

NPN SILICON EPITAXIAL TRANSISTOR  
3 PINS ULTRA SUPER MINI MOLD

**DESCRIPTION**

The 2SC5005 is a low supply voltage transistor designed for UHF OSC/MIX.

It is suitable for a high density surface mount assembly since the transistor has been applied ultra super mini mold package.

**FEATURES**

- High  $f_t$  : 5.5 GHz TYP. (@  $V_{CE} = 5\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $f = 1\text{ GHz}$ )
- Low  $C_{re}$  : 0.7 pF TYP. (@  $V_{CB} = 5\text{ V}$ ,  $I_E = 0$ ,  $f = 1\text{ MHz}$ )
- Ultra Super Mini Mold Package. (1.6 mm × 0.8 mm)

**ORDERING INFORMATION**

PART NUMBER	QUANTITY	PACKING STYLE
2SC5005	50 pcs./unit	Embossed tape 8 mm wide. Pin 3 (Collector) face to perforation side of the tape.
2SC5005 – T1	3 kpcs./Reel	

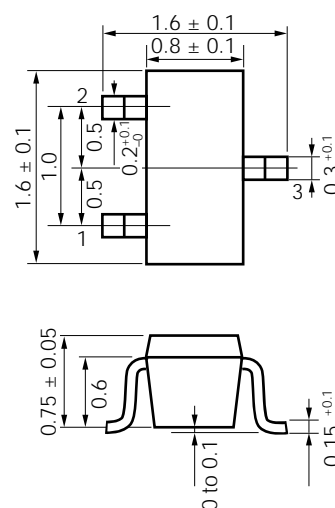
\* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs.

**ABSOLUTE MAXIMUM RATINGS ( $T_a = 25\text{ °C}$ )**

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	$I_c$	30	mA
Total Power Dissipation	$P_T$	100	mW
Junction Temperature	$T_j$	125	°C
Storage Temperature	$T_{stg}$	-55 to +125	°C

**PACKAGE DIMENSIONS**

in millimeters



**PIN CONNECTIONS**

1. Emitter
2. Base
3. Collector

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

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I <sub>CBO</sub>			0.1	μA	V <sub>CB</sub> = 15 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>			0.1	μA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
Collector Saturation Voltage	V <sub>CE(sat)</sub>			0.5	V	h <sub>FE</sub> = 10, I <sub>C</sub> = 5 mA
DC Current Gain	h <sub>FE</sub>	60		120		V <sub>CE</sub> = 5 V, I <sub>C</sub> = 5 mA*1
Gain Bandwidth Product	f <sub>T</sub>	3.0	5.5		GHz	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 5 mA
Feed-back Capacitance	C <sub>re</sub>		0.7	0.9	pF	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0, f = 1 MHz *2
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	5.0			dB	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 5 mA, f = 1 GHz

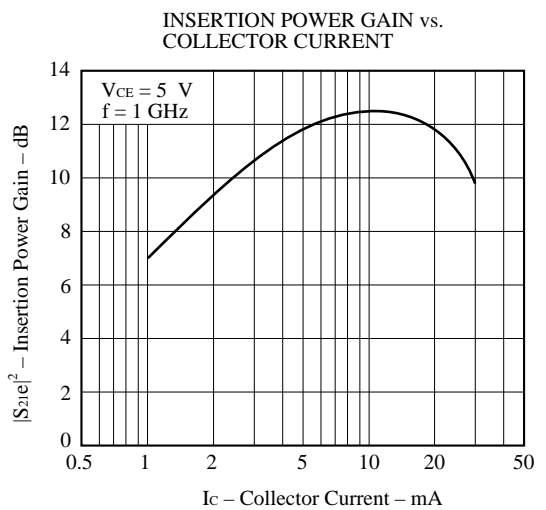
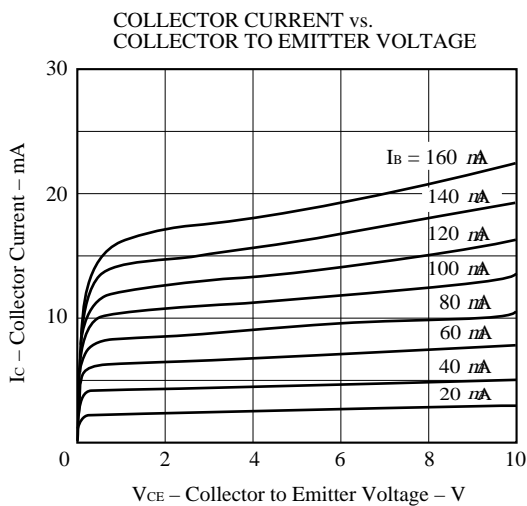
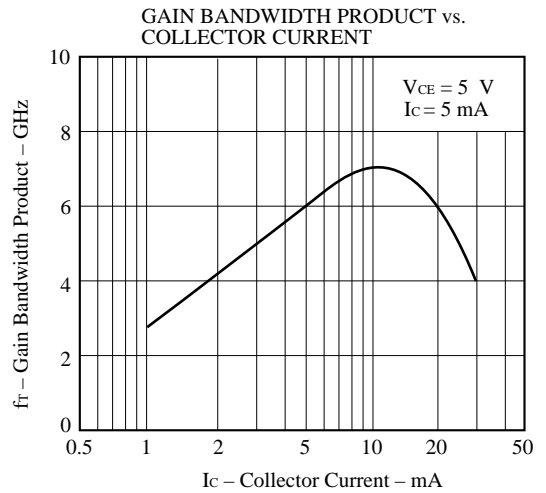
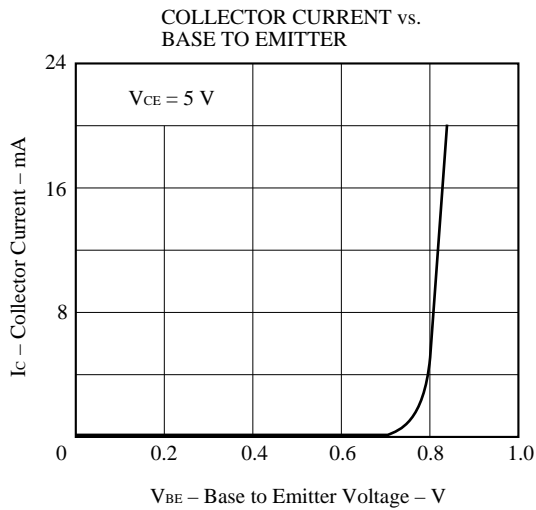
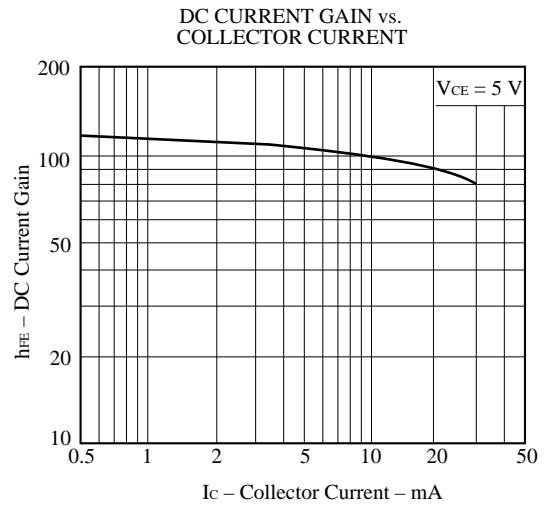
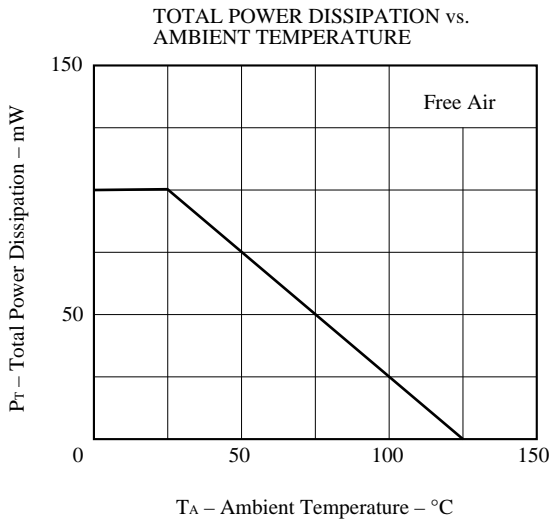
\*1 Pulse Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

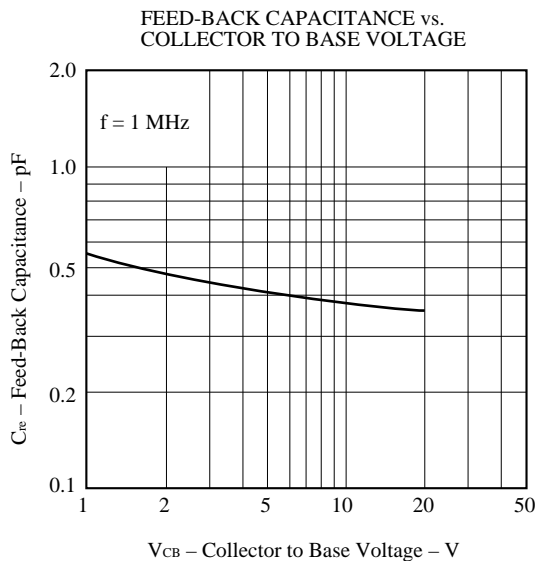
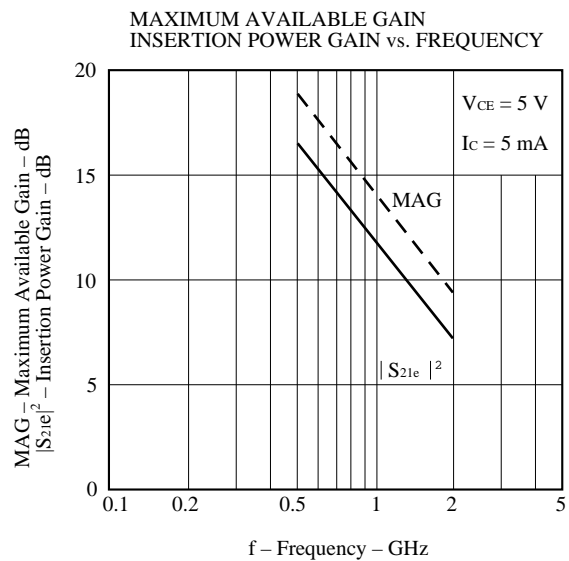
\*2 The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

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

Rank	FB
Marking	73
h <sub>FE</sub>	60 to 120

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





S-PARAMETER

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 5 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
100.00	.862	-19.6	8.912	154.5	.026	72.7	.940	-14.3
200.00	.769	-37.2	8.353	135.7	.045	61.1	.830	-25.1
300.00	.661	-54.8	7.788	119.9	.059	52.6	.718	-31.2
400.00	.559	-70.7	7.068	106.4	.070	46.6	.638	-34.6
500.00	.468	-85.5	6.414	94.3	.080	43.1	.575	-37.0
600.00	.406	-96.9	5.640	84.3	.088	39.8	.530	-38.4
700.00	.351	-108.2	5.086	75.2	.097	36.5	.495	-39.4
800.00	.315	-118.4	4.580	66.8	.105	32.9	.468	-40.5
900.00	.287	-128.3	4.167	59.2	.114	30.5	.444	-41.3
1000.00	.268	-137.3	3.829	52.2	.123	27.3	.426	-42.7
1100.00	.254	-145.8	3.532	45.5	.131	24.2	.409	-43.5
1200.00	.245	-154.4	3.282	38.9	.140	21.0	.395	-45.0
1300.00	.240	-162.3	3.061	32.6	.149	17.9	.384	-46.4
1400.00	.238	-169.3	2.876	26.6	.158	14.1	.372	-48.2
1500.00	.240	-176.3	2.711	20.7	.167	10.9	.361	-49.8
1600.00	.243	177.2	2.572	14.6	.176	7.4	.350	-51.6
1700.00	.246	171.2	2.446	8.9	.185	3.7	.341	-53.6
1800.00	.252	165.8	2.327	2.9	.194	.3	.330	-55.2
1900.00	.260	160.5	2.222	-2.5	.203	-3.3	.320	-57.7
2000.00	.269	155.5	2.129	-8.3	.213	-7.1	.312	-60.0
2100.00	.278	151.2	2.053	-13.7	.222	-10.8	.300	-62.6
2200.00	.286	147.5	1.974	-19.3	.231	-14.6	.292	-65.4
2300.00	.297	143.4	1.912	-24.7	.241	-18.5	.282	-68.1
2400.00	.307	140.0	1.845	-30.1	.250	-22.4	.271	-71.2
2500.00	.319	136.8	1.789	-35.3	.258	-26.1	.260	-74.2
2600.00	.330	133.8	1.738	-40.7	.267	-30.2	.252	-78.2
2700.00	.341	130.9	1.691	-46.0	.275	-34.2	.242	-82.1
2800.00	.353	128.2	1.638	-51.2	.285	-38.1	.233	-85.9
2900.00	.364	125.4	1.594	-56.3	.293	-42.1	.225	-90.2
3000.00	.378	122.9	1.552	-61.5	.302	-46.0	.218	-94.9

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 3 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
100.00	.922	-14.0	5.626	157.8	.026	76.4	.968	-10.6
200.00	.862	-28.7	5.479	142.0	.050	64.6	.900	-20.0
300.00	.785	-42.7	5.345	127.7	.067	54.4	.813	-26.3
400.00	.707	-56.1	5.052	115.2	.080	46.8	.742	-31.2
500.00	.623	-69.5	4.849	103.5	.091	40.8	.679	-34.6
600.00	.557	-80.2	4.385	92.9	.101	35.6	.630	-37.2
700.00	.487	-91.6	4.130	82.8	.108	31.8	.588	-39.1
800.00	.434	-102.1	3.838	73.4	.117	28.0	.554	-40.7
900.00	.389	-111.9	3.562	64.8	.124	24.6	.524	-42.2
1000.00	.355	-121.1	3.330	57.0	.131	21.5	.502	-43.5
1100.00	.328	-130.0	3.114	49.5	.138	18.2	.481	-44.8
1200.00	.308	-139.0	2.909	42.5	.146	14.6	.464	-46.4
1300.00	.293	-147.0	2.739	35.7	.155	11.8	.449	-48.0
1400.00	.285	-155.0	2.577	29.1	.161	8.7	.436	-49.7
1500.00	.279	-162.6	2.440	22.7	.168	5.3	.423	-51.4
1600.00	.277	-169.6	2.323	16.6	.176	2.3	.410	-53.2
1700.00	.275	-176.5	2.212	10.3	.184	-1.3	.399	-55.2
1800.00	.277	177.2	2.115	4.2	.193	-4.2	.389	-57.1
1900.00	.281	170.8	2.024	-1.5	.200	-7.6	.378	-59.4
2000.00	.287	165.0	1.951	-7.3	.209	-10.9	.369	-61.8
2100.00	.294	159.6	1.881	-13.2	.217	-14.5	.358	-64.4
2200.00	.300	155.5	1.809	-18.7	.225	-17.8	.350	-66.8
2300.00	.310	150.6	1.756	-24.4	.234	-21.4	.339	-69.7
2400.00	.319	146.6	1.695	-30.0	.242	-25.2	.329	-72.7
2500.00	.330	142.9	1.647	-35.4	.249	-28.8	.318	-75.7
2600.00	.339	139.1	1.598	-40.8	.259	-32.5	.310	-79.4
2700.00	.350	135.6	1.557	-46.3	.268	-36.3	.301	-82.8
2800.00	.361	132.4	1.511	-51.6	.275	-39.6	.291	-86.8
2900.00	.372	129.3	1.473	-56.9	.284	-43.6	.284	-90.6
3000.00	.385	126.4	1.436	-62.1	.293	-47.3	.278	-95.0

**S-PARAMETER**

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
100.00	.986	-9.8	1.971	165.5	.029	78.9	.992	-5.8
200.00	.957	-19.8	2.002	150.9	.054	69.6	.973	-11.7
300.00	.929	-28.5	2.041	138.6	.079	60.1	.939	-16.7
400.00	.891	-38.1	2.023	127.1	.100	51.7	.906	-21.3
500.00	.847	-47.4	2.036	117.0	.117	43.6	.868	-25.4
600.00	.803	-55.9	1.913	106.6	.133	36.1	.837	-29.0
700.00	.754	-64.7	1.885	96.6	.144	29.6	.801	-32.2
800.00	.709	-73.6	1.851	86.8	.154	23.3	.769	-35.2
900.00	.662	-82.3	1.806	77.6	.161	17.7	.735	-37.8
1000.00	.613	-91.5	1.794	68.7	.169	12.4	.708	-40.3
1100.00	.568	-100.3	1.765	60.0	.173	7.6	.683	-42.4
1200.00	.528	-109.1	1.731	51.7	.178	3.2	.662	-44.7
1300.00	.498	-117.0	1.667	43.8	.183	-1.2	.644	-46.8
1400.00	.467	125.2	1.623	36.0	.187	-5.1	.626	-49.2
1500.00	.444	-132.9	1.569	28.5	.190	-8.9	.611	-51.4
1600.00	.426	-140.6	1.519	21.4	.193	-12.3	.595	-53.6
1700.00	.407	-148.5	1.479	14.3	.196	-15.7	.584	-55.9
1800.00	.397	-155.6	1.427	7.5	.200	-18.7	.570	-58.0
1900.00	.388	-163.0	1.389	.9	.203	-21.8	.558	-60.6
2000.00	.381	-170.3	1.354	-5.7	.207	-24.7	.549	-63.0
2100.00	.380	-177.0	1.315	-11.9	.210	-27.6	.536	-65.8
2200.00	.378	177.0	1.275	-18.1	.214	-30.5	.530	-68.5
2300.00	.381	170.8	1.251	-24.2	.218	-33.1	.518	-71.5
2400.00	.384	165.1	1.211	-30.2	.222	-35.9	.510	-74.5
2500.00	.390	159.9	1.184	-35.9	.227	-38.4	.499	-77.6
2600.00	.395	154.8	1.157	-41.8	.233	-41.3	.491	-81.1
2700.00	.400	150.1	1.132	-47.5	.239	-44.3	.483	-84.6
2800.00	.410	145.5	1.102	-53.1	.245	-46.9	.477	-88.4
2900.00	.418	141.4	1.078	-58.6	.251	-49.9	.468	-92.1
3000.00	.429	137.4	1.055	-64.1	.258	-52.6	.464	-96.1

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
100.00	.867	-19.3	8.773	153.5	.028	71.9	.931	-16.1
200.00	.757	-39.7	8.305	134.5	.050	59.4	.810	-28.1
300.00	.646	-58.4	7.727	118.4	.065	51.1	.690	-34.9
400.00	.546	-75.5	6.944	104.8	.076	44.9	.602	-38.9
500.00	.458	-91.1	6.269	92.7	.087	41.5	.537	-41.7
600.00	.399	-103.1	5.496	82.6	.095	37.5	.488	-43.2
700.00	.350	-115.0	4.931	73.6	.104	34.6	.451	-44.4
800.00	.318	-125.6	4.440	65.3	.113	31.4	.422	-45.6
900.00	.295	-135.6	4.035	57.5	.122	28.7	.399	-46.6
1000.00	.279	-144.5	3.698	50.7	.131	25.4	.377	-48.1
1100.00	.270	-153.1	3.406	44.1	.141	22.2	.360	-49.0
1200.00	.263	-161.3	3.163	37.4	.149	19.0	.345	-50.4
1300.00	.261	-168.6	2.949	31.1	.159	16.0	.332	-51.7
1400.00	.261	-175.4	2.772	25.0	.169	12.3	.320	-54.0
1500.00	.264	178.1	2.613	19.0	.178	9.0	.307	-55.9
1600.00	.268	172.3	2.473	13.2	.187	5.4	.297	-57.7
1700.00	.273	166.4	2.344	7.2	.196	1.8	.286	-60.0
1800.00	.279	161.7	2.242	1.5	.206	-1.9	.275	-62.0
1900.00	.287	156.7	2.140	-4.4	.216	-5.5	.264	-64.8
2000.00	.297	152.1	2.056	-9.7	.225	-9.5	.256	-67.2
2100.00	.306	148.0	1.974	-15.5	.235	-13.3	.244	-70.4
2200.00	.315	144.8	1.906	-20.9	.244	-17.1	.236	-73.5
2300.00	.327	140.7	1.838	-26.4	.253	-21.2	.225	-77.2
2400.00	.336	137.5	1.775	-31.9	.262	-24.9	.215	-80.7
2500.00	.348	134.6	1.721	-37.1	.270	-28.7	.205	-84.7
2600.00	.357	131.2	1.667	-42.4	.280	-32.9	.198	-89.4
2700.00	.369	128.6	1.624	-47.7	.289	-36.8	.188	-94.2
2800.00	.381	125.8	1.573	-53.0	.298	-40.8	.181	-99.4
2900.00	.392	123.4	1.527	-58.1	.307	-45.1	.174	-104.7
3000.00	.404	120.7	1.493	-63.3	.315	-49.0	.168	-110.9

**S-PARAMETER**

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.927	-15.4	5.565	158.7	.030	74.8	.961	-11.9	
200.00	.854	-30.3	5.460	141.0	.055	62.3	.887	-22.2	
300.00	.773	-45.0	5.302	126.4	.074	52.8	.792	-29.4	
400.00	.695	-59.3	4.990	113.7	.088	45.0	.715	-34.5	
500.00	.610	-73.4	4.776	101.8	.100	39.0	.646	-38.3	
600.00	.546	-84.6	4.313	91.2	.109	34.2	.595	-41.2	
700.00	.477	-96.7	4.041	81.1	.117	29.8	.550	-43.3	
800.00	.428	-107.5	3.741	71.6	.125	25.9	.514	-45.2	
900.00	.388	-117.9	3.476	63.1	.133	22.3	.484	-46.7	
1000.00	.356	-127.6	3.230	55.2	.140	19.4	.458	-48.2	
1100.00	.334	-136.5	3.014	47.7	.149	16.0	.437	-49.6	
1200.00	.317	-145.4	2.817	40.8	.156	13.2	.419	-51.3	
1300.00	.305	-153.4	2.644	33.9	.164	9.7	.403	-52.9	
1400.00	.298	-161.0	2.495	27.4	.173	6.7	.389	-55.0	
1500.00	.295	-168.4	2.360	20.9	.179	3.1	.375	-56.9	
1600.00	.295	-175.2	2.246	14.8	.187	-1	.361	-58.9	
1700.00	.295	178.4	2.138	8.6	.195	-3.4	.350	-60.8	
1800.00	.297	172.5	2.042	2.5	.205	-6.9	.338	-63.0	
1900.00	.304	166.7	1.958	-3.5	.213	-10.1	.326	-65.5	
2000.00	.310	161.0	1.885	-9.2	.221	-13.4	.319	-68.4	
2100.00	.319	156.1	1.811	-15.0	.229	-17.1	.306	-71.1	
2200.00	.325	152.0	1.752	-20.7	.238	-20.7	.297	-74.1	
2300.00	.336	147.6	1.695	-26.3	.246	-24.3	.287	-77.3	
2400.00	.344	143.7	1.636	-31.8	.254	-27.9	.276	-80.7	
2500.00	.355	140.0	1.587	-37.2	.261	-31.5	.267	-84.3	
2600.00	.365	136.4	1.541	-42.8	.271	-35.3	.259	-88.4	
2700.00	.375	133.3	1.501	-48.1	.280	-38.9	.250	-92.5	
2800.00	.386	130.1	1.456	-53.5	.288	-42.9	.241	-97.3	
2900.00	.397	127.2	1.415	-58.7	.296	-46.8	.235	-101.9	
3000.00	.408	124.2	1.382	-64.0	.305	-50.3	.229	-106.8	

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY		S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.983	-9.9	1.946	164.5	.032	79.0	.990	-6.5	
200.00	.956	-19.8	2.001	150.1	.062	69.1	.969	-12.7	
300.00	.925	-29.7	2.042	137.5	.087	59.7	.931	-18.2	
400.00	.884	-39.6	2.016	125.7	.110	50.3	.896	-23.2	
500.00	.840	-49.4	2.025	115.5	.130	42.4	.853	-27.7	
600.00	.796	-58.1	1.896	104.7	.146	34.2	.818	-31.6	
700.00	.744	-67.4	1.869	94.6	.158	27.7	.779	-35.0	
800.00	.699	-76.6	1.830	84.7	.169	21.4	.745	-38.2	
900.00	.651	-85.6	1.786	75.4	.177	15.6	.708	-40.9	
1000.00	.605	-95.0	1.777	66.3	.185	10.0	.680	-43.6	
1100.00	.560	-104.0	1.741	57.6	.189	5.3	.653	-46.0	
1200.00	.521	-113.1	1.699	49.3	.195	.9	.629	-48.3	
1300.00	.493	-121.1	1.638	41.3	.199	-3.5	.611	-50.4	
1400.00	.466	-129.5	1.590	33.7	.202	-7.5	.591	-53.0	
1500.00	.444	-137.3	1.533	26.2	.205	-11.3	.575	-55.3	
1600.00	.428	-145.0	1.486	19.1	.208	-15.0	.560	-57.6	
1700.00	.413	-152.8	1.444	11.9	.211	-18.7	.546	-60.1	
1800.00	.402	-159.8	1.397	5.2	.213	-21.7	.532	-62.5	
1900.00	.397	-167.2	1.356	-1.6	.217	-24.9	.519	-65.2	
2000.00	.392	-174.4	1.322	-8.0	.220	-27.9	.511	-67.8	
2100.00	.391	179.4	1.280	-14.3	.223	-30.9	.497	-70.8	
2200.00	.393	173.5	1.243	-20.5	.228	-33.8	.488	-73.8	
2300.00	.396	167.3	1.219	-26.5	.231	-36.8	.477	-76.8	
2400.00	.400	162.0	1.180	-32.6	.236	-39.7	.469	-80.2	
2500.00	.405	157.1	1.153	-38.3	.241	-42.3	.458	-83.5	
2600.00	.410	152.0	1.127	-44.2	.246	-45.2	.451	-87.2	
2700.00	.417	147.4	1.101	-49.8	.250	-48.0	.443	-91.1	
2800.00	.429	143.3	1.072	-55.5	.256	-50.6	.435	-95.1	
2900.00	.435	139.2	1.048	-60.9	.263	-53.8	.428	-99.2	
3000.00	.445	135.3	1.024	-66.4	.269	-56.5	.424	-103.6	

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