FAIRCHILD
A Schlumberger Company

2N2904A/5A/6A/7A
PN2904A/5A/6A/7A
FTSO2904A/5A/6A/7A

PNP Small Signal General Purpose Amplifiers & Switches

- **P_D ... 625 mW @ T_A = 25° C (PN Series)**
- **V_{CEO} ... -60 V (Min)**
- **h_{FE} ... 40-120 (2N/PN/FTSO2904A/6A), 100-300 (2N/PN/FTSO2905A/7A)**
- **t_{on} ... 45 ns (Max) @ 150 mA, t_{off} ... 100 ns (Max) @ 150 mA**
- **Complements ... 2N/PN/FTSO2218 Series, 2N/PN/FTSO2218A Series**

PACKAGE

2N2904A	TO-39
2N2905A	TO-39
2N2906A	TO-18
2N2907A	TO-18
PN2904A	TO-92
PN2905A	TO-92
PN2906A	TO-92
PN2907A	TO-92
FTSO2904A	TO-236AA/AB
FTSO2905A	TO-236AA/AB
FTSO2906A	TO-236AA/AB
FTSO2907A	TO-236AA/AB

ABSOLUTE MAXIMUM RATINGS (Note 1)

Temperatures	**2N**	**PN/FTSO**
Storage Temperature	-65° C to 200° C	-55° C to 150° C
Operating Junction Temperature	175° C	150° C

Power Dissipation (Notes 2 & 3)

	2N2904/5A	**2N2906/7A**
Total Dissipation at 25° C Ambient Temperature	0.6 W	0.4 W
25° C Case Temperature	3.0 W	1.8 W

	PN	**FTSO**
Total Dissipation at 25° C Ambient Temperature	0.625 W	0.350 W*
25° C Case Temperature	1.0 W	

Voltages & Currents	**2N/PN**
V_{CEO} Collector to Emitter Voltage (Note 4)	−40 V
V_{CBO} Collector to Base Voltage	−60 V
V_{EBO} Emitter to Base Voltage	−5.0 V
I_C Collector Current	600 mA

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	2904A/2906A MIN	2904A/2906A MAX	UNITS	TEST CONDITIONS
h_{FE}	DC Current Gain (Note 5)	40	120		I_C = 150 mA, V_{CE} = −10 V
		40			I_C = 500 mA, V_{CE} = −10 V
		40			I_C = 10 mA, V_{CE} = −10 V
		40			I_C = 1.0 mA, V_{CE} = −10 V
		40			I_C = 0.1 mA, V_{CE} = −10 V

NOTES:

1. These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
3. These ratings give a maximum junction temperature of 200° C and junction-to-case thermal resistance of 58.3° C/W (derating factor of 17.2 mW/° C); junction-to-ambient thermal resistance of 292° C/W (derating factor of 3.42 mW/° C) for 2N2904A and 2N2905A; junction-to-case thermal resistance of 97.3° C/W (derating factor of 10.3 mW/° C); junction-to-ambient thermal resistance of 437° C/W (derating factor of 2.28 mW/° C) for the 2N2906A and 2N2907A. These ratings give a maximum junction resistance of 150° C and junction-to-case thermal resistance of 125° C/W (derating factor of 8.0 mW/° C); junction-to-ambient thermal resistance of 200° C/W (derating factor of 5.0 mW/° C) for PN2904A, PN2905A, PN2906A, and PN2907A; (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
4. Rating refers to a high current point where collector to emitter voltage is lowest.
5. Pulse conditions: length = 300 μs; duty cycle = 1%.
6. For product family characteristic curves, refer to Curve Set T212.

* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	2905A/2907A MIN	MAX	UNITS	TEST CONDITIONS
h_{FE}	DC Current Gain (Note 5)	100 50 100 100 75	300		I_C = 150 mA, V_{CE} = −10 V I_C = 500 mA, V_{CE} = −10 V I_C = 10 mA, V_{CE} = −10 V I_C = 1.0 mA, V_{CE} = −10 V I_C = 0.1 mA, V_{CE} = −10 V
BV_{EBO}	Emitter to Base Breakdown Voltage	−5.0		V	I_C = 0, I_E = 10 μA
BV_{CBO}	Collector to Base Breakdown Voltage	−60		V	I_C = 10 μA, I_E = 0
I_{CEX}	Collector Reverse Current		50	nA	V_{CE} = −30 V, V_{EB} = −0.5 V
I_{CBO}	Collector Cutoff Current		10 10	nA μA	V_{CB} = −50 V, I_E = 0 V_{CB} = −50 V, I_E = 0, T_A = 150° C
I_B	Base Current		50	nA	V_{CE} = −0 V, V_{EB} = −0.5 V
$V_{CEO(sus)}$	Collector to Emitter Sustaining Voltage (Notes 4 & 5)	−40		V	I_C = 10 mA (pulsed), I_B = 0
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		−0.4 −1.6	V V	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)		−1.3 −2.6	V V	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA
C_{ob}	Output Capacitance		8.0	pF	V_{CB} = −10 V, I_E = 0, f = 100 kHz
C_{ib}	Emitter Transition Capacitance		30	pF	V_{EB} = −2.0 V, I_C = 0, f = 100 kHz
h_{fe}	High Frequency Current Gain	2.0			I_C = 50 mA, V_{CE} = −20 V, f = 100 MHz
t_d	Turn On Delay Time (test circuit no. 224)		10	ns	I_C = 150 mA, V_{CC} = −30 V, I_{B1} = 15 mA
t_r	Rise Time (test circuit no. 224)		40	ns	I_C = 150 mA, V_{CC} = −30 V, I_{B1} = I_{B2} = 15 mA
t_s	Storage Time (test circuit no. 225)		80	ns	I_C = 150 mA, V_{CC} = −6.0 V, I_{B1} = 15 mA
t_f	Fall Time (test circuit no. 225)		30	ns	I_C = 150 mA, V_{CC} = −6.0 V, I_{B1} = I_{B2} = 15 mA
t_{on}	Turn On Time (test circuit no. 224)		45	ns	I_C = 150 mA, V_{CC} = −3.0 V, I_{B1} = 15 mA
t_{off}	Turn Off Time (test circuit no. 225)		100	ns	I_C = 150 mA, V_{CC} = −6.0 V, I_{B1} = I_{B2} = 15 mA