



CPH6021 — PNP Epitaxial Planar Silicon Transistor

High-Frequency Low-Noise Amplifier

Features

- Low-noise use : NF=1.2dB typ (f=1GHz)
- High cut-off frequency : $f_T=10\text{GHz}$ typ ($V_{CE}=5\text{V}$)
- High gain : $|S_{21e}|^2=14\text{dB}$ typ (f=1GHz)
- Halogen free compliance

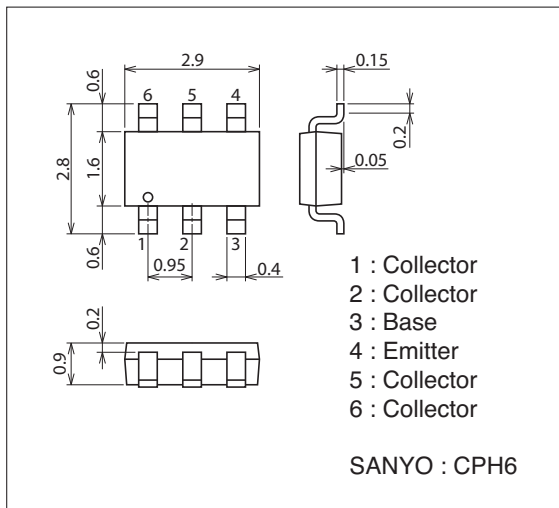
Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		12	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		100	mA
Collector Dissipation	P_C	When mounted on ceramic substrate (250mm ² ×0.8mm)	700	mW
Junction Temperature	T_j		150	°C
Storage Temperature	T_{stg}		-55 to +150	°C

Package Dimensions

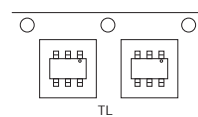
unit : mm (typ)
7018A-002



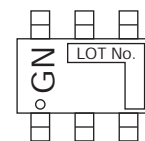
Product & Package Information

- Package : CPH6
- JEITA, JEDEC : SC-74, SOT-457
- Minimum Packing Quantity : 3,000 pcs./reel

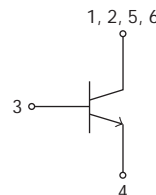
Packing Type: TL



Marking



Electrical Connection

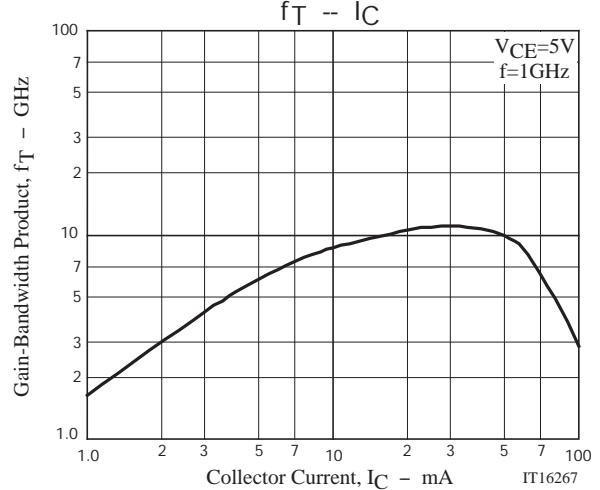
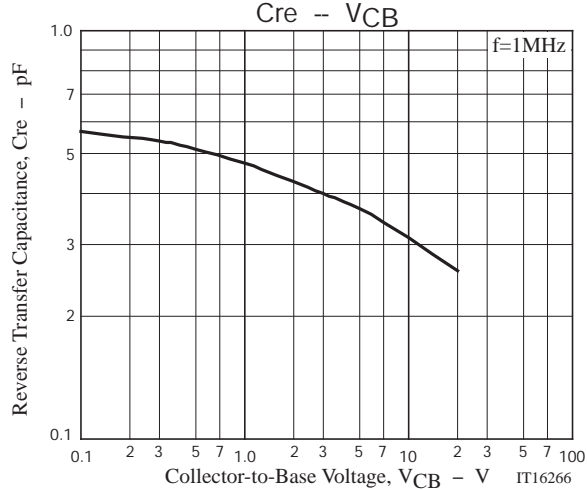
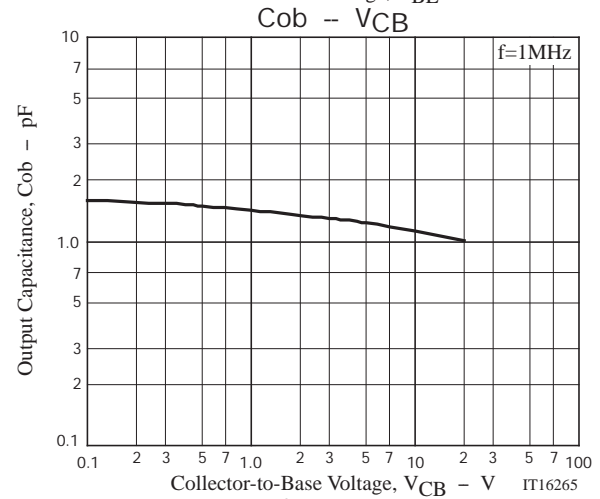
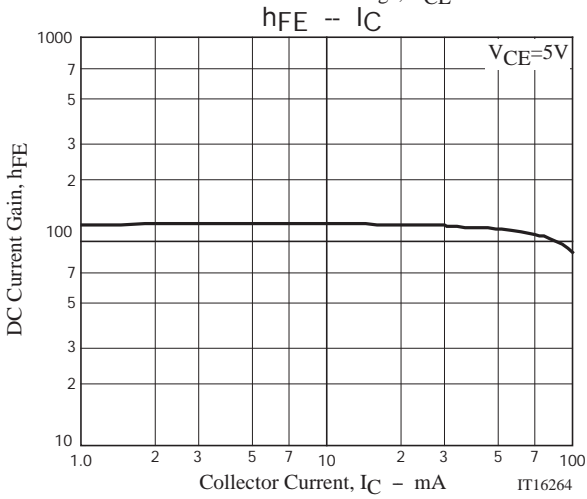
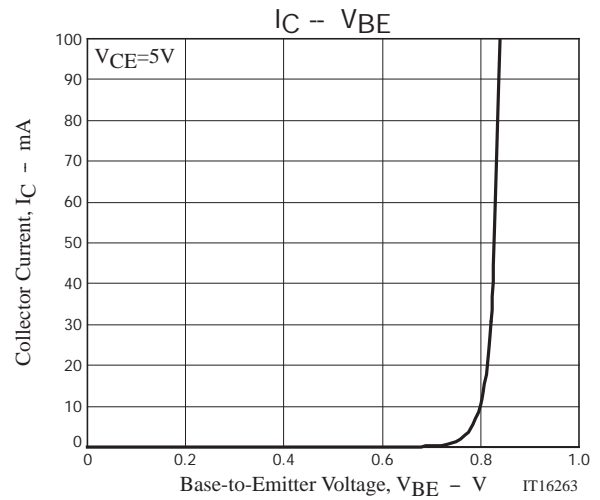
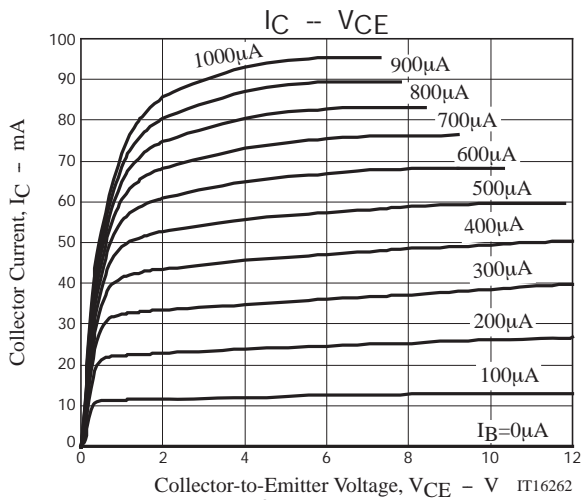


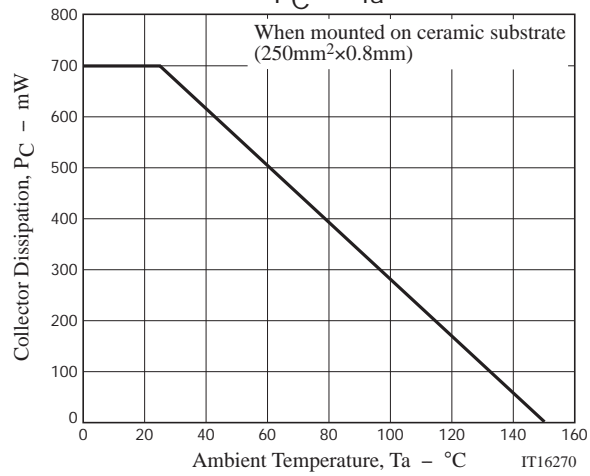
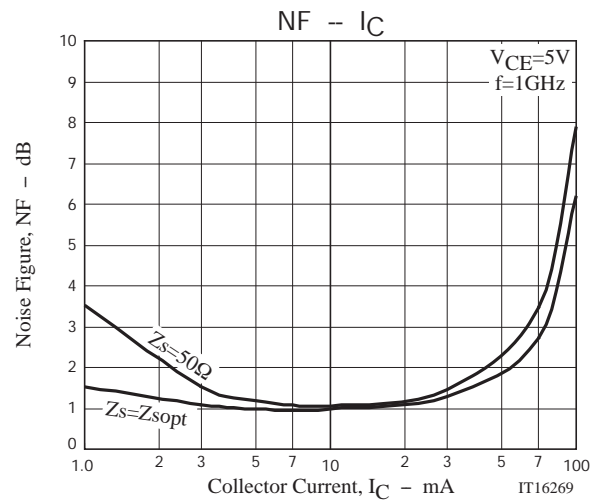
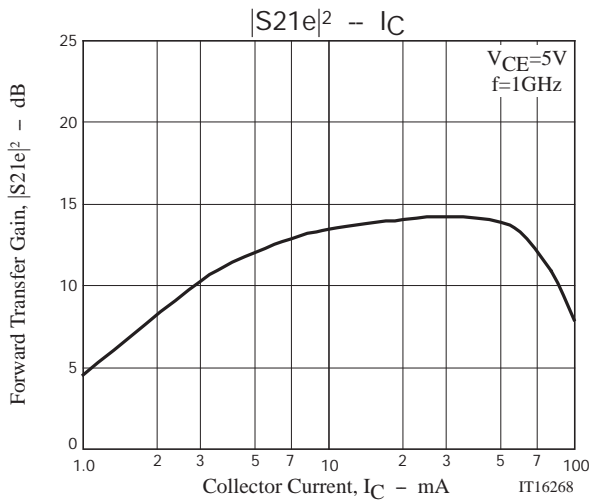
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Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	ICBO	V _{CB} =5V, I _E =0A			1.0	μA
Emitter Cutoff Current	IEBO	V _{EB} =1V, I _C =0A			1.0	μA
DC Current Gain	h _{FE}	V _{CE} =5V, I _C =50mA	60		150	
Gain-Bandwidth Product	f _T	V _{CE} =5V, I _C =30mA	8	10		GHz
Forward Transfer Gain	S _{21e} ²	V _{CE} =5V, I _C =30mA, f=1GHz	10	14		dB
Noise Figure	NF	V _{CE} =5V, I _C =10mA, f=1GHz		1.2	1.8	dB

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





S Parameters (Common emitter)

$V_{CE}=3V, I_C=10mA$

Freq(MHz)	S11	∠S11	S21	∠S21	S12	∠S12	S22	∠S22
100	0.758	-26.8	14.284	149.0	0.021	74.1	0.878	-24.0
200	0.630	-56.2	13.720	131.4	0.033	66.6	0.711	-38.2
300	0.503	-82.5	12.164	116.0	0.044	65.4	0.593	-46.0
400	0.414	-103.1	10.315	104.5	0.053	65.8	0.512	-51.3
500	0.368	-117.9	8.649	96.7	0.062	67.0	0.457	-55.3
600	0.341	-129.4	7.360	90.8	0.072	68.0	0.419	-58.7
700	0.326	-138.7	6.370	86.0	0.081	68.6	0.391	-61.8
800	0.313	-147.1	5.629	81.7	0.091	69.2	0.370	-64.6
900	0.307	-154.2	5.036	78.0	0.101	69.2	0.353	-67.3
1000	0.302	-160.2	4.556	74.7	0.112	69.2	0.342	-69.9
1200	0.299	-170.7	3.832	68.6	0.133	68.5	0.325	-75.2
1400	0.298	-179.6	3.316	63.1	0.155	67.4	0.316	-80.5
1600	0.301	172.7	2.931	57.9	0.177	66.0	0.312	-86.0
1800	0.305	165.8	2.634	53.0	0.199	64.4	0.311	-91.4
2000	0.309	159.4	2.398	48.3	0.222	62.7	0.312	-96.9
2200	0.315	153.4	2.204	43.8	0.244	60.7	0.314	-102.6
2400	0.320	147.8	2.044	39.5	0.267	58.7	0.316	-108.0
2600	0.326	142.7	1.911	35.4	0.290	56.6	0.321	-113.1
2800	0.334	137.8	1.799	31.3	0.314	54.3	0.327	-118.8
3000	0.338	133.2	1.700	27.7	0.337	52.2	0.333	-123.7

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S Parameters (Common emitter)

$V_{CE}=3V, I_C=30mA$

Freq(MHz)	S11	∠S11	S21	∠S21	S12	∠S12	S22	∠S22
100	0.422	-60.6	29.590	135.2	0.016	71.4	0.722	-33.7
200	0.307	-104.4	21.814	112.1	0.025	72.9	0.519	-44.2
300	0.268	-126.8	15.788	100.5	0.037	76.0	0.425	-48.4
400	0.256	-140.7	12.124	93.3	0.047	77.3	0.373	-51.5
500	0.254	-150.8	9.776	88.0	0.058	78.3	0.340	-54.4
600	0.255	-158.5	8.161	83.9	0.070	78.3	0.317	-57.4
700	0.258	-164.9	6.998	80.2	0.081	77.8	0.300	-60.3
800	0.259	-170.4	6.125	77.0	0.093	77.5	0.288	-63.2
900	0.262	-175.2	5.448	74.1	0.105	76.6	0.278	-66.1
1000	0.265	-179.3	4.911	71.3	0.117	75.3	0.272	-68.8
1200	0.270	-173.0	4.110	66.2	0.141	73.4	0.263	-74.5
1400	0.275	-166.2	3.546	61.3	0.165	71.1	0.259	-80.3
1600	0.281	-160.2	3.126	56.7	0.189	68.6	0.259	-86.1
1800	0.287	-154.6	2.804	52.3	0.212	66.2	0.260	-91.9
2000	0.292	-149.3	2.549	48.0	0.236	63.6	0.263	-97.7
2200	0.299	-144.3	2.343	43.7	0.259	61.0	0.266	-103.5
2400	0.305	-139.4	2.170	39.7	0.282	58.5	0.269	-109.0
2600	0.310	-135.1	2.028	35.9	0.305	56.0	0.275	-114.2
2800	0.317	-130.7	1.908	32.0	0.329	53.3	0.280	-119.9
3000	0.320	-126.7	1.803	28.5	0.352	50.9	0.287	-124.7

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

Freq(MHz)	S11	∠S11	S21	∠S21	S12	∠S12	S22	∠S22
100	0.317	-109.4	31.770	125.5	0.013	75.2	0.630	-35.4
200	0.309	-140.2	20.342	105.6	0.023	76.4	0.452	-42.0
300	0.303	-153.5	14.403	96.2	0.034	78.9	0.381	-44.4
400	0.305	-161.9	10.996	89.9	0.045	79.8	0.343	-46.8
500	0.310	-168.1	8.862	85.1	0.057	80.6	0.319	-49.5
600	0.315	-172.9	7.391	81.2	0.068	80.1	0.303	-52.5
700	0.321	-177.3	6.332	77.7	0.080	80.0	0.291	-55.6
800	0.324	-178.9	5.544	74.6	0.092	79.1	0.282	-58.6
900	0.329	-175.4	4.934	71.7	0.104	78.4	0.275	-61.6
1000	0.332	-172.3	4.448	69.0	0.116	77.4	0.271	-64.6
1200	0.338	-166.2	3.725	63.8	0.140	75.1	0.267	-70.7
1400	0.344	-160.6	3.216	58.9	0.164	72.7	0.265	-77.0
1600	0.351	-155.5	2.838	54.1	0.188	70.3	0.267	-83.3
1800	0.356	-150.7	2.545	49.6	0.212	67.8	0.270	-89.5
2000	0.362	-146.0	2.316	45.2	0.237	65.2	0.275	-95.7
2200	0.369	-141.3	2.128	40.9	0.260	62.5	0.279	-101.9
2400	0.374	-136.9	1.973	36.8	0.284	60.0	0.284	-107.8
2600	0.379	-132.8	1.843	32.9	0.308	57.4	0.290	-113.3
2800	0.387	-128.7	1.735	29.0	0.332	54.6	0.297	-119.4
3000	0.389	-124.8	1.640	25.5	0.357	52.1	0.304	-124.5

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S Parameters (Common emitter)

V_{CE}=3V, I_C=80mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.476	-152.5	23.097	116.2	0.016	68.9	0.452	-34.8
200	0.527	-167.4	12.902	98.8	0.025	72.7	0.341	-36.3
300	0.540	-174.6	8.790	90.8	0.034	76.2	0.305	-37.7
400	0.547	-179.4	6.612	85.1	0.045	78.8	0.288	-40.3
500	0.553	176.8	5.303	80.5	0.056	79.7	0.277	-43.6
600	0.557	173.5	4.423	76.6	0.068	79.6	0.270	-47.4
700	0.561	170.5	3.794	72.9	0.079	79.6	0.266	-51.2
800	0.564	167.7	3.328	69.7	0.092	79.3	0.264	-55.1
900	0.566	165.0	2.969	66.5	0.104	78.6	0.262	-59.0
1000	0.569	162.4	2.683	63.4	0.116	77.8	0.261	-62.7
1200	0.573	157.4	2.259	57.7	0.141	76.0	0.264	-70.5
1400	0.577	152.6	1.960	52.2	0.166	73.8	0.268	-78.1
1600	0.581	148.0	1.739	47.0	0.191	71.5	0.274	-85.7
1800	0.585	143.4	1.567	42.1	0.218	69.1	0.281	-93.1
2000	0.588	138.9	1.432	37.5	0.244	66.5	0.289	-100.4
2200	0.591	134.4	1.321	33.1	0.270	63.7	0.296	-107.6
2400	0.594	130.1	1.229	29.1	0.297	61.1	0.304	-114.4
2600	0.596	125.9	1.152	25.3	0.323	58.2	0.311	-120.7
2800	0.600	121.6	1.087	21.7	0.350	55.2	0.319	-127.6
3000	0.600	117.6	1.032	18.6	0.377	52.5	0.328	-133.5

V_{CE}=5V, I_C=10mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.766	-25.4	14.421	149.8	0.020	72.1	0.889	-22.0
200	0.640	-53.7	13.939	132.3	0.031	67.6	0.734	-35.1
300	0.512	-78.9	12.421	117.0	0.041	66.8	0.620	-42.4
400	0.418	-98.6	10.572	105.3	0.049	67.1	0.541	-47.2
500	0.366	-113.3	8.897	97.5	0.058	68.5	0.488	-50.9
600	0.335	-124.8	7.581	91.4	0.067	69.8	0.450	-54.1
700	0.318	-134.3	6.565	86.6	0.076	70.4	0.423	-57.0
800	0.302	-142.8	5.808	82.3	0.086	70.7	0.401	-59.6
900	0.294	-150.2	5.196	78.6	0.096	70.9	0.385	-62.1
1000	0.289	-156.4	4.700	75.2	0.106	70.9	0.373	-64.7
1200	0.284	-167.3	3.953	69.1	0.127	70.3	0.356	-69.6
1400	0.282	-176.6	3.421	63.5	0.148	69.3	0.347	-74.8
1600	0.285	175.3	3.022	58.3	0.169	68.0	0.342	-80.2
1800	0.288	168.1	2.715	53.4	0.191	66.5	0.340	-85.5
2000	0.292	161.5	2.470	48.7	0.213	64.8	0.341	-90.9
2200	0.298	155.4	2.270	44.2	0.236	62.8	0.343	-96.6
2400	0.304	149.6	2.104	39.9	0.258	60.8	0.345	-102.0
2600	0.310	144.4	1.966	35.8	0.281	58.8	0.350	-107.1
2800	0.318	139.3	1.849	31.7	0.305	56.5	0.355	-112.9
3000	0.322	134.7	1.747	28.0	0.329	54.5	0.361	-117.8

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S Parameters (Common emitter)

V_{CE}=5V, I_C=30mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.447	-51.2	31.013	137.1	0.015	72.3	0.749	-30.3
200	0.303	-94.5	22.794	113.5	0.024	74.5	0.556	-39.8
300	0.254	-118.0	16.483	101.5	0.033	76.9	0.464	-43.7
400	0.237	-133.0	12.654	94.1	0.044	78.3	0.412	-46.5
500	0.232	-144.2	10.199	88.7	0.055	79.6	0.378	-49.1
600	0.231	-152.7	8.520	84.4	0.066	79.4	0.356	-51.8
700	0.233	-159.7	7.304	80.7	0.077	79.3	0.338	-54.5
800	0.234	-165.7	6.390	77.5	0.088	78.6	0.325	-57.1
900	0.236	-171.0	5.681	74.6	0.100	77.8	0.315	-59.9
1000	0.239	-175.6	5.120	71.8	0.111	77.1	0.308	-62.5
1200	0.244	-176.1	4.285	66.7	0.134	74.8	0.298	-67.8
1400	0.249	-168.9	3.693	61.9	0.157	72.7	0.293	-73.4
1600	0.255	-162.5	3.255	57.2	0.180	70.2	0.292	-79.0
1800	0.260	-156.7	2.919	52.8	0.203	67.9	0.293	-84.6
2000	0.266	-151.2	2.651	48.5	0.226	65.5	0.295	-90.3
2200	0.274	-146.0	2.435	44.3	0.249	62.9	0.297	-96.1
2400	0.279	-141.0	2.254	40.3	0.272	60.4	0.300	-101.6
2600	0.285	-136.4	2.104	36.4	0.295	58.0	0.305	-106.8
2800	0.293	-132.0	1.979	32.6	0.318	55.4	0.310	-112.6
3000	0.297	-127.9	1.869	29.1	0.341	53.1	0.316	-117.4

V_{CE}=5V, I_C=50mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.286	-86.2	35.792	128.9	0.013	76.8	0.686	-31.3
200	0.249	-124.8	22.813	107.7	0.022	78.3	0.508	-37.7
300	0.242	-142.0	16.061	97.7	0.032	80.1	0.435	-40.2
400	0.242	-152.3	12.234	91.2	0.042	81.7	0.394	-42.4
500	0.247	-160.1	9.830	86.3	0.053	82.4	0.368	-45.0
600	0.252	-166.1	8.194	82.3	0.064	82.1	0.350	-47.8
700	0.258	-171.3	7.020	78.9	0.075	81.6	0.336	-50.6
800	0.262	-175.7	6.139	75.8	0.087	80.9	0.326	-53.4
900	0.266	-179.8	5.460	72.9	0.098	80.1	0.318	-56.1
1000	0.270	-176.6	4.918	70.2	0.110	78.9	0.313	-58.9
1200	0.276	-169.9	4.112	65.1	0.133	76.8	0.305	-64.5
1400	0.283	-163.8	3.545	60.3	0.156	74.3	0.303	-70.4
1600	0.290	-158.3	3.124	55.7	0.179	71.9	0.302	-76.3
1800	0.296	-153.1	2.801	51.2	0.203	69.5	0.304	-82.2
2000	0.303	-148.2	2.545	46.9	0.226	67.0	0.307	-88.1
2200	0.310	-143.4	2.336	42.7	0.249	64.4	0.310	-94.2
2400	0.316	-138.8	2.163	38.6	0.273	61.9	0.314	-99.9
2600	0.322	-134.6	2.019	34.8	0.296	59.4	0.319	-105.2
2800	0.330	-130.3	1.898	30.9	0.320	56.6	0.324	-111.2
3000	0.334	-126.4	1.792	27.4	0.344	54.3	0.331	-116.4

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S Parameters (Common emitter)

V_{CE}=5V, I_C=80mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.345	-137.6	29.631	121.2	0.013	65.7	0.593	-27.9
200	0.398	-159.0	16.989	102.4	0.020	76.7	0.468	-29.9
300	0.414	-168.4	11.622	93.6	0.029	79.1	0.426	-31.5
400	0.425	-174.1	8.756	87.6	0.039	82.5	0.403	-34.1
500	0.433	-178.6	7.015	83.0	0.049	83.3	0.388	-36.9
600	0.438	177.7	5.843	79.0	0.059	83.9	0.378	-40.2
700	0.443	174.4	5.008	75.5	0.070	83.5	0.370	-43.6
800	0.448	171.3	4.383	72.3	0.081	83.3	0.364	-46.8
900	0.452	168.5	3.903	69.3	0.092	82.6	0.360	-50.3
1000	0.455	165.7	3.519	66.4	0.104	81.8	0.357	-53.6
1200	0.460	160.5	2.952	60.9	0.127	80.1	0.354	-60.4
1400	0.466	155.5	2.552	55.7	0.151	78.1	0.355	-67.3
1600	0.472	150.8	2.254	50.7	0.175	75.9	0.357	-74.2
1800	0.477	146.2	2.025	45.9	0.200	73.5	0.361	-81.1
2000	0.482	141.7	1.845	41.3	0.226	71.0	0.366	-87.9
2200	0.488	137.2	1.695	36.9	0.251	68.4	0.370	-94.6
2400	0.493	132.9	1.572	32.8	0.278	65.7	0.375	-101.3
2600	0.498	128.8	1.469	28.9	0.304	63.0	0.380	-107.5
2800	0.504	124.6	1.382	25.0	0.331	60.1	0.386	-114.1
3000	0.506	120.6	1.307	21.6	0.359	57.4	0.392	-120.1

V_{CE}=8V, I_C=10mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.779	-24.4	14.321	150.5	0.018	70.1	0.899	-20.2
200	0.654	-51.5	13.927	133.2	0.029	68.6	0.755	-32.2
300	0.527	-75.6	12.487	118.0	0.038	67.5	0.647	-39.1
400	0.427	-94.7	10.692	106.3	0.047	68.6	0.571	-43.6
500	0.371	-109.3	9.024	98.3	0.055	69.6	0.518	-47.3
600	0.337	-120.7	7.706	92.1	0.063	70.6	0.482	-50.3
700	0.316	-130.2	6.683	87.2	0.072	71.5	0.454	-52.9
800	0.298	-139.0	5.917	82.8	0.082	72.0	0.433	-55.5
900	0.288	-146.5	5.295	79.0	0.091	72.2	0.416	-58.0
1000	0.282	-152.8	4.792	75.6	0.101	72.4	0.404	-60.4
1200	0.275	-164.1	4.032	69.5	0.121	72.0	0.387	-65.2
1400	0.273	-173.8	3.486	63.8	0.141	71.0	0.378	-70.3
1600	0.274	177.9	3.080	58.6	0.162	69.9	0.373	-75.5
1800	0.277	170.5	2.765	53.7	0.183	68.4	0.371	-80.8
2000	0.282	163.6	2.518	49.0	0.205	66.8	0.372	-86.2
2200	0.288	157.4	2.312	44.4	0.227	64.9	0.373	-91.8
2400	0.293	151.4	2.142	40.1	0.250	63.0	0.375	-97.2
2600	0.299	146.0	2.001	36.0	0.273	61.1	0.380	-102.4
2800	0.308	140.8	1.881	31.8	0.297	58.8	0.385	-108.1
3000	0.313	136.1	1.775	28.1	0.321	56.8	0.391	-113.1

CPH6021

S Parameters (Common emitter)

$V_{CE}=8V, I_C=30mA$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.474	-47.3	31.092	138.3	0.014	73.7	0.770	-27.4
200	0.315	-88.1	23.124	114.6	0.023	74.9	0.588	-36.2
300	0.256	-111.3	16.805	102.3	0.032	77.7	0.499	-39.7
400	0.232	-126.8	12.923	94.7	0.041	79.9	0.449	-42.3
500	0.224	-138.4	10.426	89.2	0.052	80.5	0.416	-44.8
600	0.221	-147.5	8.709	84.8	0.062	80.5	0.393	-47.4
700	0.221	-155.2	7.470	81.1	0.072	80.4	0.376	-50.0
800	0.222	-161.5	6.535	77.9	0.083	79.9	0.362	-52.5
900	0.223	-167.2	5.812	74.9	0.094	79.0	0.351	-55.1
1000	0.225	-172.0	5.238	72.1	0.106	78.3	0.344	-57.6
1200	0.229	179.1	4.379	67.0	0.128	76.4	0.334	-62.8
1400	0.234	171.6	3.774	62.1	0.150	74.2	0.329	-68.2
1600	0.240	164.8	3.324	57.4	0.173	72.0	0.327	-73.7
1800	0.246	158.8	2.980	53.0	0.195	69.7	0.327	-79.2
2000	0.252	153.1	2.706	48.7	0.218	67.4	0.329	-84.8
2200	0.259	147.7	2.484	44.4	0.240	64.9	0.330	-90.5
2400	0.266	142.5	2.299	40.4	0.263	62.5	0.333	-96.0
2600	0.272	137.9	2.145	36.6	0.285	60.2	0.338	-101.2
2800	0.280	133.4	2.017	32.7	0.309	57.5	0.343	-107.0
3000	0.284	129.2	1.903	29.1	0.332	55.3	0.349	-112.0

$V_{CE}=8V, I_C=50mA$

Freq(MHz)	S11	$\angle S11$	S21	$\angle S21$	S12	$\angle S12$	S22	$\angle S22$
100	0.306	-72.7	36.956	130.9	0.011	71.4	0.720	-28.3
200	0.240	-113.2	23.684	109.1	0.020	79.6	0.548	-34.3
300	0.225	-133.1	16.651	98.7	0.030	81.1	0.476	-36.5
400	0.223	-145.1	12.680	92.0	0.039	83.0	0.437	-38.8
500	0.226	-154.0	10.188	86.9	0.050	83.4	0.410	-41.3
600	0.230	-160.9	8.491	82.9	0.060	83.2	0.392	-44.0
700	0.235	-166.7	7.273	79.3	0.071	82.8	0.377	-46.7
800	0.239	-171.6	6.356	76.2	0.082	82.1	0.367	-49.3
900	0.243	-176.1	5.651	73.4	0.093	81.0	0.357	-52.1
1000	0.246	180.0	5.089	70.6	0.104	80.5	0.352	-54.7
1200	0.253	172.7	4.254	65.6	0.126	78.2	0.344	-60.2
1400	0.259	166.2	3.665	60.7	0.149	76.0	0.340	-65.8
1600	0.267	160.5	3.229	56.1	0.171	73.6	0.339	-71.6
1800	0.273	155.1	2.892	51.7	0.194	71.3	0.340	-77.2
2000	0.280	149.9	2.627	47.4	0.217	68.8	0.342	-83.0
2200	0.288	145.0	2.411	43.1	0.240	66.3	0.345	-89.0
2400	0.295	140.2	2.230	39.1	0.264	63.9	0.348	-94.6
2600	0.301	135.8	2.080	35.2	0.286	61.5	0.353	-100.0
2800	0.310	131.6	1.954	31.3	0.310	58.8	0.358	-106.0
3000	0.314	127.6	1.844	27.8	0.334	56.5	0.364	-111.1

CPH6021

S Parameters (Common emitter)

V_{CE}=8V, I_C=80mA

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.308	-126.7	31.174	123.7	0.011	65.2	0.658	-24.0
200	0.360	-153.8	18.003	104.2	0.019	78.8	0.537	-26.2
300	0.378	-164.8	12.329	95.1	0.027	81.1	0.495	-28.2
400	0.388	-171.5	9.301	89.0	0.035	83.9	0.472	-30.9
500	0.395	-176.6	7.456	84.3	0.045	85.8	0.456	-33.9
600	0.401	179.3	6.212	80.4	0.054	86.0	0.445	-37.1
700	0.407	175.7	5.328	76.9	0.065	86.1	0.436	-40.4
800	0.411	172.4	4.665	73.8	0.075	85.9	0.429	-43.7
900	0.414	169.4	4.154	70.8	0.086	85.4	0.423	-47.0
1000	0.417	166.4	3.748	68.0	0.097	84.7	0.419	-50.3
1200	0.423	160.9	3.144	62.7	0.120	83.0	0.415	-56.9
1400	0.428	155.7	2.718	57.6	0.143	81.1	0.413	-63.6
1600	0.434	150.9	2.403	52.7	0.167	78.9	0.413	-70.3
1800	0.438	146.2	2.158	48.1	0.192	76.5	0.414	-77.0
2000	0.443	141.7	1.966	43.6	0.217	74.0	0.417	-83.6
2200	0.449	137.2	1.808	39.2	0.243	71.3	0.419	-90.3
2400	0.454	132.8	1.676	35.1	0.269	68.7	0.422	-96.7
2600	0.459	128.7	1.567	31.2	0.296	65.8	0.426	-102.9
2800	0.465	124.5	1.474	27.3	0.323	62.9	0.430	-109.3
3000	0.467	120.6	1.394	23.9	0.350	60.1	0.435	-115.2

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