Ordering number:ENN6258

NPN Epitaxial Planar Silicon Transistor

2SC5534

UHF to S Band Low-Noise Amplifier, OSC Applications

Features

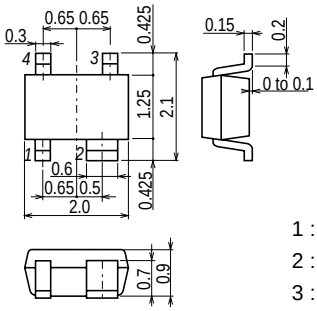
- Low noise : NF=1.2dB typ (f=2GHz).
- High gain : $|S21e|^2$=10dB typ (f=2GHz).
- High cutoff frequency : f_T=13GHz typ.

Package Dimensions

unit:mm

2161

[2SC5534]



1 : Emitter
2 : Collector
3 : Emitter
4 : Base
SANYO : MCP4

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		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	Tj		150	˚C
Storage Temperature	Tstg		–55 to +150	˚C

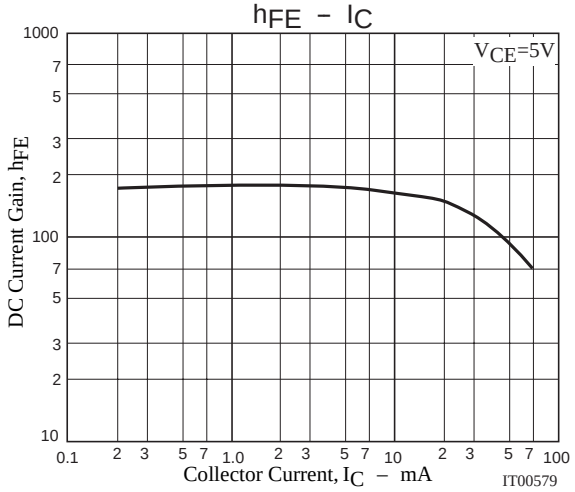
Electrical Characteristics at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=5V, I_E=0			1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=1V, I_C=0			10	μA
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	Cre	V_{CB}=5V, f=1MHz		0.3	0.6	pF
Forward Transfer Gain	$\|S21e\|^2$ 1	V_{CE}=5V, I_C=10mA, f=2GHz	8	10		dB
	$\|S21e\|^2$ 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

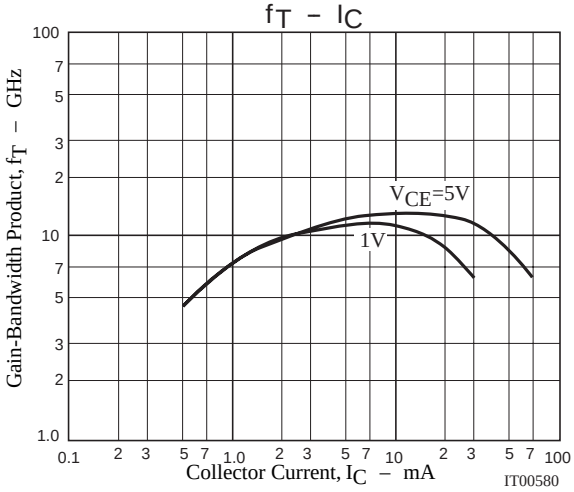
Marking : RY

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

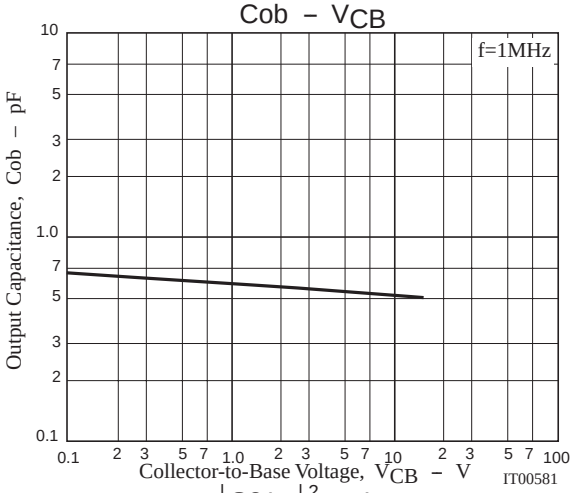
h_{FE} – I_C



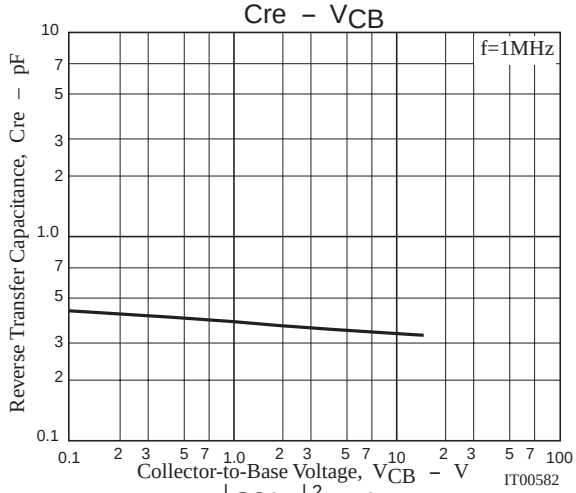
f_T – I_C



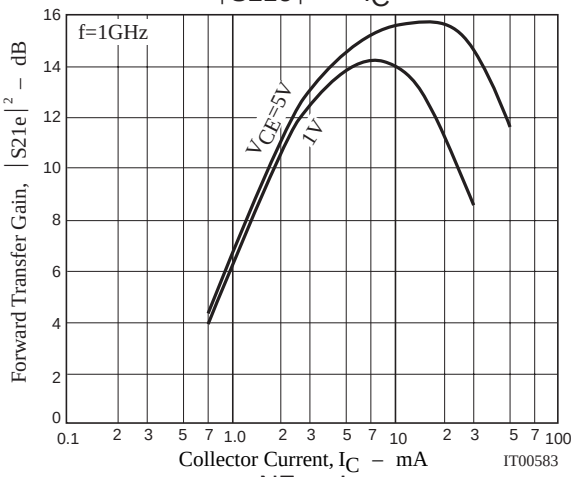
Cob – V_{CB}



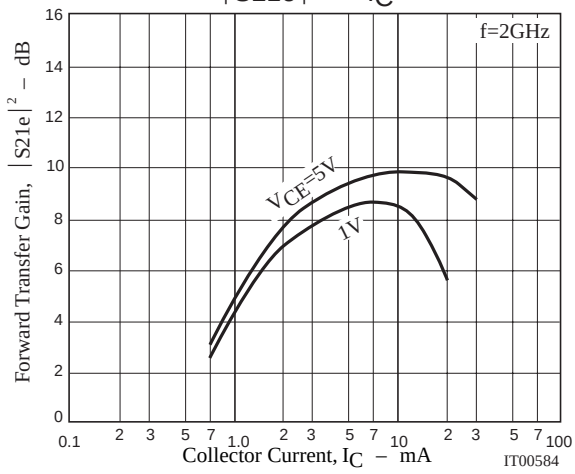
Cre – V_{CB}



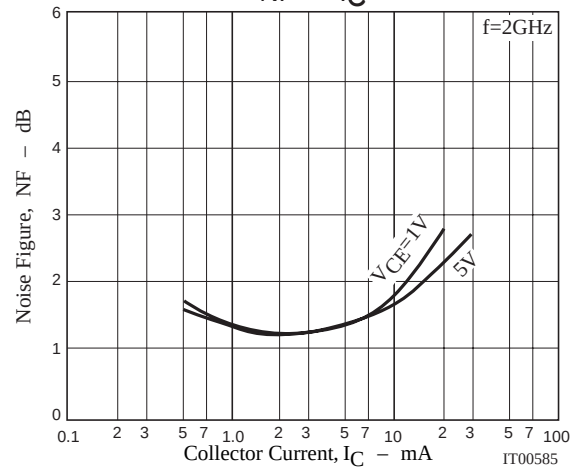
$|S21e|^2$ – I_C



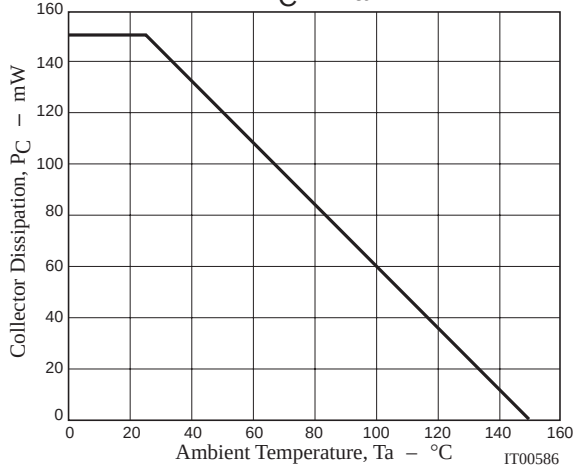
$|S21e|^2$ – I_C



NF – I_C



P_C – Ta



S Parameters (Common emitter)

V_{CE}=1V, I_C=1mA, Z_O=50Ω

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=50Ω

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=50Ω

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

V_{CE}=1V, I_C=10mA, Z_O=50Ω

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=50Ω

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=50Ω

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

V_{CE}=5V, I_C=5mA, Z_O=50Ω

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=50Ω

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