

## Small Signal Product

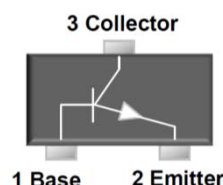
**300mW, NPN Small Signal Transistor**
**FEATURES**

- Epitaxial planar die construction
- Surface device type mounting
- Moisture sensitivity level 1
- Matte Tin (Sn) lead finish with Nickel (Ni) underplate
- Pb free version and RoHS compliant
- Packing code with suffix "G" means green compound (halogen-free)


**SOT-23**

**MECHANICAL DATA**

- Case: SOT- 23, molded plastic
- Terminal: Matte tin plated, lead free, solderable per MIL-STD-202, Method 208 guaranteed
- High temperature soldering guaranteed: 260°C/10s
- Weight: 8mg (approximately)
- Marking Code: 1P



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Power Dissipation	P <sub>D</sub>	300	mW
Collector-Base Voltage	V <sub>CBO</sub>	75	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Collector Current	I <sub>C</sub>	600	mA
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

Notes:1. Valid provided that electrodes are kept at ambient temperature

PARAMETER	SYMBOL	MIN	MAX	UNIT	
Collector-Base Breakdown Voltage	I <sub>C</sub> = 10 μA I <sub>E</sub> = 0	V <sub>(BR)CBO</sub>	75	-	V
Collector-Emitter Breakdown Voltage	I <sub>C</sub> = 10 mA I <sub>B</sub> = 0	V <sub>(BR)CEO</sub>	40	-	V
Emitter-Base Breakdown Voltage	I <sub>E</sub> = 10 μA I <sub>C</sub> = 0	V <sub>(BR)EBO</sub>	6	-	V
Collector Cut-off Current	V <sub>CB</sub> = 60 V I <sub>E</sub> = 0	I <sub>CBO</sub>	-	0.01	μA
Collector Cut-off Current	V <sub>CE</sub> = 60 V V <sub>BE(OFF)</sub> = 3 V	I <sub>CEO</sub>	-	0.01	μA
Emitter Cut-off Current	V <sub>EB</sub> = 3 V I <sub>C</sub> = 0	I <sub>EBO</sub>	-	0.1	μA
DC Current Gain	V <sub>CE</sub> = 10 V I <sub>C</sub> = 500 mA	h <sub>FE</sub>	40	-	
	V <sub>CE</sub> = 10 V I <sub>C</sub> = 150 mA		100	300	
	V <sub>CE</sub> = 10 V I <sub>C</sub> = 10 mA		75	-	
	V <sub>CE</sub> = 10 V I <sub>C</sub> = 1 mA		50	-	
	V <sub>CE</sub> = 10 V I <sub>C</sub> = 0.1 mA		35	-	
Collector-Emitter Saturation Voltage	I <sub>C</sub> = 500 mA I <sub>B</sub> = 50 mA	V <sub>CE(sat)</sub>	-	1	V
Base-Emitter Saturation Voltage	I <sub>C</sub> = 500 mA I <sub>B</sub> = 50 mA	V <sub>BE(sat)</sub>	-	2	V
Transition frequency	V <sub>CE</sub> = 20 V I <sub>C</sub> = 10 mA f = 100MHz	f <sub>T</sub>	300	-	MHz
Output Capacitance	V <sub>CB</sub> = 10V I <sub>E</sub> = 0 f = 1.0MHz	C <sub>obo</sub>	8		pF
Input Capacitance	V <sub>EB</sub> = 0.5V I <sub>C</sub> = 0 f = 1.0MHz	C <sub>ibo</sub>	25		pF
Delay Time	V <sub>CC</sub> =30V V <sub>BE(off)</sub> = -0.5V I <sub>C</sub> =150mA	t <sub>d</sub>	-	10	ns
Rise Time		t <sub>r</sub>	-	25	ns
Storage Time	V <sub>CC</sub> =30V I <sub>C</sub> =150mA I <sub>B1</sub> = -I <sub>B2</sub> =15mA	t <sub>s</sub>	-	225	ns
Fall Time	V <sub>CC</sub> =30V I <sub>C</sub> =150mA I <sub>B1</sub> = -I <sub>B2</sub> =15mA	t <sub>f</sub>	-	60	ns

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RATINGS AND CHARACTERISTICS CURVES

( $T_A=25^\circ\text{C}$  unless otherwise noted)

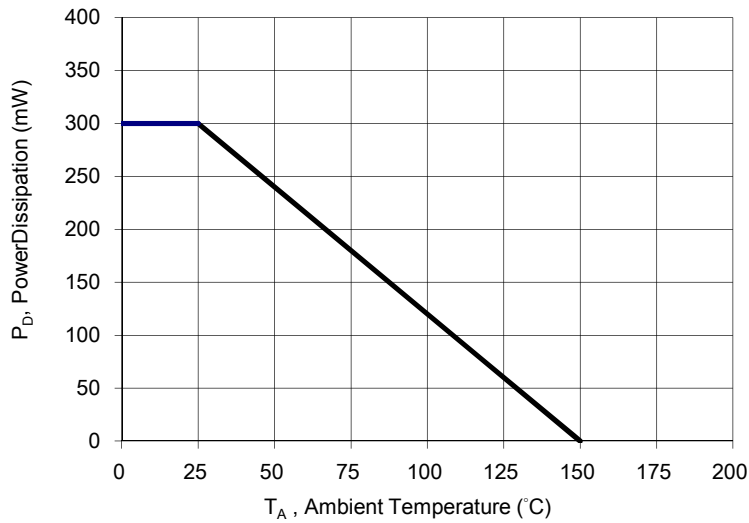


Fig. 1 Max Power Dissipation VS. Ambient Temperature

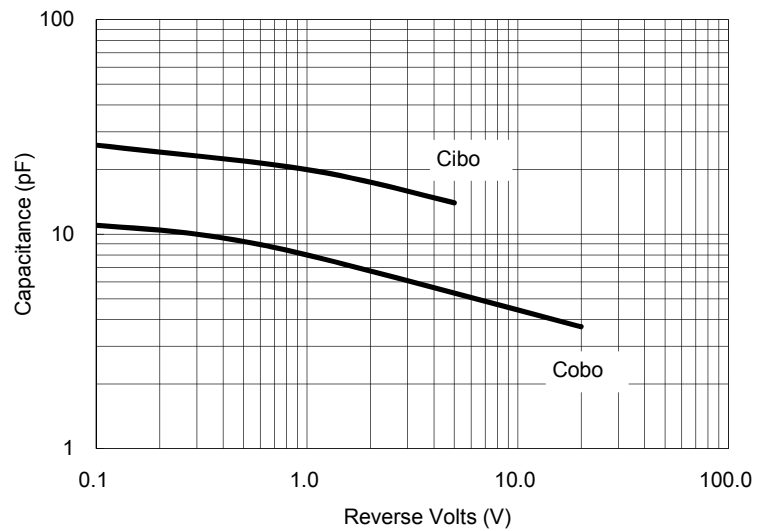


Fig. 2 Typical Capacitance

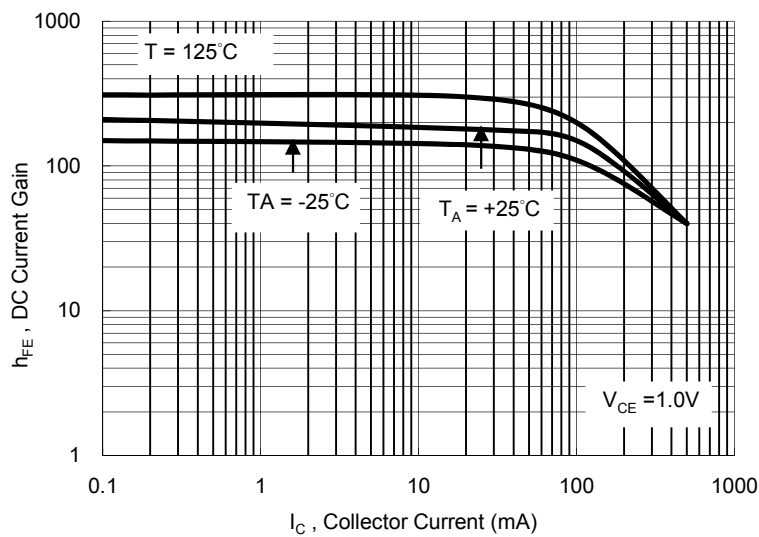


Fig.3 Typical DC Current Gain VS. Collector Current

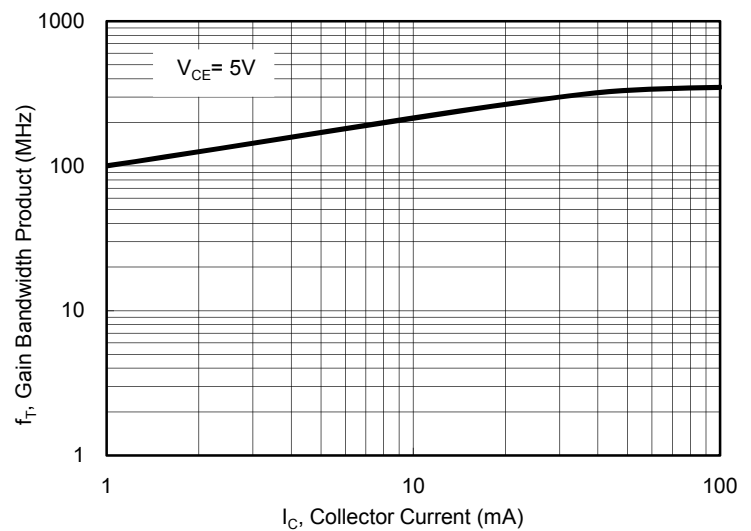


Fig. 4 Gain Bandwidth Product VS. Collector Current

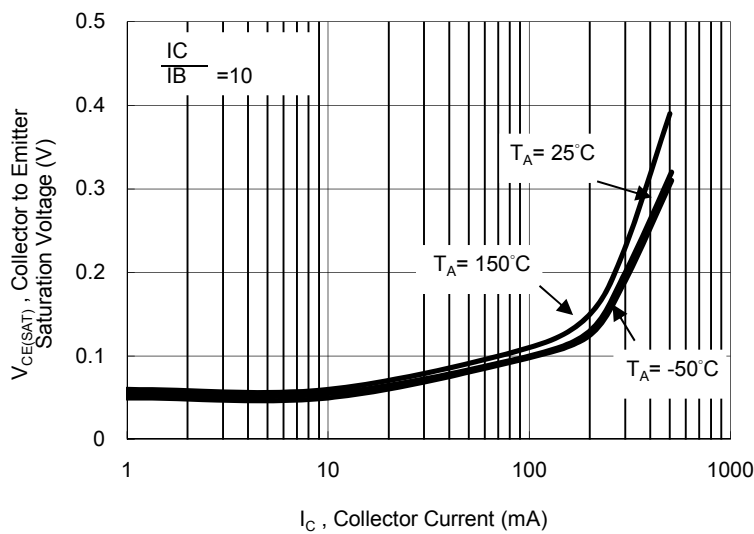


Fig. 5 Collector Emitter Saturation Voltage VS. Collector Current

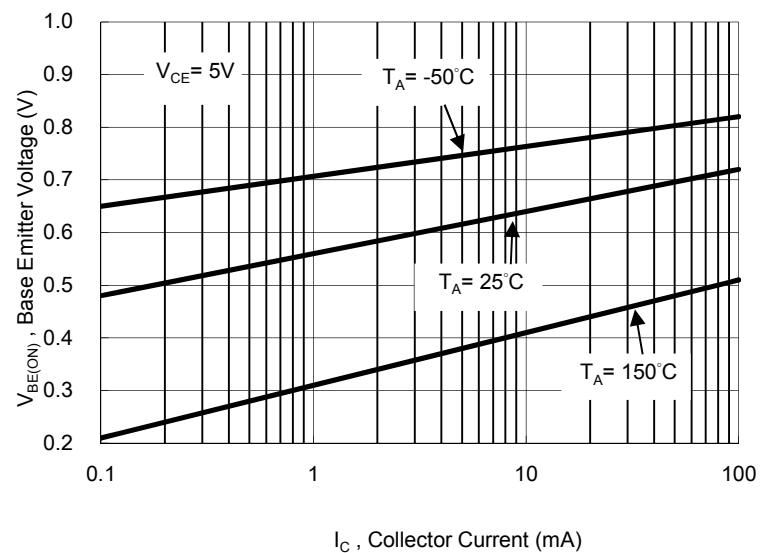
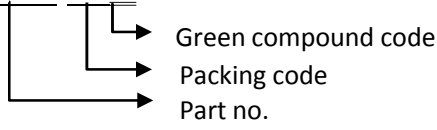


Fig. 6 Base Emitter Voltage vs. Collector Current

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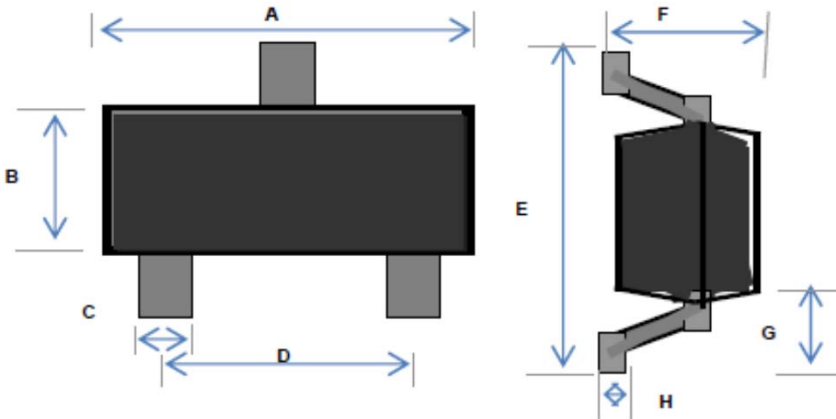
ORDER INFORMATION (EXAMPLE)

**MMBT2222A RFG**



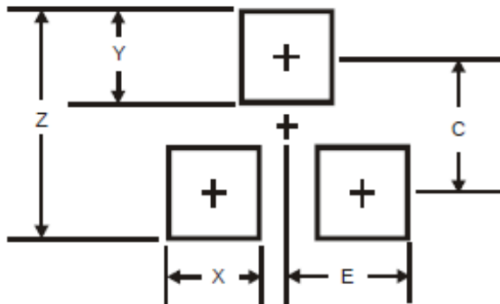
PACKAGE OUTLINE DIMENSIONS

**SOT-23**



DIM.	Unit (mm)		Unit (inch)	
	Min	Max	Min	Max
A	2.70	3.10	0.106	0.122
B	1.10	1.50	0.043	0.059
C	0.30	0.51	0.012	0.020
D	1.78	2.04	0.070	0.080
E	2.10	2.64	0.083	0.104
F	0.89	1.30	0.035	0.051
G	0.55 REF		0.022 REF	
H	0.10 REF		0.004 REF	

SUGGEST PAD LAYOUT



DIM	Unit (mm)	Unit (inch)
	TYP	TYP
Z	2.8	0.11
X	0.7	0.03
Y	0.9	0.04
C	1.9	0.07
E	1.0	0.04

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