Ordering number : ENA1912

MCH4017

RF Transistor

12V, 100mA, f_T=10GHz, NPN Single MCPH4

ON Semiconductor®

http://onsemi.com

Features

- Low-noise use : NF=1.2dB typ (f=1GHz)
- High cut-off frequency : f_T=10GHz typ (V_{CE}=5V)
- High gain : $|S21e|^2$=17dB typ (f=1GHz)
- Halogen free compliance

Specifications

Absolute Maximum Ratings at Ta=25°C

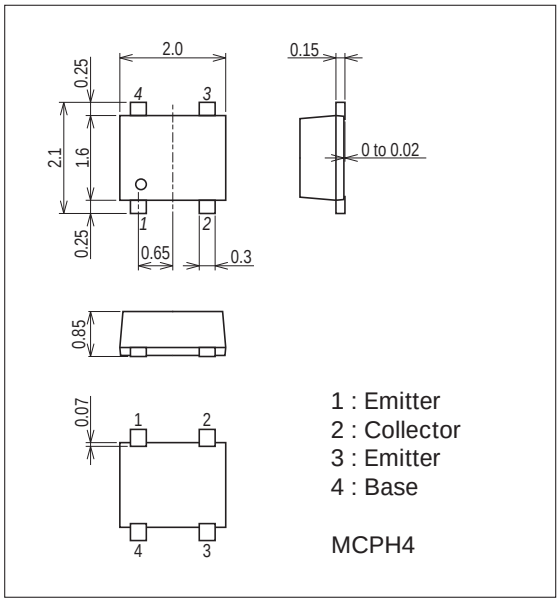
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to- Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		12	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		100	mA
Collector Dissipation	P_C		450	mW
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Package Dimensions

unit : mm (typ)

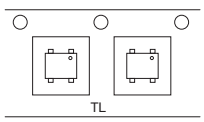
7020A-003



Product & Package Information

- Package : MCPH4
- JEITA, JEDEC : SC-82AB, SOT-343, SC-82
- Minimum Packing Quantity : 3,000 pcs./reel

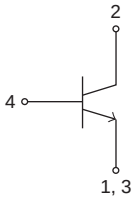
Packing Type: TL



Marking



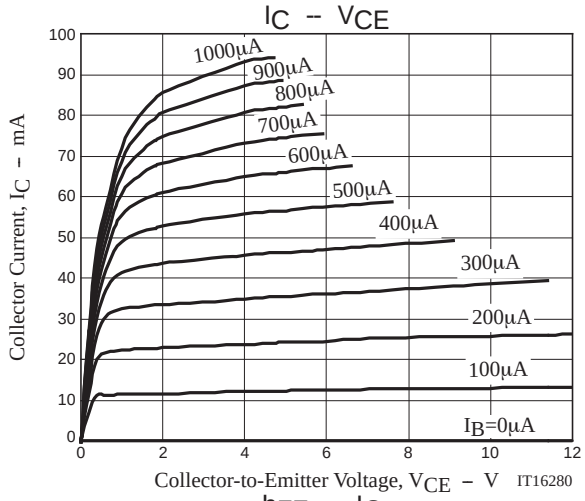
Electrical Connection

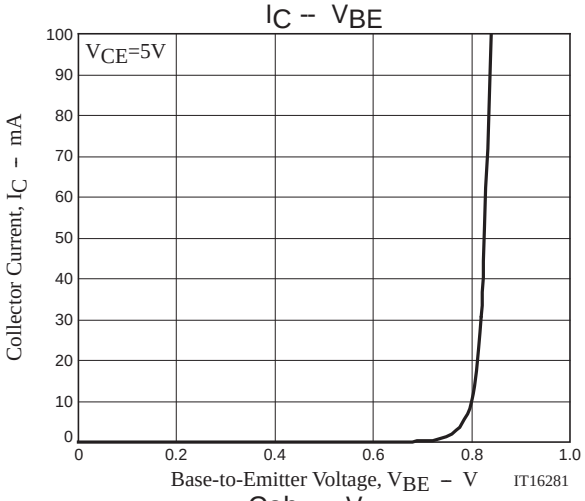


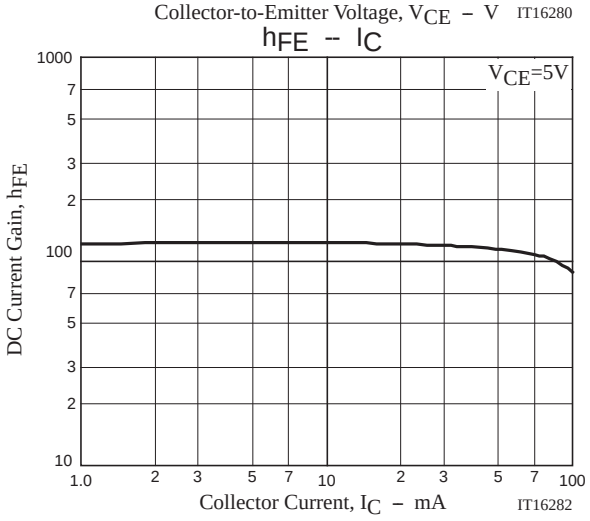
Electrical Characteristics at Ta=25°C

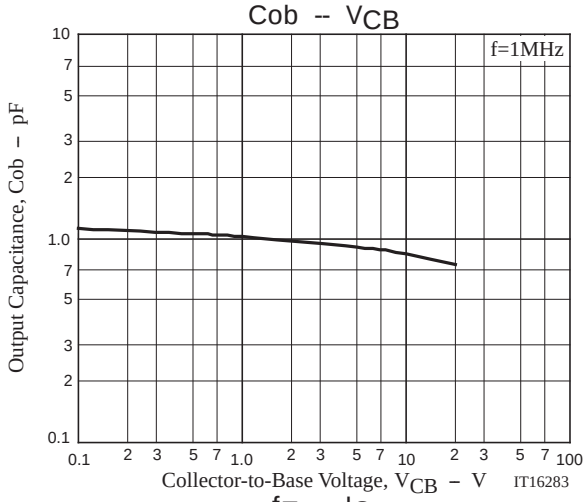
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=5V, I_E=0A			1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=1V, I_C=0A			1.0	μA
DC Current Gain	h_{FE}	V_{CE}=5V, I_C=50mA	60		150	
Gain-Bandwidth Product	f_T	V_{CE}=5V, I_C=30mA	8	10		GHz
Forward Transfer Gain	$\|S21e\|^2$	V_{CE}=5V, I_C=30mA, f=1GHz	14	17		dB
Noise Figure	NF	V_{CE}=5V, I_C=10mA, f=1GHz		1.2	1.8	dB

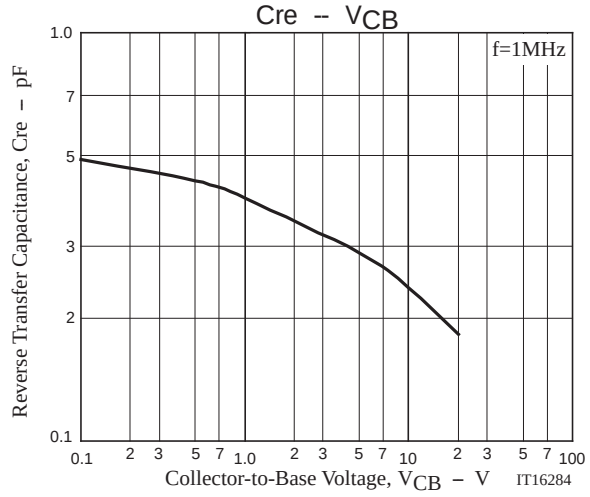
Pay attention to handling since it is liable to be affected by static electricity due to the high-frequency process adopted.

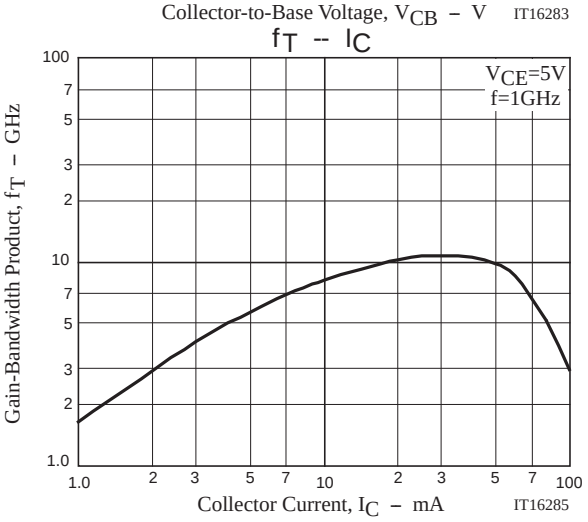


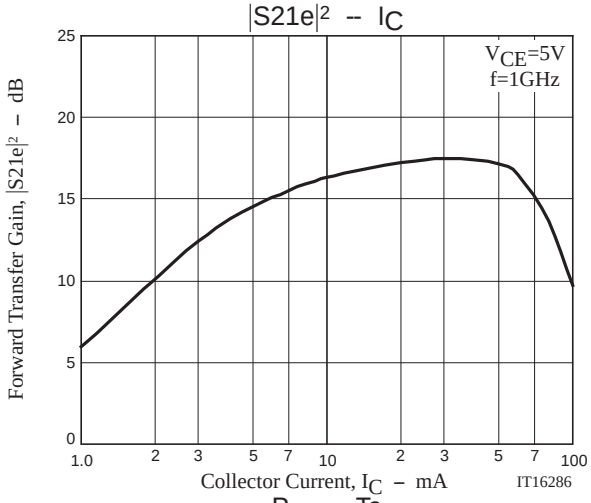


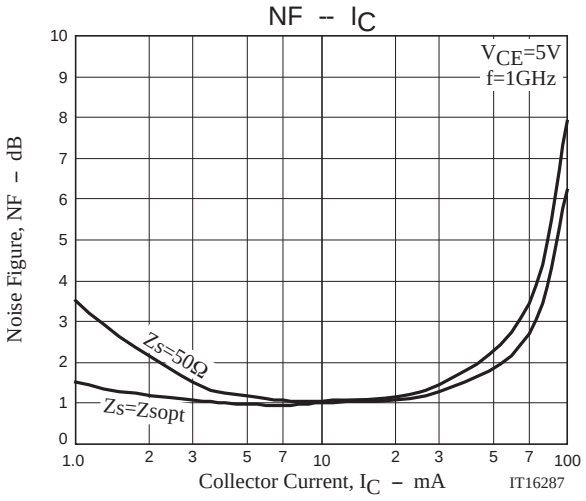


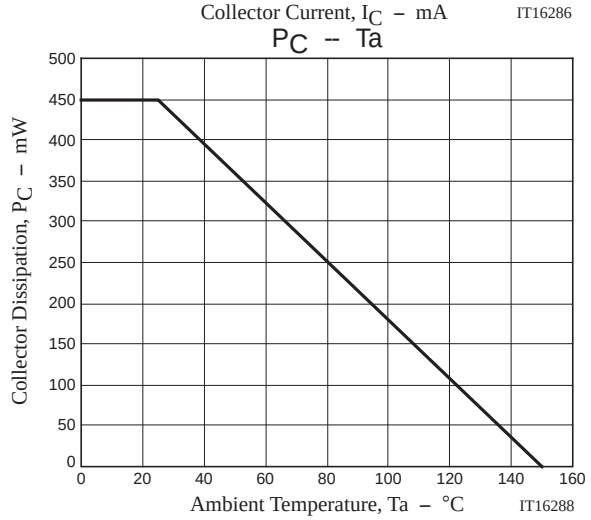












S Parameters (Common emitter)

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.763	-38.0	22.980	155.3	0.018	71.5	0.923	-22.7
200	0.733	-71.8	20.122	135.9	0.031	58.6	0.798	-40.2
300	0.702	-98.5	17.019	121.3	0.038	50.6	0.703	-53.5
400	0.690	-116.5	14.110	110.7	0.043	46.3	0.626	-62.9
500	0.701	-127.2	12.307	103.5	0.048	45.0	0.592	-67.4
600	0.679	-137.1	10.431	97.5	0.050	43.7	0.531	-72.0
700	0.663	-145.1	8.949	92.7	0.052	43.6	0.484	-75.2
800	0.651	-152.1	7.848	88.4	0.054	43.9	0.446	-78.7
900	0.646	-157.6	6.993	84.8	0.057	44.0	0.422	-81.6
1000	0.639	-162.3	6.272	81.9	0.059	45.1	0.404	-84.4
1200	0.635	-170.2	5.211	76.5	0.063	47.1	0.375	-88.7
1400	0.634	-176.5	4.462	71.7	0.068	49.1	0.362	-92.4
1600	0.633	177.9	3.907	67.3	0.073	51.2	0.352	-95.9
1800	0.636	173.2	3.463	63.4	0.079	52.7	0.351	-99.0
2000	0.637	169.1	3.122	59.5	0.085	54.3	0.352	-102.3
2200	0.637	164.9	2.838	55.8	0.091	55.5	0.356	-105.2
2400	0.638	161.0	2.604	52.1	0.098	56.5	0.364	-108.1
2600	0.639	157.3	2.413	48.7	0.105	57.2	0.372	-111.1
2800	0.642	153.7	2.244	45.1	0.112	57.9	0.384	-113.5
3000	0.641	150.0	2.095	41.8	0.120	57.8	0.396	-116.2

S Parameters (Common emitter)

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.542	-76.9	42.437	142.3	0.013	63.9	0.801	-36.2
200	0.588	-118.2	30.735	119.6	0.020	53.9	0.602	-56.8
300	0.614	-138.6	22.677	106.5	0.024	52.3	0.505	-69.3
400	0.626	-150.0	17.506	98.4	0.027	53.8	0.448	-77.9
500	0.635	-155.0	14.522	92.7	0.031	55.6	0.423	-79.8
600	0.630	-161.3	12.035	88.5	0.035	57.8	0.381	-83.6
700	0.627	-166.4	10.249	85.2	0.038	59.8	0.350	-86.9
800	0.626	-170.9	8.902	82.2	0.042	61.3	0.327	-90.4
900	0.627	-174.7	7.888	79.5	0.045	62.3	0.314	-93.2
1000	0.626	-177.8	7.046	77.3	0.049	63.4	0.303	-96.1
1200	0.629	176.7	5.835	73.1	0.057	65.4	0.287	-100.4
1400	0.631	171.9	4.976	69.2	0.065	66.2	0.282	-103.8
1600	0.633	167.7	4.344	65.6	0.073	66.5	0.280	-106.9
1800	0.637	163.9	3.854	62.0	0.082	66.8	0.281	-109.7
2000	0.638	160.5	3.474	58.7	0.090	66.6	0.287	-112.5
2200	0.638	156.8	3.160	55.5	0.099	66.5	0.293	-115.1
2400	0.640	153.5	2.900	52.2	0.108	65.8	0.302	-117.3
2600	0.640	150.2	2.684	49.0	0.117	65.2	0.312	-119.5
2800	0.642	146.9	2.499	45.9	0.125	64.3	0.324	-121.6
3000	0.640	143.6	2.337	42.8	0.134	63.6	0.337	-123.8

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.514	-110.3	43.067	133.3	0.011	59.0	0.700	-40.9
200	0.607	-141.4	29.221	112.3	0.016	53.1	0.495	-58.9
300	0.642	-154.9	20.818	101.0	0.019	55.3	0.417	-68.7
400	0.657	-162.5	15.865	94.1	0.023	58.5	0.376	-75.5
500	0.660	-165.8	13.033	88.9	0.027	61.4	0.360	-75.7
600	0.659	-170.3	10.812	85.3	0.030	64.0	0.330	-78.7
700	0.658	-174.3	9.213	82.3	0.034	66.1	0.307	-81.5
800	0.660	-177.8	7.995	79.5	0.038	67.8	0.291	-84.5
900	0.663	179.2	7.097	77.1	0.042	68.6	0.284	-87.1
1000	0.662	176.6	6.333	74.8	0.046	69.6	0.277	-89.7
1200	0.666	172.0	5.247	70.8	0.055	70.9	0.268	-93.7
1400	0.670	167.9	4.475	67.0	0.063	71.3	0.269	-97.1
1600	0.673	164.1	3.897	63.4	0.072	71.5	0.270	-100.2
1800	0.676	160.6	3.469	59.9	0.080	71.4	0.275	-103.3
2000	0.678	157.5	3.113	56.5	0.089	71.0	0.284	-106.5
2200	0.679	154.1	2.836	53.1	0.098	70.4	0.293	-109.3
2400	0.681	150.9	2.598	49.8	0.107	69.8	0.304	-111.9
2600	0.682	147.8	2.404	46.6	0.116	68.9	0.316	-114.4
2800	0.683	144.6	2.241	43.4	0.125	67.8	0.330	-117.0
3000	0.682	141.3	2.094	40.3	0.135	66.8	0.346	-119.6

S Parameters (Common emitter)

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.662	-146.8	29.622	120.5	0.011	47.5	0.455	-44.8
200	0.751	-164.0	16.762	102.8	0.014	46.9	0.315	-52.9
300	0.774	-171.2	11.369	94.2	0.017	52.5	0.288	-57.1
400	0.783	-175.6	8.549	88.9	0.019	58.6	0.279	-61.3
500	0.778	-178.0	6.977	84.2	0.023	62.0	0.283	-61.0
600	0.778	179.0	5.801	81.0	0.027	66.0	0.272	-62.9
700	0.778	176.3	4.965	78.3	0.030	68.6	0.265	-65.2
800	0.780	173.9	4.316	75.7	0.034	70.2	0.260	-68.0
900	0.782	171.6	3.846	73.3	0.038	71.9	0.263	-70.7
1000	0.782	169.6	3.439	71.0	0.042	73.0	0.263	-73.7
1200	0.787	166.0	2.860	66.6	0.051	74.5	0.268	-78.5
1400	0.789	162.5	2.454	62.4	0.059	75.3	0.278	-83.1
1600	0.792	159.2	2.139	58.4	0.068	75.7	0.288	-87.5
1800	0.796	156.0	1.912	54.5	0.077	75.7	0.300	-91.7
2000	0.797	153.1	1.721	50.8	0.086	75.4	0.314	-96.1
2200	0.797	149.9	1.569	47.1	0.095	75.0	0.328	-100.0
2400	0.799	146.8	1.436	43.4	0.105	74.1	0.343	-103.8
2600	0.800	143.8	1.331	39.9	0.115	73.4	0.359	-107.4
2800	0.801	140.6	1.238	36.5	0.125	72.2	0.377	-110.9
3000	0.799	137.4	1.157	33.3	0.135	71.1	0.394	-114.4

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.771	-35.8	23.180	156.3	0.016	72.7	0.933	-20.3
200	0.741	-68.2	20.484	137.3	0.028	60.4	0.820	-36.2
300	0.706	-94.4	17.503	122.8	0.035	53.0	0.722	-48.5
400	0.691	-112.7	14.633	111.9	0.040	48.5	0.656	-57.3
500	0.701	-123.8	12.817	104.7	0.044	47.2	0.622	-61.7
600	0.677	-133.9	10.891	98.4	0.047	46.0	0.560	-66.0
700	0.659	-142.2	9.349	93.5	0.049	45.5	0.513	-68.9
800	0.646	-149.5	8.209	89.1	0.051	45.7	0.474	-72.0
900	0.640	-155.2	7.315	85.3	0.053	46.1	0.449	-74.7
1000	0.633	-160.1	6.557	82.3	0.055	46.9	0.428	-77.4
1200	0.628	-168.2	5.459	76.8	0.060	49.0	0.399	-81.4
1400	0.625	-174.7	4.663	71.9	0.064	51.0	0.385	-84.9
1600	0.625	179.5	4.086	67.5	0.069	53.3	0.373	-88.4
1800	0.627	174.7	3.616	63.5	0.075	54.8	0.372	-91.5
2000	0.628	170.5	3.260	59.5	0.080	56.6	0.372	-94.9
2200	0.628	166.2	2.960	55.7	0.086	57.9	0.376	-98.0
2400	0.630	162.2	2.715	52.0	0.093	58.9	0.383	-101.1
2600	0.631	158.5	2.517	48.5	0.100	59.8	0.391	-104.3
2800	0.634	154.8	2.337	44.9	0.107	60.4	0.402	-107.0
3000	0.633	151.1	2.180	41.5	0.115	60.6	0.416	-109.9

S Parameters (Common emitter)

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.542	-70.6	43.013	144.3	0.012	66.3	0.826	-31.8
200	0.577	-112.5	32.303	121.4	0.018	56.3	0.636	-50.4
300	0.599	-134.2	24.068	107.8	0.022	55.0	0.539	-61.6
400	0.611	-146.5	18.636	99.4	0.025	55.5	0.478	-69.3
500	0.620	-151.9	15.457	93.6	0.029	57.7	0.454	-71.4
600	0.614	-158.6	12.813	89.2	0.033	59.6	0.410	-74.7
700	0.611	-164.1	10.898	85.6	0.036	61.5	0.376	-77.5
800	0.610	-168.7	9.470	82.5	0.039	62.9	0.351	-80.5
900	0.611	-172.7	8.381	79.8	0.043	64.1	0.337	-83.2
1000	0.610	-176.0	7.487	77.5	0.047	65.3	0.324	-85.8
1200	0.612	178.3	6.186	73.2	0.054	66.8	0.306	-89.7
1400	0.615	173.4	5.277	69.2	0.062	67.7	0.299	-93.1
1600	0.617	169.0	4.596	65.6	0.070	68.2	0.296	-96.3
1800	0.620	165.1	4.085	62.0	0.078	68.6	0.297	-99.3
2000	0.622	161.6	3.669	58.7	0.086	68.4	0.301	-102.5
2200	0.622	158.0	3.344	55.5	0.095	68.3	0.307	-105.1
2400	0.625	154.6	3.065	52.1	0.103	67.8	0.316	-107.9
2600	0.625	151.3	2.835	48.8	0.112	67.2	0.326	-110.5
2800	0.628	148.0	2.638	45.7	0.120	66.5	0.339	-113.0
3000	0.626	144.6	2.464	42.6	0.129	65.6	0.352	-115.5

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.479	-97.2	42.927	137.2	0.010	63.4	0.761	-35.0
200	0.566	-132.9	32.978	115.4	0.015	56.7	0.560	-51.6
300	0.603	-148.8	23.718	103.2	0.018	58.0	0.485	-60.6
400	0.620	-157.8	18.120	95.7	0.021	60.4	0.427	-66.9
500	0.625	-161.4	14.893	90.4	0.025	63.7	0.410	-68.0
600	0.624	-166.7	12.324	86.4	0.029	66.0	0.375	-70.7
700	0.624	-171.0	10.482	83.2	0.032	68.0	0.348	-73.2
800	0.626	-174.8	9.088	80.4	0.036	69.2	0.328	-75.9
900	0.628	-178.1	8.053	77.9	0.040	70.4	0.317	-78.4
1000	0.628	179.1	7.184	75.6	0.044	70.9	0.308	-80.9
1200	0.633	174.2	5.943	71.5	0.052	72.2	0.295	-84.6
1400	0.636	169.8	5.061	67.7	0.060	72.7	0.292	-88.2
1600	0.640	165.9	4.407	64.1	0.069	72.7	0.292	-91.5
1800	0.643	162.3	3.917	60.6	0.077	72.6	0.295	-94.7
2000	0.645	159.1	3.518	57.2	0.086	72.3	0.301	-98.1
2200	0.646	155.6	3.202	54.0	0.094	71.8	0.309	-101.1
2400	0.648	152.4	2.931	50.6	0.103	71.1	0.319	-104.0
2600	0.650	149.3	2.708	47.3	0.112	70.3	0.331	-106.8
2800	0.652	146.0	2.520	44.2	0.121	69.3	0.344	-109.6
3000	0.650	142.7	2.353	41.1	0.130	68.2	0.358	-112.5

S Parameters (Common emitter)

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.558	-133.0	39.014	127.8	0.009	54.5	0.618	-33.7
200	0.671	-155.6	23.364	107.6	0.012	52.6	0.457	-41.5
300	0.704	-165.1	16.107	97.6	0.014	57.5	0.415	-45.4
400	0.718	-170.7	12.150	91.5	0.017	62.9	0.395	-49.0
500	0.716	-173.4	9.907	86.7	0.021	66.8	0.385	-50.4
600	0.717	-177.0	8.214	83.3	0.024	69.5	0.378	-52.4
700	0.718	179.9	7.015	80.4	0.028	72.5	0.364	-54.4
800	0.720	177.1	6.091	77.8	0.031	73.9	0.354	-57.0
900	0.723	174.5	5.413	75.3	0.035	75.7	0.351	-59.7
1000	0.723	172.3	4.829	72.9	0.039	76.8	0.346	-62.4
1200	0.728	168.3	4.009	68.8	0.047	78.1	0.343	-67.0
1400	0.731	164.7	3.423	64.7	0.055	78.9	0.347	-71.8
1600	0.735	161.2	2.987	60.8	0.063	78.9	0.352	-76.2
1800	0.738	157.9	2.662	57.1	0.072	79.1	0.359	-80.6
2000	0.740	155.0	2.393	53.5	0.081	78.7	0.369	-85.3
2200	0.741	151.7	2.179	50.0	0.090	78.2	0.379	-89.5
2400	0.743	148.6	1.993	46.4	0.099	77.4	0.391	-93.5
2600	0.744	145.6	1.843	43.0	0.109	76.5	0.404	-97.4
2800	0.746	142.4	1.716	39.6	0.119	75.4	0.418	-101.3
3000	0.744	139.2	1.601	36.3	0.129	74.2	0.433	-105.1

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.784	-33.9	22.973	157.1	0.014	73.5	0.941	-18.1
200	0.754	-64.8	20.491	138.6	0.025	62.4	0.839	-32.6
300	0.715	-90.5	17.690	124.1	0.032	55.0	0.739	-44.1
400	0.697	-109.0	14.905	113.1	0.037	50.3	0.685	-52.2
500	0.704	-120.4	13.108	105.8	0.041	49.3	0.652	-56.5
600	0.678	-130.9	11.176	99.3	0.044	47.7	0.591	-60.6
700	0.659	-139.5	9.599	94.2	0.046	47.3	0.544	-63.3
800	0.645	-146.9	8.439	89.7	0.048	47.3	0.504	-66.1
900	0.638	-152.9	7.523	85.8	0.050	47.5	0.478	-68.7
1000	0.629	-158.0	6.746	82.7	0.052	48.6	0.457	-71.2
1200	0.623	-166.3	5.618	77.1	0.056	50.5	0.427	-75.0
1400	0.621	-173.1	4.797	72.1	0.060	52.6	0.411	-78.5
1600	0.620	-179.0	4.199	67.5	0.065	55.0	0.399	-81.8
1800	0.622	176.1	3.717	63.4	0.071	56.9	0.398	-85.2
2000	0.623	171.8	3.348	59.4	0.076	58.6	0.397	-88.5
2200	0.623	167.4	3.039	55.5	0.082	60.1	0.401	-91.7
2400	0.625	163.5	2.786	51.8	0.089	61.4	0.407	-95.0
2600	0.626	159.6	2.581	48.2	0.096	62.2	0.415	-98.3
2800	0.629	155.9	2.395	44.6	0.103	62.8	0.426	-101.3
3000	0.629	152.2	2.233	41.1	0.111	63.0	0.439	-104.4

S Parameters (Common emitter)

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.556	-65.2	43.179	145.8	0.011	67.8	0.846	-28.0
200	0.578	-106.8	32.894	123.0	0.017	57.9	0.669	-44.6
300	0.594	-129.7	24.775	109.1	0.021	56.2	0.584	-54.7
400	0.604	-142.8	19.256	100.3	0.024	57.0	0.512	-61.6
500	0.614	-148.7	15.997	94.4	0.028	59.0	0.488	-63.9
600	0.606	-155.8	13.266	89.8	0.031	60.8	0.443	-66.9
700	0.603	-161.6	11.285	86.1	0.034	62.5	0.409	-69.3
800	0.602	-166.5	9.802	82.9	0.037	64.2	0.382	-72.0
900	0.602	-170.7	8.672	80.0	0.041	65.4	0.366	-74.3
1000	0.600	-174.1	7.739	77.6	0.044	66.3	0.352	-76.7
1200	0.603	179.9	6.401	73.3	0.051	68.1	0.333	-80.3
1400	0.605	174.9	5.453	69.2	0.059	69.2	0.325	-83.7
1600	0.607	170.4	4.753	65.4	0.066	69.8	0.321	-87.0
1800	0.611	166.4	4.215	61.8	0.074	70.0	0.321	-90.2
2000	0.613	162.9	3.791	58.4	0.082	69.9	0.325	-93.4
2200	0.614	159.2	3.445	55.1	0.090	70.1	0.330	-96.5
2400	0.616	155.8	3.155	51.7	0.099	69.6	0.339	-99.4
2600	0.617	152.4	2.916	48.4	0.107	69.1	0.349	-102.4
2800	0.619	149.1	2.711	45.2	0.115	68.5	0.361	-105.3
3000	0.619	145.7	2.531	42.0	0.124	67.5	0.375	-108.2

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

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.477	-88.8	42.926	139.6	0.009	65.5	0.793	-30.4
200	0.554	-127.0	34.154	117.2	0.014	59.2	0.603	-45.1
300	0.589	-144.5	24.758	104.4	0.017	59.1	0.529	-53.1
400	0.606	-154.4	18.954	96.6	0.020	61.9	0.478	-58.7
500	0.613	-158.4	15.585	91.2	0.024	64.8	0.453	-60.2
600	0.611	-164.1	12.888	87.0	0.027	67.3	0.416	-62.6
700	0.611	-168.8	10.954	83.7	0.031	69.1	0.388	-64.8
800	0.613	-172.8	9.503	80.7	0.034	70.4	0.366	-67.2
900	0.616	-176.3	8.407	78.1	0.038	71.5	0.355	-69.5
1000	0.615	-179.2	7.494	75.7	0.042	72.3	0.343	-71.9
1200	0.619	175.7	6.192	71.6	0.049	73.7	0.329	-75.5
1400	0.623	171.2	5.272	67.7	0.057	74.1	0.324	-79.0
1600	0.626	167.2	4.586	64.0	0.065	74.5	0.323	-82.4
1800	0.631	163.5	4.071	60.4	0.073	74.4	0.325	-85.8
2000	0.633	160.2	3.658	57.0	0.081	74.0	0.331	-89.4
2200	0.634	156.7	3.322	53.7	0.090	73.7	0.337	-92.7
2400	0.637	153.5	3.041	50.3	0.099	73.0	0.347	-95.9
2600	0.638	150.3	2.809	47.0	0.107	72.2	0.358	-99.1
2800	0.641	147.0	2.611	43.8	0.116	71.3	0.371	-102.3
3000	0.640	143.7	2.435	40.7	0.125	70.4	0.386	-105.5

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