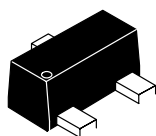


## General Purpose Transistor NPN Silicon

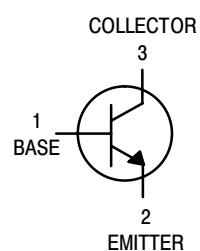
### FEATURES:

- We declare that the material of product compliance with RoHS requirements.

### Circuit Diagram & Pin Configuration:



SOT-523/SC-89



### DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
TMBT2222AT	1P	3000/Tape&Reel

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	$V_{CEO}$	40	Vdc
Collector-Base Voltage	$V_{CBO}$	75	Vdc
Emitter-Base Voltage	$V_{EBO}$	6.0	Vdc
Collector Current – Continuous	$I_C$	600	mAdc

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) $T_A = 25^\circ\text{C}$	$P_D$	150	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector – Emitter Breakdown Voltage (Note 1) ( $I_C = 1.0\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	40	–	Vdc
Collector – Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	75	–	Vdc
Emitter – Base Breakdown Voltage ( $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	6.0	–	Vdc
Base Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $V_{EB} = 3.0\text{ Vdc}$ )	$I_{BL}$	–	20	nAdc
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $V_{EB} = 3.0\text{ Vdc}$ )	$I_{CEX}$	–	100	nAdc

**ON CHARACTERISTICS** (Note 2)

DC Current Gain ( $I_C = 0.1\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 10\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )	$H_{FE}$	35 50 75 100 40	– – – – –	–
Collector – Emitter Saturation Voltage ( $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$ ) ( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )	$V_{CE(sat)}$	– –	0.3 1.0	Vdc
Base – Emitter Saturation Voltage ( $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$ ) ( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )	$V_{BE(sat)}$	0.6 –	1.2 2.0	Vdc

**SMALL–SIGNAL CHARACTERISTICS**

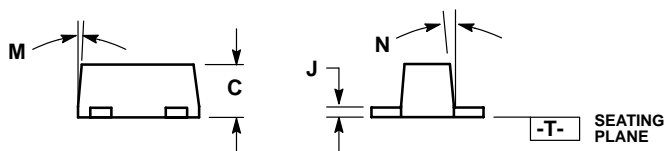
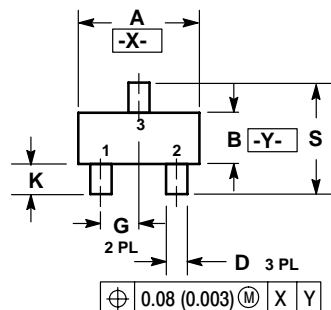
Current – Gain – Bandwidth Product ( $I_C = 20\text{ mA}$ , $V_{CE} = 20\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	250	–	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	–	8.0	pF
Input Capacitance ( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	–	30	pF
Input Impedance ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $f = 1.0\text{ kHz}$ )	$h_{ie}$	0.25	1.25	k $\Omega$
Voltage Feedback Ratio ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $f = 1.0\text{ kHz}$ )	$h_{re}$	–	4.0	$\times 10^{-4}$
Small – Signal Current Gain ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	75	375	–
Output Admittance ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $f = 1.0\text{ kHz}$ )	$h_{oe}$	25	200	$\mu\text{mhos}$
Noise Figure ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 100\text{ }\mu\text{A}$ , $R_S = 1.0\text{ k ohms}$ , $f = 1.0\text{ kHz}$ )	NF	–	4.0	dB

**SWITCHING CHARACTERISTICS**

Delay Time	$(V_{CC} = 3.0\text{ Vdc}$ , $V_{BE} = -0.5\text{ Vdc}$ , $I_C = 150\text{ mA}$ , $I_{B1} = 15\text{ mA}$ )	$t_d$	–	10	ns
Rise Time		$t_r$	–	25	
Storage Time	$(V_{CC} = 30\text{ Vdc}$ , $I_C = 150\text{ mA}$ , $I_{B1} = I_{B2} = 15\text{ mA}$ )	$t_s$	–	225	ns
Fall Time		$t_f$	–	60	

- Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint.
- Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

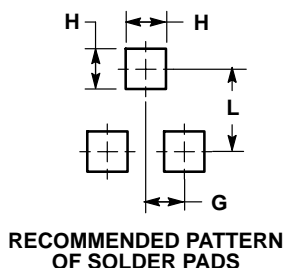
SC-89



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067



## NOTICE

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