To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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RENESAS

SILICON TRANSISTOR
μPA804T

NPN SILICON EPITAXIAL TRANSISTOR (WITH BUILT-IN 2 ELEMENTS) MINI MOLD

The 2SC4571 has built-in 2 transistors which were developed for UHF.

FEATURES

- High f_T
  f_T = 5.0 GHz TYP. (@ V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz)
- Small Collector Capacitance
  C_{ob} = 0.9 pF TYP. (@ V_{CB} = 5 V, I_E = 0, f = 1 MHz)
- A surface Mounting Package Adopted
- Built-in 2 Transistors (2 × 2SC4571)

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
μPA804T	Loose products (50 PCS)	Embossed tape 8 mm wide. Pin 6 (Q1 Base), Pin 5 (Q2 Base), Pin 4 (Q2 Emitter) face to perforation side of the tape.
μPA804T-T1	Taping products (3 KPCS/Reel)	

Remark If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

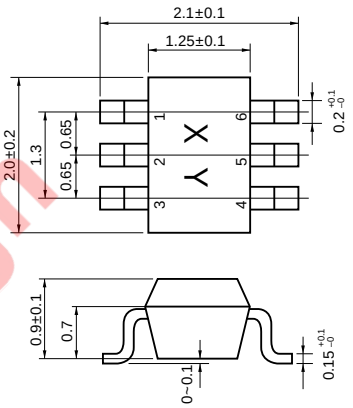
ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
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	60	mA
Total Power Dissipation	P_T	120 in 1 element 160 in 2 elements[Note]	mW
Junction Temperature	T_j	125	°C
Storage Temperature	T_{stg}	–55 to 125	°C

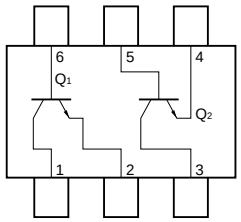
Note 90 mW must not be exceeded in 1 element.

PACKAGE DRAWINGS

(Unit: mm)



PIN CONFIGURATION (Top View)



PIN CONNECTIONS

1. Collector (Q1)
2. Emitter (Q1)
3. Collector (Q2)
4. Emitter (Q2)
5. Base (Q2)
6. Base (Q1)

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	I_{CBO}	V_{CB} = 15 V, I_E = 0			0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 1 V, I_C = 0			0.1	μA
Collector to Emitter Saturation Voltage	$V_{CE (sat)}$	h_{FE} = 10, I_C = 5 mA			0.5	V
DC Current Gain	h_{FE}	V_{CE} = 5 V, I_C = 5 mA **Note 1**	60		200	
Gain Bandwidth Product (1)	f_T	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	3	5		GHz
Feed-back Capacitance	C_{re}	V_{CB} = 5 V, I_E = 0, f = 1 MHz **Note 2**		0.9	1.2	pF
Insertion Power Gain (1)	$\|S_{21}\|^2$	V_{CE} = 5 V, I_C = 5 mA, f = 1 GHz	5			dB
h_{FE} Ratio	h_{FE1}/h_{FE2}	V_{CE} = 5 V, I_C = 5 mA A smaller value among h_{FE} of h_{FE}1 = Q1, Q2 A larger value among h_{FE} of h_{FE}2 = Q1, Q2	0.85			

Notes 1. Pulse Measurement: Pw ≤ 350 μs, Duty cycle ≤ 2 %

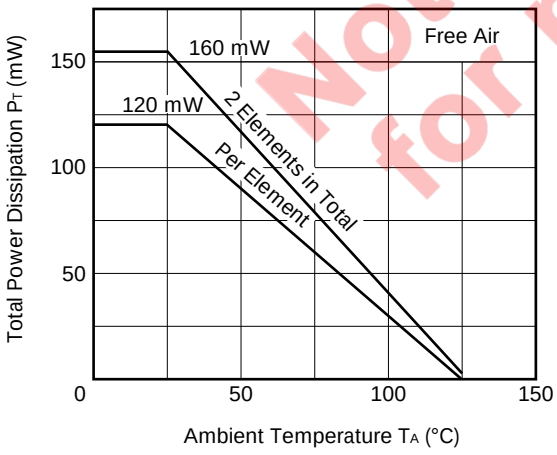
2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

h_{FE} CLASSIFICATION

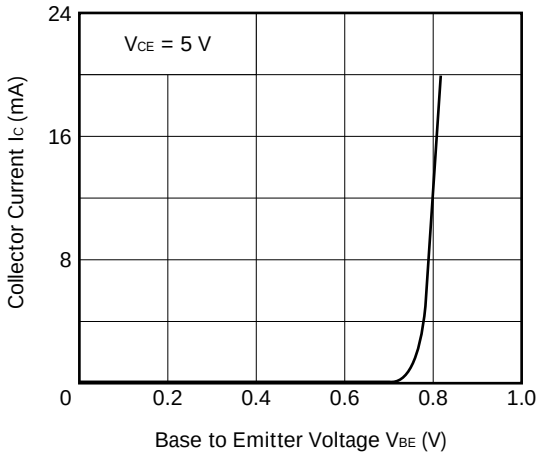
Rank	FB	GB
Marking	T76	T77
h_{FE} Value	60 to 120	100 to 200

TYPICAL CHARACTERISTICS (T_A = 25 °C)

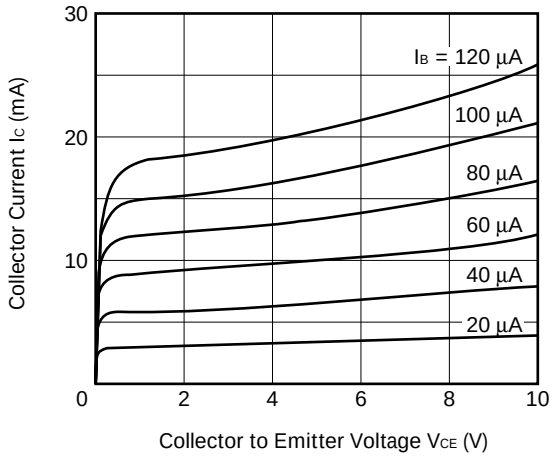
P_T–T_A Characteristics



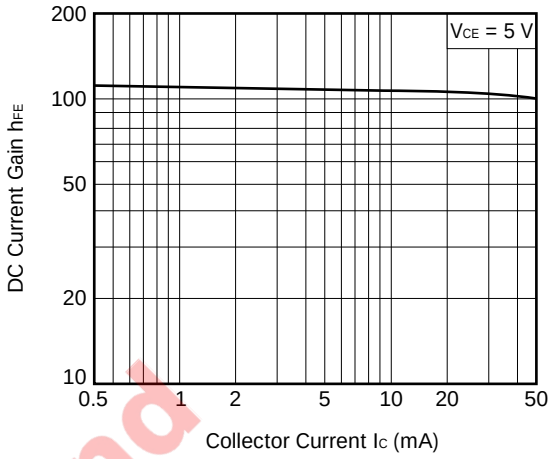
I_C–V_{BE} Characteristics



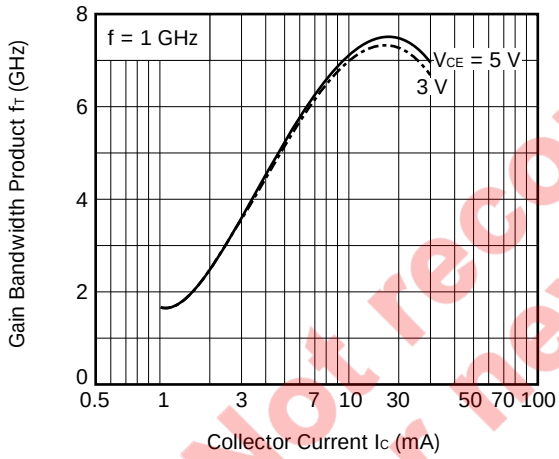
I_C–V_{CE} Characteristics



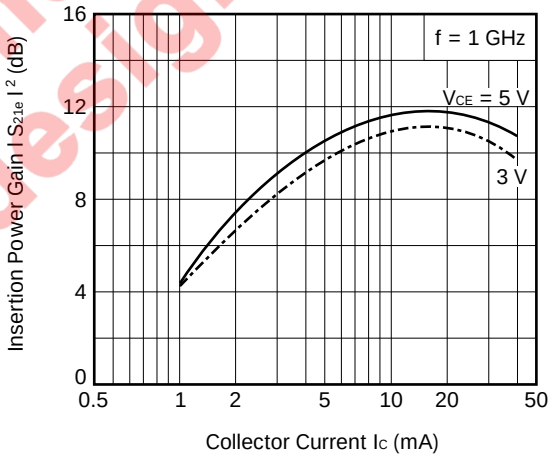
h_{FE} | I_C Characteristics



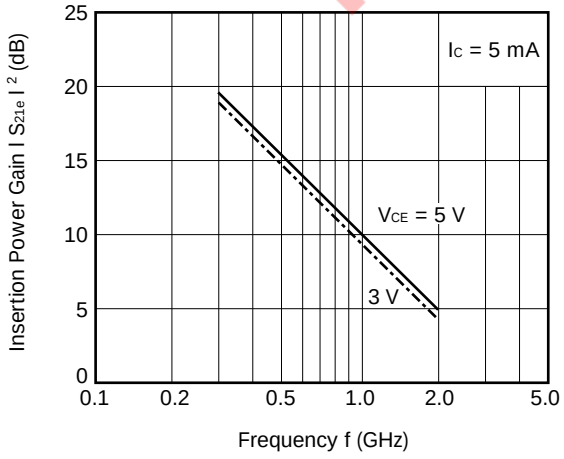
f_T | I_C Characteristics



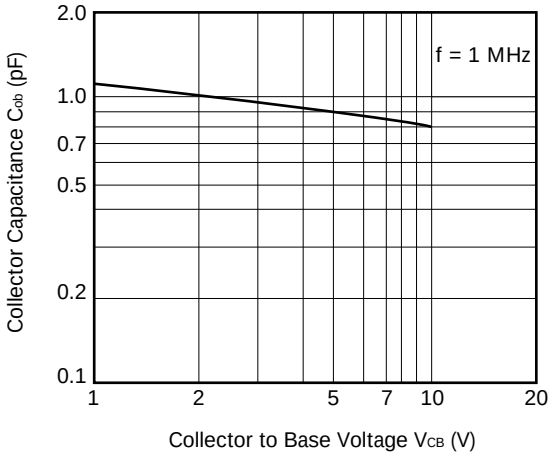
$|S_{21e}|^2$ – I_C Characteristics



$|S_{21e}|^2$ – f Characteristics



C_{ob} – V_{CB} Characteristics



S-PARAMETERS

V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.874	–24.2	8.628	152.9	.032	71.8	.910	–18.4
200.00	.752	–49.1	8.089	135.3	.054	61.2	.763	–30.3
300.00	.625	–70.9	7.278	121.4	.068	55.5	.643	–36.7
400.00	.523	–89.3	6.406	110.0	.079	52.9	.560	–40.1
500.00	.444	–105.3	5.617	101.1	.088	52.1	.502	–42.3
600.00	.396	–117.4	4.890	94.1	.097	51.8	.462	–43.8
700.00	.359	–129.0	4.345	88.0	.105	51.9	.434	–45.2
800.00	.336	–138.5	3.893	82.9	.114	52.0	.414	–46.6
900.00	.318	–147.3	3.529	78.3	.122	52.4	.398	–47.9
1000.00	.307	–155.3	3.221	74.0	.131	52.3	.385	–49.5
1100.00	.299	–162.8	2.959	70.1	.140	52.2	.376	–51.0
1200.00	.294	–169.3	2.751	66.4	.149	52.0	.371	–52.7
1300.00	.292	–175.3	2.565	62.9	.158	52.4	.364	–54.2
1400.00	.292	179.1	2.407	59.5	.167	51.9	.359	–55.6
1500.00	.293	173.6	2.269	56.4	.177	51.3	.356	–57.3
1600.00	.296	168.8	2.155	53.3	.186	51.2	.350	–58.9
1700.00	.298	164.4	2.045	50.2	.195	50.6	.346	–60.4
1800.00	.300	160.2	1.950	47.4	.206	49.9	.342	–62.3
1900.00	.302	156.1	1.873	44.6	.215	49.4	.337	–64.5
2000.00	.310	151.8	1.793	41.6	.225	48.8	.327	–67.1
2100.00	.314	148.3	1.726	38.9	.235	48.2	.322	–69.4
2200.00	.318	144.7	1.662	36.3	.245	47.2	.317	–72.4
2300.00	.323	141.3	1.609	33.7	.255	46.3	.312	–75.3
2400.00	.328	138.2	1.556	31.2	.265	45.4	.307	–78.9
2500.00	.335	135.1	1.513	28.7	.274	44.5	.304	–82.9
2600.00	.339	131.9	1.466	26.3	.284	43.4	.302	–87.1
2700.00	.345	129.3	1.427	23.9	.294	42.5	.302	–91.0
2800.00	.349	126.3	1.387	21.5	.304	41.5	.304	–94.8
2900.00	.356	123.8	1.353	19.3	.315	40.4	.309	–98.9
3000.00	.361	121.0	1.323	17.2	.323	39.4	.313	–102.4

V_{CE} = 5 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.923	–19.2	5.456	157.3	.034	75.1	.951	–13.6
200.00	.844	–39.4	5.317	142.0	.060	63.0	.852	–24.1
300.00	.746	–57.9	5.047	128.9	.078	55.7	.752	–31.3
400.00	.660	–74.5	4.667	118.1	.091	51.5	.674	–35.8
500.00	.575	–90.3	4.321	108.3	.101	48.3	.612	–39.0
600.00	.516	–102.7	3.860	100.4	.108	46.4	.567	–41.5
700.00	.461	–114.8	3.546	93.2	.115	45.7	.532	–43.6
800.00	.423	–125.2	3.237	87.1	.122	45.3	.507	–45.4
900.00	.396	–134.9	2.979	81.6	.128	44.8	.486	–47.1
1000.00	.375	–143.6	2.749	76.6	.134	45.2	.471	–48.8
1100.00	.362	–151.4	2.547	72.4	.142	45.3	.461	–50.5
1200.00	.349	–158.8	2.380	68.0	.147	45.4	.452	–52.3
1300.00	.343	–165.2	2.222	64.2	.154	45.9	.445	–54.0
1400.00	.339	–171.7	2.101	60.4	.161	46.1	.438	–55.6
1500.00	.336	–177.6	1.984	57.0	.169	46.4	.433	–57.3
1600.00	.337	177.0	1.887	53.5	.177	46.5	.428	–59.0
1700.00	.338	172.0	1.798	50.3	.184	46.6	.423	–61.1
1800.00	.337	167.1	1.719	47.2	.193	46.7	.419	–63.1
1900.00	.339	162.7	1.648	44.0	.201	46.5	.411	–65.2
2000.00	.345	158.0	1.579	41.2	.211	46.3	.405	–68.0
2100.00	.348	153.8	1.524	38.4	.219	46.0	.399	–70.4
2200.00	.351	150.0	1.470	35.4	.229	45.6	.394	–73.4
2300.00	.357	146.1	1.424	32.8	.238	45.3	.389	–76.4
2400.00	.361	142.5	1.376	30.1	.247	44.6	.386	–80.0
2500.00	.367	139.2	1.338	27.5	.257	44.0	.383	–83.8
2600.00	.371	135.8	1.296	25.0	.266	43.5	.381	–88.0
2700.00	.376	132.6	1.263	22.5	.275	42.9	.380	–91.4
2800.00	.381	129.3	1.231	20.1	.287	42.1	.385	–95.4
2900.00	.387	126.4	1.199	17.9	.297	41.4	.389	–99.2
3000.00	.392	123.4	1.169	15.7	.306	40.4	.391	–103.0

S-PARAMETERS

V_{CE} = 5 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.977	–14.2	1.896	165.0	.036	79.9	.988	–7.4
200.00	.944	–28.0	1.948	150.9	.069	69.5	.954	–14.2
300.00	.897	–41.9	1.954	139.2	.095	61.1	.911	–20.1
400.00	.848	–54.9	1.907	128.9	.116	53.7	.867	–25.2
500.00	.793	–68.0	1.878	119.8	.131	47.9	.820	–29.5
600.00	.744	–79.1	1.745	110.9	.143	42.2	.786	–33.4
700.00	.689	–90.6	1.697	102.7	.151	38.6	.752	–36.6
800.00	.646	–101.4	1.630	95.2	.155	35.1	.726	–39.6
900.00	.605	–111.3	1.579	88.5	.157	32.9	.702	–42.3
1000.00	.570	-121.0	1.519	82.1	.161	31.1	.684	–44.8
1100.00	.542	–130.0	1.455	76.5	.162	30.0	.669	–47.4
1200.00	.516	–138.2	1.393	71.2	.162	29.1	.661	–49.9
1300.00	.500	–145.7	1.325	66.3	.161	29.0	.650	–52.2
1400.00	.489	–153.1	1.270	61.8	.163	29.4	.643	–54.3
1500.00	.478	–160.1	1.213	57.5	.163	29.3	.637	–56.7
1600.00	.470	–166.6	1.168	53.5	.163	30.5	.631	–59.0
1700.00	.465	–172.8	1.128	49.5	.164	31.6	.624	–61.6
1800.00	.461	–178.5	1.086	45.9	.166	33.5	.621	–64.0
1900.00	.458	175.7	1.047	42.5	.169	34.4	.614	–66.7
2000.00	.458	170.1	1.012	39.2	.173	36.3	.608	–69.6
2100.00	.460	165.0	.980	36.1	.178	38.0	.603	–72.6
2200.00	.460	160.3	.946	33.1	.183	39.5	.599	–76.0
2300.00	.462	155.6	.922	30.4	.191	40.9	.593	–79.3
2400.00	.465	151.1	.889	27.7	.198	42.3	.591	–83.1
2500.00	.469	146.7	.867	25.3	.206	43.0	.588	–87.2
2600.00	.472	142.5	.843	22.8	.216	44.2	.588	–91.3
2700.00	.476	138.7	.820	20.5	.227	44.8	.586	–95.3
2800.00	.479	134.7	.799	18.5	.239	45.2	.589	–99.4
2900.00	.482	130.9	.779	16.5	.251	45.2	.591	–103.3
3000.00	.487	127.2	.761	14.8	.263	45.4	.593	–107.1

V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.871	–26.4	8.583	152.2	.037	69.9	.894	–21.2
200.00	.735	–53.1	7.998	133.6	.061	59.2	.730	–35.0
300.00	.608	–76.6	7.129	119.2	.076	53.4	.601	–42.3
400.00	.512	–96.0	6.208	107.9	.087	51.2	.515	–46.6
500.00	.441	–112.5	5.402	99.1	.096	49.9	.452	–49.3
600.00	.400	–125.0	4.681	92.2	.105	49.8	.410	–51.2
700.00	.367	–136.5	4.139	86.3	.116	50.1	.379	–52.9
800.00	.349	–146.0	3.707	81.3	.124	50.1	.358	–54.5
900.00	.338	–154.7	3.362	76.6	.133	50.5	.341	–55.7
1000.00	.328	–162.1	3.061	72.4	.142	50.5	.327	–57.7
1100.00	.324	–168.9	2.817	68.5	.153	50.5	.317	–59.3
1200.00	.319	–175.4	2.611	64.8	.162	50.1	.311	–61.0
1300.00	.319	179.0	2.436	61.4	.172	49.9	.305	–62.6
1400.00	.321	173.8	2.296	57.9	.181	49.7	.300	–64.3
1500.00	.322	168.7	2.159	54.7	.192	49.5	.294	–65.8
1600.00	.324	164.3	2.048	51.6	.201	48.8	.289	–67.7
1700.00	.328	160.2	1.950	48.5	.212	48.2	.284	–69.3
1800.00	.329	155.9	1.858	45.8	.221	47.6	.280	–71.4
1900.00	.333	152.0	1.777	42.7	.234	46.9	.272	–73.9
2000.00	.339	148.2	1.716	40.0	.242	46.1	.265	–77.0
2100.00	.343	144.7	1.647	37.4	.253	45.2	.258	–79.9
2200.00	.348	141.6	1.587	34.7	.264	44.1	.254	–83.4
2300.00	.353	138.2	1.537	32.2	.274	43.3	.249	–86.6
2400.00	.357	135.1	1.487	29.6	.284	42.3	.246	–90.8
2500.00	.364	132.3	1.446	27.1	.293	41.0	.243	–95.6
2600.00	.368	129.3	1.403	24.8	.305	40.4	.244	–100.0
2700.00	.373	126.5	1.366	22.4	.313	39.2	.245	–104.3
2800.00	.377	123.8	1.330	19.9	.324	38.1	.250	–109.0
2900.00	.383	121.1	1.298	17.9	.334	36.9	.255	–112.8
3000.00	.388	118.3	1.268	15.7	.344	35.8	.260	–116.4

S-PARAMETERS

V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.912	–21.6	5.515	157.0	.039	74.4	.941	–15.6
200.00	.834	–42.0	5.289	140.5	.068	61.3	.829	–27.6
300.00	.733	–61.8	4.989	127.0	.088	54.0	.720	–35.4
400.00	.645	–79.5	4.582	115.9	.102	48.7	.634	–40.9
500.00	.563	–95.8	4.216	106.2	.111	46.0	.567	–44.5
600.00	.508	–108.6	3.750	98.3	.119	44.2	.520	–47.3
700.00	.459	–121.1	3.422	91.1	.126	43.4	.483	–49.6
800.00	.426	–131.5	3.114	85.1	.134	43.0	.457	–51.6
900.00	.403	–140.9	2.860	79.8	.140	42.7	.435	–53.4
1000.00	.387	–149.5	2.628	74.7	.147	43.0	.418	–55.3
1100.00	.374	–157.2	2.441	70.4	.155	43.2	.408	–57.2
1200.00	.365	–164.3	2.273	66.1	.161	43.0	.399	–59.1
1300.00	.360	–170.7	2.132	62.3	.169	43.3	.390	–60.8
1400.00	.359	–176.5	2.007	58.7	.176	43.6	.383	–62.6
1500.00	.358	177.6	1.899	55.2	.184	43.7	.378	–64.5
1600.00	.359	172.6	1.801	51.8	.192	43.8	.371	–66.4
1700.00	.360	167.7	1.720	48.3	.200	43.6	.366	–68.5
1800.00	.361	163.3	1.648	45.3	.209	43.6	.361	–70.6
1900.00	.363	158.7	1.582	42.3	.218	43.4	.355	–72.9
2000.00	.369	154.5	1.513	39.2	.227	43.1	.347	–76.1
2100.00	.372	150.4	1.462	36.5	.236	42.9	.340	–78.8
2200.00	.375	146.9	1.409	33.7	.246	42.4	.336	–82.3
2300.00	.380	143.2	1.366	31.0	.256	41.8	.331	–85.3
2400.00	.385	139.8	1.323	28.4	.265	41.4	.328	–89.4
2500.00	.391	136.5	1.287	25.8	.275	40.3	.326	–93.8
2600.00	.394	133.3	1.250	23.4	.284	39.8	.326	–98.0
2700.00	.401	130.2	1.215	20.9	.295	39.0	.327	–102.2
2800.00	.405	127.0	1.183	18.5	.305	38.2	.332	–106.2
2900.00	.410	124.2	1.156	16.3	.314	37.4	.337	–110.2
3000.00	.415	121.3	1.130	14.2	.324	36.5	.342	–113.8

V_{CE} = 3 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.970	–14.8	1.932	163.5	.042	78.2	.984	–8.3
200.00	.940	–29.4	1.944	149.6	.079	68.4	.945	–16.0
300.00	.890	–43.9	1.949	137.4	.109	59.0	.895	–22.6
400.00	.839	–57.5	1.894	127.0	.132	51.8	.846	–28.2
500.00	.782	–71.0	1.854	117.6	.149	45.3	.795	–32.8
600.00	.734	–82.5	1.723	108.5	.161	40.1	.757	–36.9
700.00	.680	–94.1	1.674	100.1	.168	36.1	.720	–40.5
800.00	.638	–105.2	1.606	92.6	.174	32.7	.691	–43.7
900.00	.598	–115.4	1.548	85.8	.177	30.0	.666	–46.5
1000.00	.565	–125.0	1.486	79.4	.179	28.5	.646	–49.3
1100.00	.541	–133.7	1.422	73.9	.180	27.2	.633	–51.8
1200.00	.518	–142.1	1.354	68.5	.179	26.0	.621	–54.5
1300.00	.504	–149.6	1.287	63.6	.180	25.9	.610	–56.9
1400.00	.494	–156.8	1.235	59.0	.180	26.0	.603	–59.3
1500.00	.485	–163.5	1.183	54.8	.179	26.2	.596	–61.8
1600.00	.478	–169.9	1.136	50.8	.180	27.0	.590	–64.3
1700.00	.476	–175.8	1.098	46.9	.181	27.5	.584	–66.9
1800.00	.472	178.5	1.054	43.4	.182	29.1	.578	–69.6
1900.00	.470	173.0	1.019	39.9	.184	30.4	.573	–72.3
2000.00	.472	167.6	.987	36.6	.189	31.9	.566	–75.6
2100.00	.473	162.6	.952	33.8	.193	33.5	.560	–78.9
2200.00	.474	158.0	.922	30.8	.198	34.5	.556	–82.5
2300.00	.476	153.5	.897	28.0	.205	36.1	.551	–86.1
2400.00	.480	149.2	.866	25.4	.212	37.3	.548	–90.2
2500.00	.484	144.9	.846	23.0	.220	38.3	.546	–94.5
2600.00	.488	141.0	.823	20.7	.230	39.3	.547	–98.9
2700.00	.491	137.0	.801	18.5	.240	39.9	.546	–103.1
2800.00	.495	133.2	.781	16.4	.252	40.2	.550	–107.3
2900.00	.498	129.7	.763	14.6	.263	40.4	.553	–111.3
3000.00	.501	125.9	.745	12.9	.275	40.5	.555	–115.2

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