

HTT1132E

Silicon NPN Epitaxial Twin Transistor

REJ03G0008-0100Z

Rev.1.00

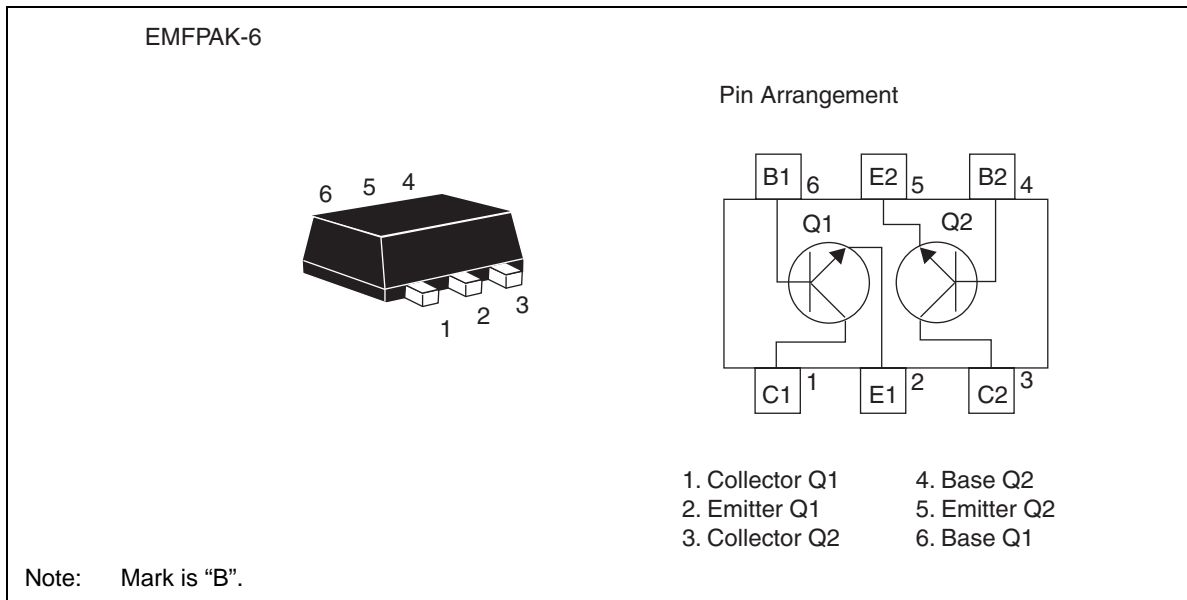
Apr.14.2003

Features

- Include 2 transistors in a small size SMD package: EMFPAK-6 (6 Leads: 1.2 x 0.8 x 0.5 mm)

Q1: Equivalent Buffer transistor	Q2: Equivalent OSC transistor
2SC5872	2SC5849

Outline

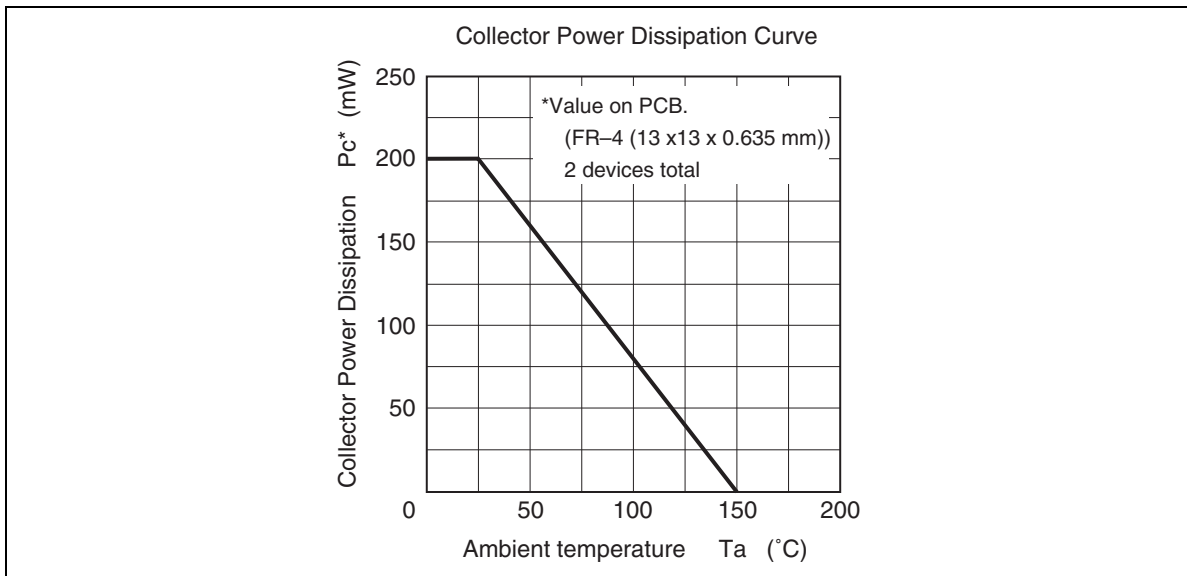


Absolute Maximum Ratings

(Ta = 25 °C)

Item	Symbol	Ratings		Unit
		Q1	Q2	
Collector to base voltage	V _{CBO}	16	15	V
Collector to emitter voltage	V _{CEO}	6	6	V
Emitter to base voltage	V _{EBO}	0.8	1.5	V
Collector current	I _C	50	80	mA
Collector power dissipation	P _C	Total 200*	Total 200*	mW
Junction temperature	T _j	150	150	°C
Storage temperature	T _{stg}	-55 to +150	-55 to +150	°C

*Value on PCB. (FR-4 (13 x 13 x 0.635 mm)).



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Q1 Electrical Characteristics

(Ta = 25°C)

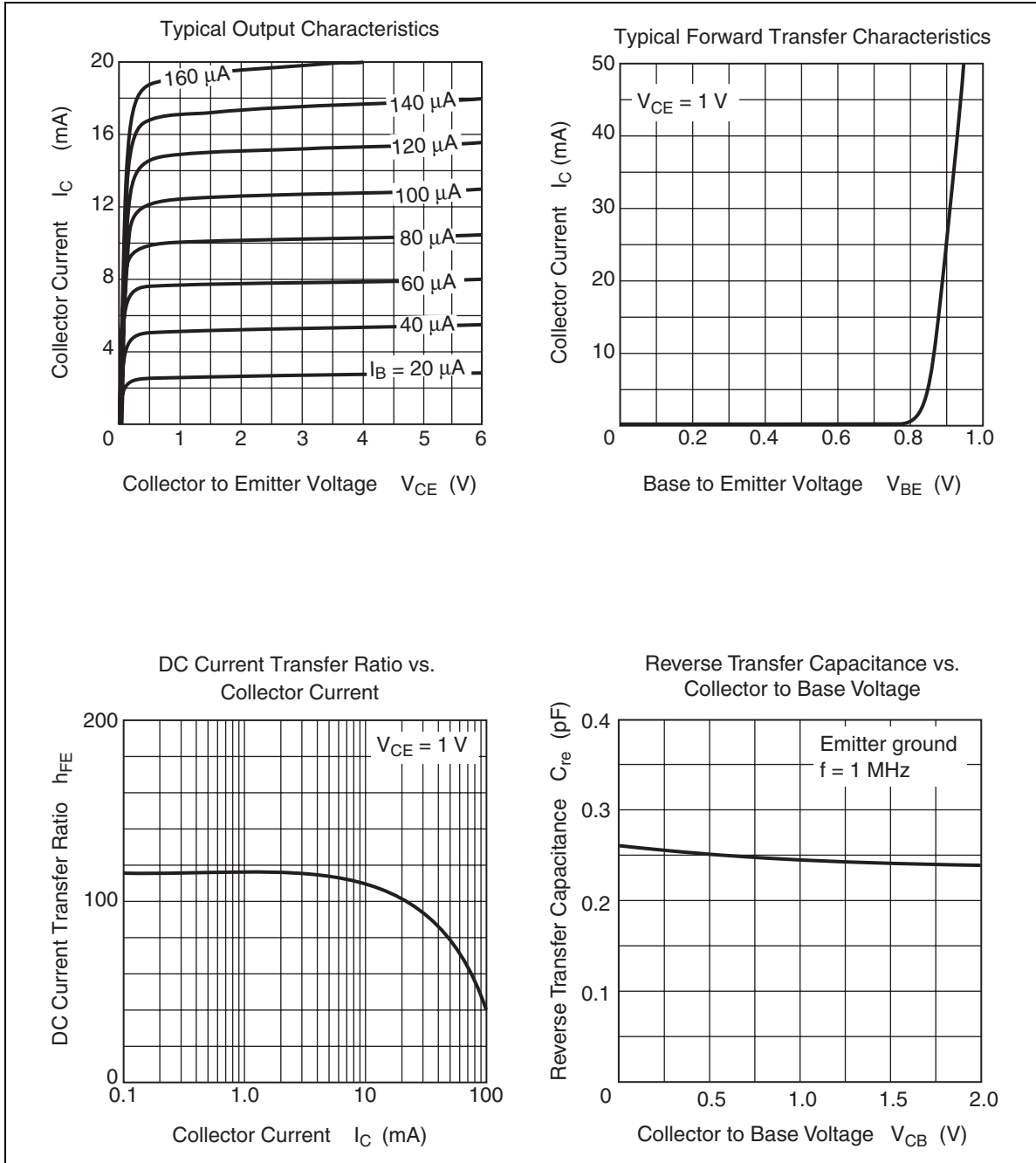
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Collector to base breakdown voltage	$V_{(BR)CBO}$	16	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	0.1	μA	$V_{CB} = 15 V, I_E = 0$
Collector cutoff current	I_{CEO}	—	—	0.1	μA	$V_{CE} = 6V, R_{BE} = \text{infinite}$
Emitter cutoff current	I_{EBO}	—	—	0.1	μA	$V_{EB} = 0.8 V, I_C = 0$
DC current transfer ratio	h_{FE}	90	120	140	—	$V_{CE} = 1 V, I_C = 5 \text{ mA}$
Reverse transfer capacitance	C_{re}	—	0.25	0.35	pF	$V_{CB} = 1 V, f = 1 \text{ MHz}$ Emitter ground
Collector output capacitance	C_{ob}	—	0.38	—	pF	$V_{CB} = 1 V, f = 1 \text{ MHz}$
Gain bandwidth product	f_T	8	10	—	GHz	$V_{CE} = 1 V, I_C = 5 \text{ mA},$ $f = 1 \text{ GHz}$
Gain bandwidth product	f_T	—	12	—	GHz	$V_{CE} = 3V, I_C = 15\text{mA},$ $f = 1 \text{ GHz}$
Forward transfer coefficient	$ S_{21} ^2$	13	16	—	dB	$V_{CE} = 1 V, I_C = 5 \text{ mA},$ $f = 900 \text{ MHz},$ $\Gamma_S = \Gamma_L = 50 \Omega$
Noise figure	NF	—	1.0	1.6	dB	

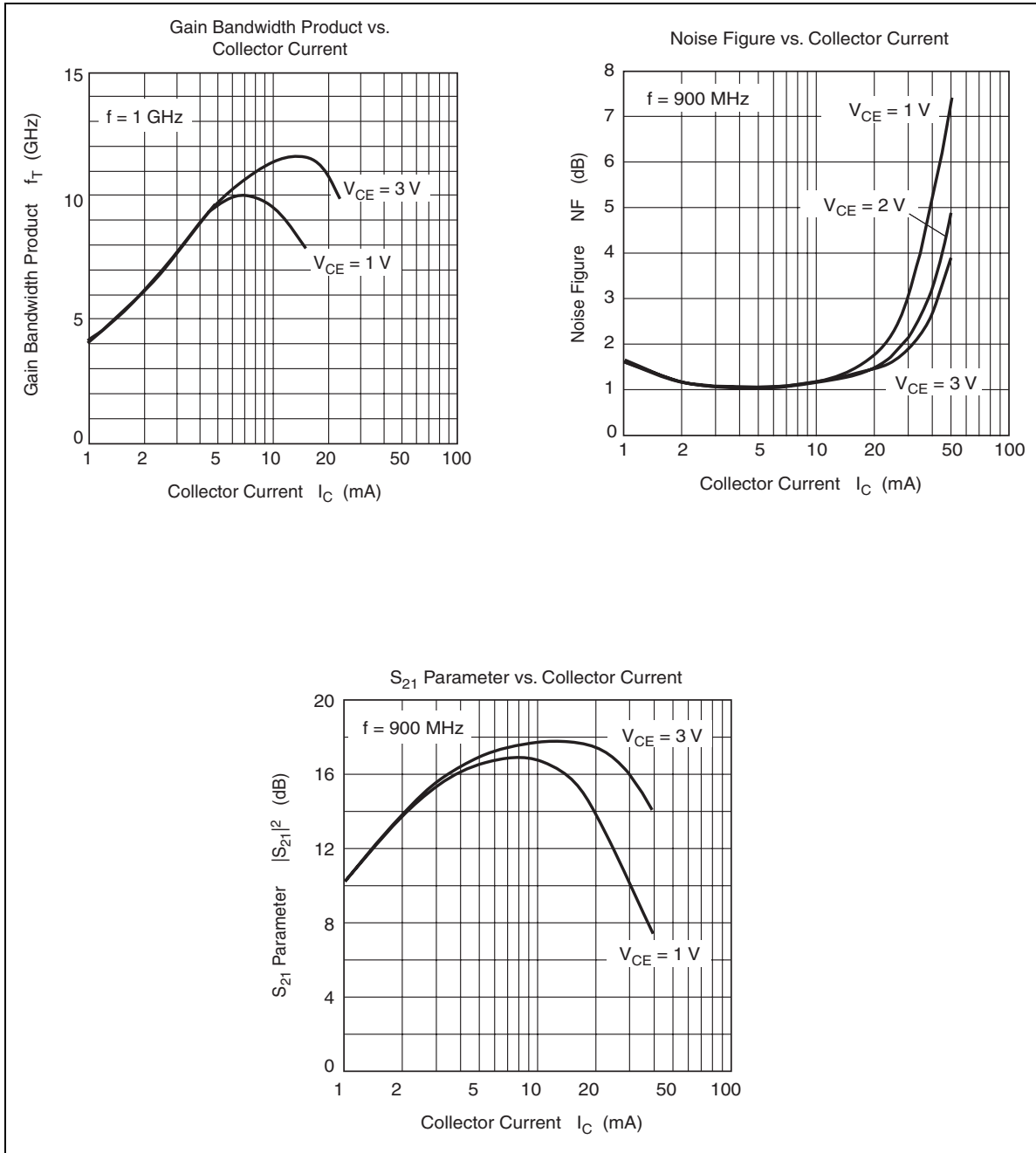
Q2 Electrical Characteristics

(Ta = 25°C)

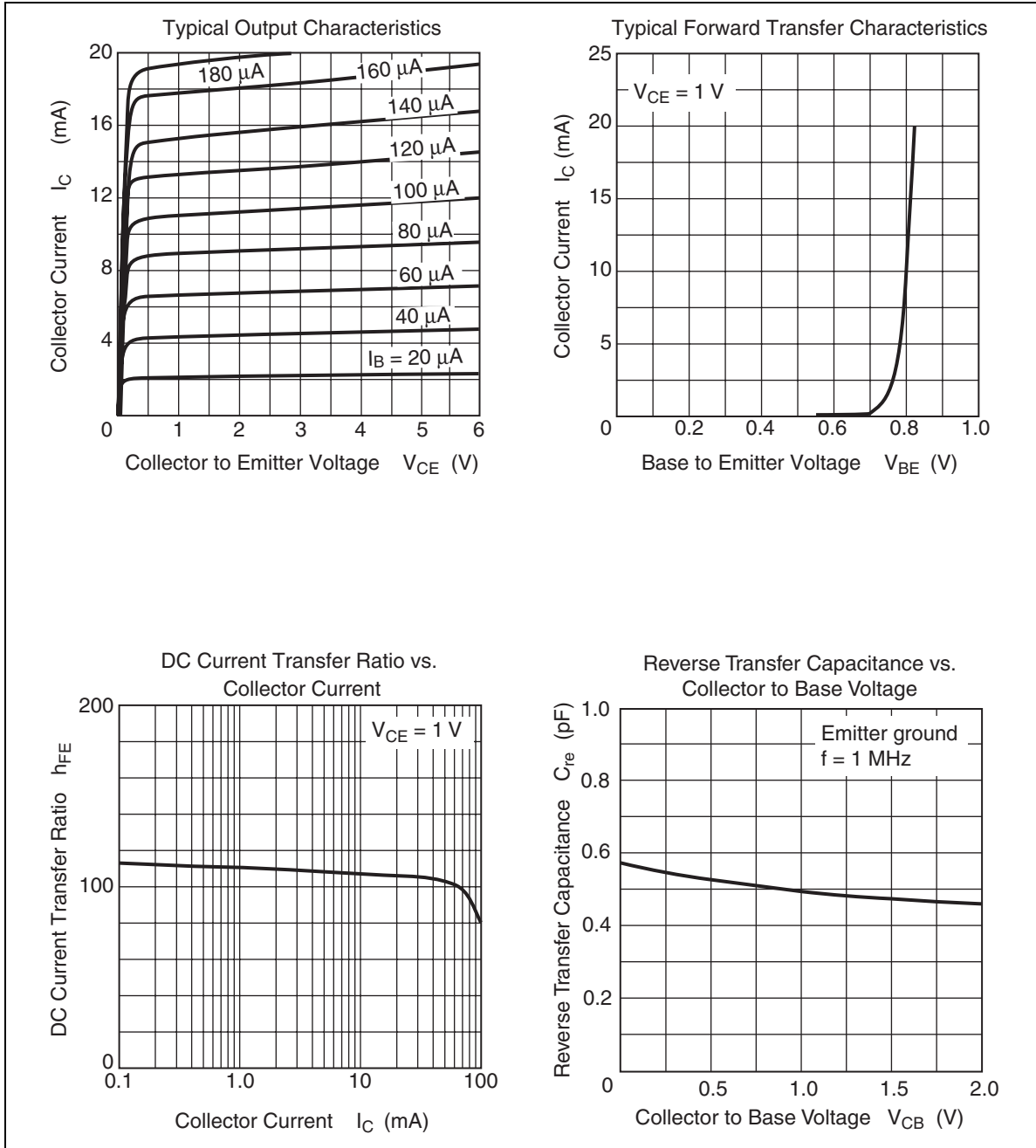
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	0.1	μA	$V_{CB} = 15 V, I_E = 0$
Collector cutoff current	I_{CEO}	—	—	0.1	μA	$V_{CE} = 6V, R_{BE} = \text{infinite}$
Emitter cutoff current	I_{EBO}	—	—	0.1	μA	$V_{EB} = 1.5V, I_C = 0$
DC current transfer ratio	h_{FE}	90	120	140	—	$V_{CE} = 1 V, I_C = 5 \text{ mA}$
Reverse transfer capacitance	C_{re}	—	0.50	0.65	pF	$V_{CB} = 1 V, f = 1 \text{ MHz}$ Emitter ground
Collector output capacitance	C_{ob}	—	0.68	—	pF	$V_{CB} = 1 V, f = 1 \text{ MHz}$
Gain bandwidth product	f_T	2	4	—	GHz	$V_{CE} = 1 V, I_C = 5 \text{ mA},$ $f = 1 \text{ GHz}$
Gain bandwidth product	f_T	—	11	—	GHz	$V_{CE} = 3V, I_C = 50\text{mA},$ $f = 1 \text{ GHz}$
Forward transfer coefficient	$ S_{21} ^2$	7	11	—	dB	$V_{CE} = 1 V, I_C = 5 \text{ mA},$ $f = 900 \text{ MHz}$ $\Gamma_S = \Gamma_L = 50 \Omega$
Noise figure	NF	—	1.7	2.3	dB	
Noise figure	NF	—	1.1	—	dB	$V_{CE} = 1 V, I_C = 5 \text{ mA},$ $f = 900 \text{ MHz}$

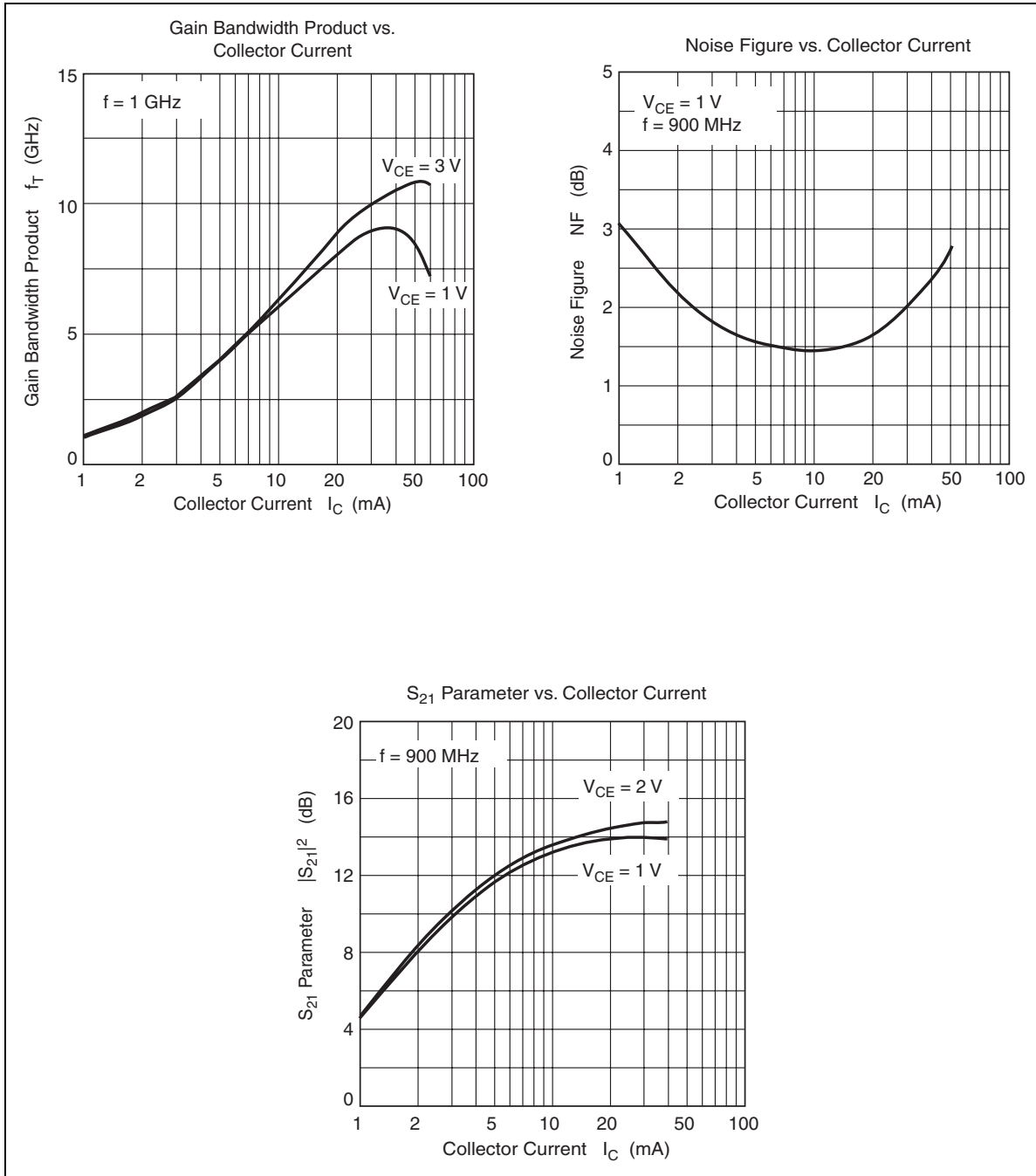
Q1 Main Characteristics





Q2 Main Characteristics





Q1 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$, $Z_O = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.916	-12.4	9.04	170.0	0.0329	89.7	0.979	-6.6
200	0.884	-23.8	8.71	160.2	0.0379	77.6	0.953	-13.6
300	0.845	-35.4	8.31	151.3	0.0503	66.2	0.906	-19.7
400	0.800	-46.1	7.92	143.6	0.0588	63.6	0.860	-25.4
500	0.749	-56.8	7.48	136.3	0.0698	61.7	0.809	-29.9
600	0.704	-66.7	7.06	129.8	0.0801	56.1	0.760	-33.7
700	0.658	-76.1	6.61	123.8	0.0892	52.6	0.712	-37.1
800	0.622	-85.0	6.21	118.4	0.0934	51.2	0.670	-39.8
900	0.580	-93.6	5.83	113.4	0.0987	48.4	0.634	-41.8
1000	0.553	-100.9	5.47	109.0	0.1025	47.2	0.598	-43.8
1100	0.523	-108.4	5.13	104.9	0.1076	45.3	0.570	-45.5
1200	0.500	-115.4	4.83	101.1	0.1079	44.9	0.543	-47.0
1300	0.479	-122.4	4.55	97.6	0.1139	43.1	0.520	-48.3
1400	0.464	-128.5	4.30	94.3	0.1156	43.9	0.497	-49.6
1500	0.450	-134.8	4.07	91.2	0.1168	43.1	0.479	-50.6
1600	0.437	-140.5	3.87	88.4	0.1203	42.9	0.462	-51.9
1700	0.429	-146.3	3.68	85.7	0.1232	43.0	0.450	-53.0
1800	0.422	-151.3	3.50	83.1	0.1244	42.5	0.436	-54.0
1900	0.414	-156.7	3.34	80.5	0.1255	43.1	0.422	-54.9
2000	0.411	-161.8	3.20	78.1	0.1299	43.3	0.412	-55.9
2100	0.407	-166.6	3.06	75.7	0.1326	43.1	0.403	-57.1
2200	0.405	-171.0	2.94	73.5	0.1357	43.1	0.395	-58.2
2300	0.405	-175.5	2.83	71.3	0.1373	43.1	0.386	-59.4
2400	0.406	179.9	2.72	69.2	0.1406	43.6	0.380	-60.6
2500	0.408	176.1	2.63	67.2	0.1440	43.5	0.372	-61.7
2600	0.409	172.1	2.54	65.2	0.1468	44.2	0.367	-62.6
2700	0.411	168.5	2.45	63.2	0.1492	44.0	0.359	-64.3
2800	0.415	164.9	2.37	61.3	0.1519	45.0	0.359	-65.4
2900	0.419	161.2	2.30	59.4	0.1550	44.5	0.352	-66.8
3000	0.422	158.0	2.23	57.5	0.1581	44.8	0.351	-68.0

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Q1 S Parameter

($V_{CE} = 1 \text{ V}$, $I_C = 5 \text{ mA}$, $Z_O = 50 \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.852	-17.6	14.12	165.7	0.0299	74.4	0.965	-9.2
200	0.809	-34.3	13.17	153.2	0.0369	67.3	0.906	-19.5
300	0.739	-49.1	12.12	142.5	0.0472	60.9	0.832	-26.3
400	0.676	-63.5	11.10	133.5	0.0553	63.3	0.756	-32.1
500	0.616	-76.4	10.09	125.5	0.0598	55.4	0.692	-36.5
600	0.566	-88.0	9.18	118.8	0.0674	52.9	0.629	-39.9
700	0.525	-98.1	8.32	113.2	0.0737	52.4	0.580	-42.0
800	0.489	-107.5	7.60	108.3	0.0762	51.1	0.539	-44.1
900	0.461	-116.0	6.97	103.9	0.0793	51.0	0.507	-45.5
1000	0.442	-123.6	6.42	100.1	0.0847	50.1	0.475	-46.5
1100	0.423	-131.2	5.93	96.6	0.0869	50.8	0.453	-47.4
1200	0.409	-138.0	5.51	93.4	0.0917	50.9	0.430	-48.5
1300	0.398	-144.4	5.15	90.5	0.0954	50.5	0.412	-49.2
1400	0.389	-150.2	4.82	87.7	0.0966	49.5	0.396	-50.0
1500	0.386	-155.6	4.53	85.1	0.1027	50.7	0.382	-50.7
1600	0.381	-160.6	4.28	82.8	0.1048	50.7	0.373	-51.6
1700	0.381	-165.9	4.05	80.4	0.1095	50.4	0.362	-52.3
1800	0.376	-170.3	3.84	78.2	0.1130	51.3	0.353	-53.6
1900	0.378	-175.3	3.66	76.0	0.1161	51.7	0.341	-54.5
2000	0.376	-179.5	3.49	73.9	0.1217	51.5	0.338	-55.4
2100	0.378	176.2	3.33	71.9	0.1252	51.8	0.329	-56.5
2200	0.380	172.6	3.19	69.9	0.1281	51.9	0.323	-57.5
2300	0.385	168.9	3.06	68.0	0.1335	52.6	0.318	-58.9
2400	0.386	165.6	2.94	66.2	0.1368	52.5	0.314	-60.1
2500	0.392	162.0	2.83	64.3	0.1412	52.2	0.310	-61.5
2600	0.395	159.0	2.73	62.6	0.1440	53.3	0.307	-62.5
2700	0.399	155.5	2.63	60.8	0.1504	52.9	0.299	-64.1
2800	0.402	152.7	2.55	59.1	0.1540	53.3	0.299	-65.6
2900	0.407	150.0	2.46	57.4	0.1586	52.4	0.294	-67.4
3000	0.412	146.9	2.39	55.6	0.1634	52.2	0.293	-68.4

Q1 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 7\text{ mA}$, $Z_O = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.798	-24.1	18.30	161.7	0.0152	13.2	0.936	-12.7
200	0.726	-44.9	16.53	147.1	0.0357	69.0	0.859	-23.3
300	0.648	-63.1	14.68	135.1	0.0401	59.3	0.760	-31.2
400	0.584	-79.4	12.96	125.6	0.0528	57.8	0.672	-36.3
500	0.528	-93.2	11.40	117.8	0.0531	54.6	0.599	-40.0
600	0.485	-105.3	10.11	111.6	0.0577	54.0	0.544	-42.2
700	0.451	-115.5	8.99	106.6	0.0633	54.1	0.497	-43.7
800	0.430	-124.5	8.09	102.2	0.0680	53.1	0.460	-44.6
900	0.411	-132.5	7.35	98.4	0.0715	53.8	0.432	-45.1
1000	0.398	-140.0	6.71	95.0	0.0761	53.3	0.408	-46.0
1100	0.386	-146.9	6.17	91.9	0.0796	53.7	0.391	-46.4
1200	0.382	-153.3	5.70	89.1	0.0834	55.3	0.373	-47.3
1300	0.378	-159.0	5.31	86.4	0.0859	55.0	0.360	-47.8
1400	0.375	-163.7	4.96	84.0	0.0901	55.8	0.349	-48.5
1500	0.373	-168.7	4.65	81.6	0.0964	56.5	0.337	-48.8
1600	0.372	-173.6	4.38	79.5	0.1015	57.1	0.328	-49.9
1700	0.374	-177.6	4.14	77.4	0.1052	56.6	0.319	-50.7
1800	0.373	178.3	3.92	75.4	0.1095	57.3	0.312	-51.5
1900	0.375	174.2	3.73	73.3	0.1133	56.5	0.304	-52.5
2000	0.377	170.5	3.55	71.4	0.1198	56.7	0.302	-53.3
2100	0.381	167.1	3.39	69.5	0.1232	57.2	0.295	-54.6
2200	0.384	163.7	3.24	67.7	0.1275	57.0	0.291	-55.9
2300	0.388	160.5	3.11	65.9	0.1326	57.4	0.285	-57.2
2400	0.394	157.5	2.98	64.2	0.1375	57.9	0.285	-58.7
2500	0.399	154.4	2.87	62.5	0.1413	57.1	0.280	-60.3
2600	0.400	151.7	2.77	60.8	0.1469	57.6	0.278	-61.2
2700	0.407	149.0	2.67	59.2	0.1510	57.0	0.273	-63.0
2800	0.410	146.7	2.58	57.5	0.1547	57.2	0.271	-64.5
2900	0.416	143.9	2.49	55.9	0.1614	56.7	0.268	-66.4
3000	0.421	141.2	2.42	54.2	0.1669	56.0	0.269	-67.9

Q1 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$, $Z_0 = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.708	-33.6	23.08	155.8	0.0200	74.9	0.905	-16.4
200	0.633	-61.6	19.73	138.8	0.0287	59.0	0.780	-28.2
300	0.550	-83.6	16.56	126.0	0.0324	55.8	0.654	-35.5
400	0.503	-101.2	13.97	116.8	0.0430	59.7	0.570	-39.0
500	0.461	-115.6	11.88	109.8	0.0450	55.2	0.502	-41.1
600	0.434	-127.2	10.31	104.3	0.0531	54.1	0.452	-42.4
700	0.417	-136.3	9.04	100.0	0.0562	54.7	0.418	-42.9
800	0.407	-144.6	8.05	96.2	0.0608	57.9	0.388	-42.7
900	0.399	-151.0	7.25	92.8	0.0630	57.1	0.369	-43.1
1000	0.396	-157.7	6.58	89.9	0.0697	58.6	0.352	-43.2
1100	0.391	-163.3	6.02	87.2	0.0721	61.5	0.338	-43.4
1200	0.392	-168.8	5.55	84.6	0.0788	60.0	0.327	-43.7
1300	0.388	-173.4	5.15	82.3	0.0831	61.8	0.316	-43.9
1400	0.391	-177.5	4.80	80.1	0.0870	62.0	0.308	-44.8
1500	0.392	178.2	4.49	77.9	0.0930	60.6	0.300	-45.4
1600	0.394	174.6	4.23	75.9	0.0972	61.4	0.293	-46.1
1700	0.397	171.2	3.99	73.9	0.1037	60.7	0.289	-46.9
1800	0.400	168.0	3.78	72.1	0.1062	62.0	0.285	-48.2
1900	0.403	164.5	3.59	70.1	0.1114	61.4	0.276	-49.4
2000	0.407	161.4	3.42	68.3	0.1180	61.2	0.275	-50.4
2100	0.411	158.3	3.26	66.5	0.1229	61.8	0.270	-51.5
2200	0.414	155.8	3.12	64.8	0.1270	61.3	0.269	-53.0
2300	0.420	153.0	2.98	63.1	0.1305	61.8	0.265	-54.5
2400	0.424	150.6	2.86	61.4	0.1386	60.7	0.263	-56.3
2500	0.431	148.1	2.76	59.8	0.1417	61.3	0.258	-57.4
2600	0.434	145.7	2.65	58.1	0.1488	60.9	0.257	-59.0
2700	0.439	143.2	2.56	56.6	0.1522	60.0	0.254	-60.9
2800	0.443	140.8	2.48	54.9	0.1562	60.1	0.254	-62.7
2900	0.448	138.6	2.39	53.4	0.1611	59.6	0.252	-64.5
3000	0.455	136.3	2.32	51.8	0.1688	59.0	0.251	-66.3

Q1 S Parameter

($V_{CE} = 3 \text{ V}$, $I_C = 5 \text{ mA}$, $Z_O = 50 \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.862	-16.2	14.11	166.8	0.0156	122.2	0.959	-9.0
200	0.814	-31.2	13.26	154.8	0.0316	77.4	0.917	-17.4
300	0.753	-45.1	12.28	144.4	0.0420	64.4	0.854	-24.3
400	0.692	-58.6	11.32	135.6	0.0522	69.2	0.780	-30.0
500	0.632	-71.2	10.35	127.7	0.0603	56.4	0.714	-34.2
600	0.577	-82.1	9.47	121.0	0.0647	57.1	0.656	-37.4
700	0.531	-92.1	8.61	115.3	0.0691	51.0	0.610	-39.8
800	0.493	-101.3	7.89	110.3	0.0738	52.4	0.567	-41.8
900	0.462	-109.5	7.26	105.9	0.0780	50.3	0.534	-43.1
1000	0.436	-117.6	6.69	102.0	0.0815	51.2	0.506	-43.9
1100	0.416	-124.6	6.20	98.5	0.0854	50.5	0.479	-44.9
1200	0.399	-131.6	5.77	95.2	0.0897	50.7	0.456	-45.8
1300	0.387	-138.1	5.40	92.3	0.0913	51.3	0.439	-46.4
1400	0.377	-144.3	5.06	89.5	0.0946	51.8	0.422	-47.2
1500	0.368	-150.0	4.76	86.9	0.0985	52.8	0.409	-47.9
1600	0.364	-155.7	4.49	84.5	0.1032	52.8	0.397	-48.9
1700	0.359	-161.2	4.26	82.1	0.1062	51.9	0.386	-49.6
1800	0.356	-165.9	4.04	79.9	0.1099	52.9	0.377	-50.5
1900	0.354	-170.9	3.85	77.7	0.1138	53.6	0.367	-51.4
2000	0.355	-175.2	3.67	75.6	0.1171	52.5	0.361	-52.2
2100	0.354	-179.5	3.51	73.6	0.1209	53.2	0.354	-53.3
2200	0.354	176.4	3.36	71.6	0.1241	53.5	0.347	-54.4
2300	0.359	172.2	3.22	69.7	0.1290	53.4	0.340	-55.5
2400	0.362	168.5	3.09	67.8	0.1329	53.3	0.338	-56.7
2500	0.365	165.1	2.98	66.0	0.1356	54.2	0.332	-58.0
2600	0.368	162.0	2.87	64.2	0.1392	53.6	0.327	-58.6
2700	0.372	158.4	2.77	62.5	0.1457	53.3	0.322	-60.2
2800	0.377	155.3	2.68	60.8	0.1483	54.0	0.322	-61.5
2900	0.382	152.3	2.59	59.2	0.1558	53.4	0.315	-62.9
3000	0.387	149.2	2.51	57.3	0.1592	53.9	0.315	-64.1

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Q1 S Parameter

($V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $Z_0 = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.735	-27.1	23.94	159.9	0.0152	110.6	0.937	-14.4
200	0.659	-49.0	21.05	143.8	0.0244	74.4	0.823	-25.6
300	0.573	-68.7	18.08	131.2	0.0346	66.6	0.718	-32.5
400	0.503	-85.0	15.52	121.8	0.0384	62.2	0.625	-36.9
500	0.445	-99.3	13.35	114.4	0.0446	59.3	0.557	-39.3
600	0.410	-110.8	11.66	108.6	0.0502	56.3	0.504	-40.9
700	0.383	-121.0	10.27	104.0	0.0534	59.8	0.462	-41.8
800	0.362	-129.9	9.18	100.1	0.0603	59.8	0.431	-42.4
900	0.348	-137.9	8.29	96.6	0.0606	59.3	0.408	-42.8
1000	0.342	-144.9	7.54	93.5	0.0679	58.9	0.389	-42.9
1100	0.332	-151.4	6.91	90.7	0.0742	60.0	0.372	-43.0
1200	0.326	-157.6	6.38	88.1	0.0757	60.5	0.358	-43.6
1300	0.326	-162.9	5.92	85.7	0.0812	62.0	0.346	-44.0
1400	0.323	-168.3	5.52	83.6	0.0873	61.7	0.336	-44.4
1500	0.324	-172.9	5.17	81.4	0.0921	61.3	0.326	-44.9
1600	0.324	-177.3	4.87	79.4	0.0961	61.9	0.320	-45.8
1700	0.326	178.1	4.60	77.4	0.1001	62.1	0.314	-46.3
1800	0.326	174.6	4.35	75.6	0.1047	62.3	0.308	-47.4
1900	0.331	170.6	4.14	73.7	0.1093	62.3	0.301	-48.3
2000	0.333	167.1	3.94	71.9	0.1158	62.4	0.297	-49.1
2100	0.337	163.6	3.76	70.2	0.1193	62.7	0.293	-50.4
2200	0.340	160.4	3.59	68.5	0.1244	62.0	0.289	-51.5
2300	0.345	157.2	3.44	66.8	0.1278	61.3	0.284	-52.7
2400	0.351	154.4	3.30	65.2	0.1361	62.0	0.283	-54.3
2500	0.357	151.6	3.18	63.6	0.1411	61.2	0.277	-55.8
2600	0.359	149.0	3.06	62.0	0.1442	61.1	0.276	-57.0
2700	0.366	146.6	2.95	60.5	0.1493	60.7	0.274	-58.7
2800	0.371	144.2	2.85	59.0	0.1540	61.1	0.272	-60.0
2900	0.375	141.4	2.76	57.4	0.1577	60.5	0.267	-61.8
3000	0.382	138.9	2.67	55.9	0.1656	59.3	0.269	-63.2

Q2 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$, $Z_O = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.884	-33.1	8.94	159.3	0.0353	43.6	0.942	-11.6
200	0.845	-61.9	7.95	142.4	0.0593	54.1	0.845	-22.4
300	0.798	-85.5	6.89	129.0	0.0767	51.1	0.743	-28.9
400	0.764	-103.7	5.94	119.0	0.0818	42.8	0.659	-32.6
500	0.745	-117.6	5.12	111.2	0.0847	37.3	0.599	-34.6
600	0.730	-127.9	4.49	104.9	0.0885	34.5	0.556	-36.0
700	0.719	-136.5	3.96	99.9	0.0904	32.5	0.524	-36.9
800	0.714	-143.4	3.55	95.5	0.0894	30.6	0.499	-37.9
900	0.710	-148.8	3.21	91.7	0.0905	31.7	0.481	-38.6
1000	0.708	-154.2	2.93	88.2	0.0894	33.1	0.463	-39.4
1100	0.704	-158.3	2.69	85.0	0.0900	33.1	0.453	-40.6
1200	0.703	-162.1	2.49	82.1	0.0912	36.0	0.444	-41.9
1300	0.703	-165.4	2.32	79.3	0.0892	36.1	0.434	-43.4
1400	0.704	-168.4	2.16	76.8	0.0892	38.1	0.427	-44.7
1500	0.702	-171.2	2.03	74.4	0.0899	40.1	0.423	-46.3
1600	0.701	-173.7	1.92	72.2	0.0914	41.7	0.414	-48.2
1700	0.704	-176.0	1.81	70.0	0.0929	44.2	0.409	-50.1
1800	0.704	-178.2	1.72	67.9	0.0928	47.2	0.407	-52.1
1900	0.706	179.8	1.64	65.8	0.0942	51.1	0.399	-54.1
2000	0.707	177.7	1.57	63.9	0.0981	52.8	0.397	-56.6
2100	0.709	175.8	1.50	61.9	0.1008	56.6	0.393	-58.8
2200	0.710	174.1	1.44	60.1	0.1043	58.7	0.390	-61.2
2300	0.713	172.5	1.39	58.3	0.1088	62.1	0.387	-63.9
2400	0.715	170.9	1.33	56.7	0.1126	63.7	0.385	-66.6
2500	0.718	169.4	1.29	54.9	0.1208	65.4	0.380	-69.1
2600	0.720	168.1	1.25	53.4	0.1257	67.9	0.380	-72.1
2700	0.723	166.5	1.20	51.9	0.1321	71.1	0.374	-75.0
2800	0.724	165.2	1.17	50.4	0.1396	71.6	0.374	-78.1
2900	0.727	163.9	1.14	48.9	0.1457	72.4	0.374	-81.7
3000	0.729	162.5	1.11	47.4	0.1551	73.7	0.371	-84.8

Q2 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_O = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.823	-42.7	13.89	154.3	0.0263	74.7	0.908	-18.5
200	0.774	-76.7	11.65	135.3	0.0442	57.7	0.744	-31.4
300	0.719	-101.2	9.55	121.9	0.0625	42.4	0.623	-37.6
400	0.693	-118.3	7.92	112.6	0.0649	44.0	0.532	-40.9
500	0.675	-130.9	6.64	105.7	0.0704	39.9	0.469	-42.6
600	0.668	-140.1	5.72	100.3	0.0717	39.3	0.426	-43.5
700	0.662	-147.2	4.99	96.0	0.0744	37.8	0.394	-43.8
800	0.658	-153.0	4.43	92.3	0.0768	39.8	0.372	-44.5
900	0.659	-157.5	3.98	89.0	0.0791	41.8	0.357	-44.6
1000	0.655	-161.6	3.62	86.0	0.0799	44.5	0.337	-45.7
1100	0.656	-165.1	3.31	83.3	0.0835	45.2	0.327	-46.2
1200	0.654	-168.3	3.05	80.8	0.0836	46.2	0.318	-47.3
1300	0.654	-171.2	2.83	78.4	0.0871	47.8	0.308	-48.5
1400	0.657	-173.7	2.64	76.1	0.0908	50.7	0.301	-49.5
1500	0.655	-176.0	2.48	74.0	0.0918	52.6	0.295	-50.9
1600	0.657	-178.2	2.33	72.0	0.0981	54.2	0.290	-52.7
1700	0.659	179.9	2.21	70.0	0.1009	55.4	0.285	-54.6
1800	0.660	178.1	2.10	68.2	0.1056	58.6	0.281	-56.4
1900	0.662	176.4	2.00	66.2	0.1071	60.2	0.275	-58.8
2000	0.664	174.6	1.90	64.4	0.1120	60.6	0.273	-60.6
2100	0.667	172.9	1.82	62.6	0.1176	63.0	0.267	-63.1
2200	0.669	171.6	1.75	61.0	0.1228	64.5	0.265	-65.6
2300	0.670	170.0	1.68	59.3	0.1289	65.6	0.262	-69.0
2400	0.675	168.7	1.62	57.7	0.1351	66.5	0.260	-71.3
2500	0.677	167.5	1.56	56.2	0.1414	68.3	0.258	-74.5
2600	0.678	166.1	1.51	54.6	0.1463	68.7	0.253	-77.6
2700	0.683	164.9	1.46	53.1	0.1539	69.5	0.255	-81.2
2800	0.684	163.8	1.41	51.6	0.1616	70.4	0.250	-83.8
2900	0.686	162.5	1.37	50.2	0.1686	71.0	0.248	-87.7
3000	0.690	161.4	1.33	48.8	0.1785	71.2	0.249	-90.9

Q2 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 7\text{ mA}$, $Z_O = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.757	-49.8	18.09	150.1	0.0252	99.6	0.858	-23.4
200	0.706	-88.2	14.39	130.0	0.0399	52.6	0.680	-38.0
300	0.664	-112.6	11.31	117.0	0.0469	47.1	0.543	-44.7
400	0.648	-128.5	9.13	108.5	0.0559	45.8	0.446	-47.6
500	0.639	-139.6	7.57	102.3	0.0614	42.4	0.387	-49.2
600	0.631	-147.7	6.46	97.6	0.0630	41.9	0.344	-49.7
700	0.626	-153.8	5.60	93.8	0.0671	45.4	0.315	-49.6
800	0.628	-158.7	4.96	90.4	0.0692	48.0	0.294	-50.0
900	0.629	-163.0	4.45	87.5	0.0723	47.9	0.276	-49.8
1000	0.629	-166.5	4.03	84.8	0.0773	50.6	0.263	-50.7
1100	0.627	-169.4	3.68	82.3	0.0800	53.0	0.252	-51.5
1200	0.627	-172.2	3.39	79.9	0.0847	54.6	0.243	-52.2
1300	0.627	-174.7	3.14	77.8	0.0885	56.2	0.235	-53.4
1400	0.630	-177.0	2.93	75.7	0.0926	56.8	0.229	-54.5
1500	0.630	-178.7	2.74	73.7	0.0958	58.3	0.221	-56.0
1600	0.633	-179.3	2.58	71.9	0.1031	59.5	0.217	-57.6
1700	0.635	-177.4	2.44	70.0	0.1069	61.2	0.211	-59.6
1800	0.637	-175.8	2.32	68.3	0.1112	63.8	0.208	-62.4
1900	0.639	-174.2	2.20	66.5	0.1166	63.9	0.203	-64.5
2000	0.640	-172.7	2.10	64.8	0.1230	65.0	0.200	-66.6
2100	0.641	-171.4	2.01	63.0	0.1284	65.4	0.196	-69.2
2200	0.644	-170.0	1.93	61.4	0.1351	66.5	0.193	-72.3
2300	0.647	-168.6	1.85	59.8	0.1402	67.4	0.189	-75.3
2400	0.651	-167.4	1.78	58.3	0.1467	68.3	0.188	-78.2
2500	0.654	-166.2	1.72	56.9	0.1548	68.0	0.187	-81.5
2600	0.655	-165.0	1.66	55.3	0.1607	69.5	0.183	-85.1
2700	0.658	-164.1	1.61	53.9	0.1674	69.1	0.182	-88.4
2800	0.660	-163.0	1.56	52.5	0.1746	69.9	0.180	-92.4
2900	0.664	-161.7	1.51	51.0	0.1833	69.8	0.180	-95.7
3000	0.666	-160.8	1.47	49.6	0.1911	70.0	0.181	-99.9

Q2 S Parameter

($V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$, $Z_O = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.687	-61.4	23.30	145.0	0.0300	70.7	0.805	-29.7
200	0.643	-101.9	17.29	124.2	0.0381	49.2	0.587	-46.1
300	0.615	-125.2	13.02	112.2	0.0420	44.0	0.451	-52.5
400	0.606	-139.2	10.28	104.6	0.0534	49.1	0.364	-55.1
500	0.602	-148.6	8.43	99.2	0.0527	47.1	0.305	-57.1
600	0.600	-155.2	7.14	95.0	0.0577	50.3	0.273	-57.4
700	0.599	-160.3	6.18	91.7	0.0618	50.9	0.243	-58.0
800	0.600	-164.4	5.45	88.7	0.0678	53.6	0.225	-58.3
900	0.597	-167.7	4.88	86.0	0.0726	56.4	0.209	-58.4
1000	0.601	-170.8	4.41	83.6	0.0765	58.8	0.195	-59.7
1100	0.601	-173.4	4.02	81.3	0.0822	59.6	0.184	-60.5
1200	0.603	-175.8	3.70	79.2	0.0851	60.7	0.175	-60.9
1300	0.605	-178.0	3.43	77.2	0.0930	62.6	0.168	-62.6
1400	0.608	-179.9	3.19	75.3	0.0958	63.5	0.161	-63.8
1500	0.607	178.3	2.99	73.5	0.1025	63.4	0.154	-66.1
1600	0.612	176.8	2.81	71.8	0.1103	65.2	0.149	-68.2
1700	0.614	175.1	2.66	70.0	0.1123	65.7	0.145	-69.2
1800	0.613	173.7	2.52	68.4	0.1196	66.8	0.142	-72.3
1900	0.616	172.3	2.40	66.7	0.1262	67.5	0.137	-75.5
2000	0.617	170.9	2.29	65.1	0.1331	67.2	0.134	-77.7
2100	0.620	169.5	2.18	63.4	0.1385	68.5	0.131	-81.7
2200	0.623	168.4	2.09	61.9	0.1451	68.2	0.129	-84.9
2300	0.626	167.1	2.01	60.4	0.1512	68.2	0.127	-88.7
2400	0.629	166.0	1.93	59.0	0.1595	68.6	0.126	-92.9
2500	0.633	165.0	1.86	57.5	0.1662	68.5	0.125	-97.0
2600	0.634	164.1	1.80	56.1	0.1714	68.4	0.124	-100.9
2700	0.638	163.0	1.74	54.7	0.1797	68.6	0.123	-106.0
2800	0.640	162.0	1.69	53.3	0.1866	69.0	0.126	-110.4
2900	0.645	161.0	1.64	52.0	0.1952	69.0	0.126	-114.3
3000	0.647	160.2	1.59	50.5	0.2013	68.7	0.128	-117.6

Q2 S Parameter

($V_{CE} = 3\text{ V}$, $I_C = 5\text{ mA}$, $Z_O = 50\ \Omega$)

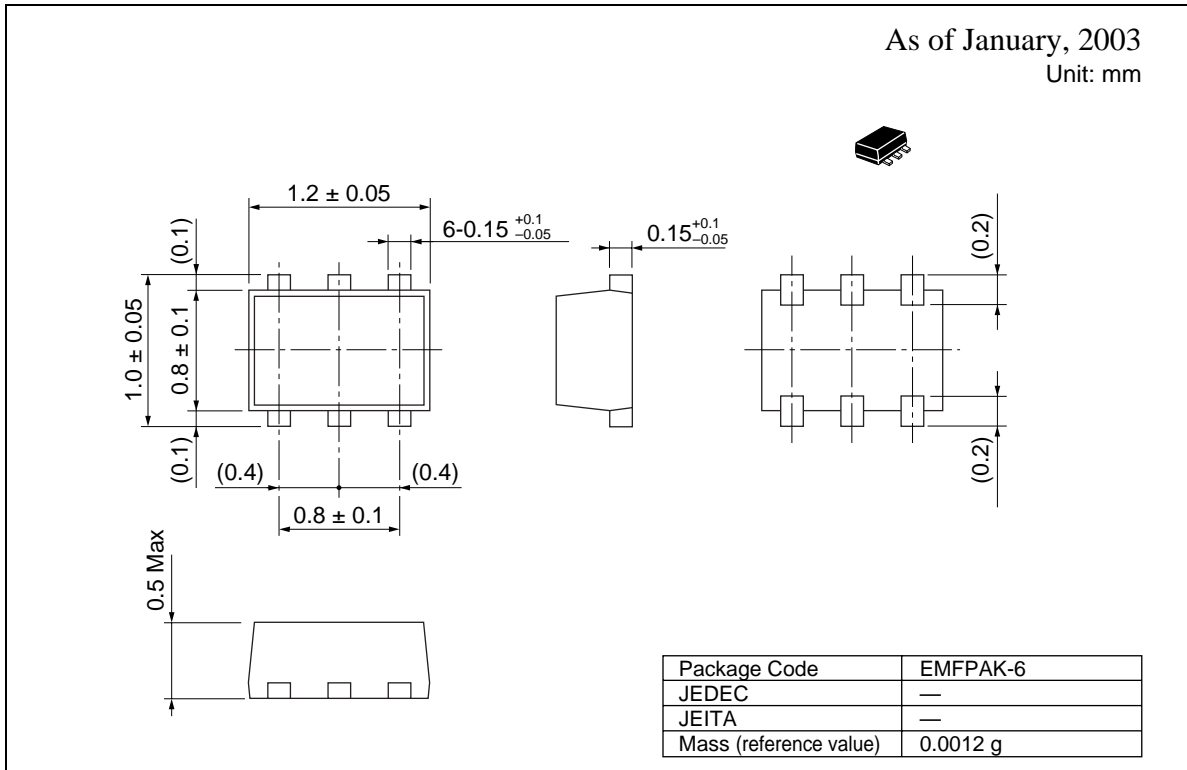
f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.830	-38.7	13.97	156.0	0.0134	59.3	0.917	-15.0
200	0.774	-70.9	11.91	137.7	0.0420	58.7	0.785	-26.1
300	0.711	-95.8	9.90	124.4	0.0474	45.9	0.675	-31.5
400	0.691	-113.5	8.28	114.9	0.0619	45.0	0.587	-34.0
500	0.669	-126.3	7.01	107.8	0.0615	41.8	0.531	-35.1
600	0.658	-136.0	6.07	102.4	0.0641	40.0	0.486	-35.7
700	0.649	-143.6	5.30	98.0	0.0650	40.4	0.458	-35.5
800	0.644	-149.6	4.72	94.3	0.0676	41.1	0.437	-35.9
900	0.641	-154.8	4.25	90.9	0.0711	44.8	0.420	-36.4
1000	0.641	-158.7	3.86	87.9	0.0723	46.3	0.404	-36.6
1100	0.642	-162.7	3.53	85.2	0.0746	47.9	0.393	-36.7
1200	0.640	-166.0	3.26	82.7	0.0761	49.2	0.384	-37.6
1300	0.639	-169.1	3.02	80.3	0.0775	51.2	0.377	-38.6
1400	0.639	-171.6	2.82	78.1	0.0817	52.5	0.369	-39.7
1500	0.641	-174.0	2.65	75.9	0.0828	55.1	0.361	-40.8
1600	0.640	-176.5	2.49	74.0	0.0869	57.7	0.359	-41.8
1700	0.643	-178.5	2.36	72.0	0.0891	59.0	0.354	-43.3
1800	0.642	179.7	2.24	70.2	0.0928	61.4	0.348	-44.9
1900	0.645	177.7	2.13	68.3	0.0975	63.5	0.343	-46.7
2000	0.646	176.0	2.03	66.5	0.1025	64.1	0.339	-48.3
2100	0.649	174.3	1.94	64.8	0.1082	66.3	0.334	-50.3
2200	0.650	172.8	1.86	63.1	0.1121	68.3	0.331	-52.3
2300	0.653	171.4	1.79	61.4	0.1170	69.4	0.324	-54.6
2400	0.657	169.9	1.72	59.9	0.1227	71.0	0.324	-56.7
2500	0.659	168.6	1.66	58.3	0.1294	71.5	0.318	-58.8
2600	0.662	167.4	1.61	56.9	0.1347	73.5	0.315	-61.5
2700	0.664	166.1	1.56	55.4	0.1425	73.7	0.312	-63.9
2800	0.664	164.8	1.51	53.9	0.1477	74.2	0.308	-66.4
2900	0.670	163.7	1.47	52.6	0.1575	74.8	0.306	-69.5
3000	0.670	162.4	1.42	51.0	0.1641	75.8	0.301	-71.9

Q2 S Parameter

($V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $Z_0 = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.694	-54.3	23.74	147.6	0.0310	65.3	0.814	-25.6
200	0.640	-94.8	18.11	127.1	0.0349	65.9	0.641	-37.9
300	0.600	-118.1	13.86	114.7	0.0386	52.7	0.503	-43.2
400	0.583	-133.3	11.04	106.8	0.0416	55.9	0.421	-44.8
500	0.582	-143.4	9.09	101.2	0.0514	51.1	0.366	-44.7
600	0.575	-151.1	7.72	96.9	0.0511	54.3	0.331	-43.9
700	0.574	-156.9	6.68	93.4	0.0562	53.6	0.307	-43.5
800	0.574	-161.1	5.90	90.4	0.0599	55.9	0.289	-43.7
900	0.575	-165.1	5.28	87.7	0.0643	57.3	0.273	-42.9
1000	0.575	-168.2	4.78	85.3	0.0691	59.0	0.260	-43.2
1100	0.574	-171.2	4.36	83.0	0.0737	60.7	0.250	-42.8
1200	0.577	-173.5	4.01	80.9	0.0781	63.1	0.241	-43.4
1300	0.579	-175.9	3.72	78.9	0.0820	63.6	0.236	-43.6
1400	0.580	-177.9	3.47	77.0	0.0870	65.0	0.229	-44.3
1500	0.580	-179.6	3.24	75.2	0.0939	65.3	0.223	-45.3
1600	0.582	178.6	3.05	73.5	0.0979	67.5	0.217	-46.6
1700	0.585	176.8	2.88	71.8	0.1025	67.3	0.211	-48.0
1800	0.585	175.3	2.73	70.2	0.1093	68.9	0.208	-49.1
1900	0.590	173.8	2.60	68.6	0.1142	69.5	0.202	-50.8
2000	0.591	172.4	2.48	67.0	0.1207	70.5	0.198	-52.3
2100	0.592	171.0	2.37	65.3	0.1270	70.5	0.195	-54.2
2200	0.596	169.9	2.27	63.9	0.1325	70.7	0.189	-56.4
2300	0.599	168.7	2.18	62.4	0.1399	71.8	0.185	-59.2
2400	0.601	167.6	2.10	61.0	0.1464	71.9	0.181	-61.7
2500	0.605	166.3	2.02	59.4	0.1509	71.8	0.177	-65.0
2600	0.610	165.6	1.95	58.1	0.1575	72.5	0.172	-66.7
2700	0.611	164.5	1.89	56.8	0.1634	72.2	0.170	-69.7
2800	0.612	163.5	1.83	55.4	0.1714	72.4	0.168	-72.8
2900	0.616	162.4	1.77	54.0	0.1788	72.3	0.164	-76.2
3000	0.619	161.5	1.73	52.7	0.1883	72.4	0.161	-78.7

Package Dimensions



Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

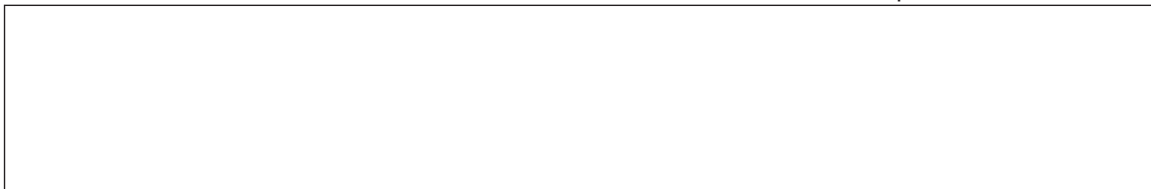
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