

ALA300/301 90 Volt Linear Arrays

Description

The ALA300 and ALA301 Linear Arrays provide design engineers the means to obtain 90 V semicustom integrated circuits. The single-module array (ALA300) consists of 13 vertical NPN and 15 vertical PNP transistors, three 6 pF capacitors, and 1 k Ω diffused and 10 k Ω ion-implanted resistor banks. The quad-module array (ALA301) is identical to the single-module array (ALA300) but has four times the number of components.

These linear arrays are fabricated by using the complementary bipolar integrated circuit (CBIC) process that offers the advantages of vertical NPN and PNP transistors. CBIC technology offers the advantage of designing high-performance circuits with less design complexity. A minimum collector-to-emitter reverse breakdown voltage of 90 V is guaranteed for both transistors. Typical peak f_T of 250 MHz for NPN and 200 MHz for PNP transistors and 5 mA current drive capability for the minimum area transistors are unique for these linear arrays.

Two-level metal is used for interconnections. Upon request, a thick-metal interconnect is also available to provide higher current capacity. The top and bottom metal layers have a low sheet resistance of <0.03 Ω /sq. and <1.0 Ω /sq. with a current capacity of 2.0 mA/ μ m and 60 μ A/ μ m of metal width, respectively. The thicker metal interconnect has a sheet resistance of <0.003 Ω /sq. and a current capacity of 20 mA/ μ m of metal width.

For more detailed information regarding ordering procedures, design kits, and packaging of the ALA300 and ALA301 devices, refer to the *Semicustom Linear Array Brochure*.

Benefits

- High-frequency performance, typical f_T of 250 MHz for NPN and 200 MHz for PNP transistors
- 90 V capability
- Low development costs
- Quick design turn-around, typically six to eight weeks from design approval

Features

- Complementary vertical NPN and PNP transistors
- Two-level metal interconnect
- 1 k Ω and 10 k Ω resistor banks
- All I/O ESD protected
- Available in chip form and a variety of standard packages

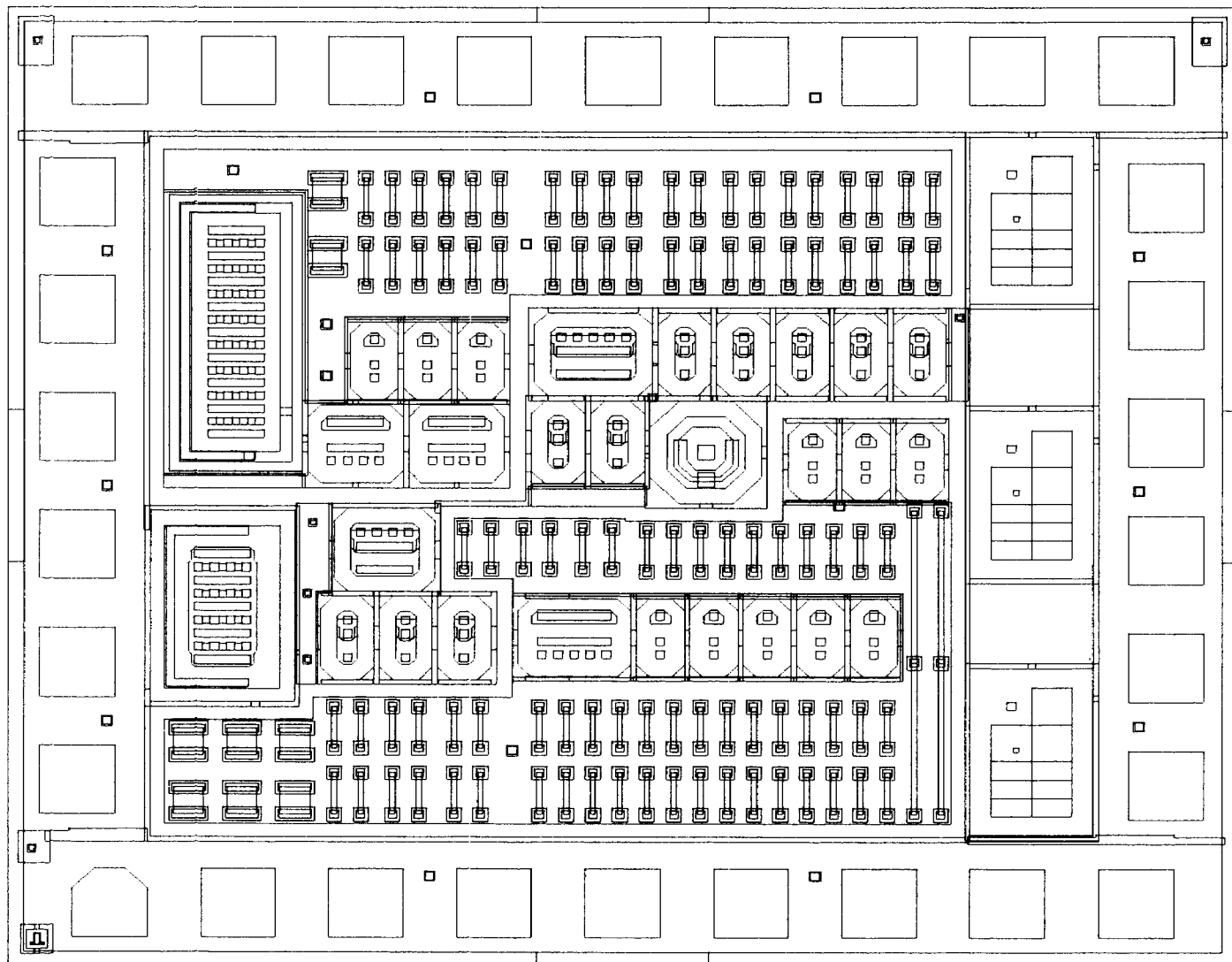


Figure 1. ALA300 High-Voltage Linear Array

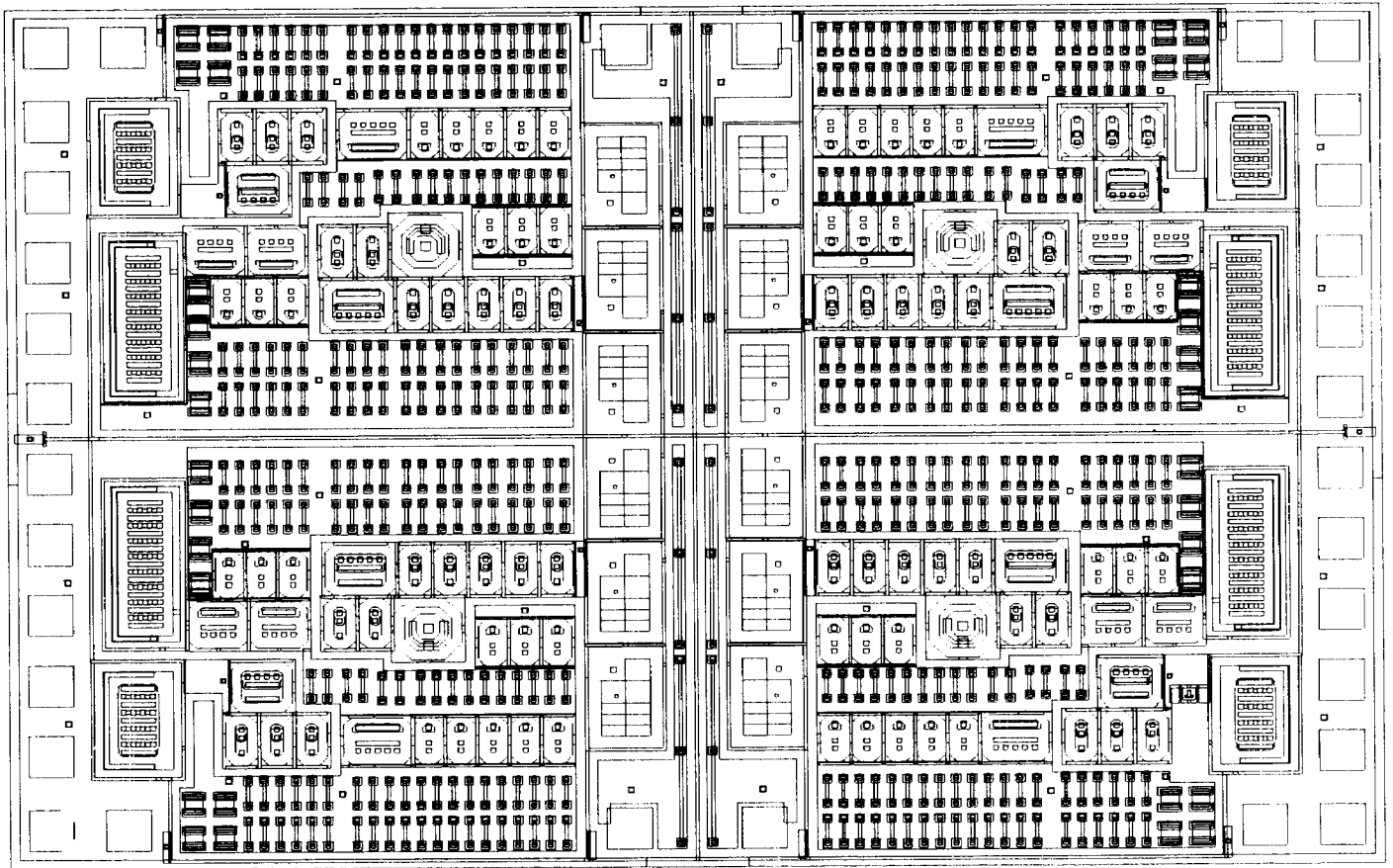


Figure 2. ALA301 High-Voltage Linear Array

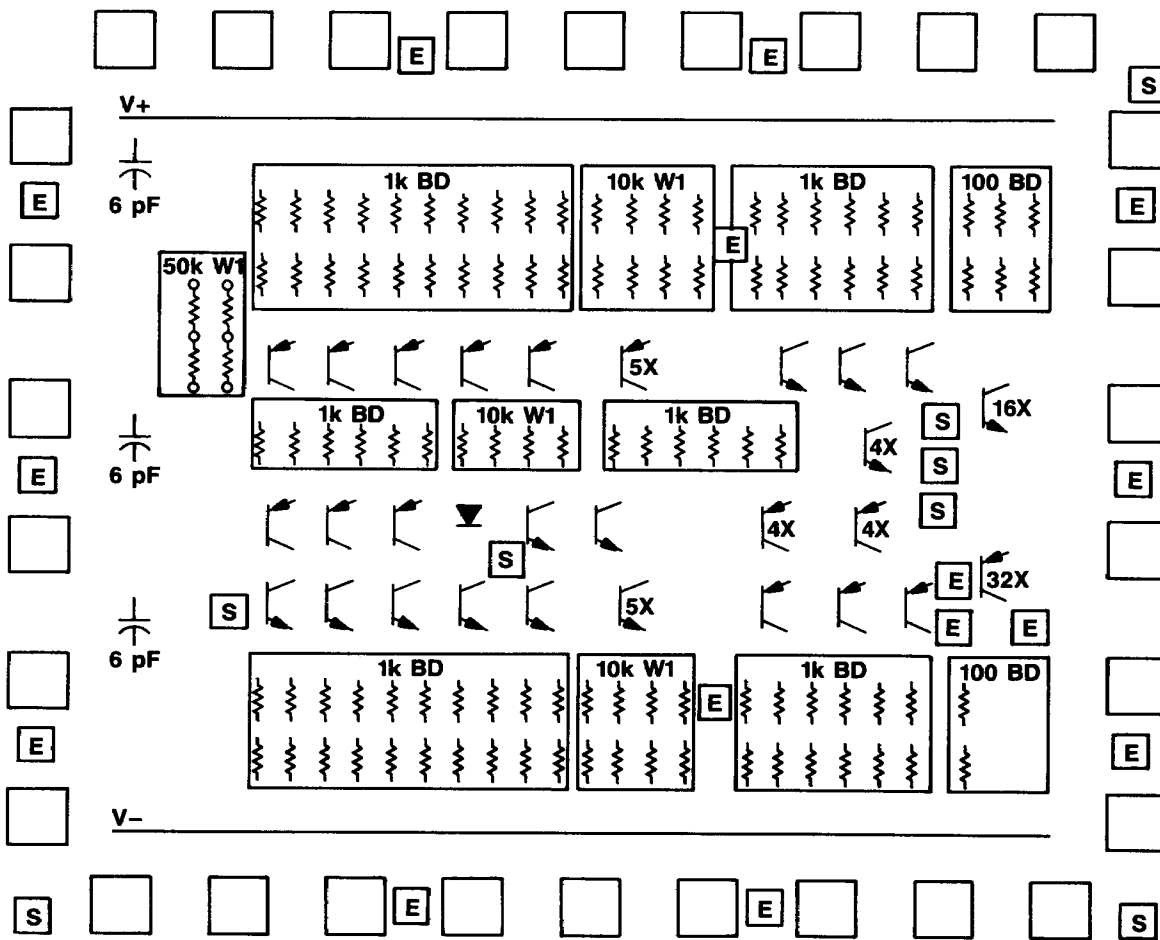


Figure 3. ALA300/301 Component Layout

Electrical Characteristics

NPN (TA = 25 °C)

Symbol	Measurement/Condition	Min	Typ	Max	Unit
hFE	IC = 1 mA, VCE = 3 V	50	110	175	—
fT	IC = 500 μA, VCE = 10 V	—	250	—	MHz
VA (early voltage)	IC = 100 μA, VCE = +5 V	65	150	300	V
VCE (sat)	IC = 1 mA, IB = 500 μA	60	100	150	mV
VBE	IE = 1 mA, VCE = 3 V	700	750	800	mV
BVCEO	IC = 1 mA	90	110	125	V
BVEBO	IE = 10 μA	7.50	8.00	8.50	V
BV (collector substrate breakdown)	IC = 1 mA	190	200	210	V
ICEO	VCE = 80 V, IB = 0	150	250	350	nA
ICBO	VCB = 80 V, IE = 0	1	2	3	nA

PNP (TA = 25 °C)

Symbol	Measurement/Condition	Min	Typ	Max	Unit
hFE	IC = 1 mA, VCE = 3 V	40	80	150	—
fT	IC = 500 μA, VCE = 10 V	—	200	—	MHz
VA (early voltage)	IC = 100 mA, VCE = -5 V	40	125	200	V
VCE (sat)	IC = -1 mA, IB = -500 μA	150	175	220	mV
VBE	IE = 1 mA, VCE = -3 V	700	750	800	mV
BVCEO	IC = -1 mA	90	115	140	V
BVEBO	IE = -10 μA	8.65	8.85	9.20	V
BV (collector substrate breakdown)	IC = -1 mA	95	100	105	V
ICEO	VCE = -80 V, IB = 0	60	70	150	nA
ICBO	VCB = -80 V, IE = 0	2	3	4	nA

Resistor Data (TA = 25 °C)

Value (Ω)	Tol (%)	Type*	TCR PPM/°C	ALA300	ALA301
100	± 25	BD	1670	8	32
1 k	± 25	BD	1670	76	304
10 k	± 20	W1	1610	20	80
50 k	± 20	W1	1610	4	16

* BD denotes a 200 Ω /sq. diffused boron resistor. W1 denotes a 2000 Ω /sq. implanted boron resistor.

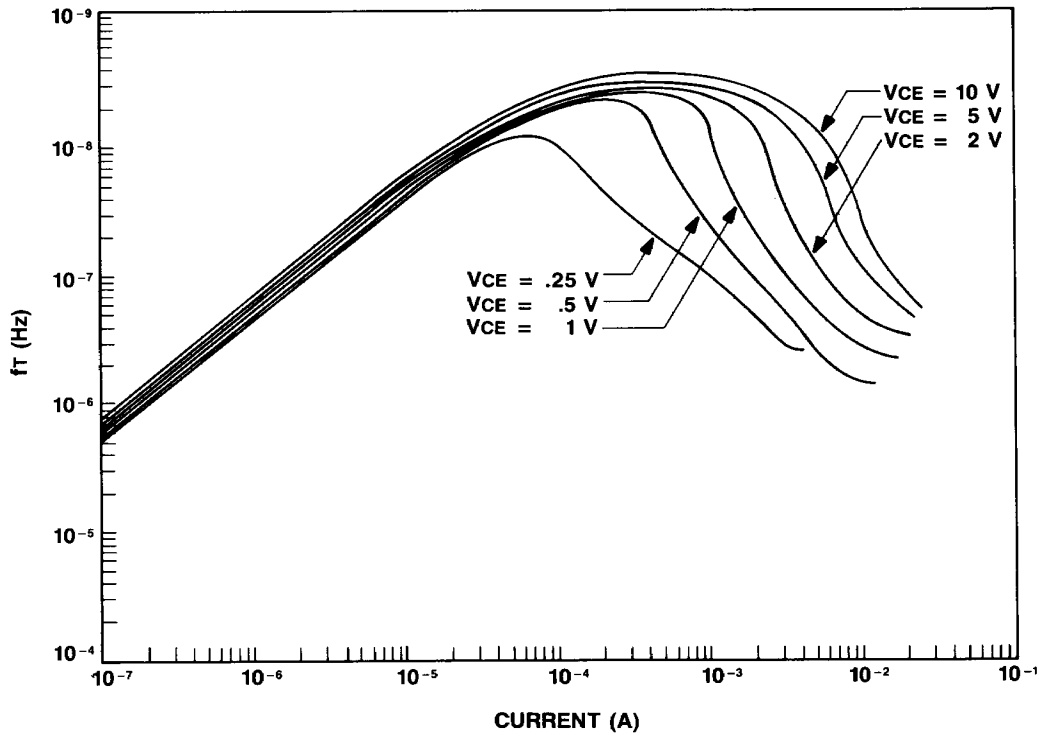
Capacitor Data

Value (pF)	Tol (%)	Type	ALA300	ALA301
6	± 30	Fixed MOS	3	12

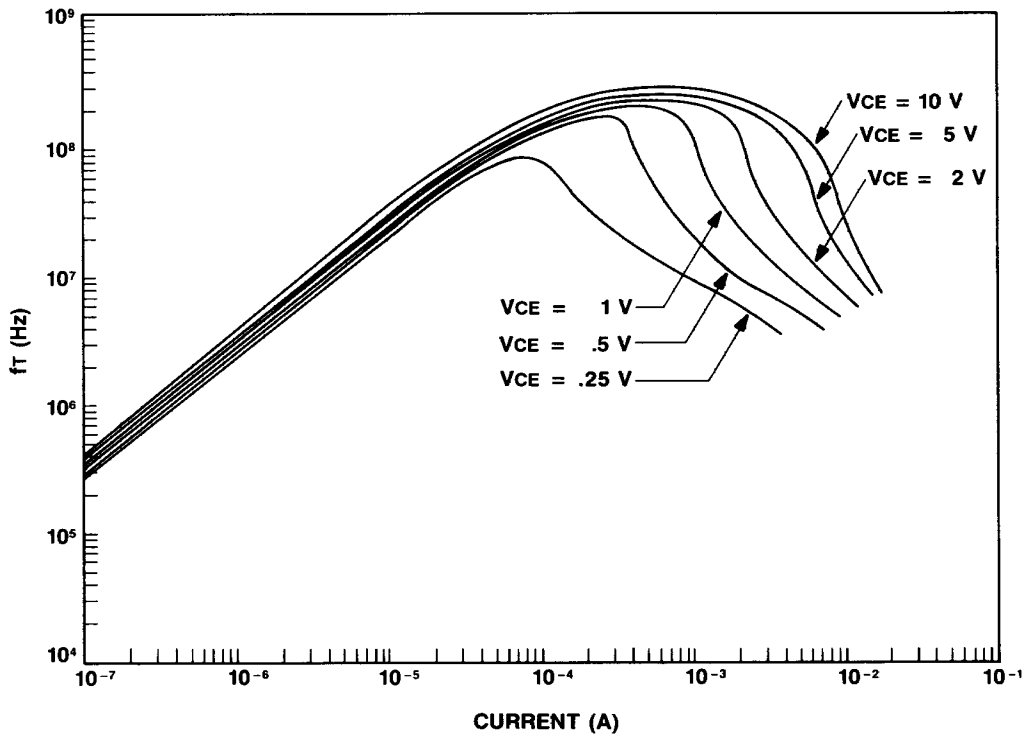
Component Totals

Component Type	ALA300	ALA301
NPN	13	52
PNP	15	60
Resistors	108	432
Capacitors	3	12
Diodes	1	4
Bonding Pads	30	32

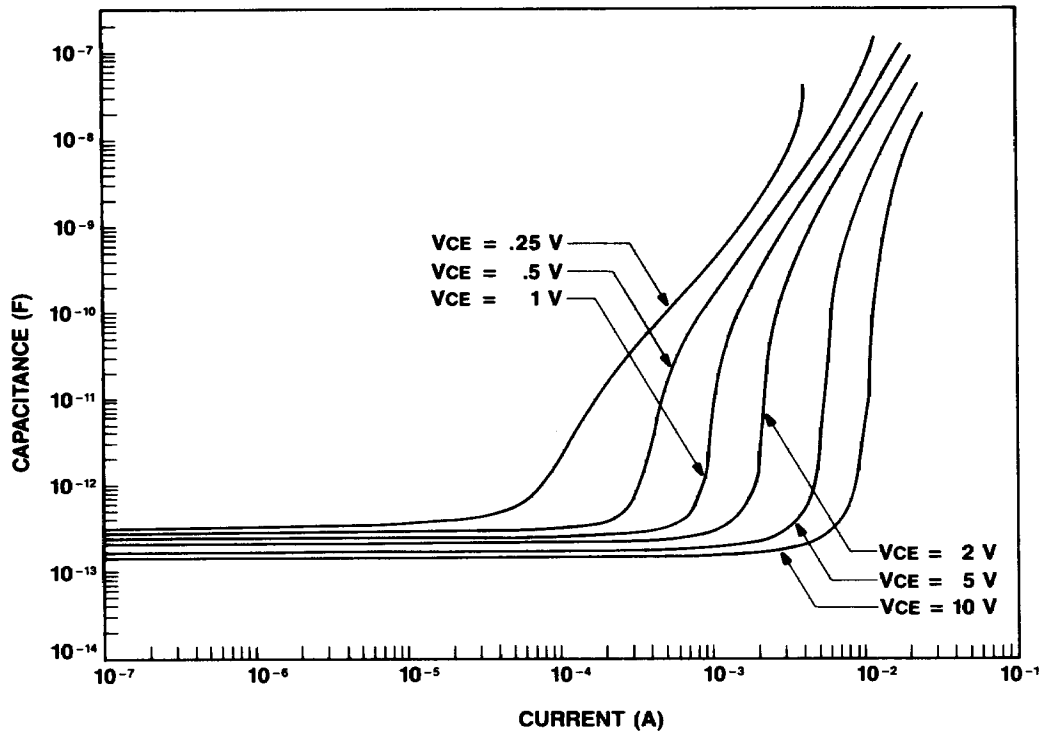
Unity Gain Frequency (NPN)



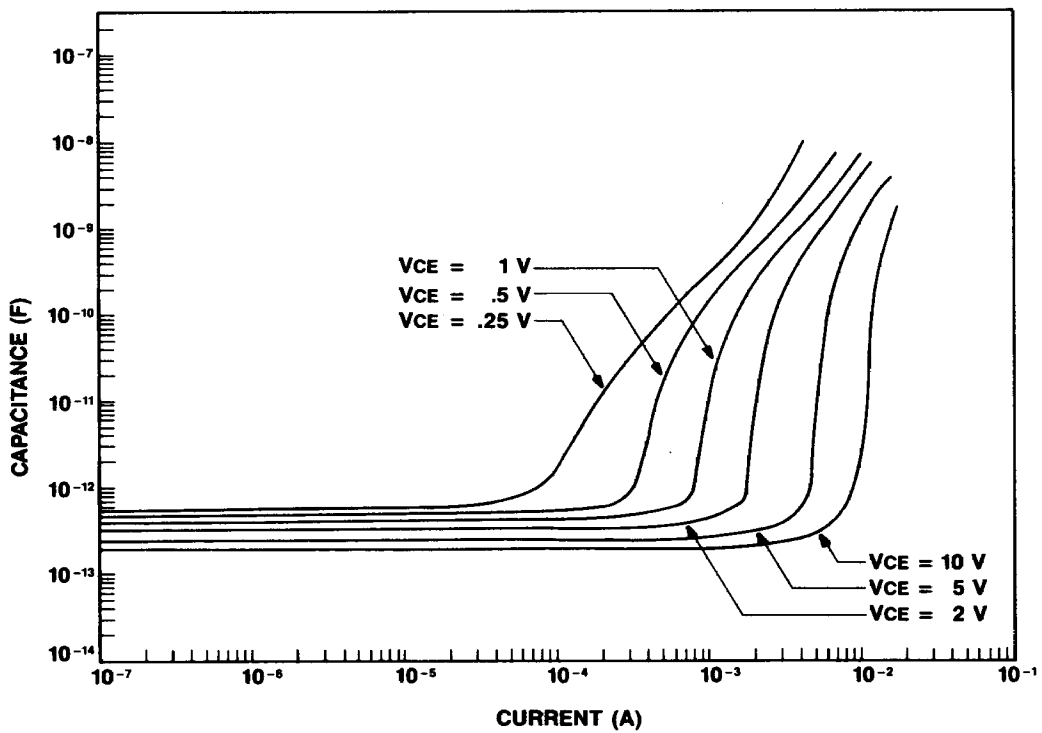
Unity Gain Frequency (PNP)



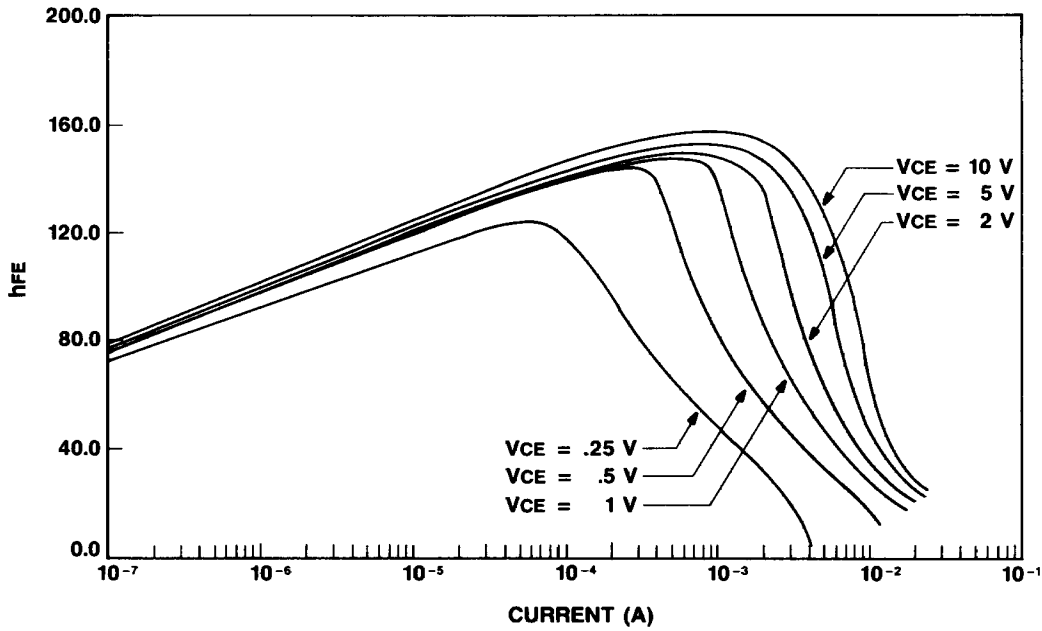
Collector-Base Capacitance (NPN)



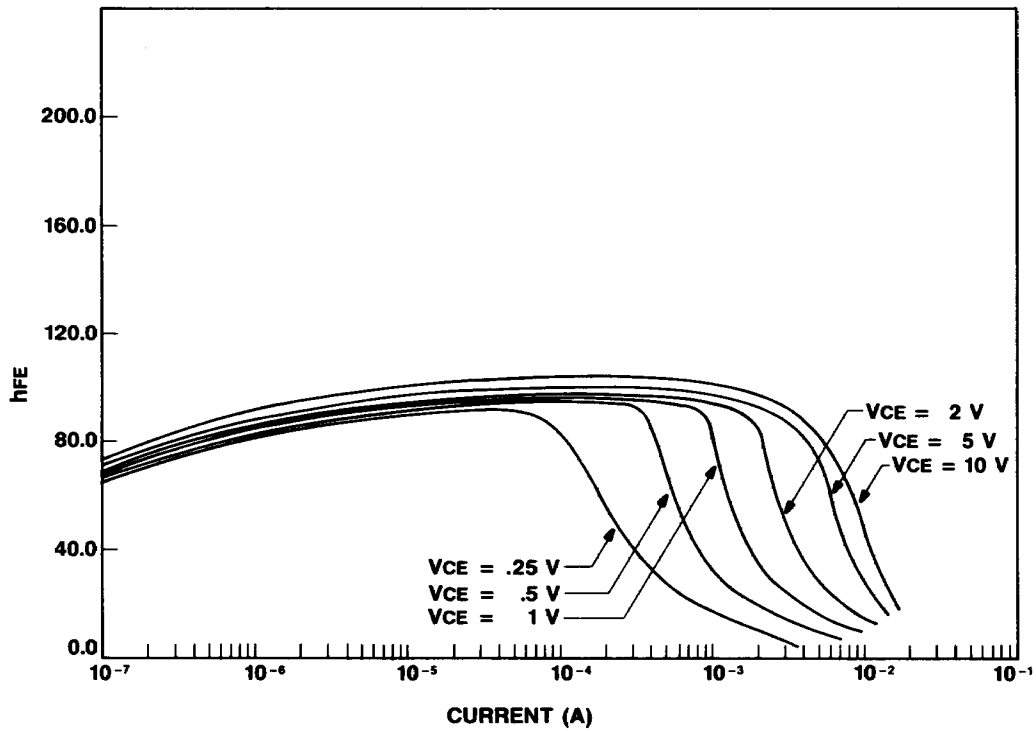
Collector-Base Capacitance (PNP)



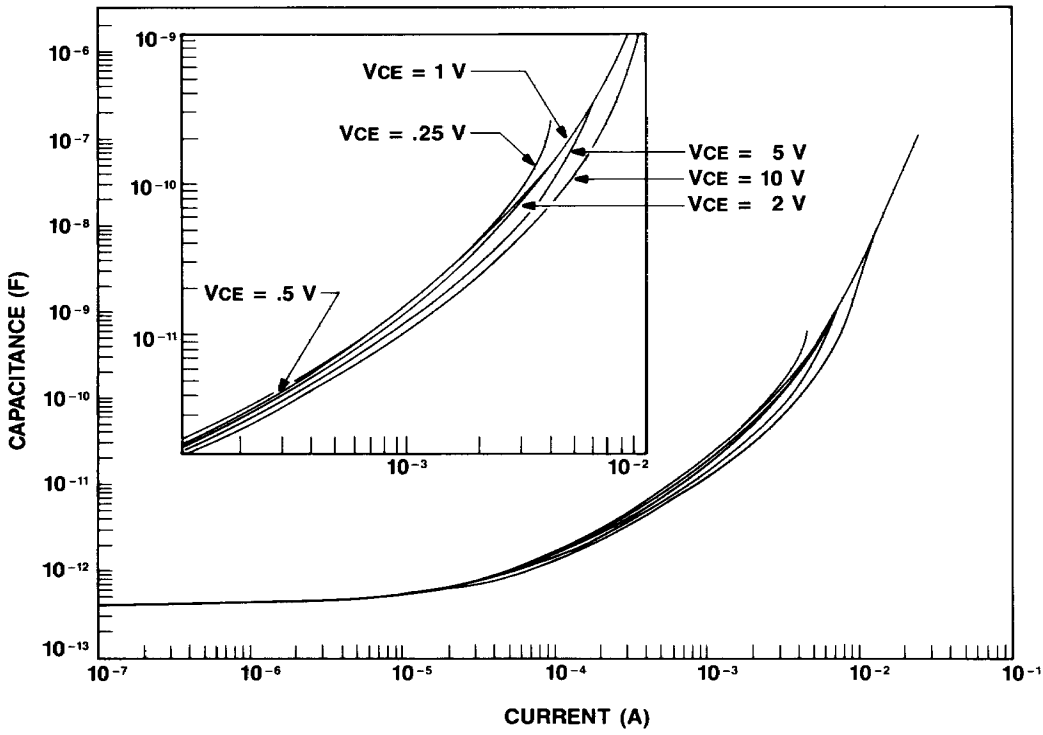
Current Gain (NPN)



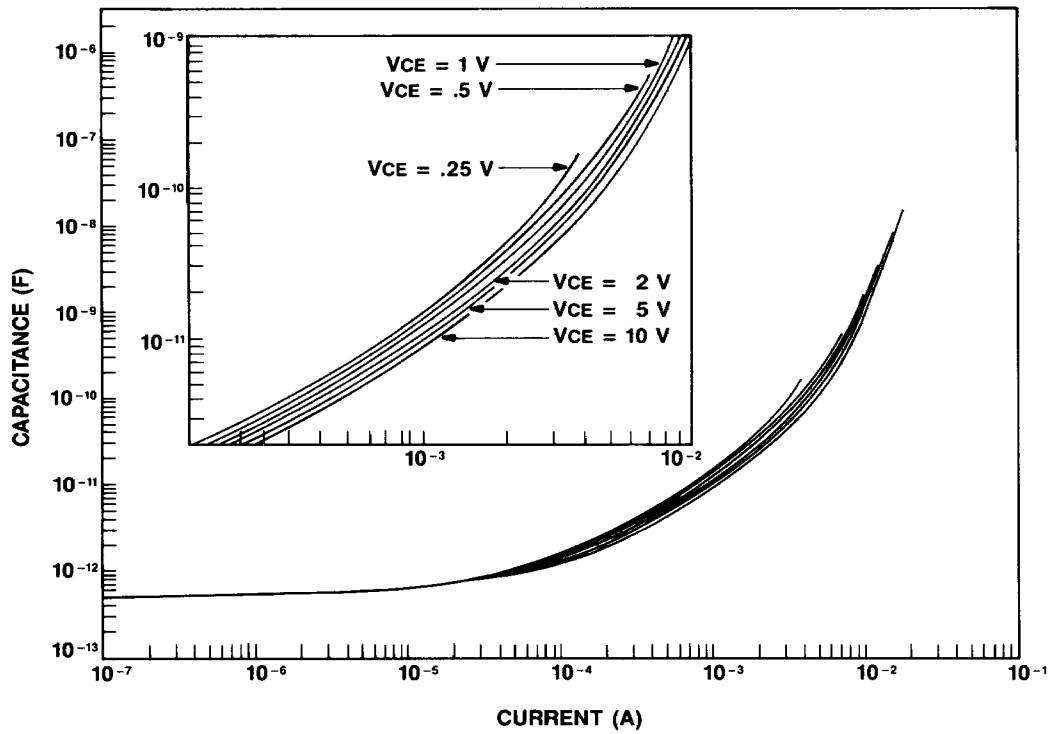
Current Gain (PNP)



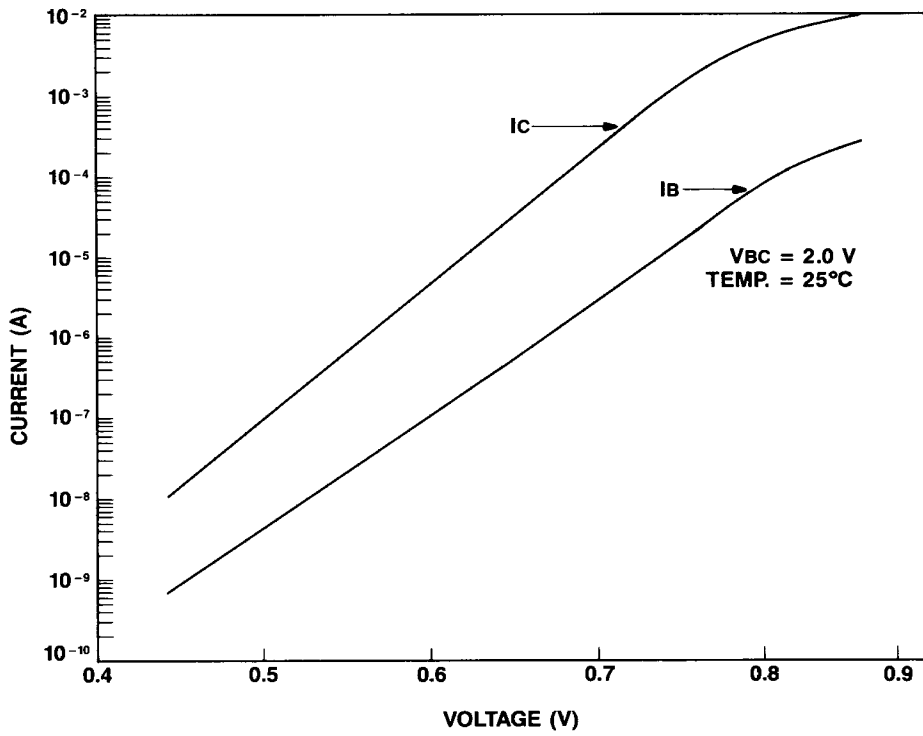
Base-Emitter Capacitance (NPN)



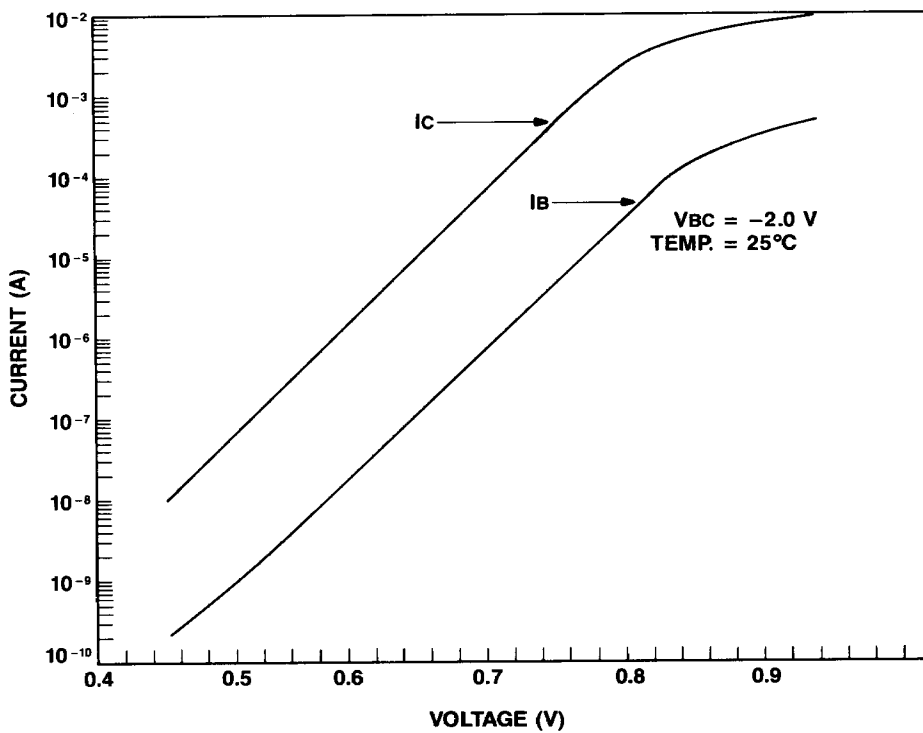
Base-Emitter Capacitance (PNP)



Current-Voltage Characteristics (NPN)



Current-Voltage Characteristics (PNP)



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