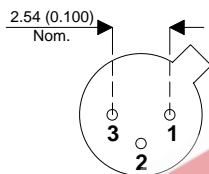
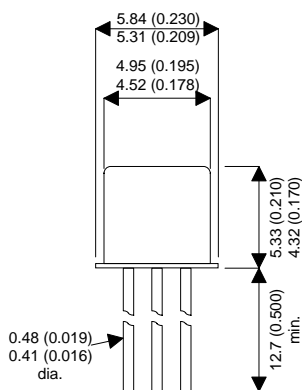


MECHANICAL DATA
Dimensions in mm (inches)



TO-18 METAL PACKAGE

PIN 1 – Emitter PIN 2 – Base PIN 3 – Collector

**GENERAL PURPOSE
NPN TRANSISTOR
FOR HIGH RELIABILITY
APPLICATIONS**

FEATURES

- SILICON PLANAR EPITAXIAL NPN TRANSISTOR
- CECC SCREENING OPTIONS
- HIGH SPEED SATURATED SWITCHING

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

V_{CBO}	Collector – Base Voltage	60V
V_{CEO}	Collector – Emitter Voltage	40V
V_{EBO}	Emitter – Base Voltage	6V
I_C	Collector Current	200mA
P_D	Total Device Dissipation @ $T_A = 25^\circ\text{C}$	350mW
	Derate above 25°C	3.33mW / $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction – Ambient	300 $^\circ\text{C}/\text{W}$
T_{STG}, T_J	Operating and Storage Temperature Range	-55 to +175 $^\circ\text{C}$

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

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CEO}^*$	Collector – Emitter Breakdown Voltage	$I_C = 1\text{mA}$	$I_B = 0$	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_{BL}	Base Cut-off Current	$V_{CE} = 30\text{V}$		50	nA
I_{CEX}	Collector – Emitter Cut-off Current	$V_{EB} = 3\text{V}$		50	
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_C = 10\text{mA}$	$I_B = 1\text{mA}$	0.2	V
		$I_C = 50\text{mA}$	$I_B = 5\text{mA}$	0.3	
$V_{BE(sat)}^*$	Base – Emitter Saturation Voltage	$I_C = 10\text{mA}$	$I_B = 1\text{mA}$	0.65	V
		$I_C = 50\text{mA}$	$I_B = 5\text{mA}$	0.95	
h_{FE}^*	DC Current Gain	$V_{CE} = 1\text{V}$	$I_C = 0.1\text{mA}$	40	—
			$I_C = 1\text{mA}$	70	
			$I_C = 10\text{mA}$	100	
			$I_C = 50\text{mA}$	60	
			$I_C = 100\text{mA}$	30	

* Pulse Test: $t_p \leq 300\mu\text{s}$, $\delta \leq 2\%$.

SMALL SIGNAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
f_t	Current Gain Bandwidth Product	$V_{CE} = 20\text{V}$	$I_C = 10\text{mA}$	300	MHz
C_{ob}	Output Capacitance	$V_{CB} = 5\text{V}$	$I_E = 0$	4	pF
C_{ib}	Input Capacitance	$V_{BE} = 0.5\text{V}$	$I_C = 0$	8	pF
h_{ie}	Input Impedance	$V_{CE} = 10\text{V}$		1	k Ω
h_{oe}	Output Admittance	$I_C = 1\text{mA}$		1	μhos
h_{re}	Voltage Feedback Ratio	$f = 1\text{kHz}$		0.5	$\times 10^{-4}$
h_{fe}	Small Signal Current Gain			100	—
N_F	Noise Figure	$V_{CE} = 5\text{V}$	$I_C = 100\mu\text{A}$	5	dB
		$f = 1\text{kHz}$	$R_S = 1\text{k}\Omega$		

SWITCHING CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_d	Delay Time	$V_{CC} = 3\text{V}$	$V_{BE} = 0.5\text{V}$	35	ns
t_r	Rise Time	$I_C = 10\text{mA}$	$I_{B1} = 1\text{mA}$	35	
t_s	Storage Time	$V_{CC} = 3\text{V}$	$V_{BE} = 0.5\text{V}$	200	
t_f	Fall Time	$I_{B1} = I_{B2} = 1\text{mA}$		50	