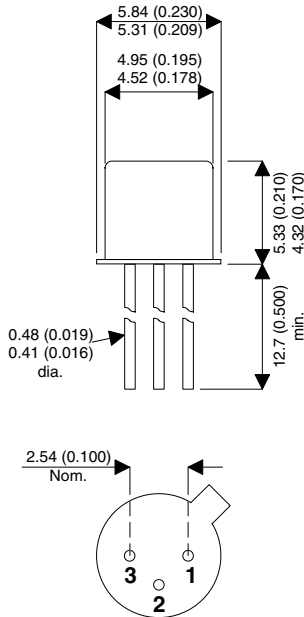


**MECHANICAL DATA**

Dimensions in mm (inches)



**TO-18 (TO-206AA)**

Underside View

Pin 1 – Emitter Pin 2 – Base Pin 3 – Collector

**GENERAL PURPOSE  
HERMETIC NPN SILICON  
TRANSISTOR**

**FEATURES**

- SILICON NPN EPITAXIAL TRANSISTOR
- HERMETIC TO18 PACKAGE
- HI-REL SCREENING OPTIONS AVAILABLE
- HIGH SPEED SATURATED SWITCHING

**APPLICATIONS**

A hermetically sealed TO18 version of the popular 2N3904 plastic part intended for high reliability applications.

**ABSOLUTE MAXIMUM RATINGS**  $T_{CASE} = 25^{\circ}C$  unless otherwise stated

$V_{CBO}$	Collector - Base Voltage	60V
$V_{CEO}$	Collector - Emitter Voltage ( $I_B = 0$ )	40V
$V_{EBO}$	Emitter - Base Voltage ( $I_C = 0$ )	6.0V
$I_C$	Continuous Collector Current	200mA
$P_D$	Total Power Dissipation at $T_A = 25^{\circ}C$ Derate Above $25^{\circ}C$	0.31W 1.8mW/ $^{\circ}C$
$T_{J/Stg}$	Operating and Storage Temperature Range	-65 to +200 $^{\circ}C$

**THERMAL DATA**

$R_{\theta JA}$	Thermal Resistance Junction - Ambient	Max	565	$^{\circ}C/W$
-----------------	---------------------------------------	-----	-----	---------------

Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}\text{C}$  unless otherwise stated)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CEO}^*$	Collector Emitter Breakdown Voltage	$I_C = 1.0\text{mA}$ $I_B = 0$	40	-	-	V
$V_{(BR)CBO}$	Collector Base Breakdown Voltage	$I_C = 10\mu\text{A}$ $I_E = 0$	60	-	-	
$V_{(BR)EBO}$	Emitter Base Breakdown Voltage	$I_E = 10\mu\text{A}$ $I_C = 0$	6	-	-	
$I_{CEX}$	Collector Emitter Cut-Off Current	$V_{CE} = 30\text{V}$ $V_{EB} = 3\text{V}$	-	-	50	nA
$h_{FE}^*$	DC Current Gain ( $V_{CE} = 10\text{V}$ )	$I_C = 0.1\text{mA}$ $V_{CE} = 1.0\text{V}$	40	-	-	
		$I_C = 1.0\text{mA}$ $V_{CE} = 1.0\text{V}$	70	-	-	
		$I_C = 10\text{mA}$ $V_{CE} = 1.0\text{V}$	100	-	300	
		$I_C = 50\text{mA}$ $V_{CE} = 1.0\text{V}$	60	-	-	
		$I_C = 100\text{mA}$ $V_{CE} = 1.0\text{V}$	30	-	-	
$h_{fe}$	Small Signal Current Gain $f=1.0\text{KHz}$	$I_C = 1.0\text{mA}$ $V_{CE} = 10\text{V}$	100	-	400	
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 10\text{mA}$ $I_B = 1.0\text{mA}$	-	-	0.2	V
		$I_C = 50\text{mA}$ $I_B = 5.0\text{mA}$	-	-	0.3	
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 10\text{mA}$ $I_B = 1.0\text{mA}$	0.65	-	0.85	
		$I_C = 50\text{mA}$ $I_B = 5.0\text{mA}$	-	-	0.95	

**DYNAMIC CHARACTERISTICS** ( $T_{case} = 25^{\circ}\text{C}$  unless otherwise stated)

$f_T$	Current Gain – Bandwidth Product	$I_C = 10\text{mA}$ $V_{CE} = 20\text{V}$ $f = 100\text{MHz}$	300	-	-	MHz
$C_{obo}$	Output Capacitance	$I_E = 0$ $V_{CB} = 5\text{V}$ $f = 1.0\text{MHz}$	-	-	4	pF
$C_{ibo}$	Input Capacitance	$I_C = 0$ $V_{EB} = 0.5\text{V}$ $f = 1.0\text{MHz}$	-	-	8	
$N_F$	Noise Figure <sup>!</sup>	$I_C = 100\mu\text{A}$ $V_{CE} = 5\text{V}$ $f = 1.0\text{KHz}$ $R_S = 1\text{K}\Omega$	-	-	5	dB
$t_d$	Delay Time	$V_{CC} = 3\text{V}$ $V_{BE} = 0.5\text{V}$	-	-	35	ns
$t_r$	Rise Time	$I_C = 10\text{mA}$ $I_{B1} = 1.0\text{mA}$	-	-	35	
$t_s$	Storage Time	$V_{CC} = 3\text{V}$ $V_{BE} = 0.5\text{V}$	-	-	200	
$t_f$	Fall Time	$I_C = 10\text{mA}$ $I_{B1} = I_{B2} = 1.0\text{mA}$	-	-	50	

\* Pulse test  $t_p = 300\mu\text{s}$ ,  $\delta < 2\%$

! Parameter characteristic verified by design only

Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.