NEC

SILICON TRANSISTOR
2SC5011

HIGH FREQUENCY LOW NOISE AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR
4 PINS SUPER MINI MOLD

FEATURES

- Small Package
- High Gain Bandwidth Product
  (f_T = 6.5 GHz TYP.)
- Low Noise, High Gain
- Low Voltage Operation

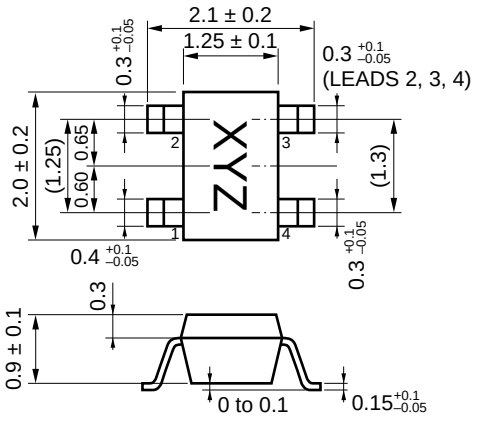
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5011-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Base), Pin4 (Emitter) face to perforation side of the tape.
2SC5011-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Collector), Pin2 (Emitter) face to perforation side of the tape.

***** Please contact with responsible NEC person, if you require evaluation sample. It is available for 50 pcs. one unit sample lot. (Part No.: 2SC5011)

PACKAGE DIMENSIONS

in millimeters



PIN CONNECTIONS

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ˚C)

Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	12	V
Emitter to Base Voltage	V_{EBO}	3	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_T	150	mW
Junction Temperature	T_j	150	˚C
Storage Temperature	T_{stg}	–65 to +150	˚C

Caution; Electrostatic Sensitive Device.

Document No. P10399EJ2V0DS00 (2nd edition)
(Previous No. TD-2411)
Date Published July 1995 P
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I_{CBO}			1.0	μA	V_{CB} = 10 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			1.0	μA	V_{EB} = 1 V, I_C = 0
DC Current Gain	h_{FE}	50	120	250		V_{CE} = 10 V, I_C = 20 mA***1**
Gain Bandwidth Product	f_T		6.5		GHz	V_{CE} = 10 V, I_C = 20 mA
Feed-back Capacitance	C_{re}		0.5	0.9	pF	V_{CB} = 10 V, I_E = 0, f = 1 MHz***2**
Insertion Power Gain	$\|S_{21e}\|^2$	11	13		dB	V_{CE} = 10 V, I_C = 20 mA, f = 1.0 GHz
Noise Figure	NF		1.1	2.0	dB	V_{CE} = 10 V, I_C = 7 mA, f = 1.0 GHz

***1** Pulse Measurement; PW ≤ 350 μs, Duty Cycle ≤ 2 % Pulsed.

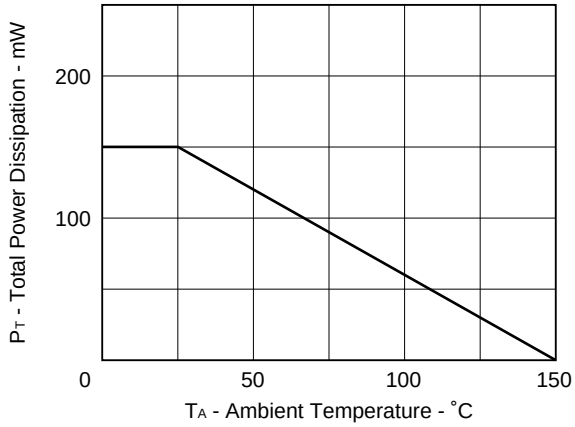
***2** Measured with 3 terminals bridge, Emitter and Case should be grounded.

h_{FE} Classification

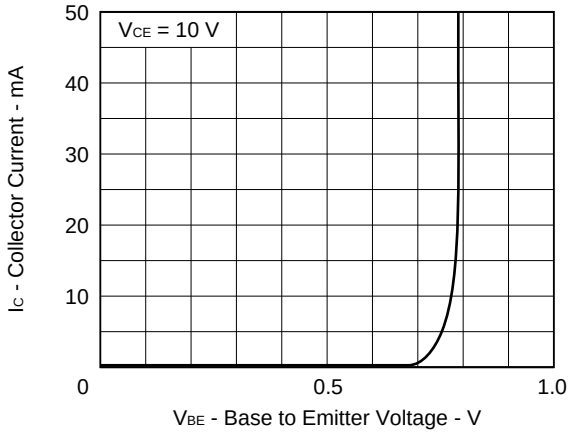
Rank	EB	FB	GB
Marking	R26	R27	R28
h_{FE}	50 to 100	80 to 160	125 to 250

TYPICAL CHARACTERISTICS (T_A = 25 °C)

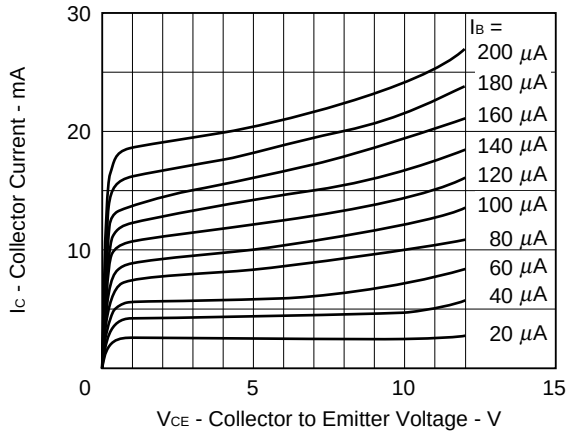
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



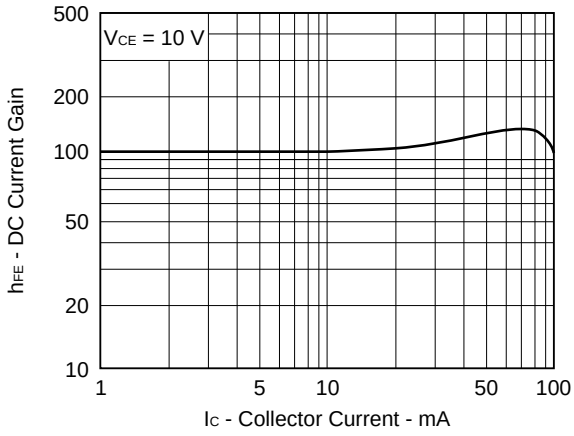
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



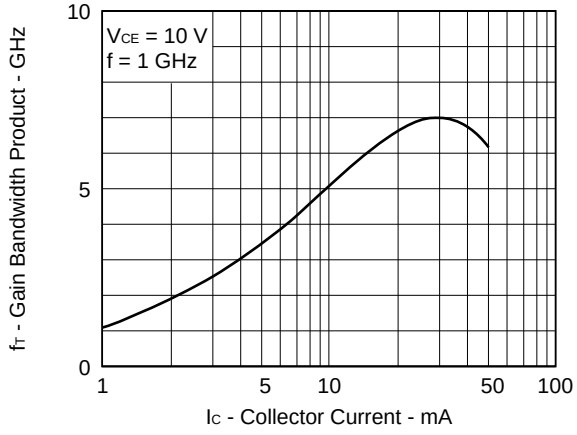
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



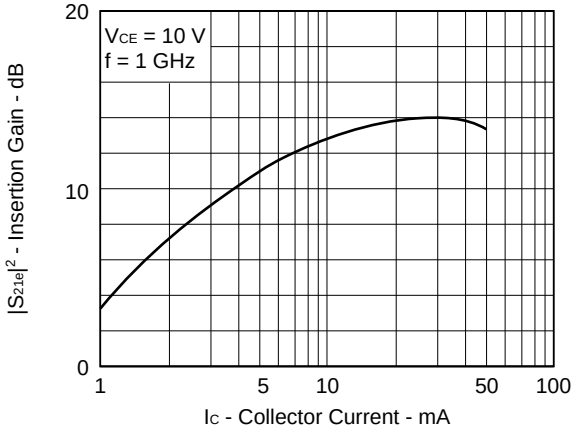
DC CURRENT GAIN vs. COLLECTOR CURRENT



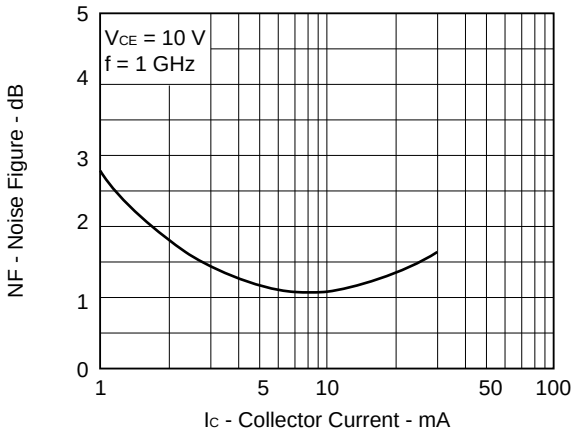
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



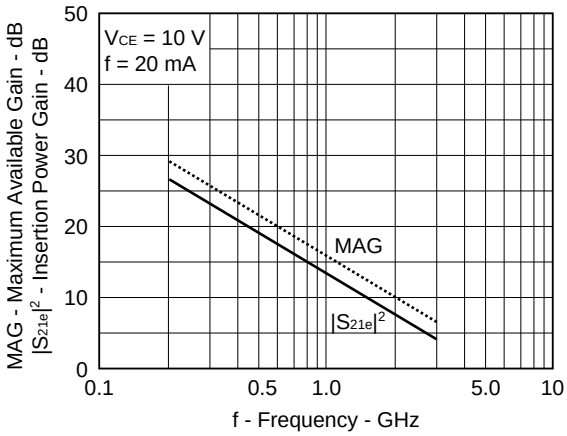
INSERTION GAIN vs. COLLECTOR CURRENT



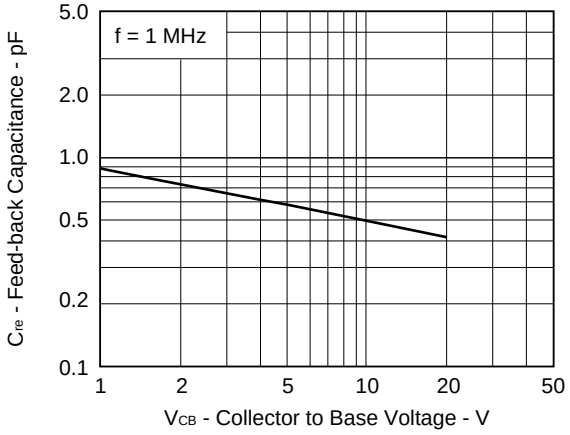
NOISE FIGURE vs.
COLLECTOR CURRENT



INSERTION POWER GAIN/MAXIMUM
AVAILABLE GAIN vs. FREQUENCY



FEED-BACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



S-PARAMETER

V_{CE} = 10 V, I_C = 20 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.583	–80.5	32.334	134.6	.022	59.7	.739	–33.6
200.00	.514	–120.6	20.817	113.4	.029	54.9	.513	–41.4
300.00	.498	–141.9	14.898	102.6	.034	52.0	.404	–44.1
400.00	.495	–155.0	11.390	95.6	.037	50.1	.342	–41.9
500.00	.494	–165.0	9.247	90.2	.044	57.2	.300	–41.9
600.00	.499	–171.1	7.798	86.0	.049	58.4	.276	–41.0
700.00	.502	–177.1	6.768	82.2	.055	59.2	.266	–41.5
800.00	.503	178.7	5.913	78.5	.064	60.6	.248	–43.9
900.00	.512	174.3	5.293	75.6	.066	61.2	.232	–43.1
1000.00	.512	169.8	4.789	72.2	.070	62.1	.232	–43.3
1100.00	.516	166.1	4.345	69.5	.079	62.6	.226	–45.1
1200.00	.524	163.8	3.959	67.0	.087	61.3	.217	–47.2
1300.00	.530	160.1	3.669	64.4	.093	61.4	.208	–50.1
1400.00	.531	158.0	3.443	61.7	.099	60.7	.207	–49.9
1500.00	.535	154.5	3.203	58.9	.104	59.0	.196	–54.6
1600.00	.541	152.2	2.999	56.3	.115	58.6	.198	–55.2
1700.00	.567	149.5	2.838	53.7	.116	59.6	.186	–59.7
1800.00	.555	147.2	2.676	51.9	.125	58.2	.190	–59.4
1900.00	.556	145.3	2.556	49.5	.128	57.4	.186	–65.0
2000.00	.574	143.4	2.434	46.9	.138	57.0	.186	–68.7
2100.00	.570	141.1	2.314	45.1	.140	58.3	.169	–72.8
2200.00	.583	140.1	2.205	42.5	.152	56.4	.181	–73.9
2300.00	.579	137.3	2.124	40.8	.156	56.2	.192	–79.3
2400.00	.585	135.6	2.054	39.3	.157	54.8	.167	–77.1
2500.00	.602	133.0	1.981	36.3	.166	54.4	.180	–86.1
2600.00	.605	131.6	1.918	34.3	.180	52.8	.179	–84.9
2700.00	.607	129.7	1.840	32.2	.179	52.7	.187	–91.7
2800.00	.600	127.8	1.772	29.2	.192	50.9	.193	–94.1
2900.00	.612	126.4	1.704	28.0	.192	50.8	.190	–95.2
3000.00	.594	123.8	1.646	25.3	.200	47.3	.190	–101.8

V_{CE} = 3 V, I_C = 5 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.794	–49.6	14.255	150.2	.036	65.6	.887	–22.7
200.00	.727	–87.2	11.175	128.8	.058	50.9	.717	–37.2
300.00	.675	–112.2	8.779	114.7	.071	40.4	.584	–45.5
400.00	.653	–129.6	7.002	105.0	.079	37.4	.492	–49.4
500.00	.636	–143.4	5.814	97.3	.081	35.2	.424	–51.2
600.00	.638	–152.4	4.980	91.3	.083	32.0	.380	–53.7
700.00	.631	–161.0	4.359	86.0	.084	35.6	.351	–53.9
800.00	.630	–168.1	3.827	81.2	.087	34.8	.327	–57.4
900.00	.635	–173.7	3.442	77.5	.093	32.2	.306	–58.6
1000.00	.631	–179.6	3.123	73.0	.095	34.4	.295	–60.4
1100.00	.635	176.2	2.834	69.6	.098	35.4	.283	–63.0
1200.00	.636	172.6	2.594	66.6	.099	37.7	.276	–65.0
1300.00	.636	168.3	2.408	63.2	.104	40.1	.260	–68.6
1400.00	.641	165.3	2.255	60.1	.103	38.9	.267	–69.5
1500.00	.643	161.7	2.106	56.9	.115	41.4	.252	–73.5
1600.00	.653	158.4	1.977	53.9	.113	39.7	.249	–76.5
1700.00	.663	155.0	1.869	50.8	.120	42.3	.241	–81.7
1800.00	.660	152.3	1.761	48.3	.123	41.9	.253	–84.4
1900.00	.663	149.8	1.690	45.9	.127	42.0	.248	–86.9
2000.00	.679	147.4	1.602	43.0	.126	46.3	.255	–91.9
2100.00	.678	144.2	1.533	39.9	.136	46.6	.259	–95.1
2200.00	.686	142.4	1.447	37.0	.145	45.1	.253	–99.5
2300.00	.682	139.5	1.399	34.8	.148	46.9	.259	–101.3
2400.00	.689	137.1	1.355	32.8	.159	44.8	.264	–105.6
2500.00	.703	135.7	1.297	29.9	.170	46.1	.267	–110.6
2600.00	.713	132.9	1.263	28.0	.171	46.2	.263	–111.3
2700.00	.698	131.3	1.223	26.5	.177	44.5	.265	–115.1
2800.00	.708	129.1	1.174	22.8	.181	45.4	.297	–119.2
2900.00	.713	127.5	1.145	21.1	.183	44.9	.290	–121.6
3000.00	.715	125.5	1.082	19.5	.199	43.5	.304	–126.5

S-PARAMETER

V_{CE} = 3 V, I_C = 3 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.865	–39.1	9.662	155.7	.039	72.5	.937	–16.1
200.00	.804	–72.2	8.150	135.9	.069	51.4	.816	–28.0
300.00	.751	–96.9	6.742	121.3	.085	42.4	.703	–35.7
400.00	.717	–115.5	5.560	110.6	.092	36.0	.612	–39.9
500.00	.685	–130.5	4.707	101.8	.096	32.8	.548	–42.9
600.00	.684	–141.5	4.083	95.1	.099	28.6	.499	–45.2
700.00	.673	–151.7	3.602	88.9	.101	27.0	.466	–46.9
800.00	.667	–159.0	3.177	83.4	.099	25.2	.442	–49.3
900.00	.669	–165.6	2.868	79.2	.104	24.9	.422	–50.7
1000.00	.671	–172.4	2.619	74.2	.103	25.8	.407	–52.1
1100.00	.670	–177.9	2.383	70.3	.103	25.0	.395	–54.9
1200.00	.674	179.0	2.173	66.8	.104	25.9	.388	–57.0
1300.00	.672	173.7	2.020	63.1	.105	25.8	.374	–59.8
1400.00	.676	170.6	1.895	59.7	.103	27.3	.374	–62.4
1500.00	.678	165.9	1.768	56.1	.107	28.1	.361	–66.4
1600.00	.686	162.6	1.661	53.1	.105	30.9	.357	–67.8
1700.00	.702	159.1	1.575	49.7	.110	32.6	.358	–71.1
1800.00	.693	156.1	1.492	46.7	.109	33.2	.362	–74.3
1900.00	.698	153.5	1.422	44.3	.113	36.6	.361	–77.8
2000.00	.704	150.7	1.345	41.3	.110	39.1	.367	–82.2
2100.00	.703	147.0	1.283	38.0	.117	38.7	.363	–85.4
2200.00	.713	144.8	1.220	34.9	.130	41.2	.370	–90.4
2300.00	.710	141.8	1.184	32.5	.130	44.1	.361	–92.5
2400.00	.713	139.6	1.136	31.1	.133	42.4	.361	–95.4
2500.00	.737	137.3	1.093	27.2	.148	43.3	.375	–100.4
2600.00	.740	135.1	1.060	26.0	.155	45.6	.370	–102.5
2700.00	.737	132.7	1.011	24.0	.160	44.7	.380	–107.6
2800.00	.733	130.2	.978	20.0	.162	49.3	.388	–112.4
2900.00	.737	128.7	.954	19.6	.178	47.1	.393	–113.0
3000.00	.733	127.0	.898	16.6	.177	44.7	.393	–117.3

V_{CE} = 3 V, I_C = 1 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.957	–26.5	3.552	162.8	.044	73.8	.978	–8.1
200.00	.921	–51.4	3.284	146.5	.078	61.3	.931	–15.2
300.00	.882	–72.6	2.966	132.7	.105	50.0	.884	–21.2
400.00	.853	–90.9	2.608	121.0	.124	40.3	.832	–25.5
500.00	.809	–106.5	2.326	110.4	.134	31.8	.783	–29.2
600.00	.805	–119.2	2.090	102.1	.143	26.2	.746	–32.1
700.00	.787	–130.6	1.892	94.2	.146	20.9	.722	–34.4
800.00	.776	–140.2	1.699	87.3	.145	14.7	.699	–38.1
900.00	.775	–148.7	1.553	81.4	.144	13.8	.681	–40.5
1000.00	.769	–156.8	1.430	75.2	.144	10.7	.669	–42.8
1100.00	.763	–163.7	1.317	70.3	.137	6.8	.658	–45.4
1200.00	.760	–168.4	1.206	65.8	.134	6.9	.647	–48.3
1300.00	.760	–174.8	1.135	61.2	.127	3.5	.635	–51.3
1400.00	.759	–178.8	1.064	57.3	.122	2.5	.636	–55.0
1500.00	.758	176.2	.994	52.8	.116	1.3	.623	–58.0
1600.00	.768	171.4	.940	49.1	.109	4.1	.623	–60.9
1700.00	.782	167.3	.899	45.9	.106	6.8	.624	–65.0
1800.00	.775	163.4	.840	42.3	.098	4.2	.628	–68.1
1900.00	.784	160.3	.799	39.4	.089	9.9	.620	–71.5
2000.00	.788	157.1	.761	36.1	.085	13.5	.632	–75.2
2100.00	.784	152.6	.728	32.8	.087	15.9	.627	–79.9
2200.00	.791	150.0	.692	29.2	.082	24.6	.634	–83.7
2300.00	.791	146.7	.658	27.5	.085	33.0	.626	–87.0
2400.00	.795	144.1	.634	26.3	.084	34.7	.625	–90.7
2500.00	.806	140.6	.610	22.7	.094	41.8	.621	–95.2
2600.00	.812	138.6	.585	21.3	.100	47.3	.624	–97.6
2700.00	.811	135.7	.557	20.0	.102	50.1	.639	–102.0
2800.00	.795	132.3	.547	17.2	.120	50.3	.652	–106.4
2900.00	.819	131.0	.528	17.2	.124	54.4	.641	–109.4
3000.00	.797	127.9	.490	14.3	.137	50.9	.658	–113.9

[MEMO]