

**2SC5276**

## UHF to S Band Low-Noise Amplifier, OSC Applications

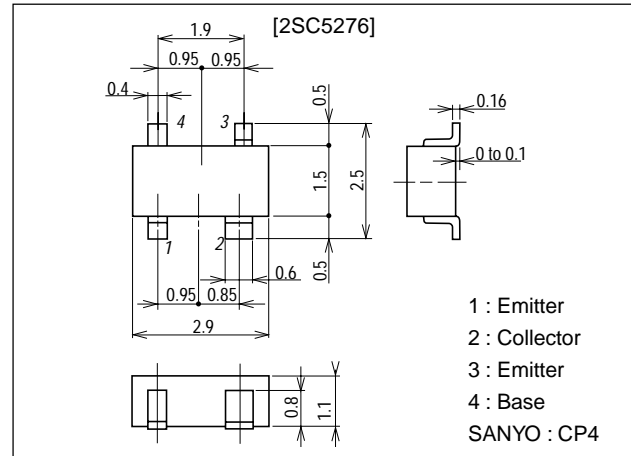
### Features

- Low noise : NF=0.9dB typ (f=1GHz).  
: NF=1.4dB typ (f=1.5GHz).
- High gain :  $|S_{21e}|^2=11\text{dB}$  typ (f=1.5GHz).
- High cutoff frequency :  $f_T=11\text{GHz}$  typ.
- Low-voltage, low-current operation  
( $V_{CE}=1\text{V}$ ,  $I_C=1\text{mA}$ )  
:  $f_T=7\text{GHz}$  type.  
:  $|S_{21e}|^2=6\text{dB}$  typ (f=1.5GHz).

### Package Dimensions

unit:mm

2110A



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CBO}$		20	V
Collector-to-Emitter Voltage	$V_{CEO}$		10	V
Emitter-to-Base Voltage	$V_{EBO}$		1.5	V
Collector Current	$I_C$		30	mA
Collector Dissipation	$P_C$		200	mW
Junction Temperature	$T_J$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=10\text{V}$ , $I_E=0$			1.0	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=1\text{V}$ , $I_C=0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}$ , $I_C=10\text{mA}$	60*		270*	
Gain-Bandwidth Product	$f_{T1}$	$V_{CE}=5\text{V}$ , $I_C=10\text{mA}$	8	11		GHz
	$f_{T2}$	$V_{CE}=1\text{V}$ , $I_C=1\text{mA}$		7		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		0.45	0.7	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		0.25		pF

\* : The 2SC5276 is classified by 10mA  $h_{FE}$  as follows :

60	3	120	90	4	180	135	5	270
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Marking : MN

 $h_{FE}$  rank : 3, 4, 5

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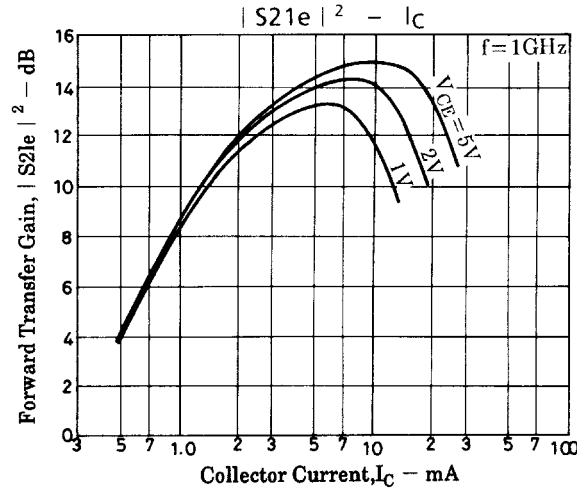
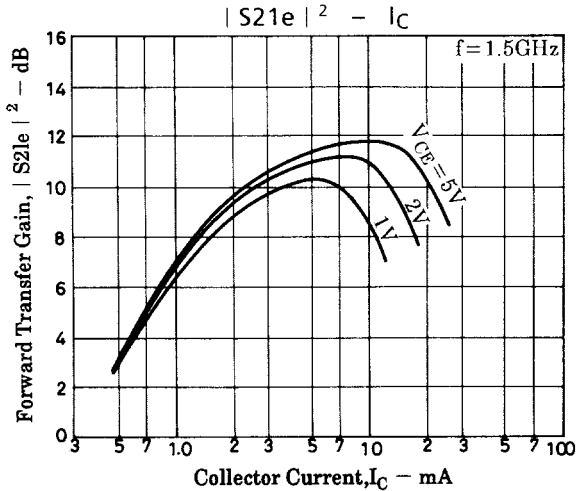
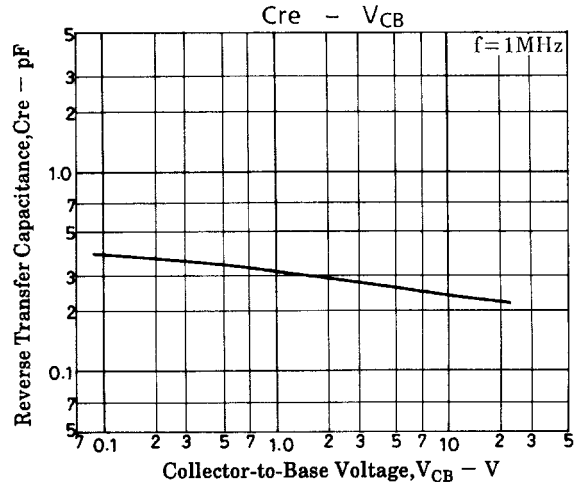
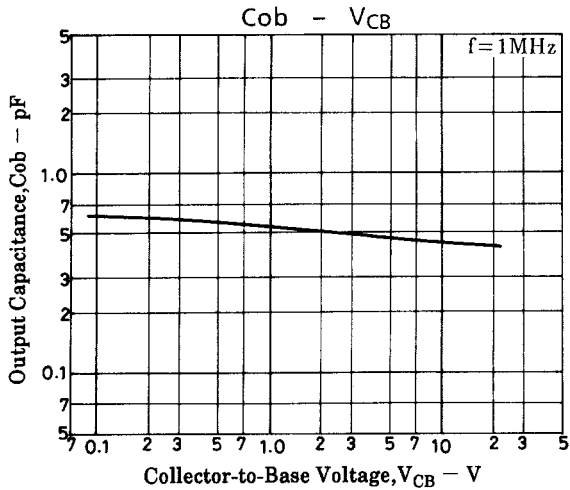
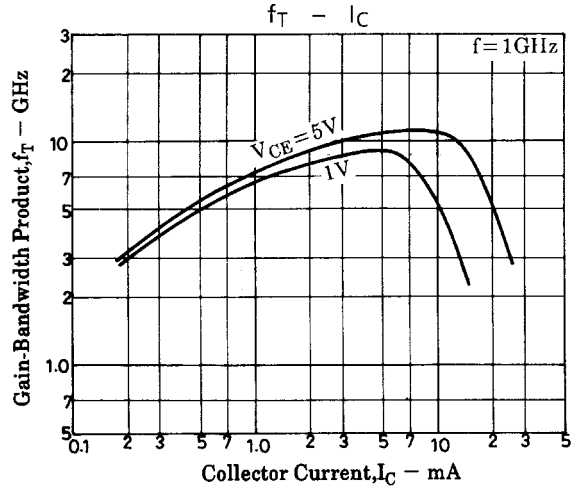
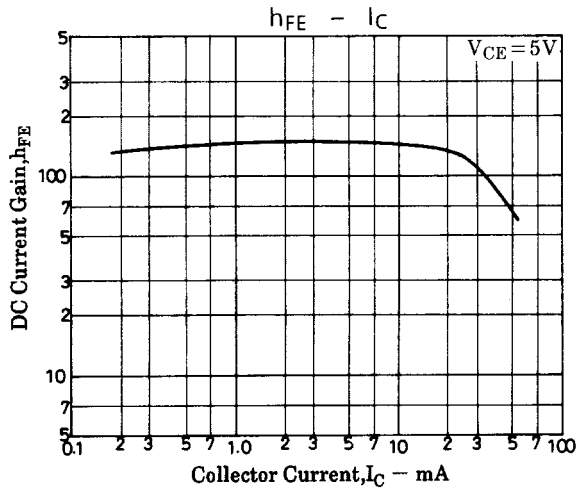
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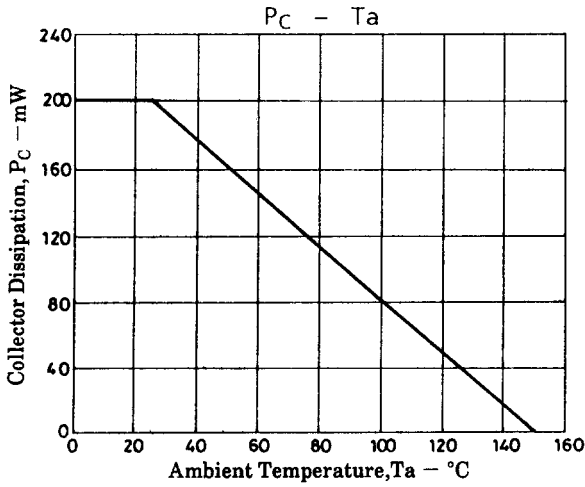
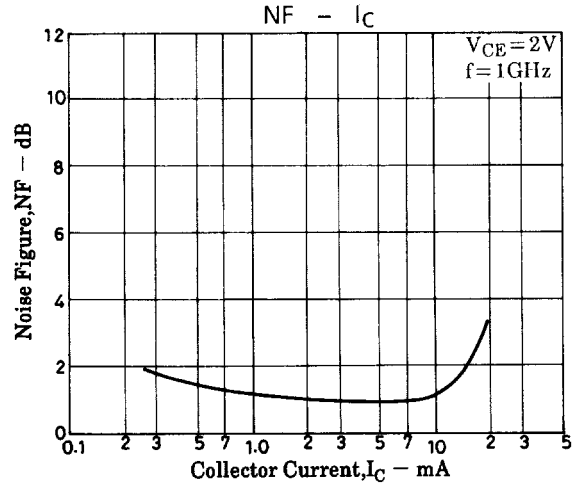
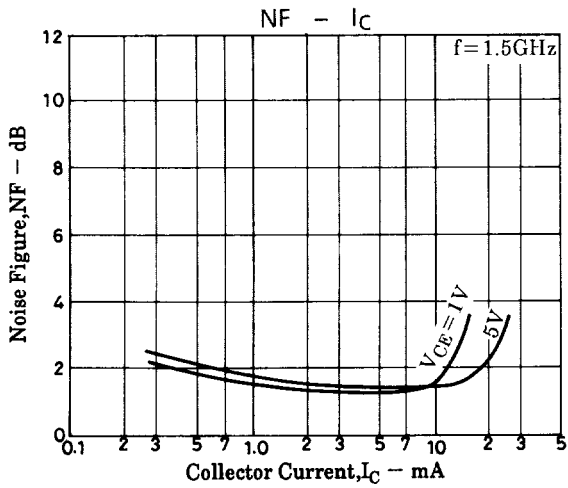
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	$ S_{21e} ^2 - 1$	$V_{CE}=5V, I_C=10mA, f=1.5GHz$	9	11		dB
	$ S_{21e} ^2 - 2$	$V_{CE}=1V, I_C=1mA, f=1.5GHz$		6		dB
Noise Figure	NF1	$V_{CE}=5V, I_C=5mA, f=1.5GHz$		1.4	3.0	dB
	NF2	$V_{CE}=2V, I_C=3mA, f=1GHz$		0.9		dB

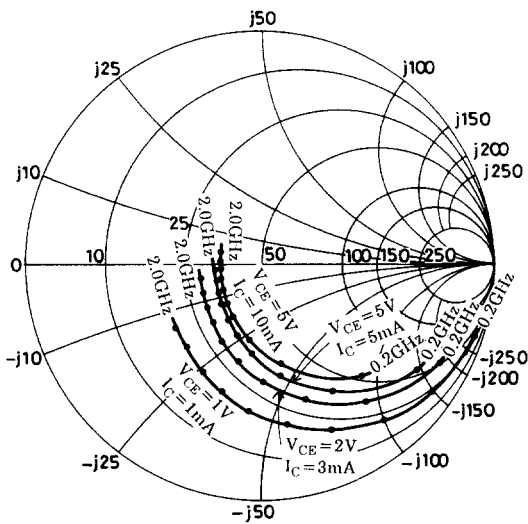


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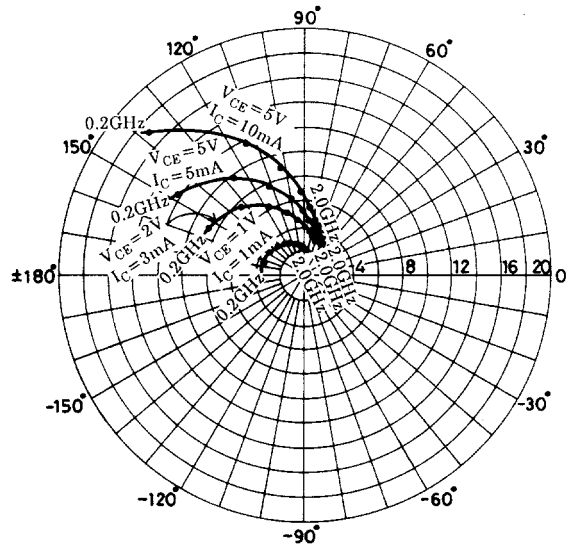


## S Parameters

S11e :  $f = 200$  to  $2000\text{MHz}$  (200MHz step)

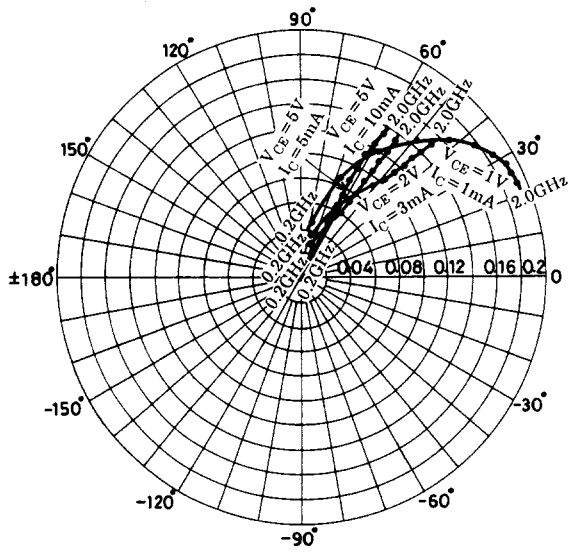


S21e :  $f = 200$  to  $2000\text{MHz}$  (200MHz step)

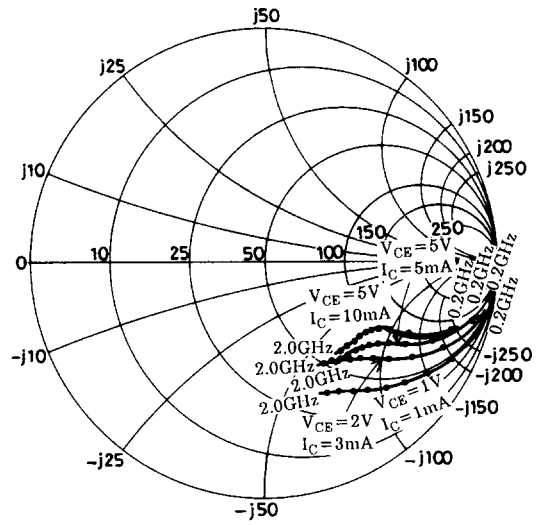


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S12e : f= 200 to 2000MHz (200MHz step)



S22e : f= 200 to 2000MHz (200MHz step)



## S parameters (Common emitter)

V<sub>CE</sub>=5V, I<sub>C</sub>=5mA, Z<sub>O</sub>=50Ω

Freq (MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
200	0.789	-34.0	12.209	148.5	0.029	72.3	0.914	-16.3
400	0.610	-60.1	9.707	125.8	0.048	62.4	0.785	-25.6
600	0.474	-79.5	7.653	110.7	0.061	58.2	0.692	-25.6
800	0.372	-95.6	6.212	99.2	0.072	56.6	0.632	-33.6
1000	0.311	-108.2	5.172	90.8	0.082	56.1	0.594	-36.1
1200	0.264	-122.2	4.459	83.0	0.093	55.9	0.570	-38.6
1400	0.225	-135.5	3.905	76.3	0.103	55.5	0.553	-41.5
1600	0.204	-147.9	3.464	70.7	0.113	55.5	0.539	-44.5
1800	0.188	-161.6	3.121	64.9	0.124	54.7	0.528	-48.2
2000	0.184	-175.1	2.855	59.7	0.135	54.2	0.527	-51.6

V<sub>CE</sub>=5V, I<sub>C</sub>=10mA, Z<sub>O</sub>=50Ω

Freq (MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
200	0.629	-47.8	17.118	137.6	0.025	69.4	0.839	-20.3
400	0.421	-77.9	11.829	114.0	0.040	63.6	0.681	-26.7
600	0.316	-98.0	8.649	101.1	0.052	62.7	0.605	-28.9
800	0.245	-117.5	6.785	91.2	0.064	62.8	0.562	-30.7
1000	0.209	-130.0	5.536	84.4	0.075	63.0	0.540	-32.9
1200	0.183	-147.2	4.719	77.6	0.088	62.9	0.528	-35.2
1400	0.168	-161.6	4.103	72.0	0.100	62.5	0.517	-37.9
1600	0.162	-174.0	3.626	66.7	0.112	61.9	0.510	-41.4
1800	0.164	173.1	3.255	61.7	0.124	60.5	0.503	-45.4
2000	0.170	160.6	2.962	56.8	0.135	59.3	0.502	-49.1

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$V_{CE}=2V, I_C=3mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.860	-28.3	8.645	154.3	0.036	73.8	0.943	-15.2
400	0.725	-52.2	7.452	133.4	0.063	62.5	0.839	-26.1
600	0.598	-71.6	6.200	117.7	0.081	55.4	0.744	-33.3
800	0.490	-88.6	5.210	105.1	0.094	51.1	0.667	-38.4
1000	0.417	-102.6	4.458	95.5	0.104	48.9	0.615	-42.3
1200	0.358	-116.9	3.901	86.7	0.114	47.5	0.579	-45.5
1400	0.311	-129.4	3.452	79.3	0.124	46.4	0.552	-48.6
1600	0.285	-141.5	3.072	72.8	0.132	46.3	0.531	-51.9
1800	0.262	-154.3	2.783	66.4	0.141	45.6	0.513	-55.7
2000	0.252	-167.3	2.551	60.9	0.150	44.5	0.505	-59.0

$V_{CE}=1V, I_C=1mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.952	-18.3	3.431	163.0	0.045	78.1	0.983	-10.2
400	0.896	-36.0	3.331	145.5	0.086	67.4	0.945	-19.6
600	0.830	-51.8	3.020	132.9	0.119	57.6	0.892	-27.7
800	0.753	-67.1	2.756	119.8	0.145	49.5	0.837	-34.9
1000	0.681	-80.9	2.543	108.6	0.163	42.6	0.782	-41.5
1200	0.617	-92.9	2.373	97.8	0.177	37.0	0.743	-46.4
1400	0.557	-107.1	2.184	88.4	0.185	32.1	0.699	-51.5
1600	0.509	-118.6	2.011	79.8	0.191	28.1	0.666	-55.9
1800	0.461	-132.1	1.888	71.6	0.191	25.5	0.640	-60.6
2000	0.440	-144.0	1.737	64.5	0.191	23.0	0.618	-64.5

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