BFT19, BFT19A, BFT19B File Number **683**

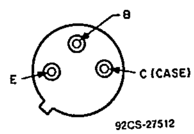
HARRIS SEMICOND SECTOR 27E D 4302271 0020194 1 HAS

Silicon P-N-P
High-Voltage Planar Transistors

For High-Speed Switching and Linear-Amplifier Applications in Military, Industrial and Commercial Equipment

Features:
- Maximum safe-area-of-operation curves
- High voltage ratings:
  V_{CBO} = −400 V max. (BFT19B); −300 V max. (BFT19A); −200 V max. (BFT19)
  $V_{CEO}(sus)$ = −350 V max. (BFT19B); −250 V max. (BFT19A); −150 V max. (BFT19)

TERMINAL DESIGNATIONS



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RCA-BFT19, BFT19A, and BFT19B are silicon p-n-p transistors with high breakdown voltages, high frequency response, and fast switching speeds. These transistors differ in their voltage ratings.

Typical applications include high-voltage differential and operational amplifiers; high-voltage inverters, and high-voltage, low-current switching and series regulators.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		BFT19	BFT19A	BFT19B	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	−200	−300	−400	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:					
With base open	$V_{CEO}(sus)$	−150	−250	−350	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER}(sus)$	−200	−300	−400	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	−5	−5	−5	V
COLLECTOR CURRENT (Continuous)	I_C	−1	−1	−1	A
BASE CURRENT (Continuous)	I_B	−0.5	−0.5	−0.5	A
TRANSISTOR DISSIPATION:	P_T				
At case temperatures up to 25°C		5	5	5	W
At case temperatures above 25°C		See Figs. 1 & 4.			
At ambient temperatures up to 25°C		1	1	1	W
At ambient temperatures above 25°C		Derate linearly at 5.7 mW/°C			
TEMPERATURE RANGE:					
Storage and Operating (Junction)		← −65 to 200 →			°C
PIN TEMPERATURE (During Soldering):					
At distance ≥ 1/32 in. (0.8 mm) from case for 10 s max.		← 255 →			°C

BFT19, BFT19A, BFT19B

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS						LIMITS						UNITS
		VOLTAGE V dc			CURRENT mA			BFT19		BFT19A		BFT19B		
		V_{CB}	V_{CE}	V_{EB}	I_C	I_E	I_B	Min.	Max.	Min.	Max.	Min.	Max.	
Collector Cutoff Current With emitter open	I_{CBO}	−100 −200 −300					0 0 0	– – –	−100 – –	– – –	– −100 –	– – –	– – −100	µA
Emitter Cutoff Current	I_{EBO}			−5	0			–	−100	–	−100	–	−100	µA
DC Forward-Current Transfer Ratio	h_{FE}		−10 −10 −10		−10 −30 −50			20 25 20	– – –	20 25 20	– – –	20 25 20	– – –	
Collector-to-Emitter Sustaining Voltage (*See Figs. 2 and 3*) With base open	$V_{CEO}(sus)$				−10		0	−150[a]	–	−250[a]	–	−350[a]	–	V
With external base-to-emitter resistance $(R_{BE}) = 100\ \Omega$	$V_{CER}(sus)$				−10			−200[a]	–	−300[a]	–	−400[a]	–	V
Base to-Emitter Saturation Voltage	$V_{BE}(sat)$				−30		−3	–	−1.8	–	−1.8	–	−1.8	V
Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$				−10 −30		−1 −3	– –	−1 −2.5	– –	−1 −2.5	– –	−1 −2.5	V
Common-Emitter, Small-Signal, Short Circuit, Forward-Current Transfer Ratio (at 1 kHz)	h_{fe}		−10		−5			25	–	25	–	25	–	
Magnitude of Common-Emitter, Small-Signal, Short Circuit Forward-Current Transfer Ratio (at 5 MHz)	$\lvert h_{fe} \rvert$		−10		−30			5	–	5	–	5	–	
Common-Base, Short Circuit, Input Capacitance (at 1 MHz)	C_{ib}			−5	0			–	75	–	75	–	75	pF
Output Capacitance (at 1 MHz)	C_{ob}	−10				0		–	15	–	15	–	15	pF
Second-Breakdown[b] Collector Current With base forward biased[c]	$I_{S/b}$[d]	−100						−50	–	−50	–	−50	–	mA
Thermal Resistance (Junction-to Case)	$R_{\theta JC}$							–	35	–	35	–	35	°C/W

[a] CAUTION The sustaining voltages $V_{CEO}(sus)$ and $V_{CER}(sus)$ MUST NOT be measured on a curve tracer The sustaining voltage should be measured by means of the test circuit shown in Fig 2.

[b] Regions for safe-operation with forward bias are shown in Fig. 1

[c] Specified value of $I_{S/b}$ for given value of V_{CE} as base voltage is increased from zero in a positive direction

[d] $I_{S/b}$ is defined as the current at which second breakdown occurs at a specified collector voltage.

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BFT19, BFT19A, BFT19B

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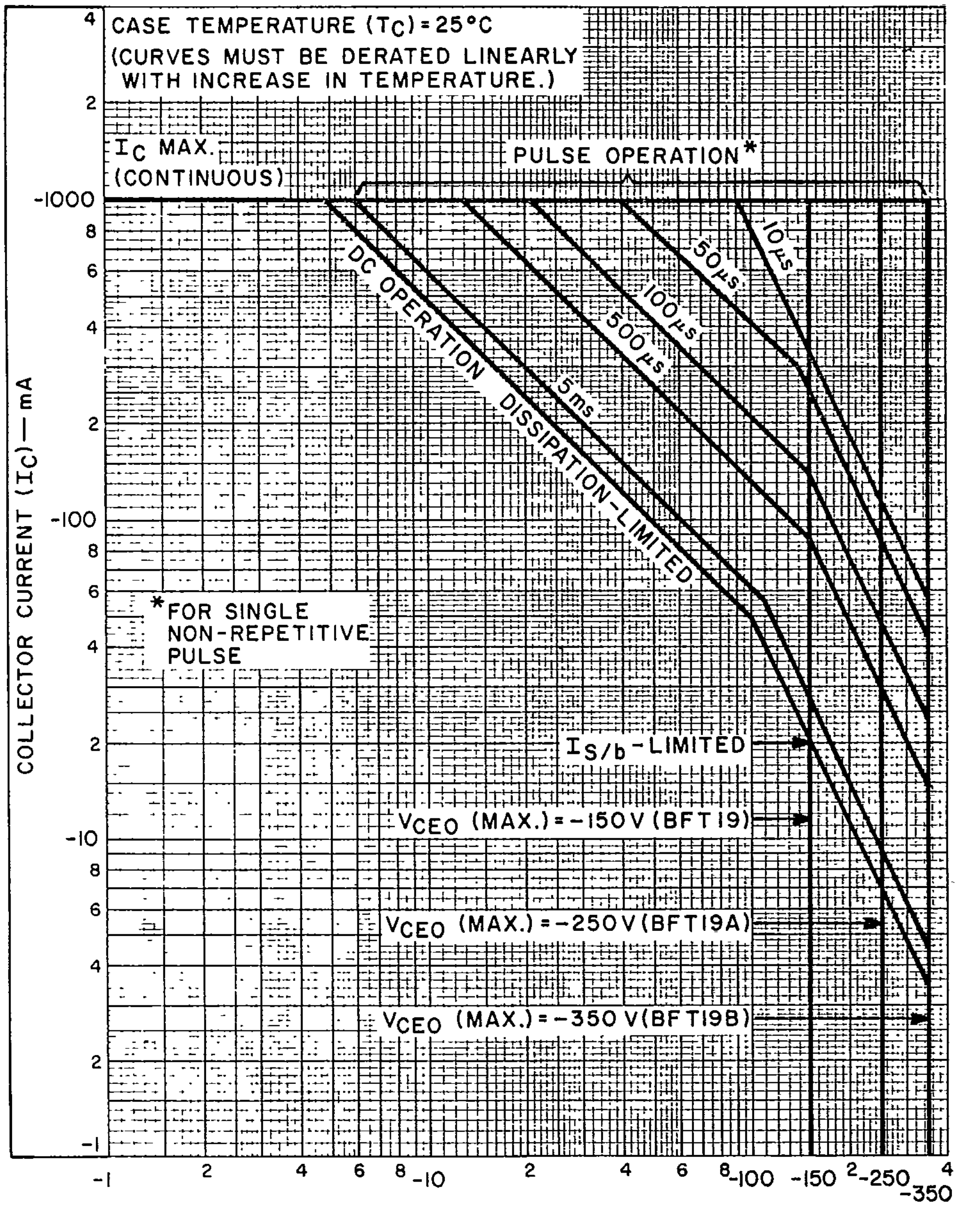

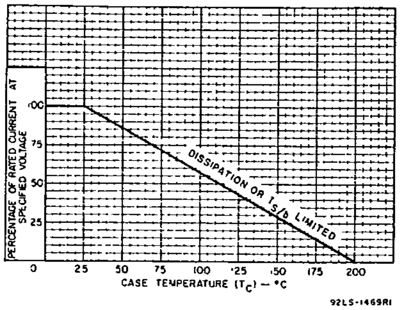

Fig. 2 — Dissipation derating curve.

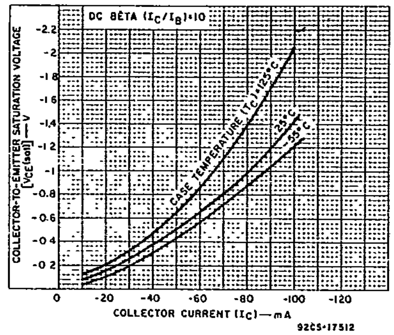

Fig. 3 — Typical collector-to-emitter saturation voltage.

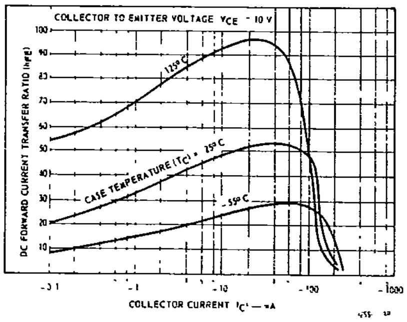

Fig. 4 — Typical dc-beta characteristics.

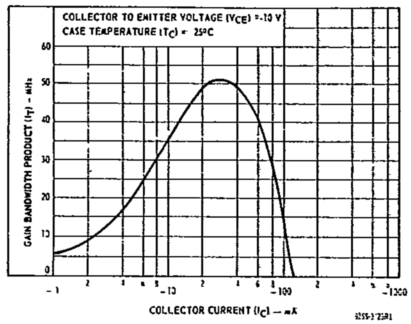

Fig. 5 — Typical gain-bandwidth product.

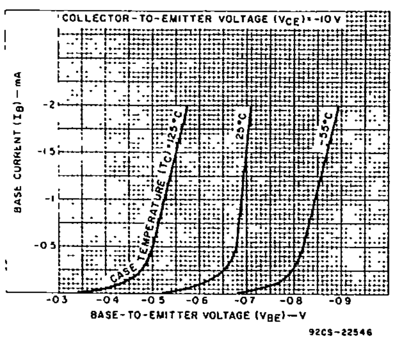

Fig. 6 — Typical input characteristics.

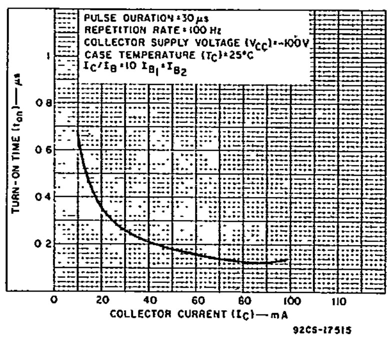

Fig. 7 — Typical turn-on time characteristic.

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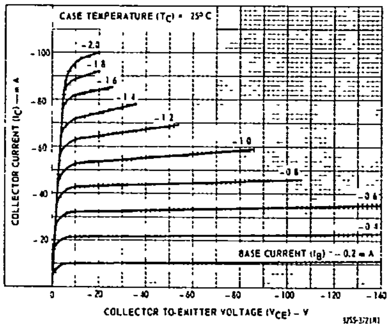


Fig. 8 — Typical output characteristics.

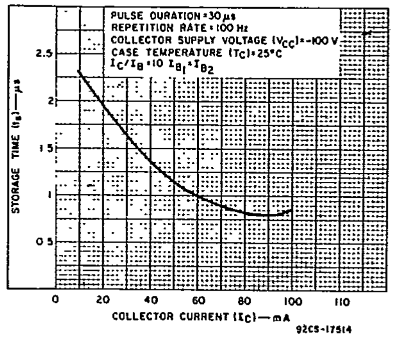


Fig. 9 — Typical storage-time characteristic.

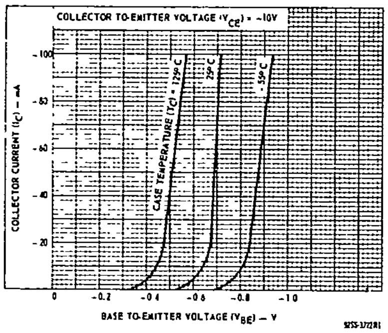


Fig. 10 — Typical transfer characteristics.

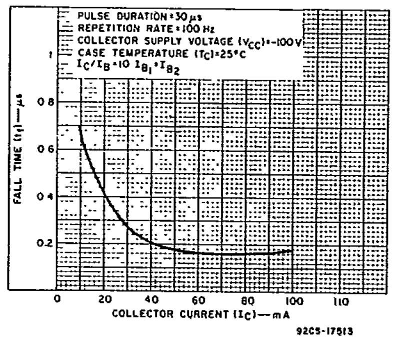


Fig. 11 — Typical fall-time characteristic.

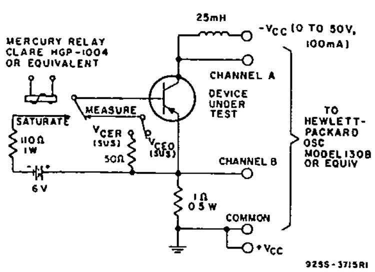
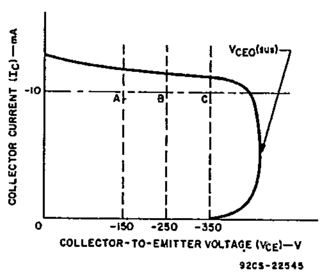


Fig. 12 — Circuit used to measure sustaining voltages, $V_{CEO}(sus)$ and $V_{CER}(sus)$.



The sustaining voltage V_{CEO}(sus) is acceptable when the trace falls to the right and above point "A" for type BFT19. The trace must fall to the right and above point "B" for type BFT19A, and point "C" for BFT19B.

Fig. 13 — Oscilloscope display for measurement of sustaining voltages.