

FAIRCHILD

A Schlumberger Company

PN5139/FTSO5139PNP Small Signal General Purpose
Amplifier & Switch

T-29-23

- V_{CE0} ... -20 V (Min)
- h_{FE} ... 40 (Min) @ 10 mA
- f_T ... 300 MHz (Min)
- C_{cb} ... 5.0 pF (Max) @ -10 V

PACKAGE

PN5139

TO-92

FTSO5139

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

Voltages & Currents

V_{CE0} Collector to Emitter Voltage	-20 V
(Note 4)	
V_{CBO} Collector to Base Voltage	-20 V
V_{EBO} Emitter to Base Voltage	-5.0 V
I_C Collector Current	100 mA

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

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
BV_{CBO}	Collector to Base Breakdown Voltage	-20		V	$I_C = 100 \mu A, I_E = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	-20		V	$I_C = 100 \mu A, V_{EB} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-5.0		V	$I_E = 100 \mu A, I_C = 0$
I_{CES}	Collector Reverse Current		50 25	nA μA	$V_{CE} = -15 V, V_{EB} = 0$ $V_{CE} = -15 V, V_{EB} = 0, T_A = 65^\circ C$
h_{FE}	DC Current Gain	30 40			$I_C = 100 \mu A, V_{CE} = -10 V$ $I_C = 1.0 mA, V_{CE} = -10 V$
h_{FE}	DC Pulse Current Gain (Note 5)	40 15			$I_C = 10 mA, V_{CE} = -1.0 V$ $I_C = 50 mA, V_{CE} = -10 V$

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).
 - 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 T215.
- * Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

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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		-0.15	V	$I_C = 1.0 \text{ mA}$, $I_B = 0.1 \text{ mA}$
$V_{CE(sat)}$	Pulsed Collector to Emitter Saturation Voltage (Note 5)		-0.20 -0.5	V V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
$V_{BE(sat)}$	Pulsed Base to Emitter Saturation Voltage (Note 5)	-0.7 -0.75	-1.0 -1.25	V V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
$V_{CE(sust)}$	Collector to Emitter Sustaining Voltage (Note 5)	-20		V	$I_C = 10 \text{ mA}$ (pulsed), $I_B = 0$
C_{cb}	Collector to Base Capacitance		5.0	pF	$V_{CB} = -10 \text{ V}$, $I_E = 0$, $f = 1.0 \text{ MHz}$
C_{eb}	Emitter to Base Capacitance		8.0	pF	$V_{EB} = -0.5 \text{ V}$, $I_C = 0$, $f = 1.0 \text{ MHz}$
$ h_{fe} $	Magnitude of Small Signal Current Gain	3.0			$I_C = 10 \text{ mA}$, $V_{CE} = -20 \text{ V}$, $f = 100 \text{ MHz}$
t_{on}	Turn On Time (test circuit no. 407)		50	ns	$I_C \approx 50 \text{ mA}$, $I_{B1} \approx 5.0 \text{ mA}$
t_{off}	Turn Off Time (test circuit no. 407)		200	ns	$I_C \approx 50 \text{ mA}$, $I_{B1} \approx 5.0 \text{ mA}$, $I_{B2} \approx -5.0 \text{ mA}$