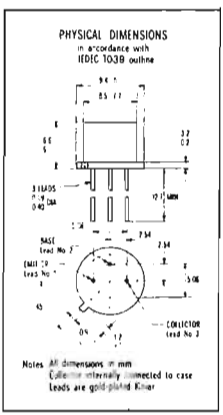
BFX38 - BFX39 - BFX40 - BFX41

HIGH-VOLTAGE, GENERAL PURPOSE TYPES

PNP DIFFUSED SILICON PLANAR II EPITAXIAL DEVICES

GENERAL DESCRIPTION - The BFX38 - 39 - 40 - 41 are PNP silicon PLANAR epitaxial transistors designed for a wide variety of applications. These devices feature 55 to 75 volts LV_{CEO}, current gain specified from 100 μA to 1000 mA, minimum f_T of 100 MHz and low saturation voltages. They are particularly useful as complementary drivers (BFY56A is a good complement), in output applications operating from supply voltages up to 75volts, and in saturated and non-saturated switching applications where high voltage and high current are required.

These devices are covered by Semiconductor Users Reliability Evaluation (SURE) Programme.



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

T_{STG}	Storage Temperature	-55°C to 200°C
T_J	Operating Junction Temperature	200°C
T_L	Lead Temperature (Soldering, 10 sec time limit)	260°C

Maximum Power Dissipations (Notes 2 and 3)

P_D	Total Dissipation at 25°C Case Temperature	4 W
	at 25°C Ambient Temperature	0.8 W

Maximum Voltages and Current

		BFX38 BFX39	BFX40 BFX41
V_{CBO}	Collector to Base Voltage	-55 V	-75 V
V_{CEO}	Collector to Emitter Voltage (Note 4)	-55 V	-75 V
V_{EBO}	Emitter to Base Voltage	-5 V	-5 V
I_C	DC Collector Current	1 A	1 A

ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

		BFX39 BFX41			BFX38 BFX40				
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
h_{FE}	DC Current Gain	30	45		60	90			I_C = 100 µA, V_{CE} = -5 V
h_{FE}	DC Current Gain (Note 5)	40	70		85	130			I_C = 100 mA, V_{CE} = -5 V
h_{FE}	DC Current Gain (Note 5)	25	65		60	120			I_C = 500 mA, V_{CE} = -5 V
h_{FE}	DC Current Gain (Note 5)	10 (for BFX41 only)			25 (for BFX40 only)				I_C = 1 A, V_{CE} = -5 V
h_{FE}	DC Current Gain (Note 5)	15 (for BFX39 only)			30 (for BFX38 only)				I_C = 1 A, V_{CE} = -5 V
h_{FE} (-55°C)	DC Current Gain (Note 5)	15			30				I_C = 100 mA, V_{CE} = -5 V
$V_{BE\ sat}$	Base-Emitter Saturation Voltage (Note 5)	-0.8		-0.9	-0.8		-0.9	V	I_C = 150 mA, I_B = 15mA
$V_{BE\ sat}$	Base-Emitter Saturation Voltage (Note 5)	-0.9		-1.1	-0.9		-1.1	V	I_C = 500 mA, I_B = 50mA
$V_{CE\ sat}$	Collector-Emitter Saturation Voltage (Note 5)	-0.12		-0.15	-0.12		-0.15	V	I_C = 150 mA, I_B = 15mA
$V_{CE\ sat}$	Collector-Emitter Saturation Voltage (Note 5)	-0.3		-0.5	-0.3		-0.5	V	I_C = 500 mA, I_B = 50mA

ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	BFX 38 BFX 39 MIN.	TYP.	MAX.	BFX 40 BFX 41 MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
I_{CBO}	Collector Reverse Current		0.2	50				nA	$I_E = 0$ $V_{CB} = -40$ V
I_{CBO} (125°C)	Collector Reverse Current		0.25	50				μA	$I_E = 0$ $V_{CB} = -40$ V
I_{CBO}	Collector Reverse Current					0.2	50	nA	$I_E = 0$ $V_{CB} = -50$ V
I_{CBO} (125°C)	Collector Reverse Current					0.25	50	μA	$I_E = 0$ $V_{CB} = -50$ V
BV_{CBO}	Collector to Base Breakdown Voltage	-55			-75			V	$I_E = 0$ $I_C = 10\ \mu A$
BV_{EBO}	Emitter to Base Breakdown Voltage	-5			-5			V	$I_C = 0$ $I_E = 10\ \mu A$
LV_{CEO}	Collector to Emitter Sustaining Voltage (Notes 4 and 5)	-55			-75			V	$I_C = 10$ mA $I_B = 0$
h_{fe}	High Frequency Current Gain	1	1.5		1	1.5			$I_C = 50$ mA $V_{CE} = -10$V f = 100 MHz
C_{obo}	Collector-Base Capacitance		15	20		15	20	pF	$I_E = 0$ $V_{CB} = -10$ V
C_{TE}	Emitter Transition Capacitance		75	120		75	120	pF	$I_C = 0$ $V_{EB} = -0.5$ V
t_{on}	Turn On Time		33	100		33	100	nsec	$I_C = 500$ mA $I_{B1} = 50$ mA
τ_s	Storage Time		160	350		160	350	nsec	$I_C = 500$ mA, $I_{B1} = I_{B2} = 50$mA
t_f	Fall Time		27	50		27	50	nsec	$I_C = 500$ mA, $I_{B1} = I_{B2} = 50$mA

NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.

(2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

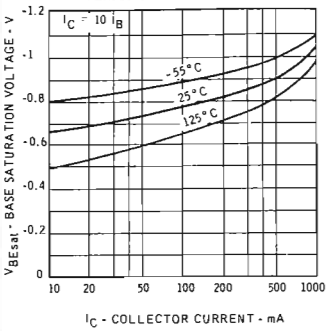
(3) These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 43.7°C/W (derating factor of 22.8 mW/°C); junction-to-ambient thermal resistance of 219°C/W (derating factor of 4.56 mW/°C).

(4) This rating refers to a high-current point where collector-to-emitter voltage is lowest. For more information send for SGS-AR 5.

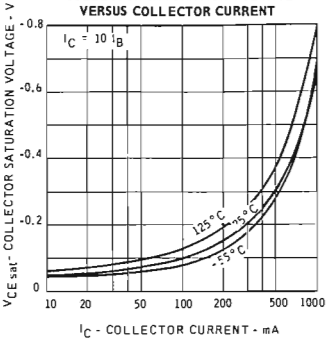
(5) Pulse conditions: length = 300 μsec; duty cycle = 1%.

TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

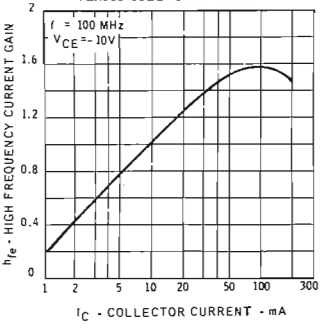
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



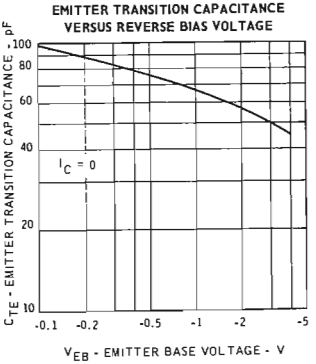
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



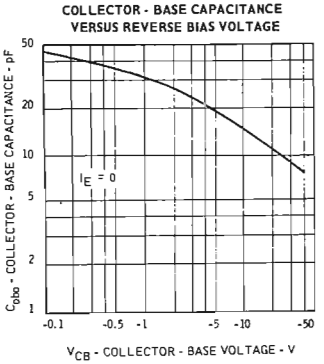
HIGH FREQUENCY CURRENT GAIN VERSUS COLLECTOR CURRENT



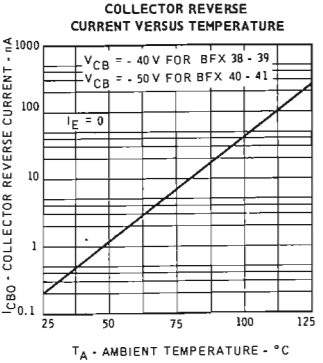
EMITTER TRANSITION CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



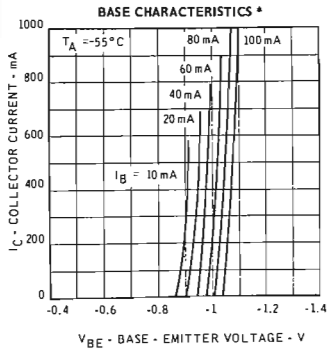
COLLECTOR - BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



COLLECTOR REVERSE CURRENT VERSUS TEMPERATURE



BASE CHARACTERISTICS *



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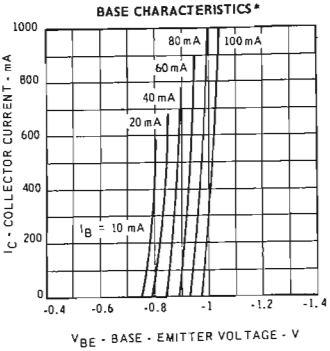

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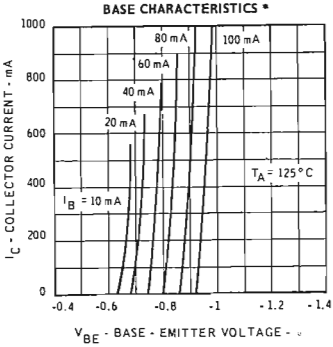
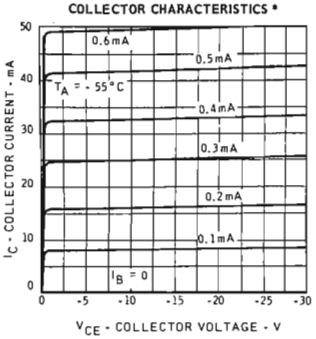


*Single family characteristics on Transistar Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

COLLECTOR CHARACTERISTICS *



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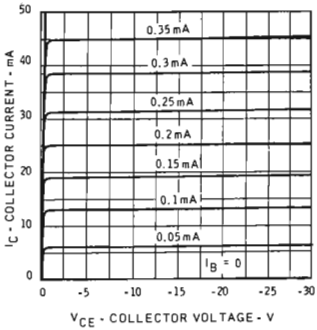

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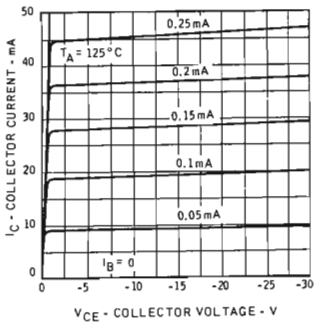

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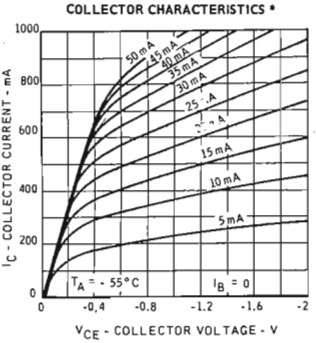

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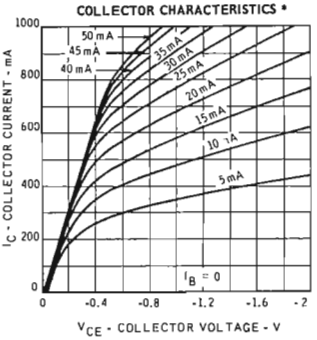

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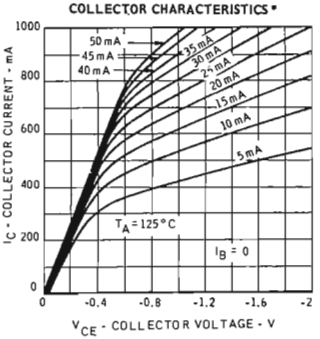
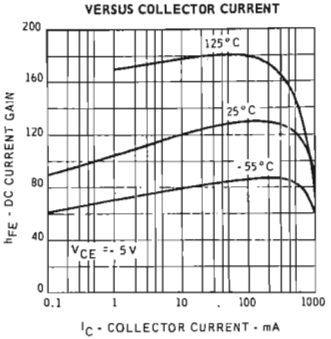


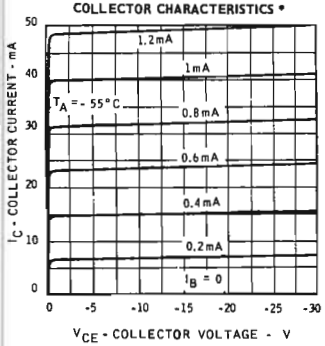
DC PULSE CURRENT GAIN
VERSUS COLLECTOR CURRENT



*Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

COLLECTOR CHARACTERISTICS *



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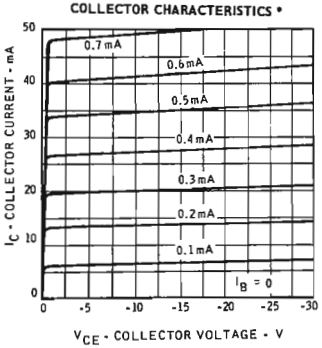

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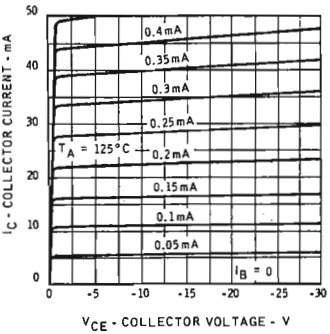

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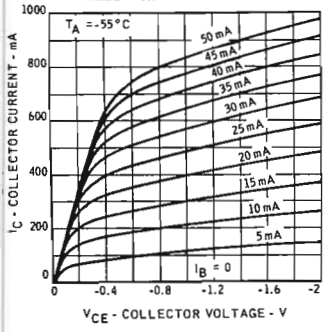

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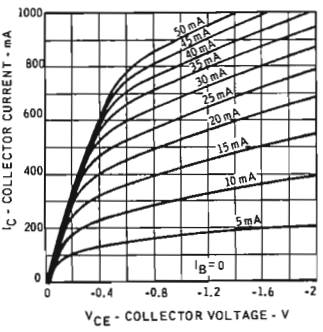

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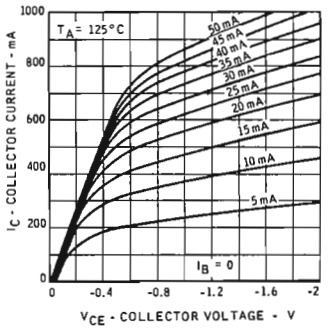
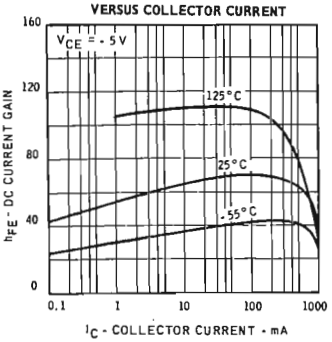


DC PULSE CURRENT GAIN
VERSUS COLLECTOR CURRENT

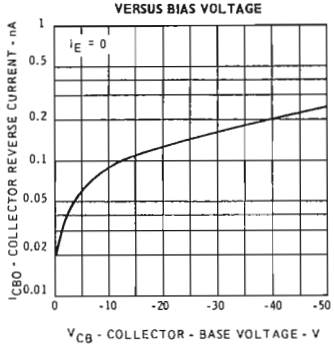


*Single family characteristics on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

BFX38 • BFX39

COLLECTOR REVERSE CURRENT
VERSUS BIAS VOLTAGE



BFX40 • BFX41

COLLECTOR REVERSE CURRENT
VERSUS BIAS VOLTAGE