

NPN Planer RF TRANSISTOR

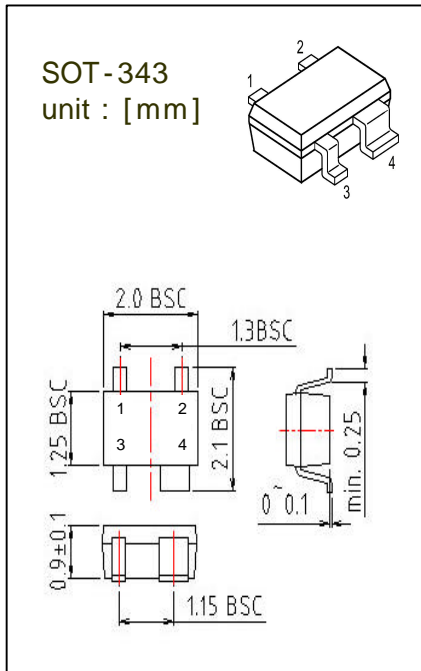
DESCRIPTION

The TARF1303Z is a low Noise figure and good associated gain performance at Microwave frequencies

It is suitable for a high density surface mount since transistor has been SOT343 package

FEATURES

- o Low Noise Figure
N.F = 1.1dB TYP. @ f=1.8GHz, V_{CE}=2V, I_c=10mA
- o High Gain
MSG = 17.5dB TYP. @ f=1.8GHz, V_{CE}=2V, I_c=40mA
- o High Transition Frequency
f_T = 22GHz TYP. @ f=1GHz, V_{CE}=3V, I_c=60mA
f_T = 17GHz TYP. @ f=1.8GHz, V_{CE}=3V, I_c=60mA



PIN CONFIGURATION

PIN NO	SYMBOL	DESCRIPTION
1	E	Emitter
2	C	Collector
3	B	Base
4	E	Emitter

MARKING : BC1

MAXIMUM RATINGS

SYMBOL	PARAMETER	CONDITION	VALUE	Unit
V _{CBO}	Collector-Base Voltage	Open Emitter	12	V
V _{CEO}	Collector-Emitter Voltage	Open Base	5	V
V _{EBO}	Emitter-Base Voltage	Open Collector	2.5	V
I _c	Collector Current (DC)		80	mA
P _T	Total Power Dissipation	T _s 90	400	mW
T _{STG}	Storage Temperature		-65 ~ 150	
T _J	Operating Junction Temperature		150	

Electrical Characteristics ($T_A = 25$)

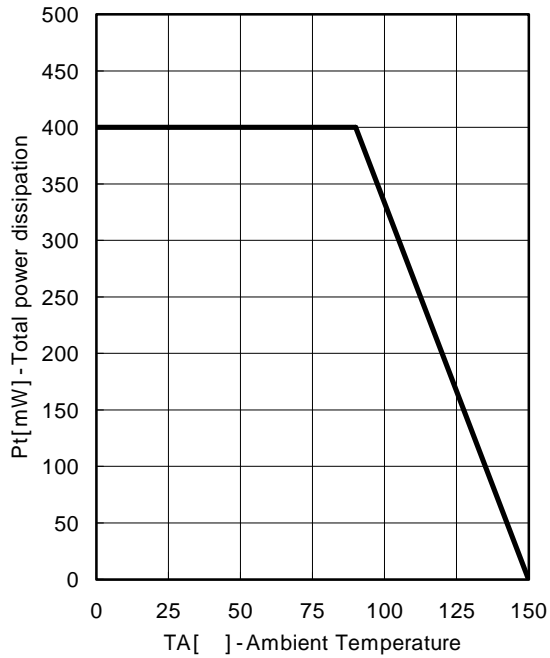
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
V _{CBO}	Collector-Base Voltage	I _{CE} = 100uA, I _E = 0	7	12		V
V _{CEO}	Collector-Emitter Voltage	I _{CE} = 100uA, I _B = 0	4.5	5		V
I _{CBO}	Collector-Cut-off current	V _{CB} = 7V, I _E = 0			300	n A
I _{EBO}	Emitter-Cut-off current	V _{EB} = 1V, I _C = 0			100	n A
h _{fe}	D.C current Gain	V _{CE} = 2V, I _C = 30mA	200	300		
f _T	Transition Frequency	V _{CE} = 3V, I _C = 60mA		22		GHz
C _{CB}	Collector-Base Capacitance	V _{CB} = 2V, f = 1MHz		0.36		pF

Performance Characteristics

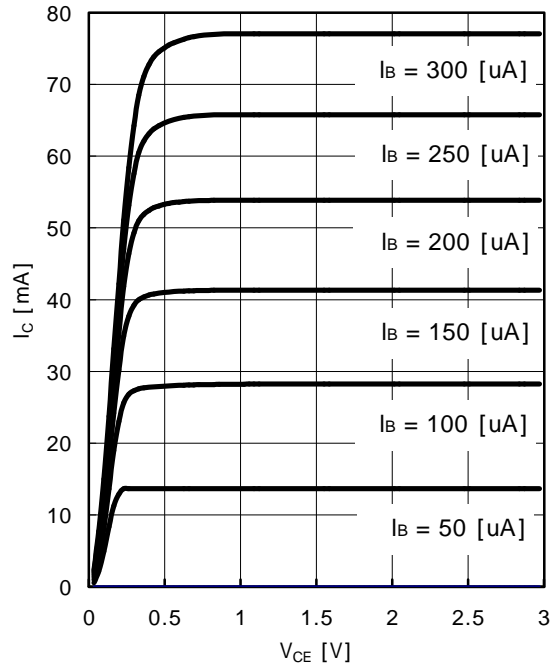
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
[S ₂₁] ²	Insertion Power Gain	V _{CE} = 2V @ f = 1.8 GHz I _C =10mA, (Z _s = Z _L = 50)		12.5		dB
		I _C =40mA, (Z _s = Z _L = 50)		13.5		
MSG	Maximum Stable Gain	I _C =10mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		17		dB
		I _C =40mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		17.5		
NF _{min}	Minimum Noise Figure	I _C =10mA, (Z _s = Z _{sopt})		1.1		dB
r _n	Noise Resistance	I _C =10mA, (Z _s = Z _{sopt})		0.08		
G _A	Associated Gain	I _C =10mA, (Z _s = Z _{sopt})		14.5		dB
		I _C =40mA, (Z _s = Z _{sopt})		16		
P _{-1dB}	1dB Compression point	I _C =40mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		19		dBm
OIP ₃	Third order intercept point	I _C =40mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		29		dBm

Total power dissipation $P_t = f(T_A)$

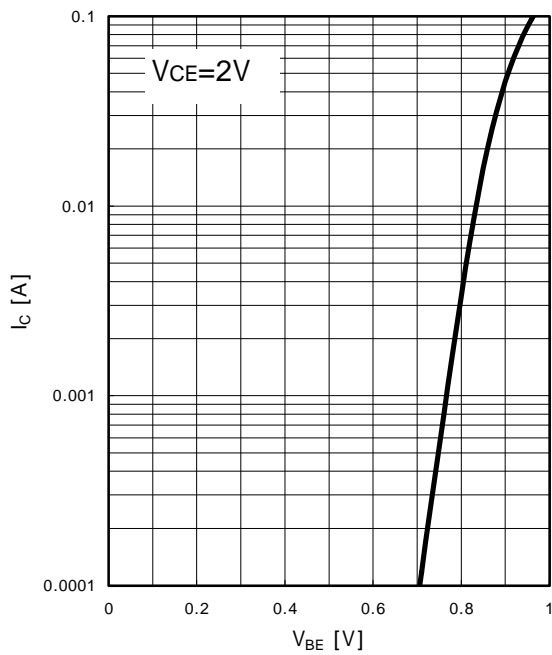
($T_A = 25$)



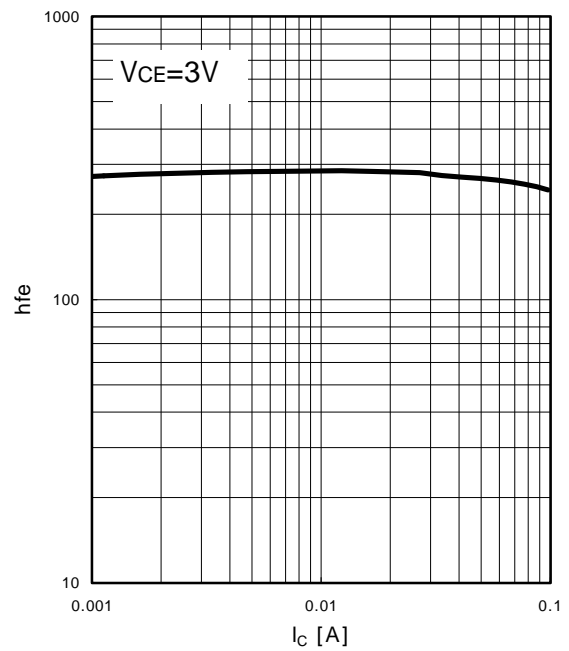
ICE vs. VCE



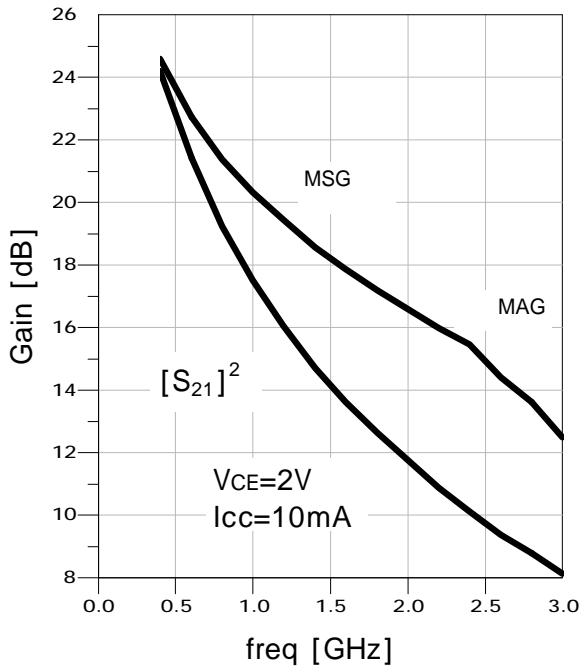
Icc vs. VBE



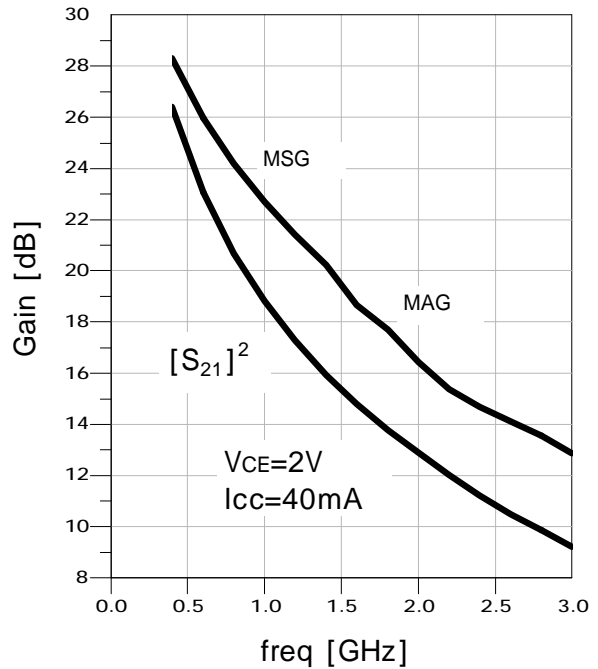
hfe vs. Icc



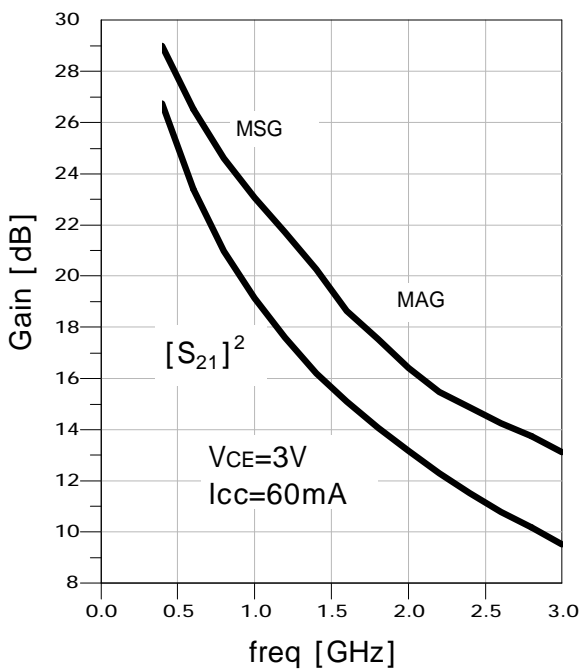
Power Gain : MSG, MAG, $[S_{21}]^2 = f(\text{freq})$



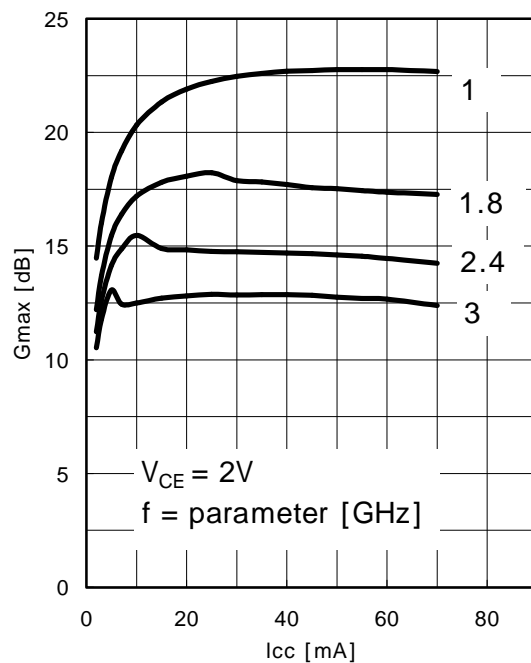
Power Gain : MSG, MAG, $[S_{21}]^2 = f(\text{freq})$



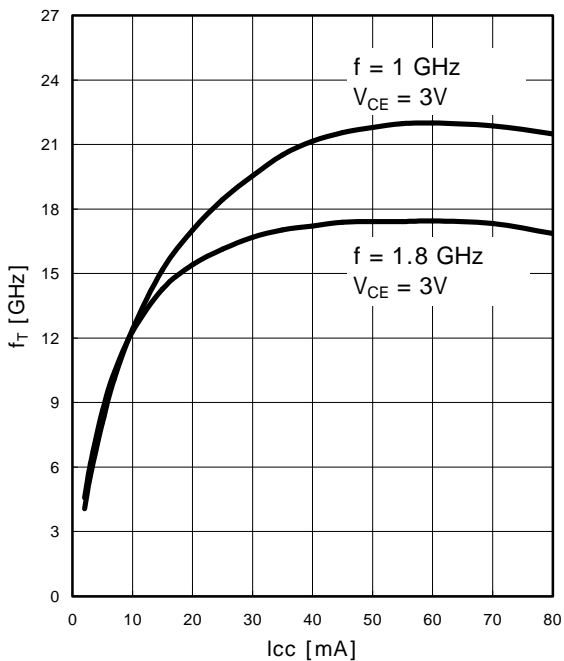
Power Gain : MSG, MAG, $[S_{21}]^2 = f(\text{freq})$



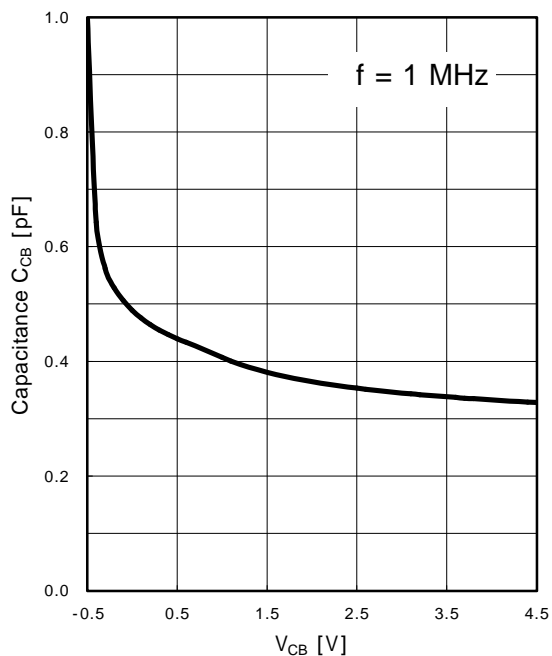
Power Gain : MAG, MSG = f(I_{CE})



Transition Frequency : f_T vs. I_{CC}

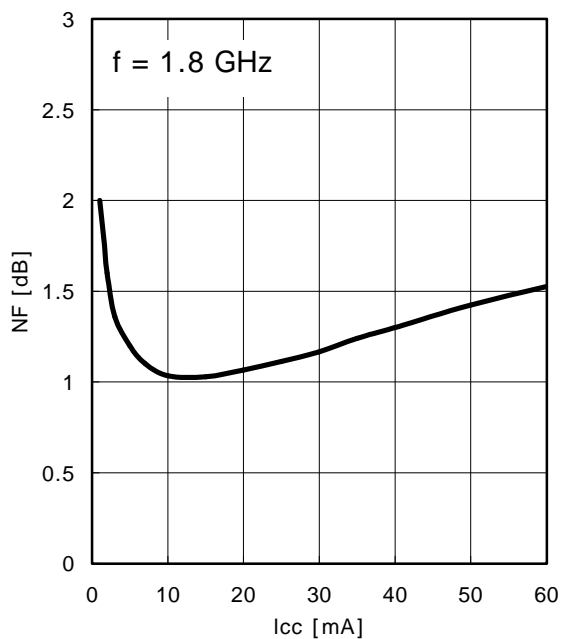


C_{CB} vs. V_{CB}



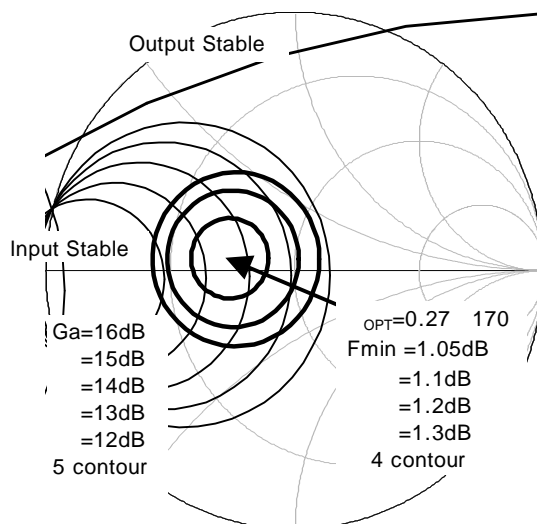
F_{min} vs. I_{CC}

$V_{CE} = 2V$, $I_{CC} = \text{parameter}$, $Z_s = Z_{opt}$



Noise Figure Contours & Constant Gain

$f = 1.8 \text{ GHz}$, $V_{CE} = 2V$, $I_{CC} = 10\text{mA}$



Common Emitter S-Parameter Data

VCE = 2V, ICC = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.779 / -90.743	11.676 / 124.427	0.074 / 43.701	0.705 / -55.874
600.0MHz	0.734 / -116.203	9.066 / 109.894	0.087 / 32.535	0.556 / -71.595
800.0MHz	0.706 / -134.931	7.284 / 99.015	0.092 / 25.383	0.456 / -83.647
1.000GHz	0.700 / -148.667	6.088 / 90.021	0.096 / 20.644	0.387 / -93.333
1.200GHz	0.704 / -157.050	5.201 / 83.610	0.098 / 17.556	0.325 / -102.019
1.400GHz	0.694 / -165.609	4.498 / 78.046	0.100 / 15.421	0.292 / -110.059
1.600GHz	0.701 / -173.504	3.990 / 71.930	0.101 / 13.279	0.267 / -118.637
1.800GHz	0.704 / 179.742	3.583 / 67.079	0.102 / 12.069	0.251 / -126.413
2.000GHz	0.701 / 173.875	3.248 / 61.514	0.103 / 10.594	0.243 / -134.214
2.200GHz	0.697 / 168.472	2.942 / 56.891	0.104 / 9.699	0.239 / -141.263
2.400GHz	0.706 / 162.181	2.705 / 52.214	0.104 / 8.743	0.238 / -147.394
2.600GHz	0.715 / 157.453	2.484 / 47.696	0.105 / 7.975	0.240 / -152.833
2.800GHz	0.717 / 152.191	2.330 / 42.943	0.107 / 6.892	0.246 / -158.525
3.000GHz	0.723 / 146.403	2.167 / 38.479	0.107 / 6.100	0.255 / -163.680

VCE = 2V, ICC = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.753 / -102.362	13.928 / 119.004	0.066 / 40.510	0.637 / -66.741
600.0MHz	0.710 / -127.224	10.452 / 105.230	0.075 / 30.761	0.490 / -84.433
800.0MHz	0.687 / -144.635	8.242 / 95.330	0.079 / 25.356	0.401 / -97.938
1.000GHz	0.690 / -157.700	6.822 / 87.013	0.082 / 22.261	0.342 / -109.202
1.200GHz	0.697 / -164.877	5.790 / 81.242	0.084 / 20.244	0.289 / -120.102
1.400GHz	0.695 / -171.859	4.984 / 76.089	0.087 / 19.244	0.265 / -129.356
1.600GHz	0.697 / -179.483	4.409 / 70.360	0.088 / 18.113	0.249 / -138.768
1.800GHz	0.701 / 174.621	3.943 / 65.861	0.090 / 17.550	0.240 / -147.226
2.000GHz	0.698 / 169.145	3.565 / 60.582	0.092 / 16.626	0.238 / -154.907
2.200GHz	0.694 / 164.252	3.229 / 56.186	0.094 / 16.183	0.239 / -161.586
2.400GHz	0.708 / 158.838	2.963 / 51.837	0.096 / 15.592	0.242 / -167.113
2.600GHz	0.709 / 153.733	2.718 / 47.621	0.099 / 14.997	0.246 / -171.790
2.800GHz	0.722 / 149.232	2.548 / 43.130	0.101 / 14.123	0.255 / -176.679
3.000GHz	0.721 / 144.013	2.361 / 38.913	0.103 / 13.343	0.266 / 179.284

VCE = 2V, ICC = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.707 / -116.105	16.245 / 113.150	0.057 / 37.390	0.565 / -80.275
600.0MHz	0.686 / -139.652	11.777 / 100.583	0.063 / 30.577	0.435 / -99.958
800.0MHz	0.673 / -154.619	9.157 / 91.638	0.067 / 27.174	0.363 / -115.037
1.000GHz	0.683 / -166.408	7.515 / 84.111	0.070 / 25.554	0.319 / -127.399
1.200GHz	0.683 / -171.627	6.343 / 78.914	0.072 / 24.899	0.279 / -140.103
1.400GHz	0.684 / -178.258	5.433 / 74.228	0.076 / 24.997	0.265 / -149.683
1.600GHz	0.691 / 175.606	4.795 / 68.882	0.078 / 24.459	0.259 / -158.772
1.800GHz	0.697 / 169.857	4.280 / 64.693	0.082 / 24.444	0.257 / -166.736
2.000GHz	0.694 / 164.945	3.872 / 59.747	0.085 / 23.767	0.260 / -173.591
2.200GHz	0.693 / 160.425	3.497 / 55.697	0.088 / 23.620	0.264 / -179.182
2.400GHz	0.706 / 155.009	3.207 / 51.579	0.091 / 22.962	0.269 / 176.105
2.600GHz	0.715 / 150.673	2.942 / 47.586	0.095 / 22.371	0.274 / 172.325
2.800GHz	0.722 / 146.117	2.751 / 43.240	0.098 / 21.421	0.285 / 168.232
3.000GHz	0.721 / 140.923	2.553 / 39.226	0.101 / 20.475	0.297 / 165.118

VCE = 2V, ICC = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.682 / -130.293	18.330 / 107.522	0.047 / 36.246	0.502 / -95.708
600.0MHz	0.673 / -150.750	12.918 / 96.295	0.052 / 31.988	0.399 / -116.769
800.0MHz	0.662 / -163.801	9.923 / 88.410	0.056 / 30.927	0.348 / -132.432
1.000GHz	0.679 / -173.348	8.092 / 81.589	0.059 / 30.852	0.320 / -144.684
1.200GHz	0.687 / -178.543	6.814 / 76.912	0.063 / 31.206	0.293 / -157.675
1.400GHz	0.682 / 176.156	5.818 / 72.652	0.067 / 31.755	0.288 / -166.218
1.600GHz	0.688 / 170.605	5.132 / 67.660	0.071 / 31.817	0.288 / -174.172
1.800GHz	0.700 / 166.019	4.574 / 63.732	0.076 / 31.688	0.290 / 178.982
2.000GHz	0.700 / 161.298	4.132 / 59.026	0.080 / 31.165	0.296 / 173.183
2.200GHz	0.694 / 157.143	3.730 / 55.171	0.084 / 30.778	0.303 / 168.479
2.400GHz	0.706 / 152.296	3.413 / 51.297	0.089 / 29.902	0.309 / 164.554
2.600GHz	0.717 / 147.751	3.129 / 47.552	0.093 / 29.178	0.313 / 161.305
2.800GHz	0.724 / 143.664	2.926 / 43.325	0.097 / 27.721	0.325 / 157.942
3.000GHz	0.724 / 139.002	2.717 / 39.502	0.101 / 26.461	0.336 / 155.352

V_{CE} = 2V, I_{CC} = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.656 / -138.542	19.494 / 104.020	0.041 / 36.722	0.469 / -106.561
600.0MHz	0.673 / -157.248	13.532 / 93.788	0.046 / 34.264	0.386 / -127.788
800.0MHz	0.662 / -169.163	10.337 / 86.531	0.050 / 34.598	0.350 / -142.956
1.000GHz	0.672 / -177.784	8.401 / 80.127	0.054 / 35.169	0.330 / -154.432
1.200GHz	0.676 / 178.082	7.061 / 75.664	0.059 / 36.031	0.311 / -166.903
1.400GHz	0.679 / 173.136	6.021 / 71.674	0.063 / 36.806	0.310 / -174.514
1.600GHz	0.685 / 168.444	5.308 / 66.819	0.068 / 36.721	0.312 / 178.353
1.800GHz	0.695 / 163.861	4.728 / 63.119	0.074 / 36.483	0.316 / 172.216
2.000GHz	0.696 / 159.174	4.269 / 58.592	0.078 / 35.624	0.323 / 166.964
2.200GHz	0.697 / 155.489	3.855 / 54.861	0.083 / 35.044	0.330 / 162.747
2.400GHz	0.707 / 150.771	3.528 / 51.031	0.088 / 33.968	0.336 / 159.163
2.600GHz	0.715 / 146.435	3.235 / 47.476	0.093 / 32.939	0.341 / 156.252
2.800GHz	0.724 / 142.267	3.025 / 43.411	0.098 / 31.309	0.352 / 153.075
3.000GHz	0.724 / 137.465	2.810 / 39.685	0.102 / 29.850	0.363 / 150.744

V_{CE} = 2V, I_{CC} = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.655 / -145.824	20.164 / 101.643	0.037 / 36.647	0.450 / -114.511
600.0MHz	0.664 / -161.631	13.882 / 92.131	0.042 / 36.647	0.383 / -135.328
800.0MHz	0.662 / -172.212	10.580 / 85.307	0.046 / 37.683	0.355 / -149.762
1.000GHz	0.678 / 179.239	8.584 / 79.107	0.051 / 38.706	0.340 / -160.548
1.200GHz	0.681 / 175.602	7.204 / 74.936	0.056 / 39.642	0.325 / -172.426
1.400GHz	0.679 / 170.855	6.149 / 71.077	0.062 / 40.313	0.326 / -179.421
1.600GHz	0.689 / 166.323	5.408 / 66.382	0.067 / 39.962	0.329 / 174.012
1.800GHz	0.702 / 162.162	4.811 / 62.761	0.072 / 39.687	0.334 / 168.277
2.000GHz	0.695 / 157.618	4.346 / 58.327	0.078 / 38.682	0.341 / 163.374
2.200GHz	0.692 / 154.141	3.927 / 54.724	0.083 / 37.847	0.349 / 159.465
2.400GHz	0.707 / 149.555	3.589 / 50.983	0.088 / 36.675	0.355 / 156.117
2.600GHz	0.714 / 145.356	3.297 / 47.377	0.093 / 35.390	0.359 / 153.300
2.800GHz	0.727 / 141.397	3.072 / 43.335	0.098 / 33.549	0.371 / 150.320
3.000GHz	0.732 / 136.829	2.854 / 39.751	0.102 / 31.994	0.382 / 148.133

V_{CE} = 2V, I_{CC} = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.655 / -150.010	20.557 / 99.996	0.034 / 38.441	0.439 / -120.439
600.0MHz	0.673 / -165.653	14.073 / 90.970	0.039 / 38.772	0.382 / -140.590
800.0MHz	0.658 / -175.163	10.708 / 84.434	0.044 / 40.143	0.360 / -154.386
1.000GHz	0.676 / 177.487	8.683 / 78.458	0.049 / 41.454	0.348 / -164.557
1.200GHz	0.682 / 174.147	7.278 / 74.392	0.055 / 42.384	0.336 / -176.010
1.400GHz	0.680 / 170.103	6.211 / 70.611	0.060 / 42.737	0.337 / 177.489
1.600GHz	0.690 / 164.903	5.465 / 66.040	0.066 / 42.535	0.341 / 171.241
1.800GHz	0.695 / 161.010	4.861 / 62.489	0.072 / 41.991	0.347 / 165.840
2.000GHz	0.697 / 157.082	4.388 / 58.072	0.077 / 40.768	0.355 / 161.153
2.200GHz	0.697 / 153.273	3.961 / 54.511	0.083 / 39.822	0.362 / 157.418
2.400GHz	0.709 / 148.765	3.621 / 50.820	0.088 / 38.449	0.368 / 154.198
2.600GHz	0.717 / 145.132	3.317 / 47.258	0.093 / 37.036	0.372 / 151.509
2.800GHz	0.726 / 140.938	3.101 / 43.229	0.099 / 35.087	0.384 / 148.585
3.000GHz	0.727 / 136.294	2.874 / 39.887	0.103 / 33.409	0.395 / 146.507

V_{CE} = 2V, I_{CC} = 40mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.654 / -155.132	20.924 / 97.752	0.031 / 39.920	0.426 / -128.591
600.0MHz	0.669 / -169.997	14.225 / 89.445	0.036 / 41.914	0.382 / -147.626
800.0MHz	0.665 / -178.206	10.792 / 83.283	0.041 / 43.862	0.367 / -160.281
1.000GHz	0.681 / 174.398	8.747 / 77.514	0.047 / 45.394	0.359 / -169.543
1.200GHz	0.692 / 172.021	7.319 / 73.635	0.053 / 46.111	0.350 / 179.645
1.400GHz	0.686 / 167.698	6.245 / 70.036	0.059 / 46.345	0.353 / 173.698
1.600GHz	0.688 / 163.438	5.495 / 65.522	0.065 / 45.685	0.358 / 167.894
1.800GHz	0.704 / 160.002	4.882 / 62.024	0.071 / 44.975	0.364 / 162.900
2.000GHz	0.702 / 154.992	4.408 / 57.759	0.077 / 43.598	0.372 / 158.463
2.200GHz	0.699 / 151.957	3.985 / 54.183	0.083 / 42.352	0.379 / 154.938
2.400GHz	0.712 / 147.483	3.640 / 50.633	0.088 / 40.873	0.385 / 151.901
2.600GHz	0.724 / 143.661	3.337 / 47.166	0.093 / 39.246	0.389 / 149.287
2.800GHz	0.729 / 139.703	3.115 / 43.059	0.099 / 37.125	0.400 / 146.505
3.000GHz	0.731 / 135.399	2.893 / 39.716	0.104 / 35.319	0.412 / 144.505

VCE = 2V, ICC = 50mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.651 / -160.576	20.891 / 96.307	0.028 / 42.478	0.418 / -134.196
600.0MHz	0.668 / -172.282	14.155 / 88.419	0.034 / 44.786	0.383 / -152.128
800.0MHz	0.669 / 179.315	10.719 / 82.472	0.040 / 46.978	0.372 / -163.983
1.000GHz	0.680 / 172.663	8.678 / 76.908	0.046 / 48.197	0.366 / -172.704
1.200GHz	0.694 / 171.097	7.271 / 73.078	0.052 / 48.399	0.359 / 177.004
1.400GHz	0.690 / 166.450	6.197 / 69.524	0.058 / 48.804	0.362 / 171.350
1.600GHz	0.691 / 162.069	5.447 / 65.066	0.064 / 47.770	0.367 / 165.890
1.800GHz	0.704 / 158.704	4.850 / 61.624	0.071 / 46.759	0.374 / 161.080
2.000GHz	0.704 / 154.428	4.373 / 57.424	0.077 / 45.316	0.381 / 156.840
2.200GHz	0.703 / 150.989	3.949 / 53.859	0.083 / 44.092	0.389 / 153.459
2.400GHz	0.717 / 147.207	3.603 / 50.341	0.088 / 42.234	0.395 / 150.503
2.600GHz	0.727 / 143.064	3.311 / 46.879	0.094 / 40.691	0.399 / 147.996
2.800GHz	0.728 / 139.094	3.093 / 42.956	0.100 / 38.456	0.410 / 145.270
3.000GHz	0.733 / 134.931	2.865 / 39.486	0.104 / 36.412	0.421 / 143.388

VCE = 2V, ICC = 60mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.662 / -163.188	20.613 / 95.216	0.027 / 44.312	0.412 / -138.308
600.0MHz	0.675 / -174.723	13.917 / 87.629	0.033 / 46.391	0.383 / -155.443
800.0MHz	0.673 / 178.021	10.536 / 81.880	0.039 / 48.909	0.375 / -166.609
1.000GHz	0.687 / 171.619	8.525 / 76.368	0.045 / 49.990	0.369 / -174.829
1.200GHz	0.697 / 169.796	7.138 / 72.596	0.051 / 50.075	0.364 / 175.122
1.400GHz	0.694 / 165.878	6.079 / 69.092	0.058 / 50.339	0.368 / 169.794
1.600GHz	0.703 / 161.745	5.346 / 64.715	0.064 / 49.084	0.373 / 164.489
1.800GHz	0.710 / 157.843	4.756 / 61.326	0.071 / 48.213	0.380 / 159.881
2.000GHz	0.705 / 153.958	4.293 / 57.050	0.077 / 46.546	0.387 / 155.758
2.200GHz	0.704 / 150.448	3.874 / 53.621	0.083 / 45.061	0.395 / 152.467
2.400GHz	0.723 / 146.158	3.535 / 50.021	0.088 / 43.339	0.401 / 149.596
2.600GHz	0.735 / 142.743	3.247 / 46.587	0.094 / 41.597	0.404 / 147.118
2.800GHz	0.737 / 138.503	3.032 / 42.560	0.100 / 39.372	0.415 / 144.486
3.000GHz	0.741 / 134.087	2.814 / 39.155	0.105 / 37.159	0.427 / 142.591

VCE = 2V, ICC = 70mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.666 / -166.249	19.986 / 94.259	0.026 / 44.904	0.406 / -142.154
600.0MHz	0.681 / -176.766	13.481 / 86.913	0.032 / 47.747	0.382 / -158.324
800.0MHz	0.679 / 176.066	10.196 / 81.260	0.038 / 50.196	0.376 / -168.890
1.000GHz	0.693 / 170.212	8.247 / 75.829	0.045 / 51.172	0.372 / -176.727
1.200GHz	0.701 / 168.110	6.901 / 72.161	0.051 / 51.437	0.368 / 173.541
1.400GHz	0.703 / 165.096	5.880 / 68.634	0.058 / 51.419	0.372 / 168.423
1.600GHz	0.705 / 160.598	5.163 / 64.283	0.064 / 50.415	0.377 / 163.353
1.800GHz	0.716 / 157.274	4.594 / 60.777	0.071 / 49.140	0.384 / 158.890
2.000GHz	0.716 / 153.245	4.147 / 56.543	0.077 / 47.282	0.392 / 154.839
2.200GHz	0.713 / 149.847	3.743 / 53.085	0.083 / 45.877	0.399 / 151.661
2.400GHz	0.730 / 145.713	3.420 / 49.570	0.089 / 43.902	0.405 / 148.844
2.600GHz	0.734 / 142.295	3.131 / 46.096	0.094 / 42.156	0.408 / 146.463
2.800GHz	0.741 / 138.222	2.923 / 42.155	0.100 / 39.804	0.419 / 143.841
3.000GHz	0.744 / 133.752	2.718 / 38.675	0.105 / 37.788	0.430 / 142.017

VCE = 2V, ICC = 80mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.668 / -169.129	18.841 / 93.191	0.025 / 45.264	0.401 / -146.278
600.0MHz	0.691 / -178.533	12.676 / 86.042	0.031 / 49.007	0.382 / -161.382
800.0MHz	0.692 / 174.636	9.578 / 80.499	0.038 / 51.138	0.378 / -171.320
1.000GHz	0.704 / 169.314	7.742 / 75.124	0.044 / 52.358	0.375 / -178.722
1.200GHz	0.712 / 166.873	6.478 / 71.454	0.051 / 52.495	0.371 / 171.931
1.400GHz	0.711 / 163.677	5.509 / 68.023	0.058 / 52.217	0.376 / 167.068
1.600GHz	0.717 / 159.765	4.842 / 63.554	0.064 / 50.999	0.381 / 162.147
1.800GHz	0.728 / 156.404	4.307 / 60.228	0.070 / 49.746	0.388 / 157.832
2.000GHz	0.721 / 152.300	3.886 / 55.850	0.077 / 47.998	0.396 / 153.932
2.200GHz	0.722 / 149.321	3.507 / 52.374	0.083 / 46.402	0.403 / 150.830
2.400GHz	0.738 / 145.212	3.202 / 48.870	0.089 / 44.438	0.409 / 148.112
2.600GHz	0.745 / 141.354	2.939 / 45.416	0.094 / 42.678	0.412 / 145.729
2.800GHz	0.757 / 137.320	2.746 / 41.491	0.100 / 40.346	0.423 / 143.197
3.000GHz	0.754 / 133.379	2.547 / 37.868	0.105 / 38.128	0.434 / 141.411

VCE = 3V, ICC = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.786 / -89.340	11.862 / 124.929	0.072 / 44.620	0.713 / -54.307
600.0MHz	0.738 / -115.556	9.237 / 110.364	0.085 / 33.200	0.563 / -69.692
800.0MHz	0.701 / -133.456	7.435 / 99.455	0.091 / 25.916	0.462 / -81.386
1.000GHz	0.707 / -148.715	6.219 / 90.405	0.094 / 21.126	0.392 / -90.772
1.200GHz	0.700 / -156.790	5.313 / 84.055	0.096 / 18.065	0.328 / -98.982
1.400GHz	0.693 / -164.793	4.599 / 78.434	0.098 / 15.840	0.294 / -106.760
1.600GHz	0.695 / -172.770	4.081 / 72.349	0.099 / 13.937	0.268 / -114.933
1.800GHz	0.699 / -179.522	3.661 / 67.423	0.100 / 12.748	0.250 / -122.489
2.000GHz	0.701 / 174.520	3.313 / 61.871	0.101 / 11.150	0.241 / -130.243
2.200GHz	0.695 / 169.275	3.012 / 57.282	0.102 / 10.343	0.236 / -137.363
2.400GHz	0.704 / 162.595	2.768 / 52.543	0.103 / 9.403	0.234 / -143.458
2.600GHz	0.711 / 157.298	2.541 / 48.192	0.104 / 8.550	0.236 / -149.030
2.800GHz	0.720 / 152.794	2.379 / 43.425	0.105 / 7.566	0.241 / -154.882
3.000GHz	0.720 / 147.141	2.212 / 38.865	0.106 / 6.911	0.249 / -160.188

VCE = 3V, ICC = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.744 / -101.307	14.187 / 119.559	0.064 / 41.094	0.643 / -64.922
600.0MHz	0.710 / -126.493	10.665 / 105.709	0.073 / 31.569	0.496 / -82.070
800.0MHz	0.684 / -143.288	8.429 / 95.722	0.078 / 25.961	0.404 / -95.271
1.000GHz	0.687 / -156.477	6.975 / 87.392	0.081 / 22.852	0.343 / -106.075
1.200GHz	0.693 / -164.212	5.918 / 81.591	0.083 / 20.888	0.288 / -116.537
1.400GHz	0.691 / -171.514	5.098 / 76.442	0.085 / 19.860	0.262 / -125.655
1.600GHz	0.692 / -178.634	4.509 / 70.657	0.087 / 18.643	0.244 / -134.946
1.800GHz	0.698 / 175.524	4.039 / 66.185	0.089 / 18.203	0.234 / -143.405
2.000GHz	0.692 / 169.614	3.652 / 60.958	0.091 / 17.254	0.231 / -151.276
2.200GHz	0.692 / 164.771	3.305 / 56.599	0.093 / 16.818	0.231 / -158.064
2.400GHz	0.703 / 159.150	3.033 / 52.242	0.095 / 16.173	0.233 / -163.731
2.600GHz	0.712 / 153.912	2.793 / 48.029	0.097 / 15.698	0.237 / -168.610
2.800GHz	0.722 / 149.431	2.605 / 43.479	0.100 / 14.768	0.246 / -173.631
3.000GHz	0.722 / 143.728	2.423 / 39.255	0.102 / 14.108	0.256 / -177.988

VCE = 3V, ICC = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.719 / -113.646	16.486 / 114.020	0.055 / 38.204	0.574 / -77.260
600.0MHz	0.684 / -137.883	11.996 / 101.281	0.062 / 30.968	0.439 / -96.381
800.0MHz	0.666 / -153.096	9.335 / 92.194	0.066 / 27.607	0.363 / -111.104
1.000GHz	0.677 / -164.778	7.667 / 84.606	0.069 / 25.824	0.316 / -123.199
1.200GHz	0.680 / -170.520	6.477 / 79.398	0.072 / 25.122	0.273 / -135.693
1.400GHz	0.681 / -177.342	5.555 / 74.656	0.075 / 25.142	0.257 / -145.298
1.600GHz	0.689 / 176.150	4.900 / 69.280	0.078 / 24.705	0.248 / -154.646
1.800GHz	0.689 / 170.761	4.380 / 65.088	0.081 / 24.685	0.245 / -162.785
2.000GHz	0.692 / 165.926	3.955 / 60.126	0.084 / 24.096	0.247 / -169.929
2.200GHz	0.693 / 161.296	3.573 / 56.037	0.087 / 23.739	0.251 / -175.850
2.400GHz	0.701 / 155.717	3.276 / 51.912	0.090 / 23.192	0.256 / 179.275
2.600GHz	0.713 / 151.086	3.005 / 47.917	0.094 / 22.597	0.260 / 175.323
2.800GHz	0.716 / 146.513	2.816 / 43.518	0.097 / 21.630	0.271 / 171.098
3.000GHz	0.721 / 141.371	2.614 / 39.641	0.100 / 20.653	0.282 / 167.750

VCE = 3V, ICC = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.672 / -127.931	18.721 / 108.208	0.046 / 37.012	0.506 / -92.479
600.0MHz	0.669 / -148.753	13.236 / 96.852	0.051 / 32.383	0.397 / -113.256
800.0MHz	0.661 / -162.628	10.172 / 88.809	0.055 / 31.203	0.343 / -128.843
1.000GHz	0.672 / -172.334	8.297 / 81.966	0.059 / 31.037	0.312 / -141.239
1.200GHz	0.676 / -177.199	6.984 / 77.183	0.063 / 31.455	0.282 / -154.362
1.400GHz	0.680 / 177.246	5.970 / 72.954	0.067 / 32.105	0.275 / -163.199
1.600GHz	0.681 / 171.440	5.264 / 67.955	0.071 / 32.083	0.274 / -171.452
1.800GHz	0.690 / 166.769	4.696 / 64.030	0.075 / 31.995	0.276 / -178.536
2.000GHz	0.688 / 161.796	4.235 / 59.397	0.079 / 31.463	0.281 / 175.407
2.200GHz	0.688 / 157.690	3.831 / 55.501	0.084 / 30.945	0.287 / 170.527
2.400GHz	0.702 / 152.867	3.505 / 51.603	0.088 / 30.246	0.294 / 166.468
2.600GHz	0.714 / 148.293	3.218 / 47.807	0.092 / 29.416	0.299 / 163.174
2.800GHz	0.718 / 143.980	3.005 / 43.621	0.097 / 27.990	0.309 / 159.680
3.000GHz	0.719 / 138.951	2.784 / 39.766	0.100 / 26.846	0.321 / 156.998

VCE = 3V, ICC = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.654 / -137.228	19.956 / 104.771	0.040 / 36.866	0.471 / -102.918
600.0MHz	0.665 / -156.396	13.891 / 94.336	0.045 / 34.642	0.382 / -124.108
800.0MHz	0.654 / -167.883	10.621 / 86.967	0.049 / 34.916	0.341 / -139.464
1.000GHz	0.675 / -176.917	8.637 / 80.475	0.054 / 35.465	0.319 / -151.252
1.200GHz	0.674 / 179.004	7.258 / 76.060	0.058 / 36.302	0.297 / -163.988
1.400GHz	0.677 / 173.898	6.198 / 72.020	0.063 / 36.932	0.295 / -171.955
1.600GHz	0.683 / 168.922	5.463 / 67.233	0.068 / 36.761	0.296 / -179.421
1.800GHz	0.691 / 164.662	4.863 / 63.476	0.073 / 36.626	0.300 / 174.206
2.000GHz	0.688 / 159.554	4.395 / 58.966	0.078 / 35.851	0.306 / 168.790
2.200GHz	0.689 / 155.833	3.970 / 55.231	0.083 / 35.287	0.313 / 164.376
2.400GHz	0.703 / 150.779	3.629 / 51.487	0.087 / 34.247	0.320 / 160.743
2.600GHz	0.710 / 146.685	3.334 / 47.748	0.092 / 33.172	0.324 / 157.731
2.800GHz	0.717 / 142.658	3.107 / 43.672	0.097 / 31.673	0.336 / 154.528
3.000GHz	0.721 / 138.028	2.882 / 39.987	0.101 / 30.153	0.347 / 152.141

VCE = 3V, ICC = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.649 / -143.561	20.666 / 102.585	0.037 / 38.130	0.452 / -110.130
600.0MHz	0.660 / -160.933	14.268 / 92.783	0.042 / 36.997	0.376 / -131.249
800.0MHz	0.653 / -171.512	10.887 / 85.795	0.046 / 37.485	0.344 / -146.023
1.000GHz	0.667 / 179.709	8.839 / 79.615	0.051 / 38.712	0.327 / -157.146
1.200GHz	0.680 / 177.119	7.410 / 75.334	0.056 / 39.571	0.309 / -169.480
1.400GHz	0.674 / 172.047	6.335 / 71.469	0.061 / 40.230	0.309 / -176.852
1.600GHz	0.681 / 167.196	5.572 / 66.804	0.066 / 39.889	0.312 / 176.222
1.800GHz	0.690 / 163.013	4.959 / 63.118	0.072 / 39.601	0.317 / 170.265
2.000GHz	0.690 / 158.353	4.477 / 58.697	0.077 / 38.677	0.324 / 165.174
2.200GHz	0.692 / 154.801	4.042 / 55.053	0.082 / 37.885	0.331 / 161.124
2.400GHz	0.702 / 150.125	3.696 / 51.283	0.087 / 36.711	0.337 / 157.680
2.600GHz	0.708 / 146.059	3.394 / 47.723	0.092 / 35.373	0.342 / 154.807
2.800GHz	0.718 / 141.547	3.170 / 43.644	0.097 / 33.681	0.353 / 151.718
3.000GHz	0.727 / 136.950	2.944 / 40.148	0.102 / 32.119	0.364 / 149.480

VCE = 3V, ICC = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.646 / -147.660	21.147 / 100.938	0.034 / 38.583	0.439 / -115.752
600.0MHz	0.651 / -163.737	14.525 / 91.691	0.039 / 38.865	0.374 / -136.386
800.0MHz	0.654 / -173.937	11.050 / 84.978	0.044 / 39.933	0.348 / -150.689
1.000GHz	0.671 / 178.258	8.963 / 78.913	0.049 / 41.363	0.334 / -161.330
1.200GHz	0.674 / 174.969	7.516 / 74.759	0.054 / 42.151	0.319 / -173.210
1.400GHz	0.674 / 170.539	6.415 / 71.040	0.060 / 42.843	0.320 / 179.899
1.600GHz	0.677 / 165.762	5.644 / 66.469	0.065 / 42.407	0.324 / 173.330
1.800GHz	0.692 / 161.404	5.027 / 62.826	0.071 / 41.929	0.329 / 167.716
2.000GHz	0.688 / 157.527	4.538 / 58.459	0.077 / 40.763	0.336 / 162.836
2.200GHz	0.691 / 153.516	4.097 / 54.904	0.082 / 39.722	0.344 / 158.960
2.400GHz	0.701 / 149.287	3.744 / 51.176	0.087 / 38.467	0.350 / 155.629
2.600GHz	0.713 / 145.247	3.435 / 47.707	0.092 / 37.113	0.354 / 152.882
2.800GHz	0.722 / 141.307	3.207 / 43.577	0.098 / 35.307	0.366 / 149.948
3.000GHz	0.724 / 136.264	2.977 / 40.114	0.102 / 33.560	0.377 / 147.764

VCE = 3V, ICC = 40mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.648 / -153.682	21.651 / 98.824	0.031 / 39.978	0.424 / -123.543
600.0MHz	0.654 / -168.286	14.776 / 90.235	0.036 / 41.856	0.373 / -143.228
800.0MHz	0.650 / -177.349	11.218 / 83.908	0.041 / 43.814	0.354 / -156.601
1.000GHz	0.671 / 175.610	9.087 / 78.107	0.047 / 45.220	0.344 / -166.406
1.200GHz	0.675 / 172.548	7.619 / 74.146	0.053 / 46.037	0.333 / -177.705
1.400GHz	0.677 / 168.894	6.493 / 70.485	0.059 / 46.245	0.335 / 175.958
1.600GHz	0.680 / 163.775	5.714 / 65.988	0.064 / 45.519	0.339 / 169.897
1.800GHz	0.693 / 160.343	5.084 / 62.468	0.071 / 44.881	0.345 / 164.644
2.000GHz	0.692 / 156.335	4.588 / 58.208	0.076 / 43.480	0.353 / 160.062
2.200GHz	0.687 / 153.095	4.144 / 54.574	0.082 / 42.278	0.360 / 156.396
2.400GHz	0.702 / 148.303	3.785 / 51.059	0.087 / 40.763	0.367 / 153.253
2.600GHz	0.716 / 144.277	3.475 / 47.651	0.093 / 39.339	0.371 / 150.587
2.800GHz	0.721 / 140.380	3.245 / 43.509	0.098 / 37.268	0.382 / 147.796
3.000GHz	0.726 / 135.492	3.011 / 39.998	0.103 / 35.351	0.393 / 145.742

V_{CE} = 3V, I_{CC} = 50mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.645 / -158.642	21.786 / 97.555	0.029 / 41.973	0.415 / -128.591
600.0MHz	0.653 / -170.721	14.825 / 89.356	0.034 / 44.502	0.372 / -147.516
800.0MHz	0.653 / -179.213	11.245 / 83.242	0.040 / 46.552	0.357 / -160.146
1.000GHz	0.671 / 173.557	9.099 / 77.573	0.046 / 47.749	0.349 / -169.449
1.200GHz	0.675 / 172.087	7.631 / 73.669	0.052 / 48.072	0.340 / 179.630
1.400GHz	0.677 / 167.602	6.496 / 70.104	0.058 / 48.512	0.343 / 173.701
1.600GHz	0.682 / 162.981	5.717 / 65.670	0.064 / 47.501	0.348 / 167.908
1.800GHz	0.696 / 159.252	5.089 / 62.230	0.070 / 46.684	0.354 / 162.878
2.000GHz	0.696 / 155.220	4.590 / 57.910	0.076 / 45.201	0.362 / 158.477
2.200GHz	0.688 / 151.871	4.146 / 54.433	0.082 / 43.909	0.369 / 154.935
2.400GHz	0.705 / 147.585	3.788 / 50.853	0.087 / 42.207	0.376 / 151.903
2.600GHz	0.712 / 143.859	3.475 / 47.447	0.093 / 40.602	0.379 / 149.316
2.800GHz	0.727 / 140.322	3.240 / 43.447	0.099 / 38.581	0.391 / 146.550
3.000GHz	0.724 / 135.302	3.009 / 39.967	0.104 / 36.570	0.402 / 144.569

V_{CE} = 3V, I_{CC} = 60mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.650 / -160.784	21.734 / 96.662	0.027 / 44.047	0.408 / -132.021
600.0MHz	0.657 / -172.606	14.754 / 88.709	0.033 / 46.204	0.371 / -150.322
800.0MHz	0.657 / 179.438	11.184 / 82.759	0.039 / 48.578	0.359 / -162.469
1.000GHz	0.676 / 172.401	9.055 / 77.196	0.045 / 49.376	0.351 / -171.403
1.200GHz	0.676 / 170.258	7.583 / 73.338	0.051 / 49.815	0.344 / 177.976
1.400GHz	0.683 / 166.634	6.457 / 69.801	0.057 / 50.028	0.347 / 172.229
1.600GHz	0.686 / 162.139	5.686 / 65.432	0.064 / 48.933	0.352 / 166.625
1.800GHz	0.694 / 158.513	5.058 / 61.982	0.070 / 47.939	0.359 / 161.749
2.000GHz	0.691 / 154.533	4.559 / 57.729	0.076 / 46.377	0.367 / 157.448
2.200GHz	0.693 / 151.330	4.120 / 54.244	0.082 / 45.030	0.374 / 154.002
2.400GHz	0.708 / 147.200	3.765 / 50.715	0.087 / 43.180	0.381 / 151.032
2.600GHz	0.718 / 143.356	3.456 / 47.257	0.093 / 41.507	0.384 / 148.507
2.800GHz	0.725 / 139.206	3.224 / 43.266	0.099 / 39.293	0.395 / 145.789
3.000GHz	0.730 / 134.649	2.994 / 39.965	0.104 / 37.297	0.407 / 143.880

V_{CE} = 3V, I_{CC} = 70mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.642 / -162.597	21.547 / 95.960	0.026 / 44.377	0.402 / -134.719
600.0MHz	0.656 / -174.324	14.593 / 88.240	0.032 / 47.825	0.369 / -152.432
800.0MHz	0.661 / 178.197	11.059 / 82.363	0.038 / 49.728	0.358 / -164.200
1.000GHz	0.678 / 171.809	8.950 / 76.808	0.044 / 50.878	0.352 / -172.853
1.200GHz	0.683 / 169.841	7.498 / 73.017	0.051 / 51.182	0.346 / 176.751
1.400GHz	0.682 / 166.222	6.385 / 69.515	0.057 / 51.139	0.349 / 171.202
1.600GHz	0.689 / 161.768	5.619 / 65.151	0.064 / 49.992	0.355 / 165.723
1.800GHz	0.696 / 158.098	4.997 / 61.768	0.070 / 48.927	0.361 / 160.974
2.000GHz	0.699 / 154.245	4.502 / 57.494	0.076 / 47.273	0.369 / 156.753
2.200GHz	0.703 / 150.900	4.067 / 54.002	0.082 / 45.838	0.376 / 153.380
2.400GHz	0.709 / 146.570	3.717 / 50.469	0.088 / 43.938	0.383 / 150.472
2.600GHz	0.717 / 142.681	3.410 / 47.047	0.093 / 42.114	0.386 / 147.956
2.800GHz	0.732 / 139.075	3.182 / 43.046	0.099 / 39.857	0.398 / 145.312
3.000GHz	0.732 / 134.615	2.953 / 39.663	0.104 / 37.849	0.409 / 143.405

V_{CE} = 3V, I_{CC} = 80mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.651 / -165.631	21.199 / 95.445	0.025 / 46.147	0.396 / -136.827
600.0MHz	0.669 / -176.068	14.338 / 87.799	0.031 / 49.147	0.366 / -154.133
800.0MHz	0.662 / 177.242	10.860 / 82.022	0.037 / 50.743	0.357 / -165.538
1.000GHz	0.679 / 170.732	8.784 / 76.542	0.044 / 51.933	0.352 / -173.937
1.200GHz	0.682 / 168.815	7.360 / 72.774	0.050 / 52.013	0.346 / 175.787
1.400GHz	0.685 / 165.369	6.266 / 69.272	0.057 / 52.008	0.350 / 170.385
1.600GHz	0.689 / 161.027	5.515 / 64.912	0.063 / 50.797	0.355 / 165.019
1.800GHz	0.703 / 157.721	4.902 / 61.485	0.070 / 49.596	0.362 / 160.359
2.000GHz	0.703 / 153.904	4.422 / 57.209	0.076 / 47.820	0.370 / 156.203
2.200GHz	0.702 / 150.283	3.997 / 53.775	0.082 / 46.406	0.377 / 152.883
2.400GHz	0.714 / 146.380	3.650 / 50.138	0.088 / 44.464	0.383 / 150.013
2.600GHz	0.728 / 142.731	3.343 / 46.734	0.093 / 42.652	0.387 / 147.577
2.800GHz	0.730 / 138.694	3.121 / 42.708	0.099 / 40.306	0.398 / 144.948
3.000GHz	0.736 / 134.303	2.904 / 39.403	0.104 / 38.242	0.409 / 143.065