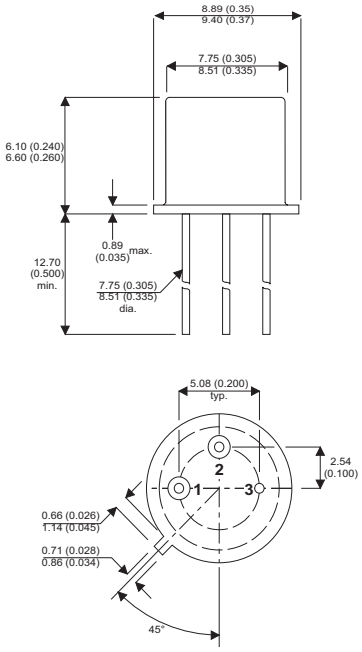
2N2904

MECHANICAL DATA
Dimensions in mm (inches)



TO–39 METAL PACKAGE

Underside View

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

GENERAL PURPOSE PNP TRANSISTOR

FEATURES

- **SILICON PLANAR EPITAXIAL PNP TRANSISTOR**
- **CECC SCREENING OPTIONS**
- **LOW NOISE AMPLIFIER**

APPLICATIONS:

- **GENERAL PURPOSE**
- **HIGH SPEED SATURATED SWITCHING**

ABSOLUTE MAXIMUM RATINGS (T_{case} = 25°C unless otherwise stated)

V_{CEO}	Collector – Emitter Voltage	40V
V_{CBO}	Collector – Base Voltage	60V
V_{EBO}	Emmiter – Base Voltage	5V
I_C	Collector Current – Continuous	600mA
P_D	Total Device Dissipation @ T_A = 25°C	600mW
	Derate above 25°C	3.43mW/ °C
P_D	Total Device Dissipation @ T_C = 25°C	3W
	Derate above 25°C	17.2mW / °C
T_J , T_{STG}	Operating and Storage Junction Temperature Range	–65 to +200°C

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SEME LAB

2N2904

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise stated)

	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
	OFF CHARACTERISTICS						
$V_{(BR)CEO}$	Collector–Emitter Breakdown Voltage[1]	I_C = 10mA	I_B = 0	40			V
$V_{(BR)CBO}$	Collector – Base Breakdown Voltage	I_C = 10µA	I_E = 0	60			
$V_{(BR)EBO}$	Emitter – Base Breakdown Voltage	I_C = 0	I_E = 10µA0	5.0			
I_{CEX}	Collector Cut-off Current	V_{CE} = 30V	V_{BE} = 0.5V			50	nA
I_{CBO}	Collector Cut-off Current	V_{CB} = 50V	I_E = 0			0.02	µA
		V_{CB} = 50V	I_E = 0			20	
			T_A = 150°C				
I_B	Base Current	V_{CE} = 30V	V_{BE} = 0.5V			50	nA
	ON CHARACTERISTICS						
h_{FE}	DC Current Gain	I_C = 0.1mA	V_{CE} = 10V			20	—
		I_C = 1mA	V_{CE} = 10V			25	
		I_C = 10mA	V_{CE} = 10V			35	
		I_C = 500mA	V_{CE} = 10V[1]			20	
	ELECTRICAL CHARACTERISTICS						
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage[1]	I_C = 150mA	I_B = 15mA			0.4	V
		I_C = 500mA	I_B = 50mA			1.6	
$V_{BE(sat)}$	Base – Emitter Saturation Voltage	I_C = 150mA	I_B = 15mA[1]			1.3	V
		I_C = 500mA	I_B = 50mA			2.6	
	SMALL SIGNAL CHARACTERISTICS						
f_t	Current Gain Bandwidth Product [2]	V_{CE} = 20V f = 100MHz	I_C = 50mA	200			MHz
C_{obo}	Output Capacitance	V_{CB} = 10V f = 100kHz	I_E = 0			8.0	pF
C_{ibo}	Input Capacitance	V_{BE} = 2..0V f = 100kHz	I_C = 0			30	
	SWITCHING CHARACTERISTICS						
t_{on}	Turn–On Time	V_{CC} = 30V I_{B1} = 15mA	I_C = 150mA		26	45	ns
t_d	Delay Time				6.0	10	
t_r	RiseTime				20	40	
t_{off}	Turn–Off Time	V_{CC} = 6V I_{B1} = I_{B2} =15mA	I_C = 150mA		70	100	ns
t_s	Sorage Time				50	80	
t_f	FallTime				20	30	

1) Pulse test : Pulse Width < 300µs ,Duty Cycle < 2%

2) f_t is defined as the frequency at which $|h_{fe}|$ extrapolates to untity.