

## 2SC5594

Silicon NPN Epitaxial  
High Frequency Low Noise Amplifier

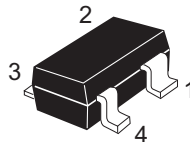
REJ03G0749-0200  
(Previous ADE-208-798)  
Rev.2.00  
Aug.10.2005

### Features

- High gain bandwidth product  
 $f_T = 24 \text{ GHz typ.}$
- High power gain and low noise figure ;  
 $PG = 18 \text{ dB typ. , } NF = 1.2 \text{ dB typ. at } f = 1.8 \text{ GHz}$

### Outline

RENESAS Package code: PTSP0004ZA-A  
(Package name: CMPAK-4)



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

Note: Marking is "XP-".

### Absolute Maximum Ratings

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

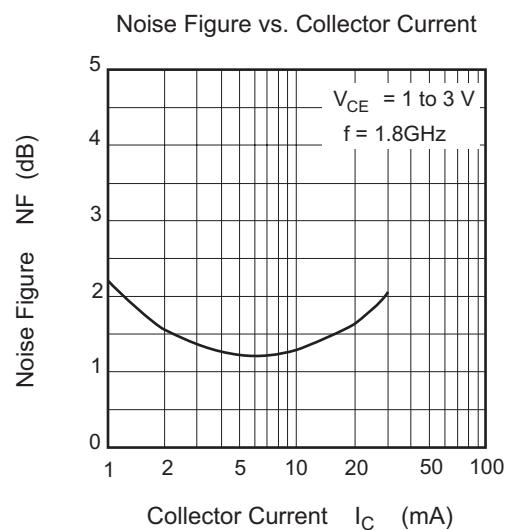
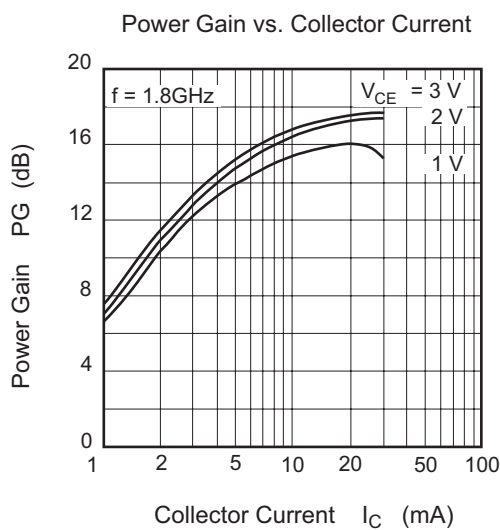
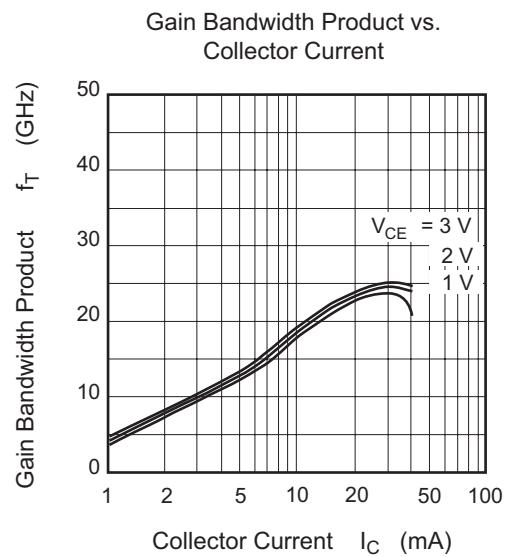
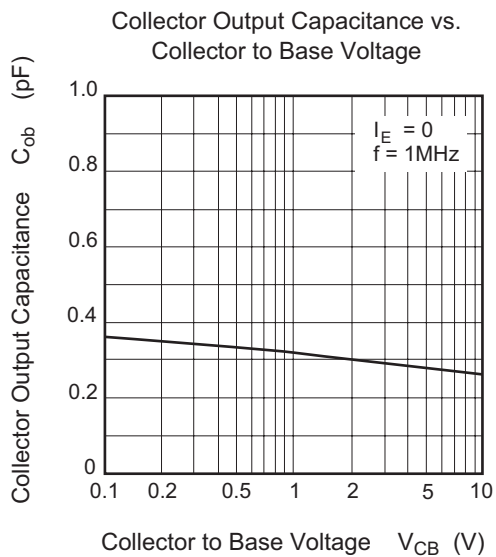
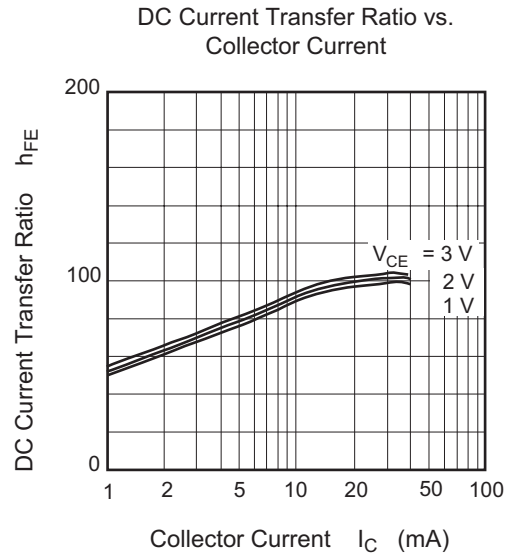
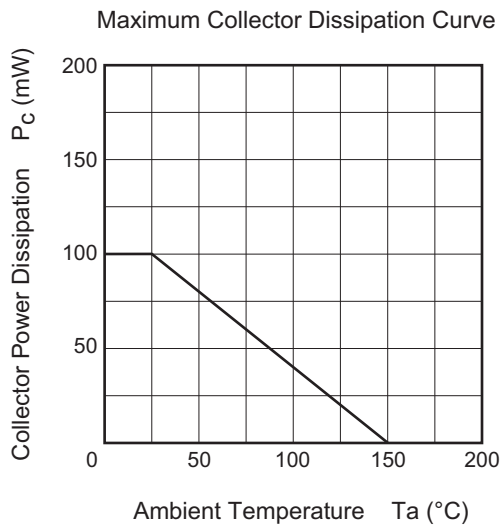
Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	12	V
Collector to emitter voltage	$V_{CEO}$	4.5	V
Emitter to base voltage	$V_{EBO}$	0.8	V
Collector current	$I_C$	35	mA
Collector power dissipation	$P_C$	100	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

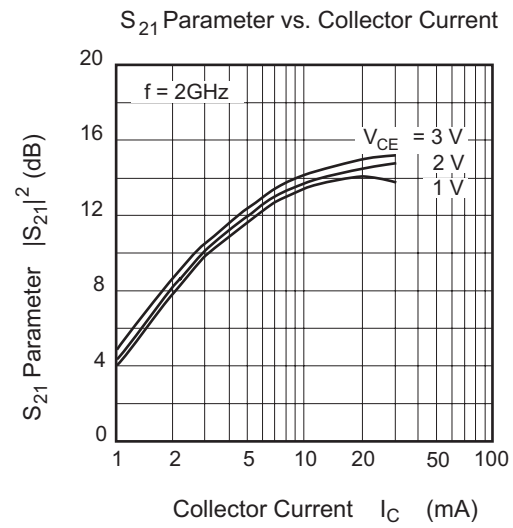
## Electrical Characteristics

(Ta = 25°C)

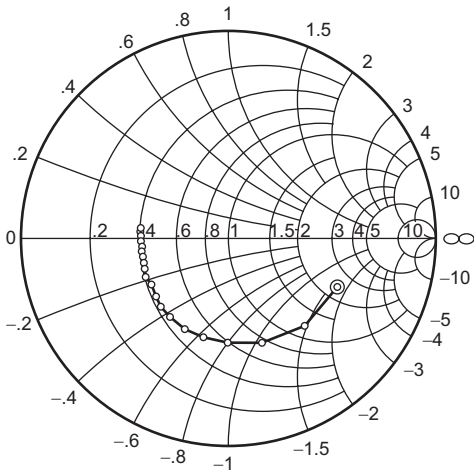
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	12	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	$I_{CBO}$	—	—	1	$\mu A$	$V_{CB} = 10 V, I_E = 0$
Collector cutoff current	$I_{CEO}$	—	—	1	$\mu A$	$V_{CE} = 4 V, R_{BE} = \infty$
Emitter cutoff current	$I_{EBO}$	—	—	12	$\mu A$	$V_{EB} = 0.8 V, I_C = 0$
DC current transfer ratio	$h_{FE}$	60	100	140		$V_{CE} = 2 V, I_C = 20 mA$
Collector output capacitance	Cob	—	0.3	0.6	pF	$V_{CB} = 2 V, I_E = 0$ $f = 1 MHz$
Gain bandwidth product	$f_T$	21	24	—	GHz	$V_{CE} = 2 V, I_C = 30 mA$ $f = 2 GHz$
Power gain	PG	14	18	—	dB	$V_{CE} = 2 V, I_C = 30 mA$ $f = 1.8 GHz$
Noise figure	NF	—	1.2	1.6	dB	$V_{CE} = 2 V, I_C = 5 mA$ $f = 1.8 GHz$

Main Characteristics



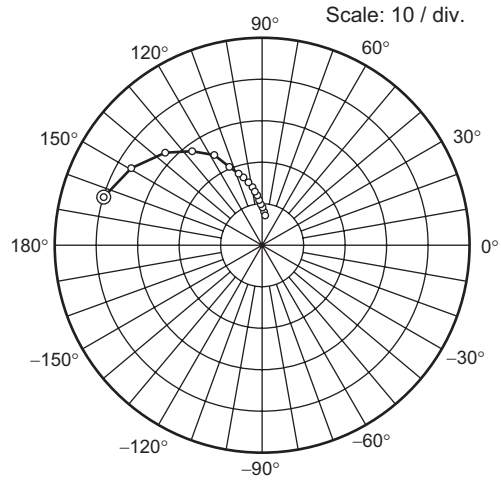


S11 Parameter vs. Frequency



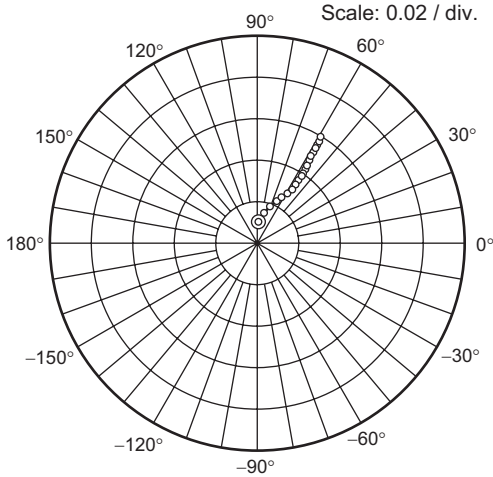
Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 20\text{ mA}$   
 100 to 2000 MHz (100 MHz step)  
 ⊙—○

S21 Parameter vs. Frequency



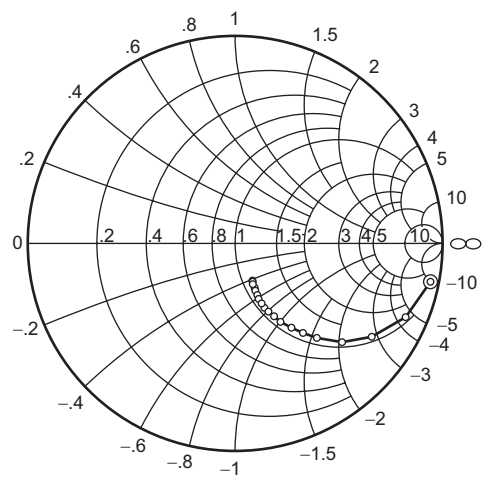
Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 20\text{ mA}$   
 100 to 2000 MHz (100 MHz step)  
 ⊙—○

S12 Parameter vs. Frequency



Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 20\text{ mA}$   
 100 to 2000 MHz (100 MHz step)  
 ⊙—○

S22 Parameter vs. Frequency



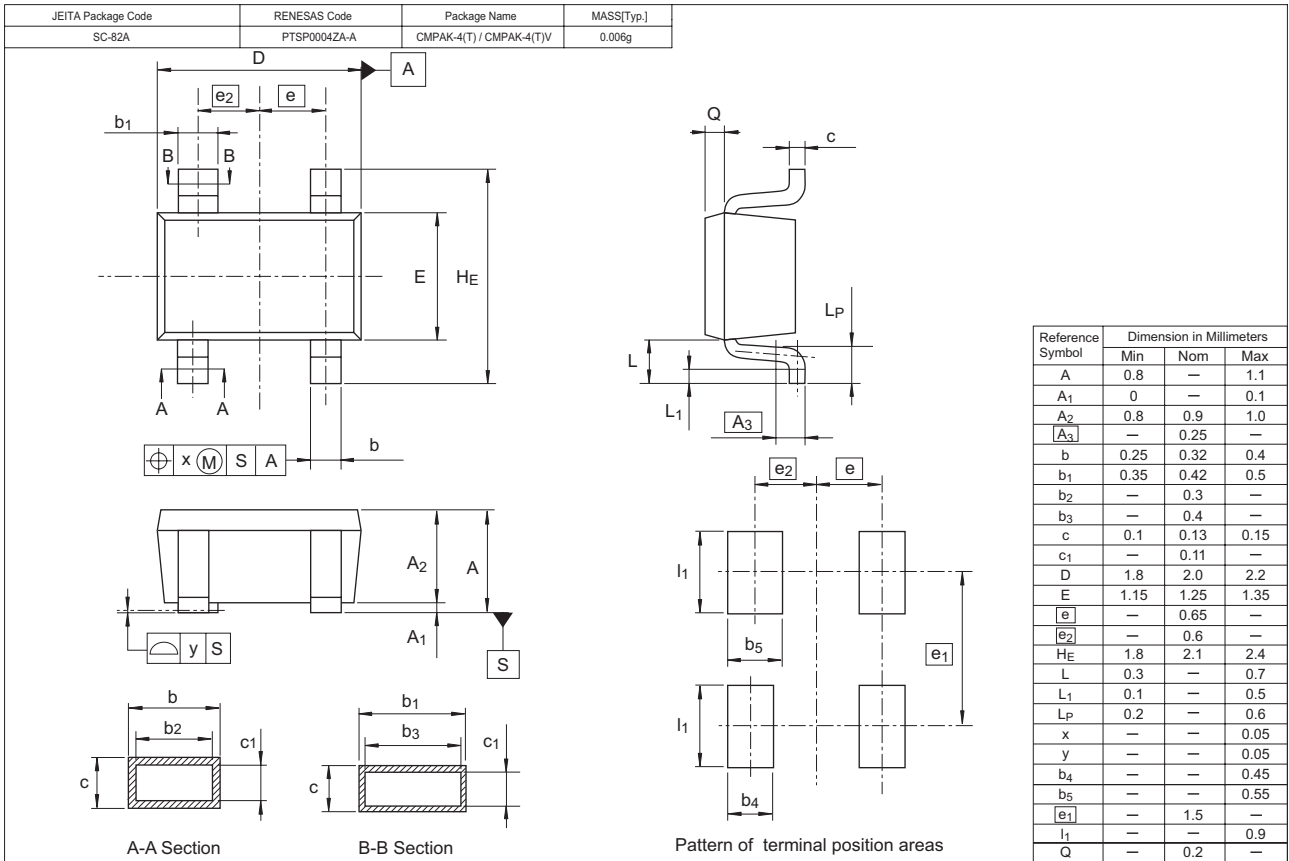
Condition ;  $V_{CE} = 2\text{ V}$  ,  $I_C = 20\text{ mA}$   
 100 to 2000 MHz (100 MHz step)  
 ⊙—○

## Sparameter

(V<sub>CE</sub> = 2 V, I<sub>C</sub> = 20 mA, Z<sub>o</sub> = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.577	-24.5	40.31	164.2	0.00674	82.9	0.963	-11.5
200	0.560	-49.8	36.64	149.3	0.0130	74.5	0.897	-23.7
300	0.541	-72.2	32.05	136.3	0.0182	68.8	0.803	-34.4
400	0.504	-90.2	27.56	126.5	0.0225	63.6	0.708	-42.4
500	0.495	-104.5	23.84	118.8	0.0256	61.3	0.622	-48.4
600	0.477	-116.9	20.64	113.1	0.0285	58.9	0.548	-53.1
700	0.458	-126.4	18.11	108.4	0.0311	57.7	0.487	-56.2
800	0.456	-134.5	16.13	105.1	0.0336	57.3	0.437	-58.7
900	0.448	-142.5	14.46	101.6	0.0355	57.8	0.394	-60.4
1000	0.435	-147.9	13.15	99.2	0.0382	56.8	0.360	-61.9
1100	0.438	-153.6	12.01	96.6	0.0399	57.4	0.331	-63.0
1200	0.430	-158.5	11.06	94.4	0.0422	57.0	0.306	-63.3
1300	0.425	-162.6	10.24	93.0	0.0443	58.1	0.288	-63.5
1400	0.426	-166.9	9.56	91.1	0.0462	58.3	0.269	-64.0
1500	0.424	-171.1	8.99	89.6	0.0488	58.3	0.253	-64.1
1600	0.425	-174.1	8.45	88.0	0.0508	58.5	0.241	-64.1
1700	0.428	-177.4	7.98	86.6	0.0527	58.8	0.230	-64.0
1800	0.424	179.7	7.59	85.0	0.0556	58.8	0.220	-64.0
1900	0.426	176.6	7.19	83.8	0.0578	59.0	0.212	-63.9
2000	0.428	174.7	6.84	82.4	0.0595	58.8	0.204	-63.7

### Package Dimensions



### Ordering Information

Part Name	Quantity	Shipping Container
2SC5594XP-TL-E	3000	φ 178 mm Reel, 8 mm Emboss Taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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