

NPN Epitaxial Planar Silicon Transistor



# 2SC5534

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

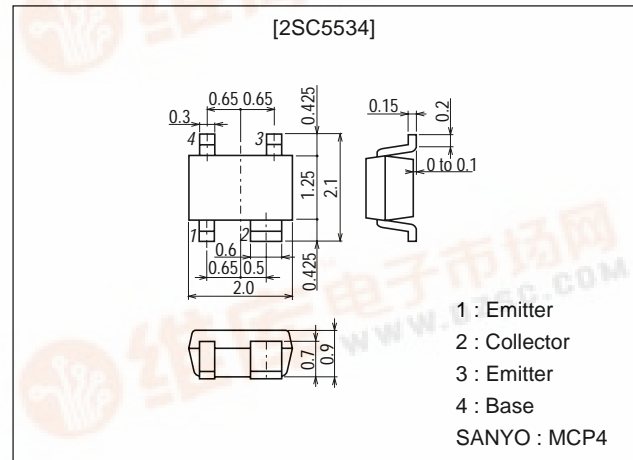
### Features

- Low noise : NF=1.2dB typ (f=2GHz).
- High gain :  $|S_{21e}|^2=10\text{dB typ (f=2GHz)}$ .
- High cutoff frequency :  $f_T=13\text{GHz typ}$ .

### Package Dimensions

unit:mm

2161



### Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CB0}$		9	V
Collector-to-Emitter Voltage	$V_{CEO}$		6	V
Emitter-to-Base Voltage	$V_{EBO}$		1.5	V
Collector Current	$I_C$		30	mA
Collector Dissipation	$P_C$		150	mW
Junction Temperature	$T_J$		150	°C
Storage Temperature	$T_{stg}$		-55 to +150	°C

Electrical Characteristics at Ta = 25°C

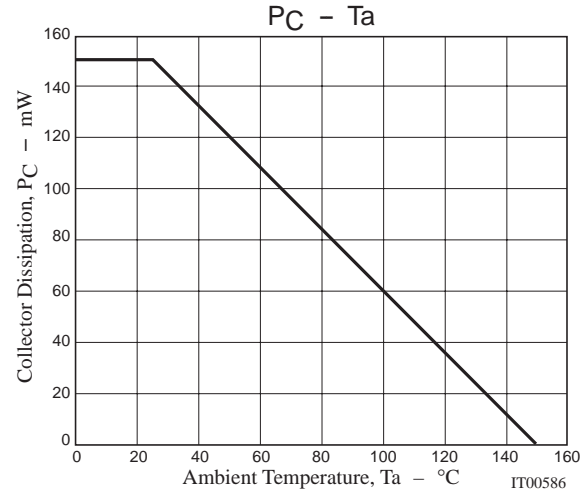
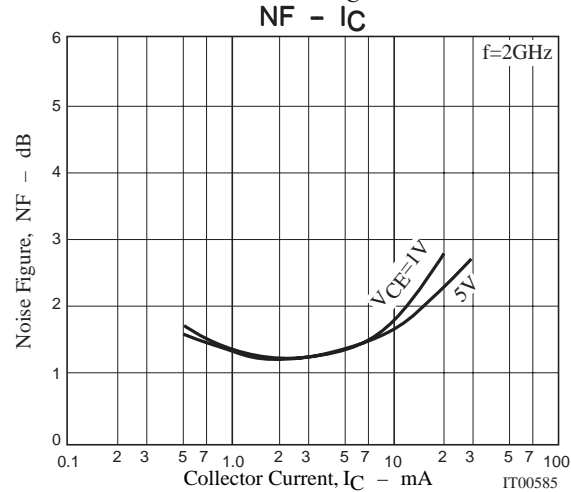
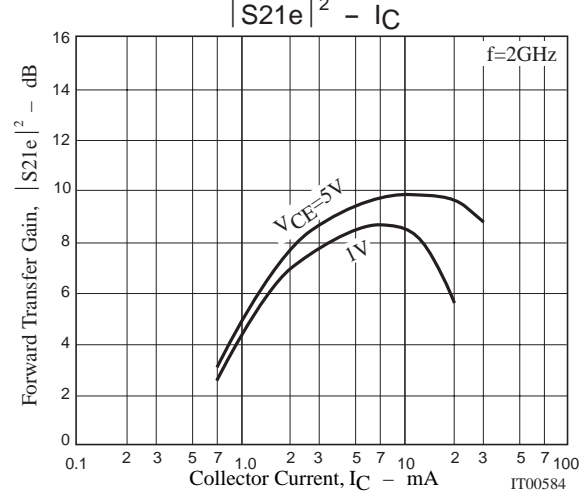
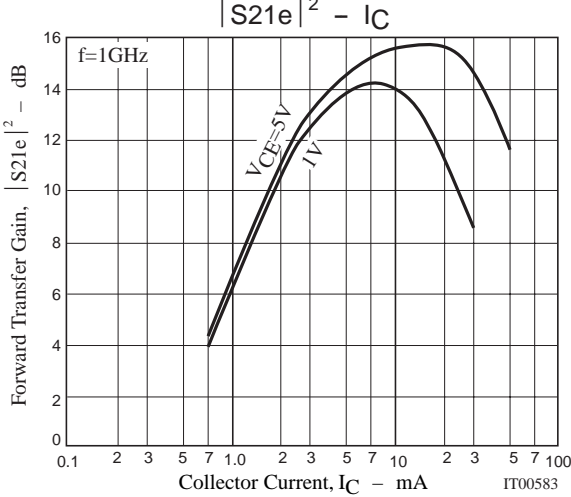
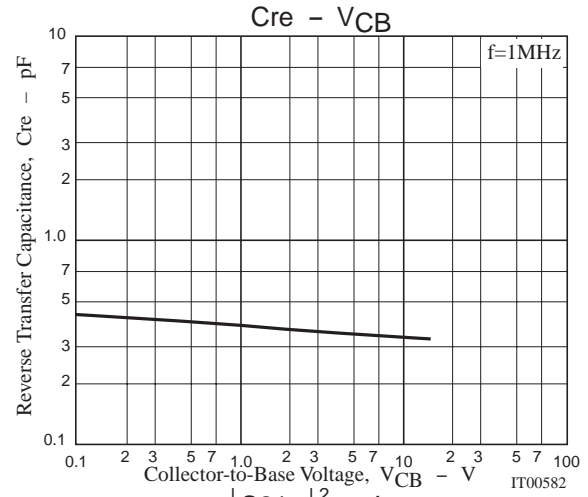
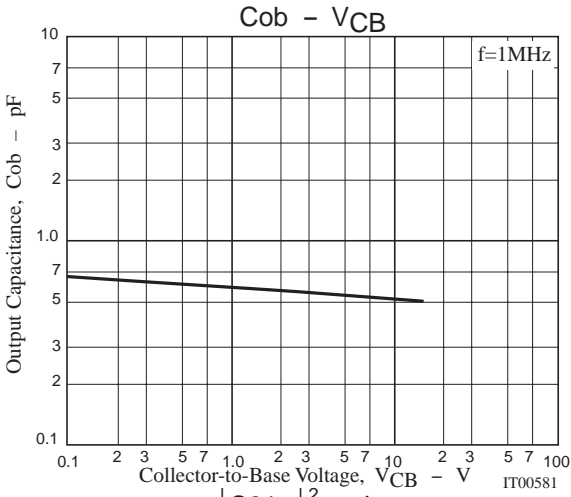
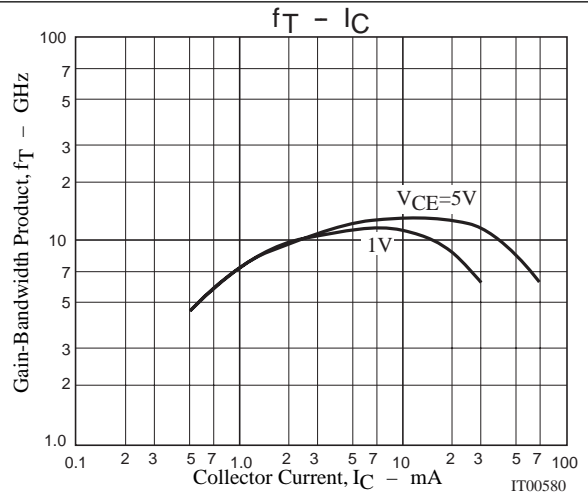
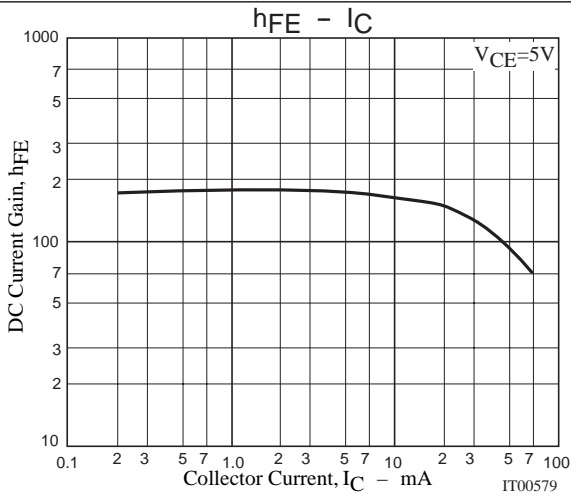
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CB0}$	$V_{CB}=5V, I_E=0$			1.0	$\mu A$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=1V, I_C=0$			10	$\mu A$
DC Current Gain	$h_{FE}$	$V_{CE}=5V, I_C=10mA$	90		200	
Gain-Bandwidth Product	$f_T$	$V_{CE}=5V, I_C=10mA$	10	13		GHz
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=5V, f=1MHz$		0.3	0.6	pF
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5V, I_C=10mA, f=2GHz$	8	10		dB
	$ S_{21e} ^2$	$V_{CE}=1V, I_C=3mA, f=2GHz$		8		dB
Noise Figure	NF	$V_{CE}=5V, I_C=5mA, f=2GHz$		1.2	2.0	dB

Marking : RY

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### S Parameters (Common emitter)

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.972	-7.6	2.444	170.6	0.025	83.8	0.994	-5.5
200	0.961	-14.6	1.998	162.7	0.050	77.4	0.981	-11.2
400	0.939	-28.3	2.323	146.8	0.096	65.7	0.955	-21.0
600	0.894	-42.8	2.325	133.2	0.132	56.9	0.902	-29.8
800	0.838	-57.4	2.138	121.7	0.161	46.5	0.835	-40.0
1000	0.822	-67.0	2.050	110.1	0.180	39.8	0.804	-45.1
1200	0.758	-81.7	2.062	98.8	0.188	31.6	0.741	-53.1
1400	0.696	-95.6	2.092	87.1	0.202	27.0	0.708	-57.9
1600	0.661	-106.7	1.869	79.0	0.224	21.3	0.711	-62.0
1800	0.619	-117.7	1.835	69.0	0.218	17.0	0.695	-65.7
2000	0.573	-130.1	1.720	60.4	0.220	14.0	0.658	-70.4

$V_{CE}=1V, I_C=3mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.911	-13.0	7.001	165.4	0.024	79.8	0.975	-9.8
200	0.880	-24.5	6.275	153.8	0.046	71.3	0.928	-19.1
400	0.771	-49.7	5.664	135.6	0.081	57.4	0.830	-33.3
600	0.694	-69.0	5.349	119.0	0.101	49.1	0.696	-44.7
800	0.605	-89.2	4.927	104.5	0.117	42.5	0.623	-51.9
1000	0.510	-110.0	4.174	94.3	0.128	39.0	0.575	-56.8
1200	0.470	-122.8	3.766	83.6	0.136	36.1	0.539	-61.3
1400	0.441	-132.5	3.342	74.6	0.143	34.7	0.497	-65.7
1600	0.402	-146.9	3.010	67.4	0.153	33.1	0.469	-69.2
1800	0.369	-160.6	2.690	60.5	0.163	31.4	0.472	-72.2
2000	0.358	-169.2	2.493	53.0	0.171	31.8	0.460	-75.3

$V_{CE}=1V, I_C=5mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.852	-18.4	10.066	162.2	0.024	78.5	0.960	-12.9
200	0.801	-34.1	9.399	147.8	0.043	67.7	0.878	-24.7
400	0.657	-66.9	8.237	126.1	0.071	54.4	0.728	-40.3
600	0.557	-90.7	6.839	110.0	0.086	48.2	0.592	-49.4
800	0.476	-112.2	5.735	97.2	0.100	44.4	0.516	-55.3
1000	0.410	-132.6	4.892	85.6	0.109	43.4	0.468	-59.3
1200	0.382	-144.5	4.202	77.5	0.120	41.9	0.446	-63.0
1400	0.360	-155.6	3.623	70.0	0.130	40.9	0.416	-66.4
1600	0.344	-166.5	3.244	63.5	0.142	40.4	0.403	-69.4
1800	0.328	-178.7	2.947	56.3	0.152	39.5	0.401	-72.5
2000	0.320	172.2	2.670	50.0	0.165	38.3	0.398	-75.4

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$V_{CE}=1V, I_C=10mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.711	-33.6	15.894	154.5	0.022	74.6	0.909	-18.3
200	0.627	-60.8	13.816	136.0	0.039	63.0	0.773	-31.8
400	0.495	-102.8	10.266	111.5	0.057	53.4	0.573	-45.5
600	0.427	-126.6	7.718	97.2	0.070	51.4	0.459	-51.0
800	0.392	-144.9	6.075	87.0	0.082	50.2	0.404	-54.4
1000	0.370	-160.0	4.948	77.8	0.093	50.7	0.372	-56.9
1200	0.357	-170.5	4.237	70.8	0.108	50.2	0.360	-60.2
1400	0.348	-179.9	3.648	63.9	0.120	49.8	0.349	-63.0
1600	0.342	171.6	3.229	58.3	0.134	48.6	0.347	-65.7
1800	0.341	162.2	2.904	51.7	0.148	47.7	0.350	-69.2
2000	0.338	154.9	2.628	45.9	0.161	45.6	0.352	-72.4

$V_{CE}=5V, I_C=1mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.976	-6.5	2.336	171.5	0.022	84.4	0.996	-4.4
200	0.961	-13.8	2.319	163.3	0.042	77.8	0.985	-9.4
400	0.939	-26.6	2.408	149.0	0.080	67.6	0.954	-19.9
600	0.905	-39.5	2.006	137.3	0.112	58.6	0.929	-26.0
800	0.840	-55.0	2.177	125.4	0.139	49.7	0.885	-33.9
1000	0.827	-64.2	2.115	114.1	0.154	43.1	0.806	-41.9
1200	0.748	-79.7	2.176	102.8	0.175	35.8	0.797	-46.9
1400	0.713	-90.1	1.949	93.3	0.192	30.3	0.788	-50.7
1600	0.693	-99.0	1.716	85.5	0.196	25.4	0.759	-55.8
1800	0.623	-112.5	1.910	74.3	0.199	20.5	0.716	-60.9
2000	0.584	-123.6	1.687	66.2	0.200	17.9	0.684	-64.8

$V_{CE}=5V, I_C=3mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.923	-11.1	6.639	167.1	0.021	79.9	0.984	-8.4
200	0.893	-21.8	6.408	155.9	0.039	73.7	0.945	-16.2
400	0.818	-41.3	5.503	139.6	0.070	60.9	0.858	-29.0
600	0.717	-62.0	5.590	122.7	0.089	52.2	0.755	-38.5
800	0.628	-80.3	5.046	109.8	0.101	46.4	0.672	-45.8
1000	0.566	-94.0	4.297	99.7	0.116	42.3	0.620	-50.5
1200	0.491	-109.7	4.009	88.6	0.125	38.9	0.569	-55.0
1400	0.432	-123.5	3.610	78.9	0.130	37.8	0.541	-58.6
1600	0.390	-136.2	3.301	71.4	0.141	36.5	0.529	-61.6
1800	0.364	-146.6	2.980	64.0	0.151	33.4	0.518	-64.7
2000	0.337	-158.0	2.696	57.3	0.156	34.0	0.505	-67.6

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$V_{CE}=5V, I_C=5mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.875	-14.9	10.148	164.2	0.020	79.7	0.971	-10.8
200	0.825	-28.9	9.923	150.6	0.036	70.7	0.909	-20.6
400	0.706	-55.4	8.394	131.2	0.062	57.9	0.774	-34.6
600	0.583	-78.9	7.349	114.2	0.077	52.0	0.645	-43.3
800	0.491	-98.7	6.285	101.4	0.090	48.1	0.573	-48.7
1000	0.414	-115.9	5.367	90.3	0.099	46.7	0.523	-52.4
1200	0.369	-129.5	4.670	81.6	0.111	43.9	0.491	-55.8
1400	0.339	-140.7	4.025	73.9	0.119	43.6	0.466	-59.0
1600	0.311	-153.4	3.634	67.2	0.131	43.1	0.450	-61.6
1800	0.290	-165.2	3.288	60.3	0.141	41.9	0.448	-64.4
2000	0.280	-174.2	2.993	53.9	0.152	41.1	0.442	-67.1

$V_{CE}=5V, I_C=10mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.773	-23.2	16.803	159.2	0.019	76.2	0.941	-15.0
200	0.688	-44.4	15.341	142.5	0.033	67.2	0.835	-26.6
400	0.530	-78.6	11.914	118.5	0.051	57.4	0.644	-40.0
600	0.412	-105.6	9.118	102.8	0.064	54.2	0.534	-45.8
800	0.351	-124.7	7.233	92.1	0.076	53.8	0.467	-49.3
1000	0.314	-139.3	5.946	83.0	0.088	53.3	0.428	-51.6
1200	0.289	-153.1	5.077	75.5	0.100	52.8	0.409	-54.1
1400	0.272	-165.3	4.359	68.6	0.111	51.6	0.397	-57.0
1600	0.263	-174.8	3.870	62.9	0.125	50.8	0.395	-59.6
1800	0.256	174.7	3.495	56.8	0.138	49.6	0.392	-62.3
2000	0.252	165.3	3.156	51.0	0.151	47.8	0.392	-65.3

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