Ordering number : ENN7323

NPN Epitaxial Planar Silicon Transistor

2SC5783

High-Frequency Low-Noise Amplifier and OSC Applications

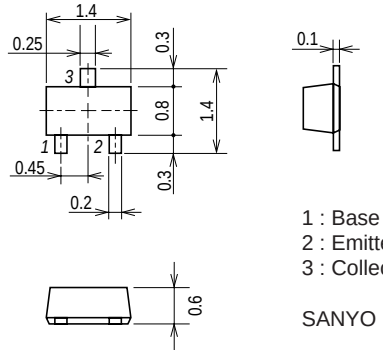
Features

- Low noise : NF=1.5dB typ (f=2GHz).
- High cutoff frequency : f_T=6.0GHz typ (V_{CE}=1V).
  : f_T=10.5GHz typ (V_{CE}=3V).
- Low operating voltage.
- Ultraminiature and thin leadless package.
  (1.4mm×0.8mm×0.6mm)

Package Dimensions

unit : mm
2159

[2SC5783]



1 : Base
2 : Emitter
3 : Collector

SANYO : SSFP

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		9	V
Collector-to-Emitter Voltage	V_{CEO}		4	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		80	mA
Collector Dissipation	P_C		100	mW
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

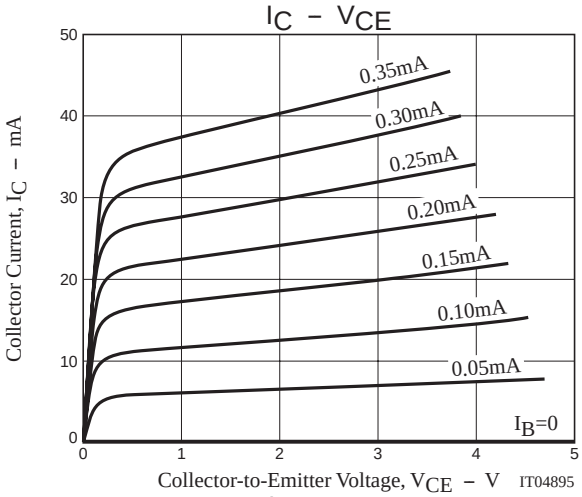
Marking : NL

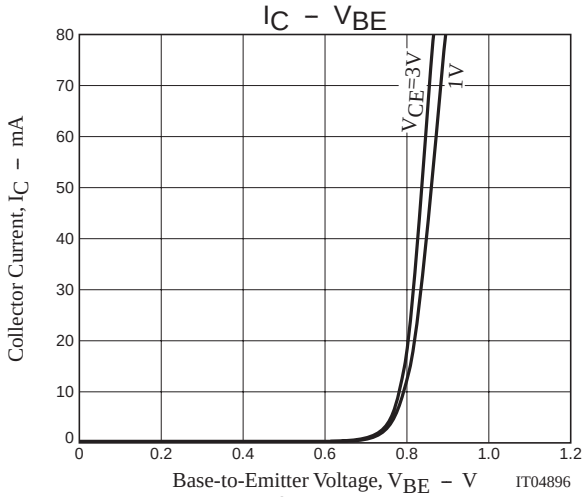
Pay attention to handling since it is liable to be affected by static electricity due to the high-frequency process adopted.

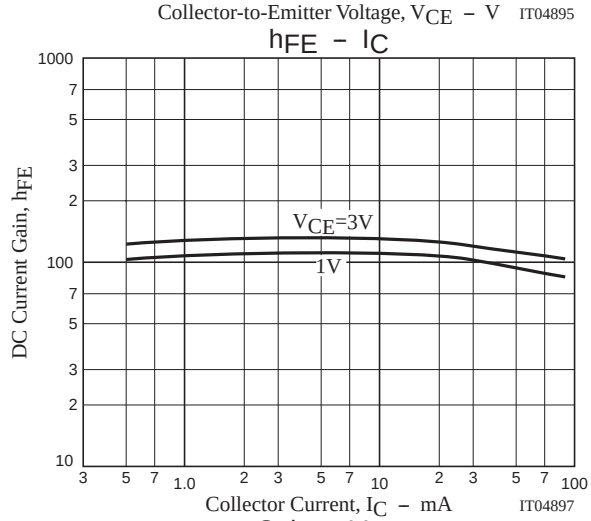
SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

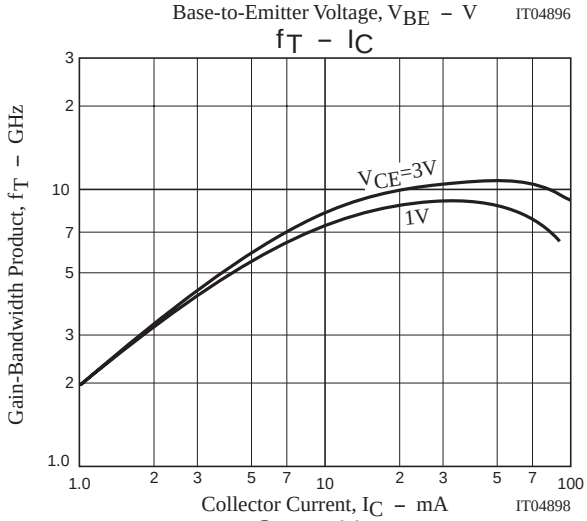
Electrical Characteristics at Ta=25°C

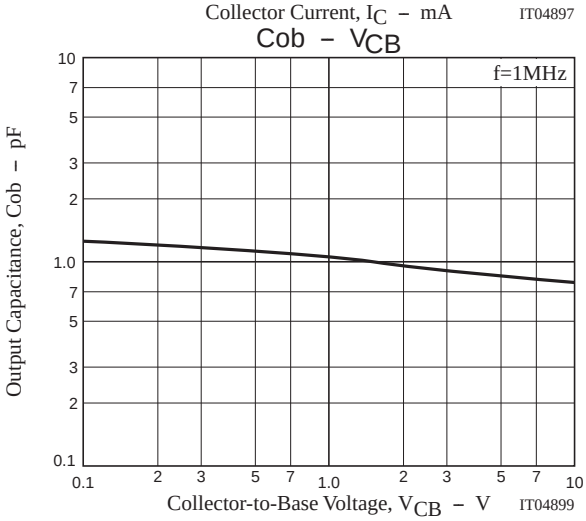
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=5V, I_E=0			1.0	nA
Emitter Cutoff Current	I_{EBO}	V_{EB}=1V, I_C=0			10	μA
DC Current Gain	h_{FE}	V_{CE}=1V, I_C=5mA	100		160	
Gain-Bandwidth Product	f_T1	V_{CE}=1V, I_C=5mA	4.5	6.0		GHz
	f_T2	V_{CE}=3V, I_C=40mA	8.5	10.5		GHz
Output Capacitance	Cob	V_{CB}=1V, f=1MHz		1.05	1.3	pF
Reverse Transfer Capacitance	Cre	V_{CB}=1V, f=1MHz		0.8	1.0	pF
Forward Transfer Gain	$\|S21e\|^2 1$	V_{CE}=1V, I_C=5mA, f=2GHz	4	5		dB
	$\|S21e\|^2 2$	V_{CE}=3V, I_C=40mA, f=2GHz	6.5	8.0		dB
Noise Figure	NF	V_{CE}=1V, I_C=7mA, f=2GHz		1.5	2.3	dB

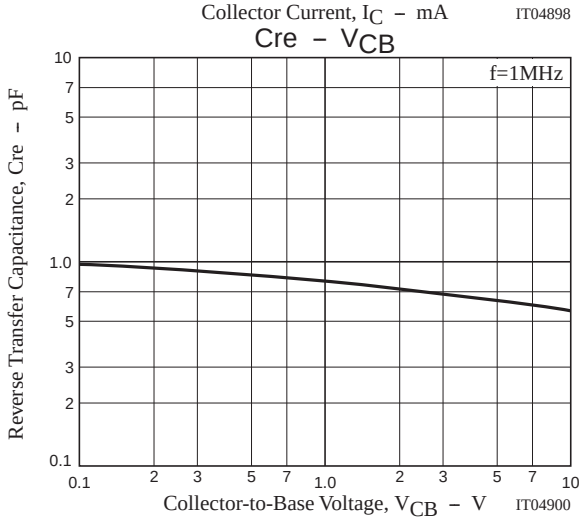


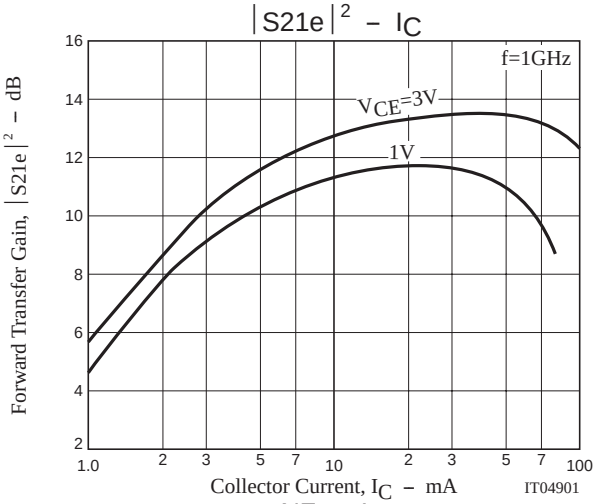


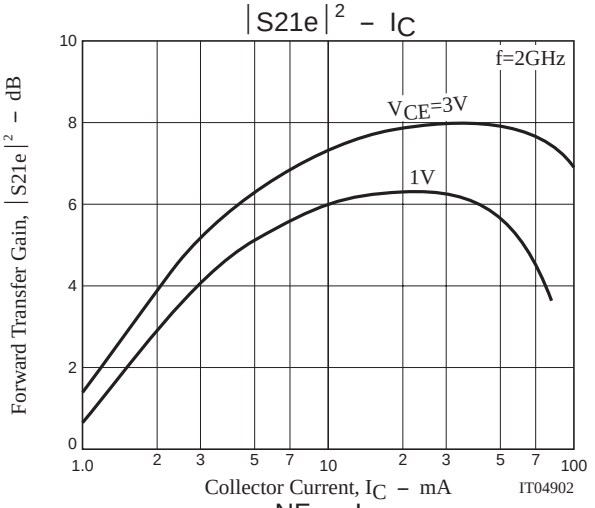


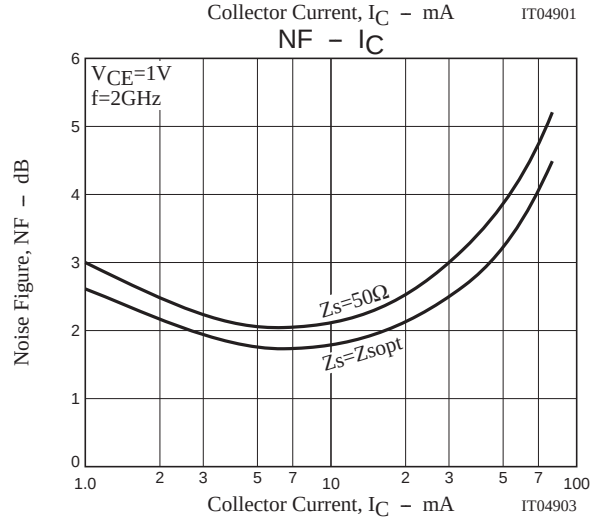


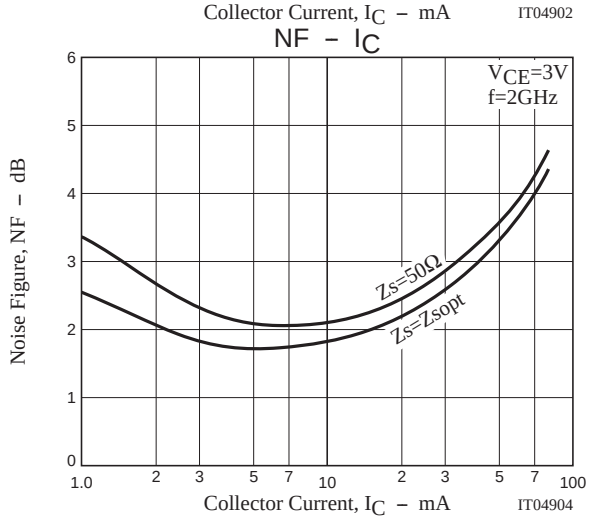


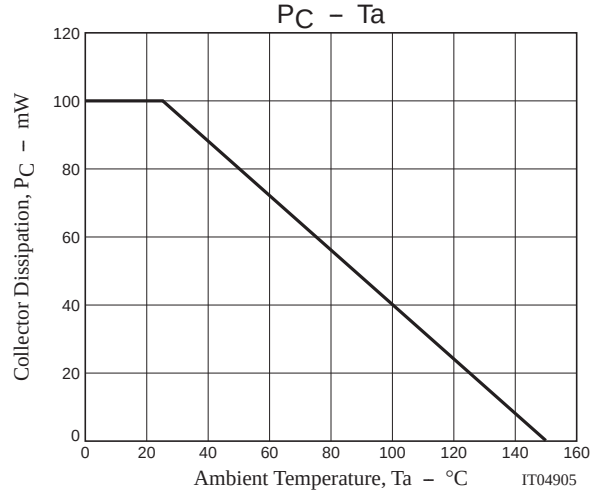



|S21e|² – IC
f=1GHz
VCE=3V
1V
Forward Transfer Gain, |S21e|² – dB
Collector Current, IC – mA
IT04901


|S21e|² – IC
f=2GHz
VCE=3V
1V
Forward Transfer Gain, |S21e|² – dB
Collector Current, IC – mA
IT04902


NF – IC
VCE=1V
f=2GHz
Zs=50Ω
Zs=Zsopt
Noise Figure, NF – dB
Collector Current, IC – mA
IT04903


NF – IC
VCE=3V
f=2GHz
Zs=50Ω
Zs=Zsopt
Noise Figure, NF – dB
Collector Current, IC – mA
IT04904


PC – Ta
Collector Dissipation, PC – mW
Ambient Temperature, Ta – °C
IT04905

S Parameters (Common emitter)

V_{CE}=1V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.961	−18.44	3.551	166.21	0.057	79.11	0.972	−10.74
200	0.942	−35.72	3.440	153.76	0.107	67.02	0.936	−20.83
400	0.889	−66.45	2.965	131.85	0.184	50.20	0.827	−36.88
600	0.839	−90.65	2.540	114.12	0.223	36.98	0.722	−48.74
800	0.792	−107.95	2.142	100.22	0.242	27.76	0.645	−57.04
1000	0.774	−122.39	1.885	88.54	0.254	21.32	0.598	−63.62
1200	0.748	−133.41	1.662	78.59	0.254	16.69	0.562	−69.60
1400	0.727	−142.48	1.475	69.74	0.252	12.93	0.540	−74.08
1600	0.709	−150.44	1.343	61.99	0.248	9.72	0.533	−78.08
1800	0.693	−156.97	1.238	55.27	0.239	7.76	0.531	−81.94
2000	0.677	−162.86	1.133	48.93	0.230	7.53	0.535	−86.11
2200	0.666	−168.34	1.053	42.99	0.221	7.56	0.536	−89.81
2400	0.652	−172.93	0.971	38.39	0.211	7.88	0.540	−92.61
2600	0.645	−177.57	0.921	34.26	0.201	10.47	0.552	−96.86
2800	0.639	177.75	0.859	29.85	0.196	13.19	0.564	−100.30
3000	0.633	173.35	0.825	26.51	0.195	17.38	0.568	−104.25

V_{CE}=1V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.839	−39.35	12.976	155.04	0.050	69.28	0.887	−27.54
200	0.778	−71.22	10.966	135.94	0.084	54.15	0.743	−48.99
400	0.697	−111.83	7.481	112.30	0.116	40.79	0.527	−75.06
600	0.661	−134.70	5.434	98.41	0.129	36.91	0.416	−91.02
800	0.637	−147.71	4.219	89.20	0.139	35.34	0.357	−101.20
1000	0.635	−157.21	3.493	81.39	0.148	36.01	0.330	−108.91
1200	0.620	−164.64	2.947	74.89	0.157	37.00	0.312	−115.63
1400	0.610	−170.64	2.547	69.21	0.167	38.20	0.304	−119.70
1600	0.604	−175.71	2.268	64.00	0.178	38.18	0.302	−123.64
1800	0.594	179.74	2.045	59.12	0.190	39.10	0.300	−126.44
2000	0.584	175.41	1.863	54.70	0.200	39.76	0.306	−128.70
2200	0.577	171.23	1.722	50.51	0.212	40.34	0.304	−131.76
2400	0.558	167.94	1.582	46.70	0.222	40.24	0.299	−132.93
2600	0.557	164.31	1.492	43.38	0.234	40.53	0.309	−135.84
2800	0.547	160.87	1.412	39.40	0.249	41.15	0.314	−138.27
3000	0.545	157.55	1.344	36.21	0.262	40.99	0.317	−140.22

V_{CE}=1V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.732	−57.81	19.989	145.93	0.045	62.36	0.798	−40.96
200	0.677	−96.22	14.897	124.77	0.068	49.90	0.609	−68.14
400	0.634	−134.17	8.943	104.01	0.088	43.28	0.419	−98.59
600	0.623	−151.63	6.242	92.66	0.102	43.32	0.347	−115.13
800	0.610	−161.45	4.766	85.29	0.114	45.64	0.314	−125.90
1000	0.611	−168.45	3.901	78.73	0.129	46.98	0.302	−133.08
1200	0.604	−174.30	3.274	73.30	0.144	48.15	0.298	−139.19
1400	0.594	−179.14	2.812	68.51	0.160	49.52	0.293	−142.92
1600	0.591	176.83	2.504	63.71	0.177	48.49	0.294	−145.81
1800	0.584	172.90	2.256	59.50	0.192	49.17	0.295	−147.89
2000	0.573	168.95	2.045	55.42	0.208	49.10	0.300	−149.85
2200	0.567	165.21	1.891	51.83	0.224	48.60	0.300	−153.03
2400	0.548	162.27	1.740	48.20	0.238	47.37	0.294	−154.50
2600	0.549	158.91	1.640	45.19	0.253	46.88	0.302	−155.97
2800	0.539	155.48	1.549	41.47	0.271	46.51	0.303	−158.63
3000	0.535	152.52	1.473	38.37	0.286	45.11	0.306	−160.23

V_{CE}=1V, I_C=40mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.550	−110.07	28.838	128.15	0.032	55.49	0.572	−73.97
200	0.600	−141.89	17.546	109.10	0.043	52.01	0.430	−108.37
400	0.621	−162.96	9.441	94.43	0.062	56.48	0.356	−137.26
600	0.625	−172.03	6.375	86.16	0.082	59.51	0.342	−150.10
800	0.620	−177.07	4.814	80.54	0.102	61.62	0.338	−156.96
1000	0.624	178.53	3.908	75.09	0.123	61.48	0.339	−160.60
1200	0.619	174.80	3.278	70.69	0.144	61.61	0.346	−164.92
1400	0.612	171.60	2.816	66.36	0.164	60.83	0.344	−166.84
1600	0.610	168.25	2.493	62.36	0.185	58.82	0.349	−168.63
1800	0.601	165.09	2.246	58.39	0.204	58.11	0.349	−170.03
2000	0.596	161.83	2.035	54.83	0.224	56.91	0.350	−171.38
2200	0.589	158.21	1.892	51.61	0.241	55.10	0.356	−173.76
2400	0.568	155.21	1.743	48.15	0.258	53.10	0.348	−175.79
2600	0.569	152.59	1.641	45.38	0.275	51.76	0.353	−176.37
2800	0.556	149.33	1.551	42.16	0.294	50.44	0.355	−178.85
3000	0.556	146.45	1.474	38.92	0.310	48.31	0.358	179.90

V_{CE}=3V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.968	−16.25	3.467	167.99	0.046	79.59	0.978	−8.53
200	0.952	−31.51	3.338	156.89	0.088	70.45	0.950	−16.75
400	0.909	−59.25	2.969	136.76	0.154	54.37	0.864	−30.24
600	0.866	−82.41	2.602	120.04	0.193	41.63	0.775	−40.43
800	0.819	−100.10	2.263	106.08	0.215	32.88	0.700	−48.22
1000	0.797	−114.58	2.012	94.55	0.228	25.41	0.654	−54.16
1200	0.767	−126.37	1.789	84.38	0.229	19.98	0.615	−59.52
1400	0.746	−136.09	1.586	75.26	0.227	16.63	0.595	−63.43
1600	0.725	−144.51	1.444	67.41	0.224	13.68	0.585	−67.58
1800	0.703	−151.80	1.338	60.46	0.215	11.93	0.580	−71.08
2000	0.684	−158.04	1.227	54.07	0.209	10.81	0.575	−75.06
2200	0.671	−163.62	1.146	47.86	0.203	10.96	0.578	−78.54
2400	0.656	−168.86	1.050	42.88	0.193	11.40	0.582	−81.13
2600	0.647	−174.07	0.995	38.57	0.185	14.19	0.588	−85.40
2800	0.638	−178.35	0.935	34.06	0.177	17.10	0.595	−89.05
3000	0.633	176.81	0.894	30.65	0.175	21.74	0.601	−92.44

V_{CE}=3V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.862	−32.61	13.072	158.31	0.041	73.53	0.905	−21.78
200	0.803	−60.74	11.549	140.57	0.071	58.88	0.786	−39.22
400	0.702	−100.07	8.267	117.15	0.103	45.62	0.576	−61.25
600	0.650	−123.89	6.184	102.60	0.117	39.51	0.450	−74.74
800	0.617	−138.92	4.825	93.15	0.129	38.71	0.379	−82.81
1000	0.607	−149.63	4.019	85.02	0.137	38.69	0.343	−89.08
1200	0.594	−157.72	3.410	78.39	0.144	39.39	0.315	−95.82
1400	0.583	−164.26	2.937	72.56	0.155	41.03	0.299	−99.01
1600	0.574	−169.88	2.625	67.26	0.165	40.62	0.293	−102.97
1800	0.563	−174.92	2.367	62.35	0.174	41.67	0.289	−105.97
2000	0.552	−179.58	2.148	57.75	0.185	42.53	0.292	−108.35
2200	0.546	175.82	1.982	53.36	0.198	42.98	0.290	−112.14
2400	0.526	172.20	1.816	49.53	0.207	42.72	0.285	−113.08
2600	0.526	168.46	1.715	46.29	0.219	43.62	0.291	−115.84
2800	0.514	164.81	1.608	42.06	0.231	43.93	0.294	−118.55
3000	0.515	161.52	1.534	38.79	0.246	43.91	0.299	−120.92

V_{CE}=3V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.761	−47.01	20.627	150.41	0.036	68.48	0.829	−32.34
200	0.687	−82.01	16.287	130.08	0.059	54.53	0.657	−54.66
400	0.611	−121.91	10.267	108.16	0.079	46.73	0.441	−79.84
600	0.585	−141.74	7.283	96.23	0.093	47.01	0.344	−94.69
800	0.567	−153.35	5.590	88.47	0.106	48.46	0.293	−104.59
1000	0.565	−161.61	4.579	81.71	0.120	48.90	0.272	−111.05
1200	0.557	−167.99	3.864	76.05	0.134	49.41	0.258	−118.37
1400	0.548	−173.35	3.326	71.22	0.149	50.76	0.250	−122.24
1600	0.545	−177.95	2.943	66.48	0.165	50.81	0.251	−125.67
1800	0.535	177.86	2.648	62.23	0.177	51.41	0.249	−128.21
2000	0.528	173.67	2.394	58.08	0.192	51.00	0.254	−130.55
2200	0.522	169.69	2.214	54.23	0.210	49.88	0.254	−133.96
2400	0.504	166.19	2.033	50.58	0.222	49.33	0.244	−135.41
2600	0.506	162.62	1.915	47.66	0.236	49.73	0.254	−137.14
2800	0.495	159.30	1.794	43.92	0.251	48.84	0.254	−140.11
3000	0.496	156.25	1.702	40.71	0.267	47.56	0.259	−142.18

V_{CE}=3V, I_C=40mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.536	−86.58	33.608	134.31	0.027	60.03	0.638	−55.40
200	0.532	−124.08	21.627	114.23	0.039	55.43	0.440	−84.47
400	0.536	−152.57	11.922	98.01	0.057	59.03	0.306	−112.87
600	0.541	−164.04	8.113	89.34	0.074	61.27	0.267	−127.98
800	0.536	−170.50	6.141	83.48	0.094	62.22	0.251	−137.60
1000	0.540	−175.55	4.991	78.00	0.113	62.49	0.248	−142.17
1200	0.538	−179.81	4.187	73.64	0.133	62.70	0.252	−147.98
1400	0.532	176.13	3.596	69.39	0.150	62.75	0.249	−150.34
1600	0.531	173.04	3.193	65.32	0.169	60.70	0.254	−153.08
1800	0.526	169.51	2.855	61.47	0.185	59.39	0.255	−154.97
2000	0.521	166.15	2.576	58.01	0.205	58.78	0.261	−156.34
2200	0.518	162.29	2.387	54.58	0.222	56.96	0.266	−158.85
2400	0.499	159.22	2.191	51.24	0.239	55.31	0.256	−160.99
2600	0.500	156.16	2.052	48.71	0.256	54.29	0.264	−161.91
2800	0.489	153.08	1.934	45.01	0.273	52.78	0.265	−164.59
3000	0.490	150.46	1.828	42.12	0.289	50.99	0.269	−166.52

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COMPONENTS FOR ALL

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