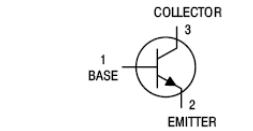
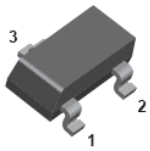
# NPN General Purpose Amplifier MMBT2222A

## FEATURES

- Epitaxial planar die construction.
- Complementary PNP type available MMBT2907A.
- Ultra-small surface mount package.

Lead-free




**SOT-23**

## APPLICATIONS

- Use as a medium power amplifier.
- Switching requiring collector currents up to 500mA.

## ORDERING INFORMATION

| Type No. | Marking | Package Code |
|---|---|---|
| MMBT2222A | 1P | SOT-23 |

## MAXIMUM RATING @ Ta=25℃ unless otherwise specified

| **Symbol** | **Parameter** | **Value** | **Unit** |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 75 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 40 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 6 | V |
| $I_C$ | Collector Current -Continuous | 600 | mA |
| $P_C$ | Collector Dissipation | 300 | mW |
| $R_{\theta JA}$ | Thermal resistance junction to ambient | 417 | ℃/W |
| $T_j, T_{stg}$ | Junction and Storage Temperature | -55 to +150 | ℃ |

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## ELECTRICAL CHARACTERISTICS @ Ta=25℃ unless otherwise specified

| Parameter | Symbol | Test conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | $I_C$=10μA $I_E$=0 | 75 | | | V |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C$=10mA $I_B$=0 | 40 | | | V |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E$=10μA $I_C$=0 | 6 | | | V |
| Collector cut-off current | $I_{CBO}$ | $V_{CB}$=60V $I_E$=0 | | | 0.01 | μA |
| Collector cut-off current | $I_{CEX}$ | $V_{CE}$=60V,$V_{BE}$=-3.0V | | | 0.01 | μA |
| Emitter cut-off current | $I_{EBO}$ | $V_{EB}$=3V $I_C$=0 | | | 0.01 | μA |
| DC current gain | $h_{FE}$ | $V_{CE}$=10V $I_C$=150mA | 100 | | 300 | |
| | | $V_{CE}$=10V $I_C$=0.1mA | 35 | | | |
| | | $V_{CE}$=10V $I_C$=1.0mA | 50 | | | |
| | | $V_{CE}$=10V $I_C$=10mA | 75 | | | |
| | | $V_{CE}$=10V $I_C$=500mA | 40 | | | |
| | | $V_{CE}$=1V $I_C$=150mA | 50 | | | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C$=500mA $I_B$=50mA<br>$I_C$=150mA $I_B$=15mA | | | 1.0<br>0.3 | V |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C$=500mA $I_B$=50mA<br>$I_C$=150mA $I_B$=15mA | | 0.6 | 2.0<br>1.2 | V |
| Transition frequency | $f_T$ | $V_{CE}$=20V $I_C$=20mA<br>f=100MHz | 300 | | | MHz |
| Output capacitance | $C_{obo}$ | $V_{CB}$=10V,$I_E$=0,f=1.0MHz | | 8.0 | | pF |
| Input capacitance | $C_{ibo}$ | $V_{EB}$=0.5V,$I_C$=0,<br>f=1.0MHz | | 25 | | pF |
| Delay time | $t_d$ | $V_{cc}$=30V, $V_{BE(off)}$=-0.5V<br>$I_C$=150mA , $I_{B1}$= 15mA | | | 10 | ns |
| Rise time | $t_r$ | | | | 25 | ns |
| Storage time | $t_s$ | $V_{CC}$=30V, $I_C$=150mA<br>$I_{B1}$=-$I_{B2}$=15mA | | | 225 | ns |
| Fall time | $t_f$ | | | | 60 | ns |

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## TYPICAL CHARACTERISTICS @ Ta=25℃ unless otherwise specified

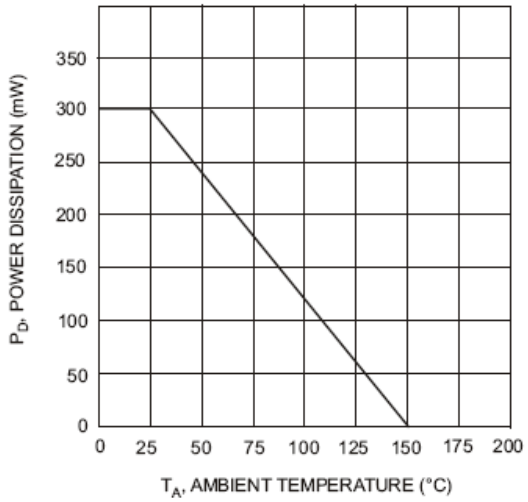


Fig. 1 Max Power Dissipation vs Ambient Temperature

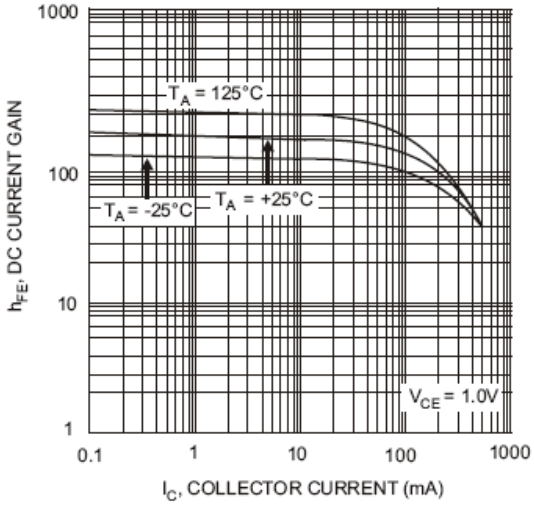


Fig. 2 Typical DC Current Gain vs Collector Current

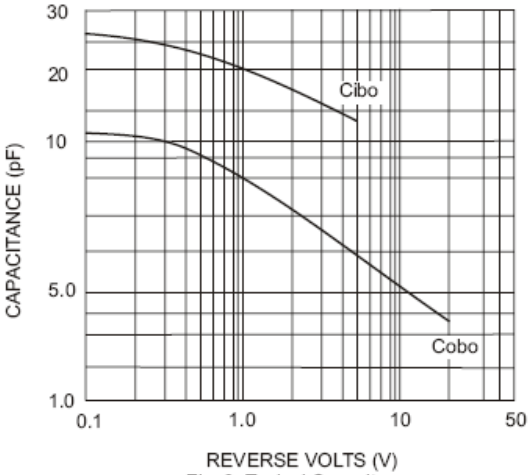


Fig. 3 Typical Capacitance

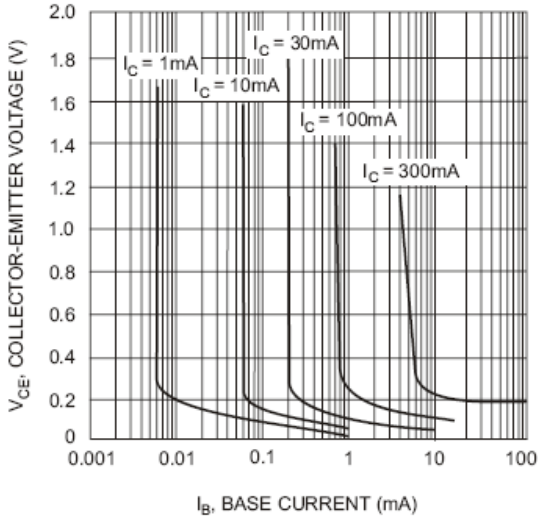


Fig. 4 Typical Collector Saturation Region

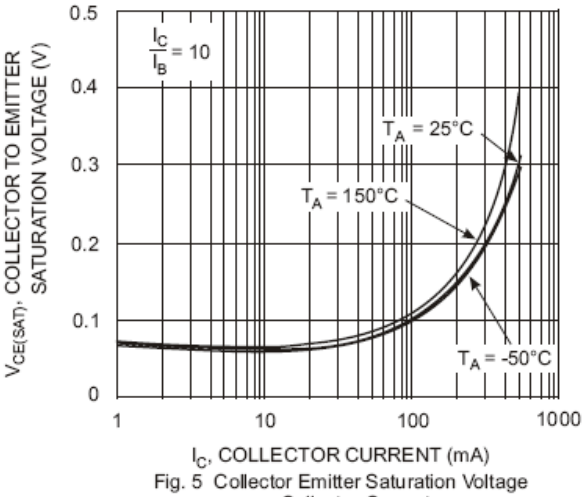


Fig. 5 Collector Emitter Saturation Voltage vs. Collector Current

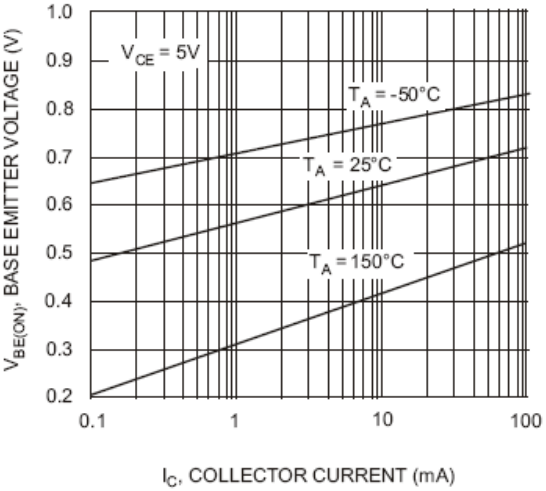


Fig. 6 Base Emitter Voltage vs. Collector Current

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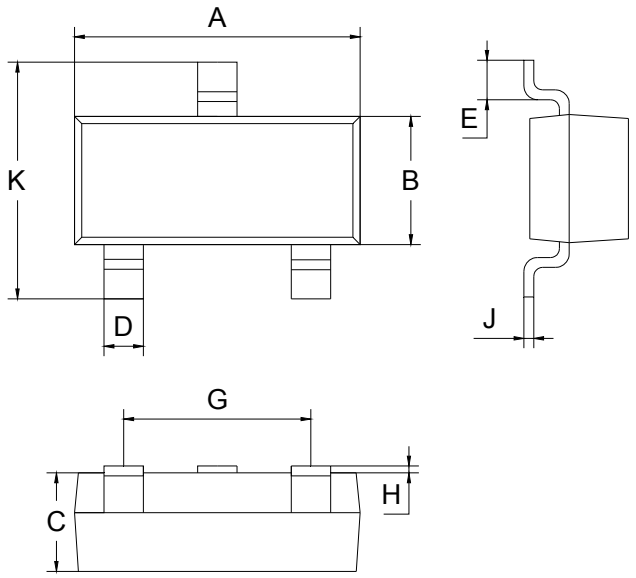
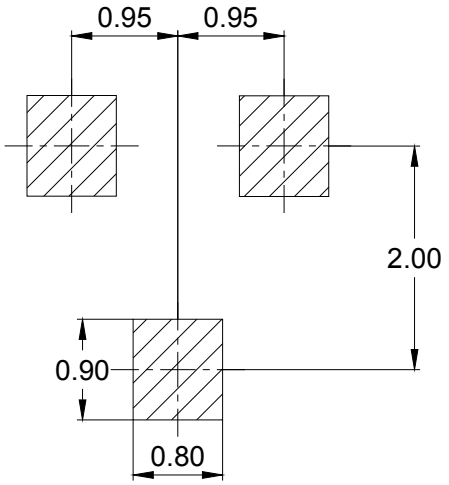
## PACKAGE OUTLINE

Plastic surface mounted package SOT-23




| SOT-23 | | |
|---|---|---|
| Dim | Min | Max |
| A | 2.70 | 3.10 |
| B | 1.10 | 1.50 |
| C | 1.0 Typical | |
| D | 0.4 Typical | |
| E | 0.35 | 0.48 |
| G | 1.80 | 2.00 |
| H | 0.02 | 0.1 |
| J | 0.1 Typical | |
| K | 2.20 | 2.60 |
| All Dimensions in mm | | |

## SOLDERING FOOTPRINT




Unit : mm

## PACKAGE INFORMATION

| Device | Package | Shipping |
|---|---|---|
| MMBT2222A | SOT-23 | 3000/Tape&Reel |