
2SC5246

Silicon NPN Epitaxial

HITACHI

ADE-208-264
1st. Edition

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

Absolute Maximum Ratings (Ta = 25°C)

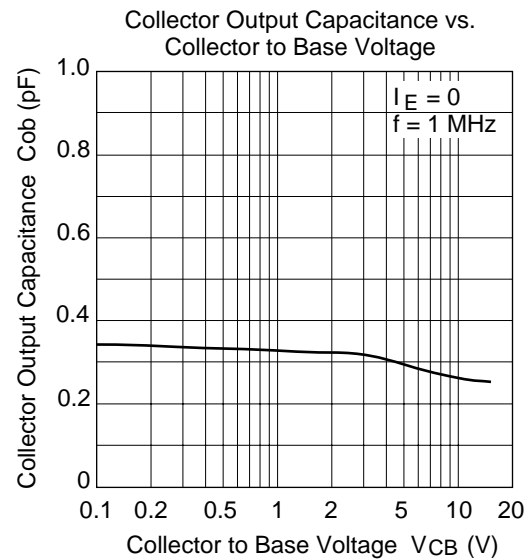
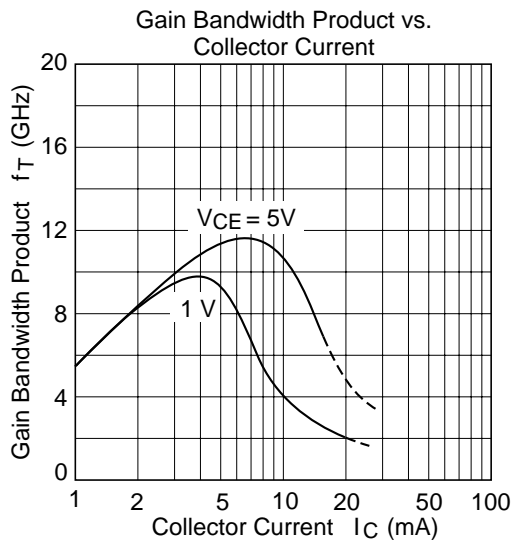
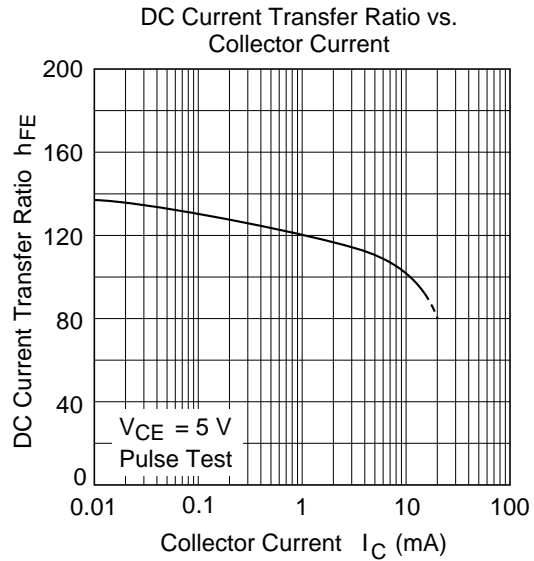
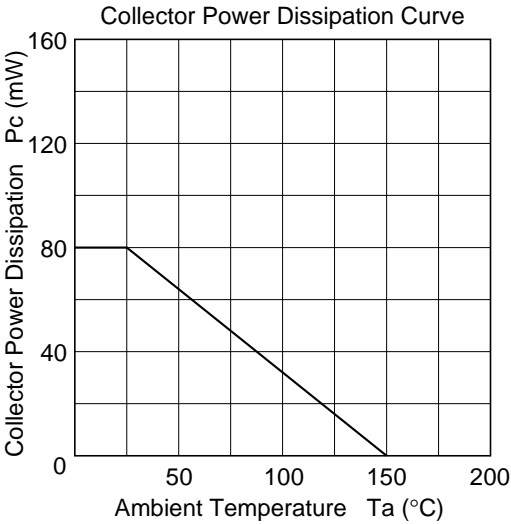
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	8	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	80	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

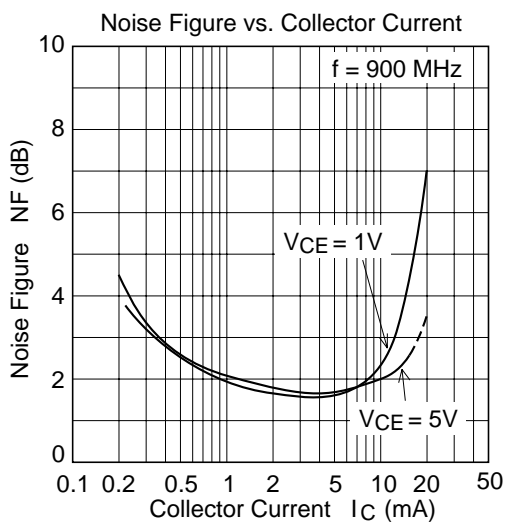
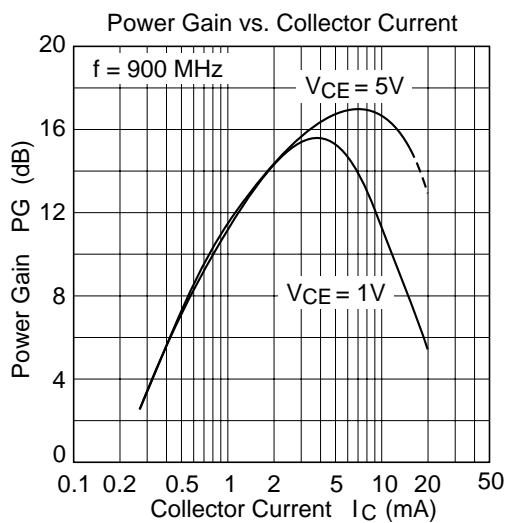
Note: Marking is “ZC-”.

Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.

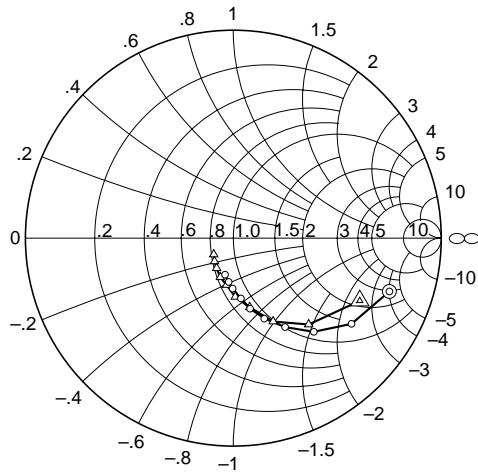
Electrical Characteristics (Ta = 25°C)

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



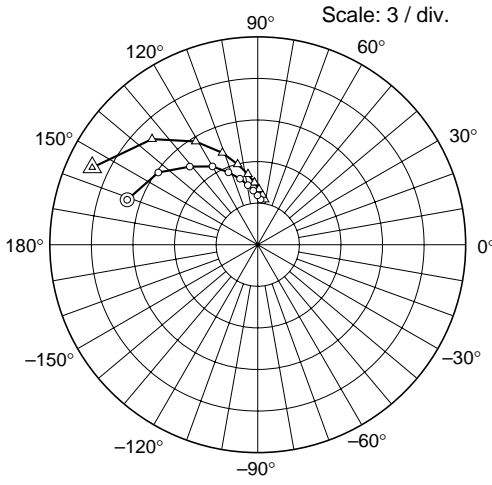


S11 Parameter vs. Frequency



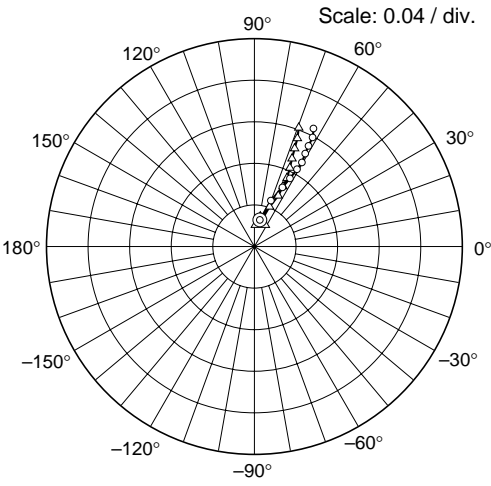
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S21 Parameter vs. Frequency



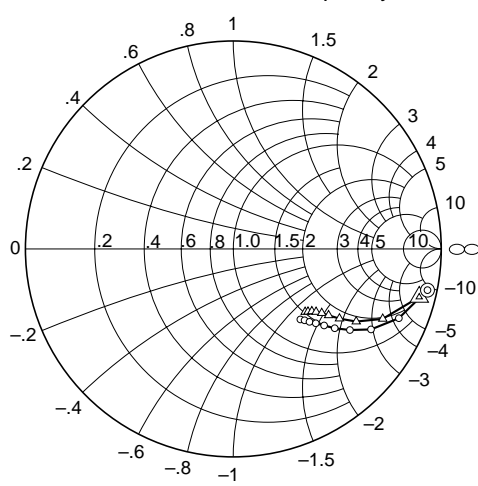
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S12 Parameter vs. Frequency



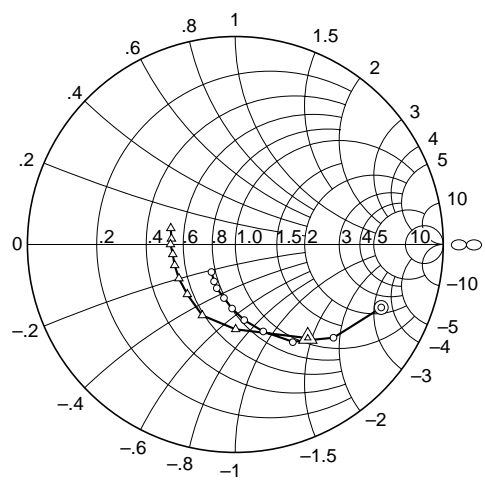
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S22 Parameter vs. Frequency



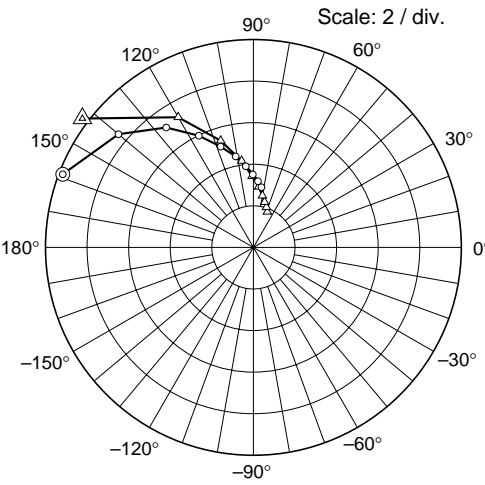
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 10\text{ mA}$)

S11 Parameter vs. Frequency



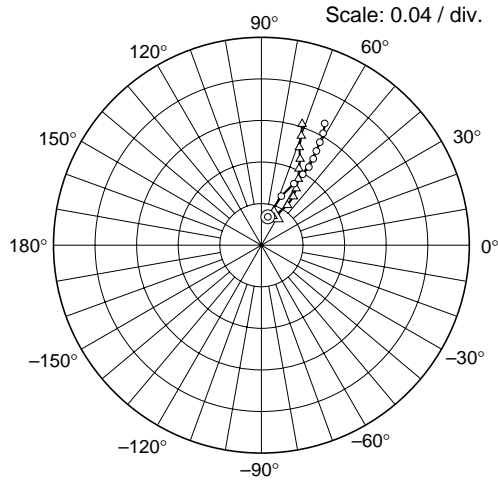
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ ($I_C = 5\text{ mA}$)
△ ($I_C = 10\text{ mA}$)

S21 Parameter vs. Frequency



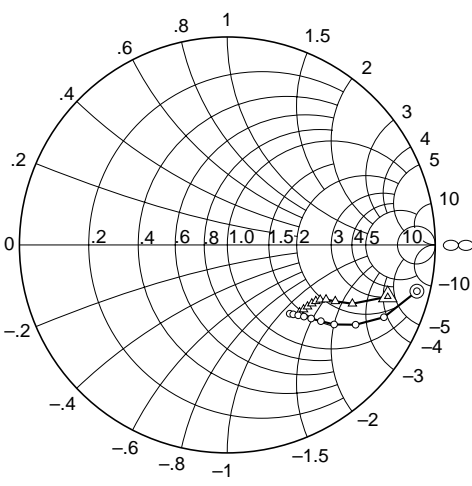
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ ($I_C = 5\text{ mA}$)
△ ($I_C = 10\text{ mA}$)

S12 Parameter vs. Frequency



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

S22 Parameter vs. Frequency



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

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

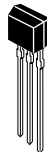
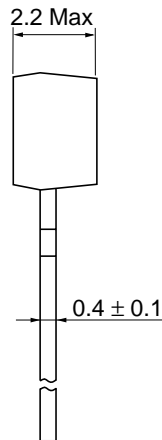
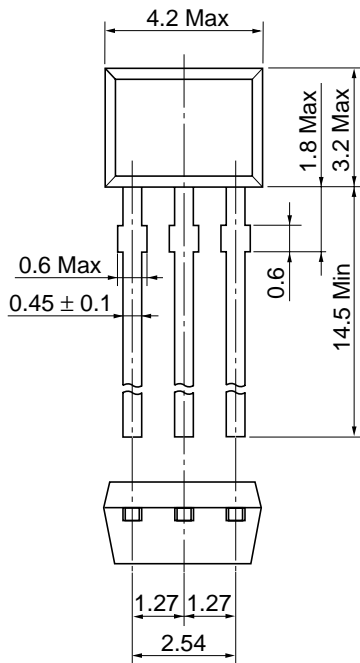
S Parameter (V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω)

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 V, I_C = 10 mA, Z_O = 50 Ω)

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

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