

3469674 FAIRCHILD SEMICONDUCTOR

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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	-15 V
(Note 4)	
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

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2N5830/FTSO5830**2N5831/FTSO5831****2N5833/FTSO5833**NPN Small Signal High Voltage
General Purpose Amplifiers

- V_{CEO} ... 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)

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

Voltages & Currents

	5830	5831	5833
V_{CEO} 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_{CEO}	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	500	60	250		$I_C = 1.0$ mA, $V_{CE} = 5.0$ V
		80		80			$I_C = 10$ mA, $V_{CE} = 5.0$ V
		80		80			$I_C = 50$ mA, $V_{CE} = 5.0$ V

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).
- Pulse conditions: length ≤ 300 μ s; duty cycle $\leq 1\%$.
- 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.

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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	$I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$

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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	$I_C = 1.0 \text{ mA}$, $V_{CE} = 10 \text{ V}$, $f = 1.0 \text{ kHz}$

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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)

	2N	FTSO
Total Dissipation at		
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	60 V	45 V
(Note 4)		
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	$I_C = 5.0 \text{ mA, } I_E = 0$
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	$V_{CB} = 45 \text{ V, } I_E = 0$
						nA	$V_{CB} = 30 \text{ V, } I_E = 0$
			50		50	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:

- 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 μs ; duty cycle = 1%.
 - 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	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	$I_C = 10 \mu A, V_{CE} = 5.0 V$, $R_S = 10 k\Omega, BW = 15.7 kHz$, $f = 10 Hz \text{ to } 10 kHz$