



SANYO Semiconductors

## DATA SHEET

NPN Epitaxial Planar Silicon Transistor

# 80GN01C — UHF Wide-band Low-noise Amplifier Applications

## Features

- High cutoff frequency :  $f_T = 8.0\text{GHz}$  typ.
- High gain :  $|S_{21e}|^2 = 11.0\text{dB}$  typ ( $f = 1\text{GHz}$ ).

## 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	$P_C$		200	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	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 1\text{V}, I_C = 0$			1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 3\text{V}, I_C = 10\text{mA}$	100		180	
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	$C_{ob}$	$V_{CB} = 1\text{V}, f = 1\text{MHz}$		1.4	1.7	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB} = 1\text{V}, f = 1\text{MHz}$		1.0		pF
Forward Transfer Gain	$ S_{21e} ^2 1$	$V_{CE} = 1\text{V}, I_C = 5\text{mA}, f = 1\text{GHz}$		8.5		dB
	$ S_{21e} ^2 2$	$V_{CE} = 3\text{V}, I_C = 30\text{mA}, f = 1\text{GHz}$	8.5	11.0		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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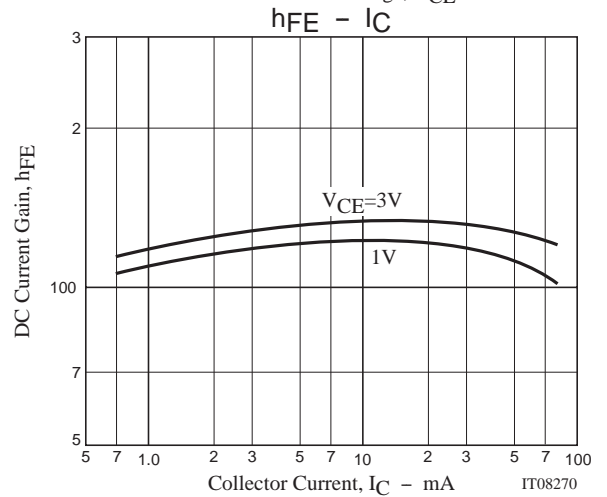
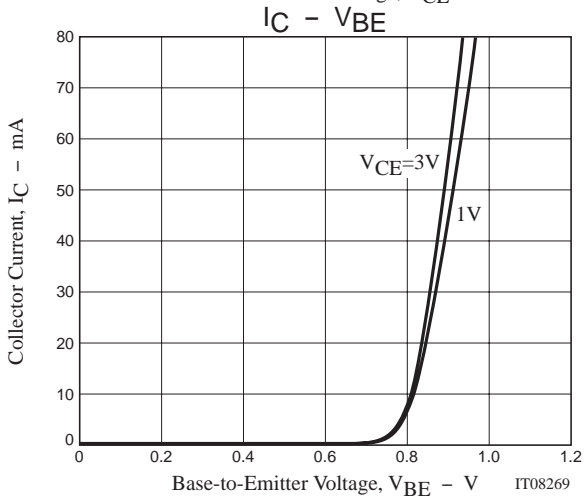
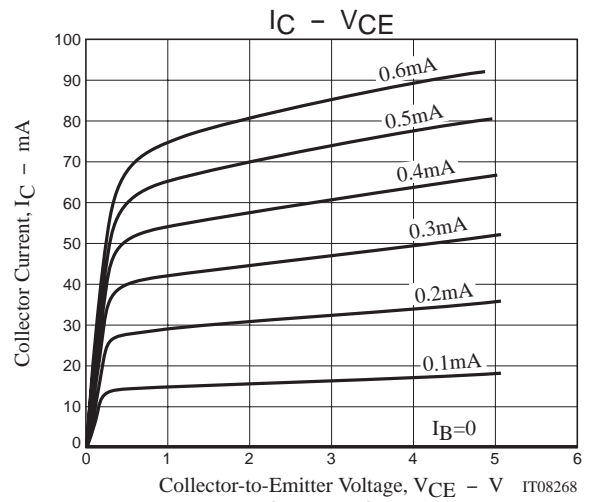
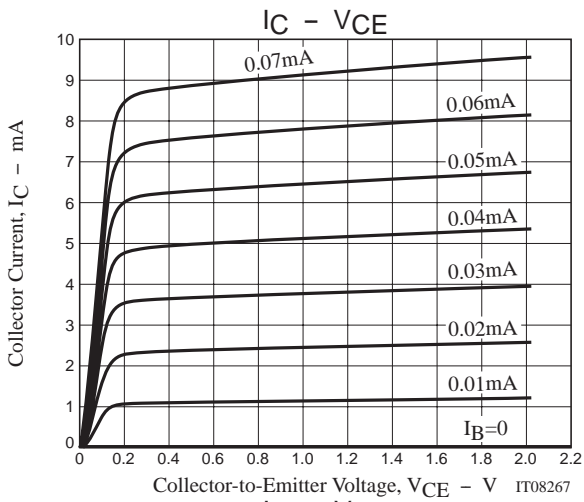
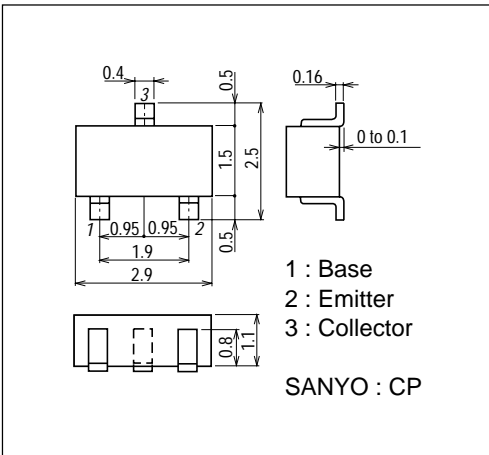
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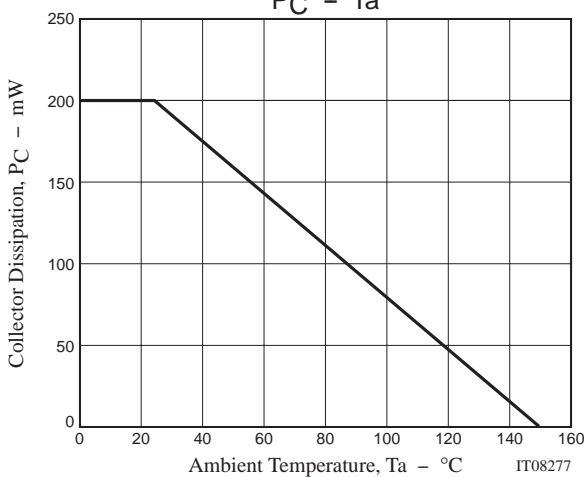
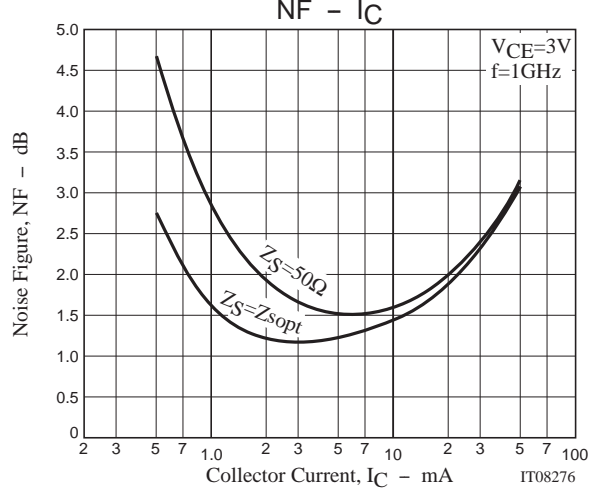
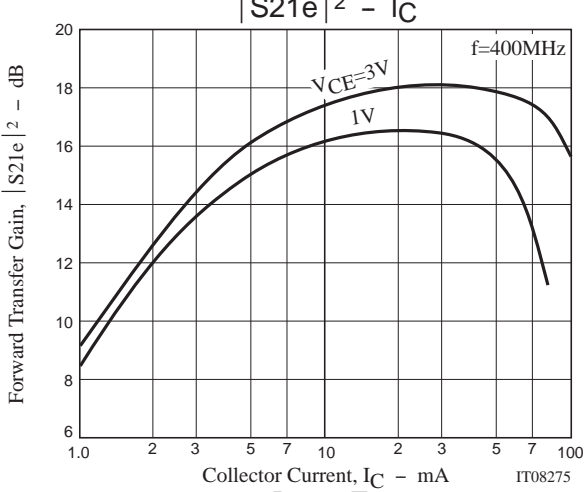
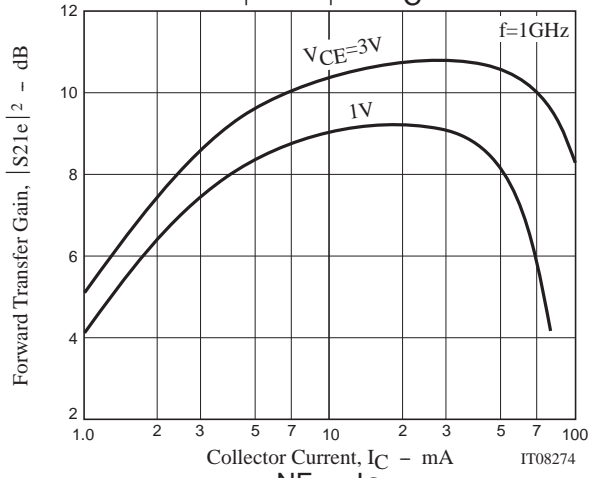
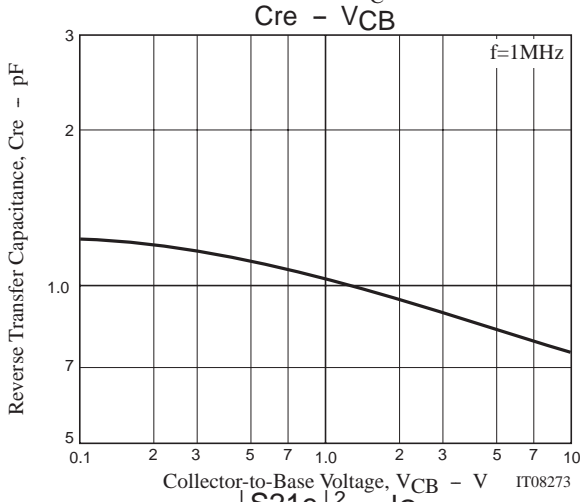
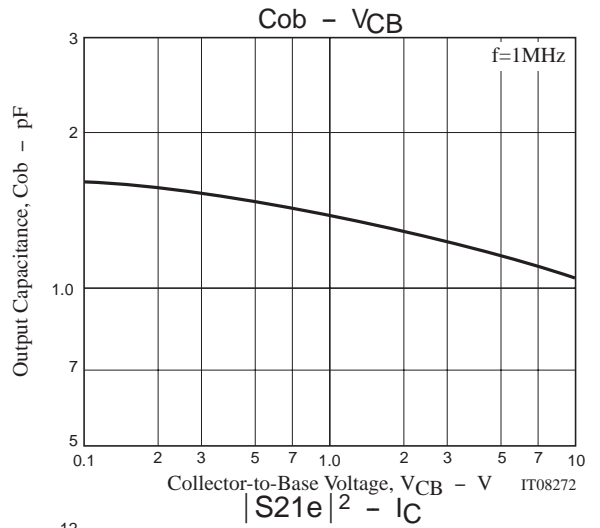
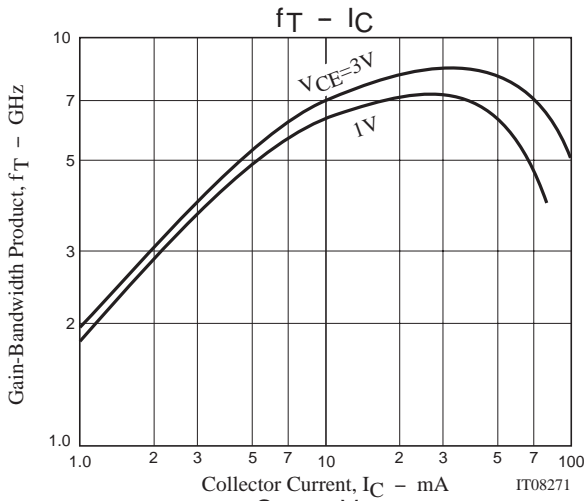
Package Dimensions

unit : mm

2018B



# 80GN01C



# 80GN01C

## 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	0.943	-20.45	3.386	163.07	0.066	75.75	0.973	-13.55
200	0.894	-39.49	3.199	148.05	0.120	64.27	0.912	-25.42
400	0.768	-72.11	2.638	122.84	0.193	45.13	0.768	-43.68
600	0.672	-98.46	2.198	104.09	0.224	33.08	0.654	-55.78
800	0.594	-120.23	1.843	88.82	0.239	25.33	0.576	-64.62
1000	0.553	-137.95	1.603	76.99	0.240	20.26	0.532	-71.94
1200	0.532	-153.29	1.424	66.52	0.235	17.72	0.500	-77.86
1400	0.522	-166.56	1.292	57.79	0.231	17.20	0.487	-83.40
1600	0.523	-179.25	1.171	49.58	0.221	17.85	0.477	-88.68
1800	0.525	169.89	1.089	42.77	0.220	20.28	0.477	-94.50
2000	0.535	159.92	1.008	36.19	0.220	24.73	0.476	-99.91

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.866	-31.95	7.993	155.21	0.061	70.23	0.916	-24.43
200	0.759	-59.19	6.880	135.86	0.103	56.15	0.777	-42.76
400	0.584	-98.56	4.786	110.31	0.143	42.00	0.556	-65.67
600	0.502	-125.92	3.581	94.47	0.161	36.89	0.436	-78.69
800	0.455	-146.45	2.826	82.86	0.175	35.79	0.373	-87.71
1000	0.436	-161.76	2.363	73.56	0.188	35.60	0.342	-95.05
1200	0.430	-174.76	2.042	65.34	0.202	36.78	0.319	-101.03
1400	0.432	174.47	1.814	58.22	0.220	37.04	0.313	-105.89
1600	0.440	164.55	1.623	51.26	0.233	37.41	0.304	-111.17
1800	0.447	155.33	1.492	45.33	0.251	37.46	0.305	-116.37
2000	0.459	147.62	1.373	39.63	0.270	37.93	0.305	-120.75

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.799	-40.95	11.314	149.36	0.056	66.46	0.867	-32.16
200	0.659	-72.88	8.948	128.09	0.091	53.13	0.679	-54.23
400	0.496	-113.79	5.675	104.05	0.121	43.82	0.454	-78.89
600	0.440	-139.54	4.078	90.20	0.141	42.87	0.354	-92.42
800	0.411	-158.42	3.167	79.98	0.158	43.29	0.306	-101.62
1000	0.403	-171.80	2.620	71.77	0.179	44.01	0.284	-109.59
1200	0.404	176.69	2.252	64.38	0.202	44.44	0.270	-115.21
1400	0.408	167.08	1.993	57.79	0.225	44.23	0.266	-120.39
1600	0.420	158.31	1.775	51.34	0.246	43.03	0.261	-125.59
1800	0.426	149.81	1.621	45.91	0.267	41.99	0.265	-130.61
2000	0.439	142.91	1.492	40.59	0.292	41.34	0.264	-135.55

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.680	-55.88	16.029	140.14	0.051	61.19	0.774	-44.47
200	0.532	-92.55	11.187	118.29	0.074	51.93	0.551	-69.80
400	0.417	-133.06	6.442	97.44	0.101	48.91	0.356	-96.56
600	0.392	-155.13	4.492	85.94	0.126	51.02	0.287	-111.56
800	0.382	-171.08	3.457	77.10	0.151	51.72	0.257	-120.87
1000	0.381	177.44	2.835	69.92	0.178	51.84	0.249	-128.56
1200	0.387	168.15	2.422	63.27	0.205	51.18	0.243	-133.87
1400	0.394	159.63	2.137	57.26	0.234	49.60	0.244	-138.60
1600	0.408	151.78	1.898	51.19	0.259	47.43	0.241	-143.80
1800	0.414	144.16	1.731	46.04	0.286	45.51	0.247	-148.11
2000	0.431	137.92	1.591	40.97	0.310	43.69	0.250	-152.29

## 80GN01C

### 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	0.613	-65.18	18.167	135.29	0.047	60.04	0.715	-51.53
200	0.478	-103.57	11.962	113.90	0.066	52.60	0.490	-78.49
400	0.392	-141.97	6.667	94.90	0.095	53.28	0.321	-106.15
600	0.380	-162.07	4.605	84.18	0.122	54.92	0.267	-121.19
800	0.376	-176.62	3.519	75.97	0.151	55.30	0.246	-130.38
1000	0.379	173.26	2.888	69.01	0.181	54.77	0.243	-137.76
1200	0.386	164.45	2.460	62.62	0.209	53.72	0.239	-142.44
1400	0.393	156.51	2.175	56.75	0.240	51.57	0.244	-146.66
1600	0.407	149.32	1.929	51.01	0.265	49.02	0.242	-151.94
1800	0.413	141.97	1.759	45.92	0.295	46.57	0.249	-155.53
2000	0.428	136.07	1.614	40.93	0.320	44.37	0.251	-159.50

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.568	-71.87	19.282	132.05	0.045	59.03	0.675	-56.24
200	0.450	-110.90	12.279	111.35	0.063	52.86	0.456	-84.14
400	0.385	-147.56	6.728	93.31	0.092	55.28	0.305	-112.47
600	0.377	-166.15	4.629	83.12	0.119	56.69	0.261	-126.97
800	0.378	-179.76	3.537	75.34	0.151	57.36	0.244	-136.09
1000	0.381	170.51	2.900	68.49	0.180	56.31	0.244	-142.82
1200	0.389	162.17	2.460	62.21	0.212	54.92	0.241	-147.51
1400	0.396	154.48	2.178	56.52	0.243	52.57	0.246	-151.00
1600	0.411	147.84	1.933	50.71	0.269	49.75	0.245	-155.75
1800	0.418	140.85	1.762	45.67	0.296	47.06	0.253	-159.62
2000	0.431	134.95	1.617	40.82	0.324	44.45	0.255	-163.45

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.515	-81.57	20.108	128.31	0.042	58.10	0.623	-62.81
200	0.425	-120.66	12.334	108.30	0.060	53.64	0.416	-91.78
400	0.384	-154.70	6.645	91.53	0.089	57.29	0.290	-120.66
600	0.385	-171.22	4.564	81.91	0.119	58.94	0.257	-134.81
800	0.387	176.41	3.476	74.23	0.152	59.21	0.244	-142.96
1000	0.389	167.48	2.844	67.59	0.183	57.71	0.245	-149.23
1200	0.399	159.61	2.423	61.32	0.213	55.74	0.245	-153.30
1400	0.408	152.45	2.138	55.72	0.246	53.41	0.249	-156.94
1600	0.424	145.85	1.901	50.05	0.273	50.15	0.251	-161.63
1800	0.432	139.07	1.736	45.18	0.302	47.50	0.259	-164.86
2000	0.444	133.41	1.593	40.18	0.329	45.00	0.260	-168.65

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.466	-98.81	19.123	123.70	0.041	56.29	0.538	-73.18
200	0.430	-135.89	11.298	104.88	0.057	54.25	0.368	-104.66
400	0.416	-164.50	5.995	88.98	0.089	59.19	0.284	-133.40
600	0.422	-178.20	4.100	79.68	0.120	60.60	0.265	-146.18
800	0.429	170.99	3.132	72.02	0.155	59.79	0.258	-153.39
1000	0.436	162.83	2.562	65.20	0.187	58.12	0.261	-158.74
1200	0.443	155.91	2.195	58.99	0.220	56.07	0.262	-162.52
1400	0.453	149.01	1.940	53.14	0.254	53.10	0.268	-165.22
1600	0.467	143.00	1.725	47.48	0.281	50.14	0.270	-169.80
1800	0.475	136.46	1.579	42.67	0.310	47.11	0.280	-173.05
2000	0.487	130.84	1.454	37.66	0.336	44.25	0.282	-176.07

# 80GN01C

## S Parameters (Common emitter)

V<sub>CE</sub>=3V, I<sub>C</sub>=1mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.953	-18.12	3.510	164.89	0.051	77.35	0.976	-10.98
200	0.909	-35.05	3.319	151.41	0.096	66.91	0.933	-20.95
400	0.794	-65.33	2.851	128.00	0.158	49.71	0.811	-36.51
600	0.694	-90.73	2.403	109.92	0.189	37.33	0.706	-47.29
800	0.612	-111.90	2.053	94.90	0.203	30.39	0.634	-54.88
1000	0.559	-129.94	1.792	83.25	0.209	25.41	0.586	-61.39
1200	0.530	-145.80	1.592	72.97	0.206	23.13	0.552	-66.36
1400	0.513	-159.91	1.438	64.01	0.202	22.72	0.534	-71.34
1600	0.506	-173.29	1.303	55.87	0.195	24.21	0.523	-76.21
1800	0.505	175.11	1.207	48.76	0.194	27.30	0.520	-81.65
2000	0.511	164.64	1.127	42.28	0.198	32.13	0.519	-86.59

V<sub>CE</sub>=3V, I<sub>C</sub>=3mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.880	-27.48	8.264	157.98	0.048	72.82	0.935	-19.67
200	0.784	-51.34	7.326	140.09	0.084	60.68	0.818	-34.81
400	0.604	-87.80	5.334	114.91	0.122	46.71	0.612	-53.70
600	0.502	-114.29	4.062	99.16	0.140	41.72	0.488	-64.05
800	0.439	-135.12	3.230	87.37	0.155	40.49	0.421	-70.84
1000	0.407	-151.34	2.706	78.28	0.167	39.87	0.382	-76.77
1200	0.397	-165.27	2.333	70.02	0.181	41.01	0.358	-81.20
1400	0.391	-177.54	2.069	62.95	0.197	42.32	0.345	-85.71
1600	0.396	171.62	1.851	56.04	0.211	42.61	0.335	-89.87
1800	0.401	161.80	1.690	50.19	0.229	43.00	0.332	-94.73
2000	0.411	153.14	1.558	44.34	0.248	43.46	0.331	-99.24

V<sub>CE</sub>=3V, I<sub>C</sub>=5mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.825	-33.84	11.621	153.04	0.045	70.59	0.896	-25.30
200	0.693	-61.70	9.580	133.16	0.076	58.00	0.738	-43.00
400	0.505	-100.32	6.384	108.68	0.107	47.64	0.509	-62.87
600	0.423	-126.11	4.652	94.64	0.124	46.18	0.396	-73.06
800	0.378	-145.93	3.647	84.14	0.142	46.04	0.340	-79.17
1000	0.359	-160.86	3.015	76.06	0.161	47.05	0.310	-85.58
1200	0.355	-173.46	2.583	68.63	0.181	47.98	0.292	-89.57
1400	0.354	175.40	2.279	62.03	0.203	48.28	0.284	-94.45
1600	0.364	165.53	2.029	55.70	0.222	47.51	0.275	-98.94
1800	0.368	156.40	1.850	50.18	0.244	46.53	0.277	-103.87
2000	0.381	148.74	1.704	44.81	0.266	46.07	0.275	-107.93

V<sub>CE</sub>=3V, I<sub>C</sub>=10mA, Z<sub>O</sub>=50Ω

Freq(MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
100	0.722	-45.10	16.727	144.98	0.042	65.88	0.822	-34.43
200	0.559	-77.27	12.401	123.47	0.063	55.72	0.613	-54.72
400	0.399	-116.09	7.418	101.72	0.091	52.77	0.392	-74.75
600	0.349	-140.20	5.234	89.86	0.113	54.00	0.304	-84.89
800	0.325	-158.57	4.033	80.99	0.136	54.26	0.263	-91.19
1000	0.316	-171.64	3.305	73.86	0.162	54.98	0.244	-98.15
1200	0.320	177.46	2.814	67.26	0.185	54.18	0.233	-102.55
1400	0.323	167.58	2.480	61.38	0.212	53.11	0.232	-107.09
1600	0.336	159.03	2.201	55.37	0.236	51.39	0.227	-112.11
1800	0.343	150.55	1.999	50.35	0.263	49.68	0.230	-117.11
2000	0.358	143.60	1.834	45.29	0.286	48.18	0.231	-121.05

# 80GN01C

## 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	0.659	-51.73	19.360	140.49	0.039	66.40	0.775	-39.49
200	0.496	-85.62	13.505	119.15	0.058	55.18	0.548	-60.63
400	0.359	-124.42	7.787	98.83	0.084	55.37	0.342	-80.65
600	0.325	-147.12	5.433	87.91	0.109	57.34	0.269	-91.18
800	0.308	-164.55	4.167	79.62	0.136	57.94	0.234	-97.98
1000	0.304	-176.47	3.406	72.85	0.162	58.02	0.222	-104.43
1200	0.309	173.37	2.903	66.52	0.188	56.38	0.214	-108.86
1400	0.314	164.04	2.551	60.93	0.217	55.13	0.216	-113.43
1600	0.329	156.23	2.258	55.21	0.241	52.74	0.212	-118.46
1800	0.336	148.17	2.052	50.26	0.267	50.59	0.218	-123.48
2000	0.351	141.49	1.878	45.40	0.293	48.66	0.218	-128.12

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.618	-56.35	20.848	137.72	0.038	62.66	0.741	-42.79
200	0.460	-90.81	14.062	116.52	0.055	56.09	0.510	-64.19
400	0.338	-129.30	7.943	97.25	0.082	56.87	0.317	-84.06
600	0.312	-151.27	5.506	86.94	0.108	59.47	0.249	-94.82
800	0.300	-167.82	4.224	78.88	0.136	59.90	0.220	-101.48
1000	0.300	-179.28	3.449	72.34	0.163	59.55	0.211	-108.21
1200	0.305	170.91	2.934	66.32	0.190	57.60	0.205	-112.68
1400	0.312	162.44	2.575	60.68	0.220	56.37	0.208	-116.78
1600	0.326	154.72	2.282	55.05	0.244	53.24	0.204	-122.51
1800	0.335	146.84	2.073	50.20	0.270	51.12	0.211	-127.28
2000	0.349	140.47	1.901	45.30	0.296	49.08	0.213	-131.37

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.568	-62.06	22.329	134.47	0.034	61.82	0.700	-46.71
200	0.421	-97.72	14.506	113.76	0.052	57.73	0.467	-68.22
400	0.323	-135.52	8.045	95.54	0.080	59.89	0.289	-88.27
600	0.305	-156.28	5.543	85.71	0.106	61.63	0.228	-98.49
800	0.298	-171.83	4.240	78.11	0.135	61.38	0.205	-105.36
1000	0.298	177.52	3.465	71.55	0.163	60.62	0.199	-112.47
1200	0.306	168.43	2.937	65.55	0.192	59.64	0.195	-116.41
1400	0.312	160.36	2.585	60.23	0.222	57.30	0.199	-120.62
1600	0.326	152.89	2.291	54.61	0.247	53.91	0.197	-126.83
1800	0.335	145.30	2.081	49.79	0.275	51.60	0.207	-130.65
2000	0.352	139.35	1.905	44.82	0.298	49.34	0.206	-135.46

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.518	-69.12	22.937	131.34	0.034	61.24	0.652	-49.82
200	0.393	-106.38	14.433	111.15	0.051	56.40	0.425	-71.28
400	0.320	-142.96	7.883	93.90	0.077	61.11	0.262	-90.96
600	0.312	-162.01	5.411	84.32	0.106	62.35	0.211	-100.98
800	0.309	-176.42	4.134	76.92	0.134	62.91	0.191	-107.61
1000	0.311	173.85	3.368	70.50	0.163	60.90	0.187	-114.03
1200	0.320	165.14	2.870	64.38	0.192	59.52	0.186	-118.54
1400	0.328	157.88	2.522	59.05	0.223	57.82	0.191	-122.08
1600	0.344	150.72	2.230	53.47	0.248	54.65	0.191	-127.87
1800	0.353	143.41	2.031	48.72	0.275	52.19	0.201	-132.59
2000	0.367	137.75	1.862	43.85	0.301	49.69	0.201	-136.00

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