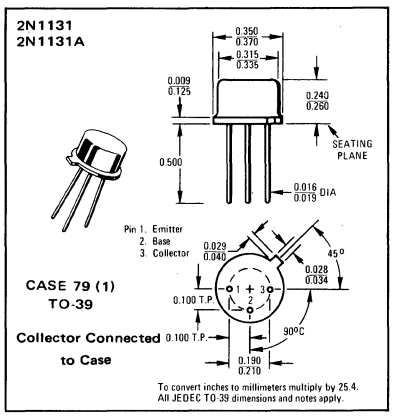
2N1131 (SILICON)
2N1131 JAN AVAILABLE
2N1131A
2N1991

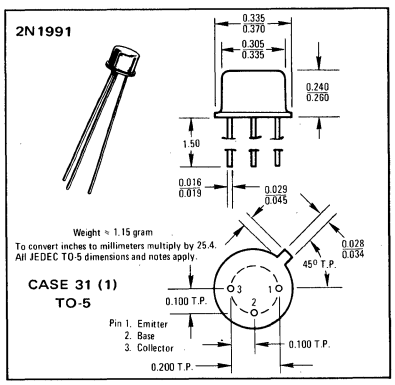
PNP SILICON ANNULAR TRANSISTORS

. . . designed for medium-speed switching and amplifier applications where low DC current gain is essential.

- Low DC Current Gain – h_{FE} = 45 (Max) @ I_C = 150 mAdc – 2N1131,A
- Turn-On Time – t_{on} = 45 ns (Max) – 2N1131A
- Turn-Off Time – t_{off} = 35 ns (Max) – 2N1131A

PNP SILICON AMPLIFIER AND SWITCHING TRANSISTORS





*MAXIMUM RATINGS

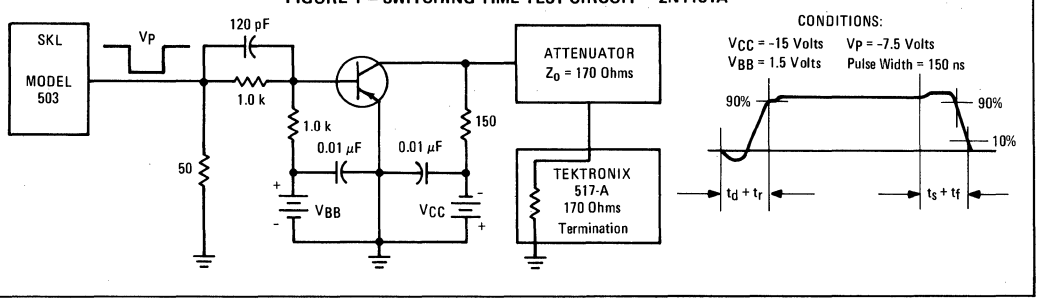
Rating	Symbol	2N1131	2N1131A	2N1991	Unit
Collector-Emitter Voltage	V_{CEO}	35	40	20	Vdc
Collector-Emitter Voltage	V_{CER}	50	50	–	Vdc
Collector-Base Voltage	V_{CB}	50	60	30	Vdc
Emitter-Base Voltage	V_{EB}	5.0	5.0	5.0	Vdc
Collector Current – Continuous	I_C	600	600	600	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.6 4.0	0.6 4.0	0.6 4.8	Watt mW/°C
Total Device Dissipation @ T_C = 25°C @ T_C = 100°C Derate above 25°C	P_D	2.0 1.0 13.3	2.0 1.0 13.3	2.0 1.0 16	Watts Watt mW/°C
Operating Junction Temperature Range	T_J	175	175	150	°C
Storage Temperature Range	T_{stg}	-65 to +200		-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	2N1131,A	2N1991	Unit
Thermal Resistance, Junction to Case	θ_{JC}	75	62.5	°C/W
Thermal Resistance, Junction to Ambient	θ_{JA}	250	208	°C/W

*Indicates JEDEC Registered Data.

FIGURE 1 – SWITCHING TIME TEST CIRCUIT – 2N1131A



2N1131, 2N1131A, 2N1991 (continued)

***ELECTRICAL CHARACTERISTICS** (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage(1)		$V_{CEO(sus)}$			Vdc
(I_C = 100 mAdc, I_B = 0)	2N1131		35	–	
	2N1131A		40	–	
	2N1991		20	–	
Collector-Emitter Sustaining Voltage(1)		$V_{CER(sus)}$	50	–	Vdc
(I_C = 100 mAdc, $R_{BE} \leq$ 10 ohms)	2N1131, 2N1131A				
Collector-Base Breakdown Voltage		BV_{CBO}			Vdc
(I_C = 100 μAdc, I_E = 0)	2N1131A		60	–	
(I_C = 1.0 mAdc, I_E = 0)	2N1991		30	–	
Emitter-Base Breakdown Voltage		BV_{EBO}	5.0	–	Vdc
(I_E = 1.0 mAdc, I_C = 0)	2N1131A				
Collector Cutoff Current		I_{CBO}			μAdc
(V_{CB} = 30 Vdc, I_E = 0)	2N1131		–	1.0	
(V_{CB} = 30 Vdc, I_E = 0, T_A = +150°C)	2N1131		–	100	
(V_{CB} = 50 Vdc, I_E = 0)	2N1131		–	100	
(V_{CB} = 45 Vdc, I_E = 0)	2N1131A		–	0.5	
(V_{CB} = 45 Vdc, I_E = 0, T_A = +150°C)	2N1131A		–	50	
(V_{CB} = 10 Vdc, I_E = 0)	2N1991		–	5.0	
(V_{CB} = 10 Vdc, I_E = 0, T_A = +150°C)	2N1991		–	200	
Emitter Cutoff Current		I_{EBO}			μAdc
(V_{BE} = 2.0 Vdc, I_C = 0)	2N1131		–	100	
(V_{BE} = 5.0 Vdc, I_C = 0)	2N1131A		–	100	
(V_{BE} = 1.0 Vdc, I_C = 0)	2N1991		–	200	
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			–
(I_C = 5.0 mAdc, V_{CE} = 10 Vdc)	2N1131, 2N1131A		15	–	
(I_C = 30 mAdc, V_{CE} = 10 Vdc)	2N1991		15	–	
(I_C = 150 mAdc, V_{CE} = 10 Vdc)	2N1131, 2N1131A		20	45	
	2N1991		15	60	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	–	1.5	Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)					
Base-Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)	2N1131, 2N1131A		–	1.3	
	2N1991		–	1.5	
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain–Bandwidth Product(2)		f_T			MHz
(I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 20 MHz)	2N1131, 2N1131A		50	–	
	2N1991		40	–	
Output Capacitance		C_{ob}			pF
(V_{CB} = 10 Vdc, I_E = 0, f = 140 kHz)	2N1131, 2N1991		–	45	
(V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	2N1131A		–	30	
Input Capacitance		C_{ib}			pF
(V_{EB} = 0.5 Vdc, I_C = 0, f = 140 kHz)	2N1131		–	80	
(V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	2N1131A		–	80	
Input Impedance		h_{ib}			ohms
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		25	35	
(I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		–	10	
Voltage Feedback Ratio		h_{rb}			X 10^{-4}
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		–	8.0	
(I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		–	8.0	
Small-Signal Current Gain		h_{fe}			–
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		15	50	
(I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		20	–	
Output Admittance		h_{ob}			μmhos
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		–	1.0	
(I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	2N1131, 2N1131A		–	5.0	
SWITCHING CHARACTERISTICS (Figure 1)					
Turn-On Time	2N1131A	t_{on}	–	45	ns
Turn-Off Time	2N1131A	t_{off}	–	35	ns

*Indicates JEDEC Registered Data.

(1)Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

(2)f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.