356-529

Farnell COMPONENTS

2

BC182
BC183
BC184

CASE 29-02, STYLE 17
TO-92 (TO-226AA)

AMPLIFIER TRANSISTORS

NPN SILICON

Refer to BC237 for graphs.

MAXIMUM RATINGS

Rating	Symbol	BC 182	BC 183	BC 184	Unit
Collector-Emitter Voltage	V_{CEO}	50	30	30	Vdc
Collector-Base Voltage	V_{CBO}	60	45	45	Vdc
Emitter-Base Voltage	V_{EBO}	6.0			Vdc
Collector Current − Continuous	I_C	100			mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	350 2.8			mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.0 8.0			Watt mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150			°C

THERMAL CHARACTERISTICS

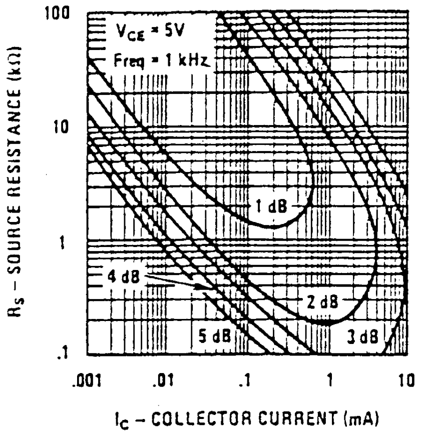
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	125	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JC}$	357	°C/W

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

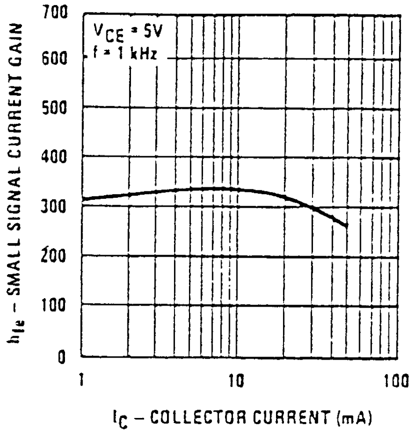
Characteristic	Type	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 2.0 mA, I_B = 0)	BC182 BC183 BC184	$V_{(BR)CEO}$	50 30 30	— — —	— — —	V
Collector-Base Breakdown Voltage (I_C = 10 µA, I_E = 0)	BC182 BC183 BC184	$V_{(BR)CBO}$	60 45 45	— — —	— — —	V
Emitter-Base Breakdown Voltage (I_E = 100 µA, I_C = 0)		$V_{(BR)EBO}$	6.0	—	—	V
Collector Cutoff Current (V_{CB} = 50 V, V_{BE} = 0) (V_{CB} = 30 V, V_{BE} = 0)	BC182 BC183 BC184	I_{CBO}	— — —	0.20 0.20 0.20	15 15 15	nA
(V_{CB} = 50 V, V_{BE} = 0) T_A = 125°C (V_{CB} = 30 V, V_{BE} = 0) T_A = 125°C	BC182 BC183 BC184		— — —	0.20 0.20 0.20	4 4 4	µA
Emitter-Base Leakage Current (V_{EB} = 4 V, I_C = 0)		I_{EBO}	—	—	15	nA
ON CHARACTERISTICS						
DC Current Gain (I_C = 10 µA, V_{CE} = 5 V)	BC182 BC183 BC184	h_{FE}	40 40 100	— — —	— — —	
(I_C = 2 mA, V_{CE} = 5 V)	BC182 BC183 BC184		100 100 250	— — —	480 850 850	
(I_C = 100 mA, V_{CE} = 5 V)	BC182 BC183 BC184		30 30 130	— — —	— — —	
Collector-Emitter On Voltage (I_C = 10 mA, I_B = 5 mA) (I_C = 100 mA, I_B = 5 mA)*		$V_{CE(sat)}$	— —	0.07 0.20	0.25 0.60	V
Base-Emitter Saturation Voltage (I_C = 100 mA, I_B = 5 mA)		$V_{BE(sat)}$	—	1.05	—	V
Base-Emitter On Voltage (I_C = 100 µA, V_{CE} = 5 V) (I_C = 2 mA, V_{CE} = 5 V) (I_C = 100 mA, V_{CE} = 5 V)		$V_{BE(on)}$	— 0.55 —	0.50 0.62 0.83	— 0.70 —	V

*Pulse-test: Tp 300 s, Duty-cycle 2%.

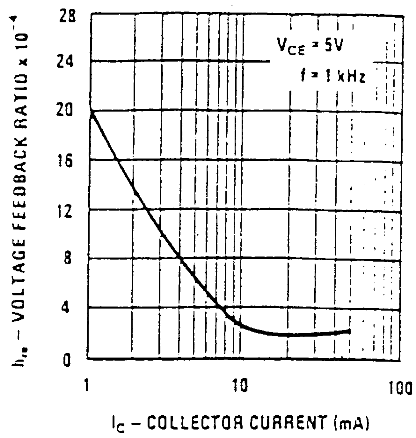
Contours of Constant Narrow Band Noise Figure



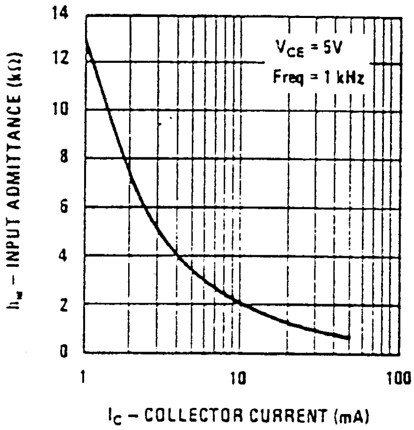
Small Signal Current Gain



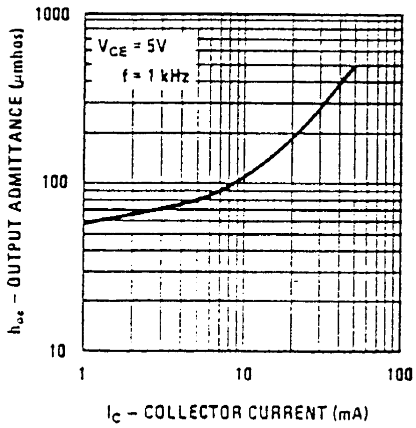
Voltage Feedback Ratio



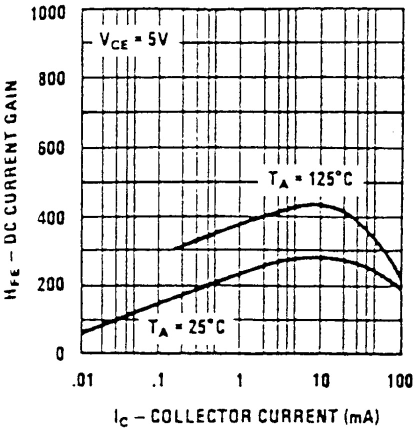
Input Admittance



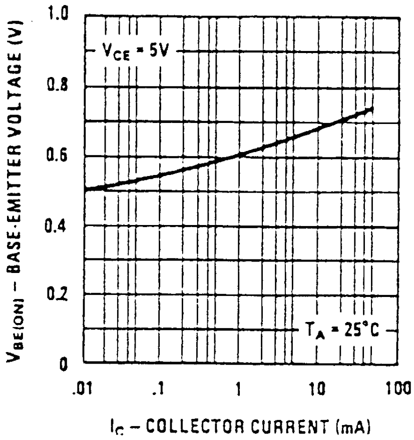
Output Admittance



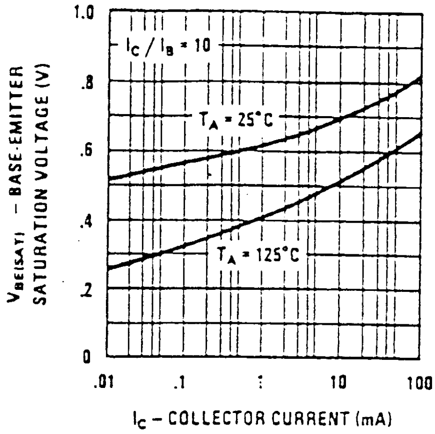
DC Current Gain vs Collector Current



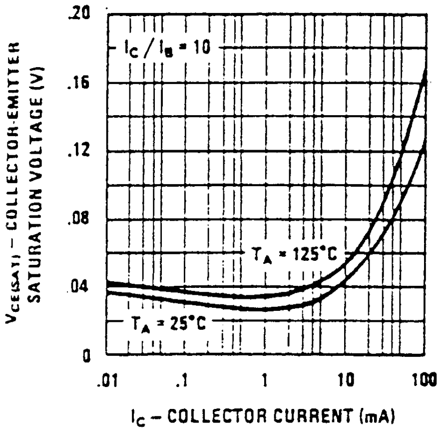
Base-Emitter ON Voltage vs Collector Current



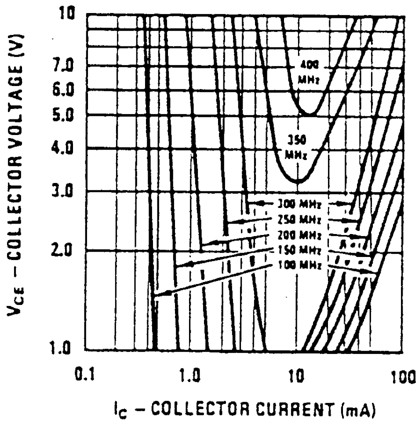
Base-Emitter Saturation Voltage vs Collector Current



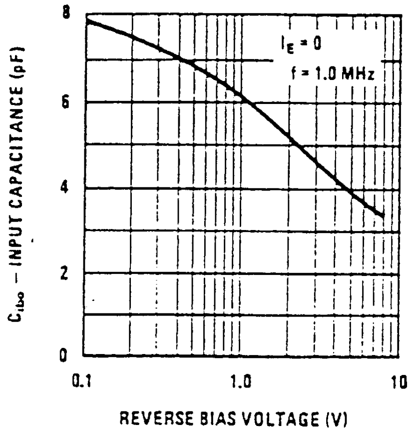
Collector-Emitter Saturation Voltage vs Collector Current



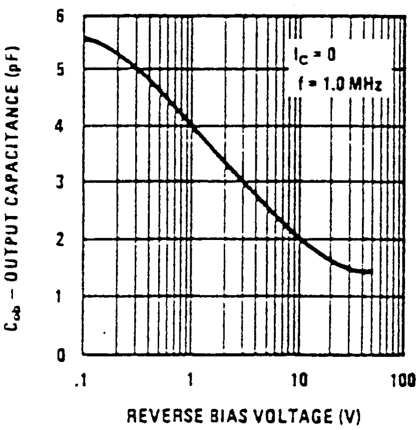
Contours of Constant Gain Bandwidth Product (f_T)



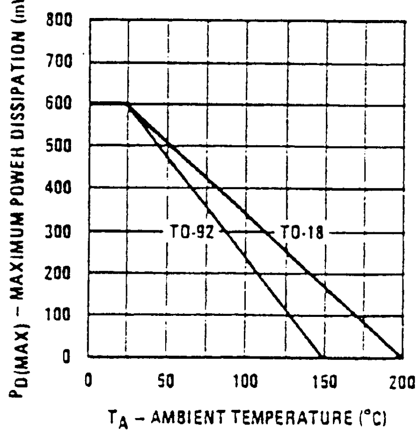
Input Capacitance vs Reverse Bias Voltage



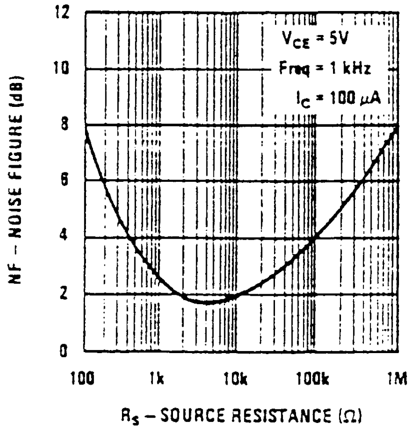
Output Capacitance vs Reverse Bias Voltage



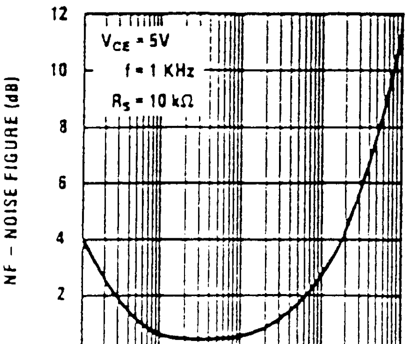
Maximum Power Dissipation vs Ambient Temperature



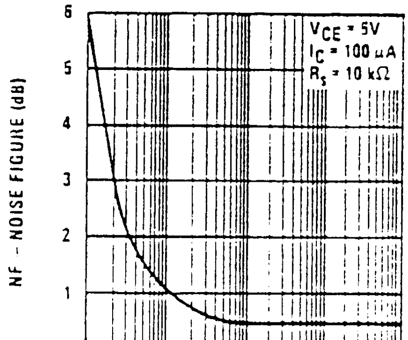
Noise Figure vs Source Resistance



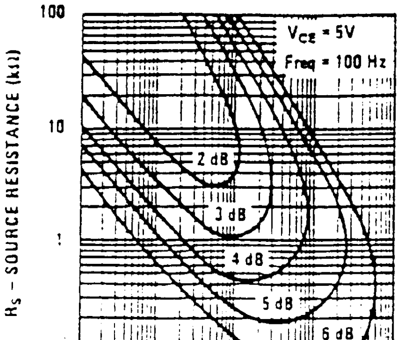
Noise Figure vs Collector Current



Noise Figure vs Frequency



Contours of Constant Narrow Band Noise Figure

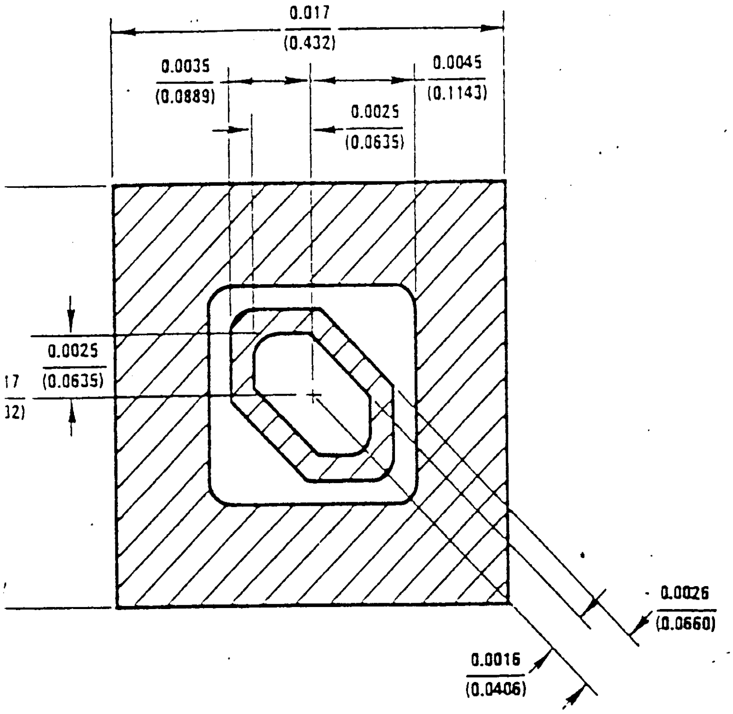


ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted)

Characteristic	Type	Symbol	Min	Typ.	Max.	Unit
DYNAMIC CHARACTERISTICS						
Current-Gain Bandwidth Product (I_C = 0.5 mA, V_{CE} = 3 V, f = 100 MHz)	BC182	f_T	—	100	—	MHz
	BC183		—	120	—	
	BC184		—	140	—	
(I_C = 10 mA, V_{CE} = 5 V, f = 100 MHz)	BC182		150	200	—	
	BC183		150	240	—	
	BC184		150	280	—	
Common Base Output Capacitance (V_{CB} = 10 V, I_C = 0, f = 1 MHz)		C_{ob}	—	—	5.0	pF
Common Base Input Capacitance (V_{BE} = 0.5 V, I_C = 0, f = 1 MHz)		C_{ib}	—	8.0	—	pF
Input Impedance (I_C = 2 mA, V_{CE} = 5 V, f = 1 KHz)	BC182	h_{ie}	1.6	2.2	4.5	Kohm
	BC183		3.2	6.0	8.5	
	BC184		6.0	8.7	15.0	
Voltage Feedback Ratio (I_C = 2 mA, V_{CE} = 5, f = 1 KHz)	BC182	h_{re}	—	1.5	—	$X10^{-4}$
	BC183		—	2.0	—	
	BC184		—	3.0	—	
Small-Signal Current Gain (I_C = 2 mA, V_{CE} = 5 V, f = 1 KHz)	BC182	h_{fe}	125	—	500	
	BC183		125	—	900	
	BC184		240	—	900	
	BC182A, BC183A		125	—	260	
	BC182B, BC183B, BC184B		240	—	500	
	BC183C, BC184C		450	—	900	
Output Admittance (I_C = 2 mA, V_{CE} = 5 V, f = 1 KHz)	BC182	h_{oe}	—	8	25	μmhos
	BC183		—	10	35	
	BC184		—	12	50	
Noise Figure (I_C = 0.2 mA, V_{CE} = 5 V, R_S = 2 Kohms, f = 30 Hz to 15 KHz)	BC184	NF	—	2	4	dB
(I_C = 0.2 mA, V_{CE} = 5 V, R_S = 2 Kohms, f = 1 KHz, f = 200 Hz)	BC182		—	2	10	
	BC183		—	2	10	
	BC184		—	2	4	

Process 04 NPN Small Signal

National Semiconductor



DESCRIPTION

Process 04 is a non-overlay, double-diffused, silicon epitaxial device. Complement to Process 71.

APPLICATION

This device was designed for low noise, high gain, general purpose amplifier applications from 10 μA to 100 mA collector current.

PRINCIPAL DEVICE TYPES

TO-18: BC107 Series
TO-92, ECB: 2N2923 Series
2N5172
TO-92, EBC: MPS2923 Series

Parameter	Conditions	Min	Typ	Max	Units	Notes
NF (spot)	$I_C = 200\ \mu A$, $V_{CE} = 5V$, $f = 1$ kHz, $R_S = 2k$		2.0	4.0	dB	TO-18
C_{ob}	$V_{CB} = 10V$, $f = 1$ MHz		2.5	3.5	pF	
C_{ib}	$V_{EB} = 0.5V$, $f = 1$ MHz			10	pF	
f_T	$V_{CE} = 5V$, $I_C = 10$ mA	125	250		MHz	
h_{FE}	$V_{CE} = 5V$, $I_C = 100\ \mu A$	50				
h_{FE}	$V_{CE} = 5V$, $I_C = 2$ mA	75	250	600		
h_{FE}	$V_{CE} = 5V$, $I_C = 100$ mA	40				
h_{FE}	$V_{CE} = 1V$, $I_C = 100$ mA	25				
$V_{CE(SAT)}$	$I_C = 10$ mA, $I_B = 1$ mA			0.2	V	
$V_{CE(SAT)}$	$I_C = 100$ mA, $I_B = 10$ mA			0.5	V	
$V_{BE(SAT)}$	$I_C = 10$ mA, $I_B = 1$ mA			0.85	V	
$V_{BE(SAT)}$	$I_C = 100$ mA, $I_B = 10$ mA			0.95	V	
BV_{CBO}	$I_C = 10\ \mu A$	45			V	
BV_{CEO}	$I_C = 10$ mA	35			V	
BV_{EBO}	$I_E = 10\ \mu A$	7.0			V	
I_{CBO}	$V_{CB} = 40V$			100	nA	
I_{EBO}	$V_{EB} = 6V$			100	nA	

PRO ELECTRON SERIES (Continued)

Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} (nA) Max	@ V_{CB} (V)	H_{FE} h_{fe} 1 kHz* Min	H_{FE} Max	@ I_C (mA)	& V_{CE} (V)	$V_{CE(SAT)}$ (V) Max	& $V_{BE(SAT)}$ $V_{BE(ON)}$* (V) Min	V_{BE} Max	@ I_C (mA)	C_{ob} (pF) Max	f_T (MHz) Min	f_T Max	@ I_C (mA)	t_{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
TO-18	25	20	5	100	20	110 240	 500*	2 2	5 5	0.18		0.78 0.75* 1.0*	10 2 100	4.5	150		10		4	1	71
TO-92 (97)	60	50	5	15	50	40 80 125	 500*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (97)	60	50	5	15	50	40 80 125	 260*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (97)	60	50	5	15	50	40 80 240	 500*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (94)	60	50	5	15	50	40 80 125	 500*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (94)	60	50	5	15	50	40 80 125	 260*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (94)	60	50	5	15	50	40 80 240	 500*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (97)	45	30	5	15	30	40 80 125	 900*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (97)	45	30	5	15	30	40 80 125	 260*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (97)	45	30	5	15	30	40 80 240	 500*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04
TO-92 (97)	45	30	5	15	30	40 80 450	 900*	0.01 100 2	5 5 5	0.6 0.25	 0.55	1.2 0.70*	100 10 2	5	150		10		10	1	04

ONDITIONS:

200 μA, V_{CE} = 5V, f = 1 kHz. (2) I_C = 100 mA, V_{CC} = 20V, $I_B^1 = I_B^2$ = 5 mA. (3) I_C = 200 μA, V_{CE} = 2V, f = 1 kHz. (4) I_C = 100 mA, V_{CC} = 10V, $I_B^1 = I_B^2$ = 10 mA. (5) I_C = 10 mA, V_{CC} = 3V
2 = 1 mA. (6) I_C = 100 μA, V_{CE} = 5V, f = 1 kHz. (7) I_C = 1 mA, V_{CE} = 10V, f = 200 kHz. (8) I_C = 1 mA, V_{CE} = 5V, f = 1 kHz. (9) I_C = 150 mA, V_{CC} = 6V, $I_B^1 = I_B^2$ = 15 mA. (10) I_C = 10 μA
V, f = WB.