NEC

SILICON TRANSISTOR
2SC5010

NPN SILICON EPITAXIAL TRANSISTOR
3 PINS ULTRA SUPER MINI MOLD

DESCRIPTION

The 2SC5010 is an NPN epitaxial silicon transistor designed for use in low noise and small signal amplifiers from VHF band to L band. Low noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This is achieved by direct nitride passivated base surface process (NEST3 process) which is an NEC proprietary fabrication technique.

FEATURES

- Low Voltage Use.
- High f_T : 12.0 GHz TYP. (@ V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz)
- Low C_{re} : 0.4 pF TYP. (@ V_{CE} = 3 V, I_E = 0, f = 1 MHz)
- Low NF : 1.5 dB TYP. (@ V_{CE} = 3 V, I_C = 3 mA, f = 2 GHz)
- High $|S_{21e}|^2$: 8.5 dB TYP. (@ V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz)
- Ultra Super Mini Mold Package.

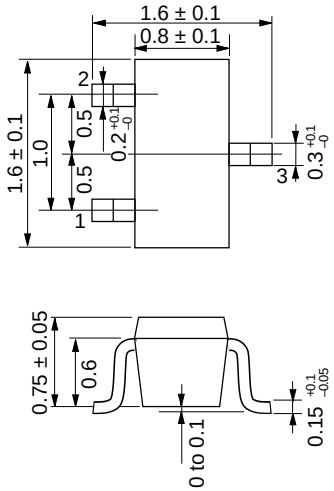
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5010	50 pcs/Unit.	Embossed tape 8 mm wide. Pin3(Collector) face to perforation side of the tape.
2SC5010-T1	3 kpcs/Reel.	

* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs.

PACKAGE DIMENSIONS

in milimeters



1. Emitter
2. Base
3. Collector

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	30	mA
Total Power Dissipation	P_T	125	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Document No. P10389EJ2V0DS00 (2nd edition)
(Previous No. TD-2401)
Date Published July 1995 P
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
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 = 10 mA***1**
Gain Bandwidth Product	f_T		12.0		GHz	V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz
Feed-Back Capacitance	C_{re}		0.4	0.7	pF	V_{CE} = 3 V, I_E = 0 , f = 1 MHz***2**
Insertion Power Gain	$\|S_{21e}\|^2$	7.0	8.5		dB	V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz
Noise Figure	NF		1.5	2.5	dB	V_{CE} = 3 V, I_C = 3 mA, f = 2 GHz

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

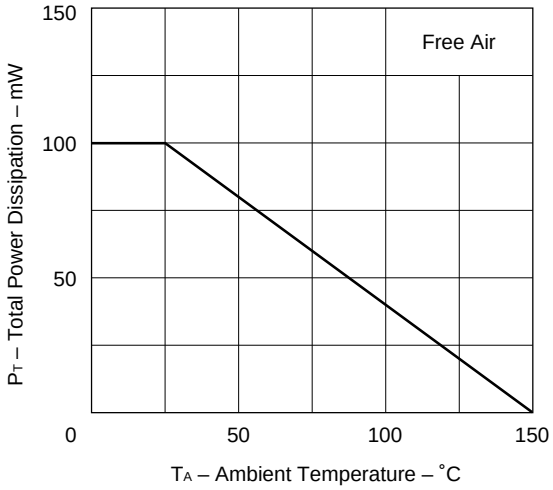
***2** The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

h_{FE} Classification

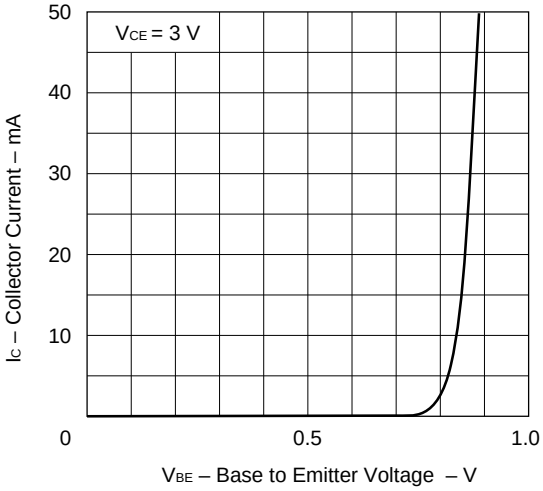
Rank	FB
Marking	83
h_{FE}	75 to 150

TYPICAL CHARACTERISTICS (T_A = 25 °C)

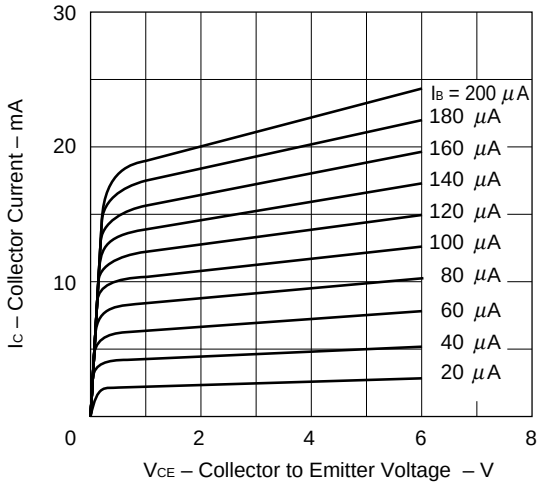
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



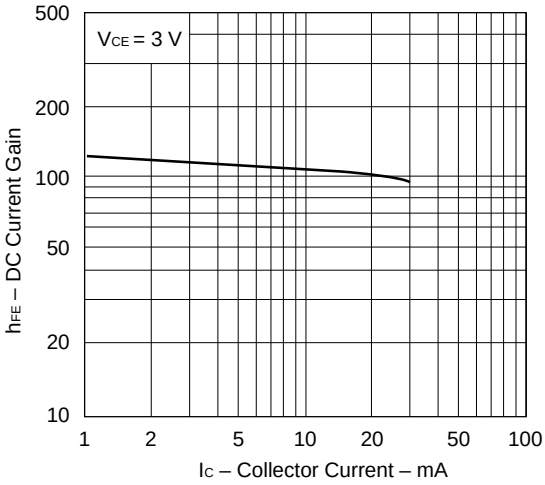
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



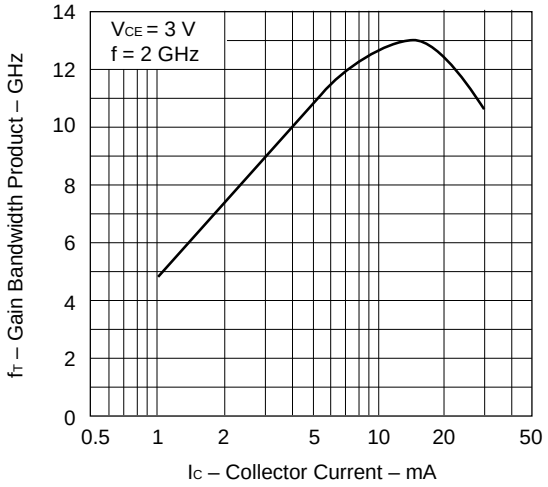
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



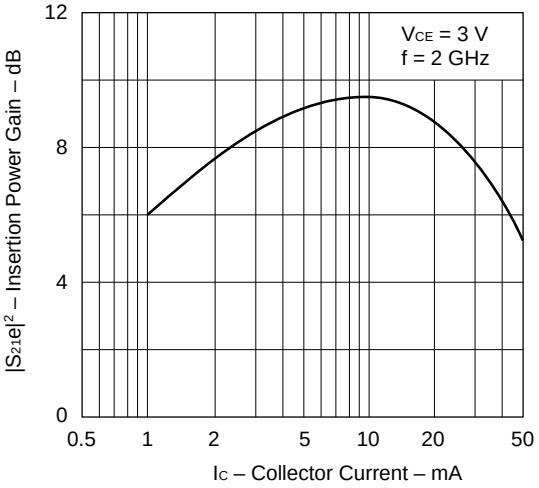
DC CURRENT GAIN vs. COLLECTOR CURRENT



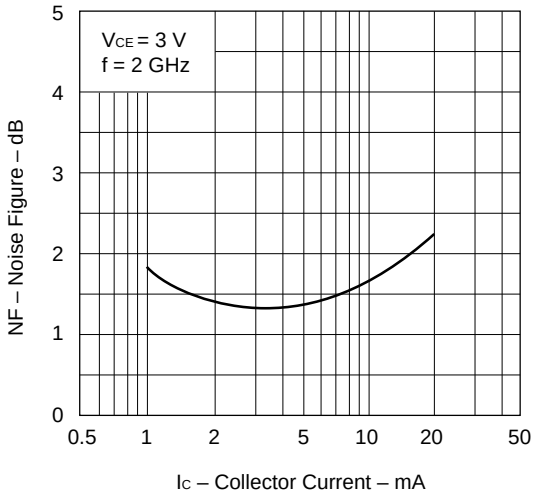
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



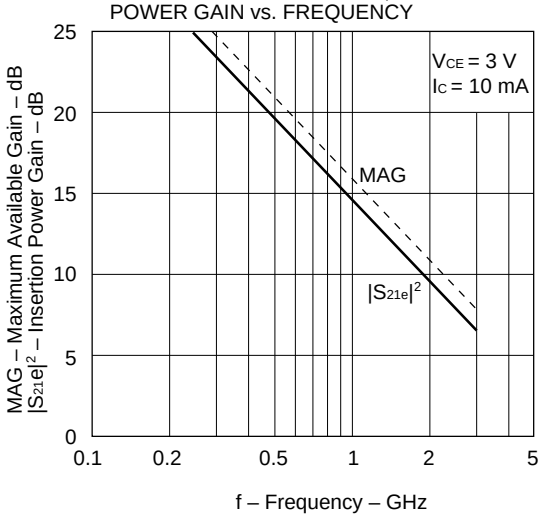
INSERTION POWER GAIN vs. COLLECTOR CURRENT



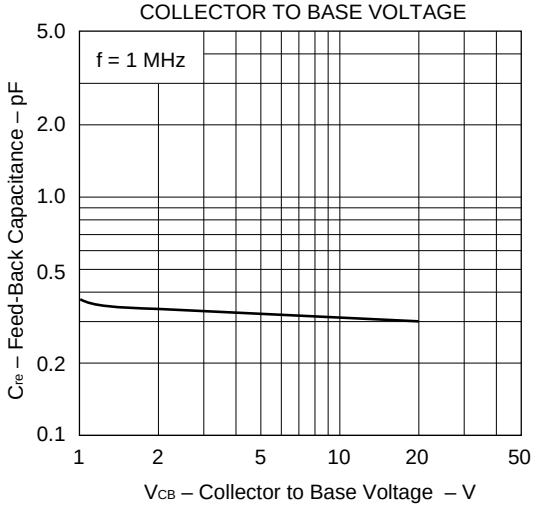
NOISE FIGURE vs. COLLECTOR CURRENT



MAXIMUM AVAILABLE GAIN, INSERTION POWER GAIN vs. FREQUENCY



FEED-BACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



S-PARAMETER

V_{CE} = 3 V, I_C = 10 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.735	–18.7	15.465	157.7	.017	78.5	.931	–15.0
200.00	.640	–37.8	14.330	142.1	.030	69.7	.810	–25.9
300.00	.534	–55.7	13.115	129.2	.040	66.3	.700	–32.4
400.00	.438	–71.4	11.574	118.3	.048	64.5	.612	–36.2
500.00	.364	–84.9	10.235	109.9	.057	63.7	.547	–38.2
600.00	.311	–96.6	8.943	103.1	.064	63.3	.499	–39.4
700.00	.268	–107.0	7.935	97.7	.072	62.8	.461	–40.4
800.00	.241	–116.9	7.105	92.7	.080	62.7	.430	–40.9
900.00	.218	–126.4	6.425	88.7	.088	62.6	.405	–41.7
1000.00	.204	–135.9	5.864	84.8	.095	62.0	.386	–42.2
1100.00	.192	–144.5	5.397	81.4	.103	61.0	.370	–42.8
1200.00	.186	–153.7	4.992	78.1	.111	60.9	.354	–43.6
1300.00	.183	–161.8	4.628	75.1	.119	60.5	.341	–44.5
1400.00	.184	–169.5	4.348	72.3	.127	59.4	.328	–45.4
1500.00	.185	–176.7	4.072	69.2	.134	58.4	.317	–46.8
1600.00	.189	176.4	3.851	66.6	.142	57.7	.305	–48.0
1700.00	.196	169.9	3.643	63.8	.151	56.9	.294	–49.1
1800.00	.201	164.8	3.457	61.3	.158	55.9	.285	–50.6
1900.00	.208	159.7	3.311	59.0	.166	55.1	.271	–52.2
2000.00	.219	155.1	3.156	56.6	.176	53.7	.261	–54.0
2100.00	.228	150.6	3.024	54.1	.183	52.3	.249	–55.6
2200.00	.239	147.1	2.904	51.5	.190	51.4	.239	–57.7
2300.00	.248	143.3	2.790	49.3	.199	50.3	.229	–59.8
2400.00	.259	139.9	2.685	46.8	.207	49.0	.218	–62.0
2500.00	.270	136.9	2.593	44.7	.215	47.9	.206	–64.6
2600.00	.281	133.7	2.511	42.2	.223	46.4	.197	–67.1
2700.00	.293	131.6	2.425	40.2	.230	45.5	.185	–70.1
2800.00	.305	128.7	2.354	37.9	.237	43.9	.174	–73.8
2900.00	.316	126.3	2.283	35.6	.246	43.0	.162	–77.0
3000.00	.329	124.5	2.220	33.5	.253	41.5	.151	–81.1

V_{CE} = 3 V, I_C = 7 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.855	–14.2	10.699	164.8	.019	80.2	.968	–10.6
200.00	.787	–28.4	10.334	151.4	.035	73.3	.902	–19.8
300.00	.715	–41.9	9.924	140.1	.048	68.5	.825	–27.0
400.00	.631	–54.9	9.183	130.2	.059	63.4	.743	–32.5
500.00	.561	–66.5	8.559	121.7	.068	60.9	.678	–36.5
600.00	.495	–77.0	7.749	113.9	.077	58.8	.621	–39.4
700.00	.434	–86.4	7.090	107.6	.084	57.5	.572	–41.9
800.00	.387	–95.8	6.490	101.5	.092	56.4	.531	–43.4
900.00	.346	–104.1	5.972	96.6	.099	55.5	.496	–45.1
1000.00	.313	–113.2	5.531	91.8	.105	55.0	.467	–46.4
1100.00	.287	–121.1	5.117	87.8	.113	54.3	.442	–47.3
1200.00	.266	–129.5	4.767	83.8	.119	54.0	.420	–48.4
1300.00	.251	–137.5	4.442	80.3	.126	53.3	.399	–49.7
1400.00	.242	–145.6	4.192	77.1	.133	52.8	.381	–50.5
1500.00	.232	–153.7	3.936	73.7	.140	52.3	.364	–51.9
1600.00	.228	–161.2	3.730	70.7	.147	51.7	.349	–53.1
1700.00	.227	–169.2	3.537	67.6	.155	50.8	.336	–54.4
1800.00	.226	–176.4	3.355	64.9	.161	50.1	.321	–55.8
1900.00	.230	177.5	3.210	62.1	.169	49.6	.307	–57.3
2000.00	.236	170.8	3.066	59.5	.177	48.7	.296	–59.0
2100.00	.243	164.7	2.944	56.7	.183	47.7	.282	–60.6
2200.00	.250	159.6	2.825	54.0	.190	47.0	.269	–62.6
2300.00	.258	154.8	2.725	51.8	.198	46.0	.259	–64.6
2400.00	.267	150.0	2.623	49.1	.205	45.0	.247	–66.7
2500.00	.277	145.9	2.534	46.8	.212	44.0	.235	–68.8
2600.00	.288	141.7	2.455	44.2	.221	43.1	.225	–71.3
2700.00	.300	138.8	2.370	41.9	.228	42.0	.211	–73.9
2800.00	.312	135.3	2.305	39.5	.234	41.0	.200	–77.3
2900.00	.321	132.0	2.230	37.1	.243	40.0	.189	–80.7
3000.00	.335	129.5	2.172	34.9	.250	38.7	.179	–84.3

S-PARAMETER

V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.900	–11.4	8.160	166.3	.019	80.5	.976	–9.1
200.00	.845	–23.9	8.072	154.4	.036	74.9	.927	–17.4
300.00	.788	–35.4	7.948	144.3	.051	68.4	.864	–24.2
400.00	.723	–46.6	7.529	135.0	.063	63.7	.795	–29.8
500.00	.657	–57.7	7.230	127.4	.074	60.9	.733	–34.2
600.00	.595	–67.8	6.685	119.6	.081	57.5	.678	–37.7
700.00	.528	–77.3	6.274	113.0	.089	56.1	.627	–40.7
800.00	.475	–86.7	5.874	106.5	.097	54.5	.583	–42.7
900.00	.425	–95.3	5.482	101.0	.103	53.4	.545	–44.7
1000.00	.384	–104.3	5.150	95.7	.110	52.3	.514	–46.4
1100.00	.347	–112.0	4.796	91.2	.118	51.5	.486	–47.5
1200.00	.321	–120.5	4.512	87.0	.123	51.3	.460	–48.8
1300.00	.298	–128.4	4.221	83.1	.129	50.4	.438	–50.3
1400.00	.283	–136.2	3.994	79.4	.137	49.6	.418	–51.4
1500.00	.268	–144.2	3.770	75.8	.143	49.4	.400	–52.8
1600.00	.258	–151.8	3.568	72.7	.149	48.6	.382	–54.2
1700.00	.254	–159.7	3.400	69.4	.155	48.3	.368	–55.2
1800.00	.249	–167.2	3.229	66.6	.162	47.3	.353	–56.7
1900.00	.250	–173.7	3.101	63.5	.169	46.8	.337	–58.4
2000.00	.253	179.0	2.957	60.8	.176	46.1	.324	–59.8
2100.00	.257	172.5	2.845	58.0	.183	45.4	.310	–61.7
2200.00	.263	166.7	2.730	55.2	.189	44.6	.296	–63.6
2300.00	.269	161.3	2.640	52.7	.196	43.7	.284	–65.5
2400.00	.277	156.2	2.539	49.9	.203	43.1	.272	–67.6
2500.00	.285	151.5	2.456	47.4	.211	41.9	.261	–69.8
2600.00	.296	147.0	2.380	44.8	.217	41.0	.250	–72.2
2700.00	.305	143.5	2.301	42.4	.223	40.4	.237	–74.4
2800.00	.318	139.6	2.234	39.9	.231	39.3	.225	–77.6
2900.00	.327	136.1	2.164	37.5	.238	38.3	.214	–80.7
3000.00	.341	133.2	2.110	35.2	.244	37.3	.204	–84.1

V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.948	–9.1	5.295	168.1	.020	82.4	.987	–7.0
200.00	.912	–18.6	5.291	158.4	.038	76.4	.955	–13.8
300.00	.876	–27.7	5.354	149.7	.055	70.1	.914	–19.8
400.00	.831	–37.1	5.177	141.3	.069	66.3	.864	–25.2
500.00	.784	–46.0	5.109	135.2	.082	61.6	.816	–29.7
600.00	.737	–54.7	4.832	127.8	.092	57.9	.769	–33.6
700.00	.680	–62.9	4.667	121.7	.101	55.1	.721	–37.2
800.00	.635	–71.7	4.504	115.1	.108	52.6	.678	–39.9
900.00	.581	–80.0	4.335	109.5	.115	50.8	.636	–42.7
1000.00	.530	–89.2	4.226	103.5	.123	48.8	.602	–44.7
1100.00	.480	–97.5	4.038	98.3	.129	47.8	.570	–46.5
1200.00	.441	–105.8	3.879	93.3	.135	46.8	.544	–48.2
1300.00	.408	–113.4	3.680	88.8	.140	45.5	.517	–50.1
1400.00	.382	–121.2	3.528	84.7	.146	44.3	.493	–51.6
1500.00	.358	–128.9	3.359	80.5	.151	43.8	.471	–53.2
1600.00	.339	–136.3	3.200	76.9	.156	43.2	.451	–54.8
1700.00	.324	–144.4	3.076	73.1	.161	42.6	.432	–56.2
1800.00	.311	–151.7	2.932	70.0	.166	41.9	.416	–57.7
1900.00	.305	–158.8	2.825	66.6	.172	41.2	.398	–59.3
2000.00	.301	–166.7	2.712	63.4	.178	40.5	.384	–60.9
2100.00	.299	–173.5	2.614	60.4	.183	40.2	.367	–62.6
2200.00	.300	180.0	2.508	57.2	.189	39.5	.354	–64.4
2300.00	.303	173.7	2.434	54.5	.195	38.9	.340	–66.4
2400.00	.307	167.8	2.348	51.5	.201	38.2	.329	–68.3
2500.00	.311	162.3	2.276	49.0	.206	37.9	.313	–70.6
2600.00	.320	156.7	2.209	45.9	.212	37.0	.303	–72.5
2700.00	.327	152.5	2.140	43.5	.218	36.5	.290	–75.1
2800.00	.337	148.0	2.080	40.8	.223	35.7	.278	–77.8
2900.00	.346	143.7	2.019	38.2	.229	35.1	.267	–80.5
3000.00	.359	140.1	1.967	35.8	.235	34.3	.256	–83.7

S-PARAMETER

V_{CE} = 3 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	1.007	–5.9	1.878	172.3	.020	83.6	.998	–4.2
200.00	.988	–12.5	1.925	164.3	.040	80.5	.986	–8.2
300.00	.978	–18.3	2.006	157.9	.059	75.4	.975	–12.3
400.00	.953	–25.2	2.012	150.9	.077	71.4	.955	–16.2
500.00	.939	–30.9	2.031	145.7	.095	66.7	.937	–19.8
600.00	.921	–37.5	1.974	139.1	.110	62.8	.916	–23.3
700.00	.889	–43.2	1.942	133.9	.125	58.6	.893	–26.9
800.00	.871	–49.3	1.914	127.9	.139	54.9	.865	–30.0
900.00	.838	–55.6	1.875	122.8	.149	50.9	.836	–33.6
1000.00	.811	–62.4	1.917	117.8	.160	47.9	.807	–36.5
1100.00	.770	–69.7	1.925	112.5	.169	44.6	.781	–38.9
1200.00	.739	–76.5	1.961	107.7	.175	42.1	.755	–41.4
1300.00	.706	–83.5	1.927	102.7	.182	39.6	.729	–44.0
1400.00	.677	–90.1	1.923	98.4	.188	36.8	.704	–46.3
1500.00	.646	–97.2	1.886	93.2	.192	34.9	.679	–48.6
1600.00	.616	–103.7	1.849	89.2	.196	32.6	.656	–50.8
1700.00	.589	–111.3	1.843	84.4	.200	30.8	.635	–53.0
1800.00	.562	–118.1	1.786	80.4	.201	29.0	.616	–55.1
1900.00	.538	–125.1	1.786	76.1	.203	27.7	.593	–57.1
2000.00	.512	–133.6	1.762	71.8	.206	26.1	.575	–59.1
2100.00	.495	–140.2	1.729	68.0	.207	25.2	.557	–61.2
2200.00	.480	–147.6	1.689	63.9	.207	23.9	.540	–63.2
2300.00	.468	–154.5	1.676	60.4	.209	23.0	.522	–65.2
2400.00	.459	–161.6	1.630	56.7	.210	22.3	.511	–67.3
2500.00	.451	–168.1	1.600	53.4	.210	21.7	.494	–69.5
2600.00	.447	–175.0	1.576	49.7	.212	21.5	.481	–71.7
2700.00	.443	179.1	1.538	46.5	.213	21.1	.467	–74.0
2800.00	.445	173.0	1.509	43.4	.214	21.0	.457	–76.5
2900.00	.443	166.8	1.482	40.1	.216	20.6	.441	–79.1
3000.00	.449	161.9	1.453	37.3	.217	20.5	.432	–81.9

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.862	–14.2	8.672	160.8	.023	80.2	.956	–13.0
200.00	.795	–28.9	8.389	148.6	.042	70.5	.875	–24.2
300.00	.718	–43.2	8.162	137.5	.057	64.0	.778	–32.6
400.00	.638	–57.7	7.624	128.2	.070	59.5	.691	–39.0
500.00	.573	–71.2	7.259	119.8	.079	57.7	.618	–43.6
600.00	.510	–83.2	6.617	112.0	.088	55.2	.556	–47.2
700.00	.447	–95.3	6.154	105.2	.096	53.5	.504	–50.1
800.00	.402	–106.5	5.675	98.7	.103	52.8	.459	–52.2
900.00	.364	–117.0	5.254	93.5	.111	52.4	.423	–54.2
1000.00	.336	–127.2	4.875	88.6	.118	51.3	.393	–55.8
1100.00	.314	–136.0	4.517	84.4	.126	50.7	.366	–57.1
1200.00	.300	–144.9	4.206	80.3	.133	50.3	.343	–58.7
1300.00	.289	–153.1	3.922	76.7	.139	49.5	.323	–60.4
1400.00	.286	–160.7	3.699	73.4	.147	48.9	.303	–61.7
1500.00	.282	–167.9	3.473	69.9	.155	48.3	.286	–63.7
1600.00	.282	–174.7	3.293	66.9	.162	47.5	.271	–65.3
1700.00	.286	178.6	3.128	63.6	.170	46.8	.255	–67.1
1800.00	.288	172.9	2.962	60.9	.177	46.2	.242	–69.0
1900.00	.294	167.6	2.838	58.1	.186	45.3	.227	–71.6
2000.00	.303	162.2	2.707	55.2	.193	44.4	.214	–74.0
2100.00	.310	157.3	2.599	52.5	.201	43.5	.200	–76.5
2200.00	.318	152.9	2.487	49.6	.208	42.5	.189	–79.5
2300.00	.327	148.8	2.404	47.4	.215	41.5	.176	–83.1
2400.00	.336	144.9	2.312	44.6	.223	40.5	.166	–86.5
2500.00	.347	141.4	2.234	42.3	.231	39.5	.154	–90.9
2600.00	.359	137.6	2.165	39.6	.237	38.2	.146	–94.9
2700.00	.368	134.9	2.089	37.3	.245	37.3	.135	–100.8
2800.00	.381	131.9	2.028	34.8	.252	36.4	.126	–106.2
2900.00	.390	128.8	1.962	32.5	.260	35.1	.118	–113.3
3000.00	.403	126.6	1.913	30.2	.267	34.0	.113	–121.0

S-PARAMETER

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.932	–10.9	5.529	165.7	.024	81.3	.977	–9.5
200.00	.886	–21.6	5.442	154.3	.045	73.7	.930	–18.3
300.00	.838	–32.2	5.475	144.7	.063	67.9	.869	–25.8
400.00	.788	–42.9	5.242	136.1	.079	61.7	.800	–32.3
500.00	.733	–53.6	5.156	129.6	.092	57.3	.739	–37.5
600.00	.682	–63.5	4.819	122.0	.102	53.8	.682	–41.9
700.00	.620	–73.4	4.644	115.5	.112	50.8	.628	–45.8
800.00	.573	–83.7	4.447	108.7	.119	49.1	.579	–48.8
900.00	.520	–93.9	4.276	103.0	.126	47.2	.535	–51.8
1000.00	.473	–104.2	4.118	96.8	.133	45.6	.498	–54.0
1100.00	.431	–113.9	3.894	91.7	.140	44.6	.467	–55.9
1200.00	.400	–123.4	3.708	86.7	.145	43.7	.439	–57.8
1300.00	.376	–131.6	3.495	82.4	.151	42.9	.412	–59.8
1400.00	.361	–139.7	3.333	78.7	.157	42.1	.389	–61.6
1500.00	.345	–147.7	3.151	74.5	.163	41.4	.368	–63.5
1600.00	.335	–155.3	3.003	71.0	.168	40.5	.347	–65.5
1700.00	.330	–163.1	2.872	67.3	.174	40.3	.329	–67.2
1800.00	.326	–169.9	2.735	64.3	.180	39.5	.313	–69.2
1900.00	.326	–176.4	2.628	61.1	.186	39.0	.297	–71.3
2000.00	.329	177.0	2.509	57.8	.194	38.1	.281	–73.7
2100.00	.333	171.0	2.419	54.9	.199	37.4	.266	–76.1
2200.00	.337	165.6	2.323	51.8	.205	36.7	.253	–78.5
2300.00	.344	160.5	2.251	49.2	.211	36.1	.239	–81.6
2400.00	.351	155.7	2.166	46.2	.218	35.5	.228	–84.2
2500.00	.359	151.3	2.097	43.7	.223	34.5	.214	–87.5
2600.00	.369	146.8	2.035	40.8	.230	33.8	.204	–91.0
2700.00	.378	143.2	1.966	38.4	.237	33.1	.193	–95.1
2800.00	.389	139.6	1.912	35.7	.242	32.0	.181	–99.7
2900.00	.399	135.9	1.853	33.2	.250	31.3	.172	–104.3
3000.00	.411	133.1	1.805	30.8	.256	30.2	.164	–109.4

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	1.006	–6.7	1.908	171.3	.025	84.6	.994	–5.1
200.00	.982	–13.7	1.949	162.2	.049	78.6	.982	–10.0
300.00	.970	–20.1	2.027	155.2	.072	73.9	.965	–14.8
400.00	.946	–27.6	2.024	147.2	.094	68.1	.938	–19.6
500.00	.924	–34.0	2.051	142.2	.114	63.6	.914	–23.9
600.00	.903	–41.0	1.977	135.3	.132	59.0	.887	–28.0
700.00	.867	–47.2	1.946	129.7	.148	54.6	.857	–32.2
800.00	.848	–54.0	1.915	123.4	.162	50.6	.822	–35.9
900.00	.811	–60.7	1.874	118.2	.173	46.2	.789	–39.8
1000.00	.783	–68.4	1.908	112.8	.184	43.0	.754	–43.2
1100.00	.741	–76.2	1.919	107.3	.193	39.9	.723	–46.0
1200.00	.707	–84.1	1.946	102.3	.201	37.1	.692	–48.6
1300.00	.675	–91.2	1.902	97.1	.207	34.5	.663	–51.5
1400.00	.647	–98.6	1.888	92.7	.212	31.8	.634	–54.1
1500.00	.617	–106.1	1.846	87.4	.216	29.5	.609	–56.8
1600.00	.589	–112.9	1.808	83.0	.220	27.1	.582	–59.4
1700.00	.565	–121.2	1.799	78.3	.223	25.4	.560	–61.8
1800.00	.542	–128.2	1.741	74.4	.224	23.6	.538	–64.1
1900.00	.523	–135.5	1.729	70.2	.226	22.4	.515	–66.4
2000.00	.502	–144.0	1.703	65.7	.228	20.7	.497	–68.6
2100.00	.489	–150.9	1.667	62.1	.228	19.7	.476	–71.1
2200.00	.479	–158.0	1.625	58.0	.229	18.6	.459	–73.4
2300.00	.470	–164.8	1.605	54.7	.230	17.6	.440	–76.0
2400.00	.466	–171.5	1.557	50.8	.230	16.7	.428	–78.3
2500.00	.461	–177.8	1.524	47.6	.230	16.0	.413	–81.1
2600.00	.462	175.8	1.497	44.0	.231	15.7	.399	–83.7
2700.00	.462	170.4	1.460	40.9	.231	15.5	.384	–86.7
2800.00	.465	164.8	1.433	37.8	.232	14.8	.372	–89.8
2900.00	.466	159.2	1.399	34.6	.233	14.7	.360	–92.9
3000.00	.474	154.9	1.374	31.8	.234	14.5	.351	–96.4

[MEMO]