CEL

SILICON TRANSISTOR

NE67839 / 2SC5455

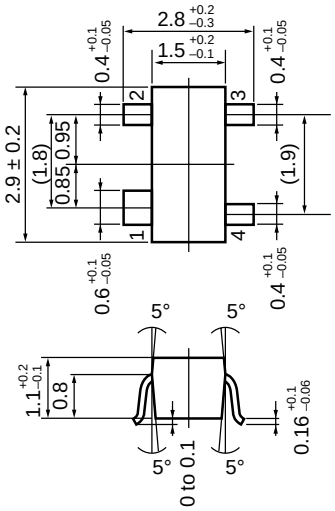
JEITA Part No.

NPN EPITAXIAL SILICON TRANSISTOR
4-PIN MINI MOLD

FEATURE

- Ideal for medium-output applications
- High gain, low noise
- Small reverse transfer capacitance
- Can operate at low voltage

PACKAGE DIMENSIONS (in mm)



PIN CONNECTIONS

1: Collector
2: Emitter
3: Base
4: Emitter

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
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	100	mA
Total Power Dissipation	P_T	200	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 5 V, I_E = 0			0.1	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V, I_C = 0			0.1	μA
DC Current Gain	h_{FE}	V_{CE} = 3 V, I_C = 30 mA **Note 1**	75		150	
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz		12.0		GHz
Reverse Transfer Capacitance	C_{re}	V_{CB} = 3 V, I_E = 0, f = 1 MHz **Note 2**		0.5	0.7	pF
Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz	8.0	10.0		dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 7 mA, f = 2 GHz		1.5	2.5	dB

Notes 1. Pulse measurement $P_W \leq 350$ μs, duty cycle ≤ 2 %

2. Collector to base capacitance measured by capacitance meter (automatic balance bridge method) when emitter pin is connected to the guard pin.

Because this product uses high-frequency process, avoid excessive input of static electricity, etc.

The information in this document is subject to change without notice.

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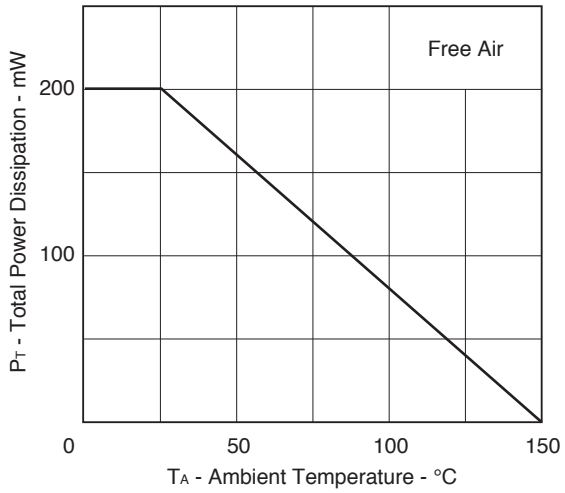
h_{FE} CLASSIFICATION

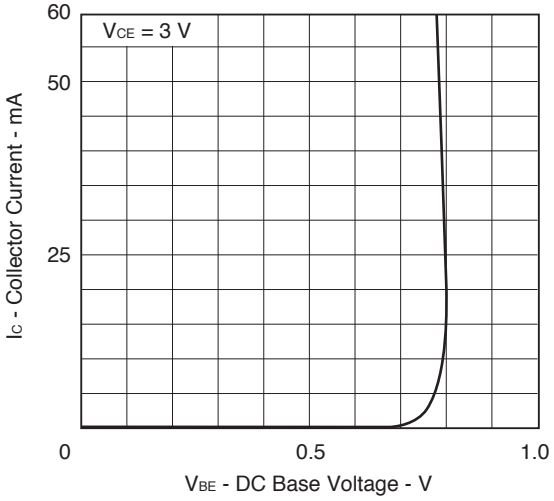
RANK	FB
Marking	R55
h_{FE}	75 to 150

TYPICAL CHARACTERISTICS (T_A = 25 °C)

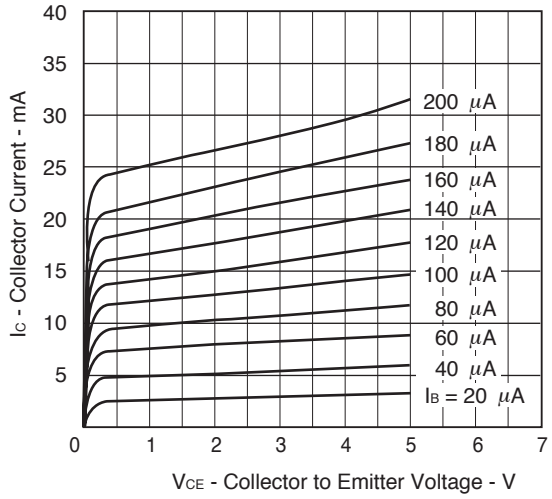
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



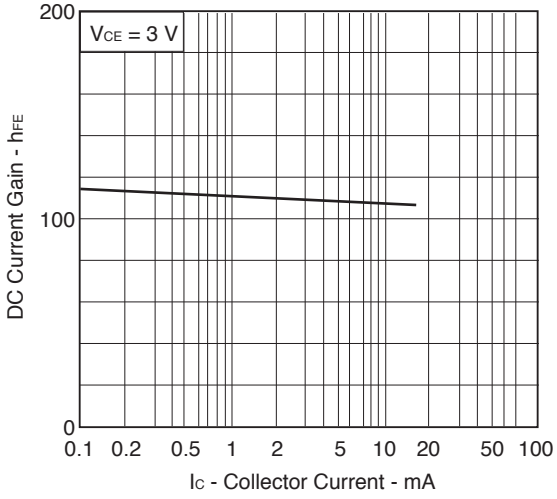
COLLECTOR CURRENT vs. DC BASE VOLTAGE



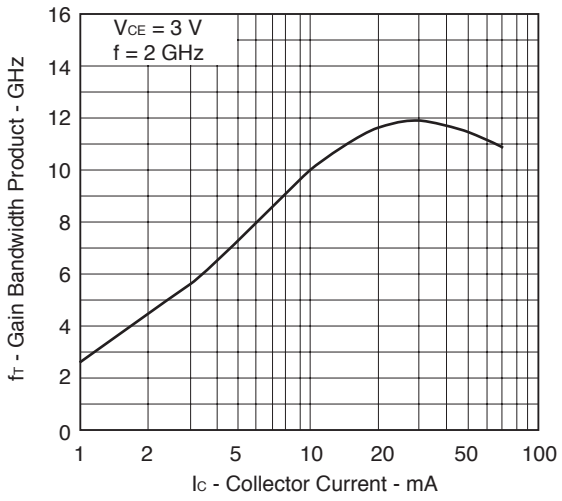
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



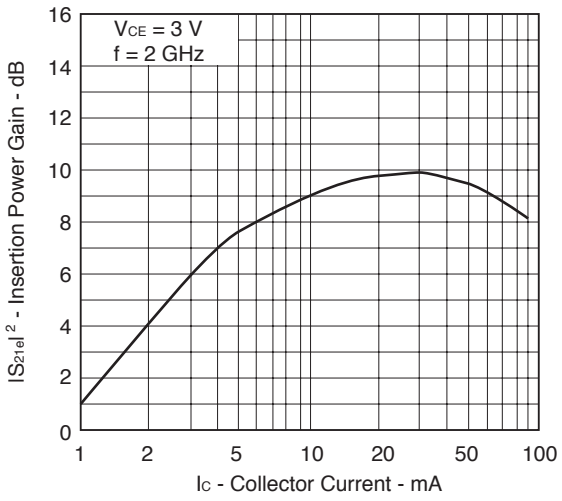
DC CURRENT GAIN vs. COLLECTOR CURRENT



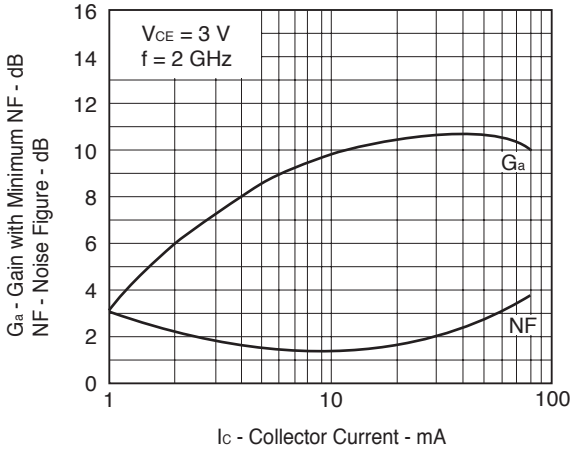
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



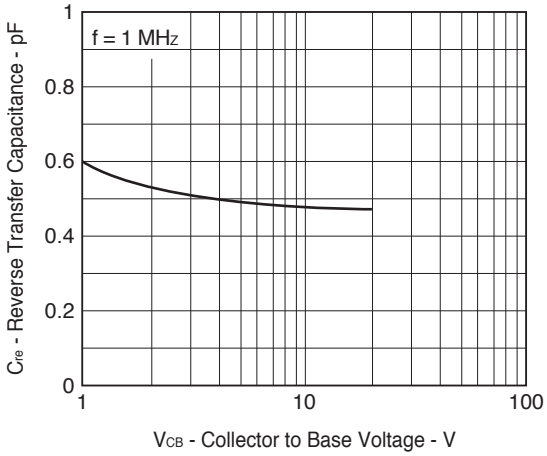
INSERTION POWER GAIN
vs. COLLECTOR CURRENT



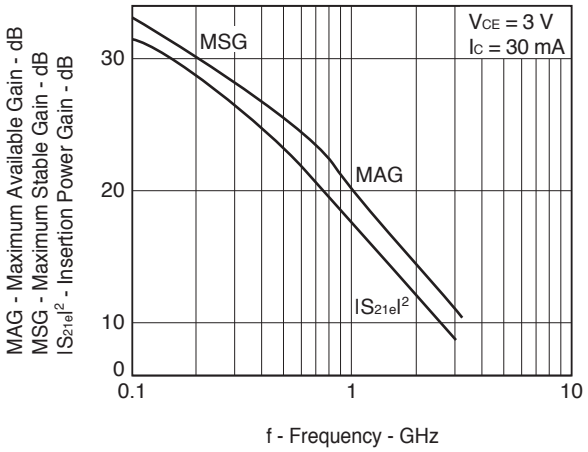
GAIN WITH MINIMUM NF/NOISE FIGURE
vs. COLLECTOR CURRENT



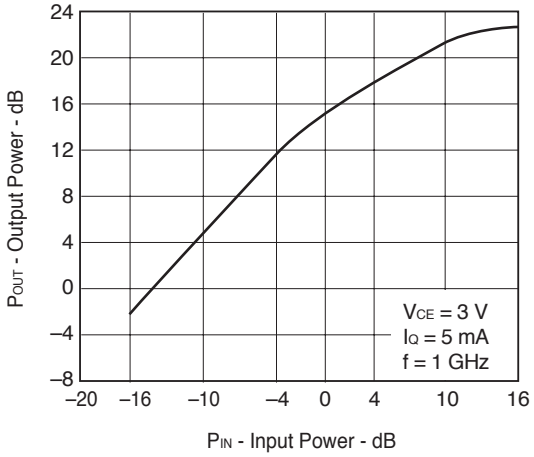
REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



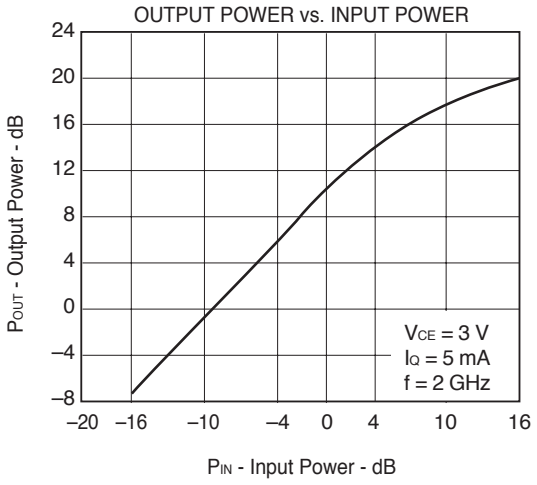
MAXIMUM AVAILABLE GAIN/
MAXIMUM STABLE GAIN/INSERTION
POWER GAIN vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



OUTPUT POWER vs. INPUT POWER



S PARAMETERS

V_{CE} = 3.0 V, I_C = 5.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.849	–29.2	14.200	159.5	0.026	74.3	0.948	–16.9
200.00	0.792	–55.4	12.643	142.7	0.046	60.0	0.849	–32.0
300.00	0.732	–78.7	11.179	128.9	0.060	49.1	0.742	–43.3
400.00	0.688	–97.0	9.470	118.4	0.069	41.5	0.644	–52.7
500.00	0.640	–113.2	8.319	107.7	0.074	36.6	0.569	–58.6
600.00	0.613	–127.0	7.339	100.0	0.078	32.3	0.511	–64.0
700.00	0.594	–137.9	6.450	93.3	0.080	30.4	0.462	–69.0
800.00	0.581	–147.8	5.764	87.3	0.082	28.7	0.427	–73.1
900.00	0.574	–156.2	5.176	82.2	0.083	26.9	0.395	–77.0
1000.00	0.570	–163.6	4.717	77.3	0.084	26.3	0.374	–80.9
1100.00	0.569	–170.1	4.318	72.9	0.085	25.4	0.358	–84.8
1200.00	0.570	–176.2	3.974	68.7	0.086	25.9	0.343	–88.1
1300.00	0.574	178.4	3.673	64.7	0.086	26.2	0.334	–92.4
1400.00	0.577	173.4	3.429	60.7	0.087	26.3	0.326	–96.2
1500.00	0.583	168.7	3.202	57.1	0.089	26.8	0.322	–100.4
1600.00	0.589	164.5	2.984	53.5	0.090	27.3	0.321	–103.9
1700.00	0.596	160.5	2.831	49.9	0.091	28.1	0.316	–108.7
1800.00	0.603	156.8	2.669	46.5	0.093	29.2	0.319	–111.9
1900.00	0.610	153.0	2.523	42.7	0.095	29.7	0.319	–117.2
2000.00	0.617	149.9	2.396	39.6	0.097	30.6	0.323	–119.9
2100.00	0.624	146.4	2.268	36.1	0.099	31.2	0.328	–125.4
2200.00	0.632	143.5	2.162	32.9	0.102	31.6	0.333	–127.0
2300.00	0.637	140.5	2.044	29.9	0.104	32.7	0.341	–133.3
2400.00	0.645	137.6	1.952	26.7	0.108	33.4	0.346	–133.8
2500.00	0.646	135.1	1.870	24.4	0.111	34.1	0.357	–139.6
2600.00	0.654	132.4	1.773	21.2	0.115	34.6	0.369	–140.4
2700.00	0.660	130.3	1.712	18.2	0.120	35.2	0.384	–145.9
2800.00	0.666	127.7	1.632	15.9	0.124	34.7	0.393	–148.1
2900.00	0.673	125.7	1.561	12.6	0.129	34.5	0.412	–152.4
3000.00	0.676	123.3	1.494	10.7	0.133	34.3	0.418	–155.2

V_{CE} = 3.0 V, I_C = 10.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.741	–41.6	23.253	153.2	0.023	69.0	0.898	–25.2
200.00	0.668	–75.4	19.107	132.8	0.039	55.1	0.737	–44.8
300.00	0.612	–101.6	15.604	118.6	0.048	46.1	0.597	–58.1
400.00	0.576	–120.4	12.659	108.8	0.053	41.7	0.496	–68.0
500.00	0.553	–135.2	10.612	99.9	0.057	39.5	0.423	–74.5
600.00	0.541	–147.0	9.108	93.3	0.060	38.6	0.375	–80.4
700.00	0.535	–156.6	7.906	87.8	0.063	38.2	0.332	–86.3
800.00	0.532	–164.6	6.994	82.9	0.066	38.1	0.307	–90.7
900.00	0.531	–171.5	6.238	78.4	0.069	38.4	0.285	–95.6
1000.00	0.533	–177.6	5.639	74.3	0.072	38.8	0.269	–100.2
1100.00	0.536	177.0	5.148	70.6	0.075	38.8	0.257	–105.1
1200.00	0.540	171.9	4.726	66.9	0.079	39.4	0.249	–109.3
1300.00	0.546	167.6	4.367	63.6	0.082	39.9	0.244	–114.2
1400.00	0.551	163.4	4.060	59.9	0.085	40.0	0.241	–118.1
1500.00	0.558	159.6	3.788	56.9	0.089	39.9	0.240	–123.1
1600.00	0.565	156.0	3.543	53.5	0.092	39.9	0.243	–126.5
1700.00	0.572	152.6	3.333	50.3	0.096	40.1	0.244	–131.6
1800.00	0.579	149.5	3.146	47.4	0.100	40.1	0.248	–134.7
1900.00	0.587	146.3	2.975	44.0	0.103	39.8	0.251	–140.5
2000.00	0.592	143.8	2.819	41.1	0.107	40.0	0.255	–142.2
2100.00	0.603	140.6	2.680	38.1	0.111	39.6	0.266	–148.0
2200.00	0.611	138.1	2.548	35.1	0.115	39.1	0.268	–148.5
2300.00	0.614	135.5	2.409	32.4	0.118	39.0	0.281	–154.5
2400.00	0.624	133.0	2.300	29.6	0.122	38.7	0.283	–154.0
2500.00	0.625	130.7	2.203	27.4	0.126	38.7	0.299	–159.2
2600.00	0.635	128.3	2.097	24.8	0.131	38.1	0.306	–159.4
2700.00	0.639	126.5	2.028	21.8	0.136	37.6	0.326	–164.0
2800.00	0.647	124.1	1.934	19.7	0.140	36.8	0.332	–165.3
2900.00	0.655	122.2	1.856	16.9	0.146	35.8	0.350	–168.9
3000.00	0.658	120.0	1.783	15.0	0.149	35.3	0.356	–171.0

V_{CE} = 3.0 V, I_C = 20.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.608	–59.0	33.348	145.2	0.020	65.2	0.820	–35.6
200.00	0.556	–99.3	24.680	123.3	0.031	52.4	0.613	–58.4
300.00	0.527	–124.7	18.769	110.1	0.038	48.1	0.470	–73.0
400.00	0.505	–142.0	14.726	101.4	0.042	46.0	0.382	–83.6
500.00	0.510	–153.8	12.083	94.2	0.047	46.7	0.322	–91.6
600.00	0.508	–163.0	10.226	88.7	0.051	47.5	0.287	–98.7
700.00	0.509	–170.7	8.816	83.9	0.055	48.0	0.256	–105.3
800.00	0.512	–177.0	7.760	79.8	0.059	48.4	0.241	–111.0
900.00	0.516	177.7	6.889	76.2	0.064	49.2	0.227	–116.8
1000.00	0.521	172.7	6.214	72.4	0.068	49.1	0.218	–121.8
1100.00	0.525	168.4	5.654	68.9	0.073	49.0	0.216	–127.6
1200.00	0.531	164.1	5.188	65.9	0.077	49.4	0.211	–131.7
1300.00	0.538	160.4	4.795	62.7	0.083	48.9	0.214	–136.8
1400.00	0.544	156.8	4.447	59.7	0.087	49.0	0.215	–140.8
1500.00	0.551	153.4	4.162	56.7	0.091	48.2	0.220	–146.1
1600.00	0.557	150.3	3.883	53.7	0.096	47.7	0.224	–148.7
1700.00	0.566	147.4	3.660	50.7	0.101	47.1	0.233	–153.2
1800.00	0.571	144.6	3.453	47.8	0.106	46.5	0.236	–156.3
1900.00	0.580	141.8	3.253	44.8	0.110	45.5	0.245	–161.2
2000.00	0.586	139.6	3.086	42.1	0.115	45.0	0.247	–162.1
2100.00	0.594	136.7	2.917	39.2	0.119	44.3	0.261	–166.9
2200.00	0.602	134.6	2.784	36.5	0.124	43.3	0.260	–167.6
2300.00	0.607	132.0	2.638	34.1	0.128	42.6	0.279	–172.6
2400.00	0.617	129.8	2.509	31.5	0.132	41.5	0.274	–172.3
2500.00	0.617	127.7	2.409	29.4	0.136	41.2	0.296	–175.9
2600.00	0.628	125.5	2.287	27.0	0.142	40.3	0.298	–175.6
2700.00	0.633	123.9	2.216	24.3	0.147	39.3	0.318	–179.5
2800.00	0.641	121.5	2.119	22.4	0.151	38.2	0.323	179.6
2900.00	0.647	119.9	2.033	19.8	0.156	36.9	0.341	177.1
3000.00	0.651	117.7	1.959	18.0	0.160	36.0	0.347	175.1

V_{CE} = 3.0 V, I_C = 30.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.540	–70.7	38.305	140.7	0.019	63.3	0.773	–41.2
200.00	0.512	–112.4	26.801	118.8	0.028	51.9	0.547	–65.8
300.00	0.500	–136.0	19.773	106.5	0.033	49.4	0.415	–80.8
400.00	0.503	–150.9	15.344	98.5	0.037	51.0	0.337	–92.0
500.00	0.500	–161.7	12.506	91.8	0.043	51.3	0.285	–100.3
600.00	0.502	–169.8	10.529	86.8	0.048	52.1	0.256	–107.8
700.00	0.508	–176.6	9.061	82.3	0.053	52.6	0.234	–114.9
800.00	0.511	177.8	7.950	78.4	0.057	52.8	0.222	–120.7
900.00	0.516	172.6	7.064	74.9	0.062	53.0	0.213	–126.9
1000.00	0.521	168.2	6.367	71.5	0.068	53.6	0.208	–132.0
1100.00	0.526	164.3	5.804	68.3	0.073	53.1	0.207	–137.8
1200.00	0.533	160.3	5.306	65.2	0.078	53.2	0.207	–142.0
1300.00	0.539	156.9	4.899	62.2	0.083	52.2	0.211	–146.3
1400.00	0.545	153.5	4.553	59.2	0.088	51.8	0.213	–150.9
1500.00	0.553	150.6	4.263	56.4	0.093	51.2	0.221	–154.8
1600.00	0.559	147.5	3.967	53.5	0.098	50.8	0.226	–157.3
1700.00	0.567	144.8	3.744	50.4	0.104	49.5	0.233	–162.3
1800.00	0.572	142.2	3.528	47.8	0.108	48.2	0.241	–164.1
1900.00	0.582	139.6	3.334	44.8	0.113	47.4	0.251	–168.2
2000.00	0.587	137.4	3.161	42.3	0.118	46.6	0.251	–169.9
2100.00	0.594	134.7	2.992	39.4	0.123	45.5	0.268	–174.0
2200.00	0.603	132.7	2.847	36.8	0.128	44.4	0.265	–175.0
2300.00	0.607	130.3	2.695	34.4	0.132	43.5	0.285	–179.0
2400.00	0.618	128.1	2.564	31.8	0.136	42.9	0.280	–178.5
2500.00	0.617	126.1	2.459	29.9	0.140	42.0	0.302	177.6
2600.00	0.628	123.9	2.339	27.6	0.146	40.9	0.302	177.7
2700.00	0.633	122.5	2.263	24.8	0.150	40.0	0.326	174.6
2800.00	0.641	120.0	2.165	23.1	0.155	38.9	0.328	173.7
2900.00	0.648	118.6	2.077	20.5	0.160	37.4	0.346	171.5
3000.00	0.652	116.4	2.003	18.9	0.164	36.1	0.352	169.7

V_{CE} = 5.0 V, I_C = 5.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.858	–28.0	14.245	160.5	0.025	74.0	0.949	–16.1
200.00	0.800	–53.2	12.754	143.3	0.044	60.6	0.856	–30.3
300.00	0.739	–75.8	11.353	130.1	0.057	50.2	0.753	–41.4
400.00	0.691	–93.6	9.639	119.6	0.066	42.7	0.657	–50.2
500.00	0.642	–110.2	8.532	108.8	0.072	37.7	0.582	–56.0
600.00	0.611	–123.8	7.532	101.1	0.075	34.1	0.525	–61.3
700.00	0.590	–135.1	6.650	94.3	0.077	31.4	0.475	–66.2
800.00	0.575	–145.2	5.962	88.4	0.079	29.3	0.444	–69.7
900.00	0.567	–153.7	5.351	83.1	0.080	28.0	0.410	–73.9
1000.00	0.562	–161.3	4.876	78.0	0.081	27.5	0.388	–77.1
1100.00	0.561	–168.0	4.466	73.7	0.082	27.0	0.370	–81.0
1200.00	0.560	–174.2	4.115	69.4	0.083	26.6	0.356	–84.3
1300.00	0.565	–179.7	3.806	65.4	0.085	27.1	0.346	–88.2
1400.00	0.567	175.1	3.546	61.5	0.085	27.4	0.337	–91.9
1500.00	0.572	170.3	3.330	58.0	0.086	27.9	0.331	–96.0
1600.00	0.578	166.0	3.106	54.2	0.088	28.5	0.329	–99.5
1700.00	0.585	161.9	2.946	50.2	0.089	29.5	0.326	–104.1
1800.00	0.592	158.1	2.766	47.3	0.090	30.2	0.329	–107.4
1900.00	0.600	154.3	2.623	43.5	0.093	30.7	0.326	–112.9
2000.00	0.607	151.1	2.484	40.2	0.095	31.9	0.329	–115.1
2100.00	0.614	147.5	2.357	36.8	0.097	32.8	0.334	–121.1
2200.00	0.622	144.5	2.249	33.6	0.100	33.4	0.340	–122.7
2300.00	0.626	141.5	2.125	30.5	0.102	34.0	0.342	–128.6
2400.00	0.635	138.5	2.028	27.3	0.106	34.7	0.351	–129.8
2500.00	0.637	135.9	1.940	24.8	0.109	35.9	0.360	–135.2
2600.00	0.645	133.2	1.842	21.8	0.113	36.3	0.372	–136.4
2700.00	0.651	131.1	1.782	18.7	0.118	36.7	0.387	–142.2
2800.00	0.657	128.4	1.696	16.2	0.121	36.3	0.396	–144.2
2900.00	0.664	126.4	1.625	13.2	0.127	36.3	0.415	–148.4
3000.00	0.668	124.0	1.557	11.1	0.131	36.0	0.419	–151.6

V_{CE} = 5.0 V, I_C = 10.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.756	–39.2	23.248	154.1	0.022	70.0	0.899	–23.7
200.00	0.680	–71.6	19.314	134.2	0.038	56.1	0.751	–42.3
300.00	0.616	–97.0	15.939	120.0	0.046	47.1	0.615	–55.1
400.00	0.578	–116.3	12.974	110.2	0.052	42.9	0.515	–64.5
500.00	0.548	–131.4	10.940	101.0	0.056	40.6	0.440	–70.8
600.00	0.532	–143.4	9.424	94.4	0.059	39.4	0.388	–76.2
700.00	0.532	–153.4	8.187	88.8	0.062	38.7	0.344	–81.1
800.00	0.520	–161.6	7.256	83.8	0.065	38.5	0.318	–85.8
900.00	0.518	–168.8	6.480	79.4	0.068	38.7	0.294	–90.3
1000.00	0.520	–175.2	5.861	75.2	0.071	39.1	0.277	–94.3
1100.00	0.522	179.2	5.342	71.3	0.074	39.4	0.264	–98.9
1200.00	0.525	174.0	4.906	67.7	0.077	39.9	0.255	–102.7
1300.00	0.531	169.5	4.535	64.2	0.080	40.3	0.250	–107.3
1400.00	0.536	165.1	4.213	60.8	0.084	40.8	0.244	–111.7
1500.00	0.543	161.2	3.949	57.5	0.087	40.6	0.242	–116.3
1600.00	0.550	157.5	3.685	54.4	0.091	40.7	0.243	–120.2
1700.00	0.558	154.1	3.483	51.0	0.094	41.1	0.244	–125.0
1800.00	0.564	150.9	3.289	47.9	0.097	40.9	0.247	–128.5
1900.00	0.573	147.7	3.098	44.6	0.101	40.7	0.250	–134.3
2000.00	0.578	145.0	2.942	41.9	0.104	40.5	0.254	–136.1
2100.00	0.587	141.8	2.791	38.6	0.109	40.6	0.264	–141.7
2200.00	0.596	139.4	2.646	35.8	0.112	40.0	0.265	–142.7
2300.00	0.601	136.6	2.515	33.1	0.116	40.0	0.277	–149.1
2400.00	0.611	134.0	2.396	30.1	0.120	39.6	0.279	–148.5
2500.00	0.612	131.7	2.302	28.0	0.124	39.6	0.295	–153.8
2600.00	0.622	129.2	2.189	25.2	0.128	39.3	0.299	–154.0
2700.00	0.627	127.5	2.116	22.3	0.134	38.9	0.320	–159.2
2800.00	0.635	125.0	2.020	20.2	0.138	37.7	0.328	–160.8
2900.00	0.642	123.1	1.936	17.3	0.144	36.9	0.347	–164.3
3000.00	0.647	120.9	1.861	15.5	0.148	36.4	0.352	–166.7

V_{CE} = 5.0 V, I_C = 20.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.635	–54.4	33.512	146.5	0.020	66.2	0.830	–33.2
200.00	0.566	–93.3	25.234	124.9	0.031	53.6	0.630	–55.1
300.00	0.526	–118.9	19.353	111.5	0.037	48.0	0.485	–69.0
400.00	0.505	–136.8	15.238	102.7	0.042	47.5	0.395	–79.0
500.00	0.498	–149.4	12.561	95.2	0.046	47.1	0.332	–86.2
600.00	0.493	–159.3	10.646	89.6	0.050	47.4	0.294	–92.5
700.00	0.492	–167.5	9.192	84.9	0.054	48.0	0.263	–98.6
800.00	0.494	–174.2	8.090	80.6	0.058	48.6	0.243	–103.6
900.00	0.497	179.8	7.203	76.9	0.062	49.0	0.229	–109.7
1000.00	0.501	174.5	6.487	73.1	0.068	49.6	0.219	–114.4
1100.00	0.505	170.0	5.907	69.8	0.072	49.5	0.213	–119.6
1200.00	0.511	165.6	5.426	66.6	0.076	49.2	0.208	–124.6
1300.00	0.518	161.8	5.010	63.5	0.081	48.9	0.209	–129.5
1400.00	0.524	158.1	4.651	60.3	0.086	49.0	0.208	–133.9
1500.00	0.531	154.7	4.343	57.4	0.090	48.4	0.211	–138.7
1600.00	0.537	151.5	4.071	54.4	0.095	48.0	0.216	–141.7
1700.00	0.546	148.7	3.819	51.4	0.099	47.6	0.221	–146.9
1800.00	0.552	145.9	3.607	48.5	0.103	46.7	0.224	–149.5
1900.00	0.561	143.0	3.402	45.5	0.108	46.2	0.234	–154.6
2000.00	0.567	140.7	3.235	42.9	0.112	45.3	0.236	–156.4
2100.00	0.576	137.8	3.060	40.1	0.117	44.8	0.249	–161.6
2200.00	0.585	135.7	2.916	37.2	0.121	43.7	0.250	–162.2
2300.00	0.589	133.1	2.763	34.7	0.126	43.2	0.266	–167.5
2400.00	0.600	130.8	2.631	32.0	0.130	42.4	0.264	–166.9
2500.00	0.601	128.7	2.524	30.0	0.134	41.7	0.284	–171.1
2600.00	0.611	126.5	2.407	27.7	0.139	41.1	0.285	–170.9
2700.00	0.616	124.9	2.325	24.8	0.144	40.3	0.308	–175.1
2800.00	0.625	122.4	2.226	22.9	0.149	39.0	0.314	–175.8
2900.00	0.632	120.9	2.135	20.2	0.154	37.8	0.331	–178.6
3000.00	0.636	118.6	2.057	18.5	0.158	36.8	0.337	179.3

V_{CE} = 5.0 V, I_C = 30.0 mA, Z_0 = 50 Ω

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.572	–64.3	38.635	142.3	0.018	64.8	0.780	–38.5
200.00	0.521	–105.1	27.544	120.4	0.028	53.5	0.567	–61.5
300.00	0.496	–129.7	20.521	107.8	0.033	50.0	0.427	–75.6
400.00	0.487	–146.1	15.977	99.8	0.038	50.1	0.346	–86.2
500.00	0.485	–157.1	13.055	92.9	0.043	50.5	0.291	–94.3
600.00	0.484	–166.1	11.019	87.8	0.047	51.4	0.260	–100.7
700.00	0.486	–173.3	9.493	83.2	0.052	52.7	0.235	–107.4
800.00	0.489	–179.3	8.343	79.4	0.057	52.8	0.219	–113.0
900.00	0.493	175.2	7.411	75.8	0.062	53.3	0.210	–119.7
1000.00	0.499	170.5	6.670	72.2	0.067	53.1	0.205	–124.6
1100.00	0.504	166.5	6.077	69.0	0.072	53.2	0.200	–130.2
1200.00	0.510	162.3	5.575	66.0	0.077	52.6	0.199	–135.0
1300.00	0.516	158.9	5.148	63.1	0.082	52.7	0.203	–139.3
1400.00	0.522	155.3	4.785	60.0	0.086	51.9	0.204	–143.3
1500.00	0.529	152.2	4.465	57.2	0.092	51.1	0.209	–147.8
1600.00	0.536	149.2	4.169	54.4	0.097	50.6	0.213	–151.5
1700.00	0.544	146.4	3.928	51.4	0.101	49.8	0.221	–155.4
1800.00	0.551	143.8	3.715	48.6	0.106	48.9	0.224	–158.4
1900.00	0.560	141.0	3.496	45.7	0.111	47.9	0.235	–163.5
2000.00	0.565	138.9	3.326	43.0	0.115	47.1	0.239	–164.2
2100.00	0.574	136.0	3.136	40.2	0.120	46.4	0.253	–168.8
2200.00	0.583	134.3	2.992	37.7	0.125	45.1	0.251	–169.9
2300.00	0.586	131.6	2.835	35.1	0.129	44.4	0.268	–174.6
2400.00	0.599	129.5	2.700	32.5	0.134	43.3	0.265	–173.3
2500.00	0.599	127.4	2.599	30.7	0.138	42.7	0.288	–177.8
2600.00	0.611	125.2	2.462	28.1	0.143	41.7	0.288	–177.6
2700.00	0.614	123.7	2.382	25.6	0.148	40.7	0.310	178.8
2800.00	0.623	121.3	2.285	23.9	0.153	39.4	0.316	178.0
2900.00	0.631	119.8	2.188	21.2	0.158	38.1	0.331	175.3
3000.00	0.635	117.6	2.115	19.5	0.162	37.0	0.338	173.9

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