NEC

SILICON TRANSISTOR
2SC5179

NPN EPITAXIAL SILICON TRANSISTOR IN SMALL MINI-MOLD PACKAGE FOR LOW-NOISE MICROWAVE AMPLIFICATION

FEATURES

- Low current consumption and high gain
  $|S_{21e}|^2$ = 9 dB TYP. @ V_{CE} = 2 V, I_C = 7 mA, f = 2 GHz
  $|S_{21e}|^2$ = 8.5 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz
- Small Mini-Mold package
  EIAJ: SC-70

ORDERING INFORMATION

PART NUMBER	QUANTITY	ARRANGEMENT
2SC5179-T1	3000 units/reel	Embossed tape, 8 mm wide, pin No. 3 (Collector) facing the perforations
2SC5179-T2		Embossed tape, 8 mm wide, pins No. 1 (Emitter) and No. 2 (Base) facing the perforations

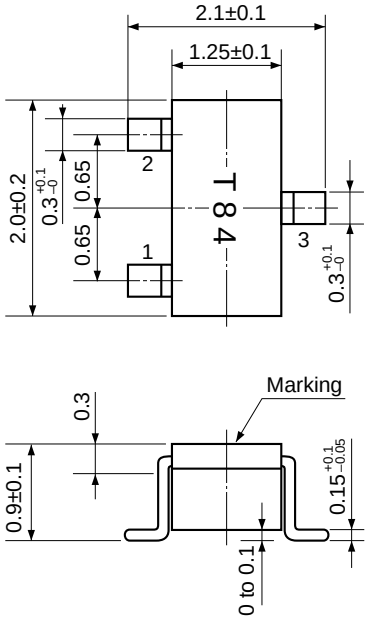
* Contact your NEC sales representatives to order samples for evaluation (available in batches of 50).

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Collector to Base Voltage	V_{CBO}	5	V
Collector to Emitter Voltage	V_{CEO}	3	V
Emitter to Base Voltage	V_{EBO}	2	V
Collector Current	I_C	10	mA
Total Power Dissipation	P_T	30	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

PACKAGE DIMENSIONS

(Units: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

CAUTION; This transistor uses high-frequency technology. Be careful not to allow excessive current to flow through the transistor, including static electricity.

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Collector Cutoff Current	I_{CBO}			100	nA	V_{CB} = 5 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			100	nA	V_{EB} = 1 V, I_C = 0
DC Current Gain	h_{FE}	70		140		V_{CE} = 2 V, I_C = 7 mA***1**
Insertion Power Gain (1)	$\|S_{21e}\|^2$	7.5	9		dB	V_{CE} = 2 V, I_C = 7 mA, f = 2 GHz
Insertion Power Gain (2)	$\|S_{21e}\|^2$	7	8.5		dB	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz
Noise Figure (1)	NF		1.5	2.0	dB	V_{CE} = 2 V, I_C = 3 mA, f = 2 GHz
Noise Figure (2)	NF		1.5	2.0	dB	V_{CE} = 1 V, I_C = 3 mA, f = 2 GHz
Gain Bandwidth Product (1)	f_T	10	13		GHz	V_{CE} = 2 V, I_C = 7 mA, f = 2 GHz
Gain Bandwidth Product (2)	f_T	8.5	12		GHz	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz
Feedback Capacitance	C_{re}		0.4	0.6	pF	V_{CB} = 2 V, I_E = 0 mA, f = 1 MHz***2**

***1.** Measured with pulses: Pulse width ≤ 350 μs, duty cycle ≤ 2 %, pulsed

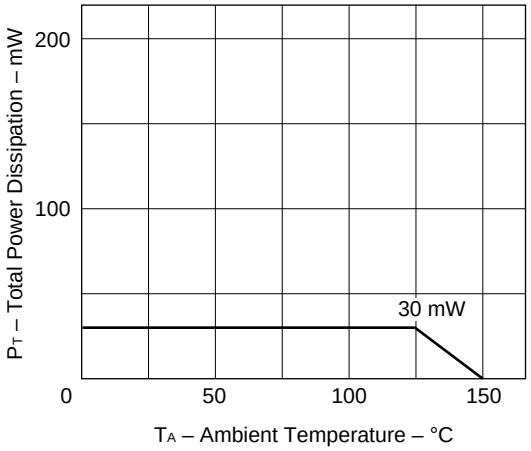
***2.** Measured with a three-terminal bridge. The emitter and case terminal are connected to the guard terminal of the bridge.

h_{FE} Class

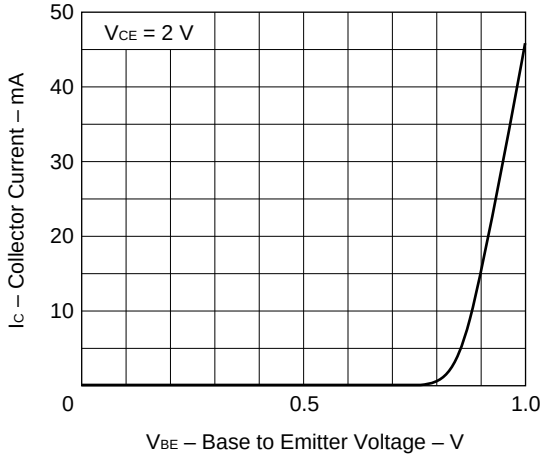
Class	FB
Marking	T84
h_{FE}	70 to 140

CHARACTERISTICS CURVES (T_A = 25 °C)

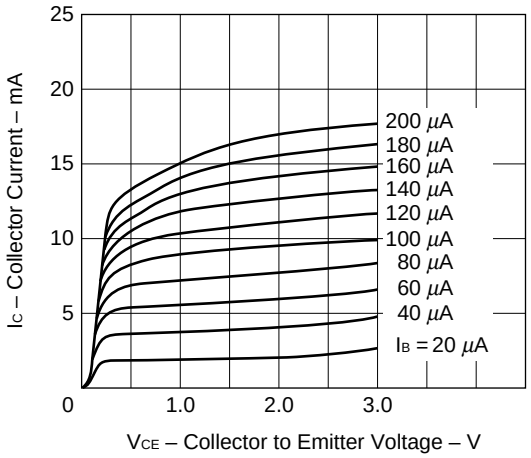
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



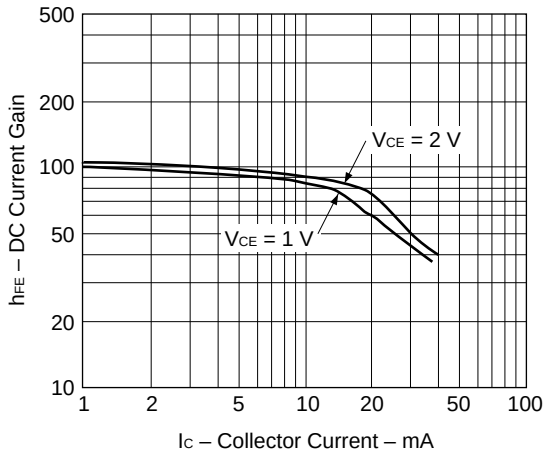
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



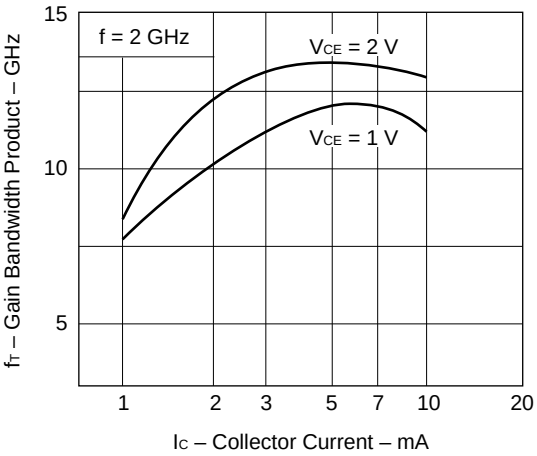
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



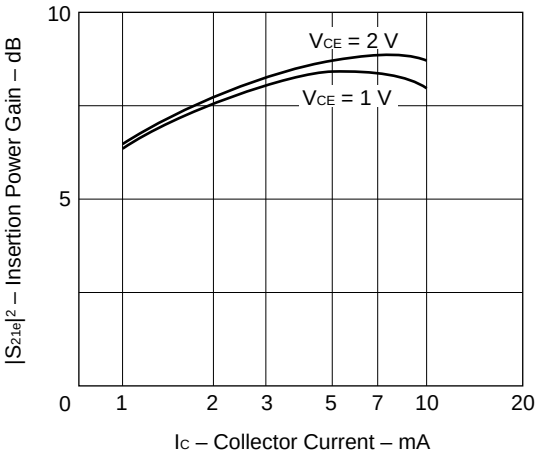
DC CURRENT GAIN vs.
COLLECTOR CURRENT



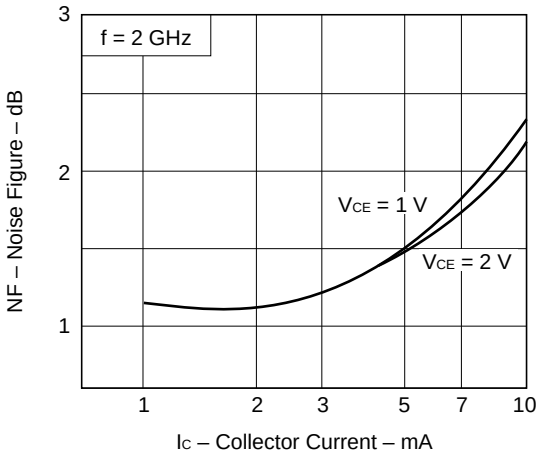
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



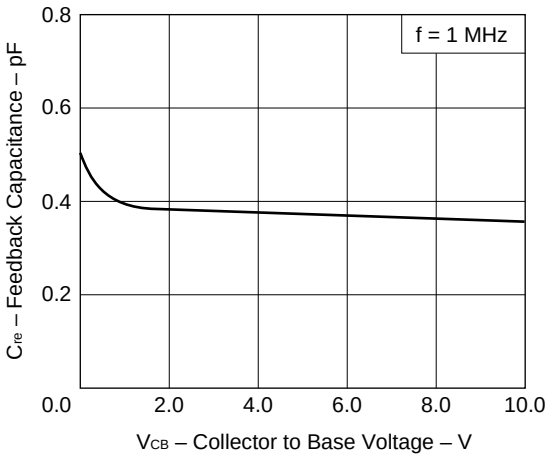
INSERTION POWER GAIN vs.
COLLECTOR CURRENT



NOISE FIGURE vs.
COLLECTOR CURRENT



FEED-BACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



S-PARAMETER

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.982	–3.7	1.968	174.3	0.020	83.4	0.994	–4.0
200.0000	0.983	–7.5	1.939	167.5	0.038	82.6	0.992	–8.1
300.0000	0.973	–10.6	1.930	161.8	0.058	79.2	0.980	–11.5
400.0000	0.955	–14.9	2.014	156.4	0.075	75.4	0.959	–15.5
500.0000	0.946	–17.9	1.934	150.9	0.091	72.8	0.949	–18.8
600.0000	0.918	–22.1	1.988	146.3	0.107	69.9	0.923	–22.1
700.0000	0.900	–25.8	1.951	141.7	0.122	66.8	0.901	–25.6
800.0000	0.873	–29.1	1.931	137.1	0.136	64.2	0.875	–28.4
900.0000	0.845	–33.3	1.996	133.2	0.148	61.7	0.851	–31.2
1000.0000	0.827	–35.8	1.900	129.5	0.158	59.8	0.832	–34.1
1100.0000	0.799	–40.3	1.963	125.6	0.170	57.6	0.806	–36.4
1200.0000	0.776	–43.4	1.944	121.7	0.179	55.7	0.781	–38.8
1300.0000	0.753	–46.8	1.909	118.0	0.189	54.3	0.761	–41.1
1400.0000	0.718	–50.7	1.936	114.1	0.196	52.7	0.736	–43.1
1500.0000	0.695	–53.4	1.870	110.7	0.205	50.9	0.719	–45.4
1600.0000	0.663	–57.1	1.878	107.2	0.211	49.7	0.698	–47.0
1700.0000	0.634	–60.0	1.849	104.0	0.215	48.5	0.677	–48.9
1800.0000	0.609	–62.8	1.810	100.6	0.222	47.3	0.658	–50.3
1900.0000	0.581	–65.7	1.786	97.9	0.227	46.4	0.642	–51.9
2000.0000	0.554	–69.0	1.773	94.7	0.231	45.8	0.622	–53.4

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.932	–6.3	5.517	168.9	0.019	83.2	0.975	–7.0
200.0000	0.914	–12.8	5.308	160.7	0.037	79.3	0.951	–13.6
300.0000	0.881	–18.1	5.147	152.7	0.054	74.7	0.913	–19.1
400.0000	0.833	–25.4	5.209	145.3	0.067	70.9	0.857	–24.5
500.0000	0.797	–29.6	4.893	139.4	0.080	67.7	0.819	–28.7
600.0000	0.737	–35.8	4.844	133.4	0.092	65.8	0.765	–32.1
700.0000	0.687	–41.6	4.709	127.6	0.101	63.4	0.720	–35.6
800.0000	0.636	–46.0	4.495	122.5	0.111	62.2	0.680	–37.8
900.0000	0.583	–51.0	4.406	117.5	0.118	61.4	0.645	–40.0
1000.0000	0.541	–54.6	4.184	113.4	0.127	60.5	0.616	–41.8
1100.0000	0.495	–59.2	4.048	108.6	0.135	59.5	0.587	–43.4
1200.0000	0.452	–61.8	3.894	104.4	0.143	59.0	0.561	–44.6
1300.0000	0.420	–65.0	3.693	101.0	0.150	58.2	0.538	–46.0
1400.0000	0.381	–67.5	3.545	97.1	0.158	58.2	0.517	–47.1
1500.0000	0.354	–70.0	3.369	94.2	0.165	57.4	0.502	–48.3
1600.0000	0.325	–71.8	3.227	91.2	0.173	57.5	0.483	–48.9
1700.0000	0.299	–73.7	3.089	88.6	0.180	57.2	0.469	–49.9
1800.0000	0.276	–75.3	2.965	85.9	0.187	56.9	0.457	–50.5
1900.0000	0.254	–77.3	2.842	83.7	0.194	56.8	0.446	–51.3
2000.0000	0.234	–79.0	2.744	81.2	0.201	56.7	0.434	–52.2

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.867	–9.9	8.234	165.2	0.018	83.2	0.957	–9.0
200.0000	0.834	–19.0	7.897	155.1	0.035	77.1	0.911	–17.3
300.0000	0.782	–25.7	7.518	145.9	0.050	72.5	0.847	–23.7
400.0000	0.713	–34.0	7.443	137.5	0.062	69.7	0.776	–28.9
500.0000	0.655	–39.7	6.901	130.7	0.073	66.9	0.723	–32.6
600.0000	0.576	–46.5	6.572	123.6	0.083	66.2	0.664	–35.4
700.0000	0.514	–52.3	6.182	117.3	0.092	64.6	0.618	–37.9
800.0000	0.458	–56.2	5.737	112.1	0.100	64.0	0.579	–39.3
900.0000	0.410	–59.9	5.382	107.5	0.109	63.2	0.547	–40.8
1000.0000	0.369	–62.7	5.014	103.5	0.116	63.5	0.522	–41.8
1100.0000	0.335	–65.8	4.692	99.8	0.125	62.8	0.499	–42.8
1200.0000	0.303	–67.2	4.411	96.3	0.134	63.2	0.479	–43.5
1300.0000	0.276	–69.6	4.134	93.3	0.141	62.4	0.459	–44.4
1400.0000	0.251	–71.0	3.902	90.4	0.149	62.7	0.444	–45.1
1500.0000	0.229	–72.5	3.681	87.9	0.159	62.1	0.431	–45.9
1600.0000	0.210	–73.7	3.493	85.3	0.167	62.0	0.420	–46.2
1700.0000	0.191	–74.4	3.326	83.0	0.174	61.6	0.409	–46.8
1800.0000	0.174	–75.1	3.175	80.8	0.182	61.3	0.399	–47.5
1900.0000	0.159	–76.8	3.035	78.7	0.190	61.0	0.392	–48.0
2000.0000	0.144	–78.3	2.915	76.7	0.198	60.7	0.384	–48.7

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.793	–15.0	10.022	161.8	0.018	80.9	0.938	–10.4
200.0000	0.737	–27.5	9.509	149.4	0.034	76.0	0.875	–19.6
300.0000	0.661	–36.5	8.774	139.2	0.047	71.5	0.796	–26.1
400.0000	0.574	–44.7	8.493	130.0	0.058	68.7	0.716	–31.0
500.0000	0.517	–50.7	7.755	122.7	0.069	67.4	0.660	–33.9
600.0000	0.446	–56.1	7.177	116.0	0.077	66.5	0.601	–36.0
700.0000	0.395	–60.3	6.636	110.4	0.086	65.8	0.559	–37.8
800.0000	0.348	–63.2	6.072	105.9	0.095	65.9	0.524	–38.7
900.0000	0.311	–66.1	5.617	102.0	0.104	65.7	0.497	–39.7
1000.0000	0.278	–68.0	5.189	98.4	0.112	66.0	0.476	–40.1
1100.0000	0.251	–70.3	4.824	95.1	0.121	65.3	0.457	–40.9
1200.0000	0.227	–71.3	4.499	92.0	0.129	65.4	0.442	–41.1
1300.0000	0.204	–73.4	4.203	89.4	0.138	65.3	0.426	–42.0
1400.0000	0.185	–74.0	3.963	86.7	0.146	64.8	0.413	–42.7
1500.0000	0.167	–75.7	3.722	84.3	0.155	64.6	0.404	–43.1
1600.0000	0.151	–76.3	3.525	82.1	0.163	64.5	0.395	–43.7
1700.0000	0.135	–77.1	3.345	80.1	0.172	64.0	0.385	–44.0
1800.0000	0.122	–77.5	3.191	77.8	0.180	63.6	0.377	–44.6
1900.0000	0.108	–78.9	3.042	76.0	0.190	63.2	0.371	–45.2
2000.0000	0.097	–81.0	2.913	74.1	0.197	62.9	0.365	–46.1

V_{CE} = 2 V, I_C = 1 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.982	–3.3	2.003	173.6	0.018	84.7	0.996	–3.6
200.0000	0.985	–6.8	1.935	168.2	0.036	83.0	0.993	–7.4
300.0000	0.977	–9.8	1.940	162.7	0.052	80.2	0.983	–10.5
400.0000	0.960	–13.9	2.017	157.1	0.069	76.3	0.964	–14.4
500.0000	0.952	–16.7	1.946	152.1	0.085	73.9	0.955	–17.4
600.0000	0.925	–20.7	1.993	147.7	0.099	71.0	0.932	–20.4
700.0000	0.908	–24.1	1.957	143.2	0.113	68.0	0.913	–23.8
800.0000	0.884	–27.3	1.942	138.8	0.126	65.9	0.888	≠26.5
900.0000	0.859	–31.1	2.004	135.0	0.137	63.8	0.865	–29.2
1000.0000	0.840	–33.5	1.911	131.4	0.147	61.6	0.847	–32.0
1100.0000	0.815	–37.8	1.973	127.7	0.159	59.3	0.822	–34.1
1200.0000	0.795	–40.5	1.951	124.0	0.168	57.8	0.803	–36.4
1300.0000	0.772	–44.0	1.928	120.4	0.177	56.1	0.782	–38.4
1400.0000	0.741	–47.4	1.956	116.7	0.184	54.6	0.758	–40.4
1500.0000	0.716	–50.2	1.889	113.2	0.193	53.0	0.743	–42.6
1600.0000	0.689	–53.5	1.896	109.8	0.198	51.6	0.719	–44.1
1700.0000	0.659	–56.4	1.873	106.7	0.204	50.5	0.699	–45.9
1800.0000	0.635	–59.0	1.835	103.4	0.210	49.6	0.681	–47.4
1900.0000	0.606	–61.6	1.815	100.7	0.215	48.8	0.666	–48.8
2000.0000	0.581	–64.7	1.801	97.6	0.220	48.0	0.647	–50.4

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.933	–5.7	5.575	170.0	0.017	84.9	0.979	–6.3
200.0000	0.922	–11.6	5.330	161.5	0.033	79.6	0.959	–12.5
300.0000	0.893	–16.6	5.178	154.0	0.049	75.2	0.924	–17.5
400.0000	0.851	–23.1	5.267	146.8	0.062	72.2	0.874	–22.6
500.0000	0.815	–27.0	4.943	141.1	0.074	69.1	0.838	–26.4
600.0000	0.759	–32.9	4.915	135.2	0.086	67.6	0.787	–29.6
700.0000	0.713	–38.0	4.769	129.6	0.095	65.0	0.745	–33.0
800.0000	0.664	–42.0	4.578	124.5	0.104	63.8	0.706	–35.0
900.0000	0.612	–46.6	4.507	119.7	0.112	63.0	0.673	–37.0
1000.0000	0.572	–49.9	4.285	115.6	0.120	61.9	0.645	–38.9
1100.0000	0.525	–54.0	4.163	111.0	0.128	61.1	0.617	–40.3
1200.0000	0.485	–56.5	4.009	106.8	0.136	60.8	0.593	–41.4
1300.0000	0.452	–59.2	3.814	103.4	0.143	60.2	0.569	–43.0
1400.0000	0.413	–61.5	3.672	99.6	0.150	59.9	0.548	–43.9
1500.0000	0.385	–63.5	3.499	96.7	0.157	59.5	0.532	–44.9
1600.0000	0.356	–64.9	3.349	93.6	0.164	59.1	0.517	–45.6
1700.0000	0.330	–66.4	3.213	90.9	0.172	58.7	0.501	–46.4
1800.0000	0.307	–67.7	3.079	88.2	0.178	58.6	0.488	–47.2
1900.0000	0.286	–69.2	2.959	85.9	0.185	58.4	0.478	–47.8
2000.0000	0.265	–70.4	2.863	83.5	1.193	58.2	0.464	–48.6

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.885	–8.3	8.518	167.7	0.017	82.5	0.964	–8.1
200.0000	0.859	–15.7	8.125	157.0	0.032	78.3	0.926	–15.6
300.0000	0.811	–22.2	7.721	148.0	0.046	73.6	0.868	–21.4
400.0000	0.742	–30.3	7.619	139.7	0.057	71.7	0.801	–26.5
500.0000	0.689	–35.3	7.082	132.9	0.068	68.6	0.752	–30.0
600.0000	0.612	–41.5	6.779	125.8	0.077	67.5	0.696	–32.3
700.0000	0.550	–46.7	6.401	119.7	0.086	66.1	0.650	–34.9
800.0000	0.495	–50.2	5.962	114.6	0.094	65.7	0.612	–36.2
900.0000	0.446	–53.7	5.613	109.9	0.102	65.0	0.581	–37.6
1000.0000	0.406	–55.9	5.244	105.8	0.111	64.6	0.557	–38.5
1100.0000	0.369	–58.4	4.918	101.9	0.118	64.6	0.534	–39.7
1200.0000	0.337	–59.5	4.631	98.5	0.127	64.6	0.515	–40.2
1300.0000	0.310	–61.3	4.346	95.5	0.134	64.1	0.495	–41.0
1400.0000	0.285	–61.9	4.103	92.6	0.142	64.0	0.481	–41.6
1500.0000	0.263	–63.2	3.875	90.0	0.150	63.7	0.467	–42.3
1600.0000	0.244	–63.4	3.680	87.4	0.157	63.4	0.456	–42.6
1700.0000	0.225	–63.7	3.502	85.1	0.165	63.3	0.446	–43.3
1800.0000	0.210	–63.8	3.338	83.0	0.172	62.7	0.435	–43.7
1900.0000	0.193	–64.7	3.193	80.9	0.181	62.5	0.427	–44.2
2000.0000	0.178	–64.8	3.064	78.9	0.188	62.3	0.419	–45.0

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.836	–10.5	11.040	165.5	0.016	82.0	0.952	–9.4
200.0000	0.794	–19.7	10.358	153.3	0.031	77.4	0.897	–17.6
300.0000	0.731	–27.4	9.657	143.3	0.043	73.3	0.825	–23.4
400.0000	0.645	–36.2	9.225	133.7	0.053	71.2	0.751	–28.2
500.0000	0.579	–41.6	8.418	126.3	0.063	69.1	0.696	–31.0
600.0000	0.500	–47.0	7.759	119.3	0.073	68.1	0.640	–32.9
700.0000	0.440	–51.4	7.124	113.3	0.081	67.5	0.598	–34.6
800.0000	0.393	–54.0	6.499	108.6	0.089	67.2	0.564	–35.3
900.0000	0.352	–56.3	6.003	104.4	0.097	67.0	0.537	–36.4
1000.0000	0.319	–57.7	5.536	100.8	0.105	67.1	0.517	–36.8
1100.0000	0.290	–59.5	5.135	97.3	0.114	67.0	0.496	–37.7
1200.0000	0.265	–59.6	4.801	94.4	0.122	67.0	0.482	–37.8
1300.0000	0.242	–61.1	4.484	91.6	0.130	66.5	0.465	–38.6
1400.0000	0.223	–61.2	4.221	89.0	0.138	66.8	0.456	–39.0
1500.0000	0.204	–62.1	3.974	86.5	0.147	66.1	0.443	–39.7
1600.0000	0.189	–61.7	3.760	84.3	0.154	65.7	0.435	–40.1
1700.0000	0.175	–61.5	3.565	82.3	0.163	65.4	0.426	–40.5
1800.0000	0.162	–60.6	3.393	80.2	0.171	65.1	0.418	–41.0
1900.0000	0.148	–60.8	3.248	78.3	0.179	64.7	0.411	–41.4
2000.0000	0.137	–60.9	3.106	76.6	0.187	64.5	0.406	–42.1

[MEMO]

[MEMO]

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M4 96.5

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