
2SC5594

Silicon NPN Epitaxial High Frequency Low Noise Amplifier

HITACHI

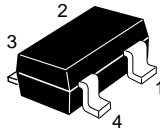
ADE-208-798 (Z)
1st. Edition
Nov. 2000

Features

- High gain bandwidth product
 $f_T = 24$ GHz typ.
- High power gain and low noise figure ;
PG = 18 dB typ. , NF = 1.2 dB typ. at $f = 1.8$ GHz

Outline

CMPAK-4



1. Emitter
2. Collector
3. Emitter
4. Base

Note: Marking is "XP-".

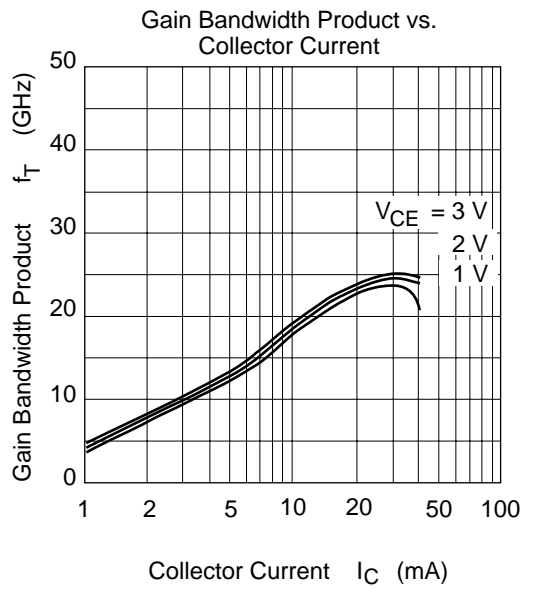
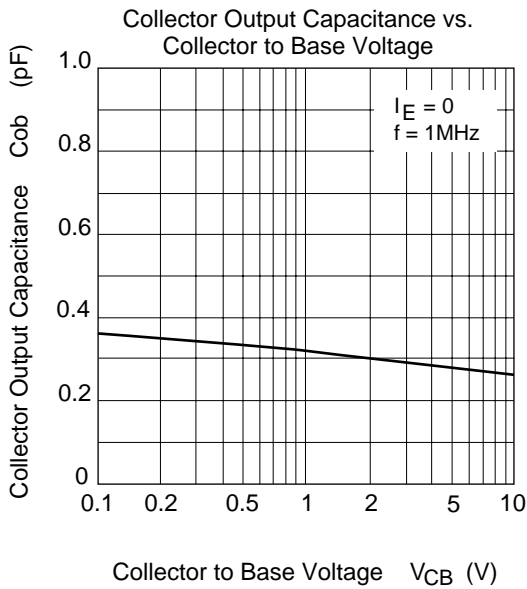
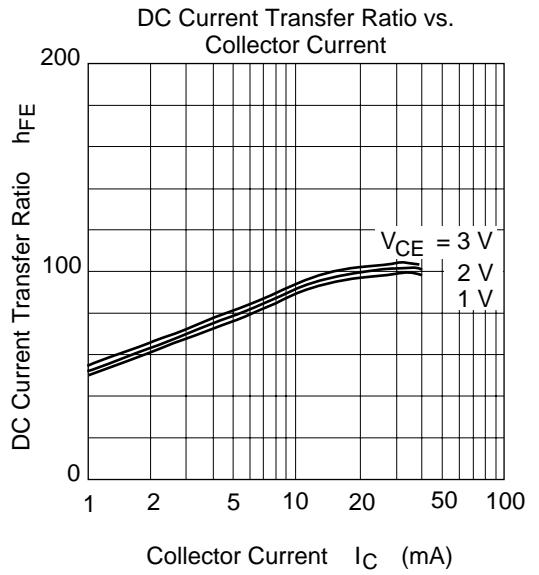
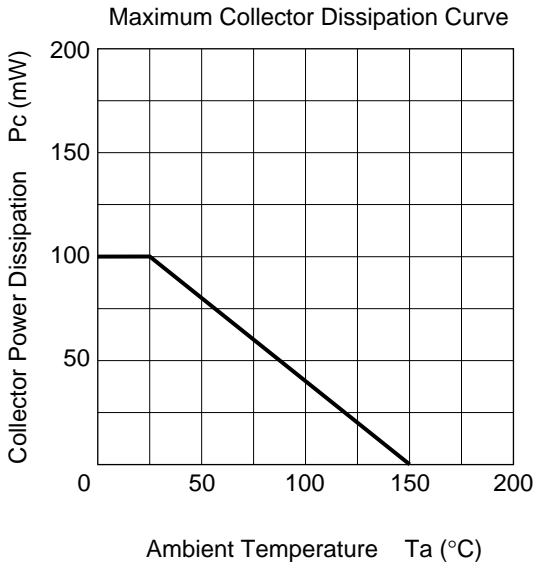
Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	12	V
Collector to emitter voltage	V_{CEO}	4.5	V
Emitter to base voltage	V_{EBO}	0.8	V
Collector current	I_{C}	35	mA
Collector power dissipation	P_{C}	100	mW
Junction temperature	T_{j}	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

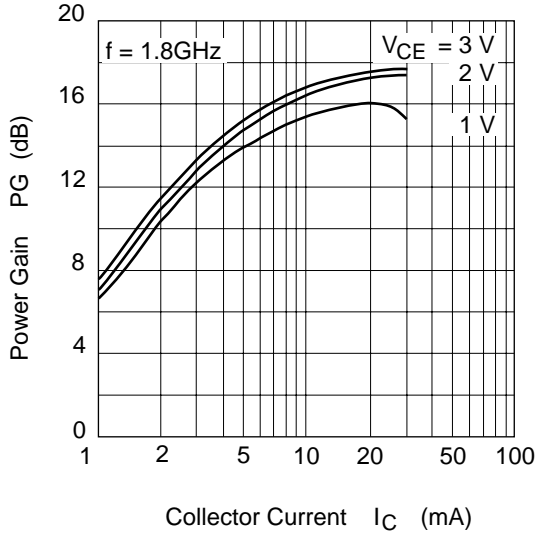
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	12	—	—	V	$I_{\text{C}} = 10 \mu\text{A}$, $I_{\text{E}} = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{\text{CB}} = 10 \text{ V}$, $I_{\text{E}} = 0$
Collector cutoff current	I_{CEO}	—	—	1	μA	$V_{\text{CE}} = 4 \text{ V}$, $R_{\text{BE}} = \infty$
Emitter cutoff current	I_{EBO}	—	—	12	μA	$V_{\text{EB}} = 0.8 \text{ V}$, $I_{\text{C}} = 0$
DC current transfer ratio	h_{FE}	60	100	140	V	$V_{\text{CE}} = 2 \text{ V}$, $I_{\text{C}} = 20 \text{ mA}$
Collector output capacitance	C_{ob}	—	0.3	0.6	pF	$V_{\text{CB}} = 2 \text{ V}$, $I_{\text{E}} = 0$ $f = 1 \text{ MHz}$
Gain bandwidth product	f_{T}	21	24	—	GHz	$V_{\text{CE}} = 2 \text{ V}$, $I_{\text{C}} = 30 \text{ mA}$ $f = 2 \text{ GHz}$
Power gain	PG	14	18	—	dB	$V_{\text{CE}} = 2 \text{ V}$, $I_{\text{C}} = 30 \text{ mA}$ $f = 1.8 \text{ GHz}$
Noise figure	NF	—	1.2	1.6	dB	$V_{\text{CE}} = 2 \text{ V}$, $I_{\text{C}} = 5 \text{ mA}$ $f = 1.8 \text{ GHz}$

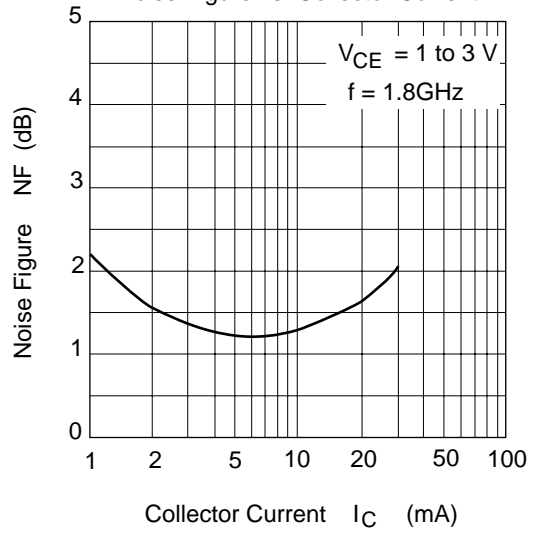
Main Characteristics



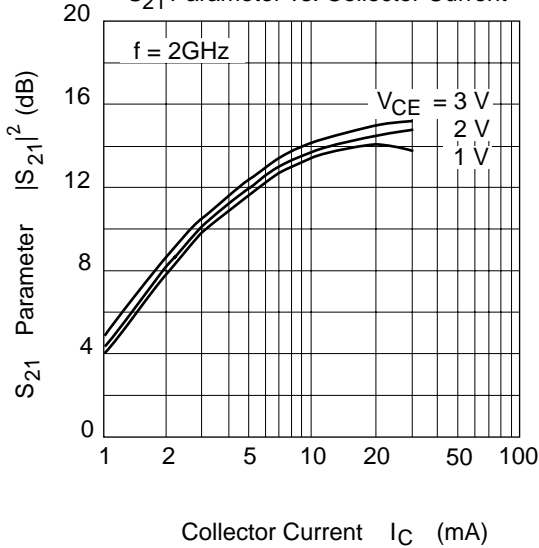
Power Gain vs. Collector Current



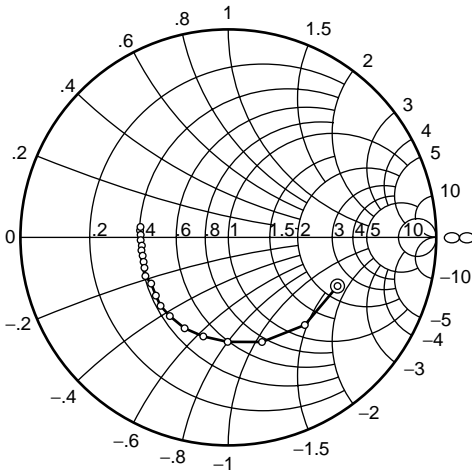
Noise Figure vs. Collector Current



S₂₁ Parameter vs. Collector Current



S11 Parameter vs. Frequency

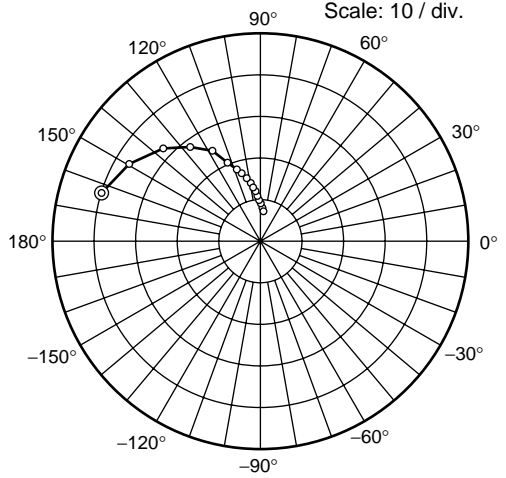


Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

S21 Parameter vs. Frequency

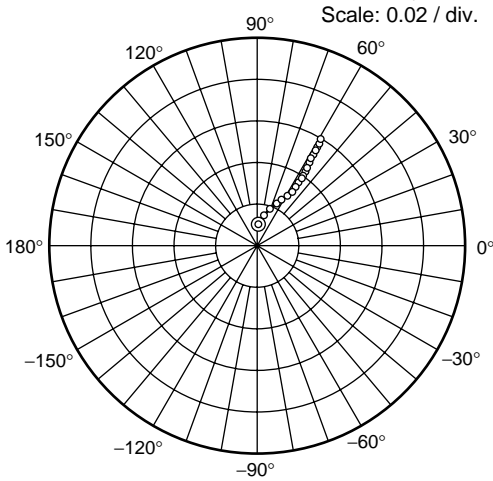


Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

S12 Parameter vs. Frequency

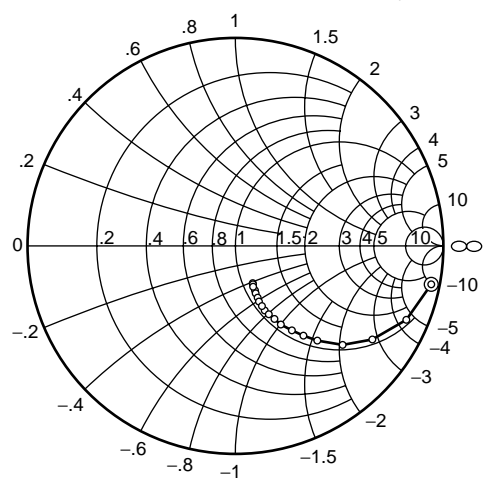


Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

S22 Parameter vs. Frequency



Condition ; $V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$

100 to 2000 MHz (100 MHz step)

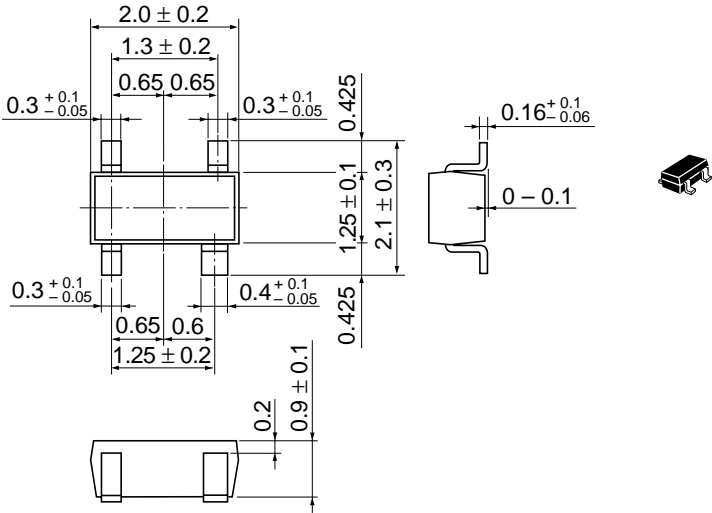
⊙—○

Sparameter ($V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_o = 50 \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.577	-24.5	40.31	164.2	0.00674	82.9	0.963	-11.5
200	0.560	-49.8	36.64	149.3	0.0130	74.5	0.897	-23.7
300	0.541	-72.2	32.05	136.3	0.0182	68.8	0.803	-34.4
400	0.504	-90.2	27.56	126.5	0.0225	63.6	0.708	-42.4
500	0.495	-104.5	23.84	118.8	0.0256	61.3	0.622	-48.4
600	0.477	-116.9	20.64	113.1	0.0285	58.9	0.548	-53.1
700	0.458	-126.4	18.11	108.4	0.0311	57.7	0.487	-56.2
800	0.456	-134.5	16.13	105.1	0.0336	57.3	0.437	-58.7
900	0.448	-142.5	14.46	101.6	0.0355	57.8	0.394	-60.4
1000	0.435	-147.9	13.15	99.2	0.0382	56.8	0.360	-61.9
1100	0.438	-153.6	12.01	96.6	0.0399	57.4	0.331	-63.0
1200	0.430	-158.5	11.06	94.4	0.0422	57.0	0.306	-63.3
1300	0.425	-162.6	10.24	93.0	0.0443	58.1	0.288	-63.5
1400	0.426	-166.9	9.56	91.1	0.0462	58.3	0.269	-64.0
1500	0.424	-171.1	8.99	89.6	0.0488	58.3	0.253	-64.1
1600	0.425	-174.1	8.45	88.0	0.0508	58.5	0.241	-64.1
1700	0.428	-177.4	7.98	86.6	0.0527	58.8	0.230	-64.0
1800	0.424	179.7	7.59	85.0	0.0556	58.8	0.220	-64.0
1900	0.426	176.6	7.19	83.8	0.0578	59.0	0.212	-63.9
2000	0.428	174.7	6.84	82.4	0.0595	58.8	0.204	-63.7

Package Dimensions

As of January, 2001
Unit: mm



Hitachi Code	CMPAK-4(T)
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.006 g

Cautions

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