

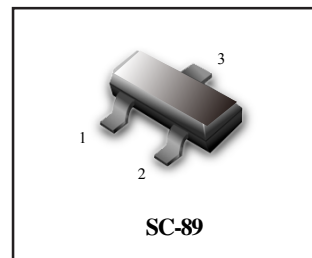
### General Purpose Transistor

#### NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SC-89 package which is designed for low power surface mount applications.

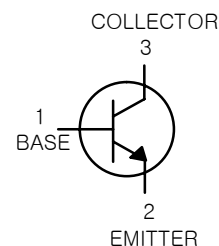
#### Features

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



#### ORDERING INFORMATION

Device	Maring	Shipping
2N2222AE	1P	3000 / Tape & Reel



#### MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Rating	Symbol	Max	Unit
Collector–Emitter Voltage	V <sub>CEO</sub>	40	Vdc
Collector–Base Voltage	V <sub>CBO</sub>	75	Vdc
Emitter–Base Voltage	V <sub>EBO</sub>	6.0	Vdc
Collector Current – Continuous	I <sub>C</sub>	600	mAdc

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) T <sub>A</sub> = 25°C	P <sub>D</sub>	150	mW
Thermal Resistance, Junction–to–Ambient	R <sub>θJA</sub>	833	°C/W
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	–55 to +150	°C

#### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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#### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (Note 1) (I <sub>C</sub> = 1.0 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	40	–	Vdc
Collector–Base Breakdown Voltage (I <sub>C</sub> = 10 μAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	75	–	Vdc
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 10 μAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	6.0	–	Vdc
Base Cutoff Current (V <sub>CE</sub> = 60 Vdc, V <sub>EB</sub> = 3.0 Vdc)	I <sub>BL</sub>	–	20	nAdc
Collector Cutoff Current (V <sub>CE</sub> = 60 Vdc, V <sub>EB</sub> = 3.0 Vdc)	I <sub>CEX</sub>	–	100	nAdc

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## ON CHARACTERISTICS (Note 2)

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

## SMALL-SIGNAL CHARACTERISTICS

Current-Gain - Bandwidth Product ( $I_C = 20 \text{ mAdc}$ , $V_{CE} = 20 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	$f_T$	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 ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{ie}$	0.25	1.25	k $\Omega$
Voltage Feedback Ratio ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{re}$	-	4.0	$\times 10^{-4}$
Small-Signal Current Gain ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{fe}$	75	375	-
Output Admittance ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{oe}$	25	200	$\mu\text{mhos}$
Noise Figure ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 100 \mu\text{Adc}$ , $R_S = 1.0 \text{ k ohms}$ , $f = 1.0 \text{ kHz}$ )	NF	-	4.0	dB

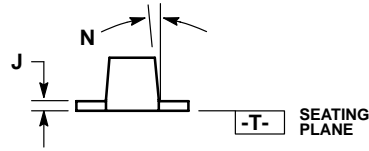
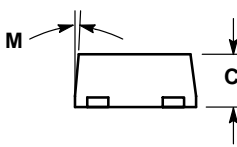
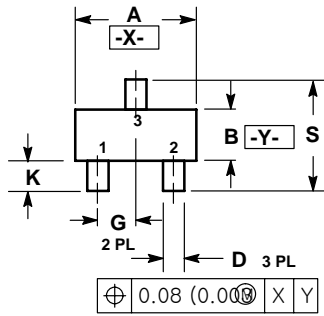
## SWITCHING CHARACTERISTICS

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

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

# 2N2222AE

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

