

NPN Planer RF TRANSISTOR

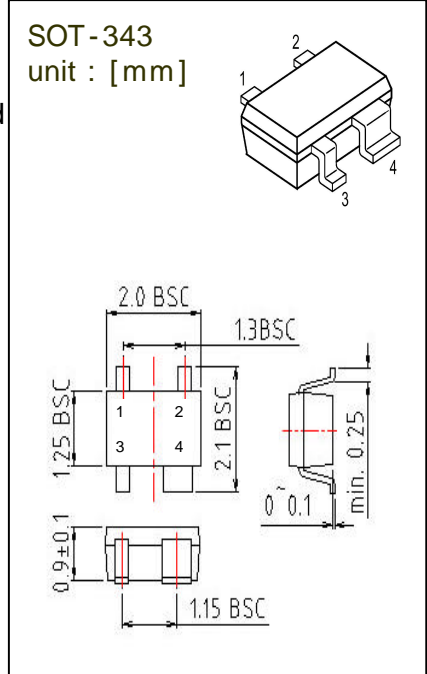
DESCRIPTION

The TARF1302Z 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, $V_{CE}=2V$, $I_c=5mA$
- o High Gain
MSG = 20dB TYP. @ f=1.8GHz, $V_{CE}=2V$, $I_c=20mA$
- o High Transition Frequency
 $f_T = 24GHz$ TYP. @ f=1.8GHz, $V_{CE}=3V$, $I_c=30mA$



PIN CONFIGURATION

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

MARKING : BB1

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)		35	mA
P_T	Total Power Dissipation	T_s 100	160	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 _{CB0}	Collector-Base Voltage	I _{CE} = 100 μ A, I _E = 0	7	12		V
V _{CEO}	Collector-Emitter Voltage	I _{CE} = 100 μ A, I _B = 0	4.5	5		V
I _{CB0}	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 = 20mA	200	300		
f _T	Transition Frequency	V _{CE} = 3V, I _C = 30mA	20	24		GHz
C _{CB}	Collector-Base Capacitance	V _{CB} = 2V, f = 1MHz		0.22		pF

Performance Characteristics

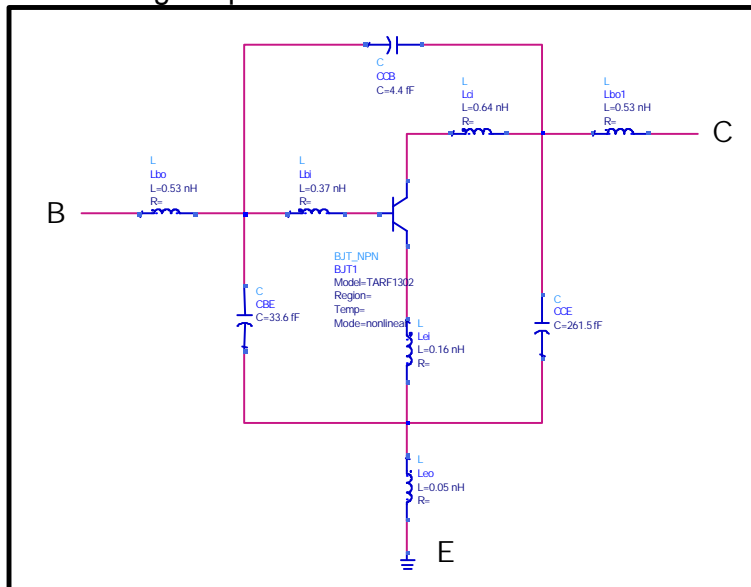
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
		V _{CE} = 2V @ f = 1.8 GHz				
[S ₂₁] ²	Insertion Power Gain	I _C =5mA, (Z _s = Z _L = 50)		14		dB
		I _C =20mA, (Z _s = Z _L = 50)		16		
MSG	Maximum Stable Gain	I _C =5mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		17.5		dB
		I _C =20mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		20		
NF _{min}	Minimum Noise Figure	I _C =5mA, (Z _s = Z _{sopt})		1.1		dB
r _n	Noise Resistance	I _C =5mA, (Z _s = Z _{sopt})		0.13		
G _A	Associated Gain	I _C =5mA, (Z _s = Z _{sopt})		15		dB
		I _C =20mA, (Z _s = Z _{sopt})		17		
P _{-1dB}	1dB Compression point	I _C =20mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		12		dBm
OIP ₃	Third order intercept point	I _C =20mA, (Z _s =Z _{sopt} , Z _L =Z _{Lopt})		22		dBm

SPICE Parameters (Gummel-Poon Model)

Transistor Chip Data

IS = 9.7 E-17 A	BF = 560	NF = 0.9895
VAF = 80.68 V	IKF = 0.58 A	ISE = 1.41 E-15 A
NE = 1.53	BR = 11.05	NR = 0.9863
VAR = 2.9 V	IKR = 0.0993 A	ISC = 2.95 E-17 A
NC = 1.091	RB = 9.5 Ohm	IRB = 1.5 E-5 A
RBM = 2.8 Ohm	RE = 0.5 Ohm	RC = 0.9 Ohm
CJE = 7.6 E-13 F	VJE = 0.699 V	MJE = 0.1661
CJC = 2.78 E-13 F	VJC = 0.5993 V	MJC = 0.0343
XCJC = 0.37	CJS = -	VJS = 0.75V
MJS = -	FC = 0.91	XTF = 4.8
TF = 4.1 E-12 sec	VTF = 0.8988 V	ITF = 0.2131 A
PTF = 15.963	TR = 4.7 E-12 sec	EG = 1.11 eV
XTB = 1	XTI = 3	

Package Equivalent Circuit:

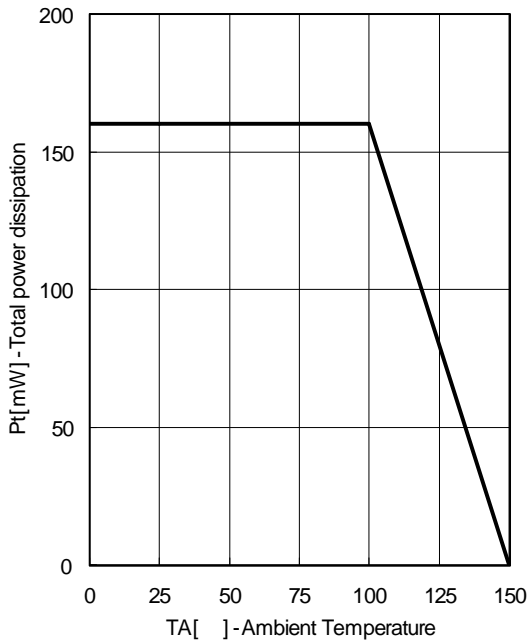


C_{CB}	=	4.4	fF
C_{BE}	=	33.6	fF
C_{CE}	=	261.5	fF
L_{ci}	=	0.64	nH
L_{co}	=	0.53	nH
L_{bi}	=	0.37	nH
L_{bo}	=	0.53	nH
L_{ei}	=	0.16	nH
L_{eo}	=	0.05	nH

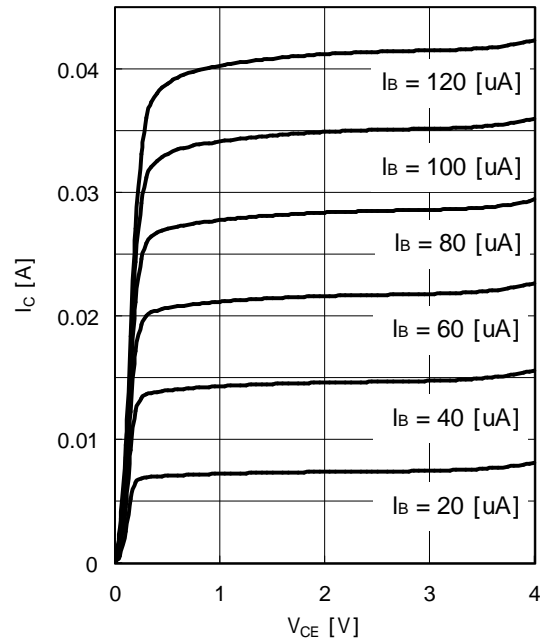
Valid up to 6GHz

To avoid high complexity of the package equivalent circuit, both leads are combined in one electrical connection. The SOT-343 package has two emitter leads.

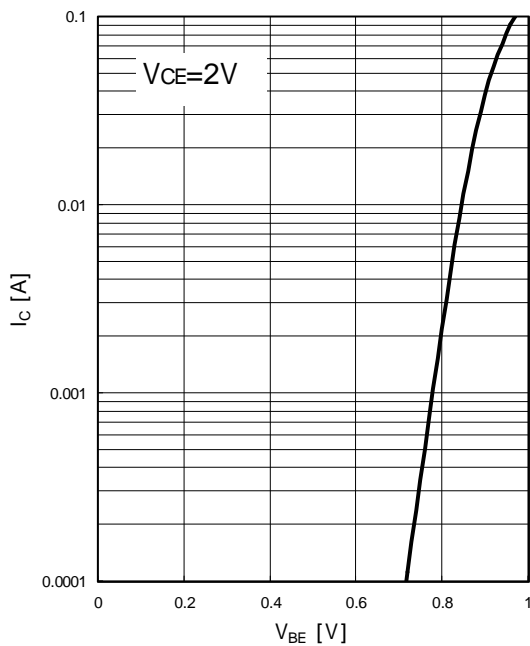
Total power dissipation $P_t = f(T_A)$
 ($T_A = 25$)



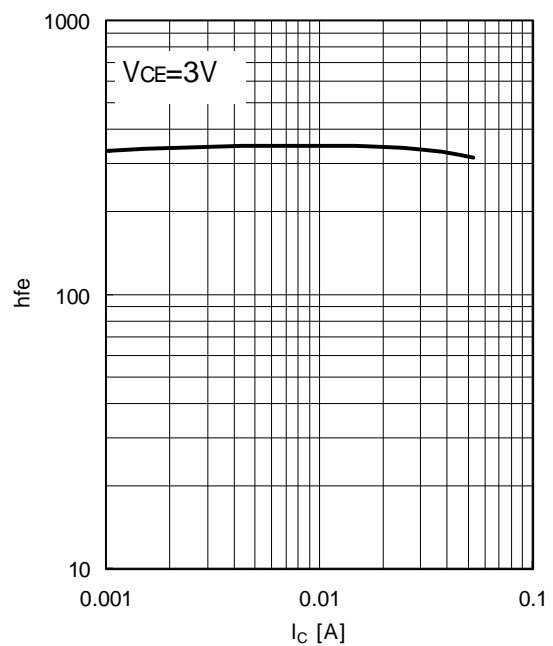
ICE vs. VCE



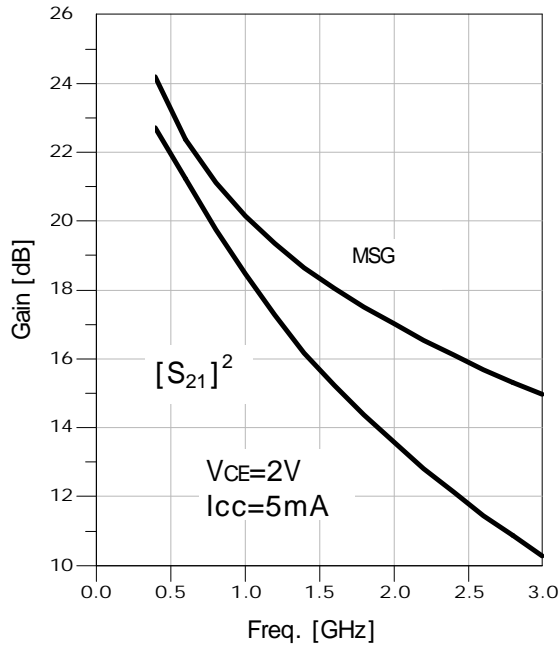
Icc vs. VBE



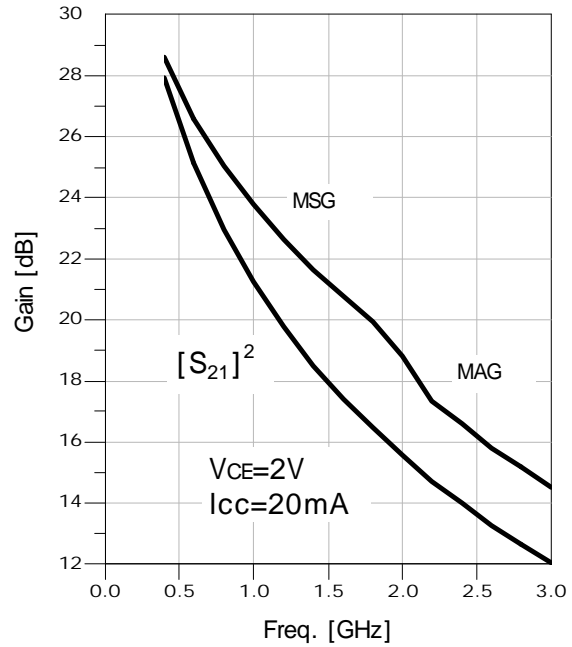
hfe vs. Icc



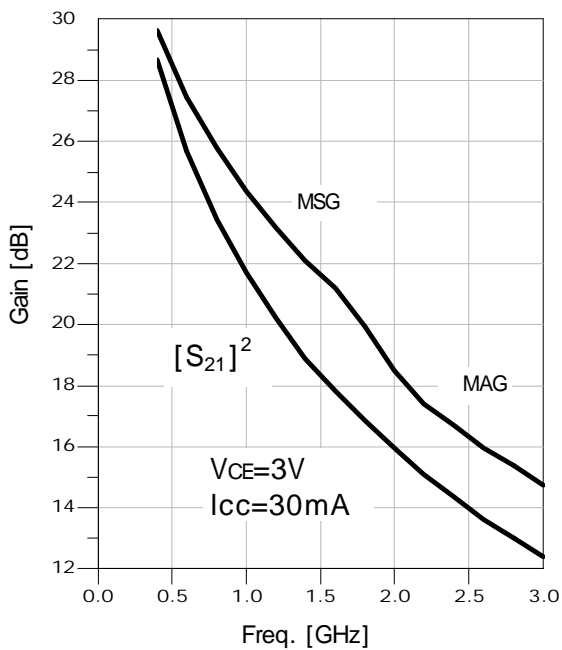
Power Gain : MSG, MAG, $[S_{21}]^2 = f(\text{freq})$



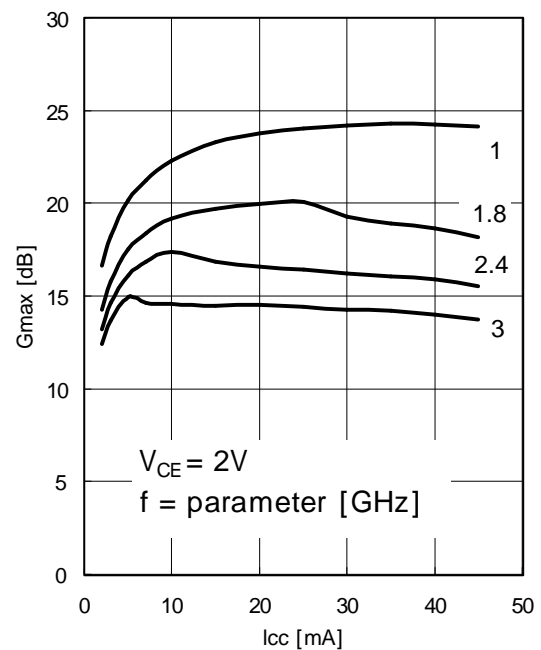
Power Gain : MSG, MAG, $[S_{21}]^2 = f(\text{freq})$



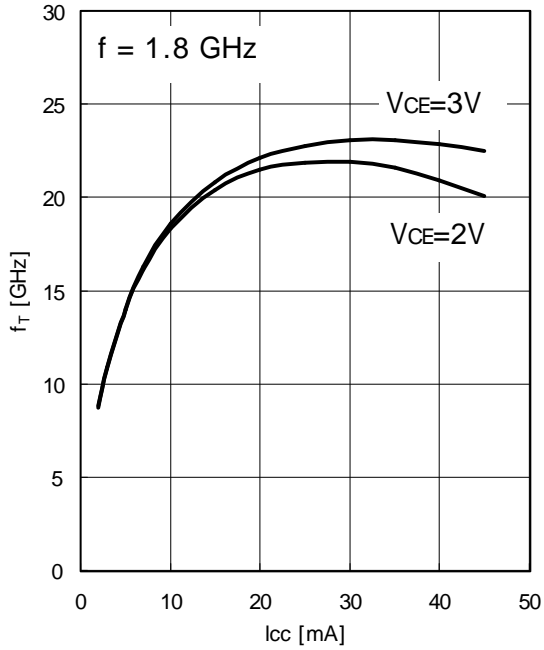
Power Gain : MSG, MAG, $[S_{21}]^2 = f(\text{freq})$



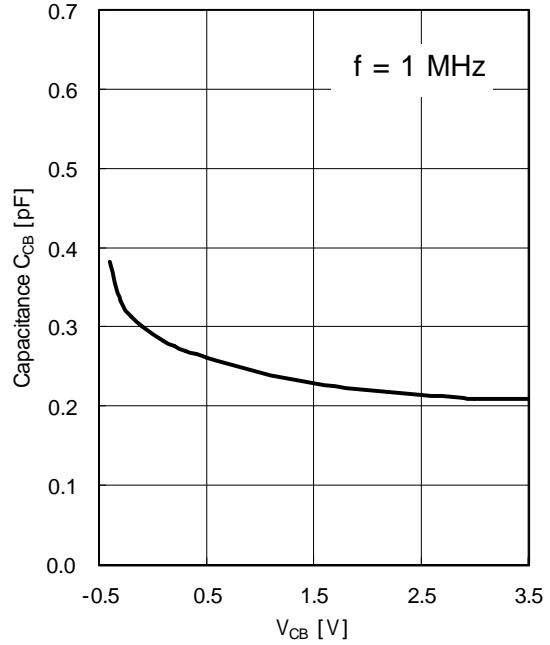
Power Gain : MAG, MSG = f(I_{CE})



Transition Frequency : f_T vs. I_{CC}

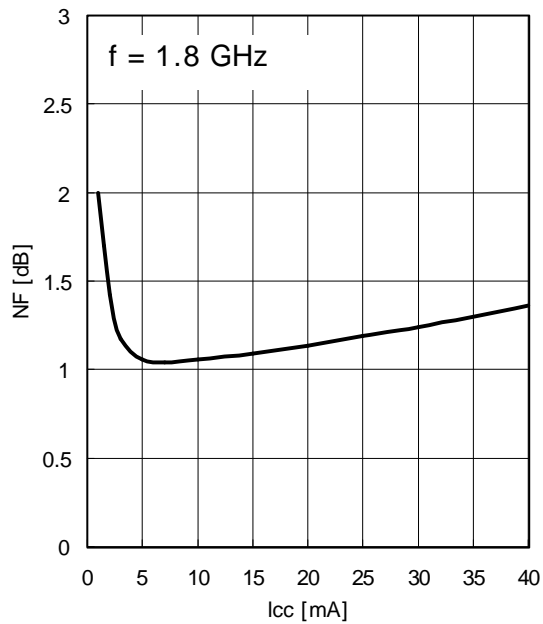


C_{CB} vs. V_{CB}



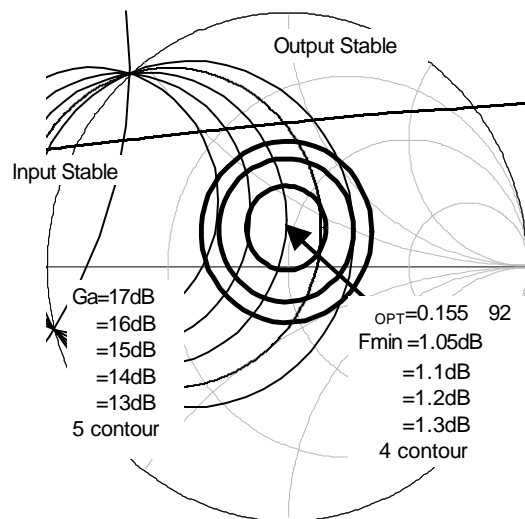
F_{min} vs. I_{CC}

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



Noise Figure Contours & Constant Gain

$f = 1.8 \text{ GHz}$, $V_{CE} = 2V$, $I_{CC} = 5\text{mA}$



Common Emitter S-Parameter Data

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

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.898 / -41.560	6.675 / 149.283	0.059 / 64.788	0.926 / -23.059
600.0MHz	0.856 / -59.558	6.110 / 136.904	0.081 / 54.761	0.850 / -32.081
800.0MHz	0.800 / -76.585	5.536 / 125.781	0.098 / 45.223	0.780 / -40.256
1.000GHz	0.763 / -91.595	5.054 / 115.744	0.110 / 37.630	0.712 / -46.887
1.200GHz	0.737 / -103.267	4.600 / 107.898	0.118 / 31.374	0.647 / -51.998
1.400GHz	0.711 / -113.978	4.182 / 100.837	0.125 / 26.294	0.596 / -56.703
1.600GHz	0.688 / -124.691	3.846 / 93.377	0.129 / 21.464	0.550 / -61.578
1.800GHz	0.673 / -134.622	3.562 / 87.199	0.133 / 17.413	0.511 / -65.774
2.000GHz	0.658 / -143.309	3.295 / 80.603	0.135 / 13.427	0.478 / -70.630
2.200GHz	0.639 / -151.887	3.049 / 74.683	0.136 / 10.009	0.449 / -74.967
2.400GHz	0.637 / -161.056	2.860 / 68.917	0.137 / 6.760	0.424 / -79.073
2.600GHz	0.637 / -168.908	2.667 / 63.610	0.138 / 3.828	0.402 / -83.465
2.800GHz	0.646 / -176.457	2.520 / 58.284	0.138 / 0.972	0.384 / -88.213
3.000GHz	0.632 / 175.765	2.370 / 52.846	0.137 / -1.600	0.365 / -93.037

V_{CE} = 2V, I_{CC} = 3mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.886 / -49.562	9.374 / 144.687	0.057 / 61.717	0.892 / -28.494
600.0MHz	0.807 / -70.319	8.300 / 131.597	0.076 / 50.989	0.792 / -38.982
800.0MHz	0.753 / -87.397	7.310 / 120.100	0.089 / 41.672	0.704 / -47.903
1.000GHz	0.715 / -104.052	6.513 / 110.124	0.098 / 34.793	0.626 / -54.879
1.200GHz	0.693 / -115.373	5.819 / 102.581	0.103 / 29.289	0.552 / -59.970
1.400GHz	0.665 / -125.989	5.206 / 95.870	0.108 / 25.075	0.498 / -64.681
1.600GHz	0.653 / -136.289	4.735 / 88.854	0.111 / 21.149	0.451 / -69.630
1.800GHz	0.642 / -146.287	4.335 / 83.133	0.114 / 18.060	0.412 / -73.847
2.000GHz	0.630 / -154.179	3.980 / 76.896	0.115 / 15.012	0.380 / -78.805
2.200GHz	0.617 / -161.886	3.658 / 71.508	0.117 / 12.572	0.352 / -83.320
2.400GHz	0.619 / -170.777	3.405 / 66.193	0.117 / 10.136	0.329 / -87.645
2.600GHz	0.620 / -177.872	3.164 / 61.186	0.118 / 8.061	0.309 / -92.282
2.800GHz	0.625 / 174.846	2.980 / 56.121	0.119 / 5.925	0.293 / -97.538
3.000GHz	0.617 / 167.656	2.786 / 51.233	0.119 / 4.087	0.278 / -103.058

V_{CE} = 2V, I_{CC} = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.821 / -62.705	13.685 / 137.295	0.052 / 56.798	0.823 / -37.702
600.0MHz	0.738 / -86.109	11.507 / 123.364	0.067 / 45.931	0.691 / -50.101
800.0MHz	0.681 / -104.576	9.715 / 112.036	0.075 / 37.966	0.586 / -59.779
1.000GHz	0.649 / -121.045	8.392 / 102.657	0.081 / 32.578	0.501 / -67.077
1.200GHz	0.635 / -131.387	7.323 / 95.734	0.085 / 28.766	0.424 / -72.371
1.400GHz	0.620 / -141.674	6.444 / 89.677	0.088 / 26.034	0.371 / -77.304
1.600GHz	0.613 / -151.454	5.786 / 83.324	0.090 / 23.607	0.328 / -82.762
1.800GHz	0.607 / -160.076	5.244 / 78.171	0.093 / 21.811	0.292 / -87.504
2.000GHz	0.597 / -167.529	4.778 / 72.532	0.095 / 20.018	0.265 / -93.156
2.200GHz	0.593 / -174.287	4.364 / 67.665	0.097 / 18.523	0.241 / -98.533
2.400GHz	0.597 / 178.073	4.035 / 62.861	0.099 / 17.099	0.223 / -103.918
2.600GHz	0.595 / 172.091	3.731 / 58.322	0.101 / 15.978	0.208 / -109.667
2.800GHz	0.607 / 165.696	3.500 / 53.709	0.103 / 14.603	0.197 / -116.558
3.000GHz	0.606 / 158.926	3.266 / 49.288	0.104 / 13.212	0.189 / -123.678

V_{CE} = 2V, I_{CC} = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.762 / -73.351	16.754 / 131.869	0.048 / 53.303	0.763 / -44.772
600.0MHz	0.697 / -97.039	13.534 / 117.771	0.060 / 43.311	0.616 / -58.281
800.0MHz	0.635 / -116.326	11.132 / 106.959	0.066 / 36.626	0.506 / -68.376
1.000GHz	0.617 / -131.555	9.465 / 98.093	0.071 / 32.547	0.424 / -75.985
1.200GHz	0.607 / -141.297	8.165 / 91.679	0.074 / 30.030	0.349 / -81.623
1.400GHz	0.596 / -150.709	7.121 / 86.214	0.077 / 28.531	0.300 / -87.196
1.600GHz	0.589 / -159.842	6.359 / 80.259	0.080 / 26.875	0.261 / -93.403
1.800GHz	0.588 / -168.104	5.734 / 75.490	0.083 / 25.758	0.230 / -99.188
2.000GHz	0.583 / -174.330	5.208 / 70.096	0.086 / 24.587	0.207 / -105.918
2.200GHz	0.583 / 179.127	4.742 / 65.567	0.088 / 23.628	0.188 / -112.671
2.400GHz	0.586 / 172.158	4.375 / 61.069	0.091 / 22.555	0.174 / -119.466
2.600GHz	0.597 / 166.203	4.037 / 56.847	0.094 / 21.690	0.164 / -126.458
2.800GHz	0.603 / 160.872	3.776 / 52.337	0.097 / 20.374	0.158 / -134.683
3.000GHz	0.599 / 154.139	3.525 / 48.167	0.099 / 19.262	0.156 / -142.987

VCE = 2V, Icc = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.710 / -85.049	20.073 / 125.612	0.043 / 50.119	0.687 / -53.343
600.0MHz	0.641 / -110.417	15.521 / 111.917	0.052 / 41.709	0.531 / -67.841
800.0MHz	0.592 / -128.366	12.460 / 101.871	0.057 / 36.876	0.425 / -78.424
1.000GHz	0.580 / -142.864	10.422 / 93.680	0.061 / 34.502	0.349 / -86.657
1.200GHz	0.581 / -151.566	8.910 / 87.845	0.064 / 33.132	0.279 / -93.343
1.400GHz	0.572 / -159.774	7.726 / 82.842	0.068 / 32.419	0.238 / -100.063
1.600GHz	0.573 / -167.986	6.862 / 77.325	0.071 / 31.581	0.206 / -107.776
1.800GHz	0.575 / -174.614	6.165 / 72.878	0.075 / 31.128	0.180 / -115.419
2.000GHz	0.568 / 178.902	5.591 / 67.933	0.079 / 30.214	0.164 / -124.134
2.200GHz	0.564 / 173.257	5.081 / 63.581	0.082 / 29.556	0.151 / -132.755
2.400GHz	0.578 / 166.643	4.670 / 59.404	0.085 / 28.531	0.143 / -141.279
2.600GHz	0.584 / 161.027	4.307 / 55.373	0.089 / 27.667	0.139 / -149.161
2.800GHz	0.596 / 156.105	4.021 / 51.079	0.093 / 26.405	0.140 / -158.096
3.000GHz	0.600 / 149.667	3.746 / 47.218	0.096 / 25.097	0.145 / -166.181

VCE = 2V, Icc = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.643 / -100.222	23.230 / 118.826	0.038 / 47.691	0.596 / -63.368
600.0MHz	0.594 / -125.052	17.239 / 106.065	0.044 / 41.255	0.443 / -78.665
800.0MHz	0.560 / -141.355	13.548 / 96.999	0.049 / 38.734	0.348 / -90.078
1.000GHz	0.560 / -154.153	11.207 / 89.531	0.053 / 37.847	0.284 / -99.341
1.200GHz	0.566 / -161.557	9.506 / 84.397	0.057 / 37.650	0.222 / -108.024
1.400GHz	0.556 / -168.234	8.200 / 79.844	0.061 / 37.865	0.190 / -116.629
1.600GHz	0.553 / -175.215	7.268 / 74.720	0.065 / 37.318	0.166 / -126.651
1.800GHz	0.568 / 178.565	6.507 / 70.617	0.070 / 37.145	0.149 / -136.589
2.000GHz	0.563 / 172.873	5.889 / 65.904	0.074 / 36.152	0.141 / -146.834
2.200GHz	0.558 / 167.598	5.343 / 61.868	0.078 / 35.473	0.136 / -156.656
2.400GHz	0.577 / 162.149	4.903 / 57.876	0.082 / 34.518	0.136 / -165.271
2.600GHz	0.582 / 156.563	4.518 / 54.103	0.087 / 33.393	0.138 / -172.721
2.800GHz	0.597 / 152.021	4.217 / 50.020	0.091 / 31.922	0.145 / 179.710
3.000GHz	0.594 / 147.283	3.921 / 46.236	0.095 / 30.507	0.154 / 173.499

VCE = 2V, Icc = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.604 / -109.952	24.927 / 114.445	0.034 / 46.570	0.532 / -70.405
600.0MHz	0.572 / -133.920	18.060 / 102.526	0.040 / 42.447	0.389 / -86.189
800.0MHz	0.551 / -148.707	14.039 / 94.125	0.044 / 40.837	0.304 / -98.289
1.000GHz	0.546 / -160.730	11.541 / 87.175	0.048 / 41.075	0.248 / -108.349
1.200GHz	0.552 / -167.186	9.768 / 82.364	0.053 / 41.095	0.194 / -118.967
1.400GHz	0.552 / -173.304	8.398 / 78.043	0.058 / 41.592	0.168 / -128.843
1.600GHz	0.553 / -179.460	7.425 / 73.202	0.062 / 41.311	0.151 / -140.016
1.800GHz	0.561 / 174.395	6.644 / 69.275	0.067 / 40.872	0.140 / -150.934
2.000GHz	0.560 / 169.417	6.008 / 64.723	0.072 / 40.027	0.137 / -161.288
2.200GHz	0.560 / 164.782	5.442 / 60.804	0.077 / 39.165	0.137 / -170.642
2.400GHz	0.575 / 158.935	4.999 / 56.933	0.081 / 37.948	0.140 / -178.424
2.600GHz	0.582 / 154.076	4.606 / 53.218	0.086 / 36.799	0.144 / 175.073
2.800GHz	0.589 / 149.775	4.297 / 49.219	0.091 / 35.066	0.153 / 168.836
3.000GHz	0.599 / 144.090	3.992 / 45.562	0.095 / 33.558	0.165 / 163.910

VCE = 2V, Icc = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.581 / -118.155	25.805 / 111.286	0.032 / 46.788	0.484 / -75.635
600.0MHz	0.562 / -140.766	18.414 / 100.048	0.037 / 43.557	0.350 / -91.771
800.0MHz	0.546 / -155.170	14.222 / 92.131	0.041 / 43.069	0.274 / -104.478
1.000GHz	0.544 / -166.287	11.656 / 85.519	0.046 / 43.470	0.225 / -115.121
1.200GHz	0.551 / -171.358	9.833 / 80.969	0.050 / 43.907	0.177 / -127.164
1.400GHz	0.549 / -176.965	8.448 / 76.871	0.056 / 44.305	0.156 / -137.758
1.600GHz	0.552 / 176.987	7.463 / 72.104	0.060 / 44.265	0.144 / -149.500
1.800GHz	0.563 / 171.968	6.668 / 68.307	0.066 / 43.677	0.137 / -160.613
2.000GHz	0.559 / 167.006	6.027 / 63.861	0.071 / 42.632	0.137 / -170.445
2.200GHz	0.562 / 162.664	5.457 / 60.041	0.076 / 41.583	0.139 / -179.119
2.400GHz	0.577 / 156.915	5.010 / 56.290	0.081 / 40.327	0.145 / 173.823
2.600GHz	0.585 / 152.639	4.610 / 52.650	0.085 / 38.990	0.150 / 168.171
2.800GHz	0.597 / 148.039	4.300 / 48.684	0.090 / 37.133	0.160 / 162.741
3.000GHz	0.598 / 143.160	4.003 / 44.985	0.095 / 35.483	0.172 / 158.441

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

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.567 / -125.268	26.140 / 109.064	0.030 / 46.386	0.448 / -79.481
600.0MHz	0.555 / -145.571	18.460 / 98.331	0.035 / 44.533	0.323 / -95.846
800.0MHz	0.539 / -159.287	14.208 / 90.774	0.039 / 44.894	0.254 / -108.863
1.000GHz	0.552 / -169.911	11.608 / 84.371	0.044 / 45.325	0.210 / -119.914
1.200GHz	0.549 / -174.213	9.787 / 79.993	0.049 / 45.809	0.165 / -132.869
1.400GHz	0.549 / -179.319	8.399 / 75.985	0.054 / 46.364	0.149 / -143.886
1.600GHz	0.556 / 174.702	7.419 / 71.287	0.059 / 45.955	0.139 / -155.704
1.800GHz	0.564 / 169.777	6.628 / 67.636	0.065 / 45.408	0.135 / -166.742
2.000GHz	0.565 / 165.257	5.989 / 63.202	0.070 / 44.338	0.137 / -176.092
2.200GHz	0.563 / 160.901	5.421 / 59.406	0.075 / 43.257	0.141 / 175.685
2.400GHz	0.576 / 156.047	4.972 / 55.667	0.080 / 41.913	0.146 / 169.291
2.600GHz	0.596 / 151.887	4.576 / 52.148	0.085 / 40.482	0.153 / 164.073
2.800GHz	0.600 / 146.994	4.267 / 48.206	0.090 / 38.572	0.163 / 159.072
3.000GHz	0.598 / 141.735	3.964 / 44.565	0.095 / 36.804	0.175 / 155.351

V_{CE} = 2V, I_{CC} = 35mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.567 / -131.019	26.136 / 107.128	0.028 / 45.902	0.417 / -82.548
600.0MHz	0.548 / -149.769	18.312 / 96.876	0.033 / 45.508	0.300 / -99.278
800.0MHz	0.544 / -162.629	14.046 / 89.602	0.038 / 46.117	0.236 / -112.423
1.000GHz	0.539 / -172.622	11.464 / 83.396	0.043 / 47.011	0.197 / -123.785
1.200GHz	0.557 / -175.793	9.651 / 79.119	0.048 / 47.853	0.156 / -137.459
1.400GHz	0.557 / 178.340	8.274 / 75.209	0.054 / 47.885	0.142 / -148.770
1.600GHz	0.557 / 173.725	7.305 / 70.570	0.059 / 47.483	0.135 / -160.562
1.800GHz	0.570 / 168.050	6.524 / 66.951	0.064 / 46.921	0.132 / -171.301
2.000GHz	0.564 / 163.788	5.898 / 62.602	0.070 / 45.730	0.136 / 179.758
2.200GHz	0.568 / 159.421	5.333 / 58.815	0.075 / 44.594	0.141 / 171.978
2.400GHz	0.582 / 154.291	4.890 / 55.183	0.080 / 43.049	0.147 / 166.008
2.600GHz	0.598 / 150.064	4.498 / 51.603	0.085 / 41.564	0.153 / 161.188
2.800GHz	0.591 / 145.677	4.205 / 47.528	0.091 / 39.510	0.164 / 156.483
3.000GHz	0.607 / 140.831	3.903 / 44.151	0.095 / 37.764	0.177 / 153.174

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

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.556 / -134.187	25.796 / 105.450	0.027 / 46.328	0.389 / -85.330
600.0MHz	0.559 / -153.642	17.951 / 95.551	0.032 / 46.528	0.279 / -102.088
800.0MHz	0.547 / -165.885	13.721 / 88.526	0.037 / 47.360	0.221 / -115.478
1.000GHz	0.554 / -175.282	11.191 / 82.473	0.042 / 48.384	0.185 / -127.029
1.200GHz	0.558 / -178.603	9.409 / 78.299	0.047 / 48.970	0.148 / -141.465
1.400GHz	0.564 / 176.911	8.063 / 74.443	0.053 / 49.357	0.136 / -152.696
1.600GHz	0.566 / 171.247	7.116 / 69.913	0.058 / 48.735	0.131 / -164.449
1.800GHz	0.581 / 166.912	6.349 / 66.286	0.064 / 48.017	0.130 / -174.998
2.000GHz	0.570 / 162.295	5.736 / 61.937	0.069 / 46.778	0.134 / 176.501
2.200GHz	0.576 / 158.469	5.191 / 58.188	0.075 / 45.568	0.139 / 169.108
2.400GHz	0.594 / 153.303	4.759 / 54.548	0.080 / 43.931	0.146 / 163.452
2.600GHz	0.600 / 149.453	4.377 / 51.028	0.085 / 42.525	0.153 / 159.004
2.800GHz	0.611 / 145.176	4.081 / 47.070	0.090 / 40.374	0.164 / 154.670
3.000GHz	0.616 / 140.322	3.795 / 43.557	0.095 / 38.461	0.177 / 151.540

V_{CE} = 2V, I_{CC} = 45mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.555 / -138.896	25.091 / 103.883	0.027 / 45.391	0.362 / -88.007
600.0MHz	0.559 / -156.721	17.357 / 94.347	0.031 / 46.686	0.260 / -104.760
800.0MHz	0.551 / -168.254	13.250 / 87.540	0.036 / 48.252	0.207 / -118.279
1.000GHz	0.563 / -176.735	10.789 / 81.592	0.041 / 49.234	0.174 / -129.992
1.200GHz	0.573 / 179.710	9.064 / 77.499	0.047 / 50.111	0.140 / -144.846
1.400GHz	0.568 / 174.433	7.768 / 73.683	0.052 / 50.301	0.130 / -156.258
1.600GHz	0.575 / 169.475	6.848 / 69.205	0.058 / 49.697	0.127 / -167.774
1.800GHz	0.585 / 165.396	6.106 / 65.612	0.063 / 48.921	0.127 / -178.133
2.000GHz	0.584 / 160.908	5.516 / 61.303	0.069 / 47.625	0.132 / 173.785
2.200GHz	0.583 / 157.363	4.993 / 57.542	0.074 / 46.350	0.138 / 166.715
2.400GHz	0.598 / 152.448	4.576 / 53.949	0.080 / 44.595	0.145 / 161.473
2.600GHz	0.610 / 148.016	4.217 / 50.415	0.085 / 43.077	0.152 / 157.196
2.800GHz	0.615 / 144.752	3.922 / 46.397	0.090 / 41.101	0.163 / 153.210
3.000GHz	0.624 / 139.233	3.650 / 42.966	0.095 / 39.224	0.176 / 150.417

VCE = 3V, ICC = 2mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.910 / -41.152	6.748 / 149.434	0.057 / 65.625	0.930 / -22.617
600.0MHz	0.859 / -59.311	6.186 / 137.285	0.079 / 55.194	0.854 / -31.476
800.0MHz	0.804 / -75.929	5.607 / 126.185	0.095 / 45.694	0.785 / -39.569
1.000GHz	0.773 / -90.735	5.123 / 116.156	0.107 / 38.338	0.719 / -46.106
1.200GHz	0.734 / -102.507	4.669 / 108.390	0.115 / 31.977	0.654 / -51.117
1.400GHz	0.708 / -113.888	4.238 / 101.316	0.122 / 26.871	0.603 / -55.736
1.600GHz	0.690 / -124.295	3.908 / 93.870	0.126 / 22.056	0.557 / -60.544
1.800GHz	0.671 / -133.936	3.622 / 87.682	0.130 / 18.101	0.519 / -64.661
2.000GHz	0.659 / -142.772	3.347 / 81.047	0.132 / 14.120	0.486 / -69.426
2.200GHz	0.646 / -151.344	3.095 / 75.225	0.133 / 10.790	0.456 / -73.691
2.400GHz	0.635 / -160.678	2.902 / 69.491	0.134 / 7.442	0.431 / -77.742
2.600GHz	0.635 / -168.457	2.713 / 64.188	0.135 / 4.623	0.409 / -82.060
2.800GHz	0.641 / -175.311	2.567 / 58.804	0.135 / 1.691	0.391 / -86.673
3.000GHz	0.633 / 176.107	2.410 / 53.470	0.134 / -0.850	0.372 / -91.450

VCE = 3V, ICC = 3mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.872 / -49.178	9.351 / 145.107	0.055 / 62.650	0.897 / -27.634
600.0MHz	0.810 / -69.074	8.327 / 132.171	0.074 / 51.563	0.800 / -37.937
800.0MHz	0.756 / -86.785	7.353 / 120.710	0.087 / 42.355	0.713 / -46.724
1.000GHz	0.723 / -102.578	6.561 / 110.776	0.096 / 35.377	0.636 / -53.565
1.200GHz	0.697 / -114.420	5.863 / 103.145	0.102 / 29.865	0.563 / -58.564
1.400GHz	0.672 / -124.817	5.258 / 96.484	0.106 / 25.779	0.509 / -63.173
1.600GHz	0.647 / -135.578	4.779 / 89.467	0.109 / 21.748	0.461 / -68.008
1.800GHz	0.637 / -145.309	4.379 / 83.685	0.112 / 18.651	0.423 / -72.085
2.000GHz	0.627 / -153.046	4.025 / 77.452	0.114 / 15.585	0.390 / -76.893
2.200GHz	0.617 / -160.868	3.703 / 72.071	0.115 / 13.122	0.362 / -81.280
2.400GHz	0.617 / -169.910	3.442 / 66.745	0.116 / 10.642	0.339 / -85.486
2.600GHz	0.616 / -176.919	3.209 / 61.821	0.117 / 8.659	0.318 / -90.074
2.800GHz	0.624 / 175.937	3.010 / 56.717	0.118 / 6.490	0.302 / -95.097
3.000GHz	0.610 / 168.190	2.829 / 51.761	0.118 / 4.660	0.286 / -100.365

VCE = 3V, ICC = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.823 / -61.439	13.721 / 137.895	0.051 / 57.257	0.831 / -36.492
600.0MHz	0.745 / -84.656	11.575 / 124.010	0.065 / 46.586	0.701 / -48.671
800.0MHz	0.686 / -103.147	9.805 / 112.657	0.074 / 38.624	0.597 / -58.173
1.000GHz	0.655 / -118.917	8.487 / 103.200	0.080 / 33.145	0.512 / -65.311
1.200GHz	0.634 / -130.214	7.414 / 96.258	0.084 / 29.303	0.435 / -70.353
1.400GHz	0.618 / -140.714	6.528 / 90.227	0.087 / 26.490	0.382 / -75.109
1.600GHz	0.608 / -149.784	5.868 / 83.864	0.089 / 24.106	0.338 / -80.271
1.800GHz	0.607 / -158.912	5.314 / 78.710	0.092 / 22.384	0.302 / -84.785
2.000GHz	0.595 / -166.543	4.852 / 73.100	0.094 / 20.449	0.274 / -90.153
2.200GHz	0.591 / -173.199	4.424 / 68.206	0.096 / 18.980	0.250 / -95.240
2.400GHz	0.592 / 178.840	4.096 / 63.403	0.097 / 17.534	0.230 / -100.368
2.600GHz	0.600 / 172.559	3.790 / 58.894	0.100 / 16.531	0.215 / -105.883
2.800GHz	0.608 / 166.615	3.548 / 54.210	0.102 / 14.989	0.203 / -112.338
3.000GHz	0.604 / 159.542	3.311 / 49.817	0.103 / 13.720	0.194 / -119.304

VCE = 3V, ICC = 7mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.767 / -70.992	16.857 / 132.567	0.047 / 54.203	0.773 / -43.414
600.0MHz	0.697 / -96.771	13.668 / 118.454	0.059 / 44.196	0.627 / -56.560
800.0MHz	0.642 / -114.703	11.276 / 107.573	0.065 / 37.441	0.517 / -66.443
1.000GHz	0.615 / -130.621	9.593 / 98.633	0.070 / 33.247	0.434 / -73.860
1.200GHz	0.607 / -140.174	8.284 / 92.216	0.073 / 30.668	0.358 / -79.141
1.400GHz	0.592 / -149.616	7.232 / 86.666	0.076 / 28.846	0.310 / -84.339
1.600GHz	0.584 / -158.820	6.462 / 80.742	0.079 / 27.310	0.270 / -90.162
1.800GHz	0.582 / -166.309	5.833 / 75.925	0.082 / 26.326	0.237 / -95.505
2.000GHz	0.578 / -173.486	5.299 / 70.647	0.085 / 25.058	0.214 / -101.881
2.200GHz	0.576 / -179.948	4.822 / 66.064	0.087 / 24.026	0.193 / -108.198
2.400GHz	0.582 / 173.178	4.448 / 61.572	0.090 / 22.981	0.178 / -114.604
2.600GHz	0.594 / 166.857	4.109 / 57.433	0.093 / 22.117	0.167 / -121.257
2.800GHz	0.600 / 161.400	3.846 / 52.783	0.096 / 20.751	0.160 / -129.196
3.000GHz	0.597 / 155.065	3.587 / 48.706	0.098 / 19.685	0.156 / -137.450

VCE = 3V, Icc = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.700 / -83.597	20.253 / 126.394	0.042 / 50.755	0.698 / -51.678
600.0MHz	0.648 / -108.105	15.757 / 112.595	0.051 / 42.432	0.542 / -65.789
800.0MHz	0.596 / -127.025	12.677 / 102.421	0.056 / 37.453	0.435 / -76.136
1.000GHz	0.583 / -140.846	10.622 / 94.215	0.060 / 34.903	0.358 / -83.985
1.200GHz	0.578 / -150.595	9.085 / 88.395	0.064 / 33.396	0.287 / -90.146
1.400GHz	0.566 / -158.957	7.879 / 83.338	0.067 / 32.786	0.244 / -96.391
1.600GHz	0.568 / -166.884	7.004 / 77.790	0.071 / 31.940	0.211 / -103.606
1.800GHz	0.568 / -174.235	6.294 / 73.375	0.074 / 31.435	0.184 / -110.553
2.000GHz	0.567 / 179.485	5.710 / 68.371	0.078 / 30.633	0.166 / -118.759
2.200GHz	0.561 / 174.186	5.186 / 64.090	0.081 / 29.907	0.152 / -126.995
2.400GHz	0.575 / 167.633	4.766 / 59.836	0.085 / 28.999	0.143 / -135.211
2.600GHz	0.579 / 162.291	4.397 / 55.916	0.088 / 28.119	0.137 / -143.357
2.800GHz	0.592 / 156.900	4.113 / 51.600	0.092 / 26.792	0.137 / -152.342
3.000GHz	0.591 / 150.791	3.828 / 47.709	0.095 / 25.543	0.140 / -160.829

VCE = 3V, Icc = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.653 / -97.235	23.559 / 119.835	0.037 / 47.979	0.611 / -61.091
600.0MHz	0.594 / -122.053	17.587 / 106.959	0.044 / 41.848	0.457 / -75.951
800.0MHz	0.561 / -139.283	13.854 / 97.715	0.048 / 39.372	0.359 / -86.971
1.000GHz	0.560 / -152.156	11.470 / 90.190	0.053 / 38.475	0.292 / -95.642
1.200GHz	0.560 / -159.839	9.739 / 84.981	0.057 / 37.898	0.229 / -103.600
1.400GHz	0.552 / -167.028	8.400 / 80.434	0.061 / 38.055	0.194 / -111.478
1.600GHz	0.554 / -174.458	7.444 / 75.285	0.065 / 37.534	0.169 / -120.864
1.800GHz	0.558 / 179.436	6.674 / 71.159	0.069 / 37.373	0.149 / -130.332
2.000GHz	0.556 / 173.633	6.035 / 66.437	0.073 / 36.351	0.139 / -140.446
2.200GHz	0.553 / 169.023	5.479 / 62.368	0.078 / 35.767	0.132 / -150.227
2.400GHz	0.568 / 162.921	5.030 / 58.413	0.082 / 34.649	0.130 / -159.255
2.600GHz	0.576 / 157.640	4.638 / 54.656	0.086 / 33.588	0.131 / -167.000
2.800GHz	0.585 / 152.612	4.332 / 50.461	0.090 / 32.212	0.137 / -175.091
3.000GHz	0.589 / 147.127	4.028 / 46.797	0.094 / 30.701	0.146 / 178.002

VCE = 3V, Icc = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.611 / -107.048	25.406 / 115.664	0.034 / 47.487	0.552 / -67.631
600.0MHz	0.565 / -131.399	18.517 / 103.539	0.040 / 42.797	0.404 / -82.953
800.0MHz	0.544 / -147.351	14.432 / 94.980	0.044 / 41.476	0.316 / -94.537
1.000GHz	0.544 / -158.839	11.891 / 87.931	0.048 / 41.131	0.257 / -104.000
1.200GHz	0.543 / -165.263	10.057 / 83.076	0.053 / 41.438	0.199 / -113.565
1.400GHz	0.541 / -172.478	8.655 / 78.766	0.057 / 41.767	0.171 / -122.855
1.600GHz	0.549 / -178.630	7.657 / 73.842	0.062 / 41.431	0.151 / -133.637
1.800GHz	0.550 / 175.896	6.854 / 69.911	0.067 / 41.066	0.138 / -144.270
2.000GHz	0.551 / 170.370	6.194 / 65.351	0.071 / 40.159	0.133 / -154.832
2.200GHz	0.549 / 165.665	5.620 / 61.399	0.076 / 39.255	0.131 / -164.650
2.400GHz	0.564 / 159.825	5.157 / 57.569	0.081 / 38.071	0.133 / -173.006
2.600GHz	0.576 / 155.195	4.748 / 53.897	0.085 / 36.850	0.136 / 179.978
2.800GHz	0.588 / 151.144	4.425 / 49.899	0.090 / 35.261	0.145 / 173.043
3.000GHz	0.590 / 144.859	4.126 / 46.305	0.094 / 33.709	0.156 / 167.555

VCE = 3V, Icc = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.600 / -114.114	26.479 / 112.726	0.031 / 47.031	0.508 / -72.315
600.0MHz	0.560 / -137.600	19.006 / 101.235	0.037 / 44.178	0.368 / -88.061
800.0MHz	0.532 / -152.439	14.730 / 93.139	0.041 / 43.393	0.287 / -100.110
1.000GHz	0.538 / -164.213	12.086 / 86.452	0.046 / 43.572	0.234 / -110.157
1.200GHz	0.543 / -168.688	10.211 / 81.761	0.050 / 43.953	0.182 / -120.994
1.400GHz	0.540 / -175.283	8.773 / 77.652	0.056 / 44.395	0.158 / -131.203
1.600GHz	0.544 / 178.209	7.757 / 72.851	0.060 / 44.022	0.143 / -142.703
1.800GHz	0.550 / 173.301	6.936 / 69.030	0.065 / 43.590	0.133 / -153.847
2.000GHz	0.550 / 168.075	6.269 / 64.601	0.070 / 42.619	0.132 / -164.185
2.200GHz	0.550 / 163.705	5.675 / 60.736	0.075 / 41.611	0.133 / -173.565
2.400GHz	0.565 / 158.157	5.212 / 56.953	0.080 / 40.163	0.136 / 178.830
2.600GHz	0.575 / 153.526	4.797 / 53.382	0.085 / 38.999	0.141 / 172.540
2.800GHz	0.583 / 149.006	4.476 / 49.347	0.090 / 37.202	0.151 / 166.448
3.000GHz	0.589 / 143.753	4.161 / 45.849	0.094 / 35.611	0.163 / 161.747

VCE = 3V, ICC = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.562 / -120.210	27.083 / 110.561	0.030 / 46.559	0.473 / -76.014
600.0MHz	0.543 / -143.103	19.244 / 99.520	0.035 / 45.008	0.341 / -91.933
800.0MHz	0.530 / -156.597	14.845 / 91.789	0.039 / 45.129	0.266 / -104.301
1.000GHz	0.532 / -166.681	12.159 / 85.278	0.044 / 45.581	0.218 / -114.845
1.200GHz	0.536 / -172.175	10.247 / 80.837	0.049 / 46.046	0.170 / -126.732
1.400GHz	0.535 / -177.732	8.807 / 76.824	0.054 / 46.453	0.150 / -137.439
1.600GHz	0.544 / 176.182	7.772 / 72.111	0.059 / 45.943	0.138 / -149.272
1.800GHz	0.551 / 171.333	6.949 / 68.403	0.065 / 45.556	0.131 / -160.486
2.000GHz	0.550 / 166.362	6.284 / 63.990	0.070 / 44.317	0.131 / -170.521
2.200GHz	0.552 / 162.339	5.684 / 60.216	0.075 / 43.441	0.134 / -179.406
2.400GHz	0.565 / 156.795	5.221 / 56.523	0.080 / 41.842	0.139 / 173.509
2.600GHz	0.573 / 152.317	4.806 / 52.891	0.085 / 40.464	0.145 / 167.787
2.800GHz	0.583 / 147.931	4.481 / 48.948	0.090 / 38.552	0.155 / 162.414
3.000GHz	0.592 / 143.119	4.165 / 45.457	0.094 / 36.918	0.167 / 158.139

VCE = 3V, ICC = 35mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.562 / -124.413	27.339 / 108.911	0.028 / 47.147	0.446 / -78.746
600.0MHz	0.536 / -146.358	19.279 / 98.298	0.033 / 46.299	0.321 / -94.716
800.0MHz	0.529 / -159.836	14.832 / 90.805	0.038 / 46.390	0.251 / -107.358
1.000GHz	0.538 / -169.092	12.129 / 84.444	0.043 / 47.059	0.206 / -118.074
1.200GHz	0.540 / -173.550	10.220 / 80.119	0.048 / 47.632	0.161 / -130.706
1.400GHz	0.536 / -179.227	8.774 / 76.149	0.054 / 47.996	0.143 / -141.758
1.600GHz	0.542 / 175.221	7.745 / 71.576	0.059 / 47.452	0.133 / -153.675
1.800GHz	0.555 / 169.593	6.920 / 67.913	0.064 / 46.865	0.129 / -164.907
2.000GHz	0.551 / 165.386	6.252 / 63.510	0.069 / 45.601	0.130 / -174.607
2.200GHz	0.549 / 161.112	5.663 / 59.753	0.075 / 44.569	0.134 / 176.878
2.400GHz	0.565 / 155.814	5.191 / 56.110	0.080 / 43.076	0.140 / 170.242
2.600GHz	0.583 / 151.681	4.775 / 52.597	0.085 / 41.622	0.146 / 164.865
2.800GHz	0.586 / 147.237	4.456 / 48.604	0.090 / 39.598	0.156 / 159.797
3.000GHz	0.595 / 142.063	4.147 / 45.099	0.094 / 37.902	0.169 / 155.992

VCE = 3V, ICC = 40mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.550 / -128.925	27.353 / 107.608	0.027 / 47.260	0.423 / -80.749
600.0MHz	0.536 / -149.249	19.190 / 97.321	0.032 / 46.613	0.303 / -96.855
800.0MHz	0.527 / -161.833	14.745 / 89.989	0.037 / 47.581	0.238 / -109.643
1.000GHz	0.536 / -171.535	12.031 / 83.788	0.042 / 48.688	0.196 / -120.507
1.200GHz	0.544 / -175.677	10.137 / 79.535	0.047 / 49.014	0.154 / -133.707
1.400GHz	0.540 / 178.715	8.696 / 75.646	0.053 / 49.183	0.138 / -144.887
1.600GHz	0.545 / 173.022	7.672 / 71.074	0.058 / 48.691	0.129 / -156.894
1.800GHz	0.556 / 168.548	6.853 / 67.446	0.064 / 47.932	0.126 / -168.090
2.000GHz	0.552 / 164.157	6.195 / 63.124	0.069 / 46.709	0.128 / -177.489
2.200GHz	0.554 / 160.009	5.603 / 59.365	0.074 / 45.425	0.133 / 174.271
2.400GHz	0.569 / 155.071	5.142 / 55.738	0.079 / 43.938	0.139 / 167.947
2.600GHz	0.584 / 150.879	4.738 / 52.198	0.085 / 42.540	0.146 / 162.862
2.800GHz	0.588 / 146.472	4.419 / 48.242	0.090 / 40.354	0.156 / 157.967
3.000GHz	0.597 / 141.252	4.101 / 44.771	0.094 / 38.609	0.169 / 154.467

VCE = 3V, ICC = 45mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
400.0MHz	0.532 / -131.609	27.206 / 106.482	0.026 / 48.015	0.404 / -82.474
600.0MHz	0.539 / -151.737	19.002 / 96.459	0.031 / 47.243	0.288 / -98.533
800.0MHz	0.530 / -163.882	14.562 / 89.262	0.036 / 48.585	0.226 / -111.323
1.000GHz	0.542 / -173.184	11.878 / 83.172	0.042 / 49.677	0.187 / -122.356
1.200GHz	0.544 / -177.588	9.994 / 79.018	0.047 / 49.764	0.146 / -135.887
1.400GHz	0.540 / 177.687	8.574 / 75.154	0.053 / 50.117	0.132 / -147.281
1.600GHz	0.552 / 172.245	7.563 / 70.620	0.058 / 49.493	0.125 / -159.311
1.800GHz	0.562 / 167.266	6.751 / 67.052	0.063 / 48.811	0.122 / -170.399
2.000GHz	0.560 / 163.040	6.098 / 62.694	0.069 / 47.557	0.126 / -179.715
2.200GHz	0.558 / 159.202	5.522 / 58.978	0.074 / 46.325	0.131 / 172.369
2.400GHz	0.574 / 154.238	5.064 / 55.375	0.079 / 44.668	0.137 / 166.313
2.600GHz	0.586 / 149.954	4.658 / 51.857	0.084 / 43.114	0.144 / 161.467
2.800GHz	0.594 / 145.836	4.351 / 47.929	0.090 / 41.116	0.155 / 156.731
3.000GHz	0.595 / 141.423	4.037 / 44.455	0.094 / 39.061	0.168 / 153.459