdc
Gate-Body Leakage Current (V <sub>GS</sub> = ± 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSS</sub>	–	–	±100	nAdc

## ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μAdc)	V <sub>GS(th)</sub>	1.0	1.7	2.4	Vdc
Static Drain-to-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 200 mAdc) (V <sub>GS</sub> = 4.5 Vdc, I <sub>D</sub> = 50 mAdc)	r <sub>DS(on)</sub>	–	1.5 2.0	2.2 3.5	Ω
Forward Transconductance (V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 200 mAdc)	g <sub>FS</sub>	–	600	–	mMhos

## DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 5.0 V)	C <sub>iss</sub>	–	50	–	pF
Output Capacitance	(V <sub>DS</sub> = 5.0 V)	C <sub>oss</sub>	–	45	–	
Transfer Capacitance	(V <sub>DG</sub> = 5.0 V)	C <sub>rss</sub>	–	20	–	

## SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	(V <sub>DD</sub> = -15 Vdc, R <sub>L</sub> = 75 Ω, I <sub>D</sub> = 200 mAdc, V <sub>GEN</sub> = -10 V, R <sub>G</sub> = 6.0 Ω)	t <sub>d(on)</sub>	–	2.5	–	ns
Rise Time		t <sub>r</sub>	–	1.0	–	
Turn-Off Delay Time		t <sub>d(off)</sub>	–	16	–	
Fall Time		t <sub>f</sub>	–	8.0	–	
Gate Charge (See Figure 5)	(V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 200 mA)	Q <sub>T</sub>	–	2700	–	pC

## SOURCE-DRAIN DIODE CHARACTERISTICS

Continuous Current	I <sub>S</sub>	–	–	0.3	A
Pulsed Current	I <sub>SM</sub>	–	–	0.75	
Forward Voltage (Note 3)	V <sub>SD</sub>	–	1.5	–	V

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

## TYPICAL CHARACTERISTICS

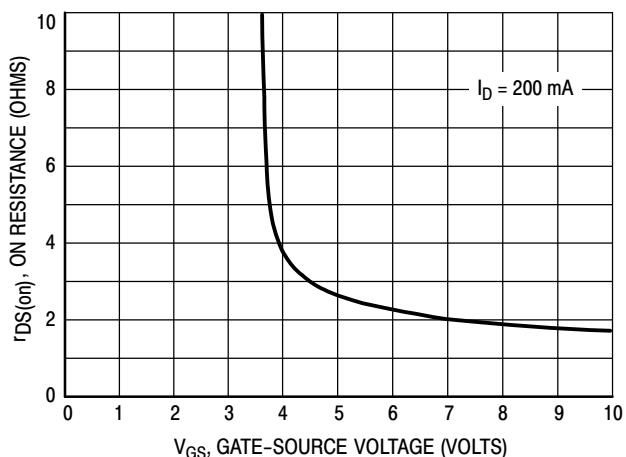


Figure 1. On Resistance versus Gate-Source Voltage

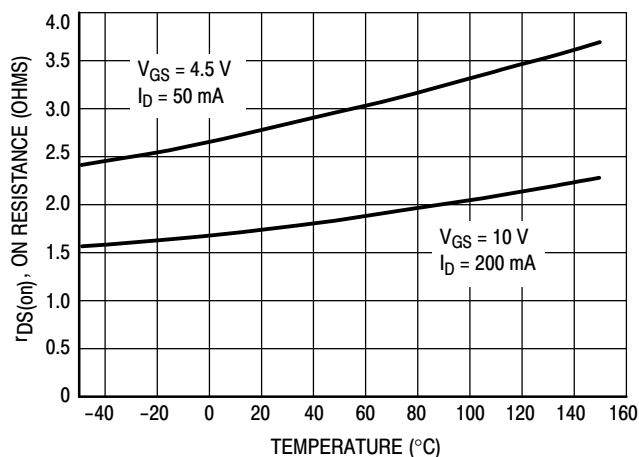


Figure 2. On Resistance versus Temperature

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## TYPICAL CHARACTERISTICS

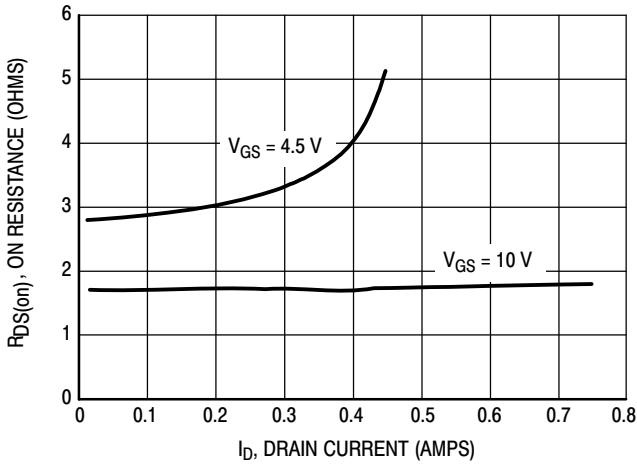


Figure 3. On Resistance versus Drain Current

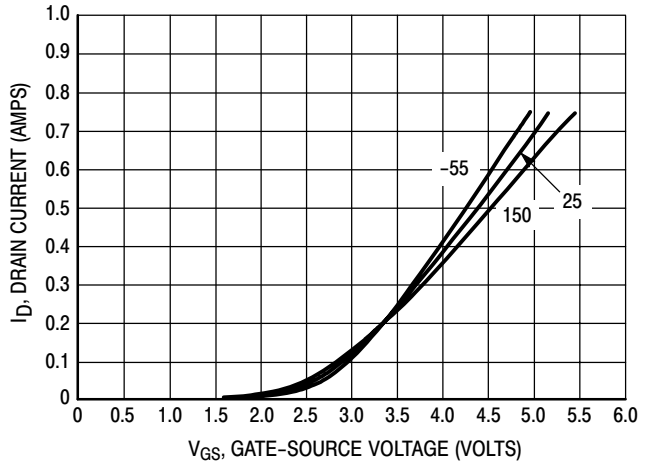


Figure 4. Transfer Characteristics

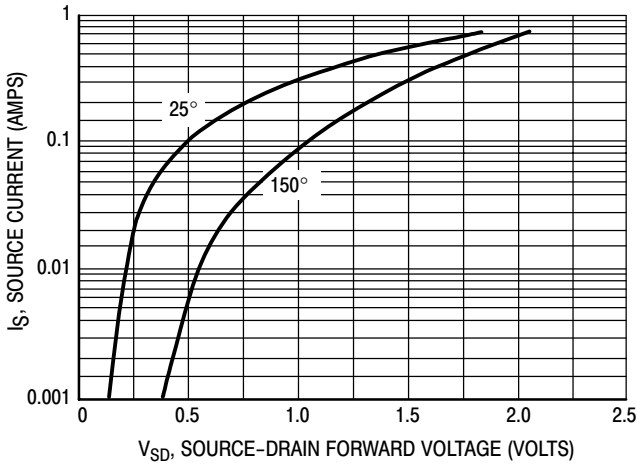


Figure 5. Source-Drain Forward Voltage

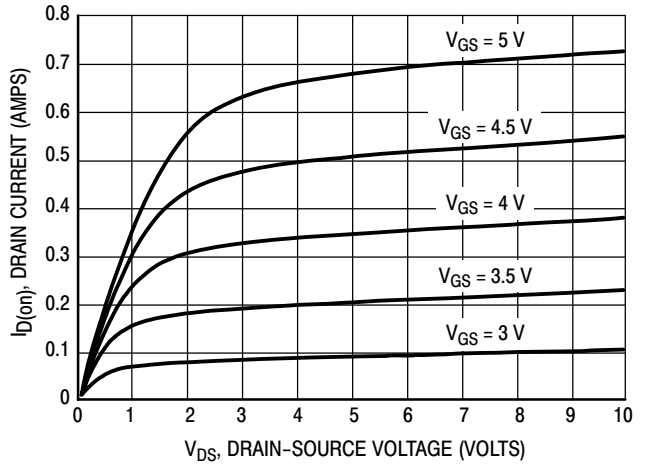


Figure 6. On Region Characteristics

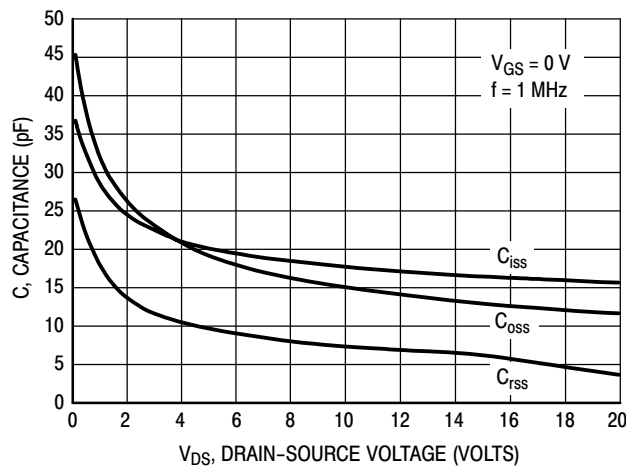
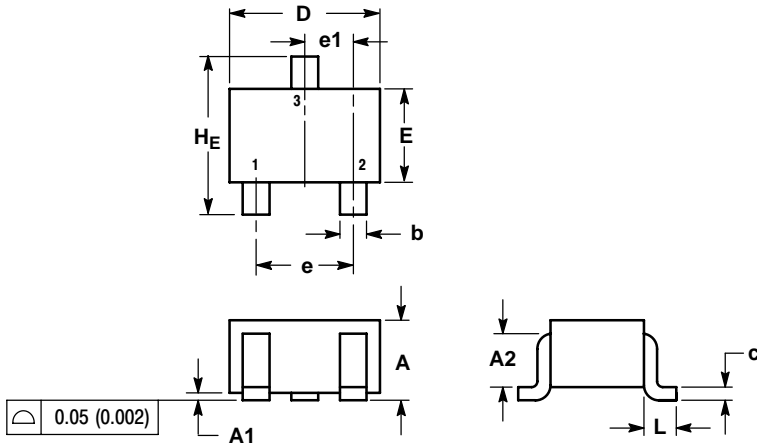


Figure 7. Capacitance Variation

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## PACKAGE DIMENSIONS

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

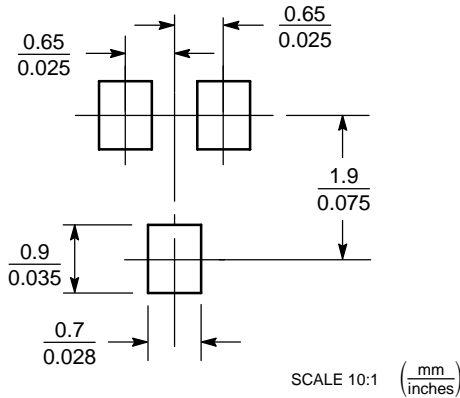


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

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	0.7 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	0.425 REF			0.017 REF		
H <sub>E</sub>	2.00	2.10	2.40	0.079	0.083	0.095

- STYLE 8:  
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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