

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

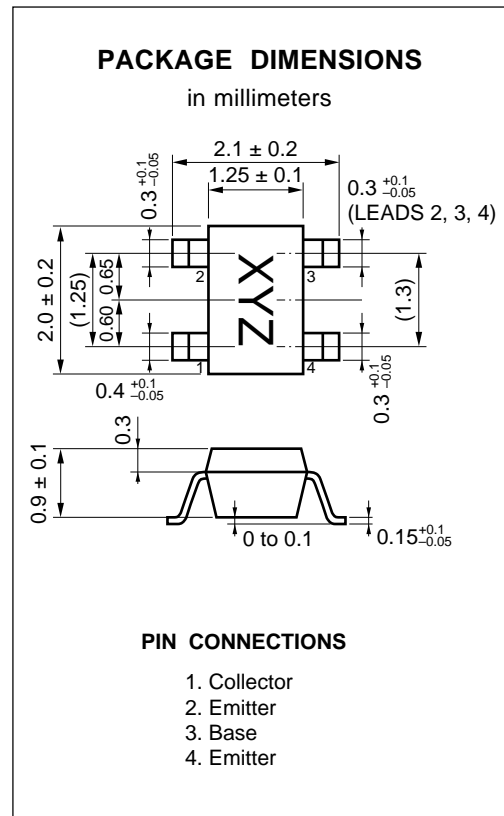
ORDERING INFORMATION

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)

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$  °C)

Collector to Base Voltage	$V_{CB0}$	20	V
Collector to Emitter Voltage	$V_{CE0}$	12	V
Emitter to Base Voltage	$V_{EB0}$	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.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I <sub>CB0</sub>			1.0	μA	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			1.0	μA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	50	120	250		V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA* <sup>1</sup>
Gain Bandwidth Product	f <sub>T</sub>		6.5		GHz	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA
Feed-back Capacitance	C <sub>re</sub>		0.5	0.9	pF	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz* <sup>2</sup>
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	11	13		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA, f = 1.0 GHz
Noise Figure	NF		1.1	2.0	dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 7 mA, f = 1.0 GHz

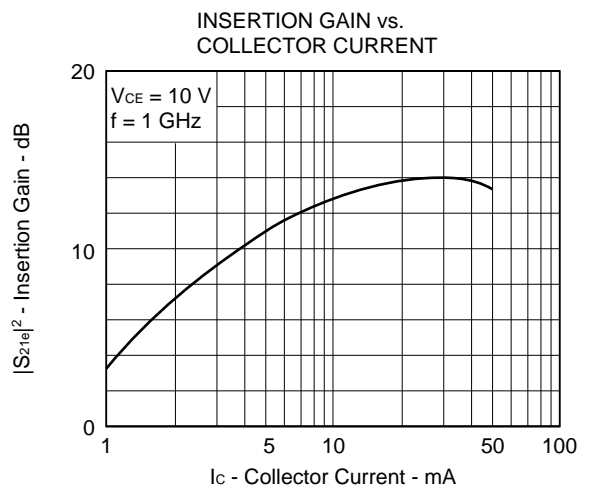
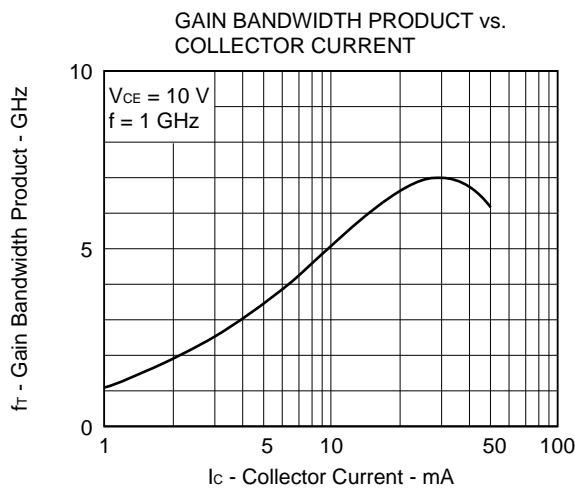
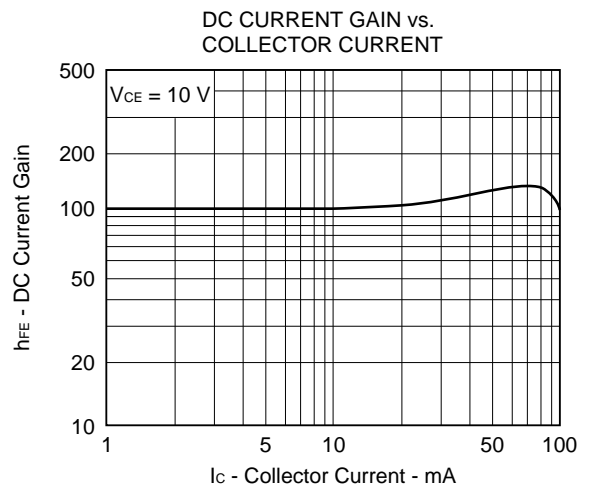
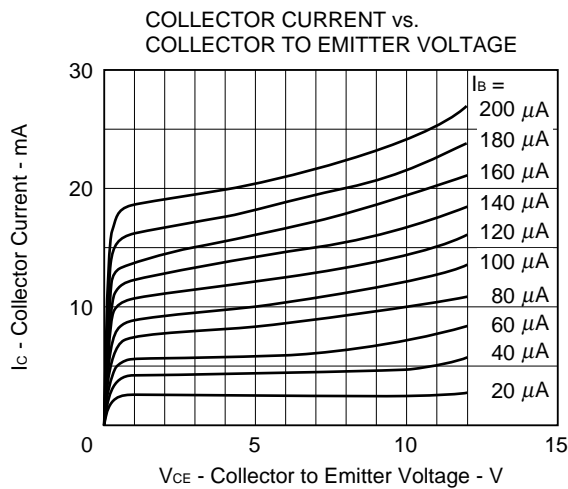
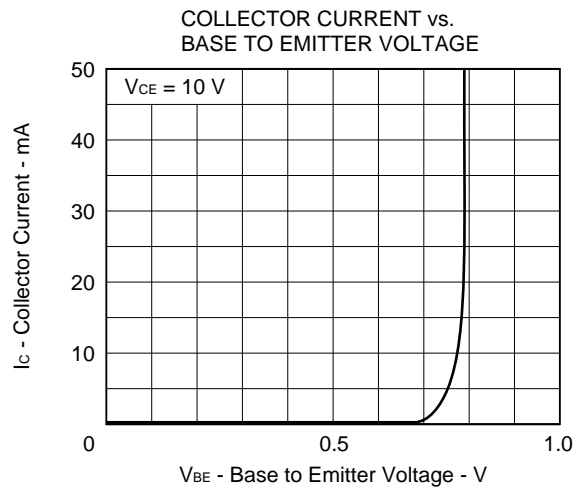
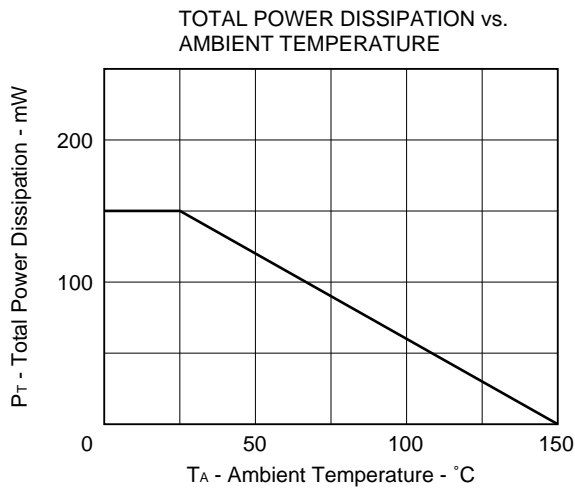
\*1 Pulse Measurement; PW ≤ 350 μs, Duty Cycle ≤ 2 % Pulsed.

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

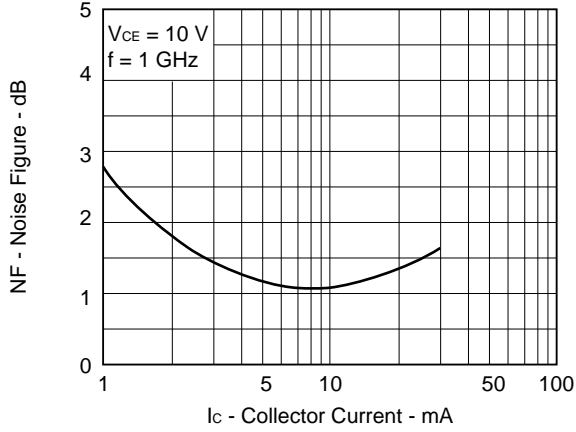
**h<sub>FE</sub> Classification**

Rank	EB	FB	GB
Marking	R26	R27	R28
h <sub>FE</sub>	50 to 100	80 to 160	125 to 250

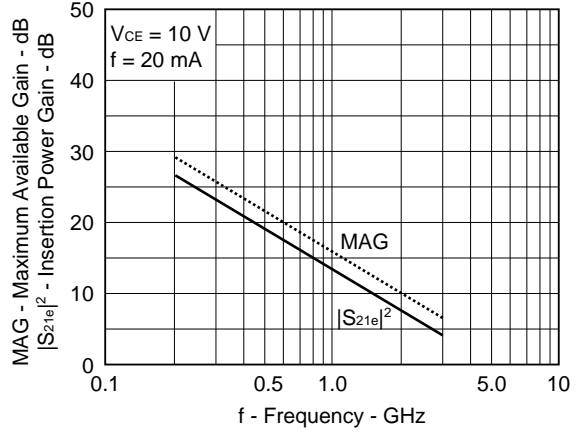
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



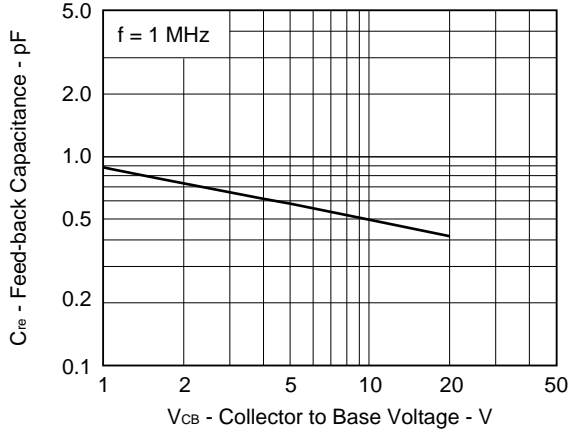
NOISE FIGURE vs. COLLECTOR CURRENT



INSERTION POWER GAIN/MAXIMUM AVAILABLE GAIN vs. FREQUENCY



FEED-BACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



**S-PARAMETER**

V<sub>CE</sub> = 10 V, I<sub>c</sub> = 20 mA

FREQUENCY f (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA

FREQUENCY f (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA

FREQUENCY f (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA

FREQUENCY f (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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]

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NEC devices are classified into the following three quality grades:

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Anti-radioactive design is not implemented in this product.