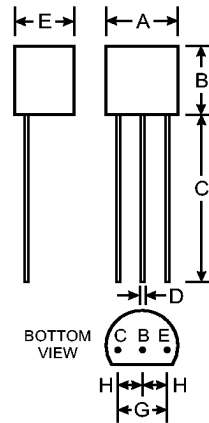


Features

- Epitaxial Planar Die Construction
- Available in both Through-Hole and Surface Mount Packages
- Ideal for Switching and Amplifier Applications
- Complementary PNP Type Available (2N3906)

Mechanical Data

- Case: TO-92, Plastic
- Leads: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: Type Number
- Weight: 0.18 grams (approx.)



TO-92		
Dim	Min	Max
A	4.32	4.83
B	4.32	4.78
C	12.50	15.62
D	0.36	0.56
E	3.15	3.94
G	2.29	2.79
H	1.14	1.40
All Dimensions in mm		

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	2N3904	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	5.0	V
Collector Current - Continuous	I_C	100	mA
Collector Current - Peak	I_{CM}	200	mA
Power Dissipation (Note 1)	P_d	500	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	250	K/W
Operating and Storage Temperature Range	T_j, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 1. Leads maintained at a distance of 2.0mm from body at specified ambient temperature.
2. Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
DC Current Gain	h_{FE}	50 70 100 60 30	— — 300 — —	—	$-V_{CE} = 1.0\text{V}, -I_C = 0.1\text{mA}$ $-V_{CE} = 1.0\text{V}, -I_C = 1.0\text{mA}$ $-V_{CE} = 1.0\text{V}, -I_C = 10\text{mA}$ $-V_{CE} = 1.0\text{V}, -I_C = 50\text{mA}$ $-V_{CE} = 1.0\text{V}, -I_C = 100\text{mA}$
Collector Saturation Voltage	$V_{CE(SAT)}$	—	0.25 0.40	V	(Note 2) $-I_C = 10\text{mA}, -I_B = 1.0\text{mA}$ $-I_C = 50\text{mA}, -I_B = 5.0\text{mA}$
Base Saturation Voltage	$V_{BE(SAT)}$	—	0.85 0.95	V	(Note 2) $-I_C = 10\text{mA}, -I_B = 1.0\text{mA}$ $-I_C = 50\text{mA}, -I_B = 5.0\text{mA}$
Collector Cutoff Current	I_{CEX}	—	50	nA	$-V_{EB} = 3.0\text{V}, -V_{CE} = 30\text{V}$
Emitter Cutoff Current	I_{BL}	—	50	nA	$-V_{EB} = 3.0\text{V}, -V_{CE} = 30\text{V}$
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60	—	V	$-I_C = 10\mu\text{A}, -I_B = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40	—	V	$-I_C = 1.0\text{mA}, -I_E = 0$ (Note 2)
Emitter-base Breakdown voltage	$V_{(BR)EBO}$	5.0	—	V	$-I_E = 10\mu\text{A}, -I_C = 0$
Gain Bandwidth Product	f_T	250	—	MHz	$V_{CE} = 20\text{V}, -I_C = 10\text{mA},$ $-f = 100\text{MHz}$
Collector-Base Capacitance	C_{CBO}	—	4.5	pF	$-V_{CB} = 5.0\text{V}, -I_E = 0, f = 100\text{kHz}$
Emitter-Base Capacitance	C_{EBO}	—	10	pF	$-V_{EB} = 0.5\text{V}, -I_C = 0, f = 100\text{kHz}$
Noise Figure	—	—	5.0	dB	$-V_{CE} = 5.0\text{V}, -I_C = 100\mu\text{A},$ $R_G = 1.0\text{k}\Omega, -f = 10 \text{ to } 15000\text{Hz}$
Delay Time	t_d	—	35	ns	$-I_{B1} = 1.0\text{mA}, -I_C = 10\text{mA},$ $V_{CC} = 3.0\text{V}, V_{BE(off)} = 0.5\text{V}$
Rise Time	t_r	—	35	ns	$-I_{B1} = 1.0\text{mA}, -I_C = 10\text{mA},$ $-V_{CC} = 3.0\text{V}, -V_{BE(off)} = 0.5\text{V}$
Storage Time	t_s	—	225	ns	$-I_{B1} = -I_{B2} = 1.0\text{mA},$ $-I_C = 10\text{mA}, -V_{CC} = 3.0\text{V}$
Fall Time	t_f	—	75	ns	$-I_{B1} = -I_{B2} = 1.0\text{mA},$ $-I_C = 10\text{mA}, -V_{CC} = 3.0\text{V}$

Notes: 1. Leads maintained at a distance of 2.0mm from body at specified ambient temperature.
2. Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.