2SC5593

Silicon NPN Epitaxial
High Frequency Low Noise Amplifier

HITACHI

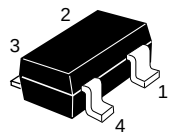
ADE-208-797 (Z)
1st. Edition
Nov. 2000

Features

- High gain bandwidth product
  f_T = 23 GHz typ.
- High power gain and low noise figure ;
  PG = 18 dB typ. , NF = 1.8 dB typ. at f = 1.8 GHz

Outline

CMPAK-4



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

Note: Marking is “XH-”.

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

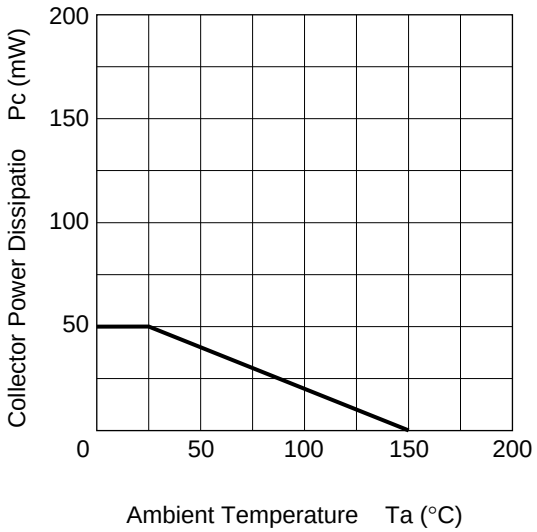
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	12	V
Collector to emitter voltage	V_{CEO}	4.5	V
Emitter to base voltage	V_{EBO}	1	V
Collector current	I_C	12	mA
Collector power dissipation	Pc	50	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

Electrical Characteristics (Ta = 25°C)

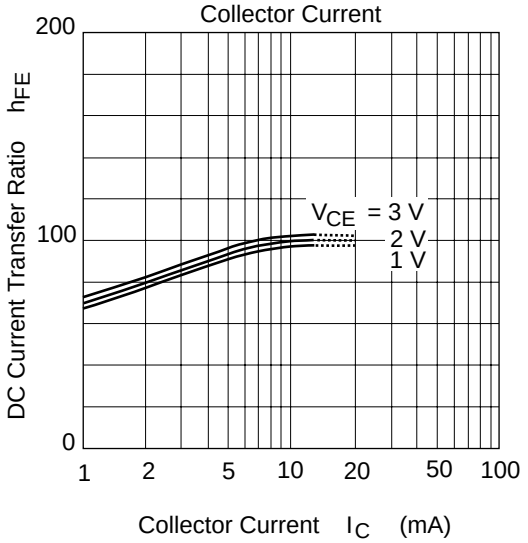
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	12	—	—	V	I_C = 10 µA , I_E = 0
Collector cutoff current	I_{CBO}	—	—	1	µA	V_{CB} = 10 V , I_E = 0
Collector cutoff current	I_{CEO}	—	—	1	µA	V_{CE} = 4 V , R_{BE} = ∞
Emitter cutoff current	I_{EBO}	—	—	12	µA	V_{EB} = 1 V , I_C = 0
DC current transfer ratio	h_{FE}	60	100	140	V	V_{CE} = 2 V , I_C = 10 mA
Collector output capacitance	Cob	—	0.16	0.4	pF	V_{CB} = 2 V , I_E = 0 f = 1 MHz
Gain bandwidth product	f_T	20	23	—	GHz	V_{CE} = 2 V , I_C = 10 mA f = 2 GHz
Power gain	PG	14	18	—	dB	V_{CE} = 2 V , I_C = 10 mA f = 1.8 GHz
Noise figure	NF	—	1.8	2.3	dB	V_{CE} = 2 V , I_C = 3 mA f = 1.8 GHz

Main Characteristics

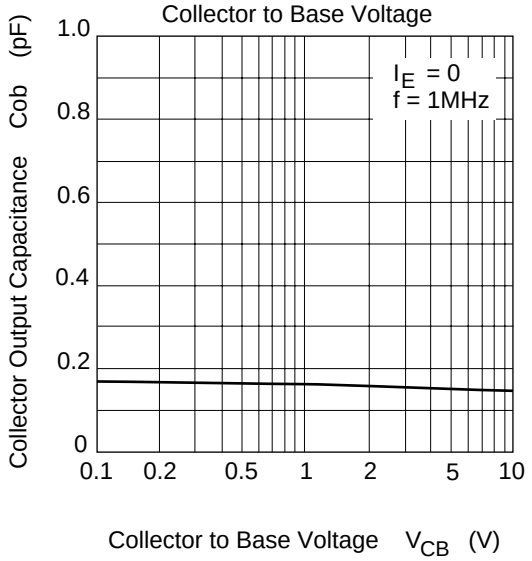
Collector Power Dissipation Curve



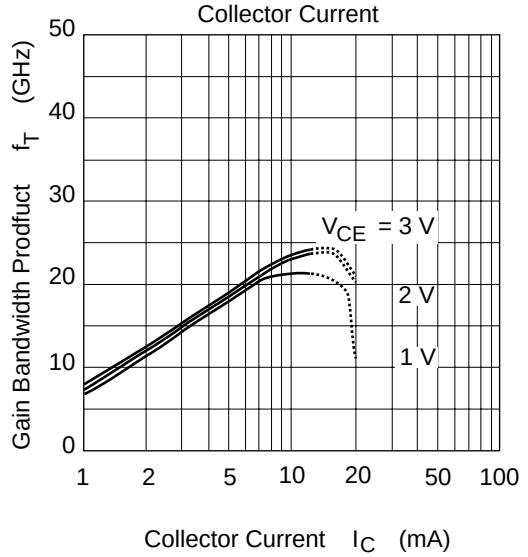
DC Current Transfet Ratio vs. Collector Current



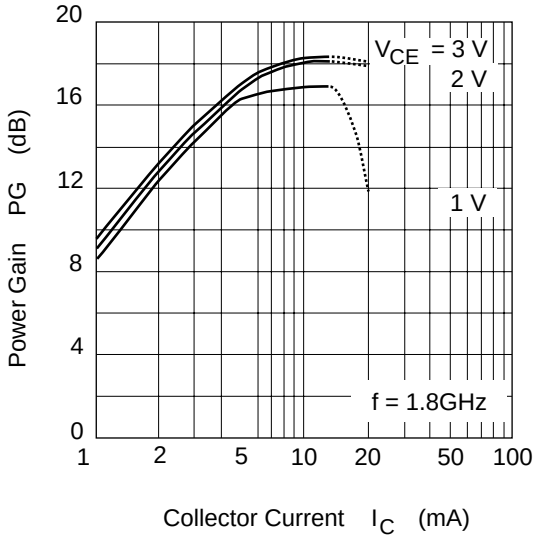
Collector Output Capacitance vs. Collector to Base Voltage



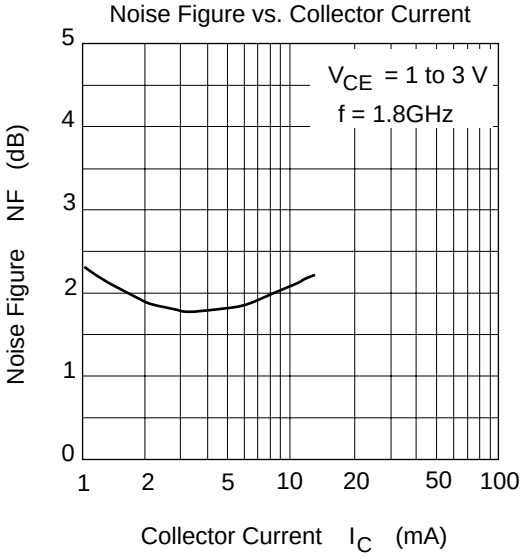
Gain Bandwidth Product vs. Collector Current



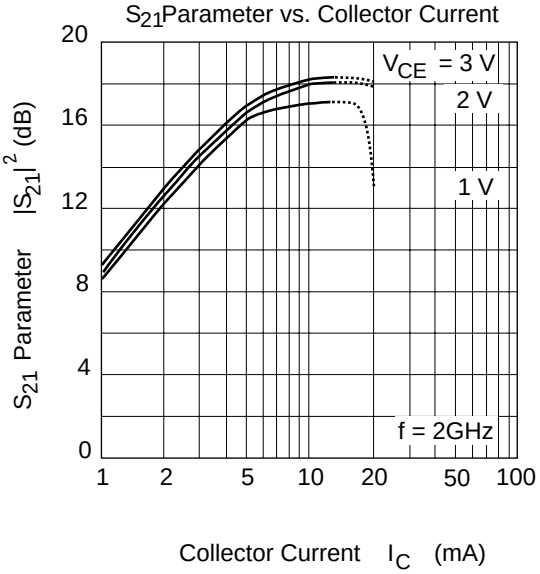
Power Gain vs. Collector Current



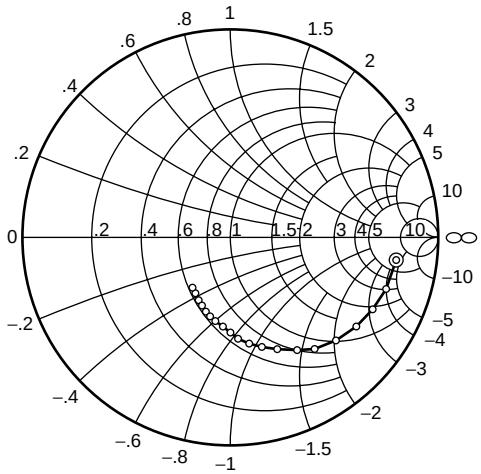
Noise Figure vs. Collector Current



S_{21}Parameter vs. Collector Current



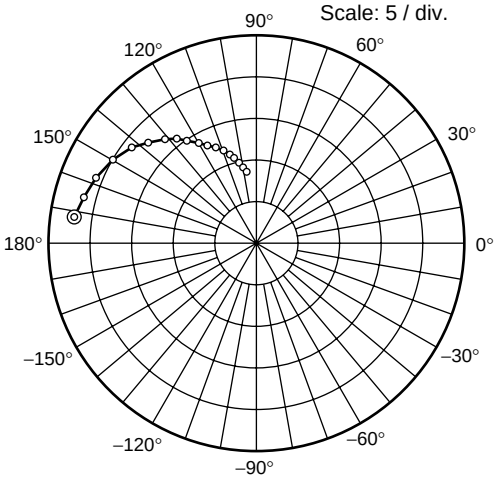
S11 Parameter vs. Frequency



Condition : V_{CE} = 2 V , I_C = 10 mA

100 to 2000 MHz (100 MHz step)

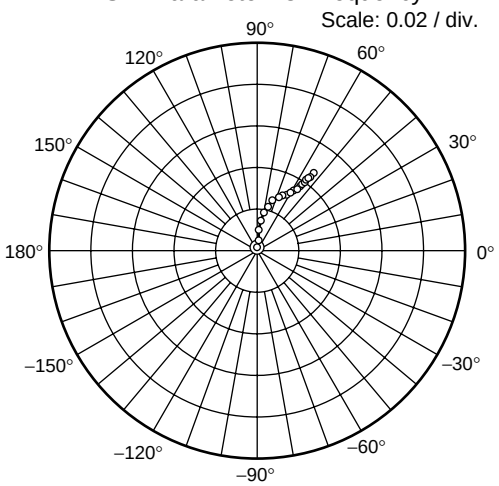
S21 Paramter vs. Frequency



Condition : V_{CE} = 2 V , I_C = 10 mA

100 to 2000 MHz (100 MHz step)

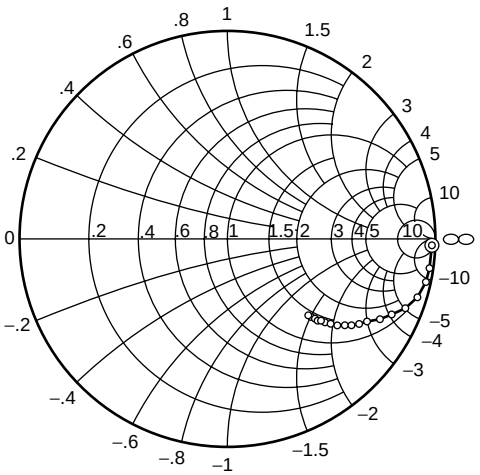
S12 Parameter vs. Frequency



Condition : V_{CE} = 2 V , I_C = 10 mA

100 to 2000 MHz (100 MHz step)

S22 Parameter vs. Frequency



Condition : V_{CE} = 2 V , I_C = 10 mA

100 to 2000 MHz (100 MHz step)

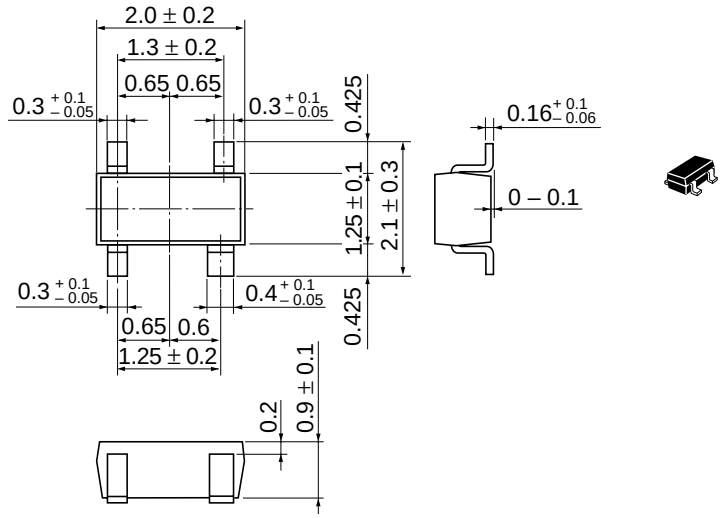
S-parameter (V_{CE} = 2 V, I_C = 10 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.804	–8.2	22.02	172.5	0.00305	94.6	0.993	–3.4
200	0.795	–17.8	21.55	165.0	0.0067	86.8	0.986	–8.1
300	0.776	–27.4	20.88	157.5	0.0107	85.4	0.972	–12.7
400	0.746	–35.8	20.05	150.2	0.0146	82.5	0.947	–17.2
500	0.714	–44.5	18.93	143.7	0.0182	78.4	0.917	–21.2
600	0.673	–53.2	17.84	137.9	0.0215	74.8	0.881	–25.1
700	0.632	–59.9	16.60	132.5	0.0249	71.8	0.842	–28.3
800	0.595	–67.1	15.69	127.9	0.0274	67.9	0.808	–31.2
900	0.557	–74.6	14.64	123.5	0.0296	65.1	0.763	–33.7
1000	0.519	–79.1	13.68	119.5	0.0319	63.6	0.729	–35.6
1100	0.488	–86.0	12.88	116.0	0.0337	61.6	0.696	–37.2
1200	0.454	–91.1	12.03	112.8	0.0350	60.4	0.666	–38.6
1300	0.430	–95.9	11.26	110.6	0.0366	58.8	0.644	–39.5
1400	0.403	–101.8	10.69	107.8	0.0382	57.4	0.619	–40.6
1500	0.377	–106.3	10.16	105.4	0.0401	56.6	0.598	–41.2
1600	0.364	–111.0	9.66	103.6	0.0410	56.3	0.581	–42.0
1700	0.346	–116.6	9.19	101.4	0.0422	55.6	0.564	–42.6
1800	0.327	–120.0	8.79	99.3	0.0435	55.2	0.550	–43.2
1900	0.313	–124.9	8.40	97.5	0.0447	55.2	0.537	–43.9
2000	0.296	–130.8	7.99	95.5	0.0457	54.8	0.525	–44.0

Package Dimensions

As of January, 2001

Unit: mm



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

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