

# 2SC5631

Silicon NPN Epitaxial  
UHF / VHF Wide Band Amplifier

# HITACHI

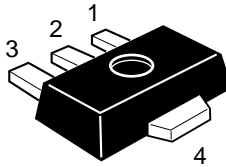
ADE-208-981A (Z)  
2nd. Edition  
Mar. 2001

## Features

- High gain bandwidth product  
 $f_T = 11$  GHz typ.
- High power gain and low noise figure ;  
PG = 10 dB typ. , NF = 1.2 dB typ. at  $f = 900$  MHz

## Outline

UPAK



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

Note: Marking is "JR".

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

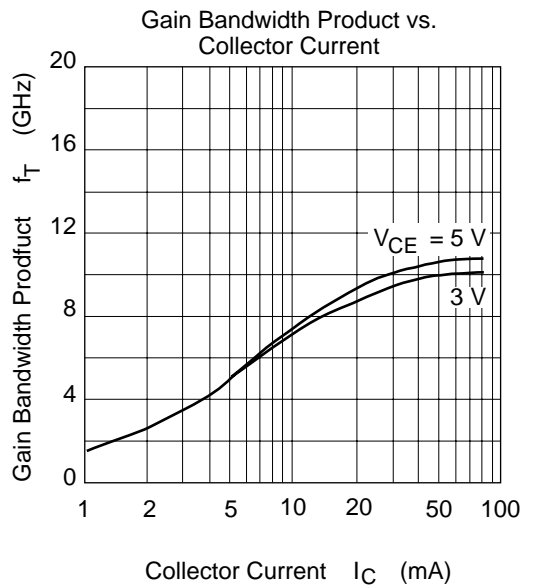
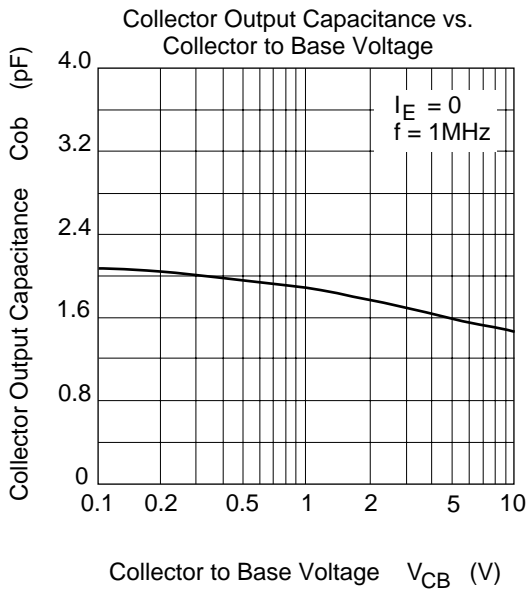
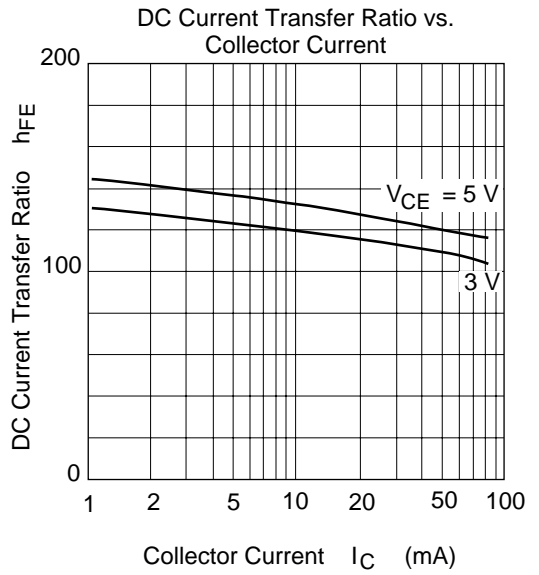
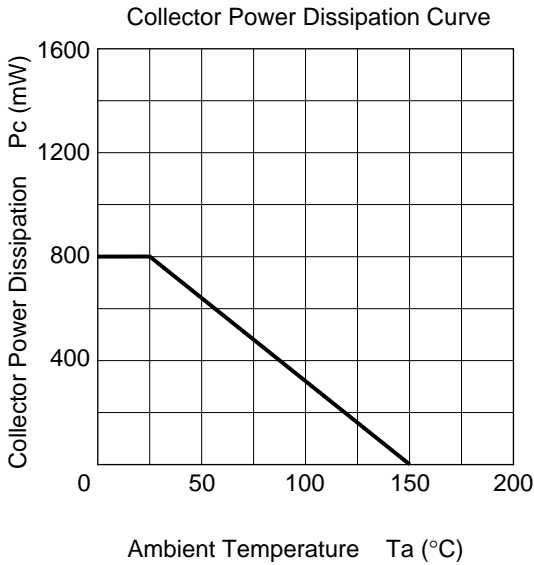
Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{\text{CBO}}$	15	V
Collector to emitter voltage	$V_{\text{CEO}}$	6	V
Emitter to base voltage	$V_{\text{EBO}}$	1.5	V
Collector current	$I_{\text{C}}$	80	mA
Collector power dissipation	$P_{\text{C}}$	800*	mW
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$

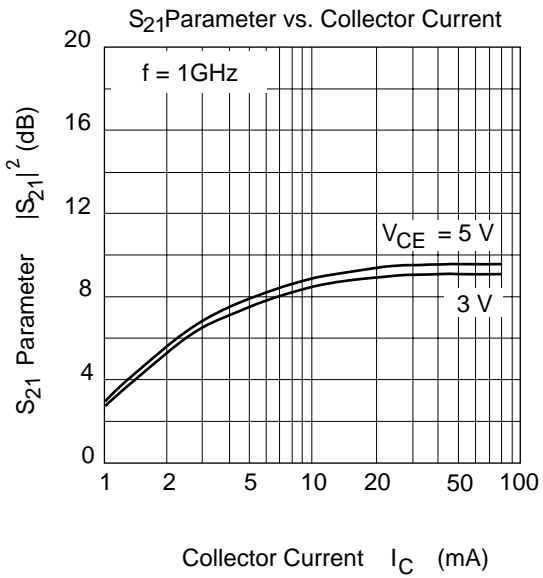
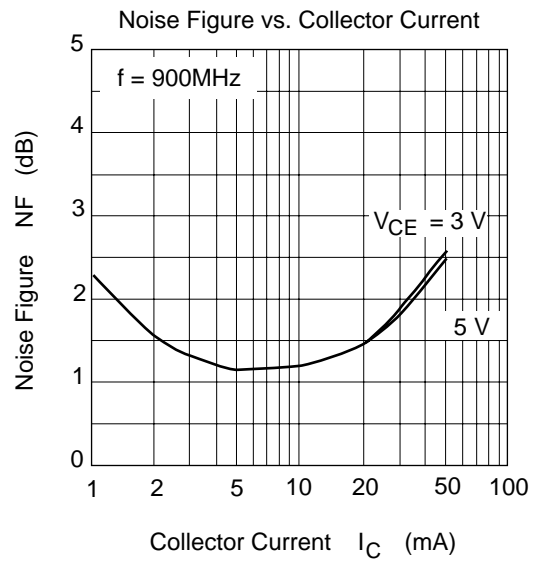
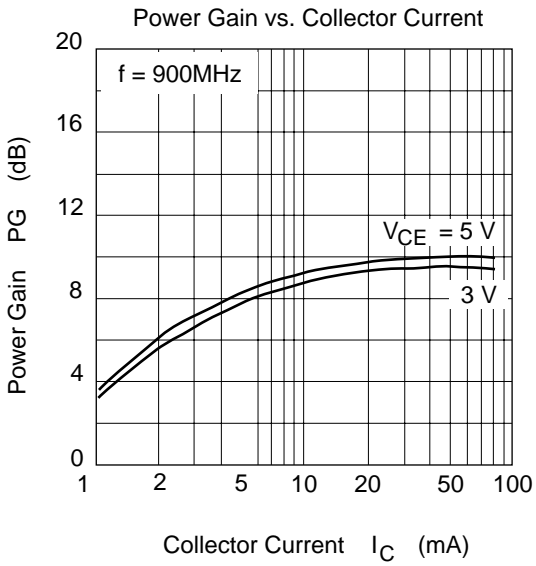
\* When using alumina ceramic board (12.5 x 20 x 0.7 mm)

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

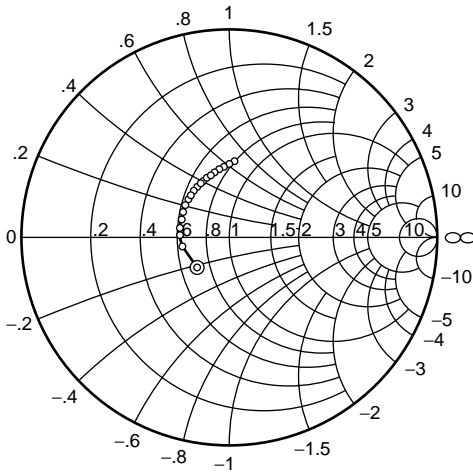
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	15	—	—	V	$I_{\text{C}} = 10 \mu\text{A}$ , $I_{\text{E}} = 0$
Collector cutoff current	$I_{\text{CBO}}$	—	—	1	$\mu\text{A}$	$V_{\text{CB}} = 12 \text{ V}$ , $I_{\text{E}} = 0$
Collector cutoff current	$I_{\text{CEO}}$	—	—	1	mA	$V_{\text{CE}} = 6 \text{ V}$ , $R_{\text{BE}} = \infty$
Emitter cutoff current	$I_{\text{EBO}}$	—	—	10	$\mu\text{A}$	$V_{\text{EB}} = 1.5 \text{ V}$ , $I_{\text{C}} = 0$
DC current transfer ratio	$h_{\text{FE}}$	80	120	160	V	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 50 \text{ mA}$
Collector output capacitance	$C_{\text{ob}}$	—	1.6	2.2	pF	$V_{\text{CB}} = 5 \text{ V}$ , $I_{\text{E}} = 0$ $f = 1 \text{ MHz}$
Gain bandwidth product	$f_{\text{T}}$	8	11	—	GHz	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 50 \text{ mA}$ $f = 1 \text{ GHz}$
Power gain	PG	7	10	—	dB	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 50 \text{ mA}$ $f = 900 \text{ MHz}$
Noise figure	NF	—	1.2	1.9	dB	$V_{\text{CE}} = 5 \text{ V}$ , $I_{\text{C}} = 5 \text{ mA}$ $f = 900 \text{ MHz}$

Main Characteristics





S11 Parameter vs. Frequency

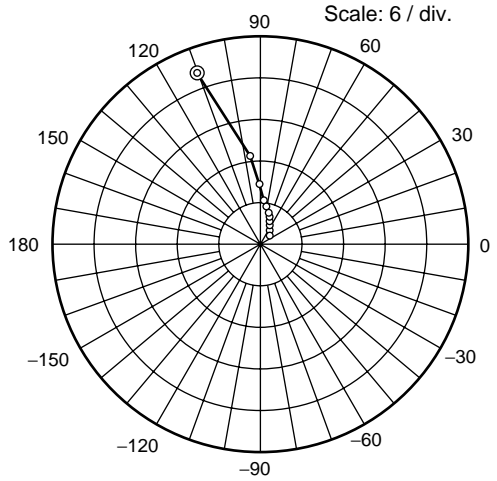


Condition :  $V_{CE} = 3\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)



S21 Parameter vs. Frequency

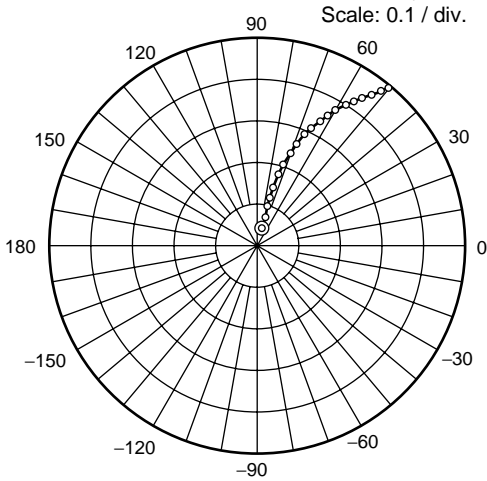


Condition :  $V_{CE} = 3\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)



S12 Parameter vs. Frequency

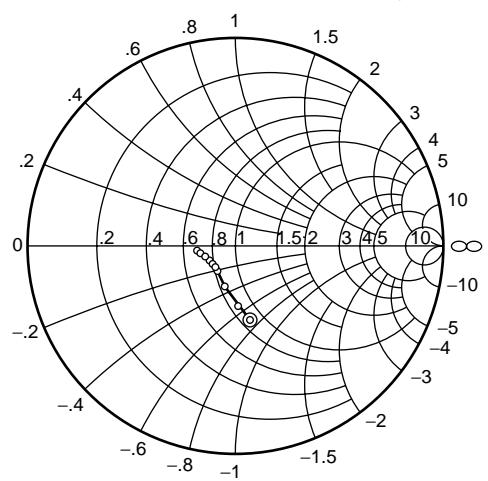


Condition :  $V_{CE} = 3\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)



S22 Parameter vs. Frequency

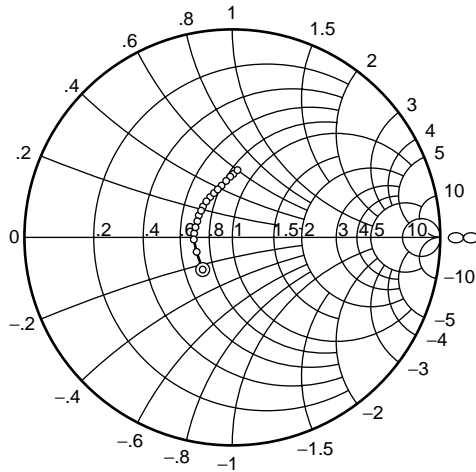


Condition :  $V_{CE} = 3\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)



S11 Parameter vs. Frequency

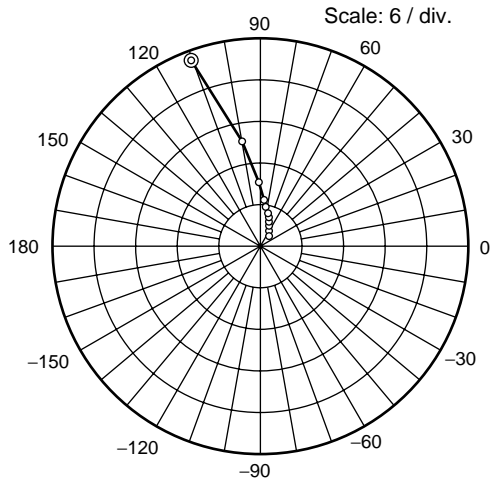


Condition :  $V_{CE} = 5\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

S21 Parameter vs. Frequency

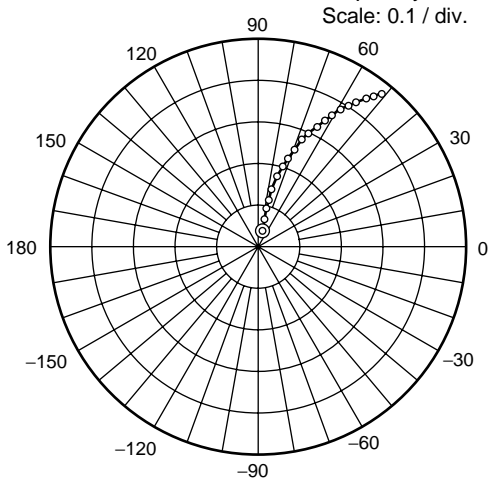


Condition :  $V_{CE} = 5\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

S12 Parameter vs. Frequency

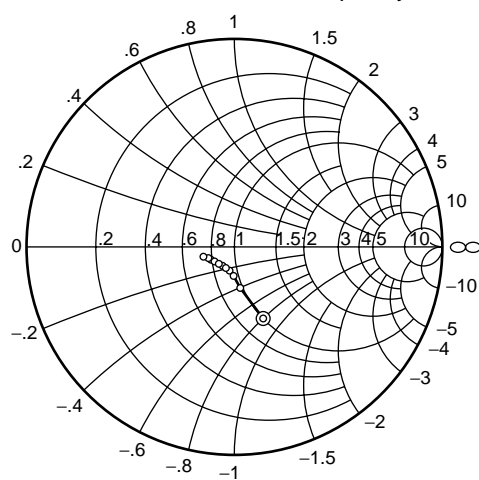


Condition :  $V_{CE} = 5\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

S22 Parameter vs. Frequency



Condition :  $V_{CE} = 5\text{ V}$  ,  $I_C = 50\text{ mA}$

100 to 2000 MHz (100 MHz step)

⊙—○

Sparameter (  $V_{CE} = 3V, I_C = 50 \text{ mA}, Z_o = 50 \Omega$  )

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.234	-135.7	26.57	109.9	0.0299	75.5	0.353	-77.7
200	0.233	-165.2	13.47	96.1	0.0575	78.0	0.199	-99.6
300	0.234	179.3	8.92	89.7	0.0863	77.8	0.153	-112.5
400	0.238	170.1	6.70	84.9	0.114	76.9	0.135	-121.8
500	0.242	161.2	5.37	81.2	0.142	75.4	0.127	-128.3
600	0.249	153.9	4.52	77.8	0.169	73.9	0.124	-133.5
700	0.250	145.9	3.89	74.5	0.196	72.2	0.125	-138.0
800	0.259	140.4	3.43	71.4	0.223	70.4	0.126	-141.3
900	0.267	134.2	3.08	68.6	0.249	68.4	0.128	-145.0
1000	0.274	128.0	2.80	65.8	0.275	66.9	0.131	-147.7
1100	0.282	123.5	2.58	63.2	0.299	65.0	0.136	-150.3
1200	0.290	119.2	2.40	60.3	0.323	63.2	0.140	-153.0
1300	0.297	114.2	2.25	57.9	0.346	61.3	0.144	-155.6
1400	0.307	109.6	2.12	55.9	0.367	59.7	0.149	-158.1
1500	0.318	105.3	2.01	53.4	0.389	57.8	0.153	-160.5
1600	0.324	101.7	1.92	51.3	0.409	56.2	0.159	-162.7
1700	0.334	97.7	1.83	48.6	0.430	54.4	0.163	-165.1
1800	0.345	93.9	1.77	46.8	0.448	52.8	0.170	-167.9
1900	0.357	91.6	1.72	44.6	0.468	50.9	0.174	-170.2
2000	0.366	87.9	1.65	42.6	0.485	49.5	0.180	-172.6

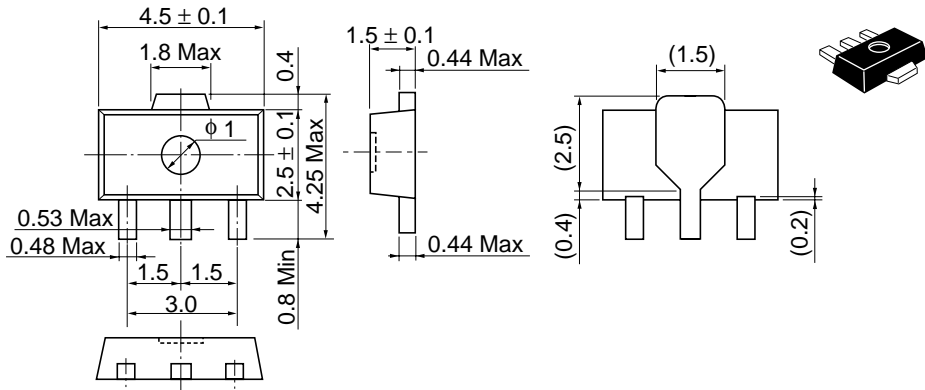
**Sparameter** (  $V_{CE} = 5V, I_C = 50 \text{ mA}, Z_o = 50 \Omega$  )

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.205	-123.9	28.04	110.8	0.0284	74.9	0.360	-69.1
200	0.193	-159.6	14.24	96.9	0.0547	78.2	0.197	-84.5
300	0.190	-177.1	9.44	90.2	0.0820	78.3	0.145	-92.5
400	0.193	169.9	7.09	85.3	0.109	77.5	0.123	-99.0
500	0.201	162.0	5.68	81.8	0.135	76.3	0.112	-104.1
600	0.206	153.7	4.76	78.4	0.162	74.6	0.107	-109.5
700	0.206	145.4	4.11	75.1	0.188	72.9	0.105	-113.7
800	0.221	139.0	3.62	72.2	0.213	71.3	0.105	-117.6
900	0.224	132.6	3.25	69.4	0.238	69.4	0.106	-121.8
1000	0.234	126.8	2.94	66.6	0.262	67.8	0.110	-125.4
1100	0.243	120.8	2.72	64.0	0.286	66.0	0.113	-128.7
1200	0.249	116.8	2.53	61.3	0.309	64.3	0.117	-132.0
1300	0.261	111.3	2.36	59.0	0.331	62.5	0.120	-135.5
1400	0.270	107.4	2.23	56.9	0.353	60.9	0.125	-138.7
1500	0.280	103.5	2.10	54.5	0.373	59.1	0.129	-142.0
1600	0.285	99.1	2.01	52.1	0.393	57.6	0.135	-144.9
1700	0.298	95.4	1.92	50.3	0.414	56.0	0.139	-148.1
1800	0.312	91.8	1.84	47.6	0.431	54.3	0.145	-151.3
1900	0.321	87.9	1.79	45.7	0.450	52.5	0.148	-154.5
2000	0.330	85.6	1.71	43.8	0.467	51.4	0.155	-157.5



Package Dimensions

As of January, 2001  
Unit: mm



Hitachi Code	UPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.050 g

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Colophon 2.0

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