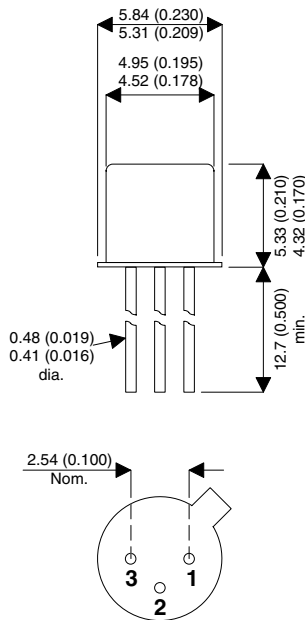


**MECHANICAL DATA**

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 $T_A = 25^{\circ}C$	0.31W
	Derate Above $25^{\circ}C$	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	$^{\circ}C/W$
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**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

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