

3469674 FAIRCHILD SEMICONDUCTOR

84D 27618 D

FAIRCHILD

A Schlumberger Company

2N5771/FTSO5771 T-37-67PNP Ultra High Speed Saturated
Logic Switch

- V_{CEO} ... 15 V (Min)
- t_{on} ... 15 ns (Max) @ 10 mA, t_{off} ... 20 ns (Max) @ 10 mA
- T_s ... 20 ns (Max) @ 10 mA
- Complements ... 2N5769, 2N5772

PACKAGE

| | |
|----------|-------------|
| 2N5771 | TO-92 |
| FTSO5771 | TO-236AA/AB |

ABSOLUTE MAXIMUM RATINGS (Note 1)**Temperatures**

| | |
|--------------------------------|------------------|
| Storage Temperature | -55° C to 150° C |
| Operating Junction Temperature | 150° C |

Power Dissipation (Notes 2 & 3)

| | | |
|---------------------------|-----------|-------------|
| Total Dissipation at | 2N | FTSO |
| 25° C Ambient Temperature | 0.625 W | 0.350 W* |
| 25° C Case Temperature | 1.0 W | |

Voltages & Currents

| | |
|--|--------|
| V_{CEO} Collector to Emitter Voltage (Note 4) | -15 V |
| V_{CBO} Collector to Base Voltage | -15 V |
| V_{EBO} Emitter to Base Voltage | -4.5 V |
| I_C Collector Current | 50 mA |

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

| SYMBOL | CHARACTERISTIC | MIN | MAX | UNITS | TEST CONDITIONS |
|------------|--|----------------------|-----------|---------------|---|
| BV_{CEO} | Collector to Emitter Breakdown Voltage (Note 5) | -15 | | V | $I_C = 3.0$ mA, $I_B = 0$ |
| BV_{CES} | Collector to Emitter Breakdown Voltage | -15 | | V | $I_C = 100$ μ A, $V_{BE} = 0$ |
| BV_{CBO} | Collector to Base Breakdown Voltage | -15 | | V | $I_C = 100$ μ A, $I_E = 0$ |
| BV_{EBO} | Emitter to Base Breakdown Voltage | -4.5 | | V | $I_E = 100$ μ A, $I_C = 0$ |
| I_{CBO} | Collector to Base Cutoff Current | | 10 | nA | $V_{CB} = -8.0$ V, $I_C = 0$ |
| I_{EBO} | Emitter Cutoff Current | | 1.0 | μ A | $V_{EB} = -4.5$ V, $I_C = 0$ |
| I_{CES} | Collector Reverse Current | | 10 5.0 | nA μ A | $V_{CE} = -8.0$ V, $V_{BE} = 0$ $V_{CE} = -8.0$ V, $V_{BE} = 0$, $T_A = 125^\circ$ C |
| h_{FE} | DC Current Gain (Note 5) | 35 50 40 20 | 120 | | $I_C = 1.0$ mA, $V_{CE} = -0.5$ V $I_C = 10$ mA, $V_{CE} = -0.3$ V $I_C = 50$ mA, $V_{CE} = -1.0$ V $I_C = 10$ mA, $V_{CE} = -0.3$ V, $T_A = 55^\circ$ C |

NOTES:

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
- These ratings give a maximum junction temperature of 150° C and (TO-92) 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); (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
- Rating refers to a high current point where collector to emitter voltage is lowest
- Pulse conditions: length = 300 μ s; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T292.
 - * 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 | MIN | MAX | UNITS | TEST CONDITIONS |
|---------------|---|------|-------|-------|--|
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 5) | | -0.18 | V | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ |
| | | | -0.15 | V | $I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$ |
| | | | -0.6 | V | $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ |
| $V_{BE(sat)}$ | Base to Emitter Saturation Voltage (Note 5) | -0.8 | -0.8 | V | $I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$ |
| | | | -0.95 | V | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ |
| | | | -1.5 | V | $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ |
| C_{cb} | Collector to Base Capacitance | | 3.0 | pF | $V_{CB} = -5.0 \text{ V}, I_E = 0, f = 140 \text{ kHz}$ |
| C_{eb} | Emitter to Base Capacitance | | 3.5 | pF | $V_{EB} = -0.5 \text{ V}, I_C = 0, f = 140 \text{ kHz}$ |
| h_{fe} | High Frequency Current Gain | 8.5 | | | $I_C = 10 \text{ mA}, V_{CE} = -10 \text{ V}, f = 100 \text{ MHz}$ |
| t_{on} | Turn On Time (test circuit no 348) | | 15 | ns | $I_C = 10 \text{ mA}, I_{B1} = 1.0 \text{ mA}$ |
| t_{off} | Turn Off Time (test circuit no 348) | | 20 | ns | $I_C = 10 \text{ mA}, I_{B1} = I_{B2} = 1.0 \text{ mA}$ |
| τ_s | Charge Storage Time Constant (test circuit no. 234) | | 20 | ns | $I_C = 10 \text{ mA}, I_{B1} \approx I_{B2} \approx 10 \text{ mA}$ |

FAIRCHILD

A Schlumberger Company

2N5830/FTSO5830

2N5831/FTSO5831

2N5833/FTSO5833

NPN Small Signal High Voltage
General Purpose Amplifiers

T-29-23

- V_{CE0} ... 100 V (Min) (2N5830), 140 V (Min) (2N/FTSO5831), 180 V (Min) (2N/FTSO5833)
- h_{FE} ... 80 (Min) (2N/FTSO5830/1), 50 (Min) (2N/FTSO5833)
- C_{cb} ... 4.0 pF (Max)

PACKAGE

| | |
|----------|-------------|
| 2N5830 | TO-92 |
| 2N5831 | TO-92 |
| 2N5833 | TO-92 |
| FTSO5830 | TO-236AA/AB |
| FTSO5831 | TO-236AA/AB |
| FTSO5833 | TO-236AA/AB |

ABSOLUTE MAXIMUM RATINGS (Note 1)

Temperatures

| | |
|--------------------------------|------------------|
| Storage Temperature | -55° C to 150° C |
| Operating Junction Temperature | 150° C |

Power Dissipation (Notes 2 & 3)

| Total Dissipation at | 2N | FTSO |
|---------------------------|---------|----------|
| 25° C Ambient Temperature | 0.625 W | 0.350 W* |
| 25° C Case Temperature | 1.0 W | |

Voltages & Currents

| | 5830 | 5831 | 5833 |
|---|--------|--------|--------|
| V_{CE0} Collector to Emitter Voltage (Note 4) | 100 V | 140 V | 180 V |
| V_{CBO} Collector to Base Voltage | 120 V | 160 V | 200 V |
| V_{EBO} Emitter to Base Voltage | 5.0 V | 5.0 V | 6.0 V |
| I_C Collector Current | 600 mA | 600 mA | 600 mA |

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 5)

| SYMBOL | CHARACTERISTIC | 5830 | | 5831 | | UNITS | TEST CONDITIONS |
|------------|--|------|-----|------|-----|---------|--|
| | | MIN | MAX | MIN | MAX | | |
| BV_{CE0} | Collector to Emitter Breakdown Voltage | 100 | | 140 | | V | $I_C = 1.0$ mA, $I_B = 0$ |
| BV_{CBO} | Collector to Base Breakdown Voltage | 120 | | 160 | | V | $I_C = 100$ μ A, $I_E = 0$ |
| BV_{EBO} | Emitter to Base Breakdown Voltage | 5.0 | | 5.0 | | V | $I_E = 10$ μ A, $I_C = 0$ |
| I_{EBO} | Emitter Cutoff Current | | 50 | | 50 | nA | $V_{EB} = 4.0$ V, $I_C = 0$ |
| I_{CBO} | Collector Cutoff Current | | 50 | | 50 | nA | $V_{CB} = 100$ V, $I_E = 0$ |
| | | | 25 | | 25 | μ A | $V_{CB} = 120$ V, $I_E = 0$ |
| | | | | | | μ A | $V_{CB} = 100$ V, $I_E = 0$, $T_A = 100^\circ$ C $V_{CB} = 120$ V, $I_E = 0$, $T_A = 100^\circ$ C |
| h_{FE} | DC Current Gain (Note 4) | 60 | | 60 | | | $I_C = 1.0$ mA, $V_{CE} = 5.0$ V |
| | | 80 | 500 | 80 | 250 | | $I_C = 10$ mA, $V_{CE} = 5.0$ V |
| | | 80 | | 80 | | | $I_C = 50$ mA, $V_{CE} = 5.0$ 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 150° C and (TO-92) 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); (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
 4. Pulse conditions: length \leq 300 μ s; duty cycle \leq 1%.
 5. For product family characteristic curves, refer to Curve Set T147.
- * Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

3469674 FAIRCHILD SEMICONDUCTOR

84D 27621 D 7.29.23

2N5830/FTSO5830
 2N5831/FTSO5831
 2N5833/FTSO5833

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 5)

| SYMBOL | CHARACTERISTIC | 5830 | | 5831 | | UNITS | TEST CONDITIONS |
|---------------|---|------|------|------|------|-----------------|--|
| | | MIN | MAX | MIN | MAX | | |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 4) | | 0.15 | | 0.15 | V | $I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$ |
| | | | 0.20 | | 0.20 | V | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ |
| | | | 0.25 | | 0.25 | V | $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ |
| $V_{BE(ON)}$ | Base to Emitter "On" Voltage | | 0.8 | | 0.8 | V | $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ |
| $V_{BE(sat)}$ | Base to Emitter Saturation Voltage (Note 4) | | 0.8 | | 0.8 | V | $I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$ |
| | | | 1.0 | | 1.0 | V | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ |
| | | | 1.0 | | 1.0 | V | $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ |
| C_{cb} | Collector to Base Capacitance | | 4.0 | | 4.0 | pF | $V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$ |
| $ h_{fe} $ | Magnitude of Common Emitter High Frequency Current Gain | 1.0 | 5.0 | 1.0 | 5.0 | | $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}, f = 100 \text{ MHz}$ |
| h_{fe} | Small Signal Current Gain | 60 | | 60 | | | $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$ |
| h_{ie} | Input Resistance | | 6.0 | | 6.0 | k Ω | $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$ |
| h_{oe} | Output Conductance | | 40 | | 40 | μmho | $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$ |

2N5830/FTSO5830
2N5831/FTSO5831
2N5833/FTSO5833

| SYMBOL | CHARACTERISTIC | 5833 | | UNITS | TEST CONDITIONS |
|---------------|---|----------------|----------------------|---------------------|--|
| | | MIN | MAX | | |
| BV_{CEO} | Collector to Emitter Breakdown Voltage | 180 | | V | $I_C = 1.0 \text{ mA}, I_B = 0$ |
| BV_{CBO} | Collector to Base Breakdown Voltage | 200 | | V | $I_C = 100 \mu\text{A}, I_E = 0$ |
| BV_{EBO} | Emitter to Base Breakdown Voltage | 6.0 | | V | $I_E = 10 \mu\text{A}, I_C = 0$ |
| I_{EBO} | Emitter Cutoff Current | | 50 | nA | $V_{EB} = 5.0 \text{ V}, I_C = 0$ |
| I_{CBO} | Collector Cutoff Current | | 10 25 | nA μA | $V_{CB} = 160 \text{ V}, I_E = 0$ $V_{CB} = 160 \text{ V}, I_E = 0, T_A = 100^\circ\text{C}$ |
| h_{FE} | DC Current Gain (Note 4) | 50 50 50 | 250 | | $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 5.0 \text{ V}$ |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 4) | | 0.15 0.20 0.25 | V V V | $I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$ $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ |
| $V_{BE(on)}$ | Base to Emitter "On" Voltage | | 0.8 | V | $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ |
| $V_{BE(sat)}$ | Base to Emitter Saturation Voltage (Note 4) | | 0.8 1.0 1.0 | V V V | $I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$ $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ |
| C_{cb} | Collector to Base Capacitance | | 4.0 | pF | $V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$ |
| $ h_{fe} $ | Magnitude of Common Emitter High Frequency Current Gain | 1.0 | 5.0 | | $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}, f = 100 \text{ MHz}$ |
| h_{fe} | Small Signal Current Gain | 50 | | | $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$ |
| h_{ie} | Input Resistance | | 6.0 | k Ω | $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$ |
| h_{oe} | Output Conductance | | 40 | μmho | $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$ |

FAIRCHILD

A Schlumberger Company

2N5961/FTSO5961
2N5962/FTSO5962

NPN Low Level Low Noise Amplifiers

- $I_{CBO} \dots 2.0 \text{ nA (Max) @ } V_{CB} = 45 \text{ V}, 50 \text{ nA (Max) @ } V_{CB} = 45 \text{ V}, T_A = 65^\circ \text{ C (2N/FTSO5961)}$
- $V_{CE(sat)} \dots 0.2 \text{ V (Max) @ } 10 \text{ mA/0.5 mA}$
- $h_{FE} \dots 900 \text{ (Min) @ } 10 \mu\text{A}$

PACKAGE

| | |
|----------|-------------|
| 2N5961 | TO-92 |
| 2N5962 | TO-92 |
| FTSO5961 | TO-236AA/AB |
| FTSO5962 | TO-236AA/AB |

ABSOLUTE MAXIMUM RATINGS (Note 1)

Temperatures

| | |
|--------------------------------|------------------|
| Storage Temperature | -55° C to 150° C |
| Operating Junction Temperature | 150° C |

Power Dissipation (Notes 2 & 3)

| Total Dissipation at | 2N | FTSO |
|---------------------------|---------|----------|
| 25° C Ambient Temperature | 0.625 W | 0.350 W* |
| 70° C Ambient Temperature | 0.400 W | |
| 25° C Case Temperature | 1.0 W | |

Voltages & Currents

| | 5961 | 5962 |
|---|-------|-------|
| V_{CEO} Collector to Emitter Voltage (Note 4) | 60 V | 45 V |
| V_{CBO} Collector to Base Voltage | 60 V | 45 V |
| V_{EBO} Emitter to Base Voltage | 8.0 V | 8.0 V |
| I_C Collector Current (Continuous) | 50 mA | 50 mA |

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

| SYMBOL | CHARACTERISTIC | 5961 | | 5962 | | UNITS | TEST CONDITIONS |
|------------|--|------|-----|------|-----|-------|--|
| | | MIN | MAX | MIN | MAX | | |
| BV_{CEO} | Collector to Emitter Breakdown Voltage | 60 | | 45 | | V | $I_C = 5.0 \text{ mA}, I_B = 0$ |
| BV_{CBO} | Collector to Base Breakdown Voltage | 60 | | 45 | | V | $I_C = 10 \mu\text{A}, I_E = 0$ |
| BV_{EBO} | Emitter to Base Breakdown Voltage | 8.0 | | 8.0 | | V | $I_E = 10 \mu\text{A}, I_C = 0$ |
| I_{EBO} | Emitter Cutoff Current | | 1.0 | | 1.0 | nA | $V_{EB} = 5.0 \text{ V}, I_C = 0$ |
| I_{CBO} | Collector Cutoff Current | | 2.0 | | 2.0 | nA | $V_{CB} = 45 \text{ V}, I_E = 0$ |
| | | | 50 | | 50 | nA | $V_{CB} = 30 \text{ V}, I_E = 0$ |
| | | | | | | nA | $V_{CB} = 45 \text{ V}, I_E = 0, T_A = 65^\circ \text{ C}$ |
| | | | | | | nA | $V_{CB} = 30 \text{ V}, I_E = 0, T_A = 65^\circ \text{ C}$ |

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 150° C and (TO-92) 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); (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 T107.
- * Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

2N5961/FTSO5961
2N5962/FTSO5962
ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

| SYMBOL | CHARACTERISTIC | 5961 | | 5962 | | UNITS | TEST CONDITIONS |
|---------------|---|-------------------|------|-------------------|------|-------|---|
| | | MIN | MAX | MIN | MAX | | |
| h_{FE} | DC Current Gain | 100 120 135 | | 450 500 550 | | | $I_C = 10 \mu A, V_{CE} = 5.0 V$ $I_C = 100 \mu A, V_{CE} = 5.0 V$ $I_C = 1.0 mA, V_{CE} = 5.0 V$ |
| h_{FE} | DC Pulse Current Gain (Note 5) | 150 | 700 | 600 | 1400 | | $I_C = 10 mA, V_{CE} = 5.0 V$ |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 5) | | 0.2 | | 0.2 | V | $I_C = 10 mA, I_B = 0.5 mA$ |
| $V_{BE(ON)}$ | Base to Emitter "On" Voltage | 0.5 | 0.7 | 0.5 | 0.7 | V | $I_C = 1.0 mA, V_{CE} = 5.0 V$ |
| C_{cb} | Collector to Base Capacitance | | 4.0 | | 4.0 | pF | $V_{CB} = 5.0 V, I_E = 0$ |
| C_{eb} | Emitter to Base Capacitance | | 6.0 | | 6.0 | pF | $V_{BE} = 0.5 V, I_C = 0$ |
| $ h_{fe} $ | Magnitude of Common Emitter Small Signal Current Gain | 1.0 | | 1.0 | | | $I_C = 10 mA, V_{CE} = 5.0 V,$ $f = 100 MHz$ |
| h_{fe} | Small Signal Current Gain | 150 | 1000 | 650 | 2000 | | $I_C = 10 mA, V_{CE} = 5.0 V,$ $f = 1.0 kHz$ |
| NF | Narrow Band Noise Figure | | 6.0 | | 6.0 | dB | $I_C = 100 \mu A, V_{CE} = 5.0 V,$ $f = 1.0 kHz, R_S = 1.0 k\Omega,$ $BW = 400 Hz$ |
| | | | | | 4.0 | dB | $I_C = 100 \mu A, V_{CE} = 5.0 V,$ $f = 1.0 kHz, R_S = 10 k\Omega,$ $BW = 400 Hz$ |
| | | | | | 8.0 | dB | $I_C = 100 \mu A, V_{CE} = 5.0 V,$ $f = 1.0 kHz, R_S = 100 k\Omega,$ $BW = 400 Hz$ |
| | | | | 3.0 | 3.0 | dB | $I_C = 10 \mu A, V_{CE} = 5.0 V,$ $f = 1.0 kHz, R_S = 10 k\Omega,$ $BW = 400 Hz$ |
| NF | Wide Band Noise Figure | | 3.0 | | 3.0 | dB | $I_C = 10 \mu A, V_{CE} = 5.0 V,$ $R_S = 10 k\Omega, BW = 15.7 kHz,$ $f = 10 Hz to 10 kHz$ |