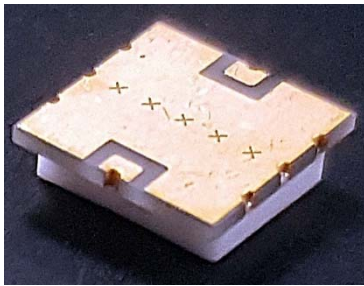


KX105

15 W, 6.0 GHz,
GaN HEMT
Transistor

DESCRIPTION

The KX105 is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT) transistor in a Surface-Mount Technology (SMT) package for high reliability applications. This transistor offers superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. GaN HEMTs offer greater power density and wider bandwidths compared to Si and GaAs transistors.



FEATURES

- ✓ High Small Signal Gain: 15 dB @ 4 GHz.
- ✓ High Output Power: 15W P_{SAT} .
- ✓ High Breakdown Voltage, Efficiency and Temperature Operation.

APPLICATIONS

- ✓ Microwave Radios
- ✓ Military Radios
- ✓ VSAT
- ✓ Telecom Infrastructure
- ✓ Test Equipment

ELECTRICAL CHARACTERISTICS (-40 to 85°C)

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Small Signal Gain	G_{SS}	$V_{DD} = 28 \text{ V}, I_{DQ} = 100 \text{ mA}$		15		dB
Saturated Power Output ¹	P_{SAT}	$V_{DS} = 28 \text{ V}, I_{DQ} = 100 \text{ mA}$		15		W
Drain Efficiency ²	η	$V_{DS} = 28 \text{ V}, I_{DQ} = 100 \text{ mA},$ $P_{SAT} = 15 \text{ W}$		65		%
Output Mismatch Stress	VSWR	$V_{DS} = 28 \text{ V}, I_{DQ} = 100 \text{ mA},$ $P_{OUT} = 15 \text{ W CW}$			10:1	

1. P_{SAT} is defined as $I_G = 0.4 \text{ mA}$.

2. Drain Efficiency = P_{OUT}/P_{DC} .

KX105 | GaN HEMT Transistor, 15 W, 6.0 GHz

OPERATING CHARACTERISTICS (-40 TO +85°C)¹

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = 10 \text{ V}, I_D = 3.6 \text{ mA}$	-3.8	-3.0	-2.3	V
Gate Quiescent Voltage	$V_{GS(Q)}$	$V_{DS} = 28 \text{ V}, I_{DQ} = 100 \text{ mA}$		-2.7		V
Drain-Source Breakdown Voltage	V_{BD}	$V_{GS} = -8 \text{ V}, I_D = 3.6 \text{ mA}$	120			V
On Resistance	R_{ON}	$V_{DS} = 0.1 \text{ V}$		1.0		Ω
Input Capacitance	C_{GS}	$V_{DS} = 28 \text{ V}, V_{GS} = -8 \text{ V}, f = 1 \text{ MHz}$		4.1		pF
Output Capacitance	C_{DS}	$V_{DS} = 28 \text{ V}, V_{GS} = -8 \text{ V}, f = 1 \text{ MHz}$		0.9		pF
Feedback Capacitance	C_{GD}	$V_{DS} = 28 \text{ V}, V_{GS} = -8 \text{ V}, f = 1 \text{ MHz}$		0.2		pF

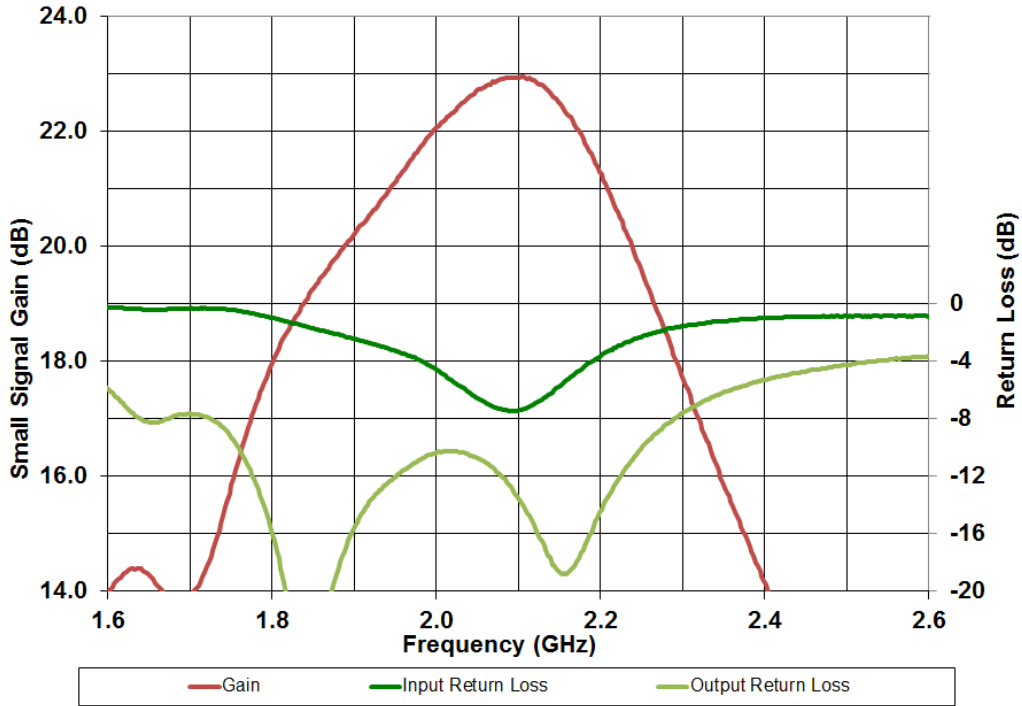
1. All operating characteristics are guaranteed over full performance temperature range but not tested.

ABSOLUTE MAXIMUM RATINGS

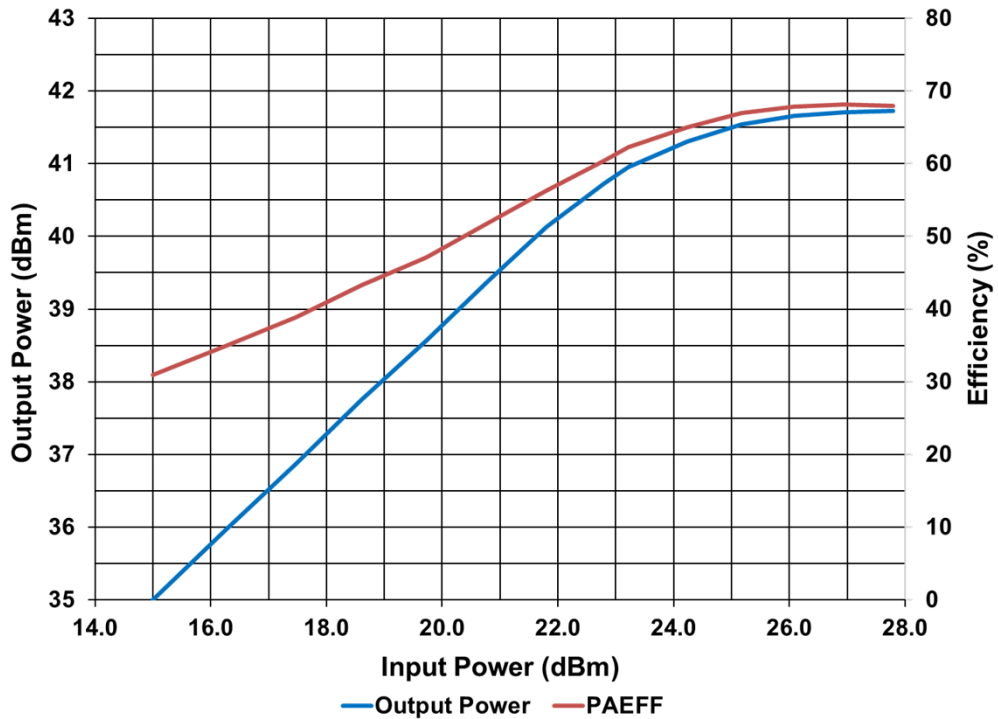
Characteristic	Conditions	Symbol	Rating	Units
Drain-Source voltage	25°C	V_{DSS}	84	VDC
Gate-Source voltage	25°C	V_{GS}	-10/+2	VDC
Storage temperature			-65/+150	°C
Operating junction temperature			225	°C
Maximum Forward Gate Current	25°C	I_{GMAX}	4	mA
Maximum Drain Current	25°C	I_{DMAX}	1.5	A
Thermal resistance, Junction to Case		$R_{\theta JC}$	5.4	°C/W
ESD sensitivity (HBM)	JEDEC JESD22/A114-D		1A/250V	

TYPICAL PERFORMANCE (+25 °C)

Gain and Return Loss vs Frequency¹



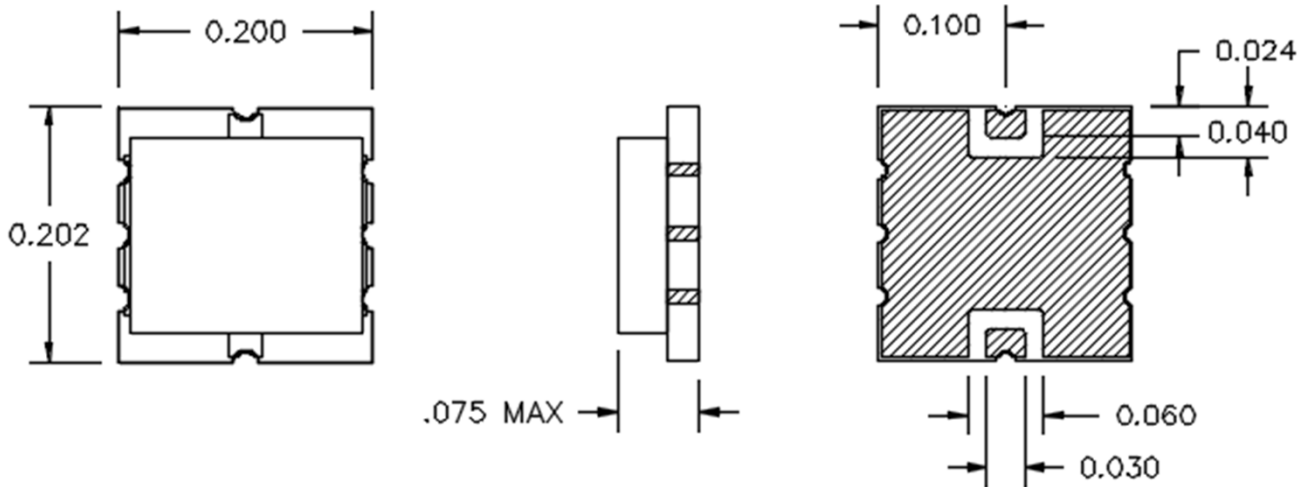
Output Power/Efficiency vs Input Power¹



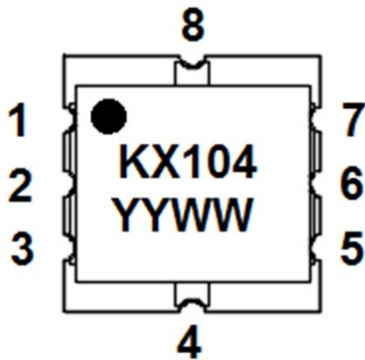
1. Gain and power data from device in application board

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OUTLINE:



DEVICE MARKING/PIN OUT:



PIN	Designation	PIN	Designation
1	SOURCE	5	SOURCE
2	SOURCE	6	SOURCE
3	SOURCE	7	SOURCE
4	GATE	8	DRAIN

PACKAGE NOTES:

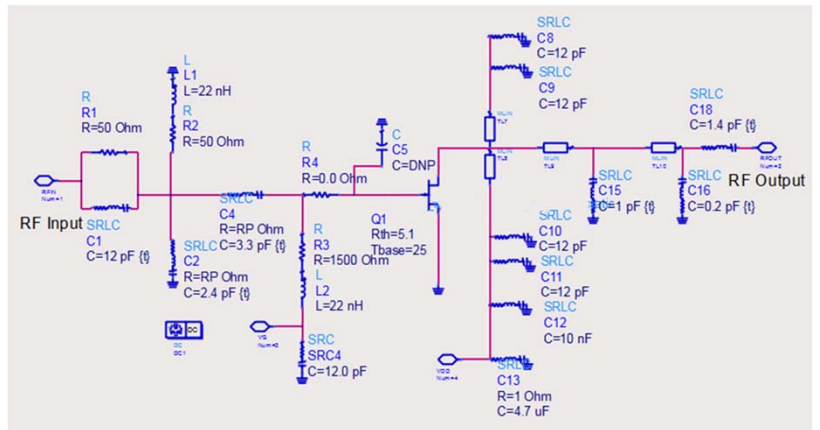
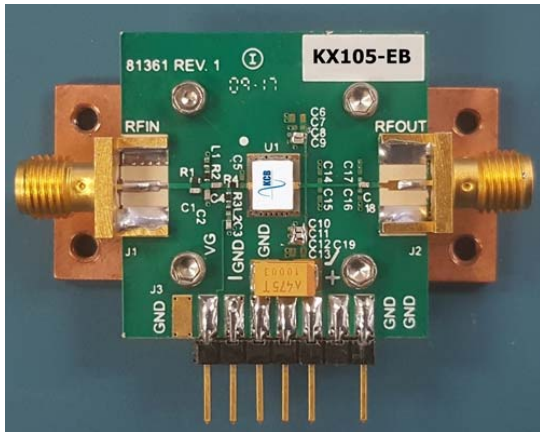
- Lid: White Ceramic
- Base: Aluminum Nitride
- Mounting Surface Finish: Gold over Nickel over Copper

ADDITIONAL NOTES:

- Maximum reflow temperature: 265°C for 60 – 90 seconds
- Package base is the transistor source

KX105 | GaN HEMT Transistor, 15 W, 6.0 GHz

EVALUATION BOARD:



Qty	Reference Designator	Description	Digikey Part Number	Manufacturer
2	J1, J2	SMA Edge Launch Connector	931-1175-ND	
1	J3	0.1" DC Header, 8 Positions		
1	U1	KCB307 Power Amplifier	N/A	
6	C1, C3, C8, C9, C10, C11	12pF, 0402, 100V, 5%	490-7300-1-ND	Murata
1	C2	2.4pF, 0402, 50V, +/-0.1pF	712-1280-1-ND	Johanson
1	C4	3.3pF, 0402, 50V, +/-0.1pF	712-1283-1-ND	Johanson
2	L1, L2	FIXED IND 22NH 350MA 420 MOHM	490-2627-1-ND	Murata
2	R1, R2	RES SMD 49.9 OHM 1% 1/10W 0402	P49.9LCT-ND	Panasonic
1	R4	RES SMD 0.0 OHM 1% 1/8W 0402	P0.0JCT-ND	Panasonic
1	R3	RES SMD 1.5K OHM 1% 1/10W 0402	P1.50KLCT-ND	Panasonic
1	C15	1.0pF, 0402, 100V, +/-0.1pF	399-8599-6-ND	Kemet
1	C16	0.2pF, 0402, 100V, +/-0.05pF	490-7271-1-ND	Murata
1	C18	1.4pF, 0402, 50V, +/-0.1pF	490-6211-1-ND	Murata
1	C12	10nF, 0402, 50V	490-4516-1-ND	Murata
1	C13	Do not populate		
1	C19	4.7uF, 2312, 50V, +/-20%	478-9430-1-ND	AVX
5	C5, C6, C7, C14, C17	Do not populate		

KX105 | GaN HEMT Transistor, 15 W, 6.0 GHz

S-PARAMETER DATA: ($V_{DS} = 28V$, $I_{DQ} = 100mA$)

FREQ	S11 Mag dB	S11 Angle	S21 Mag dB	S21 Angle	S12 Mag dB	S12 Angle	S22 Mag dB	S22 Angle
0.1	-0.038	-36.768	31.691	161.012	-40.085	71.894	-7.949	-26.388
0.2	-0.385	-76.953	29.966	136.315	-35.797	48.127	-8.776	-61.361
0.3	-0.652	-102.816	28.052	120.504	-34.202	33.239	-9.391	-83.498
0.4	-0.819	-120.292	26.290	109.362	-33.484	23.021	-9.731	-98.202
0.5	-0.922	-132.738	24.736	100.877	-33.124	15.465	-9.858	-108.330
0.6	-0.986	-142.071	23.371	93.991	-32.934	9.515	-9.842	-115.593
0.7	-1.028	-149.395	22.166	88.125	-32.835	4.594	-9.731	-121.025
0.8	-1.055	-155.364	21.091	82.944	-32.790	0.367	-9.560	-125.265
0.9	-1.074	-160.387	20.123	78.243	-32.780	-3.367	-9.349	-128.718
1.0	-1.086	-164.728	19.243	73.895	-32.794	-6.735	-9.114	-131.644
1.1	-1.094	-168.564	18.439	69.811	-32.827	-9.822	-8.865	-134.214
1.2	-1.100	-172.018	17.698	65.935	-32.873	-12.685	-8.609	-136.543
1.3	-1.103	-175.179	17.011	62.223	-32.931	-15.364	-8.352	-138.706
1.4	-1.105	-178.111	16.372	58.645	-32.998	-17.888	-8.098	-140.757
1.5	-1.106	179.137	15.775	55.178	-33.073	-20.276	-7.849	-142.731
1.6	-1.107	176.528	15.214	51.806	-33.156	-22.544	-7.608	-144.652
1.7	-1.106	174.034	14.688	48.514	-33.244	-24.704	-7.375	-146.538
1.8	-1.106	171.630	14.191	45.292	-33.337	-26.762	-7.151	-148.400
1.9	-1.106	169.299	13.721	42.131	-33.436	-28.727	-6.937	-150.246
2.0	-1.105	167.024	13.276	39.022	-33.539	-30.601	-6.734	-152.083
2.1	-1.105	164.795	12.855	35.961	-33.645	-32.388	-6.541	-153.913
2.2	-1.106	162.599	12.455	32.942	-33.755	-34.091	-6.358	-155.740
2.3	-1.106	160.429	12.075	29.960	-33.867	-35.709	-6.186	-157.565
2.4	-1.107	158.275	11.714	27.010	-33.982	-37.245	-6.023	-159.391
2.5	-1.109	156.132	11.370	24.089	-34.099	-38.698	-5.870	-161.217
2.6	-1.111	153.994	11.044	21.193	-34.217	-40.067	-5.726	-163.046
2.7	-1.114	151.855	10.733	18.319	-34.336	-41.351	-5.592	-164.878
2.8	-1.117	149.710	10.437	15.463	-34.455	-42.549	-5.466	-166.714
2.9	-1.121	147.555	10.156	12.623	-34.573	-43.658	-5.348	-168.554
3.0	-1.126	145.385	9.889	9.796	-34.691	-44.678	-5.238	-170.400
3.1	-1.131	143.198	9.635	6.979	-34.807	-45.606	-5.136	-172.252
3.2	-1.138	140.989	9.393	4.169	-34.920	-46.438	-5.042	-174.111
3.3	-1.145	138.755	9.164	1.364	-35.029	-47.174	-4.954	-175.978
3.4	-1.153	136.493	8.947	-1.439	-35.133	-47.811	-4.874	-177.855
3.5	-1.162	134.200	8.741	-4.243	-35.231	-48.347	-4.799	-179.742
3.6	-1.171	131.872	8.546	-7.050	-35.322	-48.781	-4.731	178.359
3.7	-1.182	129.506	8.362	-9.862	-35.403	-49.111	-4.670	176.447
3.8	-1.193	127.101	8.188	-12.682	-35.474	-49.340	-4.614	174.520
3.9	-1.205	124.653	8.023	-15.513	-35.531	-49.467	-4.563	172.577
4.0	-1.218	122.158	7.868	-18.356	-35.574	-49.498	-4.518	170.617

KX105 | GaN HEMT Transistor, 15 W, 6.0 GHz

S-PARAMETER DATA: ($V_{DS} = 28V, I_{DQ} = 100mA$)

FREQ	S11 Mag dB	S11 Angle	S21 Mag dB	S21 Angle	S12 Mag dB	S12 Angle	S22 Mag dB	S22 Angle
4.1	-1.232	119.616	7.722	-21.215	-35.600	-49.436	-4.479	168.637
4.2	-1.247	117.023	7.585	-24.090	-35.608	-49.289	-4.444	166.636
4.3	-1.262	114.376	7.456	-26.986	-35.594	-49.068	-4.414	164.611
4.4	-1.278	111.673	7.335	-29.903	-35.558	-48.784	-4.389	162.562
4.5	-1.295	108.912	7.221	-32.844	-35.497	-48.452	-4.368	160.485
4.6	-1.313	106.091	7.115	-35.812	-35.410	-48.090	-4.352	158.378
4.7	-1.331	103.207	7.015	-38.807	-35.296	-47.715	-4.340	156.239
4.8	-1.349	100.259	6.921	-41.833	-35.155	-47.350	-4.333	154.066
4.9	-1.368	97.244	6.834	-44.890	-34.986	-47.014	-4.329	151.856
5.0	-1.387	94.162	6.751	-47.981	-34.789	-46.730	-4.330	149.606
5.1	-1.406	91.010	6.674	-51.108	-34.566	-46.519	-4.334	147.314
5.2	-1.426	87.788	6.600	-54.271	-34.317	-46.399	-4.342	144.976
5.3	-1.445	84.496	6.531	-57.473	-34.045	-46.388	-4.353	142.589
5.4	-1.464	81.132	6.465	-60.714	-33.753	-46.502	-4.368	140.150
5.5	-1.482	77.696	6.402	-63.996	-33.441	-46.753	-4.386	137.655
5.6	-1.500	74.190	6.341	-67.319	-33.113	-47.151	-4.407	135.101
5.7	-1.517	70.614	6.283	-70.685	-32.771	-47.704	-4.432	132.485
5.8	-1.532	66.970	6.225	-74.094	-32.419	-48.416	-4.459	129.801
5.9	-1.547	63.258	6.168	-77.546	-32.057	-49.289	-4.489	127.047
6.0	-1.560	59.483	6.111	-81.041	-31.690	-50.323	-4.521	124.218
6.1	-1.571	55.646	6.054	-84.579	-31.319	-51.518	-4.555	121.310
6.2	-1.580	51.752	5.995	-88.160	-30.946	-52.871	-4.591	118.319
6.3	-1.586	47.805	5.935	-91.782	-30.574	-54.377	-4.629	115.240
6.4	-1.591	43.809	5.873	-95.446	-30.203	-56.031	-4.668	112.069
6.5	-1.593	39.769	5.808	-99.150	-29.837	-57.829	-4.708	108.803
6.6	-1.591	35.693	5.739	-102.893	-29.475	-59.763	-4.748	105.437
6.7	-1.587	31.585	5.667	-106.672	-29.121	-61.826	-4.789	101.967
6.8	-1.580	27.453	5.590	-110.486	-28.774	-64.013	-4.829	98.391
6.9	-1.570	23.303	5.509	-114.333	-28.435	-66.317	-4.867	94.706
7.0	-1.556	19.143	5.422	-118.210	-28.106	-68.729	-4.904	90.908
7.1	-1.540	14.980	5.329	-122.116	-27.788	-71.243	-4.938	86.997
7.2	-1.520	10.820	5.230	-126.046	-27.481	-73.851	-4.969	82.973
7.3	-1.497	6.673	5.125	-129.999	-27.186	-76.547	-4.996	78.835
7.4	-1.471	2.544	5.012	-133.970	-26.902	-79.323	-5.019	74.586
7.5	-1.443	-1.560	4.892	-137.957	-26.632	-82.173	-5.035	70.228
7.6	-1.412	-5.631	4.765	-141.956	-26.375	-85.089	-5.045	65.767
7.7	-1.379	-9.665	4.630	-145.963	-26.131	-88.064	-5.047	61.207
7.8	-1.344	-13.655	4.486	-149.975	-25.901	-91.091	-5.041	56.556
7.9	-1.307	-17.595	4.334	-153.988	-25.684	-94.164	-5.026	51.825
8.0	-1.269	-21.482	4.174	-157.998	-25.482	-97.277	-5.002	47.022

KX105 | GaN HEMT Transistor, 15 W, 6.0 GHz

S-PARAMETER DATA: ($V_{DS} = 28V$, $I_{DQ} = 100mA$)

FREQ	S11 Mag dB	S11 Angle	S21 Mag dB	S21 Angle	S12 Mag dB	S12 Angle	S22 Mag dB	S22 Angle
8.1	-1.230	-25.310	4.005	-162.000	-25.294	-100.422	-4.968	42.161
8.2	-1.190	-29.077	3.828	-165.991	-25.119	-103.593	-4.924	37.254
8.3	-1.150	-32.779	3.642	-169.967	-24.958	-106.784	-4.869	32.315
8.4	-1.109	-36.413	3.448	-173.922	-24.812	-109.989	-4.804	27.359
8.5	-1.068	-39.977	3.245	-177.854	-24.678	-113.201	-4.730	22.400
8.6	-1.028	-43.470	3.034	-178.242	-24.559	-116.416	-4.646	17.454
8.7	-0.988	-46.890	2.814	-174.370	-24.452	-119.626	-4.554	12.533
8.8	-0.949	-50.236	2.587	-170.534	-24.358	-122.828	-4.454	7.653
8.9	-0.911	-53.507	2.352	-166.737	-24.277	-126.015	-4.347	2.826
9.0	-0.874	-56.704	2.111	-162.984	-24.207	-129.183	-4.234	-1.938
9.1	-0.839	-59.827	1.862	-159.278	-24.149	-132.327	-4.116	-6.627
9.2	-0.804	-62.876	1.607	-155.622	-24.102	-135.443	-3.995	-11.233
9.3	-0.771	-65.851	1.345	-152.018	-24.065	-138.526	-3.871	-15.749
9.4	-0.740	-68.754	1.079	-148.470	-24.038	-141.574	-3.745	-20.167
9.5	-0.710	-71.585	0.807	-144.979	-24.020	-144.583	-3.619	-24.485
9.6	-0.681	-74.346	0.531	-141.549	-24.011	-147.550	-3.493	-28.697
9.7	-0.655	-77.038	0.251	-138.180	-24.010	-150.473	-3.368	-32.802
9.8	-0.629	-79.662	-0.032	-134.874	-24.016	-153.349	-3.245	-36.797
9.9	-0.605	-82.221	-0.318	-131.631	-24.029	-156.177	-3.124	-40.683
10.0	-0.583	-84.716	-0.606	-128.454	-24.048	-158.955	-3.006	-44.460