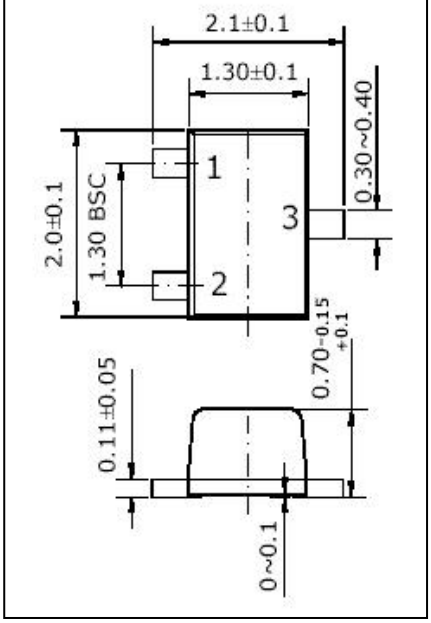
NPN Planer RF TRANSISTOR

SOT - 323F unit : mm



☐ DESCRIPTION

The TARF1503UF 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 SOT323F package

☐ FEATURES

o Low Noise Figure

N.F = 1.1dB TYP. @ f=1GHz, V_{CE}=8V, Ic=5mA

o High Gain

MAG = 18.5dB TYP. @ f=1GHz, V_{CE}=8V, Ic=15mA

o High Transition Frequency

f_T = 10GHz TYP. @ f=1GHz, V_{CE}=8V, Ic=15mA

PIN CONFIGURATION

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

☐ MARKING : AA1

☐ MAXIMUM RATINGS

SYMBOL	PARAMETER	CONDITION	VALUE	Unit
V_{CBO}	Collector-Base Voltage	Open Emitter	25	V
V_{CEO}	Collector-Emitter Voltage	Open Base	12	V
V_{EBO}	Emitter-Base Voltage	Open Collector	2.5	V
Ic	Collector Current (DC)		65	mA
P_T	Total Power Dissipation	Ts = 60℃	150	mW
T_{STG}	Storage Temperature		-65 ~ 150	℃
T_J	Operating Junction Temperature		150	℃

☐ Electrical Characteristics (T_A = 25 ℃)

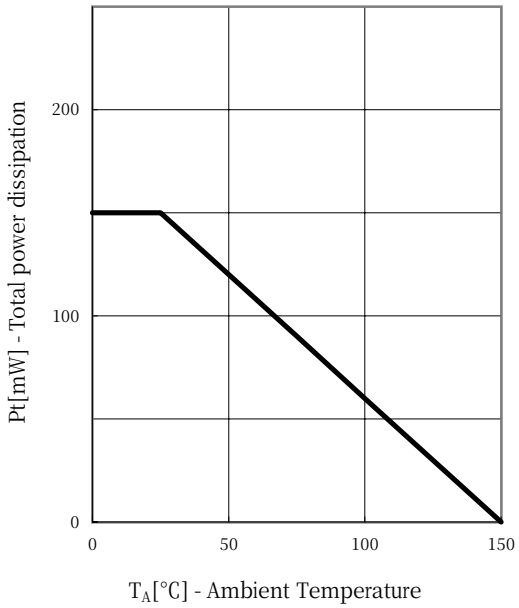
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
V_{CBO}	Collector-Base Voltage	I_{CE} = 100uA, I_E = 0	20	25		V
V_{CEO}	Collector-Emitter Voltage	I_{CE} = 100uA, I_B = 0	12	14		V
I_{CBO}	Collector-Cut-off current	V_{CB} = 10V, I_E = 0			300	n A
I_{EBO}	Emitter-Cut-off current	V_{EB} = 1V, I_C = 0			100	n A
hfe	D.C current Gain	V_{CE} = 8V, Ic = 15mA	100	150		
f_T	Transition Frequency	V_{CE} = 8V, Ic = 15mA		10		GHz
C_{CB}	Collector-Base Capacitance	V_{CB} = 10V, f = 1MHz		0.55		pF

☐ Performance Characteristics

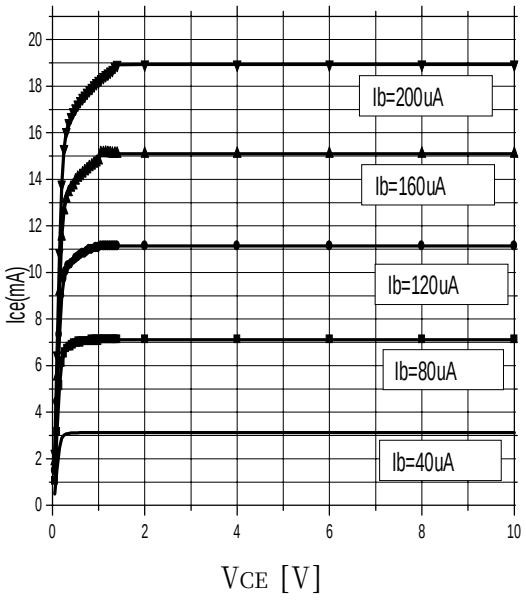
SYMBOL	PARAMETER	CONDITION	VALUE			Unit
			min	typ	max	
$[S21]^2$	Insertion Power Gain	V_{CE}=8V, Ic=5mA,f=1GHz		12		dB
		V_{CE}=8V, Ic=15mA,f=1GHz		14.3		
MSG	Maximum Stable Gain	V_{CE}=8V, Ic=5mA,f=1GHz		16.5		dB
		V_{CE}=8V, Ic=15mA,f=1GHz		18.5		
NFmin	Minimum Noise Figure	V_{CE}=8V, Ic=5mA,f=1GHz		1.1		dB
rn	Noise Resistance	V_{CE}=8V, Ic=5mA,f=1GHz		0.054		Ω
G_A	Associated Gain	V_{CE}=8V, Ic=5mA,f=1GHz		15		dB
		V_{CE}=8V, Ic=15mA,f=1GHz		16		
OIP_3	Output 3rd Intercept	V_{CE}=8V, Ic=15mA,f=1GHz		27		dBm

Total power dissipation *Pt = f(T A)*

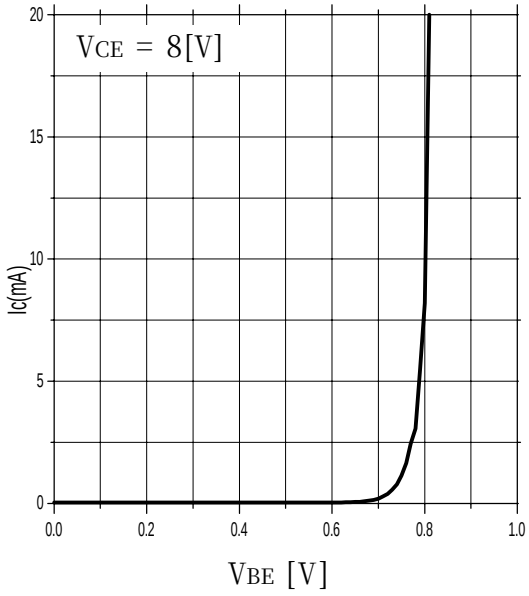
(T_A = 25 ℃)



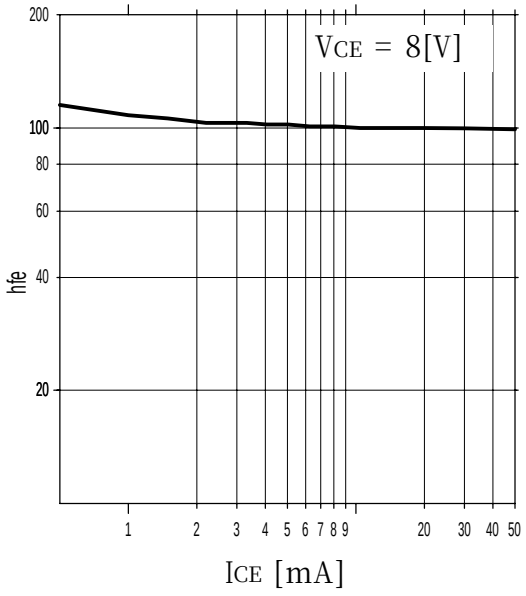
Icc vs. VCE



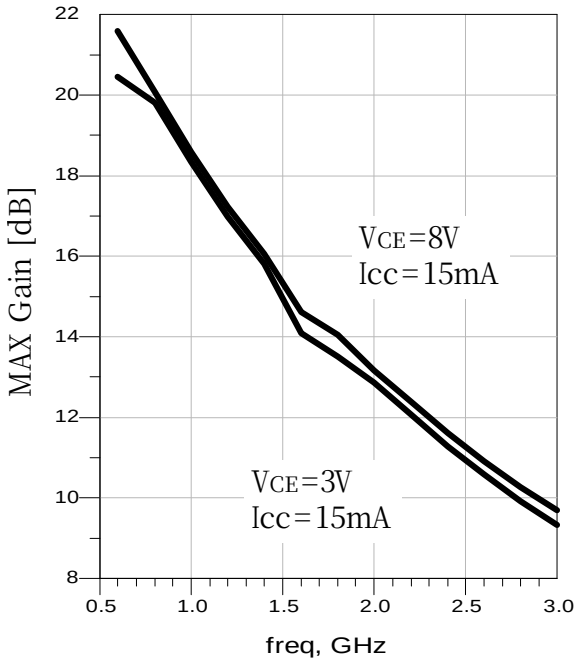
Icc vs. VBE



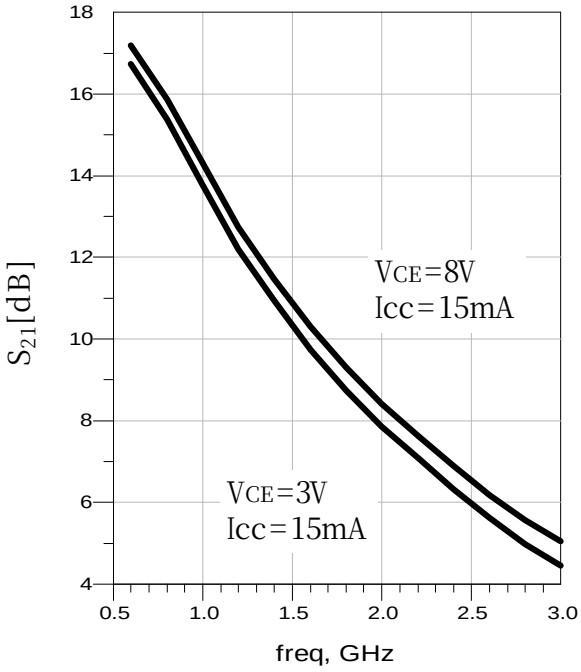
hfe vs. Icc



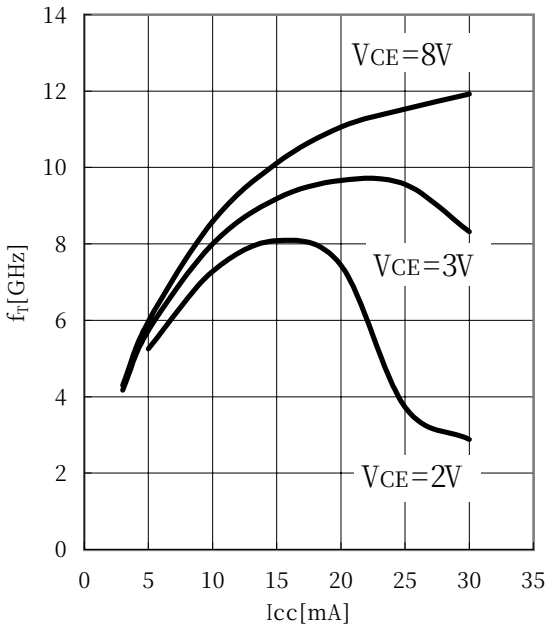
Power Gain : MSG vs. Frequency



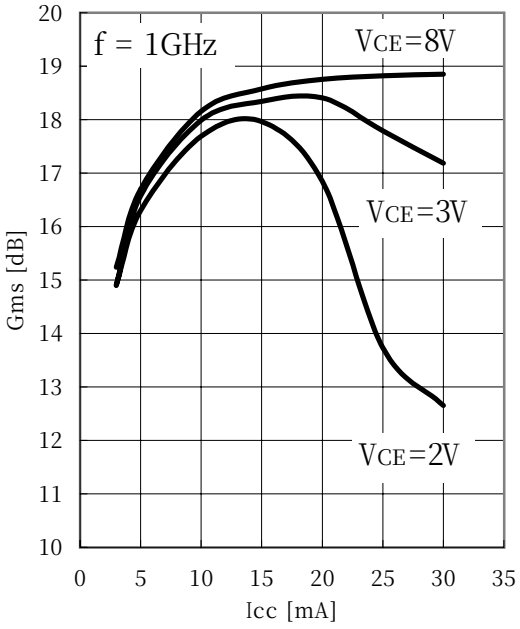
Power Gain : S_{21} vs. Frequency



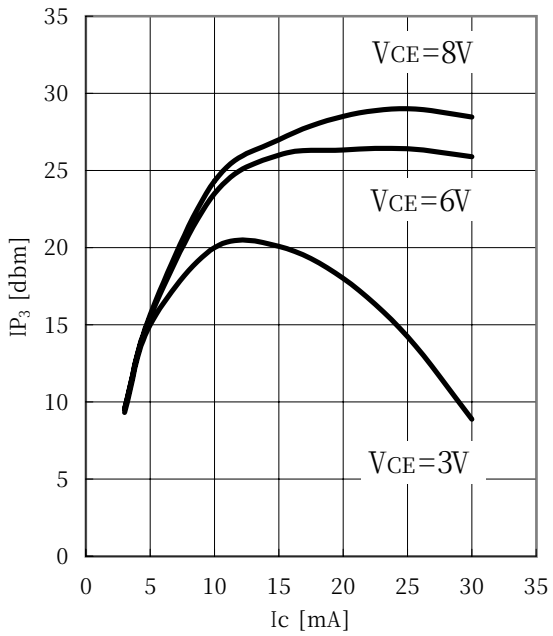
Transition Frequency : f_T vs. Icc



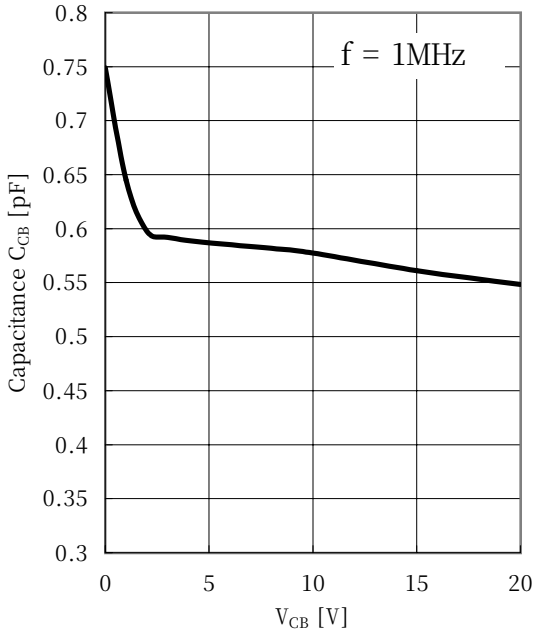
Power Gain : MSG vs. Icc



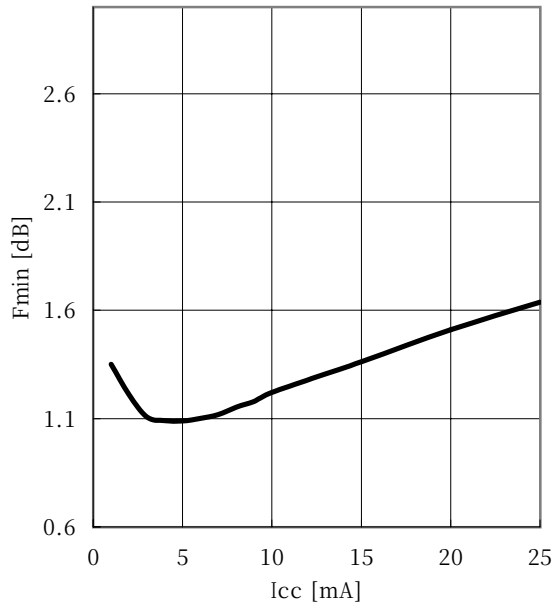
Intermodulation Intercept Point *IP3=f(Ic)*
(Z_S =Z_L= 50 Ω)



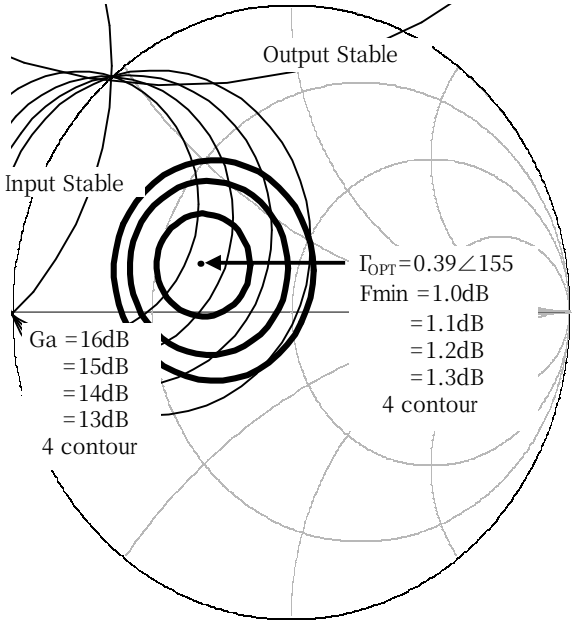
C_{CB} vs. V_{CB}



Fmin vs. Icc
V_{CE} = 8V, Icc = parameter, Zs = Zspot



Noise Figure Contours & Constant Gain
f = 1 GHz, V_{CE} = 8V, Icc = 5mA



☐ Common Emitter S-Parameter Data

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

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.628 / -124.123	4.518 / 91.099	0.108 / 21.413	0.536 / -75.880
800.0MHz	0.618 / -135.087	3.900 / 85.735	0.107 / 20.973	0.530 / -84.300
1.000GHz	0.607 / -146.051	3.283 / 80.371	0.106 / 20.533	0.524 / -92.720
1.200GHz	0.611 / -156.194	2.780 / 71.840	0.104 / 19.576	0.513 / -100.394
1.400GHz	0.621 / -163.802	2.411 / 64.003	0.101 / 20.733	0.517 / -107.407
1.600GHz	0.616 / -171.144	2.117 / 57.311	0.099 / 23.299	0.531 / -113.173
1.800GHz	0.623 / -177.725	1.886 / 50.822	0.098 / 26.777	0.546 / -119.060
2.000GHz	0.630 / 176.974	1.689 / 44.982	0.100 / 31.423	0.565 / -124.438
2.200GHz	0.646 / 172.598	1.542 / 39.621	0.104 / 36.035	0.579 / -129.833
2.400GHz	0.655 / 168.349	1.406 / 34.422	0.111 / 40.785	0.587 / -135.193
2.600GHz	0.666 / 164.332	1.291 / 29.527	0.121 / 43.950	0.602 / -140.460
2.800GHz	0.679 / 159.641	1.194 / 24.762	0.132 / 46.466	0.621 / -145.041
3.000GHz	0.677 / 154.525	1.117 / 21.415	0.145 / 48.549	0.642 / -148.545

V_{CE} = 3V, I_{CC} = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.596 / -135.207	5.453 / 86.897	0.083 / 25.385	0.420 / -86.173
800.0MHz	0.593 / -147.595	4.705 / 82.553	0.085 / 27.605	0.426 / -94.569
1.000GHz	0.590 / -159.983	3.957 / 78.209	0.087 / 29.825	0.431 / -102.965
1.200GHz	0.596 / -167.881	3.323 / 70.653	0.089 / 31.588	0.427 / -109.761
1.400GHz	0.603 / -174.492	2.874 / 63.736	0.092 / 34.287	0.436 / -115.950
1.600GHz	0.608 / 179.614	2.517 / 57.754	0.095 / 37.533	0.452 / -120.850
1.800GHz	0.612 / 173.800	2.239 / 51.701	0.100 / 40.577	0.469 / -125.838
2.000GHz	0.615 / 168.778	2.016 / 46.287	0.108 / 43.728	0.490 / -130.438
2.200GHz	0.634 / 165.398	1.843 / 41.579	0.116 / 46.108	0.506 / -135.092
2.400GHz	0.643 / 161.536	1.680 / 36.564	0.127 / 48.311	0.514 / -139.869
2.600GHz	0.652 / 158.407	1.546 / 31.742	0.138 / 49.222	0.530 / -144.538
2.800GHz	0.667 / 153.562	1.435 / 26.916	0.151 / 49.856	0.550 / -148.509
3.000GHz	0.662 / 149.055	1.341 / 23.683	0.165 / 50.283	0.572 / -151.532

V_{CE} = 3V, I_{CC} = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.600 / -165.550	6.474 / 83.027	0.058 / 39.946	0.301 / -103.949
800.0MHz	0.599 / -169.810	5.562 / 79.331	0.066 / 42.938	0.322 / -111.785
1.000GHz	0.599 / -174.070	4.650 / 75.635	0.074 / 45.930	0.343 / -119.621
1.200GHz	0.603 / 179.597	3.890 / 69.479	0.082 / 48.609	0.347 / -125.006
1.400GHz	0.609 / 174.013	3.358 / 63.346	0.090 / 50.869	0.361 / -129.753
1.600GHz	0.608 / 169.052	2.930 / 58.183	0.100 / 52.443	0.380 / -133.280
1.800GHz	0.617 / 164.206	2.613 / 52.756	0.110 / 53.431	0.397 / -136.907
2.000GHz	0.615 / 160.444	2.360 / 47.744	0.121 / 54.169	0.418 / -140.408
2.200GHz	0.630 / 157.005	2.156 / 43.438	0.133 / 54.299	0.434 / -143.981
2.400GHz	0.643 / 154.466	1.975 / 38.779	0.146 / 54.420	0.442 / -147.989
2.600GHz	0.644 / 151.855	1.816 / 34.281	0.158 / 53.397	0.458 / -151.745
2.800GHz	0.653 / 147.988	1.691 / 30.022	0.172 / 52.522	0.478 / -154.890
3.000GHz	0.659 / 143.403	1.588 / 26.474	0.186 / 51.839	0.499 / -157.177

V_{CE} = 3V, I_{CC} = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.558 / -175.337	6.863 / 80.603	0.051 / 48.327	0.257 / -115.778
800.0MHz	0.579 / -178.045	5.872 / 77.603	0.061 / 51.403	0.286 / -122.282
1.000GHz	0.601 / 179.247	4.881 / 74.603	0.071 / 54.479	0.315 / -128.786
1.200GHz	0.612 / 174.246	4.072 / 68.751	0.082 / 56.232	0.322 / -133.308
1.400GHz	0.621 / 169.744	3.523 / 62.970	0.092 / 57.335	0.337 / -137.228
1.600GHz	0.617 / 164.950	3.070 / 58.204	0.104 / 58.049	0.357 / -139.968
1.800GHz	0.625 / 160.324	2.739 / 52.940	0.115 / 58.017	0.375 / -142.917
2.000GHz	0.623 / 156.505	2.472 / 48.323	0.128 / 57.833	0.395 / -145.882
2.200GHz	0.636 / 153.679	2.260 / 44.048	0.141 / 57.077	0.411 / -148.884
2.400GHz	0.646 / 151.185	2.068 / 39.611	0.154 / 56.460	0.418 / -152.566
2.600GHz	0.648 / 148.659	1.908 / 35.115	0.167 / 55.038	0.433 / -155.870
2.800GHz	0.662 / 145.118	1.773 / 30.889	0.181 / 53.588	0.453 / -158.618
3.000GHz	0.653 / 140.638	1.669 / 27.805	0.195 / 52.497	0.474 / -160.552

V_{CE} = 3V, I_{CC} = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.617 / 179.595	6.999 / 79.777	0.046 / 55.202	0.234 / -122.952
800.0MHz	0.615 / 178.019	5.970 / 76.729	0.059 / 57.334	0.268 / -128.632
1.000GHz	0.613 / 176.443	4.940 / 73.681	0.071 / 59.466	0.302 / -134.312
1.200GHz	0.626 / 171.042	4.131 / 68.161	0.082 / 60.532	0.310 / -138.167
1.400GHz	0.627 / 166.456	3.559 / 62.715	0.094 / 61.139	0.326 / -141.508
1.600GHz	0.631 / 162.513	3.107 / 57.895	0.106 / 61.025	0.346 / -143.745
1.800GHz	0.634 / 158.213	2.767 / 52.878	0.119 / 60.562	0.365 / -146.301
2.000GHz	0.633 / 154.200	2.500 / 48.355	0.132 / 59.868	0.385 / -148.928
2.200GHz	0.643 / 151.735	2.289 / 44.063	0.145 / 58.604	0.400 / -151.675
2.400GHz	0.649 / 149.473	2.096 / 39.726	0.159 / 57.760	0.407 / -155.165
2.600GHz	0.661 / 146.962	1.929 / 35.592	0.172 / 55.986	0.423 / -158.265
2.800GHz	0.667 / 143.322	1.795 / 31.329	0.186 / 54.324	0.441 / -160.810
3.000GHz	0.666 / 138.648	1.691 / 28.060	0.200 / 52.983	0.462 / -162.534

V_{CE} = 3V, I_{CC} = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.633 / 175.773	6.877 / 78.191	0.046 / 61.088	0.220 / -126.445
800.0MHz	0.629 / 174.677	5.874 / 75.527	0.058 / 61.848	0.256 / -131.625
1.000GHz	0.625 / 173.581	4.871 / 72.863	0.071 / 62.608	0.291 / -136.805
1.200GHz	0.631 / 169.091	4.066 / 67.421	0.083 / 63.440	0.302 / -140.189
1.400GHz	0.642 / 164.576	3.505 / 62.037	0.095 / 63.517	0.319 / -143.187
1.600GHz	0.645 / 160.611	3.062 / 57.312	0.108 / 63.067	0.340 / -145.168
1.800GHz	0.648 / 156.787	2.726 / 52.310	0.120 / 62.220	0.359 / -147.509
2.000GHz	0.648 / 153.161	2.457 / 47.883	0.134 / 61.299	0.380 / -149.954
2.200GHz	0.660 / 150.748	2.247 / 43.741	0.148 / 59.905	0.396 / -152.607
2.400GHz	0.666 / 148.172	2.062 / 39.290	0.161 / 58.784	0.404 / -156.026
2.600GHz	0.669 / 145.810	1.899 / 35.145	0.175 / 56.941	0.419 / -159.061
2.800GHz	0.673 / 141.936	1.771 / 30.779	0.189 / 55.052	0.438 / -161.534
3.000GHz	0.677 / 137.826	1.664 / 27.663	0.203 / 53.550	0.460 / -163.212

V_{CE} = 3V, I_{CC} = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.679 / 171.782	6.373 / 77.347	0.045 / 62.452	0.197 / -124.568
800.0MHz	0.667 / 171.938	5.453 / 74.315	0.057 / 63.804	0.237 / -129.668
1.000GHz	0.655 / 172.094	4.534 / 71.283	0.069 / 65.156	0.276 / -134.768
1.200GHz	0.667 / 166.885	3.770 / 65.770	0.082 / 65.732	0.290 / -137.772
1.400GHz	0.673 / 163.436	3.252 / 60.330	0.094 / 65.708	0.311 / -140.673
1.600GHz	0.669 / 159.342	2.839 / 55.617	0.108 / 65.127	0.335 / -142.644
1.800GHz	0.677 / 155.342	2.525 / 50.578	0.121 / 64.207	0.357 / -145.072
2.000GHz	0.675 / 151.945	2.278 / 46.115	0.134 / 63.042	0.380 / -147.724
2.200GHz	0.685 / 149.211	2.081 / 41.824	0.148 / 61.595	0.399 / -150.508
2.400GHz	0.692 / 146.888	1.906 / 37.447	0.163 / 60.372	0.408 / -154.060
2.600GHz	0.695 / 144.667	1.758 / 33.256	0.177 / 58.311	0.426 / -157.268
2.800GHz	0.710 / 140.499	1.632 / 29.088	0.191 / 56.473	0.446 / -159.957
3.000GHz	0.704 / 136.602	1.534 / 25.888	0.206 / 54.833	0.469 / -161.816

V_{CE} = 6V, I_{CC} = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.477 / -145.478	5.677 / 87.941	0.083 / 26.397	0.426 / -86.049
800.0MHz	0.535 / -151.510	4.880 / 83.557	0.085 / 28.245	0.431 / -94.557
1.000GHz	0.593 / -157.542	4.084 / 79.173	0.087 / 30.093	0.436 / -103.065
1.200GHz	0.590 / -166.293	3.435 / 71.702	0.089 / 31.859	0.430 / -109.972
1.400GHz	0.603 / -172.871	2.977 / 64.745	0.092 / 34.480	0.438 / -116.156
1.600GHz	0.597 / -179.535	2.602 / 58.944	0.096 / 37.603	0.453 / -121.079
1.800GHz	0.609 / 174.886	2.316 / 52.894	0.101 / 40.508	0.469 / -126.041
2.000GHz	0.605 / 169.950	2.085 / 47.649	0.108 / 43.619	0.489 / -130.634
2.200GHz	0.620 / 166.267	1.911 / 42.723	0.117 / 45.950	0.504 / -135.265
2.400GHz	0.635 / 162.441	1.746 / 37.932	0.127 / 48.217	0.511 / -140.005
2.600GHz	0.647 / 159.076	1.604 / 33.074	0.138 / 49.126	0.527 / -144.629
2.800GHz	0.654 / 154.593	1.488 / 28.458	0.150 / 49.673	0.546 / -148.572
3.000GHz	0.652 / 150.307	1.397 / 24.806	0.164 / 50.224	0.568 / -151.540

V_{CE} = 6V, I_{CC} = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.559 / -164.361	6.779 / 83.703	0.060 / 39.473	0.310 / -103.669
800.0MHz	0.568 / -168.517	5.818 / 80.307	0.067 / 42.601	0.330 / -111.405
1.000GHz	0.578 / -172.673	4.858 / 76.911	0.074 / 45.729	0.351 / -119.141
1.200GHz	0.588 / -179.063	4.066 / 70.630	0.082 / 48.092	0.353 / -124.747
1.400GHz	0.595 / 175.752	3.510 / 64.541	0.090 / 50.356	0.364 / -129.655
1.600GHz	0.592 / 170.470	3.069 / 59.365	0.100 / 51.927	0.382 / -133.225
1.800GHz	0.600 / 165.442	2.737 / 54.034	0.110 / 52.962	0.399 / -136.905
2.000GHz	0.600 / 161.281	2.468 / 49.129	0.121 / 53.720	0.418 / -140.416
2.200GHz	0.616 / 158.315	2.256 / 44.712	0.132 / 53.848	0.433 / -143.992
2.400GHz	0.626 / 155.302	2.066 / 40.150	0.145 / 54.048	0.440 / -147.972
2.600GHz	0.630 / 152.635	1.908 / 35.569	0.157 / 53.161	0.455 / -151.702
2.800GHz	0.643 / 148.612	1.772 / 31.312	0.170 / 52.264	0.474 / -154.792
3.000GHz	0.636 / 144.405	1.669 / 27.829	0.184 / 51.551	0.495 / -157.029

V_{CE} = 6V, I_{CC} = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.498 / -175.120	7.257 / 81.731	0.054 / 50.405	0.270 / -114.784
800.0MHz	0.542 / -176.636	6.218 / 78.839	0.063 / 52.145	0.296 / -121.508
1.000GHz	0.586 / -178.152	5.180 / 75.947	0.072 / 53.885	0.323 / -128.232
1.200GHz	0.589 / 175.600	4.330 / 70.200	0.082 / 55.825	0.327 / -133.053
1.400GHz	0.593 / 170.887	3.739 / 64.439	0.093 / 56.928	0.340 / -137.126
1.600GHz	0.596 / 165.776	3.272 / 59.562	0.104 / 57.621	0.358 / -139.994
1.800GHz	0.602 / 161.738	2.916 / 54.494	0.115 / 57.547	0.375 / -142.997
2.000GHz	0.603 / 157.699	2.629 / 49.890	0.127 / 57.335	0.393 / -145.928
2.200GHz	0.613 / 154.942	2.406 / 45.529	0.140 / 56.581	0.408 / -148.985
2.400GHz	0.627 / 152.475	2.205 / 41.249	0.153 / 56.074	0.414 / -152.621
2.600GHz	0.634 / 150.042	2.039 / 37.127	0.166 / 54.663	0.429 / -155.925
2.800GHz	0.639 / 145.758	1.900 / 32.648	0.179 / 53.220	0.446 / -158.566
3.000GHz	0.637 / 141.805	1.782 / 29.407	0.193 / 52.178	0.466 / -160.469

V_{CE} = 6V, I_{CC} = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.685 / -175.193	7.521 / 80.906	0.050 / 55.755	0.246 / -121.424
800.0MHz	0.633 / -178.849	6.431 / 78.122	0.061 / 57.291	0.279 / -127.544
1.000GHz	0.582 / 177.495	5.341 / 75.338	0.071 / 58.827	0.311 / -133.664
1.200GHz	0.595 / 173.037	4.465 / 69.799	0.083 / 59.914	0.316 / -137.904
1.400GHz	0.605 / 168.111	3.848 / 64.266	0.094 / 60.379	0.330 / -141.538
1.600GHz	0.601 / 163.751	3.367 / 59.669	0.106 / 60.317	0.348 / -143.944
1.800GHz	0.604 / 159.065	3.008 / 54.593	0.119 / 59.862	0.364 / -146.551
2.000GHz	0.607 / 155.830	2.707 / 50.161	0.131 / 59.172	0.382 / -149.196
2.200GHz	0.614 / 153.007	2.481 / 46.143	0.144 / 58.037	0.396 / -151.915
2.400GHz	0.628 / 150.628	2.273 / 41.695	0.157 / 57.148	0.402 / -155.384
2.600GHz	0.625 / 148.313	2.103 / 37.381	0.170 / 55.369	0.415 / -158.411
2.800GHz	0.640 / 143.988	1.963 / 33.462	0.184 / 53.798	0.433 / -160.870
3.000GHz	0.641 / 140.682	1.846 / 30.089	0.198 / 52.546	0.453 / -162.521

V_{CE} = 6V, I_{CC} = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.576 / -177.873	7.651 / 80.032	0.047 / 59.605	0.234 / -125.636
800.0MHz	0.585 / 178.611	6.541 / 77.480	0.059 / 60.785	0.269 / -131.400
1.000GHz	0.594 / 175.095	5.430 / 74.928	0.071 / 61.965	0.304 / -137.164
1.200GHz	0.602 / 170.348	4.536 / 69.567	0.083 / 62.770	0.310 / -141.001
1.400GHz	0.604 / 166.425	3.913 / 64.219	0.096 / 62.646	0.324 / -144.293
1.600GHz	0.604 / 162.312	3.422 / 59.539	0.108 / 62.255	0.342 / -146.401
1.800GHz	0.609 / 158.087	3.053 / 54.783	0.120 / 61.390	0.358 / -148.772
2.000GHz	0.609 / 154.486	2.756 / 50.241	0.134 / 60.390	0.376 / -151.211
2.200GHz	0.620 / 151.783	2.521 / 46.222	0.147 / 59.022	0.390 / -153.764
2.400GHz	0.632 / 149.400	2.313 / 41.927	0.160 / 57.925	0.395 / -157.119
2.600GHz	0.631 / 147.892	2.134 / 37.701	0.173 / 55.978	0.409 / -159.991
2.800GHz	0.642 / 143.481	1.990 / 33.700	0.187 / 54.291	0.426 / -162.297
3.000GHz	0.632 / 139.522	1.873 / 30.249	0.201 / 52.755	0.445 / -163.800

V_{CE} = 6V, I_{CC} = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.580 / -179.741	7.673 / 80.094	0.046 / 59.950	0.225 / -128.600
800.0MHz	0.589 / 177.059	6.572 / 77.318	0.059 / 62.082	0.262 / -133.944
1.000GHz	0.598 / 173.859	5.471 / 74.542	0.071 / 64.214	0.298 / -139.288
1.200GHz	0.603 / 169.057	4.566 / 69.391	0.084 / 64.419	0.306 / -142.836
1.400GHz	0.612 / 165.217	3.943 / 64.016	0.097 / 64.106	0.320 / -145.883
1.600GHz	0.606 / 161.117	3.446 / 59.456	0.109 / 63.449	0.338 / -147.823
1.800GHz	0.612 / 157.279	3.074 / 54.618	0.122 / 62.328	0.355 / -150.020
2.000GHz	0.612 / 153.680	2.775 / 50.283	0.135 / 61.212	0.372 / -152.329
2.200GHz	0.624 / 150.952	2.539 / 46.245	0.149 / 59.712	0.386 / -154.791
2.400GHz	0.632 / 148.456	2.332 / 42.024	0.162 / 58.467	0.391 / -158.104
2.600GHz	0.635 / 146.361	2.154 / 37.866	0.175 / 56.516	0.405 / -160.868
2.800GHz	0.645 / 142.513	2.010 / 33.668	0.189 / 54.626	0.421 / -163.082
3.000GHz	0.641 / 138.987	1.890 / 30.374	0.203 / 53.052	0.441 / -164.519

V_{CE} = 8V, I_{CC} = 3mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.608 / -122.460	4.613 / 91.427	0.106 / 23.455	0.547 / -75.355
800.0MHz	0.609 / -133.688	3.993 / 86.531	0.106 / 22.187	0.539 / -83.915
1.000GHz	0.609 / -144.916	3.372 / 81.635	0.106 / 20.919	0.531 / -92.475
1.200GHz	0.604 / -154.155	2.851 / 73.024	0.104 / 19.889	0.518 / -100.186
1.400GHz	0.609 / -161.984	2.481 / 65.358	0.101 / 20.805	0.521 / -107.278
1.600GHz	0.610 / -169.582	2.175 / 58.622	0.099 / 23.214	0.534 / -113.064
1.800GHz	0.617 / -176.105	1.935 / 52.074	0.098 / 26.647	0.547 / -118.952
2.000GHz	0.619 / 178.339	1.743 / 46.199	0.100 / 31.184	0.566 / -124.322
2.200GHz	0.640 / 173.739	1.589 / 41.212	0.104 / 35.784	0.580 / -129.728
2.400GHz	0.649 / 169.717	1.451 / 35.824	0.111 / 40.461	0.586 / -135.085
2.600GHz	0.661 / 165.737	1.332 / 30.974	0.120 / 43.712	0.601 / -140.359
2.800GHz	0.671 / 160.483	1.232 / 26.314	0.131 / 46.309	0.619 / -144.889
3.000GHz	0.673 / 155.716	1.152 / 22.739	0.144 / 48.480	0.640 / -148.398

V_{CE} = 8V, I_{CC} = 5mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.540 / -139.393	5.640 / 88.539	0.084 / 26.545	0.433 / -85.273
800.0MHz	0.563 / -148.457	4.860 / 83.983	0.086 / 28.173	0.436 / -93.921
1.000GHz	0.585 / -157.521	4.080 / 79.427	0.088 / 29.801	0.440 / -102.569
1.200GHz	0.585 / -165.379	3.434 / 71.866	0.090 / 31.291	0.433 / -109.476
1.400GHz	0.593 / -172.768	2.967 / 65.027	0.092 / 34.067	0.441 / -115.749
1.600GHz	0.596 / -179.281	2.602 / 59.104	0.096 / 37.150	0.456 / -120.706
1.800GHz	0.603 / 175.398	2.316 / 52.940	0.101 / 40.126	0.471 / -125.697
2.000GHz	0.607 / 170.250	2.081 / 47.548	0.107 / 43.166	0.491 / -130.309
2.200GHz	0.621 / 166.603	1.903 / 42.847	0.116 / 45.675	0.506 / -134.977
2.400GHz	0.635 / 163.031	1.741 / 37.941	0.126 / 47.933	0.514 / -139.747
2.600GHz	0.644 / 159.741	1.605 / 33.427	0.137 / 48.932	0.529 / -144.408
2.800GHz	0.647 / 155.146	1.483 / 28.613	0.149 / 49.540	0.549 / -148.359
3.000GHz	0.657 / 150.578	1.392 / 25.317	0.163 / 50.196	0.570 / -151.371

V_{CE} = 8V, I_{CC} = 10mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.626 / -163.923	6.736 / 83.589	0.058 / 39.339	0.311 / -102.795
800.0MHz	0.602 / -167.887	5.801 / 80.329	0.066 / 42.431	0.332 / -110.739
1.000GHz	0.578 / -171.851	4.867 / 77.069	0.075 / 45.523	0.353 / -118.683
1.200GHz	0.583 / -178.620	4.071 / 70.774	0.082 / 48.020	0.354 / -124.340
1.400GHz	0.590 / 175.555	3.516 / 64.739	0.090 / 50.221	0.366 / -129.299
1.600GHz	0.591 / 170.796	3.076 / 59.483	0.100 / 51.785	0.383 / -132.933
1.800GHz	0.597 / 166.073	2.740 / 54.080	0.110 / 52.805	0.400 / -136.652
2.000GHz	0.601 / 161.539	2.474 / 49.239	0.120 / 53.592	0.419 / -140.166
2.200GHz	0.612 / 158.545	2.261 / 44.887	0.132 / 53.750	0.434 / -143.764
2.400GHz	0.623 / 155.928	2.071 / 40.226	0.144 / 53.884	0.441 / -147.754
2.600GHz	0.630 / 153.206	1.914 / 35.726	0.157 / 53.083	0.456 / -151.487
2.800GHz	0.641 / 148.667	1.777 / 31.611	0.170 / 52.263	0.475 / -154.642
3.000GHz	0.641 / 144.458	1.669 / 28.083	0.184 / 51.573	0.496 / -156.879

V_{CE} = 8V, I_{CC} = 15mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.608 / -170.639	7.234 / 81.801	0.050 / 46.563	0.270 / -113.071
800.0MHz	0.591 / -174.343	6.212 / 78.953	0.061 / 50.115	0.298 / -120.271
1.000GHz	0.575 / -178.047	5.190 / 76.105	0.072 / 53.667	0.325 / -127.471
1.200GHz	0.591 / 175.960	4.332 / 70.204	0.082 / 55.593	0.329 / -132.323
1.400GHz	0.594 / 171.238	3.739 / 64.518	0.093 / 56.618	0.342 / -136.538
1.600GHz	0.591 / 166.465	3.272 / 59.641	0.104 / 57.249	0.360 / -139.480
1.800GHz	0.601 / 161.959	2.914 / 54.540	0.115 / 57.325	0.376 / -142.521
2.000GHz	0.600 / 158.055	2.632 / 49.990	0.127 / 57.175	0.395 / -145.511
2.200GHz	0.613 / 155.324	2.406 / 45.631	0.139 / 56.469	0.409 / -148.562
2.400GHz	0.623 / 152.298	2.210 / 41.278	0.152 / 56.047	0.415 / -152.243
2.600GHz	0.631 / 149.687	2.038 / 37.034	0.165 / 54.627	0.429 / -155.522
2.800GHz	0.636 / 146.116	1.897 / 32.522	0.179 / 53.226	0.447 / -158.239
3.000GHz	0.632 / 141.812	1.789 / 29.399	0.192 / 52.149	0.467 / -160.145

V_{CE} = 8V, I_{CC} = 20mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.614 / -175.479	7.483 / 80.999	0.048 / 53.911	0.250 / -119.679
800.0MHz	0.595 / -178.539	6.422 / 78.247	0.060 / 56.235	0.281 / -126.235
1.000GHz	0.576 / 178.401	5.360 / 75.495	0.071 / 58.559	0.312 / -132.791
1.200GHz	0.592 / 172.197	4.475 / 69.879	0.082 / 59.571	0.318 / -137.148
1.400GHz	0.591 / 168.504	3.869 / 64.393	0.094 / 60.114	0.331 / -140.838
1.600GHz	0.599 / 164.138	3.377 / 59.728	0.106 / 60.109	0.349 / -143.324
1.800GHz	0.605 / 159.656	3.009 / 54.746	0.118 / 59.770	0.365 / -145.989
2.000GHz	0.606 / 156.093	2.714 / 50.166	0.131 / 59.056	0.383 / -148.683
2.200GHz	0.615 / 153.443	2.485 / 46.069	0.144 / 57.986	0.397 / -151.455
2.400GHz	0.623 / 150.823	2.286 / 41.627	0.157 / 57.078	0.402 / -154.953
2.600GHz	0.627 / 148.075	2.110 / 37.586	0.170 / 55.387	0.417 / -158.007
2.800GHz	0.638 / 144.426	1.962 / 33.285	0.183 / 53.851	0.434 / -160.486
3.000GHz	0.638 / 140.110	1.849 / 29.999	0.197 / 52.513	0.454 / -162.144

V_{CE} = 8V, I_{CC} = 25mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.611 / -176.279	7.667 / 80.485	0.047 / 57.840	0.240 / -124.639
800.0MHz	0.600 / 179.577	6.557 / 77.793	0.059 / 59.712	0.272 / -130.355
1.000GHz	0.589 / 175.433	5.447 / 75.101	0.071 / 61.584	0.305 / -136.071
1.200GHz	0.599 / 170.870	4.546 / 69.663	0.083 / 62.325	0.311 / -140.073
1.400GHz	0.598 / 166.863	3.928 / 64.268	0.095 / 62.278	0.325 / -143.459
1.600GHz	0.602 / 162.409	3.432 / 59.660	0.108 / 61.898	0.343 / -145.658
1.800GHz	0.608 / 158.425	3.064 / 54.838	0.120 / 61.062	0.359 / -148.143
2.000GHz	0.605 / 154.814	2.762 / 50.318	0.133 / 60.222	0.377 / -150.617
2.200GHz	0.618 / 151.919	2.529 / 46.383	0.146 / 58.858	0.390 / -153.207
2.400GHz	0.625 / 149.426	2.323 / 41.838	0.160 / 57.853	0.395 / -156.588
2.600GHz	0.629 / 146.860	2.146 / 37.669	0.173 / 55.908	0.409 / -159.502
2.800GHz	0.638 / 143.240	2.000 / 33.605	0.186 / 54.211	0.426 / -161.836
3.000GHz	0.639 / 139.728	1.884 / 30.322	0.200 / 52.778	0.445 / -163.386

V_{CE} = 8V, I_{CC} = 30mA

freq	S(1,1)	S(2,1)	S(1,2)	S(2,2)
600.0MHz	0.628 / -174.744	7.646 / 79.911	0.044 / 60.573	0.230 / -127.284
800.0MHz	0.609 / 179.656	6.573 / 77.339	0.058 / 62.149	0.265 / -132.700
1.000GHz	0.589 / 174.056	5.501 / 74.767	0.071 / 63.725	0.300 / -138.116
1.200GHz	0.595 / 169.776	4.589 / 69.517	0.083 / 64.039	0.307 / -141.847
1.400GHz	0.604 / 165.577	3.962 / 64.103	0.096 / 63.820	0.321 / -145.027
1.600GHz	0.608 / 161.407	3.463 / 59.575	0.109 / 63.222	0.339 / -147.028
1.800GHz	0.610 / 157.243	3.081 / 54.727	0.121 / 62.182	0.355 / -149.321
2.000GHz	0.607 / 153.790	2.786 / 50.395	0.135 / 61.077	0.373 / -151.737
2.200GHz	0.620 / 150.632	2.552 / 46.289	0.148 / 59.543	0.386 / -154.209
2.400GHz	0.627 / 148.754	2.340 / 41.966	0.162 / 58.323	0.391 / -157.515
2.600GHz	0.632 / 146.463	2.164 / 37.874	0.175 / 56.365	0.405 / -160.363
2.800GHz	0.642 / 142.937	2.012 / 33.802	0.188 / 54.603	0.422 / -162.612
3.000GHz	0.640 / 138.760	1.897 / 30.439	0.202 / 52.994	0.441 / -164.107