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## 300mW, NPN Small Signal Transistor

### FEATURES

- Low power loss, high efficiency
- Ideal for automated placement
- High surge current capability
- Compliant to RoHS directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

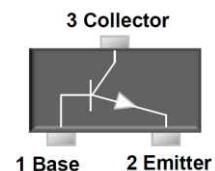
### APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- Lighting application
- On-board DC/DC converter

### MECHANICAL DATA

- Case: SOT-23
- Molding compound: UL flammability classification rating 94V-0
- Moisture sensitivity level: level 1, per J-STD-020
- Packing code with suffix "G" means green compound (halogen-free)
- Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 1A whisker test
- Polarity: Indicated by cathode band
- Weight: 8 mg (approximately)

KEY PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{CBO}$	75	V
$V_{CEO}$	40	V
$V_{EBO}$	6	V
$I_C$	600	mA
$h_{FE}$	300	
Package	SOT-23	
Configuration	Single Dice	



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	MMBT2222A	UNIT
Marking code on the device		1P	
Collector-base voltage, emitter open	$V_{CBO}$	75	V
Collector-emitter voltage, base open	$V_{CEO}$	40	V
Emitter-base voltage, collector open	$V_{EBO}$	6	V
Collector current, dc	$I_C$	600	mA
Total dc power input to all terminals	$P_T$	300	mW
Junction temperature	$T_J$	-55 to +150	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-55 to +150	$^\circ\text{C}$

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>SYMBOL</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNIT</b>
Collector-base breakdown voltage, emitter open	$I_C = 10 \mu\text{A}, I_E = 0$	$V_{(BR)CBO}$	75	-	-	V
Collector-emitter breakdown voltage, base open	$I_C = 10 \text{mA}, I_B = 0$	$V_{(BR)CEO}$	40	-	-	V
Emitter-base breakdown voltage, collector open	$I_E = 10 \mu\text{A}, I_C = 0$	$V_{(BR)EBO}$	6	-	-	V
Collector cutoff current, emitter open	$V_{CB} = 60 \text{V}, I_E = 0$	$I_{CBO}$	-	-	0.01	$\mu\text{A}$
Emitter cutoff current, collector open	$V_{EB} = 3 \text{V}, I_C = 0$	$I_{EBO}$	-	-	0.1	$\mu\text{A}$
DC Current Gain	$V_{CE} = 10 \text{V}, I_C = 500 \text{mA}$	$h_{FE}$	40	-	-	
	$V_{CE} = 10 \text{V}, I_C = 150 \text{mA}$		100	-	300	
	$V_{CE} = 10 \text{V}, I_C = 10 \text{mA}$		75	-	-	
	$V_{CE} = 10 \text{V}, I_C = 1 \text{mA}$		50	-	-	
	$V_{CE} = 10 \text{V}, I_C = 0.1 \text{mA}$		35	-	-	
Collector-emitter saturation voltage	$I_C = 500 \text{mA}, I_B = 50 \text{mA}$	$V_{CE(sat)}$	-	-	1	V
Base-emitter saturation voltage	$I_C = 500 \text{mA}, I_B = 50 \text{mA}$	$V_{BE(sat)}$	-	-	2	V
Transition frequency	$V_{CE} = 20 \text{V}, I_C = 20 \text{mA}, f = 100\text{MHz}$	$f_T$	300	-	-	MHz
Output Capacitance	1 MHz, $V_{CB} = 10 \text{V}, I_E = 0$	$C_{OBO}$	8			pF
Input Capacitance	1 MHz, $V_{EB} = 0.5 \text{V}, I_C = 0$	$C_{IBO}$	25			pF
Delay Time	$V_{CC} = 30\text{V}, V_{BE(off)} = -0.5\text{V}, I_C = 150\text{mA}$	$t_d$	-	-	10	ns
Rise Time	$I_{B1} = 15\text{mA}$	$t_r$	-	-	25	ns
Storage Time	$V_{CC} = 30\text{V}, I_{B1} = -I_{B2} = 15\text{mA}, I_C = 150\text{mA}$	$t_s$	-	-	225	ns
Fall Time	$V_{CC} = 30\text{V}, I_{B1} = -I_{B2} = 15\text{mA}, I_C = 150\text{mA}$	$t_f$	-	-	60	ns

**ORDERING INFORMATION**

<b>PART NO.</b>	<b>PACKING CODE</b>	<b>PACKING CODE SUFFIX</b>	<b>PACKAGE</b>	<b>PACKING</b>
MMBT2222A (Note 1)	RF	G	SOT-23	3K / 7" Reel

**Notes:**

1. Whole series with green compound

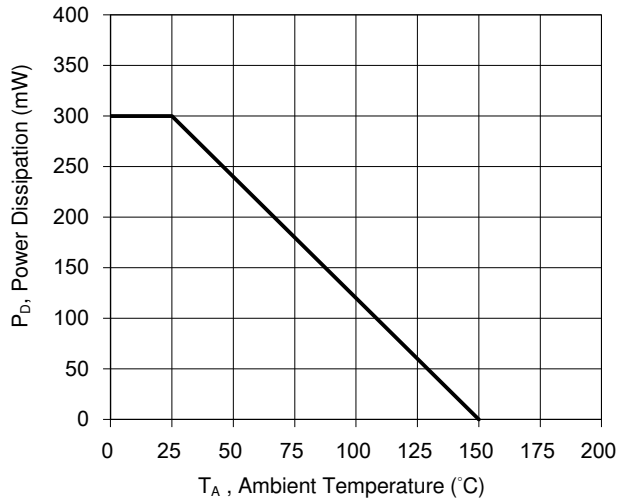
**EXAMPLE**

<b>EXAMPLE P/N</b>	<b>PART NO.</b>	<b>PACKING CODE</b>	<b>PACKING CODE SUFFIX</b>	<b>DESCRIPTION</b>
MMBT2222A RFG	MMBT2222A	RF	G	Green compound

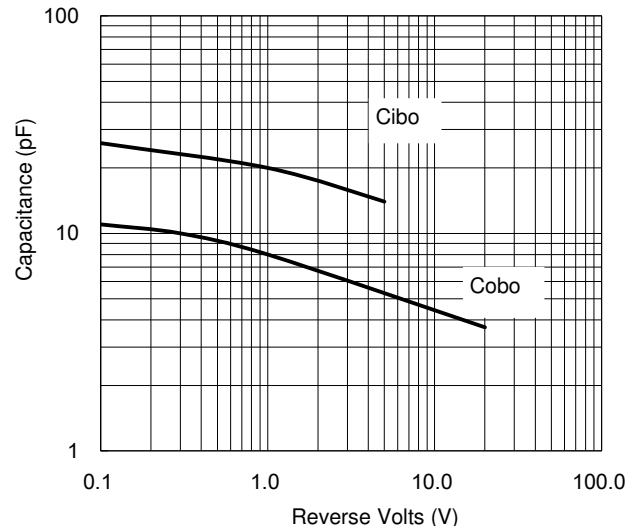
**CHARACTERISTICS CURVES**

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

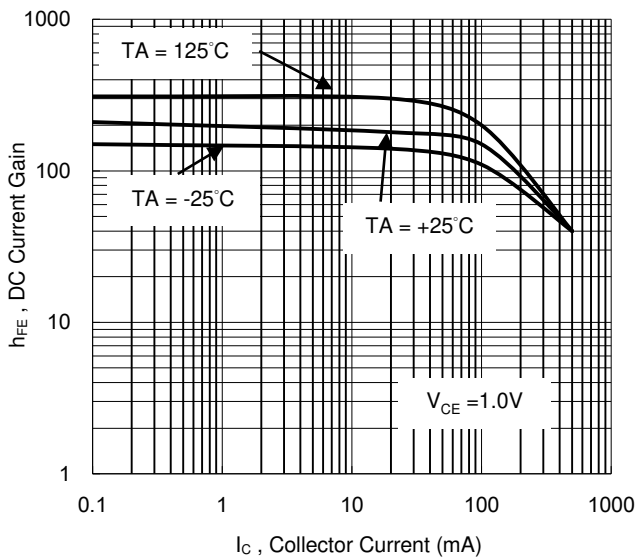
**Fig. 1 Max Power Dissipation VS. Ambient Temperature**



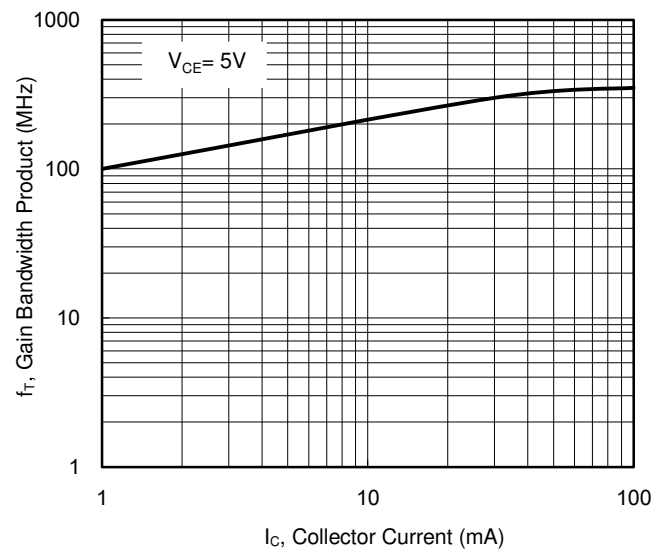
**Fig.2 Typical Capacitance**



**Fig.3 Typical DC Current Gain VS. Collector Current**



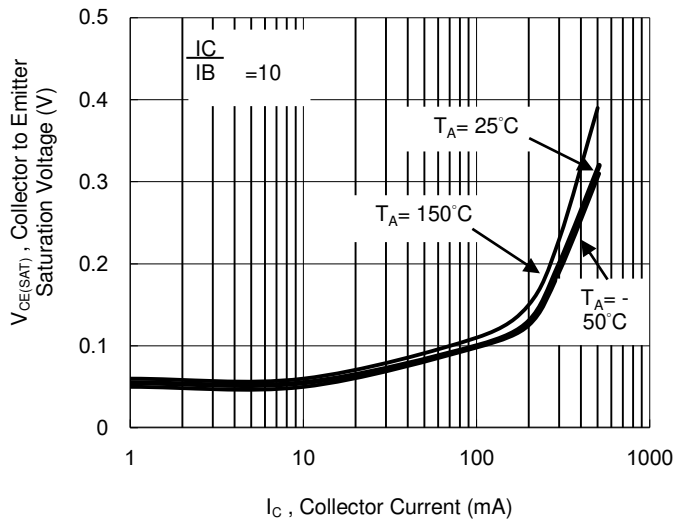
**Fig.4 Gain Bandwidth Product VS. Collector Current**



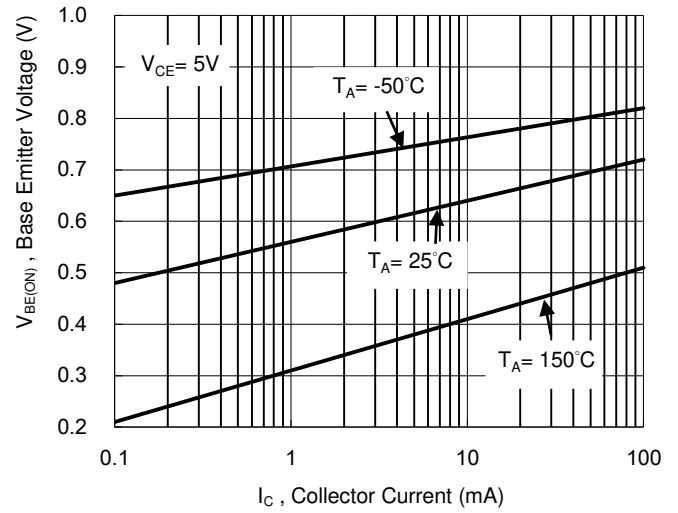
**CHARACTERISTICS CURVES**

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

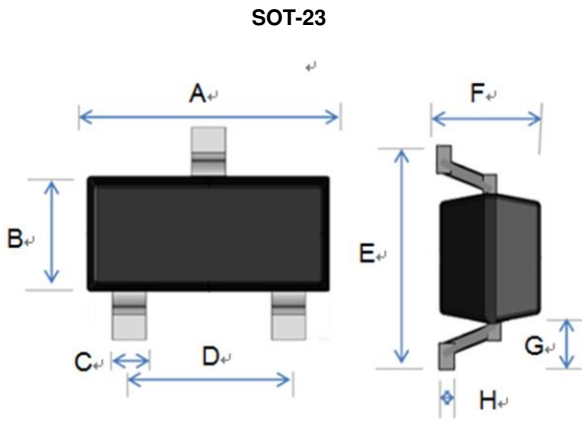
**Fig.5 Collector Emitter Saturation Voltage VS. Collector Current**



**Fig.6 Base Emitter Voltage vs. Collector Current**

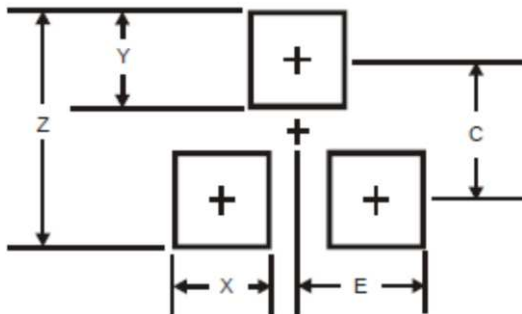


**PACKAGE OUTLINE DIMENSION**



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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