

**NPN Planer RF TRANSISTOR**

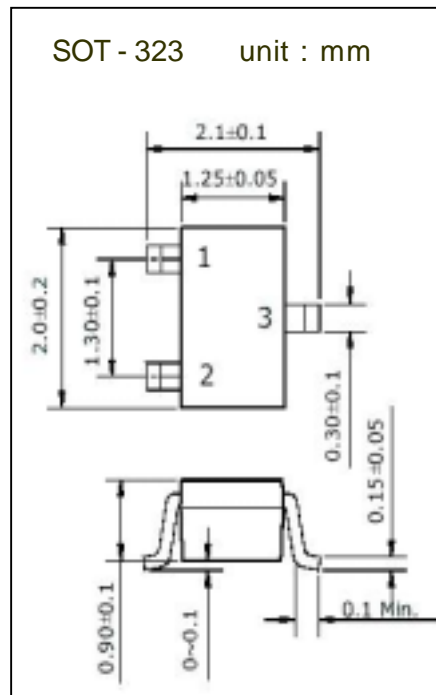
**DESCRIPTION**

The TARF1509U is a low Noise figure and good associated gain performance at UHF,VHF and Microwave frequencies

It is suitable for a high density surface mount since transistor has been SOT323 package

**FEATURES**

- o Low Noise Figure
  - N.F = 1.5dB TYP. @ f=2GHz, V<sub>CE</sub>=3V, I<sub>c</sub>=5mA
  - N.F = 1.7dB TYP. @ f=2GHz, V<sub>CE</sub>=1V, I<sub>c</sub>=3mA
- o High Gain
  - MAG = 10dB TYP. @ f=2GHz, V<sub>CE</sub>=3V, I<sub>c</sub>=15mA
  - MAG = 7.5dB TYP. @ f=2GHz, V<sub>CE</sub>=1V, I<sub>c</sub>=3mA
- o High Transition Frequency
  - f<sub>T</sub> = 9GHz TYP. @ f=2GHz, V<sub>CE</sub>=3V, I<sub>c</sub>=20mA
  - f<sub>T</sub> = 5GHz TYP. @ f=2GHz, V<sub>CE</sub>=1V, I<sub>c</sub>=3mA



**PIN CONFIGURATION**

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

**MARKING : AH1**

**MAXIMUM RATINGS**

SYMBOL	PARAMETER	CONDITION	VALUE	Unit
V <sub>CBO</sub>	Collector-Base Voltage	Open Emitter	15	V
V <sub>CEO</sub>	Collector-Emitter Voltage	Open Base	5.5	V
V <sub>EBO</sub>	Emitter-Base Voltage	Open Collector	2.5	V
I <sub>c</sub>	Collector Current (DC)		65	mA
P <sub>T</sub>	Total Power Dissipation	T <sub>s</sub> = 60	150	mW
T <sub>STG</sub>	Storage Temperature		-65 ~ 150	
T <sub>J</sub>	Operating Junction Temperature		150	

**Electrical Characteristics** (  $T_A = 25$  )

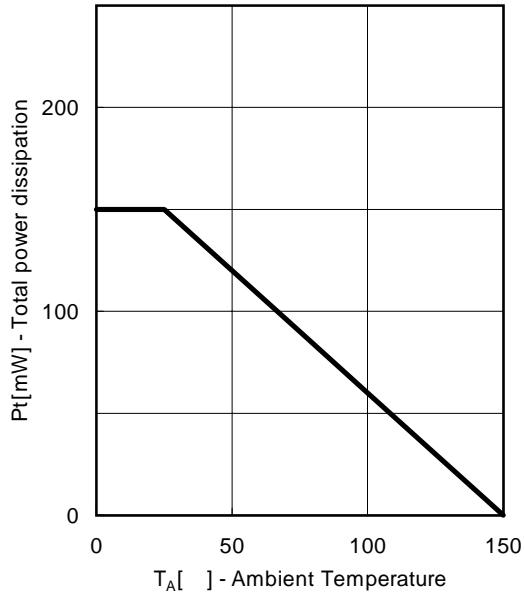
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
V <sub>CB0</sub>	Collector-Base Voltage	I <sub>CE</sub> = 100uA, I <sub>E</sub> = 0	10	25		V
V <sub>CEO</sub>	Collector-Emitter Voltage	I <sub>CE</sub> = 100uA, I <sub>B</sub> = 0	5	5.5		V
I <sub>CB0</sub>	Collector-Cut-off current	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0			300	n A
I <sub>EBO</sub>	Emitter-Cut-off current	V <sub>EB</sub> = 1V, I <sub>C</sub> = 0			100	n A
h <sub>fe</sub>	D.C current Gain	V <sub>CE</sub> = 3V, I <sub>c</sub> = 15mA	100	150		
f <sub>T</sub>	Transition Frequency	V <sub>CE</sub> = 3V, I <sub>c</sub> = 20mA		9		GHz
C <sub>CB</sub>	Collector-Base Capacitance	V <sub>CB</sub> = 10V, f = 1MHz		0.55		pF

**Performance Characteristics**

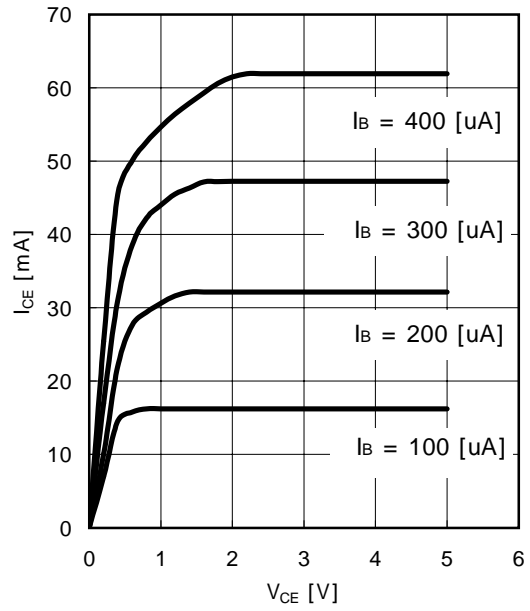
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
[S <sub>21</sub> ] <sup>2</sup>	Insertion Power Gain	V <sub>CE</sub> =3V, I <sub>c</sub> =5mA, f=2GHz		5.5		dB
		V <sub>CE</sub> =3V, I <sub>c</sub> =15mA, f=2GHz		6.5		
		V <sub>CE</sub> =1V, I <sub>c</sub> =3mA, f=2GHz		3.5		
		V <sub>CE</sub> =1V, I <sub>c</sub> =10mA, f=2GHz		4.5		
MAG	Maximum Available Gain	V <sub>CE</sub> =3V, I <sub>c</sub> =5mA, f=2GHz		10		dB
		V <sub>CE</sub> =3V, I <sub>c</sub> =15mA, f=2GHz		10.5		
		V <sub>CE</sub> =1V, I <sub>c</sub> =3mA, f=2GHz		7.5		
		V <sub>CE</sub> =1V, I <sub>c</sub> =10mA, f=2GHz		8.5		
NF <sub>min</sub>	Minium Noise Figure	V <sub>CE</sub> =1V, I <sub>c</sub> =3mA, f=2GHz		1.7		dB
		V <sub>CE</sub> =3V, I <sub>c</sub> =5mA, f=2GHz		1.5		
r <sub>n</sub>	Noise Resistance	V <sub>CE</sub> =1V, I <sub>c</sub> =3mA, f=2GHz		0.05		
		V <sub>CE</sub> =3V, I <sub>c</sub> =5mA, f=2GHz		0.04		
G <sub>A</sub>	Associated Gain	V <sub>CE</sub> =3V, I <sub>c</sub> =5mA, f=2GHz		8		dB
		V <sub>CE</sub> =3V, I <sub>c</sub> =15mA, f=2GHz		9		
		V <sub>CE</sub> =1V, I <sub>c</sub> =3mA, f=2GHz		6.5		
		V <sub>CE</sub> =1V, I <sub>c</sub> =10mA, f=2GHz		7.5		

**Total power dissipation  $P_t = f(T_A)$**

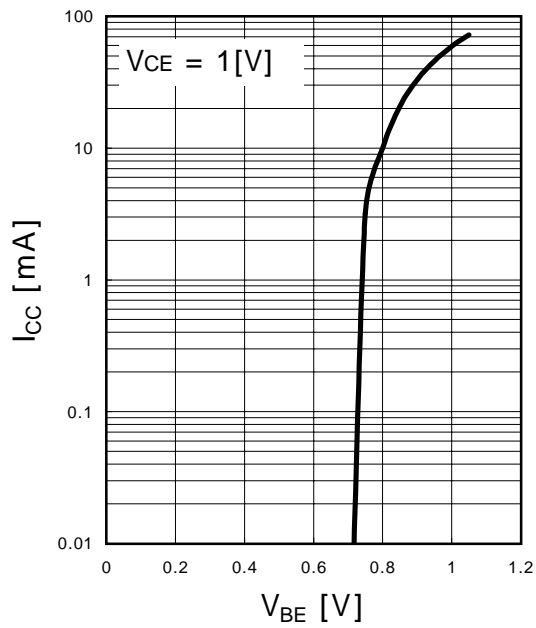
(  $T_A = 25$  )



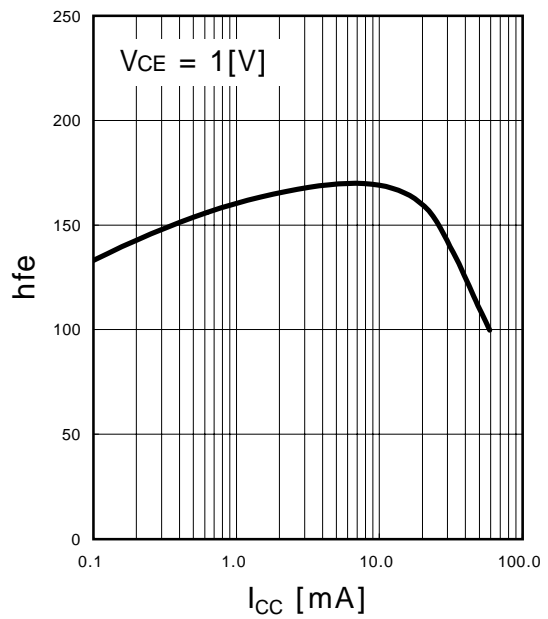
**ICE vs. VCE**



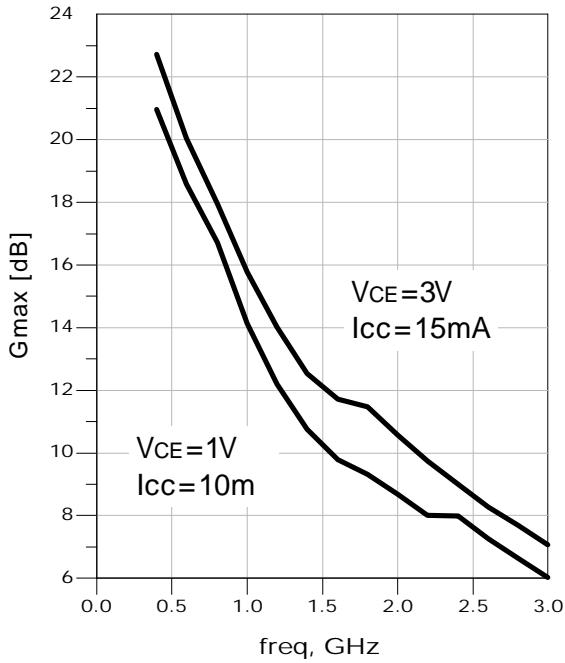
**ICC vs. VBE**



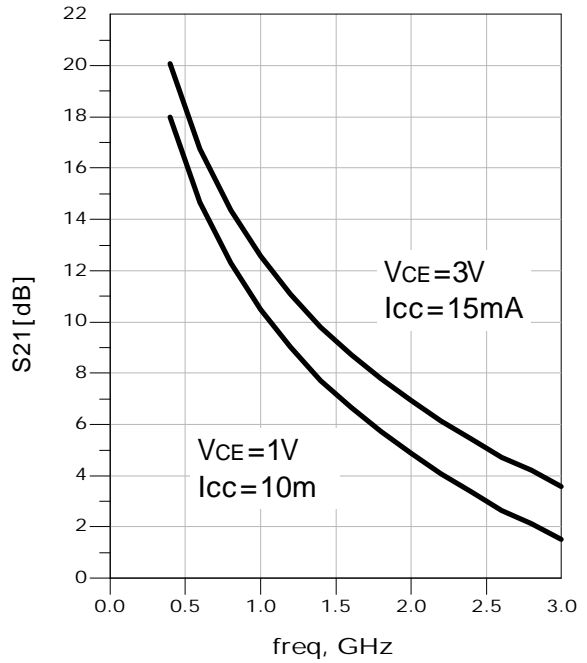
**hfe vs. ICC**



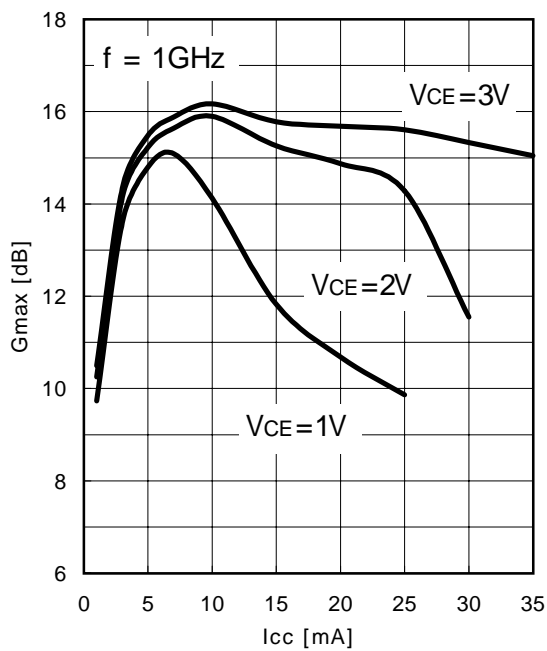
Power Gain :  $G_{max}$  vs. Frequency



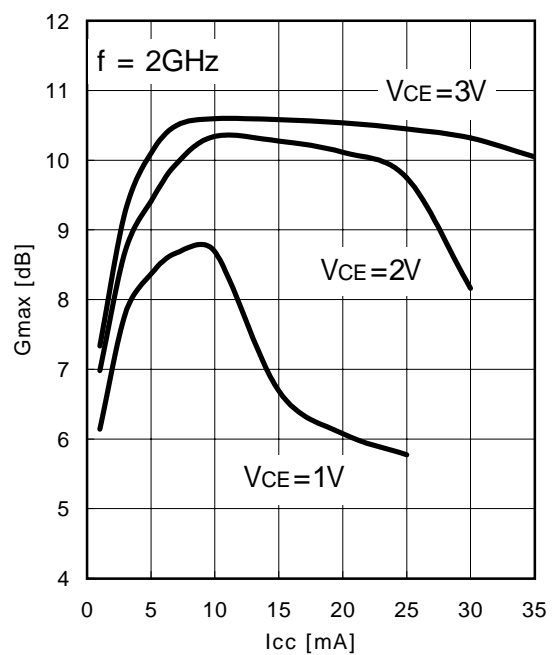
Power Gain :  $S_{21}$  vs. Frequency



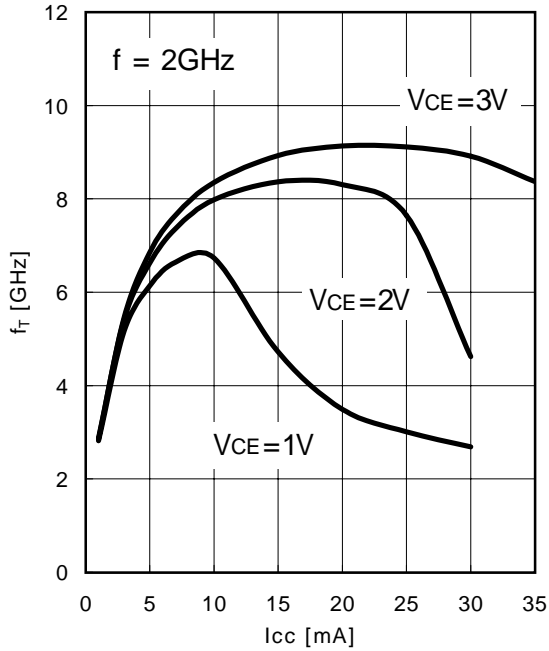
Power Gain :  $G_{max}$  vs.  $I_{cc}$



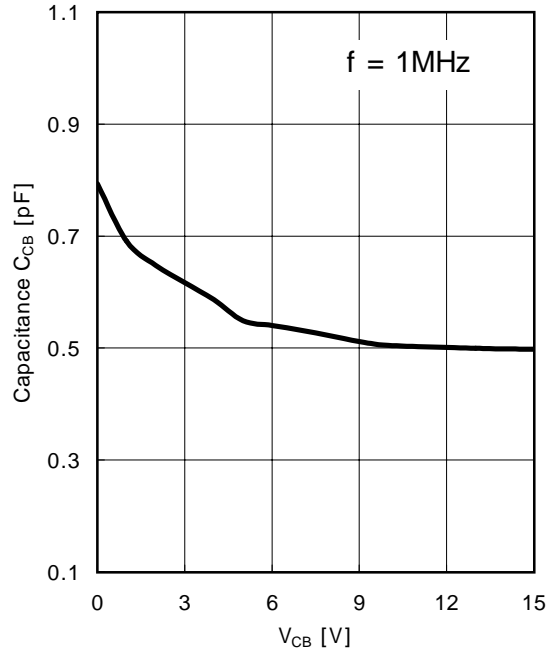
Power Gain :  $G_{max}$  vs.  $I_{cc}$



Transition Frequency :  $f_T$  vs.  $I_{CC}$

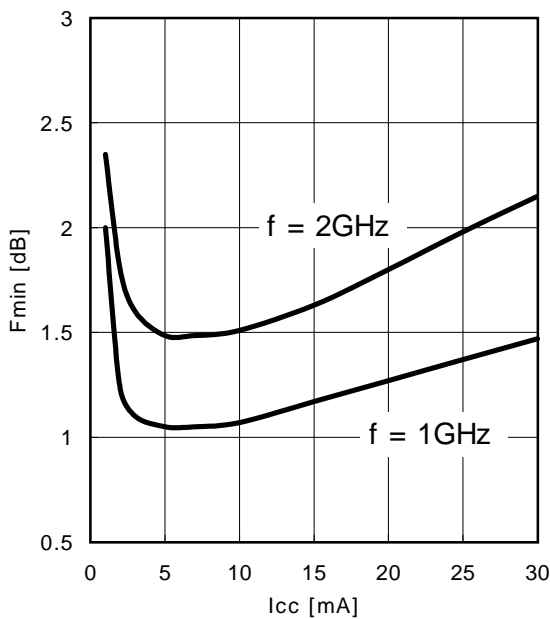


$C_{CB}$  vs.  $V_{CB}$



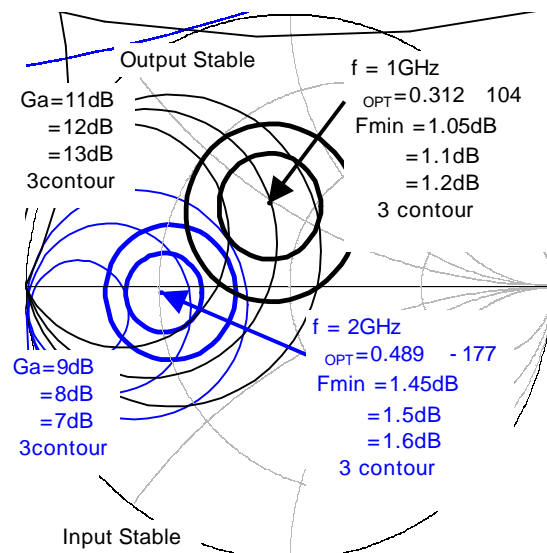
$F_{min}$  vs.  $I_{CC}$

$V_{CE} = 3V$ ,  $I_{CC} = \text{parameter}$ ,  $Z_s = Z_{opt}$



Noise Figure Contours & Constant Gain

$f = 1 GHz, 2GHz, V_{CE} = 3V, I_{CC} = 5mA$



**Common Emitter S-Parameter Data**

VCE = 3V, ICC = 3mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.663 / -97.995	6.301 / 111.651	0.100 / 39.058	0.641 / -58.477
600.0MHz	0.594 / -123.324	4.689 / 95.866	0.110 / 31.752	0.526 / -71.407
800.0MHz	0.555 / -140.476	3.697 / 83.623	0.112 / 29.245	0.466 / -81.055
1.000GHz	0.556 / -154.320	3.066 / 73.318	0.113 / 29.679	0.434 / -89.172
1.200GHz	0.558 / -161.863	2.611 / 65.450	0.114 / 32.577	0.409 / -96.700
1.400GHz	0.558 / -170.312	2.258 / 58.204	0.117 / 37.149	0.407 / -103.934
1.600GHz	0.561 / -178.431	2.007 / 50.800	0.123 / 42.063	0.412 / -111.572
1.800GHz	0.575 / 174.593	1.809 / 44.604	0.133 / 46.905	0.424 / -118.863
2.000GHz	0.589 / 168.697	1.632 / 38.101	0.147 / 50.750	0.441 / -126.238
2.200GHz	0.588 / 162.313	1.486 / 32.322	0.165 / 53.588	0.461 / -133.276
2.400GHz	0.611 / 155.528	1.360 / 26.892	0.186 / 54.961	0.483 / -139.631
2.600GHz	0.630 / 149.423	1.249 / 21.632	0.209 / 55.163	0.504 / -145.973
2.800GHz	0.638 / 143.926	1.161 / 16.980	0.234 / 54.328	0.531 / -152.108
3.000GHz	0.654 / 136.817	1.069 / 13.016	0.259 / 53.019	0.559 / -157.660

VCE = 3V, ICC = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.573 / -118.379	7.910 / 104.530	0.081 / 39.189	0.513 / -69.078
600.0MHz	0.544 / -140.306	5.646 / 90.768	0.089 / 37.068	0.411 / -81.221
800.0MHz	0.521 / -156.062	4.358 / 80.479	0.095 / 38.616	0.364 / -90.185
1.000GHz	0.526 / -167.694	3.581 / 71.368	0.101 / 41.538	0.342 / -97.753
1.200GHz	0.536 / -172.832	3.035 / 64.662	0.110 / 45.151	0.322 / -104.977
1.400GHz	0.533 / -179.597	2.616 / 58.431	0.121 / 48.957	0.325 / -111.787
1.600GHz	0.544 / 173.535	2.321 / 51.681	0.133 / 51.761	0.333 / -118.933
1.800GHz	0.560 / 167.542	2.086 / 45.889	0.149 / 54.002	0.347 / -125.703
2.000GHz	0.566 / 162.145	1.891 / 39.882	0.167 / 55.145	0.366 / -132.510
2.200GHz	0.569 / 156.435	1.721 / 34.648	0.186 / 55.672	0.386 / -138.859
2.400GHz	0.590 / 150.287	1.580 / 29.521	0.207 / 55.418	0.410 / -144.504
2.600GHz	0.609 / 145.197	1.455 / 24.833	0.229 / 54.486	0.432 / -150.130
2.800GHz	0.619 / 139.486	1.358 / 19.818	0.252 / 52.953	0.460 / -155.585
3.000GHz	0.634 / 133.257	1.260 / 15.729	0.274 / 51.241	0.489 / -160.556

VCE = 3V, ICC = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.537 / -129.671	8.767 / 100.471	0.070 / 41.669	0.437 / -76.221
600.0MHz	0.525 / -150.317	6.130 / 88.128	0.079 / 42.325	0.349 / -88.113
800.0MHz	0.509 / -163.790	4.706 / 78.764	0.088 / 45.450	0.312 / -96.840
1.000GHz	0.522 / -174.289	3.840 / 70.342	0.099 / 48.629	0.296 / -104.150
1.200GHz	0.517 / -178.945	3.249 / 64.140	0.111 / 51.836	0.279 / -111.402
1.400GHz	0.525 / 175.159	2.800 / 58.299	0.125 / 54.301	0.284 / -117.885
1.600GHz	0.538 / 168.547	2.484 / 52.087	0.141 / 55.878	0.295 / -124.714
1.800GHz	0.552 / 163.208	2.234 / 46.793	0.159 / 56.749	0.310 / -131.092
2.000GHz	0.554 / 158.272	2.023 / 40.970	0.177 / 56.813	0.329 / -137.479
2.200GHz	0.561 / 153.074	1.844 / 35.917	0.197 / 56.518	0.350 / -143.310
2.400GHz	0.581 / 147.467	1.697 / 31.064	0.217 / 55.570	0.374 / -148.509
2.600GHz	0.597 / 141.908	1.564 / 26.175	0.239 / 54.176	0.397 / -153.556
2.800GHz	0.610 / 137.686	1.454 / 21.377	0.261 / 52.324	0.424 / -158.624
3.000GHz	0.622 / 130.933	1.362 / 17.384	0.282 / 50.378	0.453 / -163.142

VCE = 3V, ICC = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.528 / -143.181	9.511 / 96.494	0.061 / 45.415	0.365 / -84.430
600.0MHz	0.512 / -160.569	6.554 / 85.648	0.072 / 48.950	0.294 / -96.265
800.0MHz	0.499 / -171.245	5.002 / 77.240	0.085 / 52.373	0.267 / -104.779
1.000GHz	0.515 / 179.681	4.076 / 69.470	0.099 / 54.974	0.258 / -111.852
1.200GHz	0.518 / 175.352	3.440 / 63.791	0.114 / 57.174	0.244 / -119.209
1.400GHz	0.525 / 170.344	2.954 / 58.439	0.131 / 58.612	0.252 / -125.261
1.600GHz	0.535 / 164.194	2.623 / 52.415	0.148 / 58.975	0.264 / -131.642
1.800GHz	0.549 / 159.801	2.356 / 47.268	0.167 / 58.893	0.280 / -137.519
2.000GHz	0.554 / 154.550	2.136 / 41.998	0.186 / 58.156	0.300 / -143.313
2.200GHz	0.557 / 150.321	1.950 / 36.847	0.207 / 57.108	0.321 / -148.619
2.400GHz	0.577 / 144.714	1.794 / 32.217	0.227 / 55.684	0.344 / -153.257
2.600GHz	0.597 / 139.855	1.653 / 27.516	0.248 / 53.888	0.367 / -157.727
2.800GHz	0.601 / 134.740	1.556 / 22.994	0.269 / 51.759	0.394 / -162.290
3.000GHz	0.612 / 129.315	1.445 / 18.898	0.290 / 49.653	0.423 / -166.344

VCE = 3V, ICC = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.499 / -153.821	10.109 / 92.863	0.054 / 51.617	0.300 / -93.861
600.0MHz	0.505 / -169.086	6.883 / 83.399	0.068 / 55.991	0.248 / -105.683
800.0MHz	0.503 / -178.644	5.225 / 75.727	0.084 / 59.057	0.232 / -114.049
1.000GHz	0.510 / 173.930	4.258 / 68.634	0.100 / 60.551	0.228 / -120.671
1.200GHz	0.521 / 171.216	3.584 / 63.399	0.118 / 61.694	0.217 / -128.164
1.400GHz	0.522 / 165.765	3.086 / 58.349	0.136 / 61.951	0.228 / -133.569
1.600GHz	0.532 / 161.082	2.730 / 52.722	0.155 / 61.395	0.242 / -139.346
1.800GHz	0.553 / 156.139	2.452 / 47.863	0.175 / 60.553	0.258 / -144.567
2.000GHz	0.551 / 151.700	2.226 / 42.641	0.195 / 59.215	0.279 / -149.780
2.200GHz	0.555 / 147.204	2.028 / 37.902	0.215 / 57.562	0.300 / -154.456
2.400GHz	0.576 / 142.030	1.869 / 33.405	0.235 / 55.772	0.323 / -158.483
2.600GHz	0.596 / 138.038	1.721 / 28.890	0.256 / 53.713	0.345 / -162.428
2.800GHz	0.605 / 133.323	1.624 / 24.283	0.277 / 51.339	0.371 / -166.446
3.000GHz	0.610 / 127.631	1.511 / 20.351	0.297 / 49.105	0.400 / -170.069

VCE = 3V, ICC = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.497 / -161.999	10.325 / 90.794	0.051 / 56.162	0.264 / -100.353
600.0MHz	0.504 / -174.039	6.996 / 82.032	0.067 / 60.230	0.224 / -112.118
800.0MHz	0.502 / 177.442	5.309 / 74.837	0.084 / 62.660	0.214 / -120.185
1.000GHz	0.519 / 170.387	4.312 / 67.982	0.102 / 63.557	0.214 / -126.347
1.200GHz	0.532 / 168.213	3.633 / 62.919	0.120 / 63.984	0.205 / -133.906
1.400GHz	0.528 / 164.051	3.118 / 58.012	0.139 / 63.635	0.217 / -138.752
1.600GHz	0.533 / 159.048	2.767 / 52.632	0.159 / 62.672	0.232 / -144.099
1.800GHz	0.553 / 154.363	2.484 / 47.955	0.179 / 61.402	0.249 / -148.934
2.000GHz	0.553 / 150.124	2.257 / 42.708	0.200 / 59.708	0.270 / -153.769
2.200GHz	0.566 / 145.989	2.054 / 38.177	0.220 / 57.853	0.291 / -158.001
2.400GHz	0.580 / 140.686	1.893 / 33.763	0.240 / 55.855	0.314 / -161.719
2.600GHz	0.591 / 136.230	1.747 / 29.309	0.261 / 53.570	0.335 / -165.297
2.800GHz	0.605 / 131.601	1.646 / 24.832	0.281 / 51.147	0.362 / -169.040
3.000GHz	0.614 / 125.704	1.531 / 20.933	0.301 / 48.787	0.390 / -172.362

VCE = 3V, ICC = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.501 / -166.714	10.337 / 89.329	0.048 / 59.018	0.241 / -104.952
600.0MHz	0.518 / -177.215	6.982 / 81.028	0.066 / 63.150	0.210 / -116.470
800.0MHz	0.519 / 175.058	5.296 / 74.133	0.084 / 65.076	0.203 / -124.014
1.000GHz	0.531 / 168.131	4.298 / 67.462	0.102 / 65.513	0.205 / -129.847
1.200GHz	0.531 / 166.629	3.624 / 62.494	0.122 / 65.370	0.199 / -137.382
1.400GHz	0.539 / 161.999	3.115 / 57.822	0.142 / 64.761	0.212 / -141.881
1.600GHz	0.539 / 157.140	2.754 / 52.310	0.161 / 63.465	0.228 / -146.890
1.800GHz	0.563 / 152.820	2.474 / 47.722	0.182 / 62.042	0.245 / -151.493
2.000GHz	0.562 / 148.596	2.244 / 42.718	0.203 / 60.134	0.266 / -156.012
2.200GHz	0.569 / 144.464	2.044 / 38.139	0.223 / 58.160	0.287 / -160.070
2.400GHz	0.585 / 139.690	1.888 / 33.716	0.243 / 55.985	0.310 / -163.633
2.600GHz	0.597 / 134.674	1.743 / 29.391	0.264 / 53.681	0.331 / -167.025
2.800GHz	0.604 / 131.010	1.633 / 24.753	0.284 / 51.019	0.358 / -170.572
3.000GHz	0.622 / 125.553	1.536 / 20.955	0.304 / 48.692	0.386 / -173.785

VCE = 3V, ICC = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.515 / -170.515	10.183 / 88.148	0.048 / 61.594	0.223 / -108.207
600.0MHz	0.526 / -179.601	6.863 / 80.160	0.065 / 65.261	0.198 / -119.169
800.0MHz	0.525 / 172.945	5.196 / 73.510	0.084 / 66.634	0.195 / -126.313
1.000GHz	0.541 / 166.668	4.214 / 66.807	0.103 / 66.723	0.200 / -131.696
1.200GHz	0.541 / 164.379	3.553 / 62.017	0.122 / 66.391	0.195 / -139.093
1.400GHz	0.549 / 160.910	3.051 / 57.261	0.143 / 65.639	0.209 / -143.431
1.600GHz	0.561 / 156.006	2.703 / 51.873	0.163 / 64.212	0.225 / -148.234
1.800GHz	0.572 / 152.149	2.425 / 47.168	0.184 / 62.529	0.243 / -152.719
2.000GHz	0.574 / 147.684	2.203 / 42.222	0.205 / 60.504	0.265 / -157.129
2.200GHz	0.579 / 143.399	2.004 / 37.656	0.225 / 58.462	0.286 / -161.102
2.400GHz	0.594 / 138.645	1.848 / 33.368	0.246 / 56.193	0.310 / -164.559
2.600GHz	0.609 / 134.090	1.709 / 28.940	0.267 / 53.797	0.331 / -167.925
2.800GHz	0.623 / 129.567	1.599 / 24.760	0.287 / 51.194	0.358 / -171.459
3.000GHz	0.636 / 124.045	1.496 / 20.811	0.307 / 48.718	0.386 / -174.601

VCE = 2V, ICC = 3mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.654 / -101.835	6.230 / 110.362	0.102 / 37.836	0.623 / -60.862
600.0MHz	0.591 / -125.983	4.598 / 94.492	0.112 / 30.856	0.508 / -73.951
800.0MHz	0.554 / -143.276	3.614 / 82.662	0.114 / 28.526	0.450 / -83.683
1.000GHz	0.562 / -156.117	2.989 / 72.231	0.115 / 29.144	0.421 / -91.846
1.200GHz	0.558 / -164.471	2.540 / 64.559	0.116 / 31.999	0.396 / -99.466
1.400GHz	0.559 / -171.724	2.201 / 57.526	0.119 / 36.336	0.396 / -106.709
1.600GHz	0.569 / 179.810	1.955 / 50.180	0.125 / 41.082	0.402 / -114.314
1.800GHz	0.584 / 173.412	1.762 / 43.802	0.136 / 45.788	0.414 / -121.552
2.000GHz	0.588 / 166.695	1.594 / 37.343	0.150 / 49.439	0.433 / -128.839
2.200GHz	0.597 / 160.755	1.450 / 31.783	0.167 / 52.203	0.453 / -135.765
2.400GHz	0.613 / 154.174	1.323 / 26.544	0.188 / 53.483	0.476 / -141.974
2.600GHz	0.630 / 148.642	1.215 / 21.117	0.210 / 53.727	0.497 / -148.142
2.800GHz	0.644 / 142.768	1.131 / 16.578	0.235 / 52.925	0.524 / -154.164
3.000GHz	0.651 / 136.010	1.046 / 12.534	0.259 / 51.670	0.552 / -159.569

VCE = 2V, ICC = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.578 / -119.879	7.653 / 103.398	0.082 / 37.958	0.500 / -71.212
600.0MHz	0.549 / -143.483	5.432 / 89.889	0.091 / 36.100	0.400 / -83.634
800.0MHz	0.528 / -157.619	4.195 / 79.556	0.096 / 37.648	0.356 / -92.729
1.000GHz	0.535 / -169.438	3.438 / 70.460	0.103 / 40.627	0.336 / -100.400
1.200GHz	0.538 / -175.388	2.911 / 63.830	0.112 / 44.291	0.317 / -107.789
1.400GHz	0.544 / 178.962	2.514 / 57.589	0.123 / 47.937	0.321 / -114.585
1.600GHz	0.555 / 171.808	2.230 / 50.906	0.136 / 50.699	0.331 / -121.697
1.800GHz	0.569 / 165.900	2.006 / 45.136	0.151 / 52.912	0.345 / -128.380
2.000GHz	0.573 / 160.306	1.815 / 39.137	0.168 / 54.080	0.364 / -135.075
2.200GHz	0.579 / 154.877	1.655 / 34.004	0.188 / 54.638	0.386 / -141.316
2.400GHz	0.600 / 149.345	1.517 / 28.912	0.208 / 54.359	0.409 / -146.849
2.600GHz	0.617 / 143.550	1.400 / 23.998	0.230 / 53.452	0.432 / -152.294
2.800GHz	0.625 / 138.361	1.307 / 19.151	0.253 / 51.943	0.460 / -157.687
3.000GHz	0.643 / 132.399	1.209 / 15.219	0.275 / 50.276	0.489 / -162.524

VCE = 2V, ICC = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.547 / -133.409	8.452 / 99.272	0.071 / 40.282	0.423 / -78.837
600.0MHz	0.524 / -153.034	5.895 / 87.168	0.081 / 41.564	0.339 / -90.984
800.0MHz	0.519 / -166.145	4.511 / 77.930	0.090 / 44.712	0.305 / -99.819
1.000GHz	0.527 / -175.972	3.684 / 69.505	0.100 / 47.875	0.291 / -107.247
1.200GHz	0.539 / 179.134	3.115 / 63.300	0.113 / 51.159	0.275 / -114.599
1.400GHz	0.539 / 173.007	2.682 / 57.552	0.127 / 53.567	0.282 / -121.102
1.600GHz	0.546 / 167.613	2.383 / 51.303	0.143 / 55.041	0.294 / -127.796
1.800GHz	0.563 / 161.753	2.138 / 46.010	0.161 / 55.975	0.309 / -134.050
2.000GHz	0.568 / 156.179	1.939 / 40.243	0.179 / 56.074	0.330 / -140.292
2.200GHz	0.575 / 151.615	1.767 / 35.155	0.199 / 55.686	0.351 / -145.970
2.400GHz	0.593 / 146.019	1.623 / 30.295	0.219 / 54.735	0.375 / -151.030
2.600GHz	0.611 / 140.771	1.494 / 25.304	0.241 / 53.292	0.398 / -155.904
2.800GHz	0.619 / 135.810	1.402 / 20.858	0.263 / 51.421	0.426 / -160.863
3.000GHz	0.634 / 130.374	1.298 / 16.537	0.284 / 49.517	0.455 / -165.229

VCE = 2V, ICC = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.521 / -146.164	9.137 / 95.317	0.062 / 44.577	0.349 / -87.825
600.0MHz	0.527 / -163.010	6.272 / 84.561	0.073 / 48.331	0.285 / -99.816
800.0MHz	0.513 / -173.956	4.778 / 76.294	0.086 / 52.092	0.261 / -108.509
1.000GHz	0.537 / 177.718	3.896 / 68.573	0.100 / 54.754	0.254 / -115.587
1.200GHz	0.531 / 173.859	3.287 / 62.960	0.116 / 56.848	0.242 / -123.078
1.400GHz	0.541 / 168.325	2.826 / 57.516	0.132 / 58.098	0.251 / -128.962
1.600GHz	0.551 / 163.043	2.504 / 51.543	0.150 / 58.454	0.265 / -135.180
1.800GHz	0.566 / 158.206	2.253 / 46.460	0.169 / 58.368	0.281 / -140.832
2.000GHz	0.566 / 153.384	2.044 / 41.035	0.189 / 57.544	0.302 / -146.467
2.200GHz	0.575 / 148.735	1.856 / 36.133	0.209 / 56.476	0.324 / -151.535
2.400GHz	0.591 / 143.366	1.709 / 31.554	0.229 / 54.971	0.347 / -156.014
2.600GHz	0.608 / 137.919	1.581 / 26.873	0.251 / 53.204	0.369 / -160.361
2.800GHz	0.615 / 133.356	1.482 / 22.291	0.272 / 50.989	0.397 / -164.767
3.000GHz	0.628 / 128.264	1.383 / 18.270	0.292 / 48.900	0.426 / -168.676



VCE = 2V, ICC = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.515 / -157.302	9.582 / 91.600	0.054 / 51.048	0.285 / -98.047
600.0MHz	0.529 / -171.582	6.504 / 82.271	0.069 / 55.727	0.240 / -110.046
800.0MHz	0.524 / 179.396	4.938 / 74.790	0.084 / 58.730	0.227 / -118.277
1.000GHz	0.536 / 171.898	4.020 / 67.582	0.101 / 60.638	0.226 / -124.743
1.200GHz	0.541 / 168.760	3.382 / 62.386	0.119 / 61.368	0.218 / -132.279
1.400GHz	0.544 / 164.592	2.912 / 57.375	0.138 / 61.677	0.230 / -137.479
1.600GHz	0.550 / 158.756	2.579 / 51.645	0.157 / 61.034	0.245 / -142.969
1.800GHz	0.569 / 154.674	2.314 / 46.654	0.177 / 60.108	0.262 / -148.020
2.000GHz	0.572 / 150.140	2.100 / 41.516	0.197 / 58.692	0.283 / -152.952
2.200GHz	0.575 / 146.212	1.915 / 36.787	0.218 / 57.054	0.305 / -157.429
2.400GHz	0.594 / 140.673	1.766 / 32.363	0.238 / 55.179	0.328 / -161.286
2.600GHz	0.608 / 135.941	1.625 / 27.818	0.259 / 53.028	0.350 / -165.053
2.800GHz	0.616 / 131.104	1.532 / 23.370	0.280 / 50.692	0.377 / -168.953
3.000GHz	0.631 / 126.095	1.421 / 19.641	0.300 / 48.453	0.406 / -172.459

VCE = 2V, ICC = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.529 / -166.475	9.562 / 89.309	0.051 / 55.229	0.249 / -105.111
600.0MHz	0.541 / -177.321	6.463 / 80.784	0.067 / 60.090	0.217 / -116.616
800.0MHz	0.537 / 174.961	4.891 / 73.597	0.084 / 62.567	0.211 / -124.285
1.000GHz	0.547 / 168.264	3.980 / 66.780	0.103 / 63.542	0.213 / -130.209
1.200GHz	0.553 / 166.244	3.352 / 61.700	0.121 / 63.845	0.208 / -137.605
1.400GHz	0.556 / 161.596	2.878 / 56.827	0.141 / 63.593	0.221 / -142.225
1.600GHz	0.567 / 156.790	2.548 / 51.222	0.161 / 62.433	0.238 / -147.242
1.800GHz	0.579 / 152.539	2.290 / 46.537	0.182 / 61.158	0.256 / -151.902
2.000GHz	0.585 / 148.125	2.076 / 41.283	0.202 / 59.401	0.277 / -156.475
2.200GHz	0.589 / 144.069	1.892 / 36.739	0.223 / 57.527	0.299 / -160.627
2.400GHz	0.606 / 138.904	1.746 / 32.244	0.243 / 55.441	0.323 / -164.217
2.600GHz	0.620 / 133.856	1.613 / 27.868	0.264 / 53.156	0.344 / -167.715
2.800GHz	0.636 / 129.602	1.514 / 23.620	0.285 / 50.674	0.372 / -171.426
3.000GHz	0.638 / 124.340	1.412 / 19.424	0.304 / 48.192	0.400 / -174.633

VCE = 2V, ICC = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.548 / -173.006	8.954 / 87.043	0.049 / 58.899	0.218 / -109.471
600.0MHz	0.568 / 178.928	6.034 / 78.992	0.066 / 62.810	0.197 / -120.077
800.0MHz	0.562 / 171.419	4.566 / 72.105	0.084 / 64.993	0.197 / -126.869
1.000GHz	0.578 / 165.444	3.706 / 65.277	0.103 / 65.462	0.204 / -132.112
1.200GHz	0.588 / 163.142	3.126 / 60.283	0.123 / 65.439	0.201 / -139.408
1.400GHz	0.587 / 158.766	2.684 / 55.416	0.143 / 64.943	0.217 / -143.643
1.600GHz	0.599 / 154.543	2.374 / 49.872	0.163 / 63.653	0.236 / -148.453
1.800GHz	0.610 / 150.086	2.136 / 45.139	0.184 / 62.151	0.256 / -152.955
2.000GHz	0.619 / 146.079	1.938 / 39.847	0.205 / 60.180	0.278 / -157.519
2.200GHz	0.617 / 141.642	1.768 / 35.354	0.227 / 58.158	0.302 / -161.616
2.400GHz	0.636 / 137.186	1.625 / 31.052	0.247 / 55.910	0.326 / -165.174
2.600GHz	0.647 / 132.175	1.501 / 26.575	0.269 / 53.525	0.349 / -168.717
2.800GHz	0.654 / 128.058	1.407 / 22.379	0.289 / 50.829	0.376 / -172.384
3.000GHz	0.660 / 122.385	1.315 / 18.426	0.309 / 48.278	0.405 / -175.639

VCE = 2V, ICC = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.672 / 179.326	5.841 / 82.012	0.046 / 59.275	0.157 / -105.088
600.0MHz	0.695 / 172.022	3.913 / 73.863	0.063 / 64.561	0.159 / -112.511
800.0MHz	0.690 / 165.963	2.959 / 66.530	0.081 / 67.032	0.175 / -118.082
1.000GHz	0.701 / 160.217	2.404 / 59.307	0.100 / 67.959	0.193 / -123.340
1.200GHz	0.706 / 157.907	2.024 / 53.793	0.121 / 68.207	0.202 / -130.435
1.400GHz	0.708 / 154.176	1.735 / 48.438	0.143 / 67.611	0.227 / -135.679
1.600GHz	0.713 / 149.211	1.537 / 42.829	0.164 / 66.288	0.253 / -141.489
1.800GHz	0.728 / 144.795	1.382 / 37.802	0.187 / 64.649	0.279 / -147.030
2.000GHz	0.728 / 140.428	1.250 / 32.719	0.210 / 62.538	0.308 / -152.591
2.200GHz	0.722 / 135.974	1.138 / 28.477	0.234 / 60.182	0.337 / -157.747
2.400GHz	0.735 / 131.027	1.047 / 24.333	0.256 / 57.649	0.366 / -162.249
2.600GHz	0.749 / 126.422	0.967 / 20.363	0.279 / 54.911	0.391 / -166.728
2.800GHz	0.751 / 122.454	0.908 / 16.693	0.301 / 51.905	0.421 / -171.245
3.000GHz	0.757 / 116.809	0.846 / 14.087	0.322 / 49.099	0.452 / -175.223

VCE = 1V, ICC = 3mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.644 / -105.310	5.858 / 108.470	0.110 / 35.782	0.600 / -64.458
600.0MHz	0.593 / -130.227	4.299 / 92.812	0.119 / 28.802	0.488 / -78.027
800.0MHz	0.561 / -147.136	3.359 / 80.949	0.121 / 26.438	0.432 / -87.990
1.000GHz	0.560 / -160.439	2.786 / 70.762	0.122 / 26.865	0.405 / -96.332
1.200GHz	0.562 / -166.815	2.367 / 62.986	0.122 / 29.344	0.383 / -104.210
1.400GHz	0.567 / -174.867	2.043 / 56.007	0.125 / 33.353	0.384 / -111.490
1.600GHz	0.574 / 177.463	1.816 / 48.701	0.130 / 37.765	0.392 / -119.059
1.800GHz	0.589 / 170.772	1.633 / 42.482	0.140 / 42.247	0.406 / -126.209
2.000GHz	0.599 / 164.469	1.481 / 36.129	0.152 / 46.046	0.425 / -133.282
2.200GHz	0.607 / 158.924	1.346 / 30.530	0.169 / 48.849	0.446 / -140.006
2.400GHz	0.622 / 152.270	1.233 / 25.268	0.189 / 50.393	0.469 / -145.977
2.600GHz	0.642 / 146.293	1.130 / 20.350	0.210 / 50.811	0.491 / -151.931
2.800GHz	0.653 / 141.073	1.057 / 15.800	0.234 / 50.342	0.519 / -157.719
3.000GHz	0.660 / 134.271	0.973 / 11.791	0.257 / 49.259	0.547 / -162.888

VCE = 1V, ICC = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.577 / -126.176	7.131 / 101.159	0.086 / 36.174	0.469 / -76.264
600.0MHz	0.557 / -148.148	5.027 / 87.715	0.094 / 34.381	0.376 / -89.064
800.0MHz	0.546 / -163.079	3.862 / 77.790	0.100 / 36.067	0.338 / -98.378
1.000GHz	0.554 / -172.891	3.162 / 68.719	0.107 / 39.053	0.321 / -106.204
1.200GHz	0.560 / -178.240	2.681 / 62.118	0.116 / 42.691	0.305 / -113.869
1.400GHz	0.570 / 175.045	2.305 / 55.856	0.127 / 46.207	0.312 / -120.502
1.600GHz	0.572 / 168.651	2.048 / 49.421	0.139 / 48.728	0.324 / -127.517
1.800GHz	0.588 / 162.664	1.842 / 43.585	0.155 / 50.822	0.340 / -133.994
2.000GHz	0.594 / 157.154	1.669 / 37.718	0.172 / 51.966	0.360 / -140.410
2.200GHz	0.595 / 152.329	1.521 / 32.504	0.192 / 52.484	0.383 / -146.373
2.400GHz	0.616 / 146.109	1.395 / 27.559	0.211 / 52.233	0.407 / -151.597
2.600GHz	0.628 / 140.728	1.289 / 22.913	0.233 / 51.313	0.429 / -156.782
2.800GHz	0.645 / 135.954	1.203 / 18.274	0.255 / 49.868	0.458 / -161.866
3.000GHz	0.652 / 129.916	1.116 / 14.204	0.277 / 48.207	0.486 / -166.425

VCE = 1V, ICC = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.556 / -142.416	7.716 / 96.553	0.074 / 38.215	0.387 / -85.113
600.0MHz	0.549 / -159.859	5.338 / 84.812	0.083 / 40.234	0.314 / -97.719
800.0MHz	0.552 / -171.318	4.082 / 75.870	0.092 / 43.492	0.287 / -106.735
1.000GHz	0.564 / 178.949	3.330 / 67.562	0.103 / 46.984	0.279 / -114.096
1.200GHz	0.566 / 175.057	2.815 / 61.481	0.116 / 49.974	0.266 / -121.767
1.400GHz	0.571 / 169.246	2.421 / 55.715	0.131 / 52.394	0.276 / -127.978
1.600GHz	0.577 / 163.612	2.148 / 49.490	0.147 / 53.869	0.291 / -134.373
1.800GHz	0.593 / 158.157	1.927 / 44.084	0.165 / 54.580	0.308 / -140.291
2.000GHz	0.592 / 153.456	1.750 / 38.452	0.184 / 54.465	0.329 / -146.158
2.200GHz	0.602 / 148.575	1.594 / 33.353	0.204 / 54.020	0.352 / -151.540
2.400GHz	0.621 / 143.044	1.468 / 28.665	0.224 / 53.015	0.376 / -156.212
2.600GHz	0.631 / 137.817	1.351 / 24.276	0.245 / 51.561	0.399 / -160.853
2.800GHz	0.648 / 133.295	1.266 / 19.594	0.267 / 49.660	0.427 / -165.471
3.000GHz	0.657 / 127.185	1.183 / 15.495	0.287 / 47.758	0.456 / -169.600

VCE = 1V, ICC = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.568 / -154.469	7.929 / 92.275	0.063 / 42.615	0.315 / -94.856
600.0MHz	0.559 / -169.312	5.407 / 82.051	0.075 / 46.621	0.263 / -107.061
800.0MHz	0.565 / -179.198	4.115 / 73.808	0.088 / 50.635	0.248 / -115.509
1.000GHz	0.581 / 173.068	3.345 / 66.154	0.102 / 53.562	0.247 / -122.315
1.200GHz	0.582 / 169.364	2.824 / 60.509	0.118 / 55.694	0.239 / -129.882
1.400GHz	0.582 / 164.717	2.428 / 54.963	0.136 / 57.076	0.253 / -135.387
1.600GHz	0.591 / 158.779	2.152 / 49.010	0.154 / 57.355	0.269 / -141.221
1.800GHz	0.610 / 154.346	1.934 / 44.010	0.174 / 57.230	0.288 / -146.593
2.000GHz	0.616 / 149.857	1.752 / 38.492	0.193 / 56.350	0.310 / -151.874
2.200GHz	0.615 / 145.307	1.602 / 33.622	0.214 / 55.181	0.333 / -156.727
2.400GHz	0.635 / 139.897	1.472 / 29.038	0.234 / 53.682	0.358 / -160.904
2.600GHz	0.644 / 134.481	1.358 / 24.776	0.256 / 51.796	0.381 / -165.040
2.800GHz	0.655 / 129.710	1.279 / 20.472	0.277 / 49.550	0.408 / -169.286
3.000GHz	0.663 / 125.057	1.192 / 16.357	0.297 / 47.392	0.437 / -172.964

VCE = 1V, Icc = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.654 / -173.705	5.989 / 84.308	0.055 / 46.352	0.210 / -106.610
600.0MHz	0.665 / 177.080	4.024 / 75.027	0.069 / 53.221	0.196 / -116.120
800.0MHz	0.661 / 169.947	3.041 / 67.152	0.084 / 57.297	0.202 / -122.365
1.000GHz	0.686 / 163.659	2.466 / 59.292	0.102 / 59.818	0.215 / -127.647
1.200GHz	0.691 / 160.711	2.078 / 53.585	0.120 / 61.272	0.219 / -134.566
1.400GHz	0.688 / 156.691	1.780 / 48.032	0.140 / 61.846	0.241 / -139.433
1.600GHz	0.697 / 151.643	1.572 / 42.079	0.161 / 61.384	0.265 / -144.820
1.800GHz	0.710 / 147.439	1.411 / 36.973	0.182 / 60.471	0.290 / -149.962
2.000GHz	0.713 / 142.432	1.276 / 31.640	0.204 / 58.938	0.318 / -155.138
2.200GHz	0.709 / 137.908	1.159 / 27.047	0.227 / 57.184	0.345 / -159.988
2.400GHz	0.723 / 133.062	1.066 / 22.847	0.249 / 55.071	0.373 / -164.214
2.600GHz	0.734 / 128.171	0.977 / 19.032	0.271 / 52.692	0.398 / -168.493
2.800GHz	0.737 / 123.132	0.919 / 14.989	0.293 / 49.962	0.428 / -172.787
3.000GHz	0.750 / 117.874	0.858 / 12.368	0.314 / 47.413	0.458 / -176.607

VCE = 1V, Icc = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.721 / -179.478	4.797 / 78.493	0.050 / 51.788	0.170 / -110.993
600.0MHz	0.730 / 173.053	3.217 / 68.503	0.066 / 58.196	0.175 / -118.115
800.0MHz	0.730 / 166.938	2.424 / 59.527	0.083 / 62.165	0.192 / -123.086
1.000GHz	0.748 / 161.565	1.961 / 50.418	0.102 / 64.165	0.214 / -127.870
1.200GHz	0.754 / 158.954	1.638 / 43.991	0.123 / 65.137	0.227 / -134.537
1.400GHz	0.759 / 154.578	1.398 / 37.293	0.144 / 65.177	0.256 / -139.421
1.600GHz	0.770 / 149.210	1.226 / 30.543	0.167 / 64.301	0.286 / -145.057
1.800GHz	0.784 / 145.046	1.086 / 24.842	0.191 / 62.884	0.317 / -150.513
2.000GHz	0.788 / 139.980	0.973 / 19.362	0.214 / 60.914	0.349 / -156.068
2.200GHz	0.790 / 135.524	0.867 / 15.004	0.239 / 58.683	0.382 / -161.353
2.400GHz	0.798 / 130.203	0.777 / 11.025	0.262 / 56.121	0.413 / -165.979
2.600GHz	0.813 / 125.325	0.703 / 8.084	0.286 / 53.318	0.440 / -170.748
2.800GHz	0.805 / 120.257	0.650 / 4.996	0.309 / 50.070	0.471 / -175.458
3.000GHz	0.807 / 115.017	0.596 / 3.191	0.330 / 47.231	0.501 / -179.543

VCE = 1V, Icc = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.746 / 176.733	4.095 / 75.635	0.049 / 55.347	0.160 / -118.629
600.0MHz	0.760 / 170.342	2.741 / 64.983	0.066 / 61.977	0.176 / -124.110
800.0MHz	0.759 / 165.157	2.068 / 55.473	0.085 / 65.120	0.201 / -128.092
1.000GHz	0.783 / 159.409	1.664 / 46.210	0.105 / 66.622	0.229 / -132.503
1.200GHz	0.789 / 157.127	1.400 / 38.991	0.127 / 67.092	0.247 / -139.298
1.400GHz	0.792 / 152.735	1.183 / 32.033	0.150 / 66.614	0.280 / -144.069
1.600GHz	0.801 / 147.918	1.037 / 24.956	0.174 / 65.183	0.313 / -149.674
1.800GHz	0.819 / 143.132	0.910 / 19.648	0.199 / 63.384	0.347 / -155.278
2.000GHz	0.817 / 138.356	0.808 / 14.168	0.224 / 61.003	0.381 / -160.897
2.200GHz	0.816 / 133.675	0.714 / 9.950	0.249 / 58.375	0.415 / -166.243
2.400GHz	0.825 / 128.499	0.636 / 7.089	0.273 / 55.472	0.445 / -170.973
2.600GHz	0.834 / 123.787	0.572 / 4.139	0.297 / 52.366	0.471 / -175.735
2.800GHz	0.829 / 118.722	0.525 / 2.928	0.320 / 48.993	0.501 / 179.543
3.000GHz	0.828 / 113.267	0.481 / 2.742	0.341 / 45.904	0.529 / 175.461

VCE = 1V, Icc = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.774 / 174.715	3.526 / 73.338	0.049 / 58.247	0.168 / -130.286
600.0MHz	0.792 / 169.237	2.352 / 62.374	0.067 / 64.049	0.190 / -133.690
800.0MHz	0.789 / 163.466	1.781 / 52.517	0.087 / 66.820	0.220 / -136.430
1.000GHz	0.811 / 158.330	1.434 / 42.855	0.110 / 67.620	0.251 / -140.092
1.200GHz	0.810 / 155.769	1.205 / 35.175	0.132 / 67.704	0.274 / -146.686
1.400GHz	0.814 / 151.214	1.020 / 28.565	0.157 / 66.828	0.309 / -151.189
1.600GHz	0.826 / 146.506	0.885 / 21.520	0.182 / 65.023	0.345 / -156.594
1.800GHz	0.839 / 142.046	0.775 / 16.275	0.208 / 62.764	0.379 / -162.005
2.000GHz	0.833 / 136.975	0.681 / 11.186	0.234 / 60.021	0.414 / -167.512
2.200GHz	0.828 / 132.399	0.602 / 8.105	0.259 / 57.123	0.446 / -172.693
2.400GHz	0.837 / 127.426	0.537 / 5.850	0.282 / 54.021	0.475 / -177.272
2.600GHz	0.849 / 122.067	0.481 / 4.753	0.306 / 50.765	0.498 / 178.121
2.800GHz	0.840 / 117.703	0.444 / 3.473	0.328 / 47.317	0.525 / 173.602
3.000GHz	0.837 / 112.141	0.422 / 5.548	0.348 / 44.126	0.551 / 169.764