TIP120, TIP121, TIP122

File Number **998**

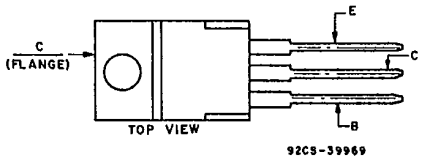
8-Ampere N-P-N Darlington Power Transistors

60, 80, and 100 Volts, 65 Watts
Gain of 1000 at 0.5 A
Gain of 1000 at 3 A

Features:
- Operates from IC without predriver
- Low leakage at high temperature

Applications:
- Power switching
- Audio amplifiers
- Hammer drivers
- Series and shunt regulators

TERMINAL DESIGNATIONS



JEDEC TO-220AB

The RCA-TIP120, TIP121 and TIP122 are monolithic n-p-n silicon Darlington transistors designed for low- and medium-frequency power applications. The construction of these devices provides good forward second-breakdown capability; their high gain makes it possible for them to be driven directly from integrated circuits.

These devices are supplied in the JEDEC TO-220AB (VERSAWATT) plastic package.

The TIP120, TIP121 and TIP122 are n-p-n complements of the TIP125, TIP126 and TIP127 described in RCA data bulletin File 997.

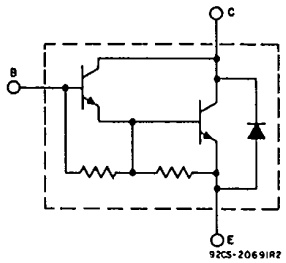


Fig. 1 – Schematic diagram for all types.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	TIP120	TIP121	TIP122	
V_{CBO}	60	80	100	V
V_{CER}(sus) R_{BE} = 100 Ω	60	80	100	V
V_{CEO}(sus)	60	80	100	V
V_{CEV}(sus) V_{BE} = -1.5 V	60	80	100	V
V_{EBO}	5	5	5	V
I_C	8	8	8	A
I_{CM}	10	10	10	A
I_B	0.25	0.25	0.25	A
P_T				
T_C up to 25°C	65	65	65	W
T_C above 25°C	Derate linearly at 0.52			W/°C
T_{stg}, T_J	-65 to 150			°C
T_L At distances ≥ 1/8 in. (3.17 mm) from case for 10 s max.	235			°C

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ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C*

CHARACTERISTIC	TEST CONDITIONS				LIMITS						UNITS
	Voltage V dc		Current A dc		TIP120		TIP121		TIP122		
	V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	
I_{CBO} I_E=0	60				–	0.2	–	–	–	–	mA
	80				–	–	–	0.2	–	–	
	100				–	–	–	–	–	0.2	
I_{CEO}	30			0	–	0.5	–	–	–	–	
	40			0	–	–	–	0.5	–	–	
	50			0	–	–	–	–	–	0.5	
I_{EBO}		–5	0		–	2	–	2	–	2	mA
V_{CEO}(sus)			0.2[a]	0	60	–	80	–	100	–	V
h_{FE}	3		3[a]		1000	–	1000	–	1000	–	
	3		0.5[a]		1000	–	1000	–	1000	–	
V_{BE}	3		3[a]		–	2.5	–	2.5	–	2.5	V
V_{CE}(sat)			3[a]	0.012	–	2	–	2	–	2	V
			5[a]	0.02	–	3	–	3	–	3	
h_{fe} f=1 kHz	5		1		1000	–	1000	–	1000	–	
$\|h_{fe}\|$ f=1 MHz	5		1		20	–	20	–	20	–	
C_{obo} V_{CB}=10 V f=1 MHz					–	200	–	200	–	200	pF
$I_{S/b}$ t=0.5 s non-rep. pulse	25				2.6	–	2.6	–	2.6	–	A
$R_{\theta JC}$					–	1.92	–	1.92	–	1.92	°C/W

[a] Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.

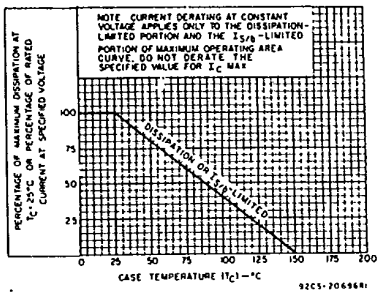

Fig. 2 — Derating curve for all types.

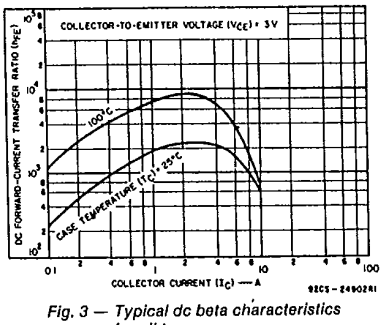

Fig. 3 — Typical dc beta characteristics for all types.

TIP120, TIP121, TIP122

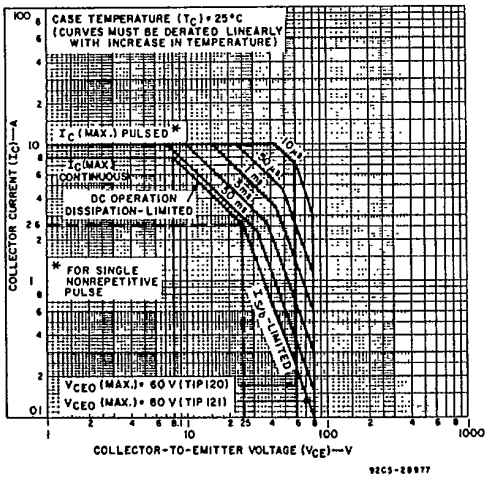

Fig. 4 – Maximum operating areas for TIP120 and TIP121.

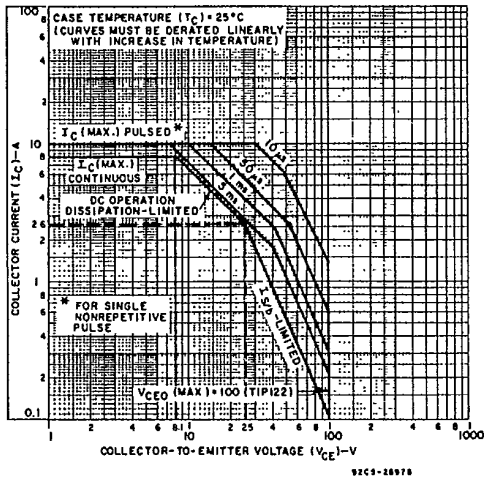

Fig. 5 – Maximum operating areas for TIP122.

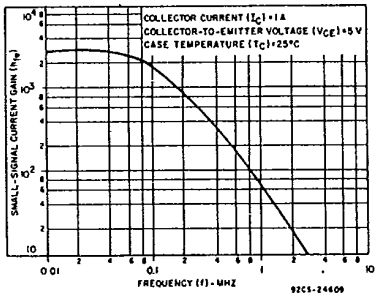

Fig. 6 — Typical small-signal current gain for all types.

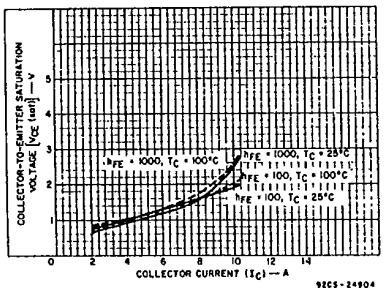

Fig. 7 — Typical saturation characteristics for all types.

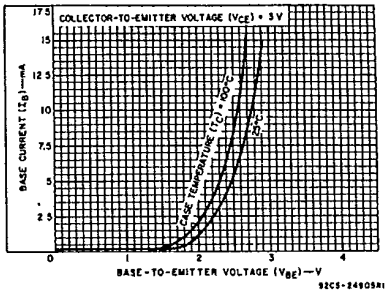

Fig. 8 — Typical input characteristics for all types.

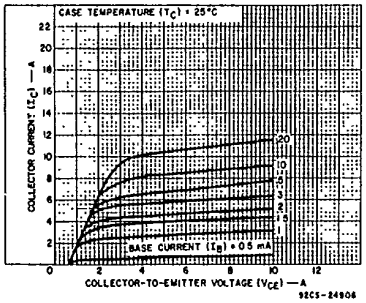

Fig. 9 — Typical output characteristics for all types.

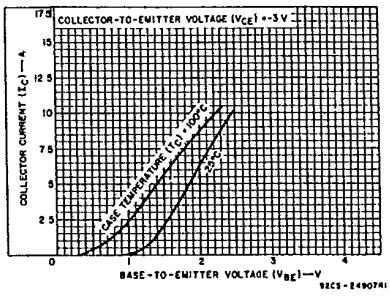

Fig. 10 — Typical transfer characteristics for all types.

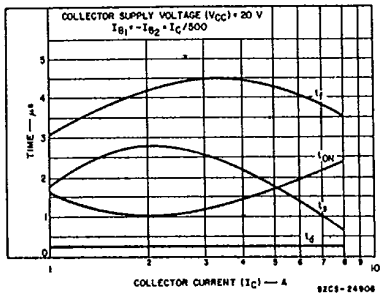

Fig. 11 — Typical saturated switching characteristics for all types.