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# 2SC5624

## Silicon NPN Epitaxial High Frequency Low Noise Amplifier

# HITACHI

ADE-208-978 (Z)  
1st. Edition  
Nov. 2000

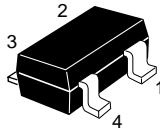
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### Features

- High gain bandwidth product  
 $f_T = 28$  GHz typ.
- High power gain and low noise figure ;  
PG = 18dB typ. , NF = 1.2dB typ. at  $f = 1.8$ GHz

### Outline

CMPAK-4



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

Note: Marking is "VH-".

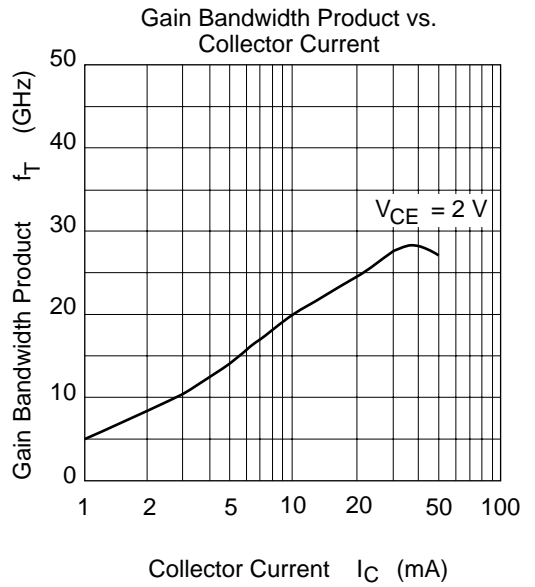
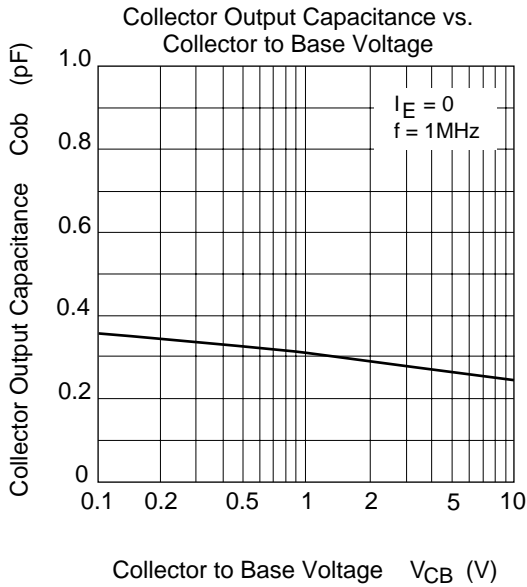
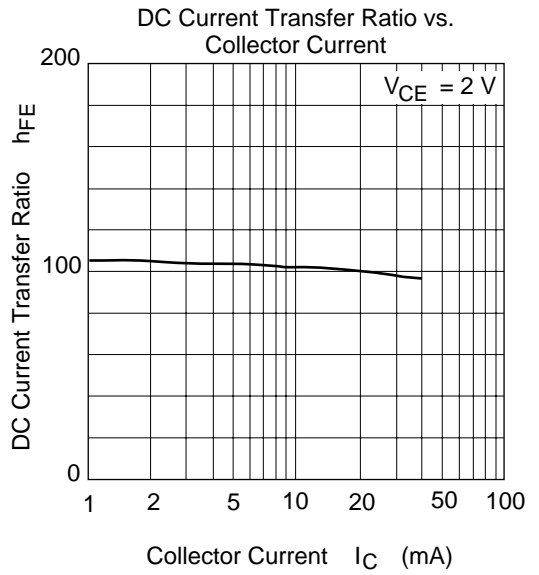
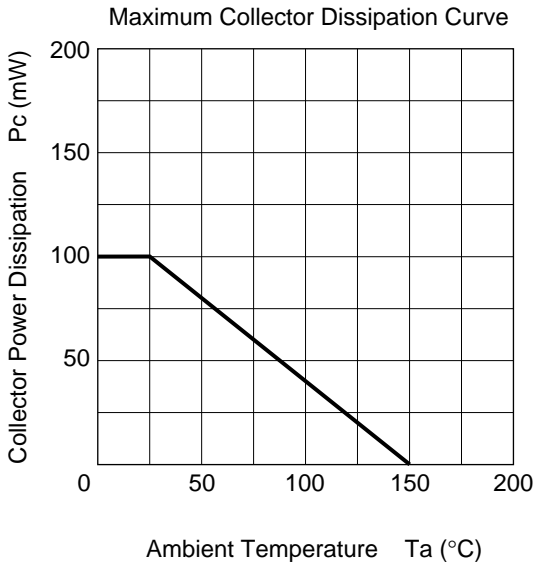
**Absolute Maximum Ratings** ( $T_a = 25^\circ\text{C}$ )

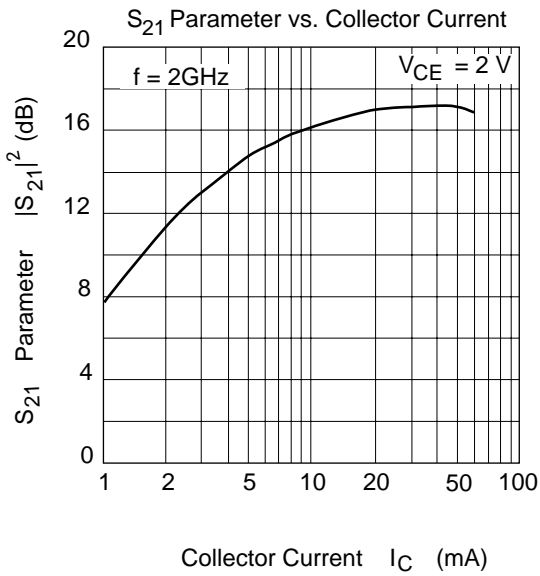
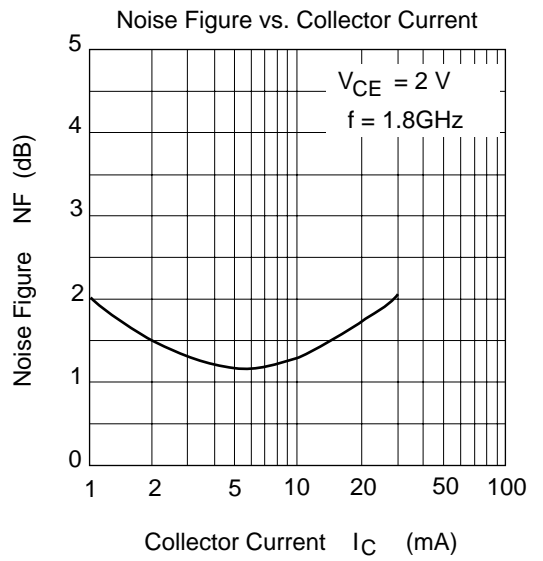
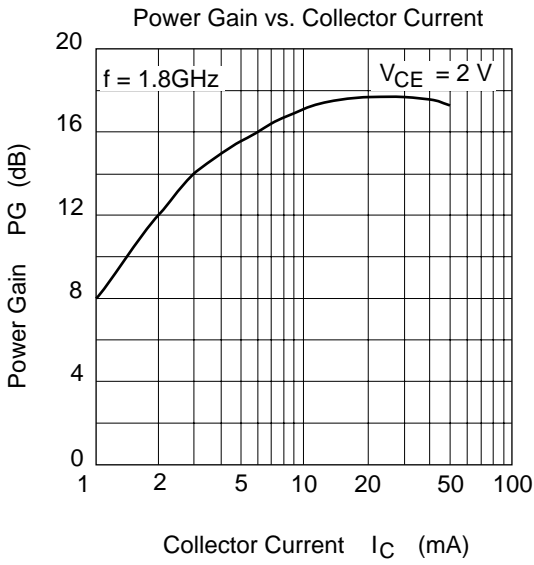
Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{\text{CBO}}$	10	V
Collector to emitter voltage	$V_{\text{CEO}}$	3.5	V
Emitter to base voltage	$V_{\text{EBO}}$	0.8	V
Collector current	$I_{\text{C}}$	35	mA
Collector power dissipation	$P_{\text{C}}$	100	mW
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$

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

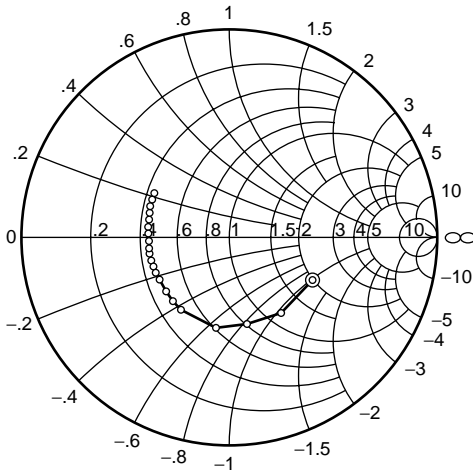
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	10	—	—	V	$I_{\text{C}} = 10 \mu\text{A}$ , $I_{\text{E}} = 0$
Collector cutoff current	$I_{\text{CBO}}$	—	—	1	$\mu\text{A}$	$V_{\text{CB}} = 8 \text{ V}$ , $I_{\text{E}} = 0$
Collector cutoff current	$I_{\text{CEO}}$	—	—	1	$\mu\text{A}$	$V_{\text{CE}} = 3 \text{ V}$ , $R_{\text{BE}} = \infty$
Emitter cutoff current	$I_{\text{EBO}}$	—	—	10	$\mu\text{A}$	$V_{\text{EB}} = 0.8 \text{ V}$ , $I_{\text{C}} = 0$
DC current transfer ratio	$h_{\text{FE}}$	60	100	140	V	$V_{\text{CE}} = 2 \text{ V}$ , $I_{\text{C}} = 20 \text{ mA}$
Collector output capacitance	$C_{\text{ob}}$	—	0.3	0.6	pF	$V_{\text{CB}} = 2 \text{ V}$ , $I_{\text{E}} = 0$ $f = 1 \text{ MHz}$
Gain bandwidth product	$f_{\text{T}}$	25	28	—	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





S11 Parameter vs. Frequency

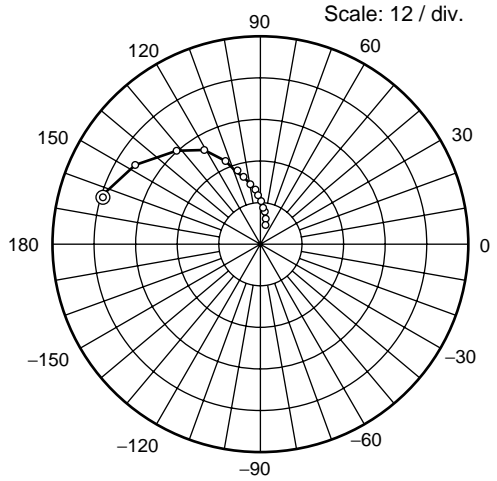


Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 30\text{ mA}$

100 to 3000 MHz (100 MHz step)



S21 Parameter vs. Frequency

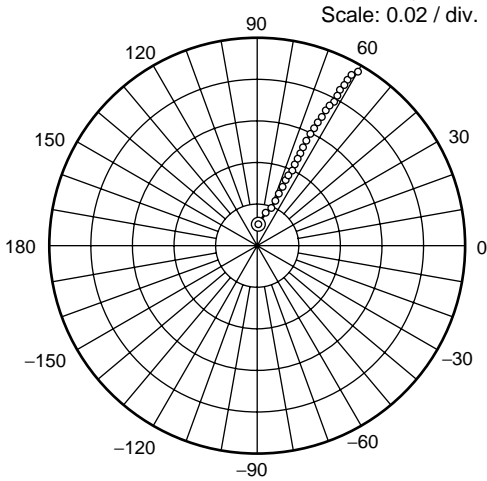


Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 30\text{ mA}$

100 to 3000 MHz (100 MHz step)



S12 Parameter vs. Frequency

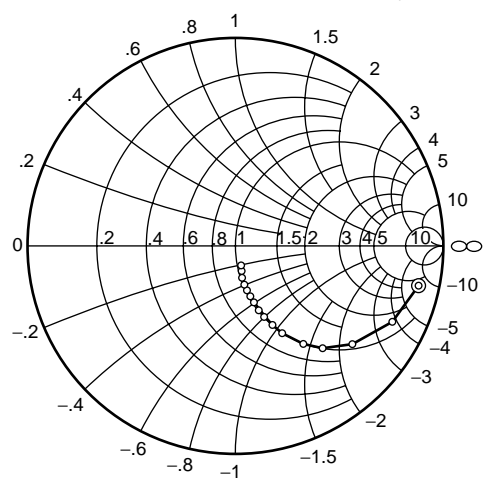


Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 30\text{ mA}$

100 to 3000 MHz (100 MHz step)



S22 Parameter vs. Frequency



Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 30\text{ mA}$

100 to 3000 MHz (100 MHz step)

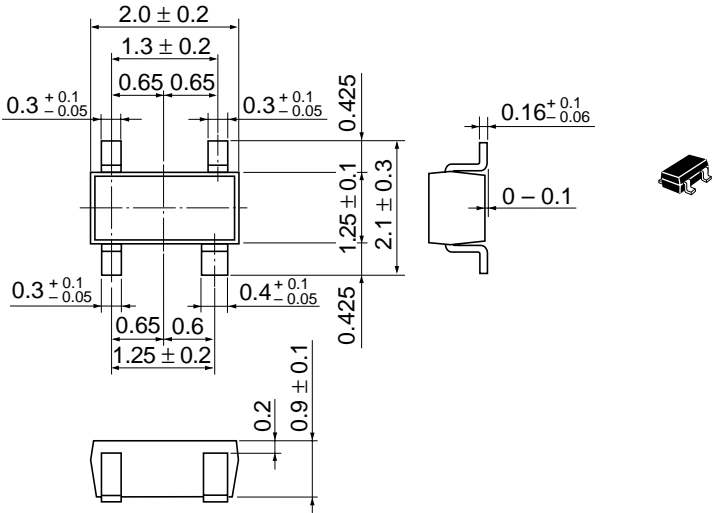


**Sparameter** (  $V_{CE} = 2 \text{ V}$ ,  $I_C = 30 \text{ mA}$ ,  $Z_o = 50 \Omega$  )

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.445	-27.3	46.66	163.5	0.0055	83.8	0.904	-12.9
200	0.447	-54.4	42.27	147.1	0.0115	78.6	0.846	-26.8
300	0.439	-78.7	36.16	133.0	0.0165	73.6	0.750	-39.3
400	0.432	-98.8	30.59	122.2	0.0207	68.8	0.650	-48.8
500	0.424	-112.8	25.84	114.5	0.0246	67.1	0.561	-55.9
600	0.414	-124.3	22.15	108.9	0.0277	66.1	0.487	-61.4
700	0.407	-133.4	19.22	104.4	0.0307	65.0	0.426	-65.3
800	0.398	-141.5	16.94	100.8	0.0335	65.3	0.376	-68.6
900	0.390	-147.9	15.05	97.7	0.0372	64.4	0.335	-70.7
1000	0.386	-154.1	13.63	95.3	0.0398	65.1	0.301	-72.5
1100	0.381	-159.0	12.45	93.3	0.0420	65.2	0.273	-73.7
1200	0.377	-164.0	11.48	91.3	0.0452	65.0	0.250	-74.5
1300	0.371	-167.8	10.60	89.6	0.0480	64.5	0.229	-74.9
1400	0.370	-171.8	9.84	87.7	0.0509	64.7	0.213	-75.1
1500	0.367	-175.7	9.23	86.1	0.0535	64.3	0.197	-75.2
1600	0.368	-178.8	8.66	84.7	0.0567	64.1	0.186	-74.7
1700	0.370	178.0	8.16	83.4	0.0595	64.4	0.173	-74.7
1800	0.360	174.7	7.72	82.2	0.0623	64.3	0.164	-74.0
1900	0.365	172.0	7.33	80.8	0.0651	64.0	0.156	-73.6
2000	0.365	168.9	6.95	79.4	0.0682	63.8	0.148	-72.7
2100	0.362	166.8	6.66	78.2	0.0709	63.1	0.142	-72.0
2200	0.372	164.1	6.35	77.0	0.0737	63.0	0.135	-71.3
2300	0.370	160.9	6.08	75.6	0.0764	62.3	0.130	-70.8
2400	0.372	159.0	5.86	74.6	0.0795	62.3	0.125	-69.9
2500	0.378	156.6	5.64	73.5	0.0824	62.0	0.121	-68.7
2600	0.370	154.5	5.42	72.3	0.0848	61.6	0.117	-68.5
2700	0.382	152.2	5.24	71.3	0.0874	61.7	0.113	-67.1
2800	0.388	150.7	5.03	70.3	0.0906	60.7	0.109	-66.8
2900	0.387	147.6	4.86	69.0	0.0928	61.0	0.105	-65.7
3000	0.388	146.9	4.72	67.9	0.0964	59.7	0.102	-65.5

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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