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# 2SC5246

Silicon NPN Epitaxial

# HITACHI

ADE-208-264  
1st. Edition

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## Application

VHF / UHF wide band amplifier

## Features

- High gain bandwidth product  
 $f_T = 12 \text{ GHz typ}$
- High gain, low noise figure  
 $PG = 16.5 \text{ dB typ, NF} = 1.6 \text{ dB typ at } f = 900 \text{ MHz}$

## Outline

SMPAK



1. Emitter
2. Base
3. Collector

## 2SC5246

### Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rated	Unit
Collector to base voltage	$V_{CBO}$	15	V
Collector to emitter voltage	$V_{CEO}$	8	V
Emitter to base voltage	$V_{EBO}$	1.5	V
Collector current	$I_C$	20	mA
Collector power dissipation	$P_C$	80	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to +150	°C

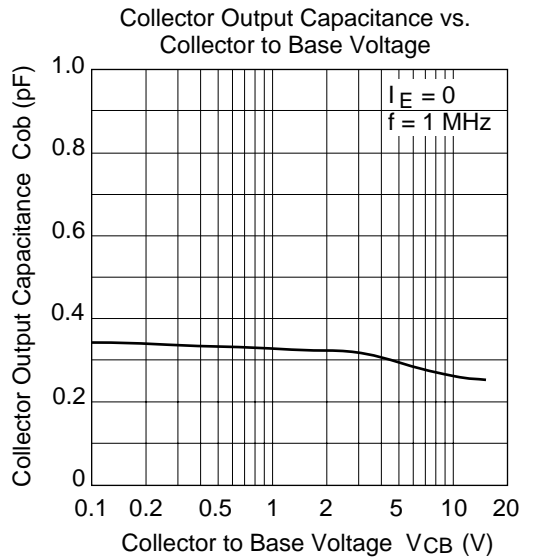
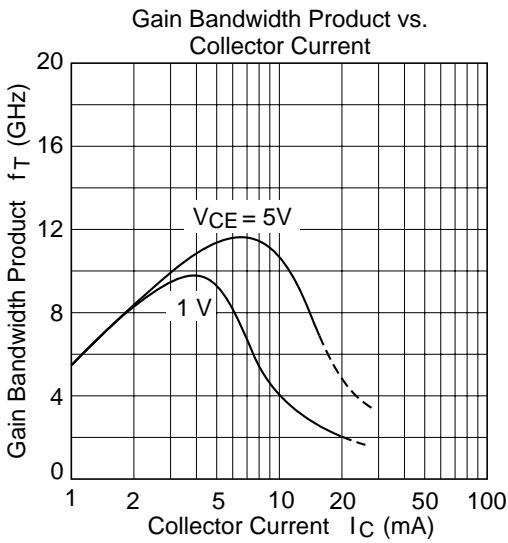
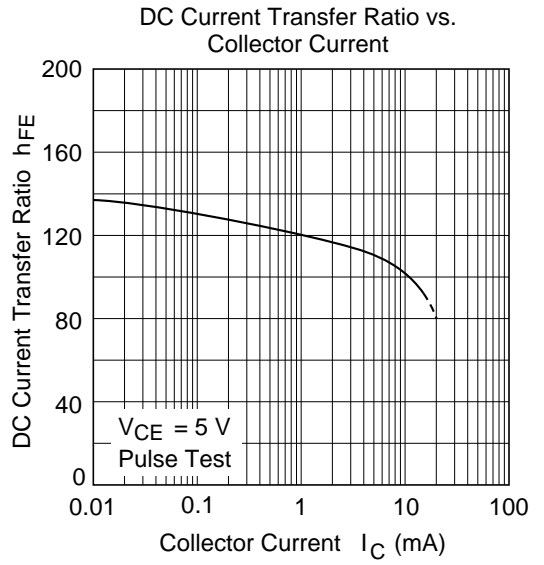
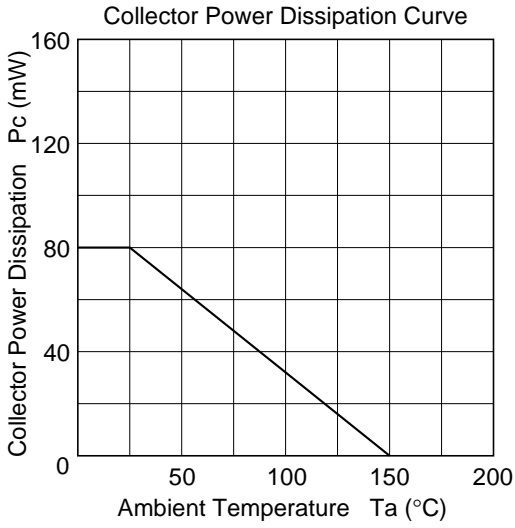
Note: Marking is "ZC-".

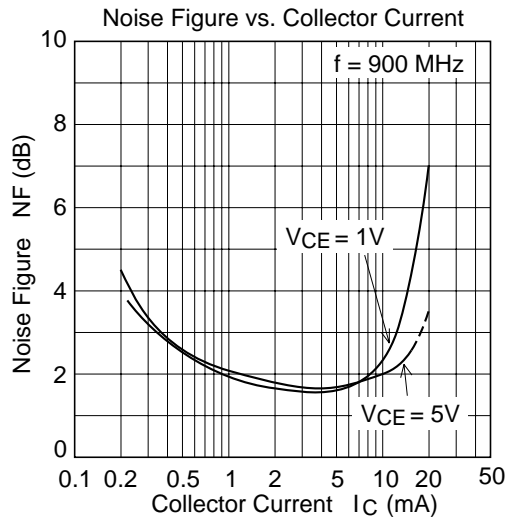
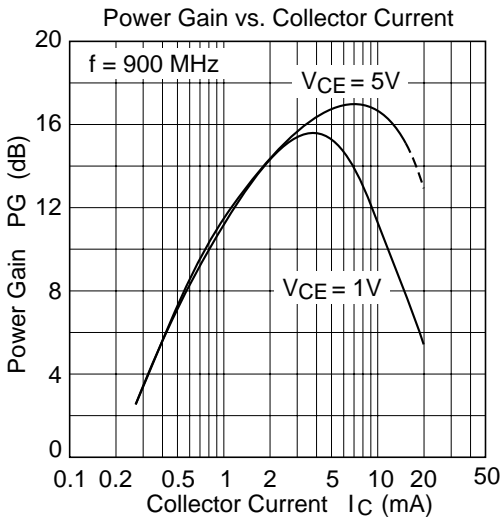
Attention: This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

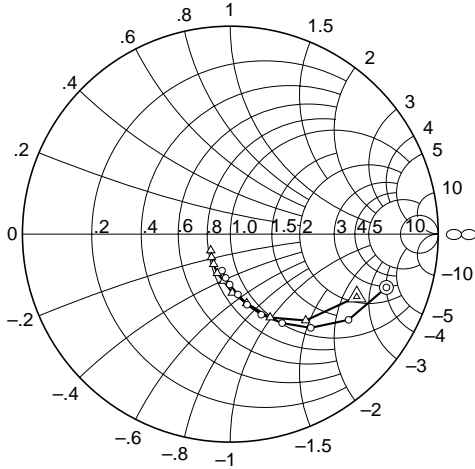
### Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	$I_{CBO}$	—	—	10	$\mu$ A	$V_{CB} = 15$ V, $I_E = 0$
	$I_{CEO}$	—	—	1	mA	$V_{CE} = 8$ V, $R_{BE} = \infty$
Emitter cutoff current	$I_{EBO}$	—	—	10	$\mu$ A	$V_{EB} = 1.5$ V, $I_C = 0$
DC current transfer ratio	$h_{FE}$	50	100	160		$V_{CE} = 5$ V, $I_C = 10$ mA
Collector output capacitance	$C_{ob}$	—	0.3	0.8	pF	$V_{CB} = 5$ V, $I_E = 0$ , $f = 1$ MHz
Gain bandwidth product	$f_T$	9	12	—	GHz	$V_{CE} = 5$ V, $I_C = 5$ mA
Power gain	PG	14	16.5	—	dB	$V_{CE} = 5$ V, $I_C = 10$ mA, $f = 900$ MHz
Noise figure	NF	—	1.6	2.5	dB	$V_{CE} = 5$ V, $I_C = 5$ mA, $f = 900$ MHz



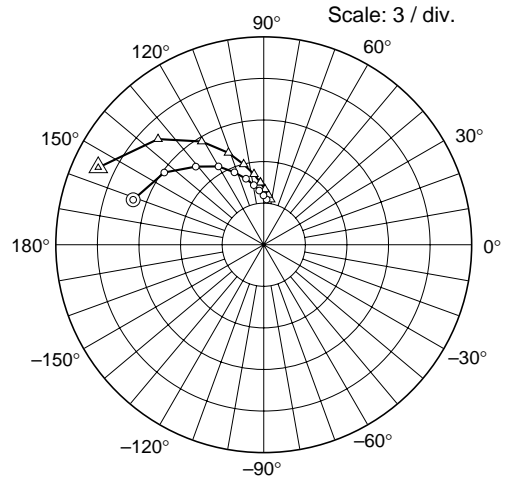


S11 Parameter vs. Frequency



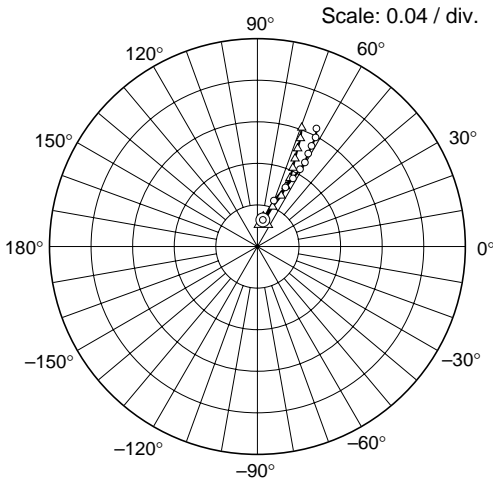
Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $I_C = 5\text{ mA}$ )  
 △ — △ ( $I_C = 10\text{ mA}$ )

S21 Parameter vs. Frequency



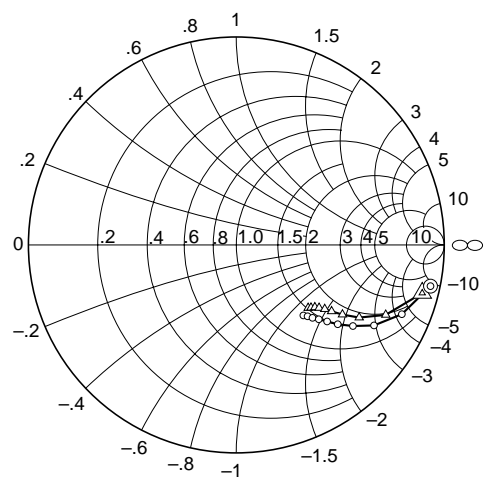
Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $I_C = 5\text{ mA}$ )  
 △ — △ ( $I_C = 10\text{ mA}$ )

S12 Parameter vs. Frequency



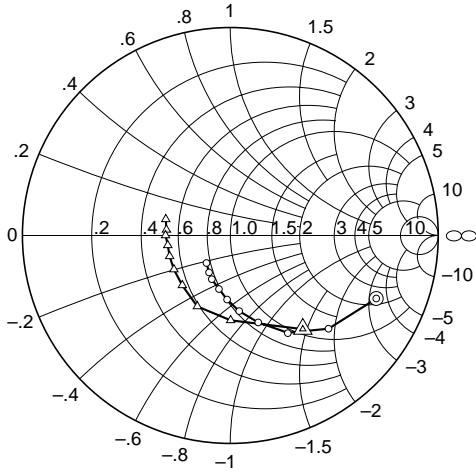
Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $I_C = 5\text{ mA}$ )  
 △ — △ ( $I_C = 10\text{ mA}$ )

S22 Parameter vs. Frequency



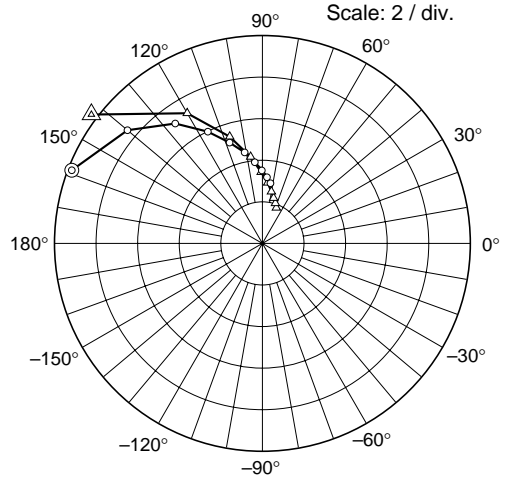
Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ — ○ ( $I_C = 5\text{ mA}$ )  
 △ — △ ( $I_C = 10\text{ mA}$ )

S11 Parameter vs. Frequency



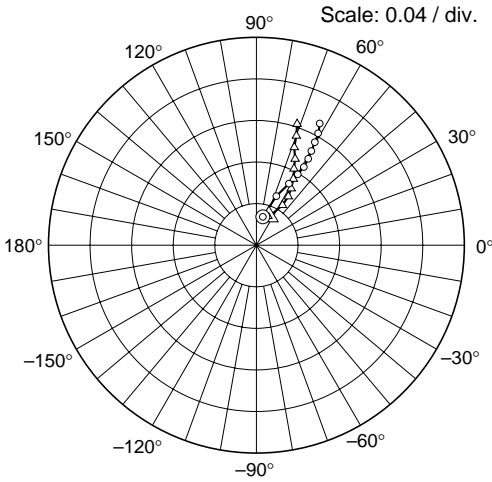
Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ (I<sub>C</sub> = 5 mA)  
 △ (I<sub>C</sub> = 10 mA)

S21 Parameter vs. Frequency



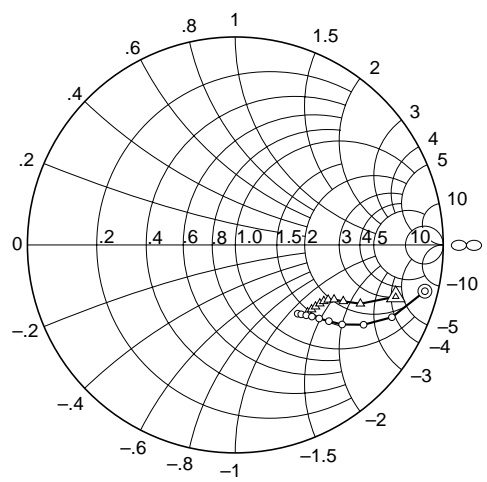
Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ (I<sub>C</sub> = 5 mA)  
 △ (I<sub>C</sub> = 10 mA)

S12 Parameter vs. Frequency



Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ (I<sub>C</sub> = 5 mA)  
 △ (I<sub>C</sub> = 10 mA)

S22 Parameter vs. Frequency



Condition:  $V_{CE} = 1\text{ V}$ ,  $Z_o = 50\ \Omega$   
 200 to 2000 MHz (200 MHz step)  
 ○ (I<sub>C</sub> = 5 mA)  
 △ (I<sub>C</sub> = 10 mA)

**S Parameter** ( $V_{CE} = 5 \text{ V}$ ,  $I_C = 5 \text{ mA}$ ,  $Z_O = 50 \Omega$ )

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.793	-18.9	9.98	161	0.026	78.6	0.955	-12.0
400	0.702	-36.0	8.88	144	0.047	70.2	0.864	-22.7
600	0.594	-49.4	7.63	131	0.063	64.6	0.768	-30.3
800	0.495	-59.9	6.54	120	0.074	62.4	0.684	-34.8
1000	0.415	-69.1	5.65	112	0.085	61.1	0.620	-38.0
1200	0.349	-76.8	4.94	105	0.093	60.5	0.572	-40.1
1400	0.293	-83.0	4.37	99.4	0.102	61.3	0.535	-42.0
1600	0.241	-90.2	3.93	94.7	0.110	61.7	0.508	-43.7
1800	0.214	-93.9	3.57	90.2	0.119	61.9	0.486	-45.0
2000	0.181	-103	3.28	89.3	0.127	63.4	0.469	-46.4

**S Parameter** ( $V_{CE} = 5 \text{ V}$ ,  $I_C = 10 \text{ mA}$ ,  $Z_O = 50 \Omega$ )

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.679	-26.4	13.2	155	0.024	76.2	0.924	-14.6
400	0.552	-48.9	10.8	135	0.041	69.0	0.794	-25.1
600	0.445	-64.5	8.71	121	0.054	64.8	0.687	-30.6
800	0.342	-76.7	7.12	111	0.064	64.5	0.611	-33.3
1000	0.283	-88.1	5.99	104	0.073	64.5	0.559	-34.9
1200	0.228	-98.3	5.15	97.8	0.083	65.7	0.526	-36.0
1400	0.191	-105	4.50	93.0	0.092	66.8	0.501	-37.3
1600	0.166	-119	4.01	88.6	0.102	67.9	0.483	-38.5
1800	0.136	-124	3.62	84.6	0.112	68.3	0.470	-40.1
2000	0.123	-140	3.31	81.1	0.122	69.5	0.460	-41.3

**S Parameter** ( $V_{CE} = 1 \text{ V}$ ,  $I_C = 5 \text{ mA}$ ,  $Z_O = 50 \Omega$ )

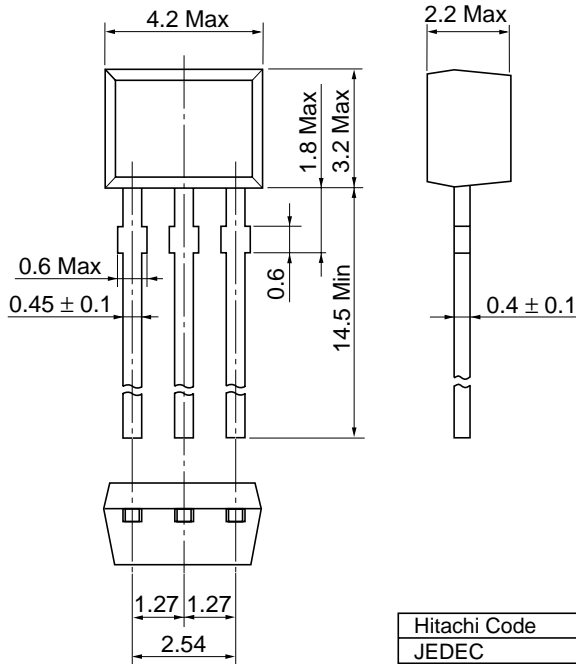
Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.764	-23.4	9.82	159	0.028	77.1	0.938	-13.7
400	0.651	-43.6	8.47	140	0.051	67.8	0.830	-24.8
600	0.545	-59.5	7.13	126	0.067	62.1	0.727	-31.9
800	0.439	-72.2	5.98	116	0.079	59.7	0.641	-36.7
1000	0.366	-83.3	5.10	108	0.088	58.7	0.581	-39.2
1200	0.308	-92.9	4.46	101	0.097	59.0	0.537	-41.3
1400	0.263	-102	3.92	95.3	0.105	59.7	0.505	-43.1
1600	0.228	-113	3.51	90.4	0.114	60.4	0.481	-44.8
1800	0.205	-120	3.19	86.0	0.123	61.1	0.461	-46.5
2000	0.175	-131	2.92	82.3	0.132	62.5	0.447	-47.8

**S Parameter** ( $V_{CE} = 1 \text{ V}$ ,  $I_C = 10 \text{ mA}$ ,  $Z_O = 50 \Omega$ )

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.570	-52.3	10.3	143	0.030	66.1	0.811	-17.9
400	0.443	-89.8	7.23	120	0.046	56.8	0.665	-25.2
600	0.376	-115	5.37	107	0.056	56.7	0.586	-27.6
800	0.333	-134	4.20	97.7	0.064	58.4	0.534	-29.0
1000	0.317	-149	3.43	91.0	0.073	60.8	0.519	-30.6
1200	0.309	-161	2.93	85.0	0.082	63.8	0.505	-32.5
1400	0.305	-171	2.53	80.1	0.091	65.8	0.495	-34.8
1600	0.312	-180	2.25	76.1	0.101	68.1	0.487	-37.6
1800	0.309	175	2.03	72.0	0.112	69.9	0.481	-40.3
2000	0.320	166	1.84	68.6	0.123	71.4	0.476	-43.1



Unit: mm



Hitachi Code	SPAK
JEDEC	—
EIAJ	—
Weight (reference value)	0.10 g

## Cautions

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