

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

FEATURES

- Low noise
- $NF = 1.3 \text{ dB TYP. @ } V_{CE} = 2 \text{ V, } I_c = 3 \text{ mA, } f = 2 \text{ GHz}$
- $NF = 1.3 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 3 \text{ mA, } f = 2 \text{ GHz}$
- Mini-Mold package  
EIAJ: SC-59

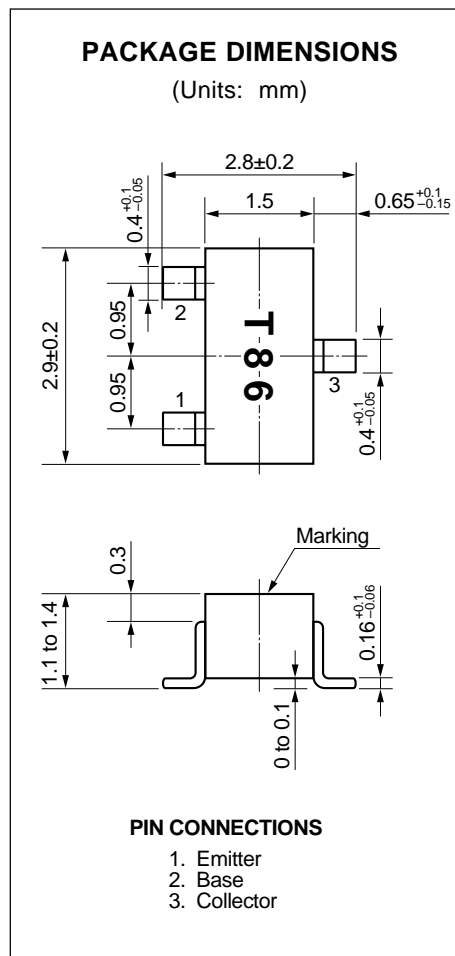
ORDERING INFORMATION

PART NUMBER	QUANTITY	ARRANGEMENT
2SC5182-T1	3 000 units/reel	Embossed tape, 8 mm wide, Pin No. 3 (Collector) facing the perforations
2SC5182-T2		Embossed tape, 8 mm wide, Pins No. 1 (Emitter) and No. 2 (Base) facing the perforations

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

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25 \text{ }^\circ\text{C}$ )

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	$I_c$	30	mA
Total Power Dissipation	$P_T$	90	mW
Junction Temperature	$T_j$	150	C
Storage Temperature	$T_{stg}$	-65 to +150	C



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

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Collector Cutoff Current	I <sub>CB0</sub>			100	nA	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			100	nA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	70		140		V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA* <sup>1</sup>
Insertion Power Gain (1)	S <sub>21e</sub>   <sup>2</sup>	7	8.5		dB	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, f = 2 GHz
Insertion Power Gain (2)	S <sub>21e</sub>   <sup>2</sup>	6	7.5		dB	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz
Noise Figure (1)	NF		1.3	2.0	dB	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 3 mA, f = 2 GHz
Noise Figure (2)	NF		1.3	2.0	dB	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz
Gain Bandwidth Product (1)	f <sub>T</sub>	9	12		GHz	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, f = 2 GHz
Gain Bandwidth Product (2)	f <sub>T</sub>	7	10		GHz	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz
Feedback Capacitance	C <sub>re</sub>		0.4	0.8	pF	V <sub>CB</sub> = 2 V, I <sub>E</sub> = 0 mA, f = 1 MHz* <sup>2</sup>

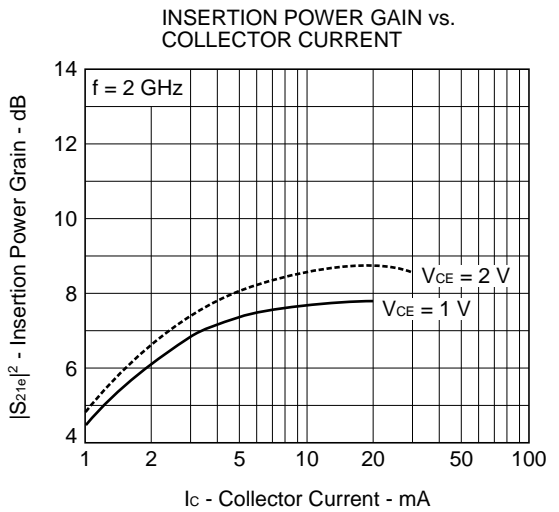
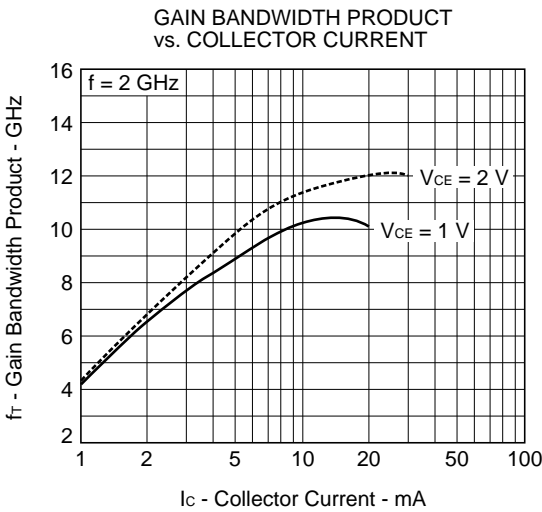
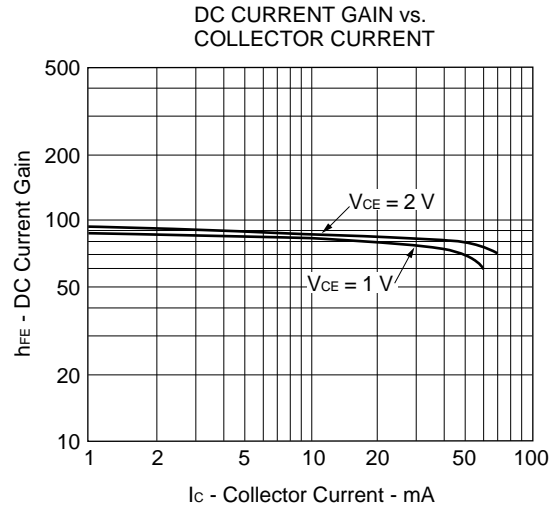
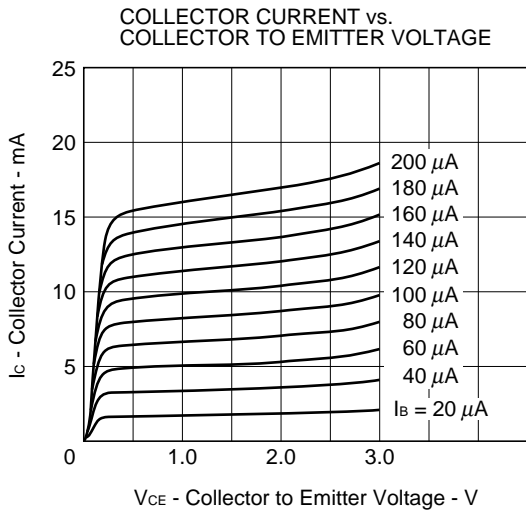
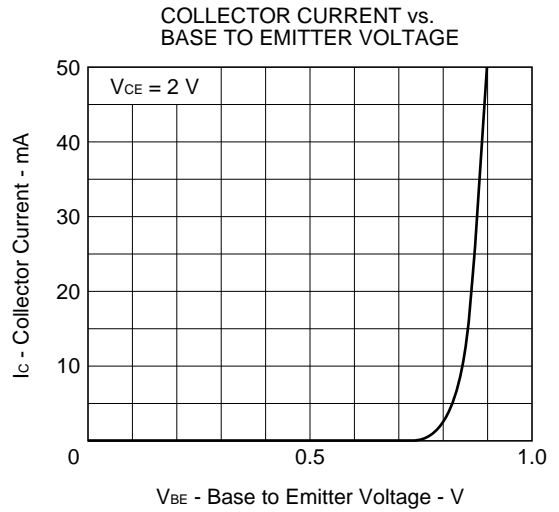
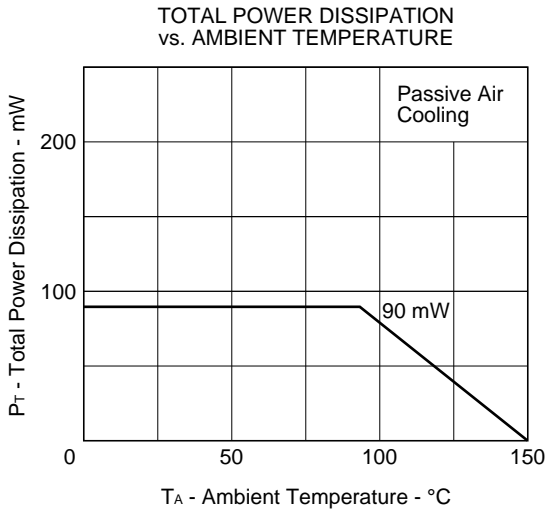
\*1 Measured with pulses: Pulse width ≤ 350 μs, duty cycle ≤ 2 %, pulsed.

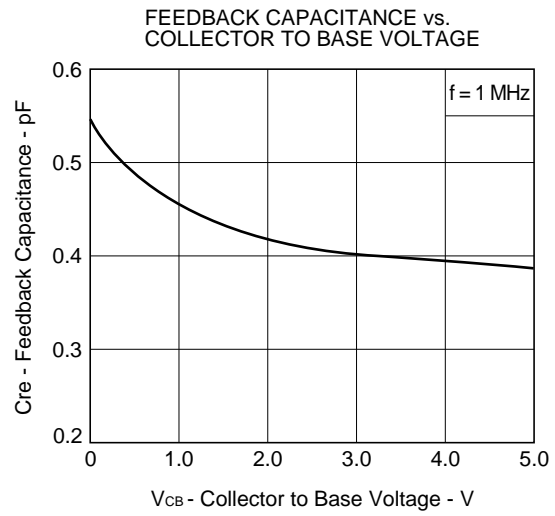
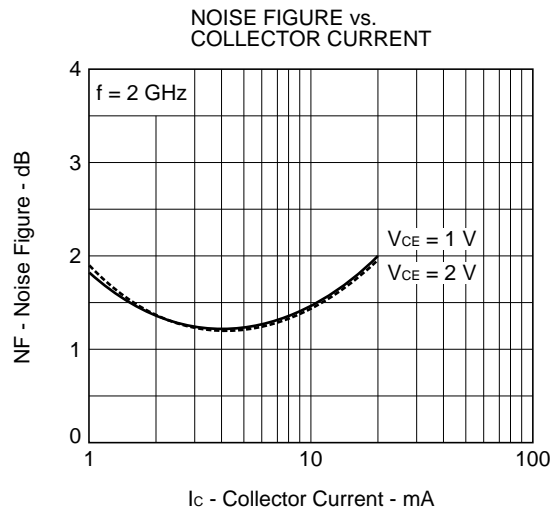
\*2 Measured with a three-terminal bridge. The emitter and case terminal are connected to the guard terminal of the bridge.

**h<sub>FE</sub> Class**

Class	FB
Marking	T86
h <sub>FE</sub>	70 to 140

CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C)





**S-PARAMETERS**

$V_{CE} = 1\text{ V}$ ,  $I_c = 1\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200.00	0.946	-15.2	2.671	165.4	0.063	78.9	0.987	-9.7	
400.00	0.909	-30.0	2.589	151.2	0.107	71.0	0.954	-18.4	
600.00	0.853	-44.5	2.488	138.3	0.156	64.3	0.901	-27.4	
800.00	0.786	-59.1	2.365	125.1	0.198	53.7	0.848	-35.4	
1000.00	0.720	-73.3	2.247	113.0	0.219	47.0	0.781	-42.3	
1200.00	0.637	-87.7	2.104	101.9	0.246	41.9	0.726	-48.6	
1400.00	0.568	-100.0	1.955	92.3	0.260	33.2	0.650	-53.8	
1600.00	0.511	-112.4	1.796	82.5	0.260	32.8	0.607	-58.8	
1800.00	0.464	-126.4	1.728	75.6	0.267	30.5	0.555	-63.5	
2000.00	0.434	-138.9	1.613	67.8	0.249	27.0	0.526	-67.0	
2200.00	0.400	-149.1	1.510	61.3	0.272	27.0	0.516	-69.4	
2400.00	0.387	-163.0	1.435	54.4	0.272	27.0	0.485	-75.3	
2600.00	0.352	-177.2	1.372	49.1	0.271	28.6	0.446	-78.2	
2800.00	0.353	169.2	1.301	43.4	0.275	28.5	0.439	-80.7	
3000.00	0.377	154.8	1.296	38.6	0.293	26.8	0.438	-85.1	

$V_{CE} = 1\text{ V}$ ,  $I_c = 3\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200.00	0.911	-19.5	5.004	162.9	0.062	80.7	0.966	-13.3	
400.00	0.840	-37.4	4.722	146.9	0.107	69.9	0.908	-26.0	
600.00	0.765	-55.0	4.355	132.6	0.149	58.6	0.815	-38.0	
800.00	0.660	-72.6	3.993	119.0	0.174	46.9	0.727	-47.7	
1000.00	0.565	-88.8	3.592	106.9	0.199	45.5	0.639	-56.8	
1200.00	0.490	-103.1	3.248	96.3	0.210	39.9	0.564	-62.2	
1400.00	0.425	-117.7	2.937	87.5	0.226	39.3	0.494	-67.8	
1600.00	0.358	-131.7	2.630	79.0	0.237	36.0	0.425	-70.2	
1800.00	0.316	-147.5	2.436	72.4	0.227	35.3	0.389	-77.0	
2000.00	0.296	-158.4	2.226	65.8	0.244	38.6	0.352	-80.4	
2200.00	0.278	-169.6	2.067	60.2	0.249	37.3	0.331	-84.2	
2400.00	0.269	174.9	1.954	53.9	0.283	36.1	0.302	-83.3	
2600.00	0.230	158.8	1.837	49.4	0.287	41.0	0.273	-91.3	
2800.00	0.262	144.4	1.736	44.2	0.306	35.6	0.264	-92.4	
3000.00	0.303	131.3	1.683	40.0	0.320	36.6	0.257	-94.5	

$V_{CE} = 1\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200.00	0.873	-22.4	6.414	160.2	0.052	80.4	0.953	-16.5	
400.00	0.789	-42.7	5.841	142.2	0.106	65.7	0.879	-30.7	
600.00	0.678	-61.7	5.207	127.1	0.140	58.2	0.752	-43.2	
800.00	0.579	-78.6	4.608	113.9	0.164	50.8	0.652	-53.0	
1000.00	0.482	-94.9	4.047	102.3	0.184	46.4	0.567	-61.2	
1200.00	0.401	-111.9	3.587	92.7	0.192	47.3	0.483	-67.1	
1400.00	0.350	-125.4	3.194	84.7	0.207	41.3	0.418	-71.6	
1600.00	0.297	-140.0	2.853	76.7	0.222	42.6	0.365	-75.5	
1800.00	0.270	-158.6	2.618	70.8	0.238	43.0	0.312	-81.2	
2000.00	0.251	-170.1	2.399	65.0	0.249	42.3	0.293	-84.6	
2200.00	0.235	177.1	2.203	59.2	0.252	43.5	0.274	-86.7	
2400.00	0.230	167.7	2.073	53.9	0.281	41.3	0.248	-92.6	
2600.00	0.201	149.7	1.965	49.4	0.298	40.2	0.221	-96.6	
2800.00	0.247	138.6	1.826	44.8	0.333	38.3	0.212	-102.6	
3000.00	0.277	122.9	1.770	40.0	0.337	37.3	0.223	-103.1	

$V_{CE} = 1\text{ V}$ ,  $I_c = 10\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200.00	0.771	-30.9	9.715	150.7	0.056	70.0	0.890	-23.7	
400.00	0.609	-55.7	7.822	128.9	0.095	63.2	0.724	-41.0	
600.00	0.483	-75.4	6.313	113.9	0.119	54.3	0.576	-51.9	
800.00	0.372	-90.8	5.206	102.0	0.144	55.8	0.485	-59.9	
1000.00	0.309	-106.2	4.377	92.7	0.155	53.2	0.415	-64.6	
1200.00	0.246	-122.4	3.790	84.8	0.191	52.1	0.347	-68.2	
1400.00	0.206	-136.3	3.314	78.4	0.198	53.2	0.316	-71.7	
1600.00	0.189	-155.4	2.942	72.0	0.219	51.8	0.272	-75.6	
1800.00	0.187	-172.0	2.697	67.0	0.239	50.3	0.242	-81.9	
2000.00	0.178	179.3	2.458	62.0	0.262	49.0	0.232	-86.0	
2200.00	0.173	163.7	2.270	57.2	0.281	46.9	0.221	-90.3	
2400.00	0.189	155.7	2.118	52.1	0.304	45.4	0.196	-96.7	
2600.00	0.199	134.5	2.020	47.7	0.318	43.8	0.176	-100.4	
2800.00	0.203	126.9	1.882	43.4	0.352	41.1	0.168	-108.2	
3000.00	0.245	114.1	1.830	39.6	0.396	40.4	0.170	-114.7	

$V_{CE} = 1\text{ V}$ ,  $I_c = 20\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY	S11		S21		S12		S22	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
200.00	0.587	-45.7	13.529	138.3	0.049	69.6	0.752	-33.6
400.00	0.399	-72.3	9.303	115.5	0.081	63.4	0.529	-49.8
600.00	0.278	-92.5	6.850	102.4	0.107	63.4	0.404	-56.4
800.00	0.219	-111.6	5.397	92.4	0.130	62.5	0.323	-61.2
1000.00	0.173	-128.6	4.442	84.9	0.158	61.3	0.274	-62.9
1200.00	0.152	-149.4	3.753	78.8	0.183	61.1	0.236	-66.5
1400.00	0.152	-169.6	3.296	73.3	0.205	58.6	0.216	-69.7
1600.00	0.139	175.6	2.929	68.3	0.231	58.2	0.194	-75.2
1800.00	0.145	161.6	2.615	63.8	0.253	56.3	0.175	-80.3
2000.00	0.158	153.9	2.411	59.4	0.281	53.9	0.156	-83.1
2200.00	0.167	138.9	2.214	55.2	0.302	51.8	0.161	-86.5
2400.00	0.185	132.5	2.095	51.3	0.332	50.8	0.140	-99.9
2600.00	0.216	125.8	1.975	47.4	0.353	48.6	0.128	-105.3
2800.00	0.242	120.3	1.874	42.7	0.379	45.9	0.106	-96.1
3000.00	0.271	109.1	1.767	38.9	0.401	41.3	0.117	-112.6

$V_{CE} = 2\text{ V}$ ,  $I_c = 1\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY	S11		S21		S12		S22	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
200.00	0.940	-16.3	3.299	163.5	0.050	75.0	0.984	-9.7
400.00	0.882	-32.1	3.132	148.4	0.098	67.2	0.937	-18.5
600.00	0.805	-46.5	2.916	134.8	0.129	61.9	0.875	-26.1
800.00	0.719	-59.5	2.715	121.8	0.167	52.1	0.818	-32.6
1000.00	0.641	-74.1	2.491	110.2	0.180	50.8	0.760	-38.6
1200.00	0.563	-86.3	2.290	99.9	0.190	44.9	0.715	-43.2
1400.00	0.485	-97.4	2.107	91.3	0.217	42.3	0.656	-47.6
1600.00	0.434	-111.0	1.914	82.5	0.210	40.4	0.609	-50.8
1800.00	0.386	-123.1	1.811	75.7	0.227	36.5	0.570	-53.6
2000.00	0.374	-133.2	1.702	69.3	0.217	36.3	0.550	-58.8
2200.00	0.325	-146.4	1.586	62.7	0.229	36.3	0.540	-60.8
2400.00	0.315	-159.4	1.517	56.8	0.249	39.3	0.490	-64.8
2600.00	0.264	-172.5	1.452	51.7	0.255	37.1	0.489	-69.9
2800.00	0.276	172.9	1.377	46.2	0.269	38.3	0.458	-70.2
3000.00	0.283	154.0	1.370	42.1	0.291	41.1	0.465	-77.2

$V_{CE} = 2\text{ V}$ ,  $I_C = 3\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200.00	0.846	-23.6	7.382	155.6	0.047	73.5	0.937	-16.0	
400.00	0.713	-44.2	6.351	135.9	0.086	63.4	0.826	-27.4	
600.00	0.583	-59.0	5.351	121.0	0.116	57.7	0.714	-36.4	
800.00	0.477	-72.5	4.564	108.6	0.130	57.0	0.624	-41.1	
1000.00	0.393	-84.7	3.929	98.5	0.154	56.8	0.568	-46.2	
1200.00	0.313	-95.6	3.444	90.2	0.165	54.4	0.512	-49.1	
1400.00	0.266	-109.6	3.054	83.4	0.188	52.0	0.468	-51.1	
1600.00	0.222	-118.2	2.718	76.2	0.197	49.8	0.428	-53.9	
1800.00	0.190	-133.8	2.510	71.0	0.212	46.4	0.394	-58.5	
2000.00	0.178	-145.2	2.301	65.6	0.227	49.1	0.398	-60.9	
2200.00	0.151	-155.8	2.143	60.6	0.253	47.6	0.375	-62.7	
2400.00	0.144	-175.8	2.013	55.7	0.274	45.7	0.348	-65.1	
2600.00	0.142	162.7	1.925	51.4	0.290	47.3	0.329	-68.3	
2800.00	0.163	151.3	1.787	47.0	0.306	46.5	0.307	-70.7	
3000.00	0.198	133.3	1.755	42.5	0.323	43.8	0.320	-77.6	

$V_{CE} = 2\text{ V}$ ,  $I_C = 5\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200.00	0.769	-28.9	10.062	150.0	0.045	73.3	0.893	-19.9	
400.00	0.602	-49.9	8.020	128.3	0.075	63.4	0.752	-32.7	
600.00	0.473	-65.4	6.390	113.8	0.098	63.8	0.620	-39.2	
800.00	0.362	-76.2	5.249	102.5	0.122	58.3	0.534	-43.7	
1000.00	0.292	-88.5	4.414	93.5	0.147	59.4	0.481	-48.5	
1200.00	0.222	-100.1	3.817	86.3	0.159	60.4	0.431	-50.2	
1400.00	0.180	-109.0	3.345	80.0	0.180	55.0	0.395	-51.7	
1600.00	0.145	-121.2	2.976	73.7	0.201	57.0	0.360	-50.7	
1800.00	0.119	-139.9	2.723	68.7	0.216	55.2	0.338	-58.4	
2000.00	0.107	-153.0	2.488	64.2	0.249	54.0	0.329	-60.5	
2200.00	0.086	-168.2	2.286	59.5	0.274	54.4	0.318	-63.0	
2400.00	0.101	165.4	2.164	54.9	0.284	48.2	0.296	-68.2	
2600.00	0.088	148.0	2.052	51.4	0.311	48.0	0.279	-71.7	
2800.00	0.120	137.3	1.923	47.0	0.323	45.5	0.264	-71.6	
3000.00	0.152	118.2	1.865	42.6	0.352	45.4	0.280	-78.0	

$V_{CE} = 2\text{ V}$ ,  $I_c = 10\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY	S11		S21		S12		S22	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
200.00	0.649	-35.6	13.772	141.3	0.047	70.2	0.826	-25.0
400.00	0.449	-57.4	9.813	118.7	0.067	62.7	0.627	-37.6
600.00	0.322	-69.2	7.343	105.6	0.093	71.8	0.504	-41.9
800.00	0.235	-78.6	5.842	95.8	0.113	64.8	0.427	-45.4
1000.00	0.173	-89.4	4.820	88.2	0.130	63.1	0.386	-46.7
1200.00	0.137	-102.3	4.118	82.0	0.154	65.1	0.355	-48.7
1400.00	0.101	-116.1	3.592	76.8	0.179	60.2	0.324	-49.8
1600.00	0.079	-120.2	3.170	71.1	0.200	59.5	0.308	-54.2
1800.00	0.055	-153.2	2.898	66.9	0.230	56.2	0.282	-56.1
2000.00	0.072	-173.2	2.634	62.5	0.253	57.3	0.280	-56.6
2200.00	0.052	154.2	2.418	58.1	0.260	56.1	0.261	-60.8
2400.00	0.061	151.5	2.291	54.1	0.307	52.6	0.244	-64.5
2600.00	0.071	123.5	2.169	50.4	0.307	48.0	0.230	-71.5
2800.00	0.105	118.9	2.019	46.3	0.332	47.9	0.233	-74.8
3000.00	0.145	103.4	1.965	41.9	0.351	43.6	0.232	-78.0

$V_{CE} = 2\text{ V}$ ,  $I_c = 20\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY	S11		S21		S12		S22	
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
200.00	0.563	-40.1	15.719	137.3	0.039	70.2	0.772	-29.0
400.00	0.375	-59.9	10.612	115.1	0.066	71.6	0.555	-40.3
600.00	0.253	-71.3	7.768	102.7	0.091	68.9	0.447	-43.8
800.00	0.183	-82.8	6.125	93.3	0.116	67.9	0.377	-46.1
1000.00	0.127	-89.7	5.011	86.5	0.136	66.3	0.336	-46.6
1200.00	0.085	-102.5	4.243	80.7	0.163	66.3	0.313	-47.5
1400.00	0.065	-122.5	3.708	75.7	0.181	63.7	0.291	-50.5
1600.00	0.057	-142.5	3.300	71.0	0.206	62.8	0.271	-51.5
1800.00	0.044	-176.9	2.941	66.7	0.232	60.6	0.251	-53.1
2000.00	0.046	153.8	2.721	62.7	0.255	58.8	0.233	-56.1
2200.00	0.064	132.0	2.493	58.4	0.271	56.7	0.229	-60.9
2400.00	0.076	124.4	2.353	54.6	0.301	55.2	0.212	-70.0
2600.00	0.121	116.4	2.216	51.0	0.319	53.4	0.196	-72.9
2800.00	0.141	109.4	2.096	46.4	0.345	50.4	0.186	-66.7
3000.00	0.170	95.5	1.964	42.5	0.360	45.8	0.190	-78.5

[MEMO]

[MEMO]

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Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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