# MMBT2222AT

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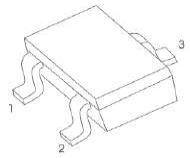
## SOT-523 Plastic-Encapsulate Transistors(NPN)

### General description
SOT-523 Plastic-Encapsulate Transistors(NPN)

**FEATURES**
- Complementary to MMBT2907AT
- Power Dissipation of 150mW
- High Stability and High Reliability
- SOT-523 Small Outline Plastic Package
- Epoxy UL: 94V-0

SOT－523




1. BASE
2. EMITTER
3. COLLECTOR

**DEVICE MARKING CODE:**

| Device Type | Device Marking |
|---|---|
| MMBT2222AT | 1P |

. **Maximum Ratings & Thermal Characteristics** (Ratings at 25℃ ambient temperature unless otherwise specified.)

| Parameters | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 75 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 40 | V |
| Emitter -Base Voltage | $V_{EBO}$ | 6 | V |
| Collector Current-Continuous | $I_C$ | 600 | mA |
| Collector Power Dissipation | $P_C$ | 150 | mW |
| Junction Temperature | $T_j$ | 150 | ℃ |
| Storage Temperature | Tstg | -55-+150 | ℃ |
| Thermal resistance From junction to ambient | $R_{\theta JA}$ | 833 | ℃/W |

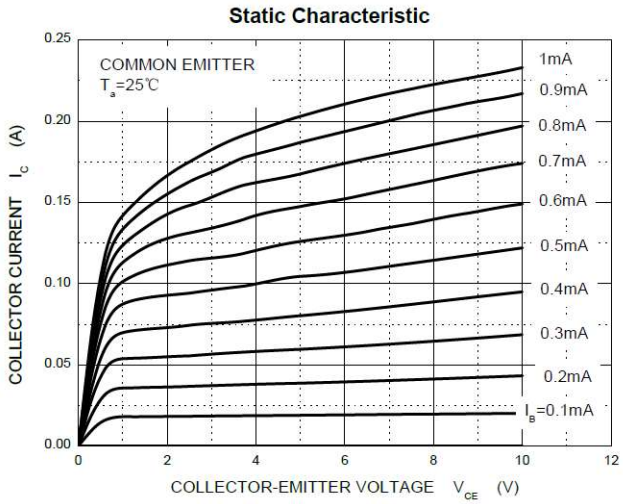
**Electrical Characteristics** (Ratings at 25℃ ambient temperature unless otherwise specified).

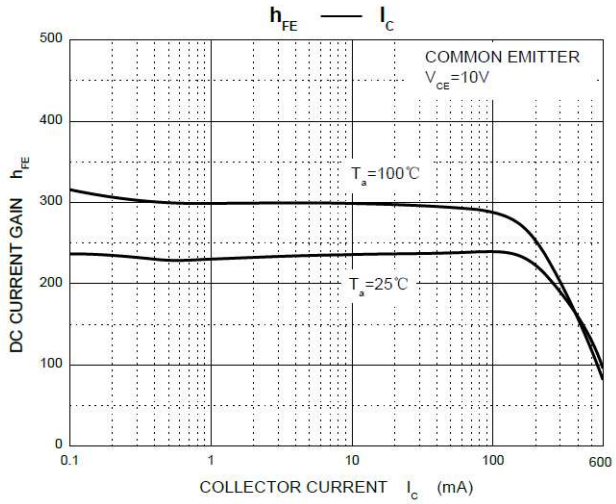
| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | $I_C$=10μA, $I_E$=0 | 75 | | | V |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C$=10mA, $I_B$=0 | 40 | | | V |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E$=10μA, $I_C$=0 | 6 | | | V |
| Collector cut-off current | $I_{CEX}$ | $V_{CE}$=60V, $V_{EB(off)}$=3V | | | 10 | nA |
| DC current gain | $h_{FE(1)}$ | $V_{CE}$=10V, $I_C$=0.1mA | 35 | | | |
| | $h_{FE(2)}$ | $V_{CE}$=10V, $I_C$=1mA | 50 | | | |
| | $h_{FE(3)}$ | $V_{CE}$=10V, $I_C$=10mA | 75 | | | |
| | $h_{FE(4)}$ | $V_{CE}$=10V, $I_C$=150mA | 100 | | 300 | |
| | $h_{FE(5)}$ | $V_{CE}$=10V, $I_C$=500mA | 40 | | | |

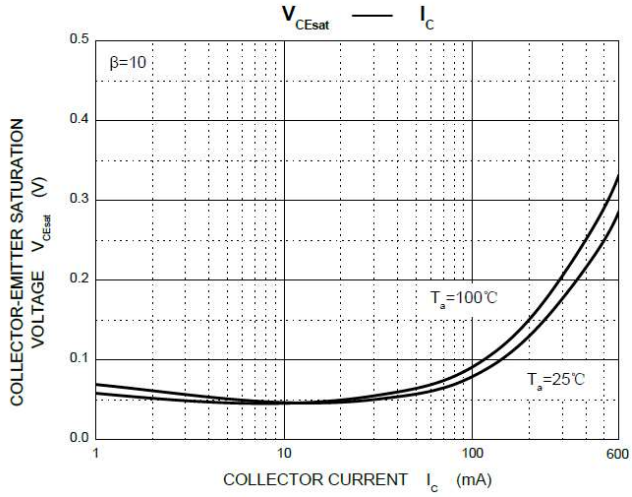
| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C$=150mA, $I_B$=15mA | | | 0.3 | V |
| | | $I_C$=500mA, $I_B$=50mA | | | 1 | V |
| Collector-emitter saturation voltage | $V_{BE(sat)}$ | $I_C$=150mA, $I_B$=15mA | | | 1.2 | V |
| | | $I_C$=500mA, $I_B$=50mA | | | 2 | V |
| Transition frequency | $f_T$ | $V_{CE}$=20V,$I_C$=20mA, f=100MHz | 300 | | | MHz |
| Collector output capacitance | $C_{ob}$ | $V_{CB}$=10V, $I_E$=0, f=1MHz | | | 8 | pF |
| Delay time | $t_d$ | $V_{CC}$=30V, $V_{BE(off)}$=-0.5V $I_C$=150mA, $I_{B1}$=15mA | | | 10 | ns |
| Rise time | $t_r$ | $V_{CC}$=30V, $V_{BE(off)}$=-0.5V $I_C$=150mA, $I_{B1}$=15mA | | | 25 | ns |
| Storage time | $t_s$ | $V_{CC}$=30V, $I_C$=150mA, $I_{B1}$=$I_{B2}$=15mA | | | 225 | ns |
| Fall time | $t_f$ | $V_{CC}$=30V, $I_C$=150mA, $I_{B1}$= $I_{B2}$=15mA | | | 60 | ns |

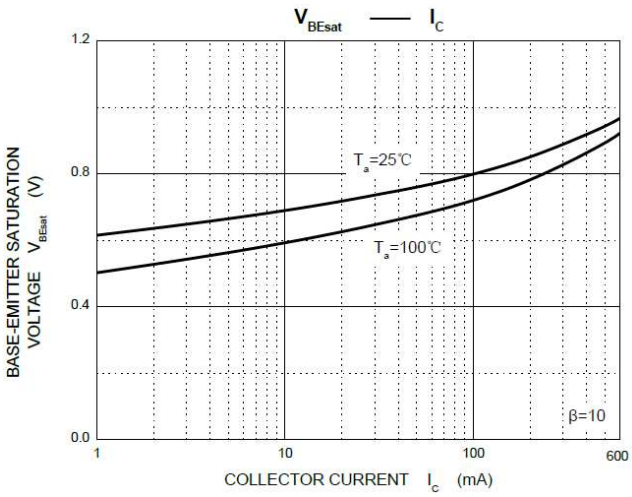
*Pulse test: pulse width≤300us, duty cycle≤2.0%

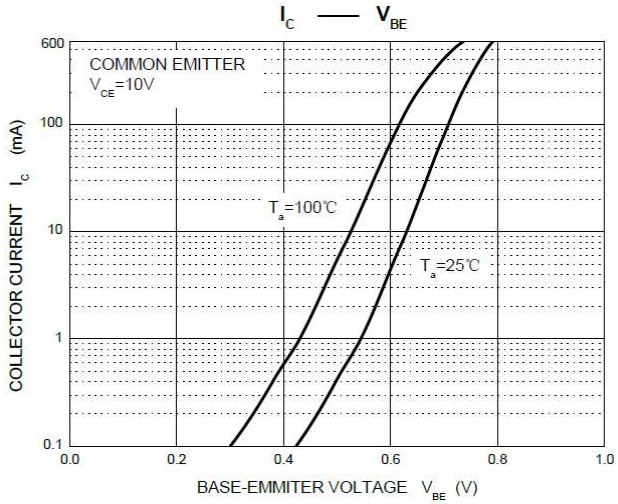
## RATING AND CHARACTERISTIC CURVES

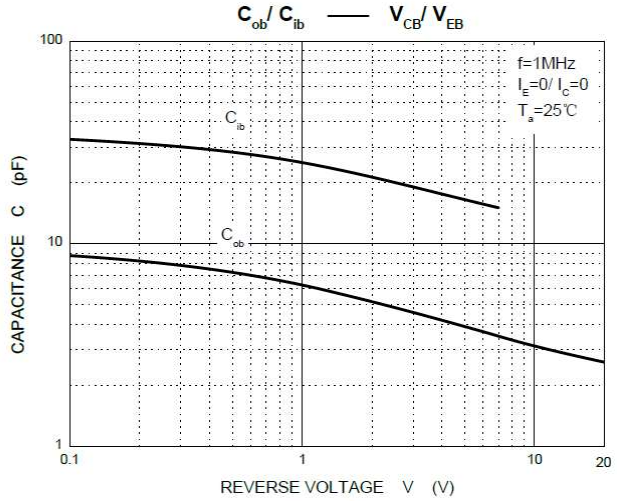


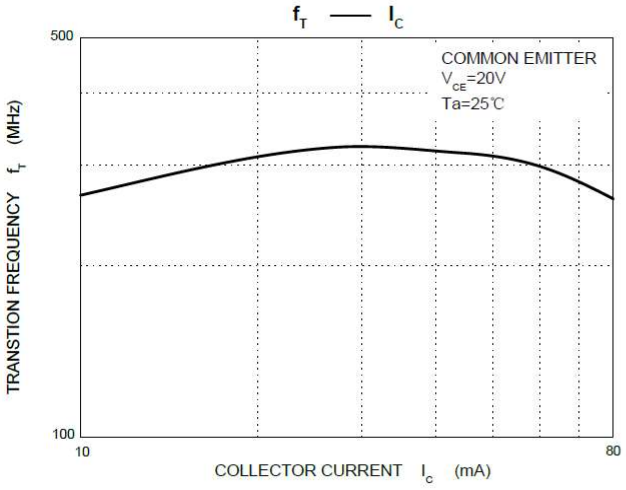



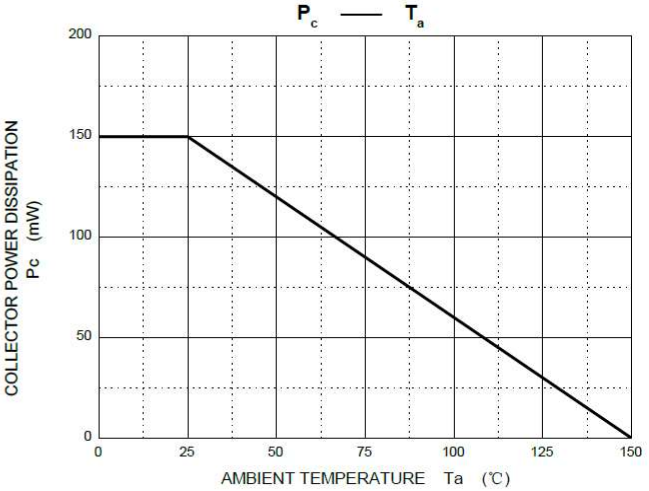

$V_{CEsat}$ — $I_C$
β=10
$T_a$=100℃
$T_a$=25℃
COLLECTOR-EMITTER SATURATION VOLTAGE $V_{CEsat}$ (V)
COLLECTOR CURRENT $I_C$ (mA)
0.0
0.1
0.2
0.3
0.4
0.5
1
10
100
600


$V_{BEsat}$ — $I_C$
$T_a$=25℃
$T_a$=100℃
β=10
BASE-EMITTER SATURATION VOLTAGE $V_{BEsat}$ (V)
COLLECTOR CURRENT $I_C$ (mA)
0.0
0.4
0.8
1.2
1
10
100
600

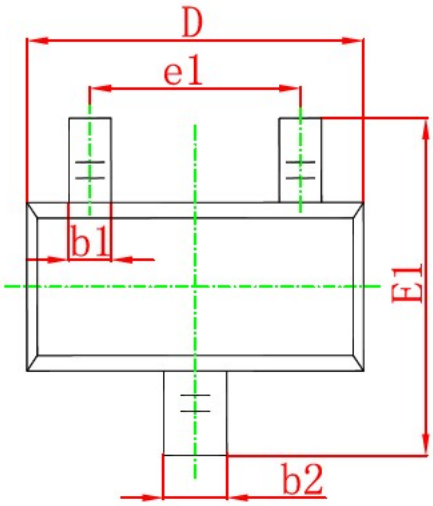

$I_C$ — $V_{BE}$
COMMON EMITTER
$V_{CE}$=10V
$T_a$=100℃
$T_a$=25℃
COLLECTOR CURRENT $I_C$ (mA)
BASE-EMMITER VOLTAGE $V_{BE}$ (V)
0.1
1
10
100
600
0.0
0.2
0.4
0.6
0.8
1.0

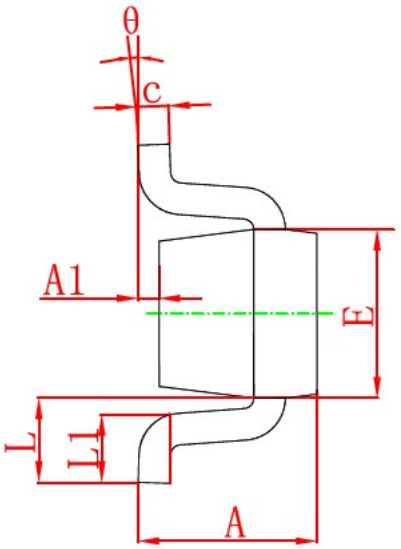

$C_{ob}$/ $C_{ib}$ — $V_{CB}$/ $V_{EB}$
f=1MHz
$I_E$=0/ $I_C$=0
$T_a$=25℃
$C_{ib}$
$C_{ob}$
CAPACITANCE C (pF)
REVERSE VOLTAGE V (V)
1
10
100
0.1
1
10
20

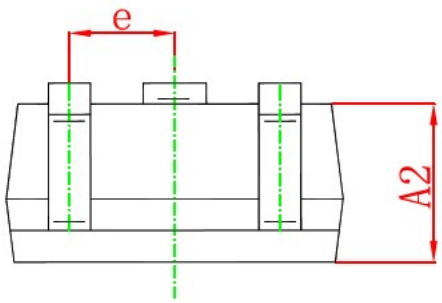

$f_T$ — $I_C$
COMMON EMITTER
$V_{CE}$=20V
Ta=25℃
TRANSTION FREQUENCY $f_T$ (MHz)
COLLECTOR CURRENT $I_C$ (mA)
100
500
10
80


$P_c$ — $T_a$
COLLECTOR POWER DISSIPATION Pc (mW)
AMBIENT TEMPERATURE Ta (℃)
0
50
100
150
200
0
25
50
75
100
125
150

## SOT-523 PACKAGE OUTLINE Plastic surface mounted package




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.700 | 0.900 | 0.028 | 0.035 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.700 | 0.800 | 0.028 | 0.031 |
| b1 | 0.150 | 0.250 | 0.006 | 0.010 |
| b2 | 0.250 | 0.350 | 0.010 | 0.014 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 1.500 | 1.700 | 0.059 | 0.067 |
| E | 0.700 | 0.900 | 0.028 | 0.035 |
| E1 | 1.450 | 1.750 | 0.057 | 0.069 |
| e | 0.500 TYP. | | 0.020 TYP. | |
| e1 | 0.900 | 1.100 | 0.035 | 0.043 |
| L | 0.400 REF. | | 0.016 REF. | |
| L1 | 0.260 | 0.460 | 0.010 | 0.018 |
| θ | 0° | 8° | 0° | 8° |

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