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
- AEC Qualified
- PPAP Capable
- Pb–Free Package is Available

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 – Continuous @ T_A = 25°C – Continuous @ T_A = 70°C – Pulsed Drain Current ($t_p \le 10\ \mu s$)	 I_D I_D I_{DM}	 300 240 750	mAdc
Total Power Dissipation @ T_A = 25°C (Note 1) Derate above 25°C	P_D	 150 1.2	 mW mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	– 55 to 150	°C
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	833	°C/W
Maximum Lead Temperature for Soldering Purposes, for 10 seconds	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional 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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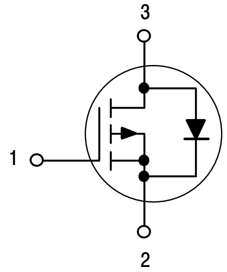
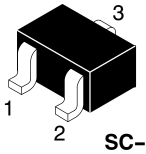
300 mAMPS, 20 VOLTS
$R_{DS(on)}$ = 2.2 Ω

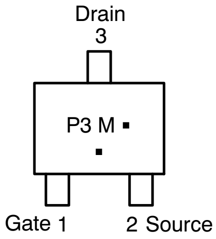
P–Channel



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.

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 = 200 mAdc) (V_{GS} = 4.5 Vdc, I_D = 50 mAdc)		$r_{DS(on)}$	 – –	 1.5 2.0	 2.2 3.5	Ω
Forward Transconductance (V_{DS} = 10 Vdc, I_D = 200 mAdc)		g_{FS}	–	600	–	mMhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 5.0 V)	C_{iss}	–	50	–	pF
Output Capacitance	(V_{DS} = 5.0 V)	C_{oss}	–	45	–	
Transfer Capacitance	(V_{DG} = 5.0 V)	C_{rss}	–	20	–	
SWITCHING CHARACTERISTICS (Note 3)						
Turn–On Delay Time	(V_{DD} = −15 Vdc, R_L = 75 Ω, I_D = 200 mAdc, V_{GEN} = −10 V, R_G = 6.0 Ω)	$t_{d(on)}$	–	2.5	–	ns
Rise Time		t_r	–	1.0	–	
Turn–Off Delay Time		$t_{d(off)}$	–	16	–	
Fall Time		t_f	–	8.0	–	
Gate Charge (See Figure 5)	(V_{DS} = 16 V, V_{GS} = 10 V, I_D = 200 mA)	Q_T	–	2700	–	pC
SOURCE–DRAIN DIODE CHARACTERISTICS						
Continuous Current		I_S	–	–	0.3	A
Pulsed Current		I_{SM}	–	–	0.75	
Forward Voltage (Note 3)		V_{SD}	–	1.5	–	V

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

TYPICAL CHARACTERISTICS

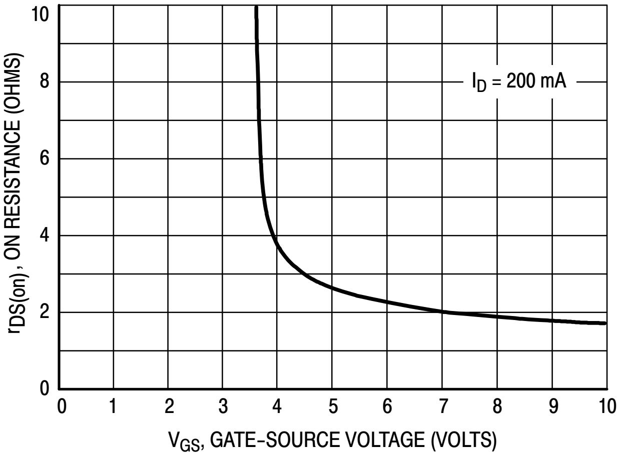


Figure 1. On Resistance versus Gate–Source Voltage

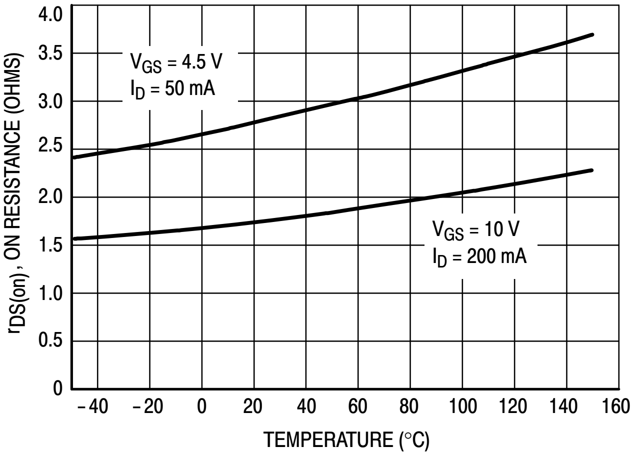


Figure 2. On Resistance versus Temperature

TYPICAL CHARACTERISTICS

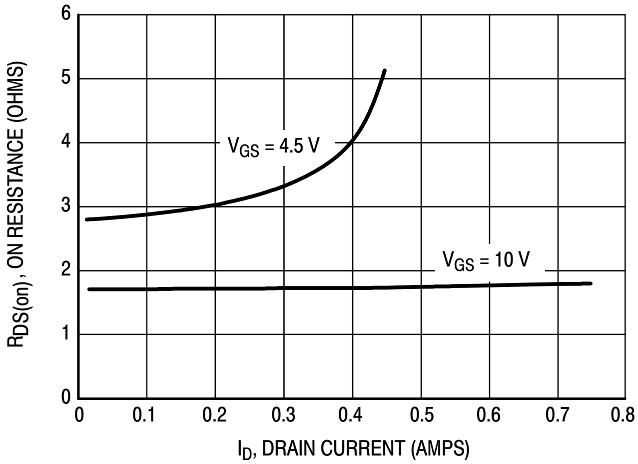


Figure 3. On Resistance versus Drain Current

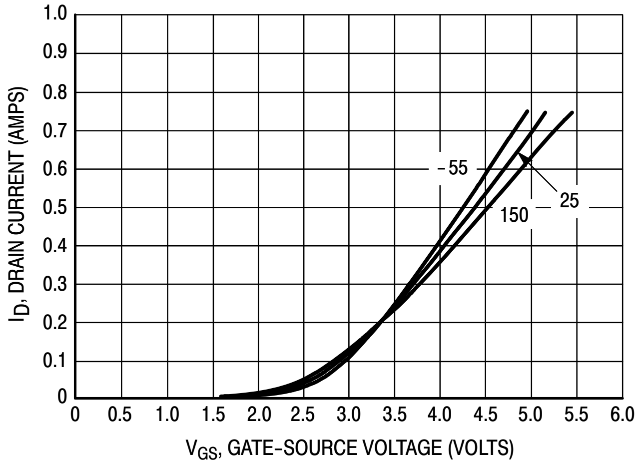


Figure 4. Transfer Characteristics

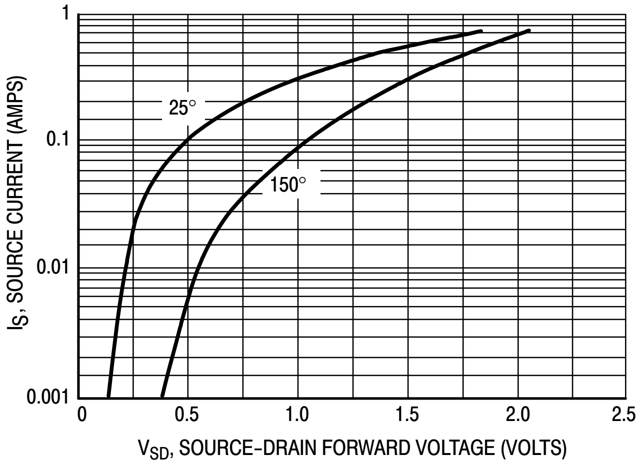


Figure 5. Source–Drain Forward Voltage

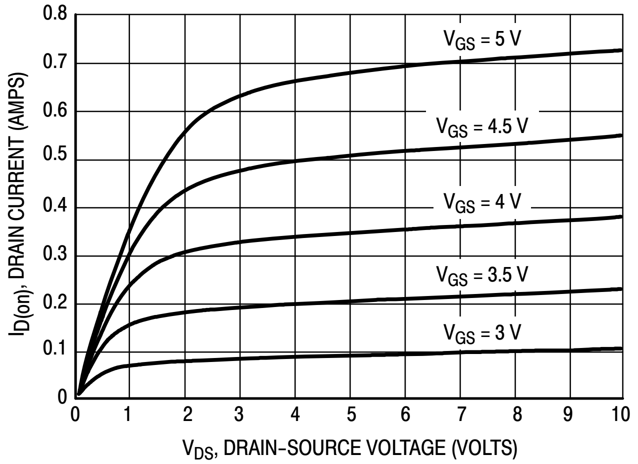


Figure 6. On Region Characteristics

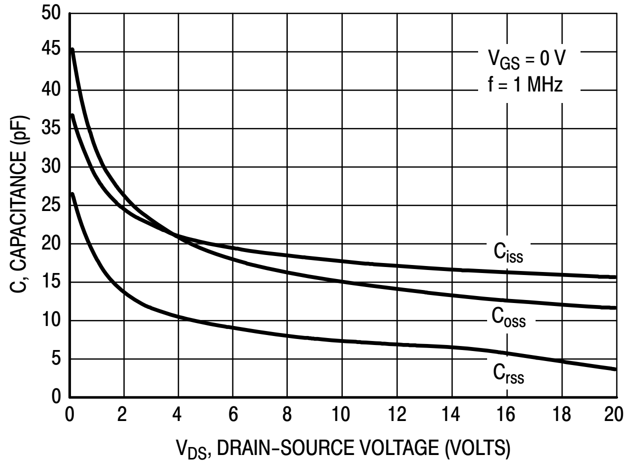
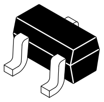


Figure 7. Capacitance Variation

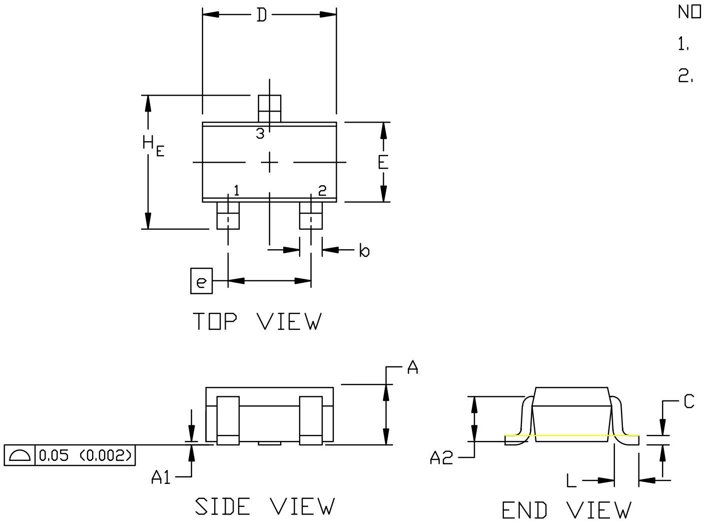
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SCALE 4:1

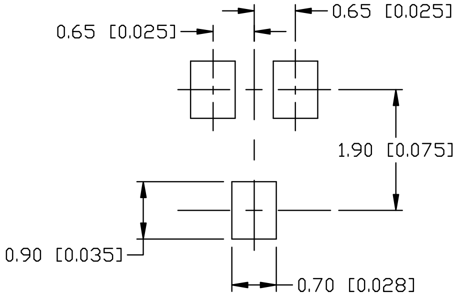
SC−70 (SOT−323)
CASE 419
ISSUE R

DATE 11 OCT 2022



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

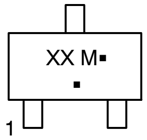
DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 BSC		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.00	2.20	0.071	0.080	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	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



* 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

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.

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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DESCRIPTION:	**SC−70 (SOT−323)**		**PAGE 1 OF 1**

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