DATA SHEET

NEC

SILICON TRANSISTOR

2SC5014

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

FEATURES

- Small Package
- High Gain Bandwidth Product (f_T = 12 GHz TYP.)
- Low Noise, High Gain
- Low Voltage Operation

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5014-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Base), Pin4 (Emitter) face to perforation side of the tape.
2SC5014-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Collector), Pin2 (Emitter) face to perforation side of the tape.

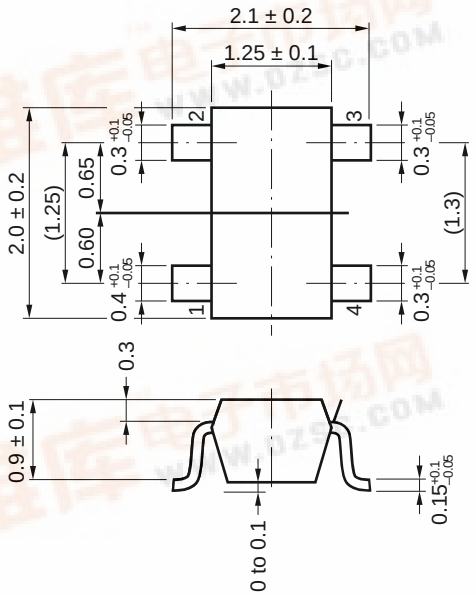
* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: 2SC5014)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ˚C)

Collector to Base Voltage	V_{CBO}	9	V
Collector to Emitter Voltage	V_{CEO}	6	V
Emitter to Base Voltage	V_{EBO}	2	V
Collector Current	I_C	10	mA
Total Power Dissipation	P_T	60	mW
Junction Temperature	T_j	150	˚C
Storage Temperature	T_{stg}	–65 to +150	˚C

PACKAGE DIMENSIONS

in millimeters



PIN CONNECTIONS

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

Caution; Electrostatic Sensitive Device.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I_{CBO}			0.1	μA	V_{CB} = 5 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			0.1	μA	V_{EB} = 1 V, I_C = 0
DC Current Gain	h_{FE}	75		150		V_{CE} = 3 V, I_C = 5 mA***1**
Gain Bandwidth Product	f_T		12		GHz	V_{CE} = 3 V, I_C = 5 mA
Feed-back Capacitance	C_{re}		0.2	0.4	pF	V_{CB} = 3 V, I_E = 0, f = 1 MHz***2**
Insertion Power Gain	$\|S_{21e}\|^2$	9	11		dB	V_{CE} = 3 V, I_C = 5 mA, f = 2.0 GHz
Noise Figure	NF		2.5	4.0	dB	V_{CE} = 3 V, I_C = 3 mA, f = 2.0 GHz

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

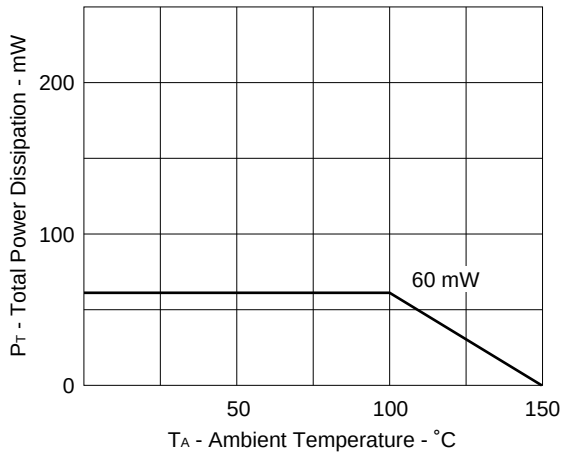
***2** Measured with 3 terminals bridge, Emitter and Case should be grounded.

h_{FE} Classification

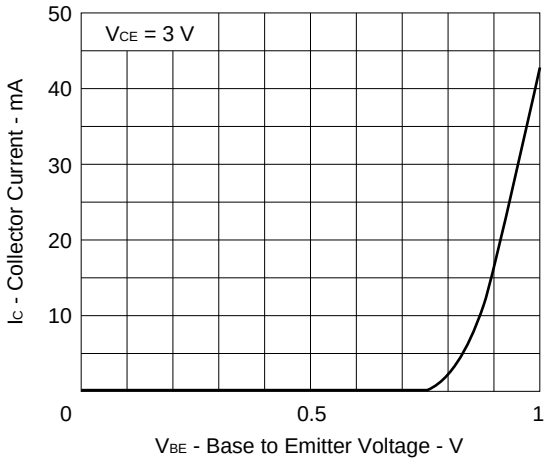
Rank	KB
Marking	T82
h_{FE}	75 to 150

TYPICAL CHARACTERISTICS (T_A = 25 °C)

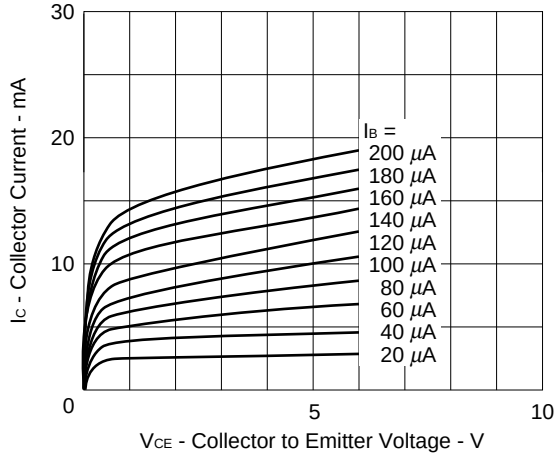
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



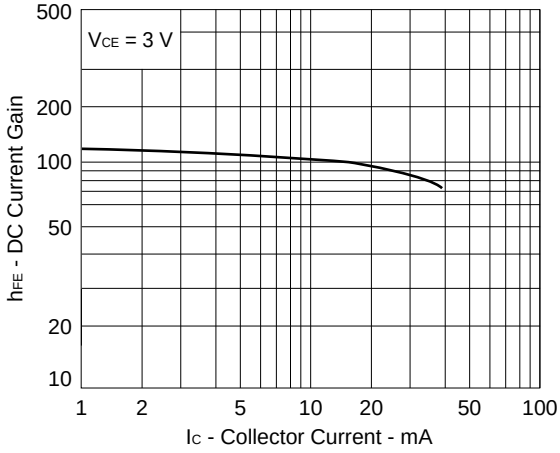
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



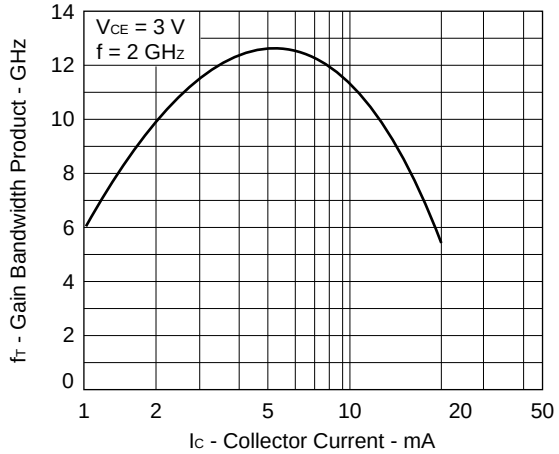
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



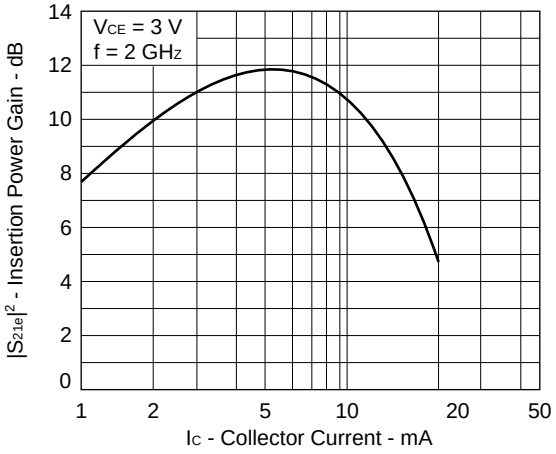
DC CURRENT GAIN vs. COLLECTOR CURRENT



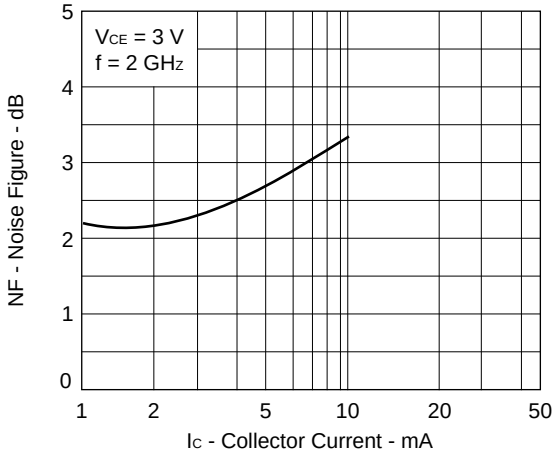
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



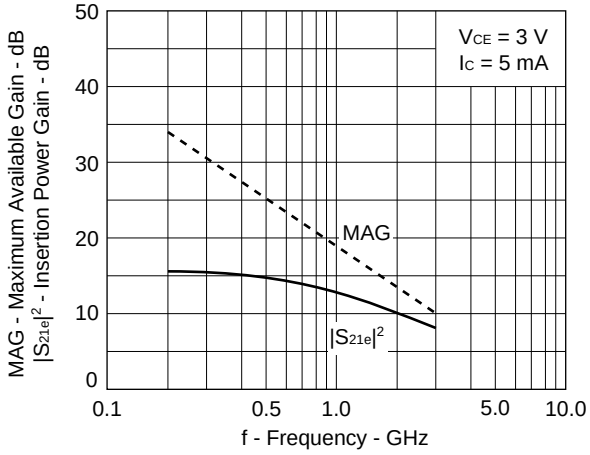
INSERTION POWER GAIN vs. COLLECTOR CURRENT



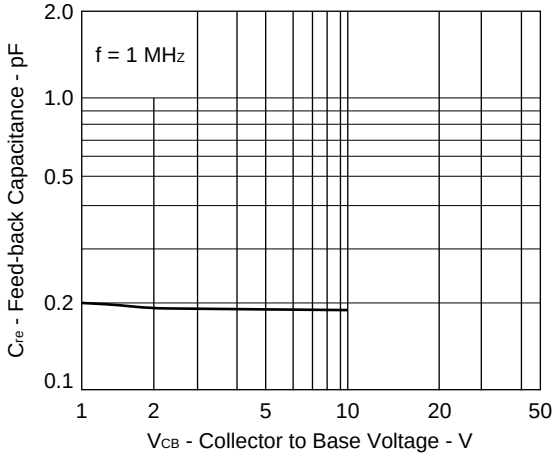
NOISE FIGURE vs.
COLLECTOR CURRENT



INSERTION POWER GAIN/MAXIMUM
AVAILABLE GAIN vs. FREQUENCY



FEED BACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



S-PARAMETER

V_{CE} = 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	.823	–8.8	11.035	169.7	.009	88.8	.985	–5.7
200.00	.793	–18.1	10.640	159.5	.020	84.1	.957	–11.0
300.00	.749	–26.0	10.141	150.5	.033	72.2	.930	–15.8
400.00	.695	–33.0	9.390	142.2	.042	73.5	.885	–20.1
500.00	.635	–39.4	8.859	134.0	.049	68.9	.842	–23.8
600.00	.590	–45.4	8.274	127.8	.055	63.7	.795	–26.8
700.00	.539	–51.0	7.737	121.6	.059	64.9	.761	–29.5
800.00	.498	–55.5	7.130	116.0	.069	60.0	.720	–32.3
900.00	.448	–59.6	6.637	111.1	.073	60.3	.685	–33.3
1000.00	.410	–63.7	6.241	106.5	.078	58.1	.666	–34.7
1100.00	.374	–67.3	5.816	102.6	.079	56.9	.638	–36.7
1200.00	.340	–70.7	5.403	98.4	.084	58.3	.619	–38.1
1300.00	.306	–74.1	5.119	95.1	.094	57.5	.591	–39.6
1400.00	.285	–77.1	4.838	91.6	.094	56.5	.577	–40.9
1500.00	.249	–80.7	4.587	88.1	.102	55.4	.556	–42.0
1600.00	.230	–82.9	4.351	85.2	.110	54.0	.544	–43.2
1700.00	.211	–90.3	4.155	82.8	.110	54.5	.520	–44.4
1800.00	.189	–93.1	3.961	79.7	.116	52.7	.520	–46.1
1900.00	.180	–93.5	3.780	77.3	.123	51.6	.508	–47.4
2000.00	.160	–101.3	3.645	74.1	.124	50.4	.505	–49.4
2100.00	.132	–103.4	3.473	71.8	.126	51.8	.485	–50.7
2200.00	.116	–113.9	3.340	68.6	.139	50.2	.477	–51.6
2300.00	.112	–115.1	3.199	67.1	.140	50.2	.481	–52.4
2400.00	.091	–121.2	3.095	64.8	.148	48.0	.452	–53.5
2500.00	.082	–127.8	2.992	62.1	.148	50.0	.451	–55.5
2600.00	.078	–138.4	2.896	59.8	.157	45.7	.451	–55.1
2700.00	.070	–147.3	2.779	58.7	.166	45.5	.452	–58.6
2800.00	.076	–149.6	2.719	55.5	.163	44.2	.446	–61.7
2900.00	.065	–158.2	2.614	54.0	.164	45.8	.431	–61.1
3000.00	.072	–165.5	2.532	51.4	.173	42.6	.432	–64.4

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	.884	–6.6	8.068	172.0	.011	93.9	.992	–4.4
200.00	.860	–14.2	7.892	163.8	.024	80.0	.977	–9.0
300.00	.834	–20.5	7.693	156.3	.032	80.2	.958	–13.3
400.00	.796	–26.7	7.283	149.2	.042	76.9	.925	–17.0
500.00	.748	–32.8	7.076	141.6	.052	67.6	.895	–21.1
600.00	.717	–38.2	6.761	136.1	.058	67.4	.862	–24.5
700.00	.669	–43.8	6.499	129.9	.070	63.3	.836	–26.7
800.00	.628	–48.0	6.091	124.2	.073	59.3	.793	–30.8
900.00	.578	52.7	5.764	119.2	.083	60.1	.762	–32.5
1000.00	.536	–56.1	5.505	114.4	.092	56.6	.743	–35.1
1100.00	.500	–61.3	5.203	110.3	.097	56.4	.712	–36.7
1200.00	.468	–64.2	4.885	105.5	.100	55.4	.691	–38.3
1300.00	.431	–68.0	4.675	101.9	.100	54.5	.657	–40.0
1400.00	.399	–72.0	4.449	98.1	.108	53.8	.645	–42.5
1500.00	.366	–75.4	4.243	94.4	.113	51.2	.615	–44.0
1600.00	.338	–78.3	4.047	91.0	.116	51.6	.599	–45.4
1700.00	.318	–82.5	3.904	88.5	.122	50.7	.578	–46.7
1800.00	.285	–86.3	3.719	84.9	.120	48.6	.572	–48.2
1900.00	.267	–87.6	3.566	82.3	.133	47.7	.556	–49.2
2000.00	.247	–94.1	3.456	79.0	.137	44.6	.552	–52.5
2100.00	.217	–96.8	3.295	76.4	.142	48.1	.531	–53.6
2200.00	.203	–100.7	3.179	73.0	.142	44.9	.525	–54.4
2300.00	.190	–105.0	3.068	71.1	.146	44.0	.518	–54.8
2400.00	.167	–105.7	2.958	68.5	.147	42.7	.492	–56.1
2500.00	.160	–112.6	2.883	65.9	.159	42.0	.492	–58.4
2600.00	.140	–120.1	2.772	63.4	.162	43.1	.481	–58.7
2700.00	.134	–123.6	2.690	61.9	.161	43.7	.470	–61.6
2800.00	.130	–125.1	2.621	58.8	.169	38.4	.472	–64.0
2900.00	.128	–133.0	2.523	57.0	.173	41.4	.468	–64.0
3000.00	.108	–132.3	2.453	54.2	.175	39.1	.461	–67.8

S-PARAMETER

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	.958	–4.1	3.306	175.2	.012	90.6	.993	–2.6
200.00	.949	–8.4	3.287	170.0	.026	83.1	.990	–5.6
300.00	.940	–12.0	3.275	165.4	.039	83.7	.993	–8.3
400.00	.925	–16.2	3.205	160.8	.046	78.7	.976	–11.2
500.00	.908	–20.4	3.226	155.1	.055	74.7	.971	–14.3
600.00	.900	–24.1	3.182	151.3	.069	74.6	.960	–16.9
700.00	.879	–28.2	3.185	146.4	.079	68.4	.951	–19.4
800.00	.860	–31.9	3.100	141.5	.090	65.7	.930	–23.1
900.00	.822	–36.0	3.045	137.0	.100	65.1	.907	–25.2
1000.00	.811	–39.4	3.015	132.6	.110	61.9	.904	–27.4
1100.00	.782	–43.3	2.944	128.6	.115	57.3	.879	–30.1
1200.00	.749	–47.4	2.859	123.5	.127	57.3	.865	–32.8
1300.00	.722	–50.7	2.822	119.8	.130	54.9	.838	–35.0
1400.00	.694	–54.3	2.750	115.7	.141	50.6	.827	–38.1
1500.00	.663	–58.1	2.700	111.3	.145	50.5	.802	–39.6
1600.00	.641	–61.5	2.600	107.3	.155	47.1	.788	–41.8
1700.00	.616	–65.3	2.595	104.6	.158	45.3	.763	–44.3
1800.00	.580	–68.5	2.521	100.4	.163	42.4	.755	–46.3
1900.00	.562	–72.3	2.450	97.2	.165	40.2	.728	–48.5
2000.00	.531	–76.8	2.424	93.1	.172	39.6	.721	–51.1
2100.00	.498	–77.9	2.340	90.0	.180	38.4	.706	–53.3
2200.00	.470	–81.7	2.291	85.9	.185	35.7	.695	–55.0
2300.00	.453	–84.7	2.232	83.5	.181	33.9	.673	–56.5
2400.00	.419	–86.6	2.158	80.1	.188	32.4	.654	–57.9
2500.00	.404	–92.0	2.134	77.2	.191	32.8	.652	–60.2
2600.00	.372	–95.0	2.063	73.8	.192	31.7	.632	–60.0
2700.00	.366	–97.8	2.016	72.4	.190	31.6	.612	–63.1
2800.00	.355	–101.0	1.990	68.6	.189	29.4	.620	–66.5
2900.00	.340	–104.6	1.920	66.2	.196	28.2	.611	–66.7
3000.00	.316	–107.2	1.907	62.9	.204	26.9	.599	–70.0

[MEMO]