



SANYO Semiconductors

DATA SHEET

NPN Epitaxial Planar Silicon Transistor

80GN01F — UHF Wide-band Low-noise Amplifier Applications

Features

- High cut-off frequency : $f_T = 8.0\text{GHz}$ typ.
- High gain : $|S_{21e}|^2 = 12.0\text{dB}$ typ ($f = 1\text{GHz}$).
- Ultrasmall package permitting applied sets to be small and slim.

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		11	V
Collector-to-Emitter Voltage	V_{CEO}		5.5	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		80	mA
Collector Dissipation	P_C		250	mW
Junction Temperature	T_J		150	$^\circ\text{C}$
Storage Temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB} = 10\text{V}, I_E = 0$			0.1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 1\text{V}, I_C = 0$			1	μA
DC Current Gain	h_{FE}	$V_{CE} = 3\text{V}, I_C = 10\text{mA}$	100		160	
Gain-Bandwidth Product	f_T1	$V_{CE} = 1\text{V}, I_C = 5\text{mA}$		4.5		GHz
	f_T2	$V_{CE} = 3\text{V}, I_C = 30\text{mA}$	6.0	8.0		GHz
Output Capacitance	C_{ob}	$V_{CB} = 1\text{V}, f = 1\text{MHz}$		1.25	1.55	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB} = 1\text{V}, f = 1\text{MHz}$		0.9		pF
Forward Transfer Gain	$ S_{21e} ^2 1$	$V_{CE} = 1\text{V}, I_C = 5\text{mA}, f = 1\text{GHz}$		9.0		dB
	$ S_{21e} ^2 2$	$V_{CE} = 3\text{V}, I_C = 30\text{mA}, f = 1\text{GHz}$	9.5	12.0		dB
Noise Figure	NF	$V_{CE} = 3\text{V}, I_C = 5\text{mA}, f = 1\text{GHz}$		1.2	1.9	dB

Marking : ZF

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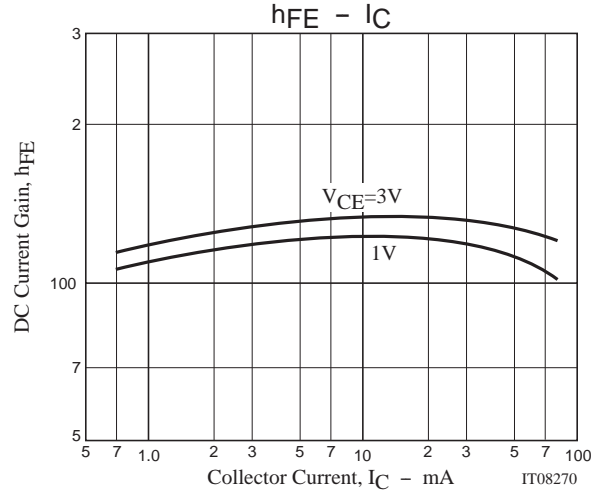
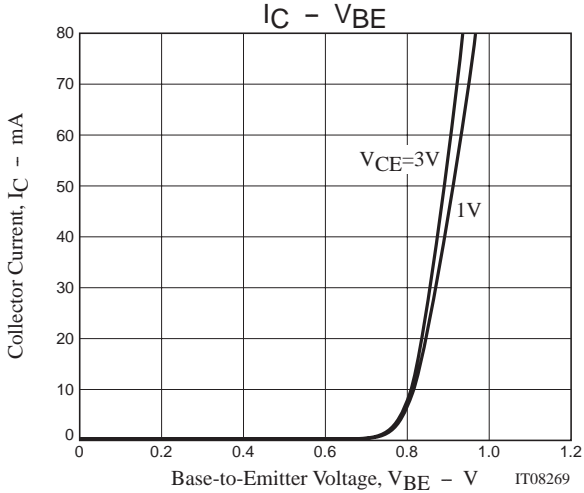
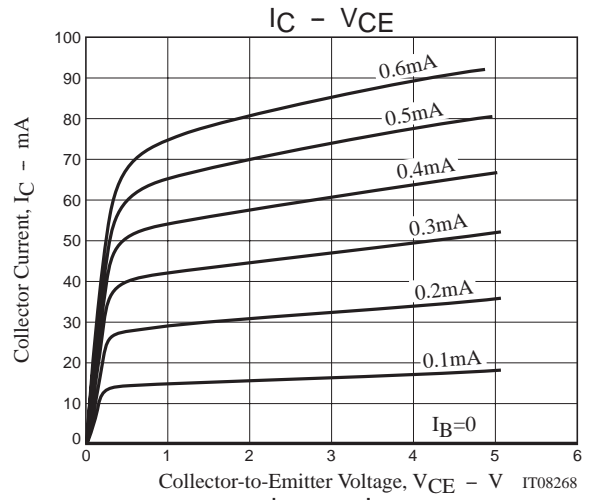
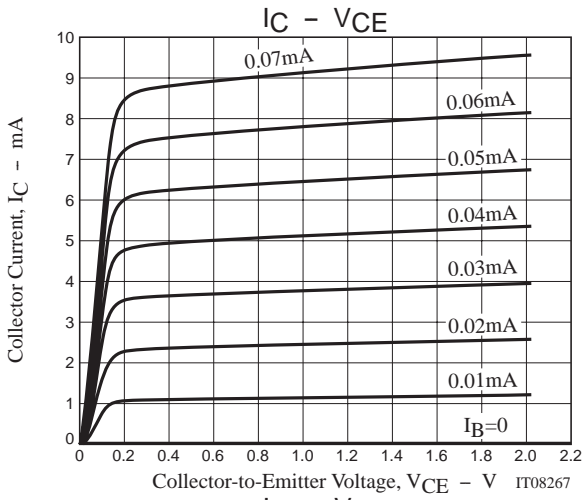
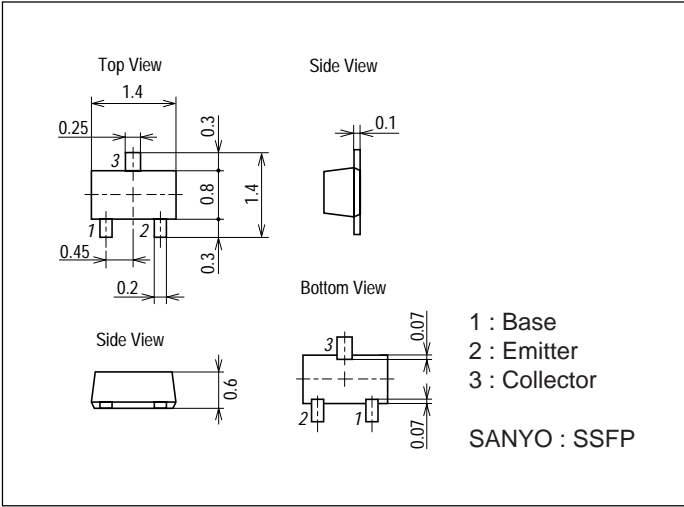
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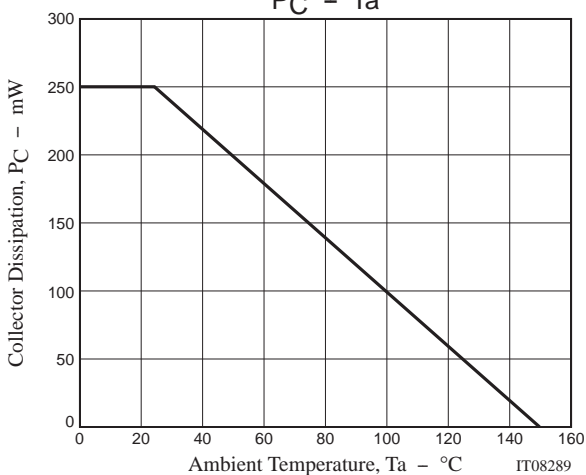
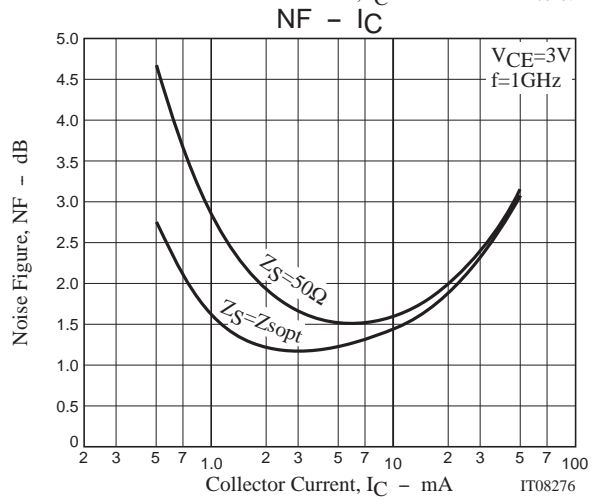
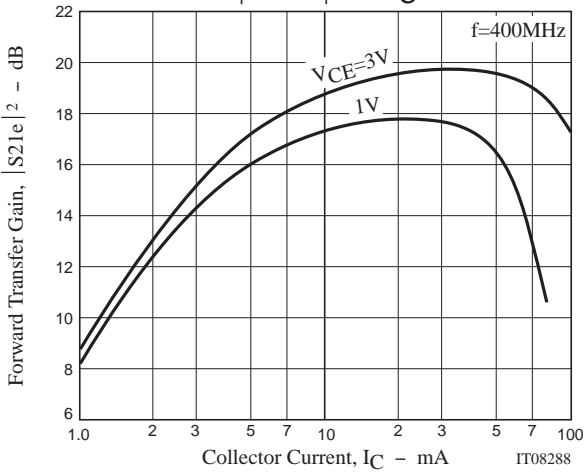
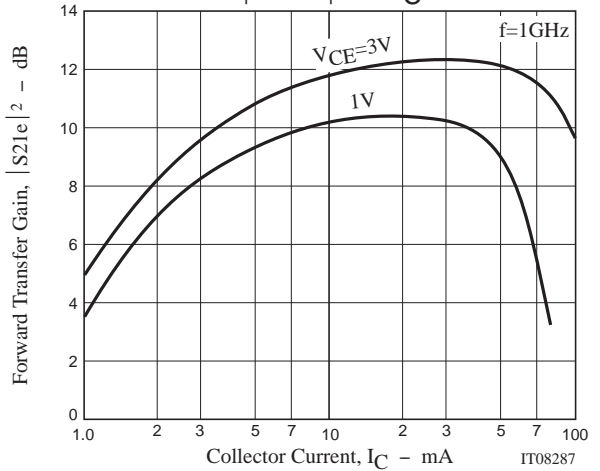
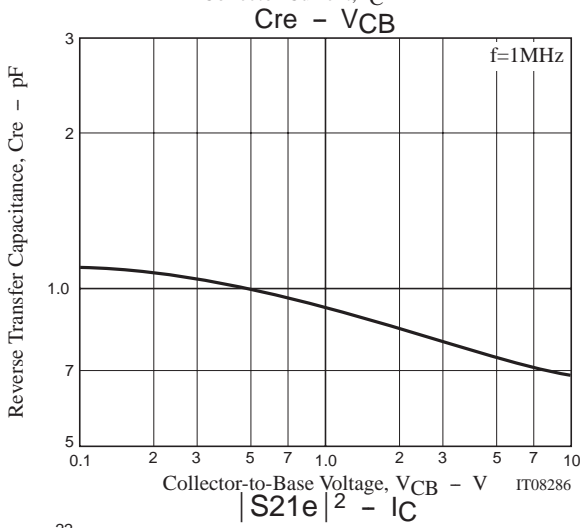
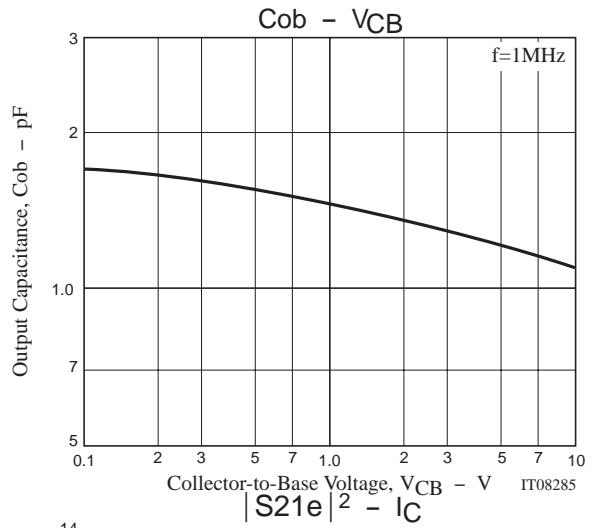
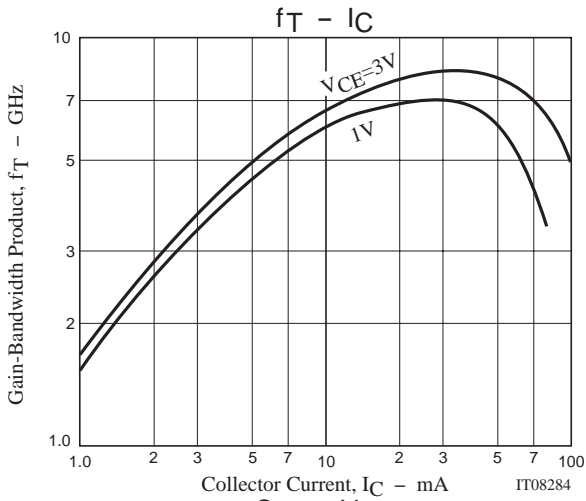
Package Dimensions

unit : mm

2159A



80GN01F



80GN01F

S Parameters (Common emitter)

$V_{CE}=1V, I_C=1mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.951	-21.08	3.299	163.78	0.063	76.46	0.973	-12.38
200	0.916	-40.47	3.121	148.94	0.116	62.93	0.910	-23.34
400	0.836	-72.71	2.566	124.82	0.187	43.76	0.752	-39.56
600	0.777	-95.67	2.092	107.29	0.217	30.30	0.620	-50.06
800	0.747	-113.28	1.748	93.51	0.229	22.09	0.532	-57.21
1000	0.712	-126.06	1.490	82.55	0.232	15.92	0.473	-62.89
1200	0.697	-135.56	1.293	73.59	0.228	12.19	0.438	-68.33
1400	0.698	-143.83	1.156	65.46	0.224	9.14	0.413	-74.15
1600	0.689	-150.89	1.044	58.63	0.214	7.18	0.403	-79.24
1800	0.685	-157.17	0.962	52.59	0.204	6.42	0.402	-84.17
2000	0.680	-162.55	0.898	47.40	0.197	7.15	0.414	-89.45

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.887	-33.08	8.146	158.07	0.059	72.56	0.934	-22.83
200	0.833	-61.40	7.208	139.94	0.102	56.62	0.816	-41.05
400	0.739	-101.14	5.184	115.42	0.144	38.27	0.606	-65.15
600	0.694	-123.94	3.907	100.51	0.158	30.57	0.487	-79.23
800	0.676	-139.75	3.112	89.46	0.168	26.92	0.423	-88.13
1000	0.650	-149.86	2.563	81.23	0.171	26.01	0.388	-93.80
1200	0.638	-157.36	2.199	74.39	0.175	25.56	0.373	-98.65
1400	0.635	-163.73	1.946	67.94	0.181	25.82	0.365	-102.71
1600	0.628	-168.85	1.731	62.15	0.183	27.05	0.361	-105.82
1800	0.618	-173.18	1.576	57.01	0.187	28.65	0.356	-107.74
2000	0.612	-177.41	1.455	52.15	0.194	31.19	0.367	-109.84

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.833	-43.47	11.917	152.48	0.056	66.29	0.892	-30.79
200	0.765	-77.90	9.731	132.28	0.089	50.48	0.728	-53.54
400	0.684	-118.38	6.347	108.79	0.118	36.52	0.507	-80.66
600	0.654	-138.23	4.584	95.87	0.129	32.77	0.407	-95.83
800	0.646	-151.87	3.591	86.26	0.138	32.86	0.363	-104.59
1000	0.625	-160.07	2.931	79.38	0.144	33.34	0.334	-111.02
1200	0.615	-165.83	2.492	73.40	0.155	34.96	0.326	-114.91
1400	0.614	-171.12	2.191	67.66	0.166	36.26	0.321	-118.59
1600	0.605	-175.45	1.947	62.26	0.173	37.06	0.316	-121.74
1800	0.597	-179.31	1.765	57.64	0.183	38.72	0.314	-123.44
2000	0.594	177.13	1.625	53.23	0.196	40.41	0.320	-125.12

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.745	-61.60	17.290	143.80	0.050	59.63	0.816	-43.71
200	0.685	-100.72	12.561	122.27	0.073	46.85	0.609	-70.97
400	0.640	-137.34	7.371	101.83	0.092	38.86	0.418	-101.09
600	0.628	-152.73	5.162	91.11	0.103	39.27	0.354	-116.59
800	0.627	-163.50	3.967	83.13	0.115	42.21	0.325	-125.42
1000	0.612	-169.72	3.223	77.21	0.127	43.43	0.309	-130.96
1200	0.603	-174.04	2.737	72.18	0.142	46.05	0.306	-134.39
1400	0.601	-178.40	2.402	67.08	0.158	46.64	0.307	-137.21
1600	0.594	178.13	2.128	62.32	0.172	47.33	0.302	-140.00
1800	0.586	174.66	1.924	58.09	0.189	47.48	0.300	-141.53
2000	0.583	171.86	1.770	53.93	0.204	48.36	0.301	-142.27

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S Parameters (Common emitter)

$V_{CE}=1V, I_C=15mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.694	-73.54	20.028	138.70	0.045	56.21	0.761	-51.78
200	0.652	-113.12	13.614	117.38	0.064	44.94	0.550	-81.22
400	0.629	-145.93	7.680	98.75	0.080	41.51	0.389	-111.73
600	0.623	-159.13	5.320	89.06	0.093	43.15	0.341	-126.57
800	0.625	-168.31	4.076	81.61	0.107	47.17	0.322	-134.76
1000	0.609	-173.87	3.300	76.40	0.123	49.07	0.313	-139.47
1200	0.604	-177.57	2.794	71.44	0.140	50.17	0.309	-142.80
1400	0.601	178.38	2.459	66.62	0.159	51.44	0.312	-145.26
1600	0.595	175.28	2.174	61.87	0.174	50.62	0.307	-147.89
1800	0.584	172.19	1.971	57.86	0.191	51.21	0.304	-149.33
2000	0.580	169.42	1.810	53.84	0.212	51.38	0.305	-149.81

$V_{CE}=1V, I_C=20mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.661	-82.03	21.490	135.41	0.042	56.62	0.723	-57.16
200	0.639	-120.91	14.055	114.48	0.059	44.74	0.516	-87.85
400	0.627	-150.96	7.763	97.03	0.075	44.08	0.373	-118.40
600	0.625	-162.71	5.350	87.97	0.089	46.81	0.338	-132.46
800	0.627	-171.17	4.083	80.82	0.105	49.27	0.325	-140.13
1000	0.613	-176.10	3.310	75.60	0.122	50.83	0.314	-144.51
1200	0.604	-179.68	2.811	70.86	0.140	53.02	0.314	-147.49
1400	0.604	176.69	2.468	66.14	0.160	53.21	0.316	-149.90
1600	0.598	173.73	2.186	61.51	0.175	52.44	0.311	-152.29
1800	0.587	170.52	1.973	57.55	0.193	52.61	0.308	-153.64
2000	0.583	168.16	1.814	53.69	0.214	52.70	0.308	-154.41

$V_{CE}=1V, I_C=30mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.629	-94.03	22.573	131.03	0.041	53.61	0.669	-64.78
200	0.631	-130.83	14.133	111.06	0.054	44.99	0.475	-96.75
400	0.633	-156.83	7.648	94.87	0.070	45.04	0.362	-126.54
600	0.634	-166.94	5.247	86.52	0.084	49.75	0.336	-139.59
800	0.636	-174.46	3.999	79.55	0.103	53.04	0.326	-146.10
1000	0.624	-178.90	3.235	74.61	0.121	54.58	0.320	-150.35
1200	0.616	178.03	2.746	70.22	0.139	55.50	0.320	-152.26
1400	0.612	174.64	2.416	65.45	0.160	55.93	0.323	-154.43
1600	0.608	171.94	2.136	60.82	0.178	54.91	0.321	-156.67
1800	0.596	168.95	1.932	56.99	0.196	54.53	0.315	-158.07
2000	0.593	166.50	1.783	53.25	0.217	54.30	0.316	-158.64

$V_{CE}=1V, I_C=50mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.612	-113.23	20.943	125.22	0.039	48.99	0.572	-77.64
200	0.653	-144.23	12.513	106.64	0.051	43.41	0.425	-111.25
400	0.666	-164.52	6.637	91.92	0.065	47.96	0.354	-138.96
600	0.669	-172.53	4.549	83.79	0.083	52.17	0.344	-149.39
800	0.674	-179.11	3.467	77.09	0.102	55.82	0.339	-154.48
1000	0.660	177.25	2.796	72.00	0.120	56.22	0.337	-157.91
1200	0.651	174.33	2.379	67.29	0.141	57.34	0.337	-159.61
1400	0.649	171.16	2.103	62.54	0.161	56.71	0.340	-160.82
1600	0.641	168.43	1.858	57.91	0.179	56.23	0.338	-162.81
1800	0.633	165.42	1.691	53.92	0.201	55.06	0.335	-164.27
2000	0.629	163.18	1.556	49.96	0.223	54.54	0.334	-164.77

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S Parameters (Common emitter)

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.963	-17.25	3.224	167.07	0.049	78.35	0.986	-9.73
200	0.946	-33.94	3.093	154.75	0.094	68.58	0.953	-18.79
400	0.893	-63.42	2.718	133.44	0.163	51.63	0.857	-33.73
600	0.848	-86.17	2.327	116.44	0.200	38.03	0.766	-44.50
800	0.817	-104.76	2.019	102.54	0.217	28.98	0.702	-52.38
1000	0.775	-118.95	1.758	90.99	0.224	22.25	0.659	-57.95
1200	0.751	-129.33	1.562	81.52	0.223	17.81	0.636	-62.74
1400	0.742	-138.92	1.404	72.89	0.223	14.02	0.623	-66.98
1600	0.727	-146.55	1.267	65.46	0.213	11.22	0.616	-70.24
1800	0.713	-153.44	1.168	58.86	0.204	10.12	0.615	-73.55
2000	0.706	-159.56	1.091	53.04	0.193	11.38	0.626	-76.85

$V_{CE}=3V, I_C=3mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.901	-27.84	8.349	161.00	0.046	74.90	0.956	-17.94
200	0.854	-52.73	7.553	144.81	0.083	60.50	0.859	-33.29
400	0.763	-90.38	5.759	121.03	0.125	43.28	0.670	-54.09
600	0.706	-114.14	4.451	105.77	0.142	34.83	0.548	-66.28
800	0.681	-131.31	3.595	94.40	0.150	31.59	0.482	-73.62
1000	0.649	-142.59	2.981	85.92	0.153	29.58	0.441	-78.81
1200	0.633	-150.52	2.565	78.84	0.158	29.36	0.423	-82.29
1400	0.627	-157.72	2.265	72.25	0.164	29.65	0.409	-86.10
1600	0.618	-163.39	2.012	66.40	0.166	30.36	0.403	-88.42
1800	0.607	-168.44	1.829	61.16	0.170	32.65	0.401	-90.06
2000	0.604	-172.85	1.685	56.29	0.176	35.23	0.407	-92.41

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.851	-35.91	12.127	156.52	0.045	70.66	0.922	-24.07
200	0.785	-66.14	10.421	137.86	0.076	55.55	0.786	-42.71
400	0.690	-106.26	7.237	114.13	0.105	42.17	0.569	-65.88
600	0.648	-128.08	5.348	100.41	0.118	36.91	0.455	-78.68
800	0.630	-142.96	4.207	90.50	0.126	36.00	0.397	-86.10
1000	0.607	-152.62	3.460	83.14	0.132	36.32	0.364	-90.95
1200	0.595	-159.10	2.937	77.13	0.141	37.50	0.350	-94.61
1400	0.591	-165.14	2.584	71.38	0.151	39.28	0.341	-97.93
1600	0.584	-170.03	2.292	65.96	0.158	40.36	0.334	-99.90
1800	0.575	-174.29	2.066	61.26	0.169	41.96	0.332	-101.46
2000	0.571	-178.01	1.905	56.90	0.182	43.19	0.339	-102.59

$V_{CE}=3V, I_C=10mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.768	-49.86	18.146	149.04	0.040	65.68	0.864	-34.10
200	0.691	-86.05	14.036	128.21	0.062	52.28	0.671	-56.89
400	0.619	-125.13	8.699	106.45	0.083	43.45	0.454	-82.20
600	0.597	-143.23	6.165	95.05	0.096	41.69	0.366	-95.60
800	0.590	-155.50	4.776	86.58	0.106	43.76	0.324	-103.40
1000	0.573	-162.59	3.875	80.60	0.118	46.04	0.304	-108.32
1200	0.565	-167.91	3.280	75.47	0.130	48.54	0.294	-110.93
1400	0.565	-172.37	2.881	70.23	0.147	49.88	0.291	-114.32
1600	0.557	-176.33	2.544	65.52	0.159	49.78	0.286	-116.09
1800	0.550	-179.99	2.297	61.27	0.175	50.60	0.283	-117.11
2000	0.547	-177.05	2.109	57.27	0.189	51.41	0.284	-117.42

80GN01F

S Parameters (Common emitter)

$V_{CE}=3V, I_C=15mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.716	-59.04	21.543	144.46	0.037	64.10	0.820	-39.99
200	0.646	-97.24	15.653	123.33	0.056	50.22	0.610	-64.53
400	0.593	-134.29	9.241	103.15	0.074	44.35	0.407	-90.95
600	0.580	-150.00	6.478	92.78	0.086	46.75	0.334	-104.42
800	0.578	-160.58	4.978	85.05	0.100	48.97	0.303	-111.90
1000	0.563	-166.96	4.026	79.61	0.113	51.61	0.286	-116.65
1200	0.555	-171.21	3.416	74.71	0.128	52.84	0.280	-119.23
1400	0.555	-175.47	2.987	69.90	0.145	52.83	0.279	-121.87
1600	0.549	-179.13	2.639	65.31	0.161	53.99	0.273	-123.80
1800	0.539	177.73	2.381	61.25	0.176	54.14	0.267	-124.72
2000	0.538	174.90	2.181	57.48	0.192	54.50	0.270	-124.94

$V_{CE}=3V, I_C=20mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.682	-65.23	23.468	141.70	0.038	60.66	0.789	-43.88
200	0.621	-104.29	16.461	120.57	0.053	49.62	0.573	-69.29
400	0.583	-139.21	9.493	101.37	0.069	46.37	0.381	-96.01
600	0.573	-153.40	6.603	91.57	0.083	48.97	0.317	-109.23
800	0.572	-163.46	5.057	84.22	0.097	51.47	0.291	-116.97
1000	0.560	-169.22	4.091	78.96	0.112	53.82	0.275	-121.73
1200	0.551	-173.23	3.470	74.16	0.128	55.31	0.274	-123.33
1400	0.553	-177.26	3.033	69.48	0.147	55.82	0.272	-125.98
1600	0.546	179.71	2.680	65.10	0.162	55.26	0.268	-127.74
1800	0.539	176.53	2.420	61.16	0.178	55.32	0.264	-128.57
2000	0.537	173.88	2.212	57.34	0.196	55.50	0.264	-128.57

$V_{CE}=3V, I_C=30mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.641	-73.51	25.554	138.22	0.034	59.31	0.748	-48.55
200	0.597	-112.77	17.177	117.29	0.048	50.06	0.528	-74.92
400	0.573	-145.11	9.666	99.29	0.063	49.13	0.353	-101.64
600	0.568	-157.83	6.681	90.09	0.077	52.31	0.301	-114.88
800	0.571	-166.87	5.109	83.13	0.095	55.02	0.279	-121.85
1000	0.559	-171.88	4.128	78.07	0.110	55.89	0.266	-126.43
1200	0.552	-175.54	3.493	73.50	0.127	58.25	0.265	-128.49
1400	0.551	-179.39	3.053	68.85	0.145	58.42	0.266	-130.51
1600	0.547	177.65	2.698	64.25	0.162	57.14	0.262	-132.06
1800	0.540	174.57	2.430	60.38	0.179	56.72	0.259	-132.63
2000	0.535	171.80	2.228	56.85	0.198	56.71	0.259	-132.88

$V_{CE}=3V, I_C=50mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.600	-83.69	26.670	134.66	0.031	56.53	0.698	-52.92
200	0.581	-122.18	17.258	114.16	0.044	50.33	0.478	-79.64
400	0.578	-151.26	9.497	97.15	0.060	51.95	0.324	-105.59
600	0.575	-162.25	6.530	88.54	0.076	54.57	0.279	-118.24
800	0.578	-170.22	4.982	81.68	0.092	57.26	0.262	-124.72
1000	0.567	-174.98	4.026	76.70	0.107	58.22	0.253	-128.64
1200	0.562	-178.05	3.412	72.28	0.127	59.32	0.253	-129.90
1400	0.563	178.19	2.982	67.61	0.146	59.17	0.256	-131.79
1600	0.558	175.62	2.629	63.16	0.161	58.67	0.252	-133.12
1800	0.551	172.73	2.369	59.36	0.180	58.64	0.249	-133.43
2000	0.548	170.27	2.171	55.57	0.197	58.18	0.249	-133.60

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