CEL

SILICON TRANSISTOR

NE68119 / 2SC5007

JEITA Part No.

NPN SILICON EPITAXIAL TRANSISTOR
3 PINS ULTRA SUPER MINI MOLD

DESCRIPTION

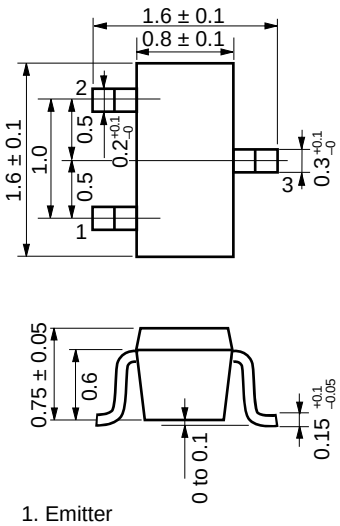
The NE68119 / 2SC5007 is an NPN epitaxial silicon transistor designed for use in low noise and small signal amplifiers from VHF band to UHF band. Low noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This is achieved by direct nitride passivated base surface, process (NEST2 process) which is a proprietary fabrication technique.

FEATURES

- Low Voltage Use.
- High f_T : 7.0 GHz TYP. (@ V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz)
- Low C_{re} : 0.45 pF TYP. (@ V_{CE} = 3 V, I_E = 0, f = 1 MHz)
- Low NF : 1.4 dB TYP. (@ V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz)
- High $|S_{21e}|^2$: 12 dB TYP. (@ V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz)
- Ultra Super Mini Mold Package.

PACKAGE DIMENSIONS

in millimeters



1. Emitter
2. Base
3. Collector

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
NE68119-A 2SC5007-A	50 pcs./Unit	Embossed tape 8 mm wide. Pin3 (Collector) face to perforation side of the tape.
NE68119-T1-A 2SC5007-T1-A	3 kpcs./Reel	

***** To order evaluation samples, please contact your nearby sales office. Unit sample quantity shall be 50 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	10	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	65	mA
Total Power Dissipation	P_T	125	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			0.8	μA	V_{CB} = 10 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			0.8	μA	V_{EB} = 1 V, I_C = 0
DC Current Gain	h_{FE}	80		160		V_{CE} = 3 V, I_C = 7 mA*1
Gain Bandwidth Product	f_T	4.5	7.0		GHz	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz
Feed-Back Capacitance	C_{re}		0.45	0.9	pF	V_{CB} = 3 V, I_E = 0, f = 1 MHz*2
Insertion Power Gain	$\|S_{21e}\|^2$	10.0	12.0		dB	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz
Noise Figure	NF		1.4	2.7	dB	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz

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

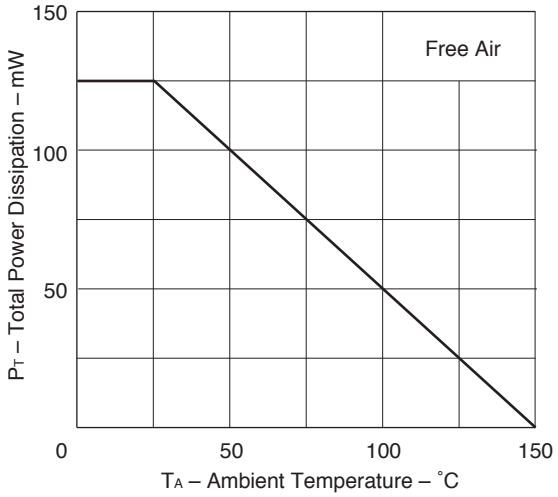
***2** The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

h_{FE} Classification

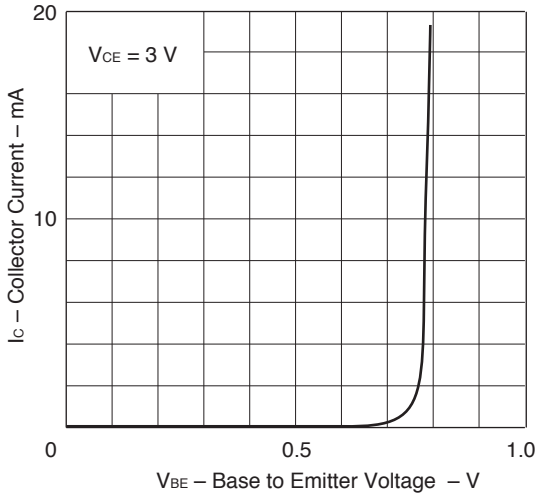
RANK	FB
Marking	34
h_{FE}	80 to 160

TYPICAL CHARACTERISTICS (T_A = 25 °C)

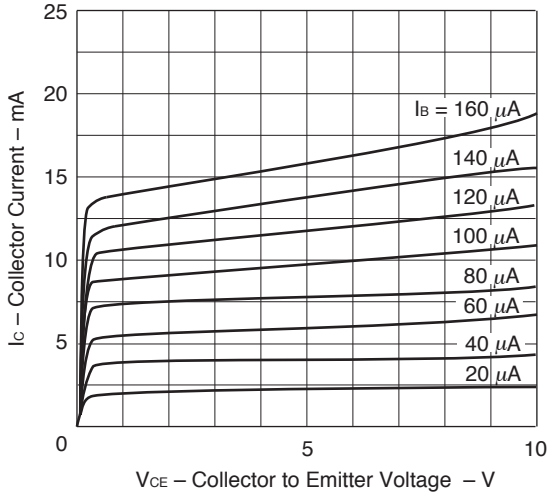
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



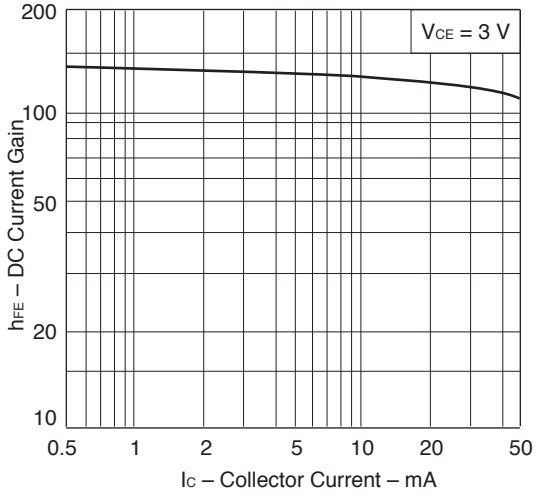
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



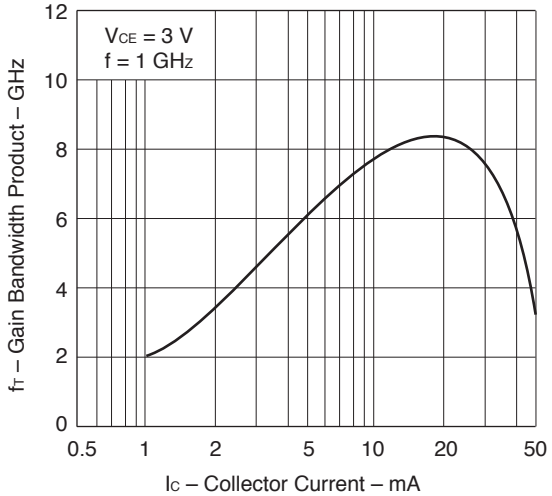
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



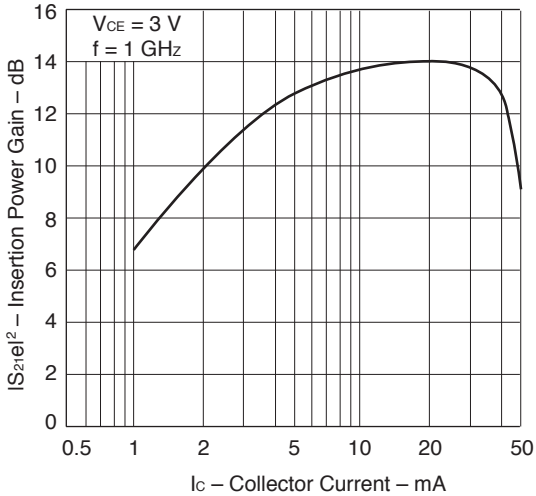
DC CURRENT GAIN vs. COLLECTOR CURRENT



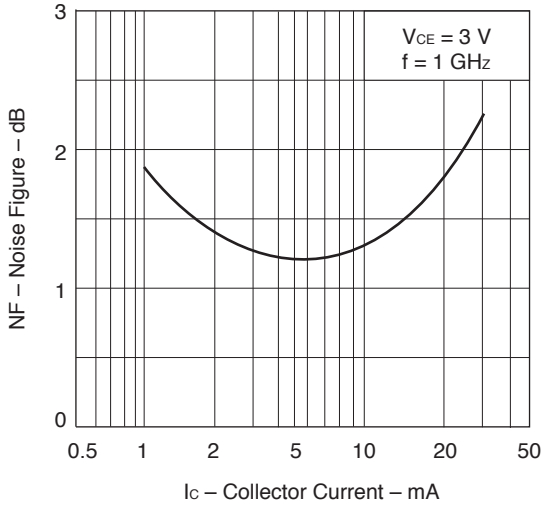
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



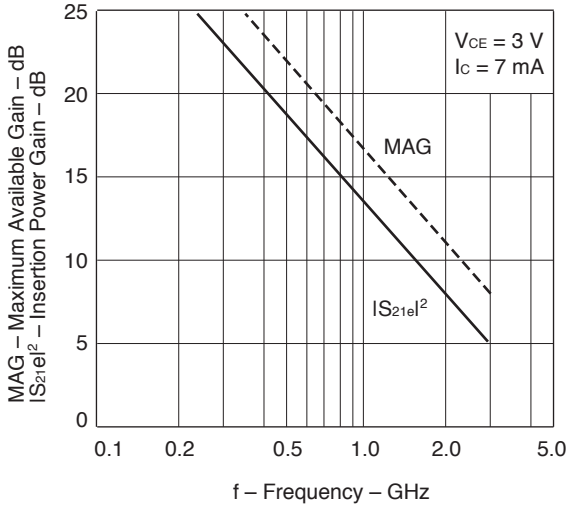
INSERTION POWER GAIN vs. COLLECTOR CURRENT



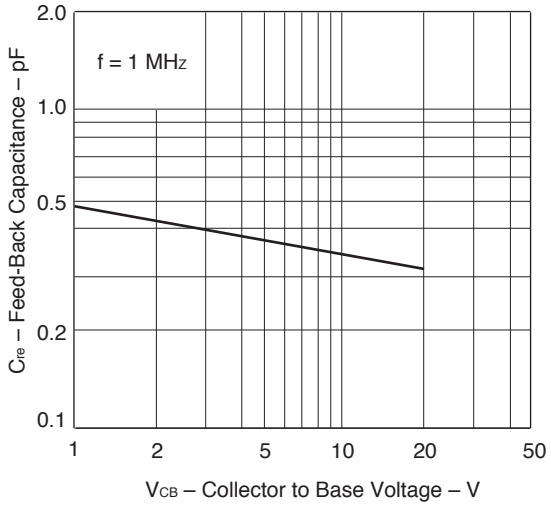
NOISE FIGURE vs. COLLECTOR CURRENT



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	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.800	–29.5	16.411	147.9	.023	69.0	.860	–22.4
200.00	.650	–60.0	14.666	126.3	.037	56.1	.684	–34.9
300.00	.533	–86.2	12.707	109.0	.047	50.1	.551	–40.9
400.00	.449	–106.2	10.607	96.1	.055	46.0	.465	–42.6
500.00	.401	–122.0	9.070	85.5	.063	43.6	.410	–44.1
600.00	.372	–134.1	7.714	76.9	.071	41.4	.366	–44.0
700.00	.353	–144.4	6.770	69.3	.079	38.9	.340	–43.9
800.00	.342	–153.2	5.990	62.1	.087	36.3	.314	–44.2
900.00	.337	–160.8	5.409	55.4	.094	33.5	.298	–44.0
1000.00	.334	–167.5	4.888	49.0	.104	30.9	.279	–45.1
1100.00	.334	–173.4	4.489	43.2	.111	27.5	.266	–44.4
1200.00	.337	–179.3	4.145	37.1	.120	24.9	.255	–46.1
1300.00	.339	176.0	3.844	31.3	.128	21.2	.241	–46.2
1400.00	.344	171.5	3.606	25.7	.138	17.9	.236	–48.0
1500.00	.348	167.4	3.375	20.0	.146	14.6	.222	–48.9
1600.00	.356	163.6	3.202	14.7	.155	10.9	.215	–50.0
1700.00	.362	159.9	3.021	9.1	.164	7.1	.204	–52.8
1800.00	.373	156.9	2.868	4.0	.172	3.2	.193	–53.9
1900.00	.385	152.7	2.743	–1.6	.180	–.9	.181	–56.9
2000.00	.394	148.8	2.599	–7.2	.187	–4.2	.168	–57.5
2100.00	.401	145.6	2.500	–12.6	.194	–8.0	.161	–59.8
2200.00	.408	143.0	2.390	–17.8	.202	–11.9	.149	–62.3
2300.00	.419	139.9	2.308	–23.0	.211	–15.4	.141	–64.4
2400.00	.425	137.3	2.211	–28.2	.218	–19.7	.128	–68.6
2500.00	.436	135.1	2.138	–33.1	.227	–23.1	.119	–70.5
2600.00	.444	132.2	2.065	–38.5	.235	–27.3	.109	–76.7
2700.00	.453	130.2	1.997	–43.3	.242	–30.8	.096	–80.7
2800.00	.464	127.7	1.937	–48.5	.251	–35.0	.090	–87.7
2900.00	.474	125.5	1.870	–53.4	.259	–39.0	.077	–93.9
3000.00	.486	123.5	1.824	–58.4	.266	–43.0	.074	–102.4

V_{CE} = 3 V, I_C = 7 mA, Z_O = 50 Ω

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.874	–24.1	12.285	152.5	.025	69.7	.903	–18.4
200.00	.747	–49.0	11.419	132.2	.041	56.9	.760	–30.7
300.00	.642	–71.8	10.461	115.9	.053	48.9	.632	–37.6
400.00	.549	–91.7	9.215	102.4	.061	43.5	.541	–40.6
500.00	.482	–108.8	8.182	90.7	.069	39.9	.479	–43.0
600.00	.437	–121.7	7.076	81.3	.076	36.5	.428	–43.6
700.00	.406	–133.2	6.308	72.9	.083	34.3	.397	–44.2
800.00	.386	–143.2	5.628	65.0	.090	31.5	.365	–44.8
900.00	.374	–151.7	5.094	57.9	.097	29.2	.344	–44.8
1000.00	.367	–159.3	4.645	51.2	.105	26.5	.323	–46.1
1100.00	.363	–166.0	4.264	45.2	.112	23.6	.308	–45.7
1200.00	.361	–172.4	3.947	38.6	.119	21.1	.296	–47.2
1300.00	.362	–178.0	3.657	32.7	.127	18.0	.282	–47.5
1400.00	.364	177.1	3.430	26.9	.134	14.7	.272	–49.1
1500.00	.367	172.5	3.223	20.9	.143	11.6	.257	–50.0
1600.00	.374	168.2	3.064	15.5	.151	8.2	.252	–51.3
1700.00	.379	163.9	2.884	9.8	.159	4.7	.241	–53.6
1800.00	.388	160.5	2.748	4.6	.168	1.1	.230	–55.0
1900.00	.400	156.2	2.624	–1.3	.174	–3.1	.216	–57.7
2000.00	.408	152.0	2.501	–6.8	.180	–6.3	.205	–58.6
2100.00	.415	148.5	2.399	–12.2	.188	–9.8	.196	–60.9
2200.00	.421	145.7	2.283	–17.4	.196	–13.2	.185	–63.4
2300.00	.432	142.3	2.217	–22.9	.204	–16.7	.177	–65.3
2400.00	.437	139.5	2.124	–28.2	.212	–20.6	.164	–69.0
2500.00	.448	137.0	2.055	–33.1	.219	–24.0	.155	–71.3
2600.00	.456	133.9	1.986	–38.6	.227	–28.0	.145	–76.1
2700.00	.465	131.7	1.920	–43.5	.234	–31.5	.133	–79.7
2800.00	.476	129.2	1.862	–48.8	.243	–35.4	.127	–85.3
2900.00	.485	127.0	1.798	–53.7	.251	–39.3	.115	–90.1
3000.00	.497	124.6	1.753	–58.7	.260	–43.1	.111	–95.9

S-PARAMETER

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	.911	–21.8	9.295	155.2	.026	72.9	.934	–14.9
200.00	.821	–41.2	8.756	136.9	.045	58.4	.824	–26.3
300.00	.733	–60.9	8.333	121.6	.059	49.0	.709	–33.6
400.00	.650	–79.2	7.605	108.6	.068	42.2	.620	–37.8
500.00	.575	–96.1	7.040	96.7	.076	37.7	.554	–40.8
600.00	.521	–109.4	6.212	86.3	.082	33.3	.499	–42.4
700.00	.475	–122.0	5.673	77.2	.089	29.8	.461	–43.5
800.00	.445	–132.9	5.129	68.6	.094	26.7	.426	–44.4
900.00	.425	–142.3	4.684	60.9	.100	24.4	.401	–44.9
1000.00	.410	–150.8	4.305	53.7	.106	21.7	.378	–46.2
1100.00	.402	–158.1	3.970	47.0	.113	19.1	.360	–46.3
1200.00	.395	–165.2	3.691	40.6	.120	15.8	.346	–47.5
1300.00	.393	–171.3	3.437	34.4	.126	13.1	.329	–48.0
1400.00	.395	–176.8	3.225	28.3	.132	10.5	.319	–49.8
1500.00	.394	177.8	3.026	22.1	.139	7.6	.304	–50.8
1600.00	.400	173.3	2.877	16.6	.148	4.8	.296	–51.9
1700.00	.402	168.5	2.711	10.6	.155	1.6	.285	–54.3
1800.00	.411	164.8	2.585	5.1	.163	–2.0	.273	–55.8
1900.00	.421	160.0	2.476	–.9	.169	–5.6	.260	–58.0
2000.00	.428	155.5	2.356	–6.3	.174	–8.7	.248	–59.4
2100.00	.435	151.7	2.262	–11.9	.181	–11.7	.240	–61.5
2200.00	.440	148.5	2.165	–17.4	.188	–14.9	.229	–64.1
2300.00	.451	145.0	2.099	–22.9	.196	–18.4	.221	–66.1
2400.00	.455	141.9	2.012	–28.2	.203	–21.8	.209	–69.1
2500.00	.466	139.2	1.949	–33.3	.210	–25.1	.200	–71.4
2600.00	.473	135.9	1.882	–38.8	.219	–28.8	.190	–76.0
2700.00	.481	133.6	1.825	–43.8	.225	–32.3	.179	–79.0
2800.00	.491	130.9	1.768	–49.2	.233	–35.8	.171	–83.7
2900.00	.500	128.4	1.708	–54.1	.241	–39.2	.161	–88.1
3000.00	.511	126.0	1.667	–59.3	.250	–43.0	.155	–92.9

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	.966	–15.9	5.685	159.8	.027	75.8	.964	–10.8
200.00	.900	–32.9	5.646	142.9	.050	61.9	.897	–20.1
300.00	.842	–48.9	5.582	128.9	.067	50.8	.813	–27.0
400.00	.774	–64.5	5.257	116.6	.079	42.0	.737	–32.0
500.00	.717	–79.4	5.097	105.5	.089	35.8	.674	–35.9
600.00	.662	–92.0	4.613	94.7	.096	28.7	.618	–38.5
700.00	.607	–104.8	4.379	84.9	.102	24.7	.575	–40.4
800.00	.565	–116.7	4.097	75.2	.107	20.3	.535	–42.3
900.00	.530	–127.3	3.843	66.7	.112	17.3	.505	–43.2
1000.00	.505	–136.9	3.598	58.5	.116	13.3	.477	–44.8
1100.00	.484	–145.1	3.359	51.2	.120	10.7	.456	–45.4
1200.00	.472	–153.4	3.164	43.9	.124	7.8	.439	–47.0
1300.00	.463	–160.3	2.952	37.2	.129	5.4	.420	–47.8
1400.00	.458	–166.7	2.796	30.8	.133	2.7	.407	–49.5
1500.00	.454	–172.7	2.631	24.4	.137	.2	.392	–51.0
1600.00	.455	–178.2	2.508	18.2	.143	–2.4	.383	–52.2
1700.00	.455	176.3	2.382	11.8	.148	–5.2	.369	–54.2
1800.00	.461	171.8	2.275	6.0	.155	–7.9	.359	–56.0
1900.00	.468	166.5	2.182	–.1	.159	–11.9	.345	–58.2
2000.00	.472	161.5	2.077	–5.9	.162	–14.1	.335	–59.9
2100.00	.479	157.3	2.009	–11.6	.168	–16.4	.326	–62.1
2200.00	.481	153.7	1.926	–17.3	.173	–19.3	.315	–64.1
2300.00	.490	149.6	1.864	–22.9	.180	–21.9	.306	–66.6
2400.00	.494	146.0	1.784	–28.5	.186	–24.8	.295	–69.4
2500.00	.504	143.0	1.731	–33.7	.193	–27.2	.286	–71.9
2600.00	.510	139.4	1.677	–39.4	.199	–30.3	.277	–75.6
2700.00	.517	136.7	1.625	–44.6	.206	–33.5	.267	–78.6
2800.00	.529	133.6	1.576	–50.0	.214	–36.6	.260	–82.4
2900.00	.534	130.9	1.524	–55.1	.221	–39.8	.250	–86.6
3000.00	.546	128.3	1.489	–60.3	.229	–43.1	.245	–90.5

S-PARAMETER

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	1.007	–11.6	2.002	164.1	.028	78.0	.990	–5.7
200.00	.983	–23.4	2.020	151.1	.055	68.0	.972	–11.2
300.00	.964	–34.8	2.079	139.1	.078	57.4	.939	–16.0
400.00	.930	–46.9	2.041	127.5	.097	47.8	.906	–20.3
500.00	.903	–57.8	2.051	117.5	.116	39.3	.872	–24.3
600.00	.868	–68.6	1.913	106.4	.129	30.3	.838	–27.7
700.00	.831	–78.8	1.883	96.8	.139	23.2	.804	–30.7
800.00	.803	–89.6	1.845	86.7	.146	15.7	.772	–33.4
900.00	.764	–99.6	1.813	77.8	.150	9.6	.740	–35.8
1000.00	.737	–110.2	1.803	68.6	.155	3.4	.712	–38.1
1100.00	.704	–119.5	1.761	60.2	.156	–1.7	.691	–39.9
1200.00	.683	–128.7	1.729	51.8	.158	–6.9	.671	–42.2
1300.00	.662	–136.9	1.647	43.9	.157	–11.7	.652	–43.9
1400.00	.649	–144.6	1.602	36.5	.157	–15.5	.637	–46.2
1500.00	.633	–152.1	1.534	28.8	.155	–19.4	.622	–48.1
1600.00	.626	–158.9	1.487	22.0	.154	–22.0	.609	–50.1
1700.00	.616	–166.0	1.444	14.5	.153	–25.3	.595	–52.3
1800.00	.611	–171.6	1.389	8.1	.154	–27.7	.586	–54.4
1900.00	.612	–178.0	1.351	1.4	.153	–31.6	.574	–56.9
2000.00	.608	176.1	1.305	–5.1	.148	–33.6	.565	–59.1
2100.00	.612	170.5	1.271	–11.3	.147	–35.4	.556	–61.6
2200.00	.612	165.7	1.221	–17.3	.145	–36.8	.550	–64.3
2300.00	.616	160.7	1.198	–23.5	.145	–37.8	.540	–67.1
2400.00	.617	156.1	1.149	–29.5	.144	–38.6	.533	–70.0
2500.00	.623	152.2	1.120	–34.9	.146	–39.1	.525	–73.0
2600.00	.627	147.6	1.091	–41.0	.149	–39.6	.518	–76.6
2700.00	.630	144.1	1.060	–46.3	.153	–40.1	.509	–80.0
2800.00	.638	140.1	1.031	–52.1	.159	–40.5	.504	–83.7
2900.00	.640	136.6	.999	–57.3	.165	–41.8	.495	–87.5
3000.00	.650	133.4	.977	–62.6	.173	–42.8	.494	–91.5

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
100.00	.897	–25.2	9.052	153.5	.035	70.1	.907	–20.1
200.00	.786	–49.2	8.496	133.0	.058	54.3	.764	–34.9
300.00	.696	–72.2	7.939	116.9	.073	44.3	.630	–44.6
400.00	.619	–92.7	7.110	103.4	.083	37.3	.530	–50.1
500.00	.563	–111.0	6.461	91.2	.092	32.9	.456	–54.7
600.00	.521	–124.5	5.626	81.2	.098	28.7	.397	–57.1
700.00	.491	–136.8	5.074	72.3	.107	25.9	.356	–59.2
800.00	.473	–147.0	4.547	63.8	.112	22.5	.317	–61.2
900.00	.461	–155.5	4.141	56.3	.119	19.8	.291	–62.2
1000.00	.455	–163.1	3.787	49.2	.126	17.4	.265	–64.6
1100.00	.452	–169.6	3.476	42.7	.134	14.3	.245	–65.4
1200.00	.451	–176.0	3.232	36.1	.140	11.2	.227	–67.7
1300.00	.451	178.7	2.996	30.0	.148	8.5	.210	–68.9
1400.00	.454	173.6	2.815	23.8	.156	5.7	.199	–71.8
1500.00	.456	169.0	2.632	17.6	.163	2.7	.183	–74.2
1600.00	.465	165.0	2.508	12.0	.171	–.6	.174	–76.4
1700.00	.467	160.7	2.366	5.9	.180	–4.0	.161	–80.6
1800.00	.475	157.3	2.250	.4	.187	–7.6	.149	–83.4
1900.00	.486	153.1	2.155	–5.7	.195	–11.6	.140	–88.6
2000.00	.493	149.3	2.053	–11.1	.200	–14.7	.127	–91.8
2100.00	.501	145.6	1.971	–16.7	.208	–17.9	.121	–97.4
2200.00	.506	142.8	1.892	–22.1	.215	–21.2	.111	–103.1
2300.00	.517	139.5	1.822	–27.7	.223	–24.7	.106	–109.2
2400.00	.521	136.6	1.746	–33.1	.230	–28.4	.099	–118.1
2500.00	.532	134.2	1.692	–38.2	.238	–31.7	.092	–125.0
2600.00	.540	131.1	1.633	–43.7	.247	–35.6	.093	–135.3
2700.00	.548	128.9	1.581	–48.6	.253	–39.3	.091	–145.0
2800.00	.556	126.2	1.532	–54.0	.261	–42.9	.096	–154.4
2900.00	.563	124.0	1.479	–59.0	.268	–46.5	.098	–164.4
3000.00	.575	121.6	1.443	–64.1	.277	–50.5	.104	–171.2

S-PARAMETER

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
100.00	.958	–19.0	5.665	158.3	.036	73.2	.949	–14.2
200.00	.881	–37.7	5.548	139.7	.064	58.2	.861	–26.3
300.00	.814	–56.1	5.432	124.9	.086	46.9	.754	–35.1
400.00	.746	–73.3	5.049	112.0	.100	37.5	.665	–41.2
500.00	.691	–90.2	4.841	100.3	.110	31.1	.593	–46.3
600.00	.639	–103.5	4.339	89.4	.117	24.7	.528	–49.8
700.00	.594	–117.0	4.078	79.6	.124	20.3	.481	–52.5
800.00	.561	–129.0	3.769	70.0	.129	15.6	.437	–54.7
900.00	.538	–139.1	3.500	61.5	.133	12.2	.404	–56.2
1000.00	.521	–148.6	3.250	53.6	.139	8.7	.373	–58.6
1100.00	.507	–156.1	3.021	46.3	.142	6.0	.349	–59.5
1200.00	.502	–164.0	2.829	39.2	.147	2.6	.330	–61.8
1300.00	.496	–170.1	2.639	32.3	.152	–.3	.310	–63.0
1400.00	.495	–176.0	2.493	25.8	.158	–2.7	.296	–65.4
1500.00	.494	178.4	2.336	19.5	.162	–5.6	.279	–67.3
1600.00	.500	173.6	2.227	13.2	.168	–8.1	.267	–69.5
1700.00	.498	168.6	2.113	7.0	.174	–11.2	.253	–72.3
1800.00	.505	164.5	2.016	1.1	.180	–14.4	.242	–74.7
1900.00	.515	159.8	1.935	–5.0	.185	–17.8	.229	–78.1
2000.00	.520	155.5	1.841	–10.8	.188	–20.2	.218	–80.9
2100.00	.526	151.3	1.776	–16.7	.194	–23.2	.208	–84.4
2200.00	.531	148.1	1.698	–22.3	.200	–25.9	.198	–88.0
2300.00	.541	144.3	1.648	–27.9	.206	–28.9	.190	–92.0
2400.00	.544	141.0	1.578	–33.5	.213	–31.8	.181	–97.1
2500.00	.554	138.3	1.532	–38.7	.218	–34.9	.173	–101.2
2600.00	.561	134.9	1.483	–44.5	.226	–38.2	.168	–107.7
2700.00	.567	132.3	1.434	–49.5	.232	–41.1	.160	–113.5
2800.00	.578	129.3	1.392	–55.2	.240	–44.5	.159	–120.3
2900.00	.584	126.8	1.343	–60.1	.247	–47.7	.153	–127.4
3000.00	.595	124.3	1.314	–65.3	.255	–51.2	.155	–133.9

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
100.00	1.003	–12.8	1.999	162.5	.037	77.9	.986	–7.2
200.00	.976	–25.7	2.006	148.6	.071	65.8	.960	–14.1
300.00	.953	–38.3	2.059	135.7	.103	54.9	.917	–20.1
400.00	.915	–51.0	2.007	123.2	.127	44.2	.875	–25.3
500.00	.885	–63.1	2.009	112.8	.147	35.2	.829	–30.2
600.00	.847	–74.4	1.873	101.4	.163	25.8	.786	–34.2
700.00	.809	–85.4	1.843	91.3	.174	18.4	.747	–37.7
800.00	.778	–96.8	1.794	80.9	.182	10.5	.706	–41.1
900.00	.744	–107.2	1.752	71.8	.187	4.5	.672	–43.8
1000.00	.718	–117.9	1.727	62.3	.191	–2.0	.638	–46.5
1100.00	.689	–127.2	1.678	53.8	.193	–7.3	.613	–48.6
1200.00	.672	–136.5	1.632	45.4	.195	–12.5	.590	–51.1
1300.00	.656	–144.3	1.551	37.5	.193	–17.5	.571	–53.3
1400.00	.646	–151.8	1.501	30.1	.193	–21.6	.553	–55.9
1500.00	.634	–159.1	1.431	22.3	.190	–26.1	.536	–58.1
1600.00	.630	–165.5	1.389	15.6	.188	–29.0	.523	–60.8
1700.00	.623	–172.3	1.345	8.4	.186	–32.4	.506	–63.3
1800.00	.620	–177.5	1.291	1.8	.185	–35.4	.494	–65.8
1900.00	.624	176.3	1.253	–5.1	.184	–39.4	.481	–68.9
2000.00	.622	170.9	1.206	–11.4	.178	–42.1	.473	–71.5
2100.00	.628	165.8	1.174	–17.7	.176	–44.2	.464	–74.8
2200.00	.628	161.4	1.128	–23.8	.173	–46.2	.456	–78.0
2300.00	.636	156.6	1.104	–29.8	.172	–47.3	.445	–81.5
2400.00	.636	152.2	1.059	–35.9	.170	–48.7	.440	–85.3
2500.00	.644	148.6	1.033	–41.3	.172	–49.2	.430	–88.9
2600.00	.648	144.2	1.003	–47.3	.173	–50.4	.425	–93.3
2700.00	.652	140.9	.972	–52.7	.174	–51.0	.418	–97.6
2800.00	.660	137.2	.946	–58.4	.179	–51.9	.412	–102.2
2900.00	.663	134.0	.917	–63.5	.184	–53.0	.407	–107.1
3000.00	.673	130.8	.896	–68.7	.192	–54.1	.406	–112.1

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