

NPN Epitaxial Planar Silicon Transistor

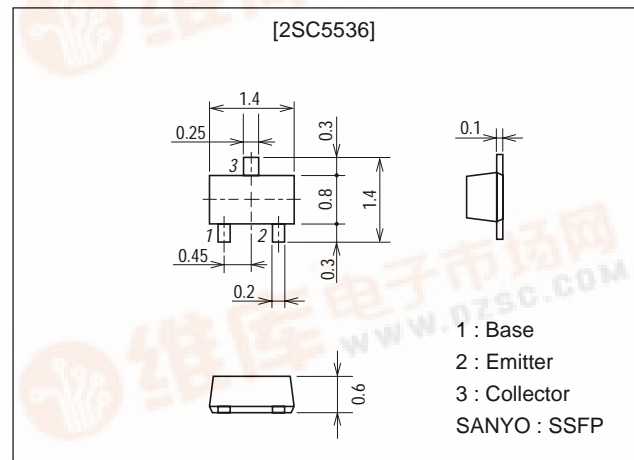
**SANYO****2SC5536****VHF Low-Noise Amplifier , OSC Applications****Features**

- Low noise :  $NF=1.8\text{dB typ (f=150MHz)}$ .
- High gain :  $|S_{21e}|^2=16\text{dB typ (f=150MHz)}$ .
- Ultrasmall, slim flat-lead package.  
(1.4mm×0.8mm×0.6mm)

**Package Dimensions**

unit:mm

2159

**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	$V_{CEO}$		12	V
Emitter-to-Base Voltage	$V_{EBO}$		2	V
Collector Current	$I_C$		50	mA
Collector 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** at  $T_a = 25^\circ\text{C}$ 

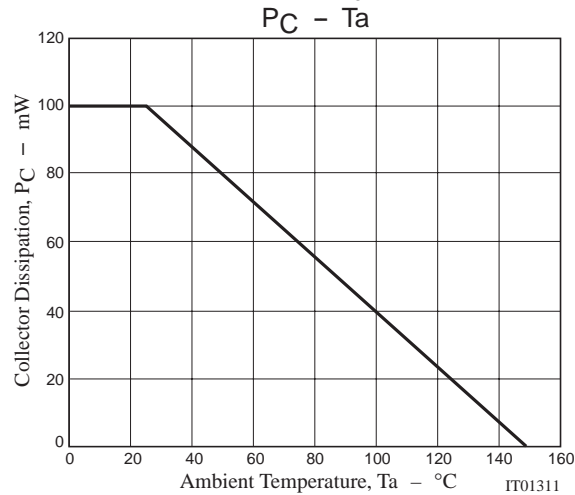
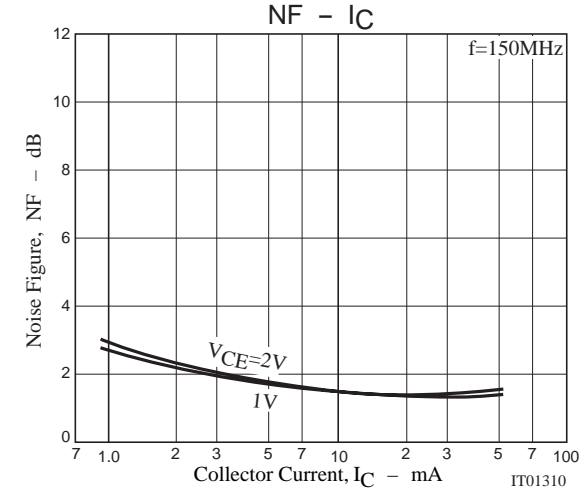
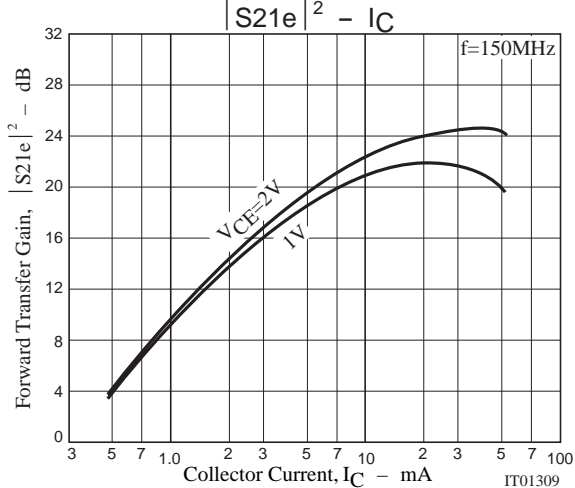
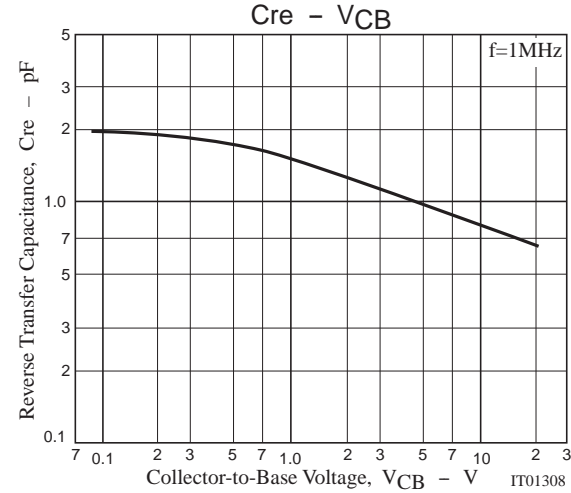
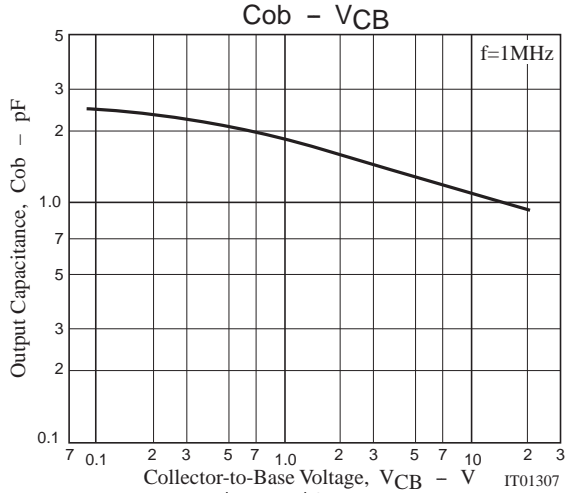
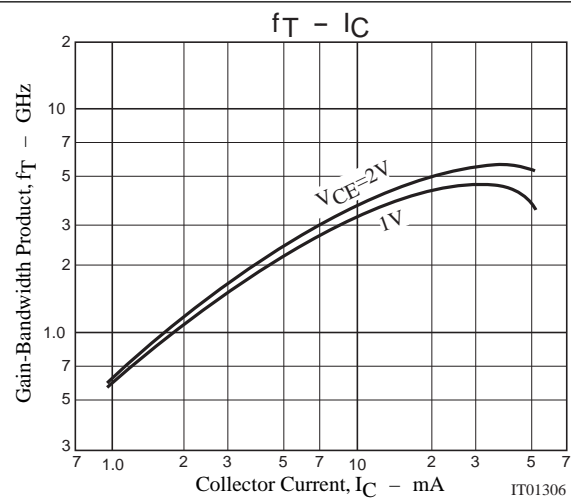
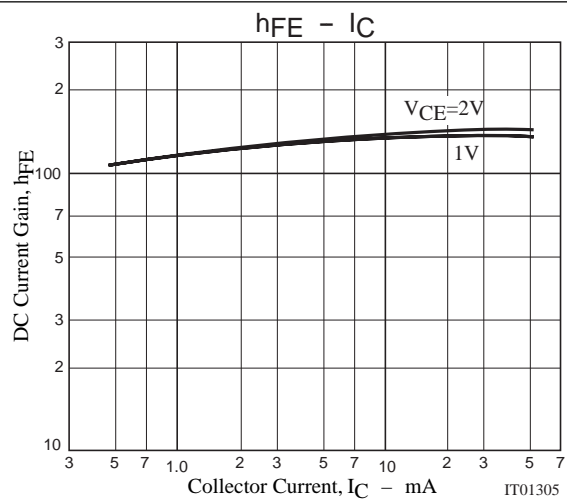
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=10\text{V}, I_E=0$			1.0	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=1\text{V}, I_C=0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE1}$	$V_{CE}=2\text{V}, I_C=3\text{mA}$	80		200	
	$h_{FE2}$	$V_{CE}=2\text{V}, I_C=50\text{mA}$	70			
Gain-Bandwidth Product	$f_T$	$V_{CE}=2\text{V}, I_C=3\text{mA}$	1.0	1.7		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		1.1	1.8	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.8		pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=2\text{V}, I_C=3\text{mA}, f=150\text{MHz}$	13	16		dB
Noise Figure	NF	$V_{CE}=2\text{V}, I_C=3\text{mA}, f=150\text{MHz}$		1.8	3.0	dB

Marking : MA

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2SC5536



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### S Parameters (Common emitter)

$V_{CE}=2V$ ,  $I_C=1mA$ ,  $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.961	-26.3	3.67	162.9	0.040	74.8	0.980	-7.3
100	0.937	-52.0	2.90	148.5	0.074	61.5	0.938	-13.4
150	0.917	-72.8	2.69	135.6	0.099	50.4	0.890	-18.0
200	0.890	-89.5	2.47	125.0	0.114	41.3	0.843	-21.5
250	0.893	-100.7	2.23	116.6	0.124	33.8	0.803	-24.4
300	0.880	-111.3	1.93	108.8	0.130	28.3	0.785	-26.5
350	0.868	-122.4	1.83	102.9	0.135	23.9	0.747	-28.6
400	0.873	-127.6	1.58	96.8	0.136	19.9	0.747	-30.5
450	0.858	-135.4	1.52	92.7	0.137	16.8	0.720	-32.3
500	0.866	-138.9	1.31	87.3	0.135	14.0	0.724	-34.3

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.888	-37.5	9.15	157.9	0.038	69.9	0.942	-15.0
100	0.860	-68.6	8.01	140.2	0.064	54.0	0.829	-26.1
150	0.835	-91.8	6.76	127.0	0.080	43.3	0.723	-32.9
200	0.810	-108.7	5.56	117.8	0.088	35.6	0.636	-36.7
250	0.800	-121.4	4.93	110.1	0.095	30.8	0.581	-39.1
300	0.792	-130.6	4.17	104.6	0.098	27.4	0.533	-40.9
350	0.791	-137.9	3.73	98.9	0.098	24.8	0.510	-42.2
400	0.787	-143.8	3.28	95.2	0.100	23.0	0.482	-43.3
450	0.785	-148.4	2.99	91.0	0.098	22.2	0.472	-44.6
500	0.783	-152.5	2.69	88.1	0.100	21.3	0.457	-45.7

$V_{CE}=2V$ ,  $I_C=10mA$ ,  $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.733	-64.8	22.70	145.6	0.031	60.7	0.825	-33.9
100	0.722	-105.2	16.71	125.0	0.046	44.9	0.605	-53.9
150	0.719	-126.7	12.55	113.3	0.052	38.2	0.462	-64.8
200	0.713	-139.6	9.94	106.2	0.055	36.3	0.371	-71.4
250	0.716	-147.8	8.10	101.0	0.059	35.6	0.314	-76.1
300	0.716	-153.8	6.88	96.9	0.060	36.2	0.276	-79.7
350	0.716	-158.8	5.96	93.4	0.062	37.4	0.248	-82.6
400	0.717	-162.1	5.25	90.7	0.065	38.6	0.228	-85.1
450	0.715	-165.3	4.70	88.2	0.067	40.6	0.215	-86.7
500	0.716	-167.6	4.24	85.9	0.069	42.1	0.204	-88.6

$V_{CE}=2V$ ,  $I_C=30mA$ ,  $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.605	-104.0	36.87	131.9	0.022	54.3	0.672	-59.9
100	0.660	-137.6	23.04	112.9	0.030	44.3	0.450	-89.4
150	0.677	-151.7	16.23	104.1	0.034	45.3	0.352	-106.7
200	0.681	-159.5	12.43	99.4	0.038	47.4	0.302	-118.6
250	0.686	-164.5	10.04	95.6	0.042	50.8	0.276	-127.0
300	0.687	-168.1	8.44	92.8	0.045	53.9	0.260	-133.7
350	0.689	-170.8	7.27	90.2	0.050	56.5	0.251	-138.8
400	0.691	-173.0	6.38	88.3	0.055	58.3	0.244	-142.9
450	0.691	-174.8	5.70	86.4	0.059	60.5	0.239	-145.6
500	0.691	-176.5	5.14	84.7	0.064	61.5	0.237	-148.2

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