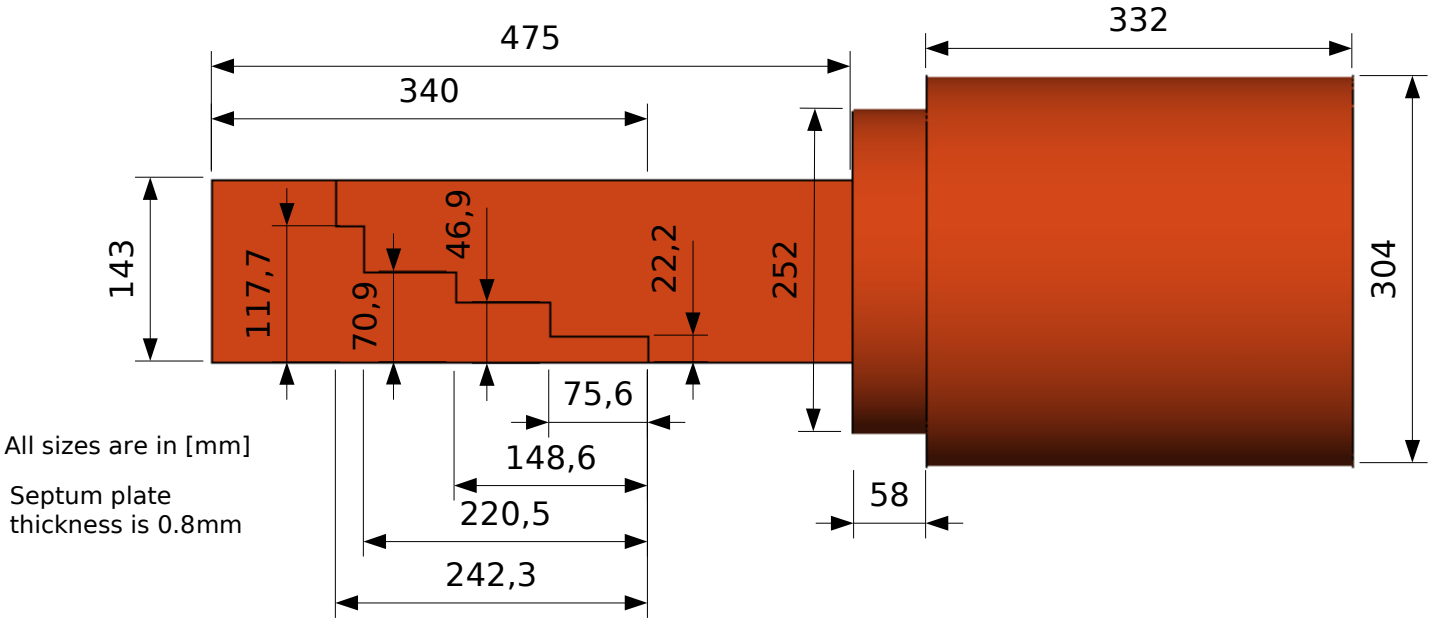
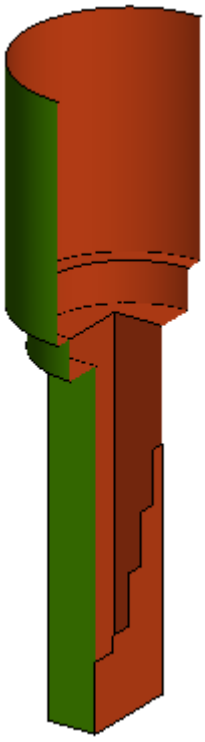
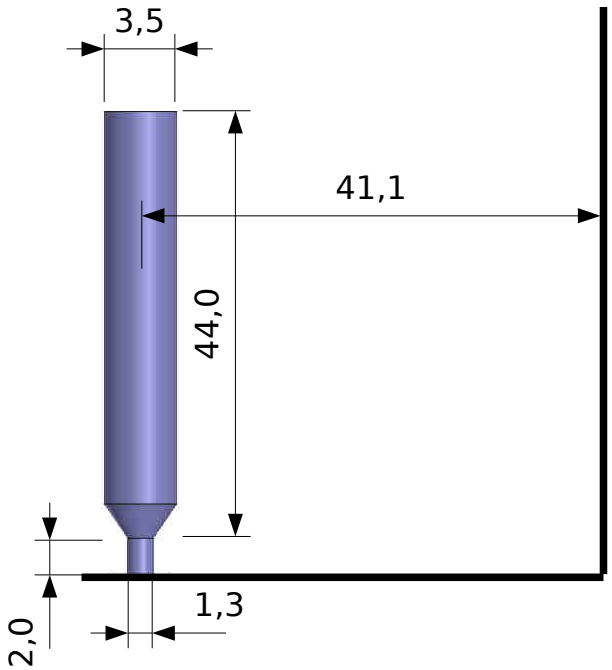
Stepped Dual Mode Horn with improved septum for 23cm band



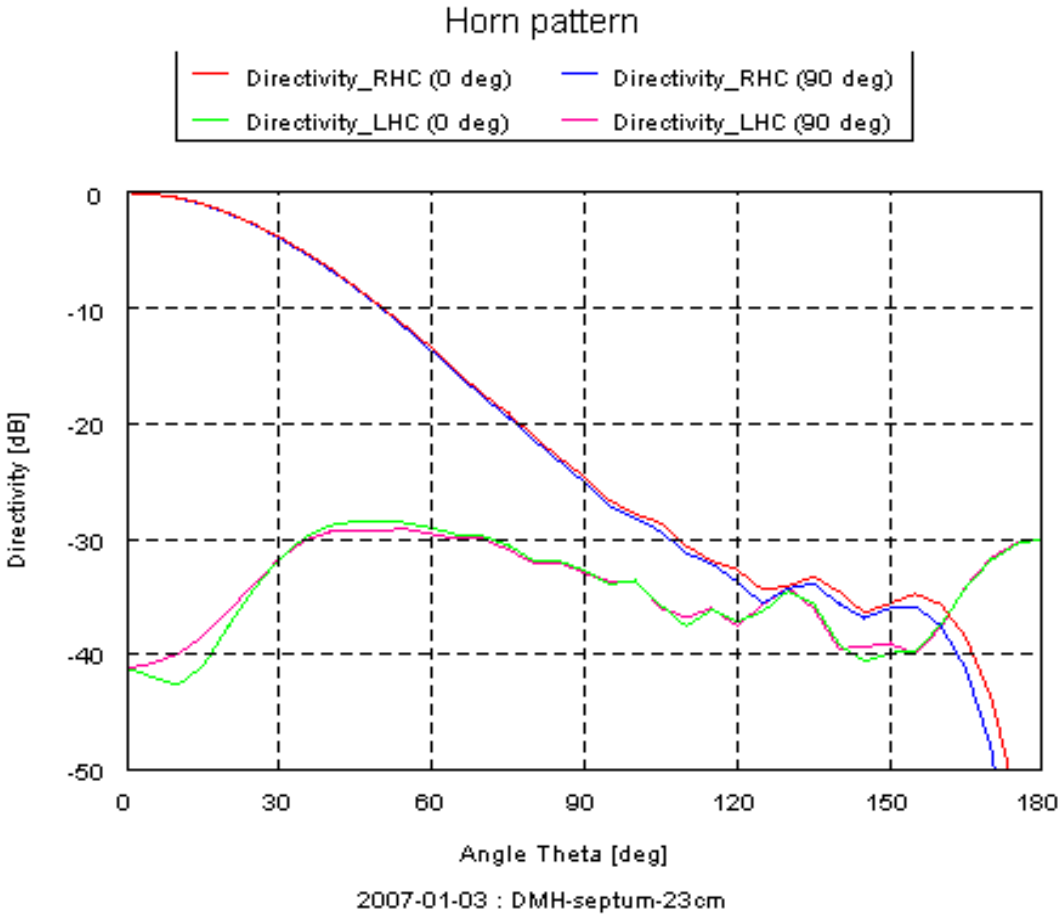
3D view

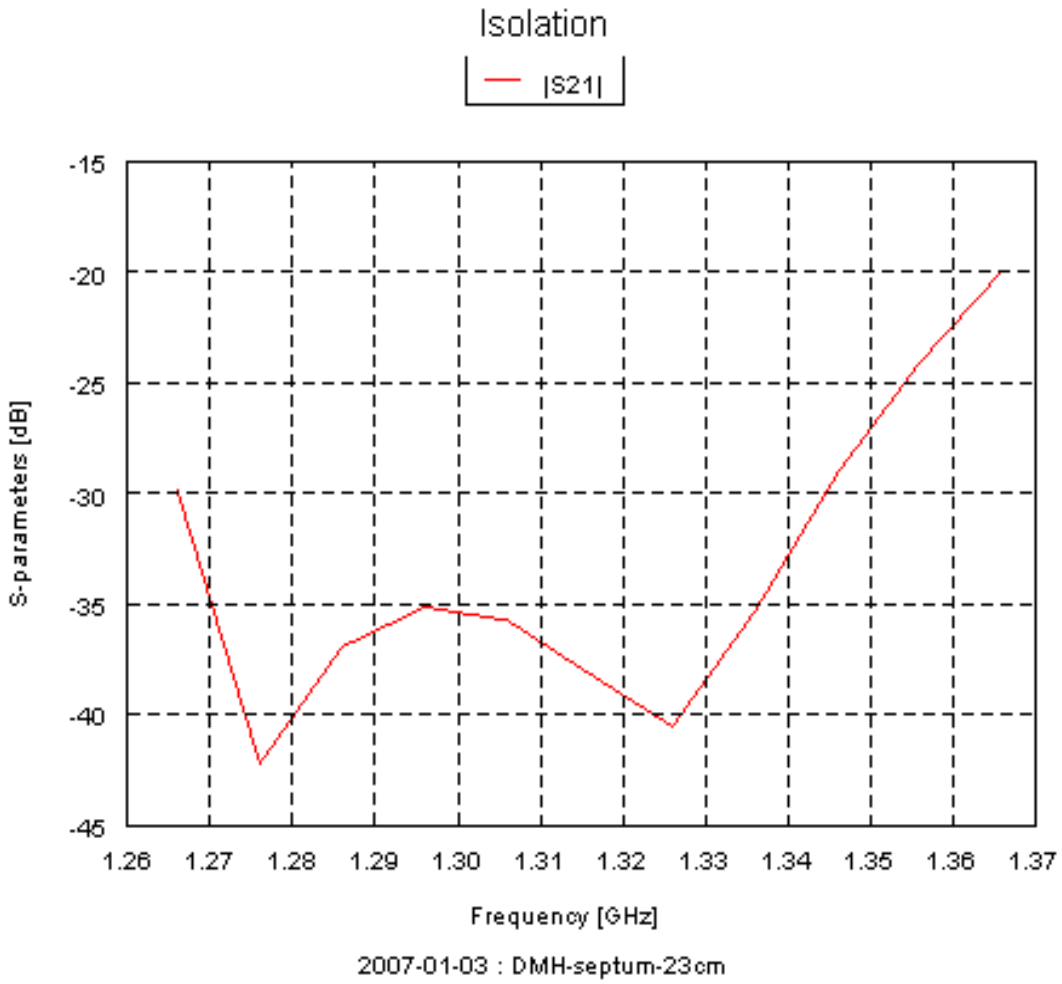


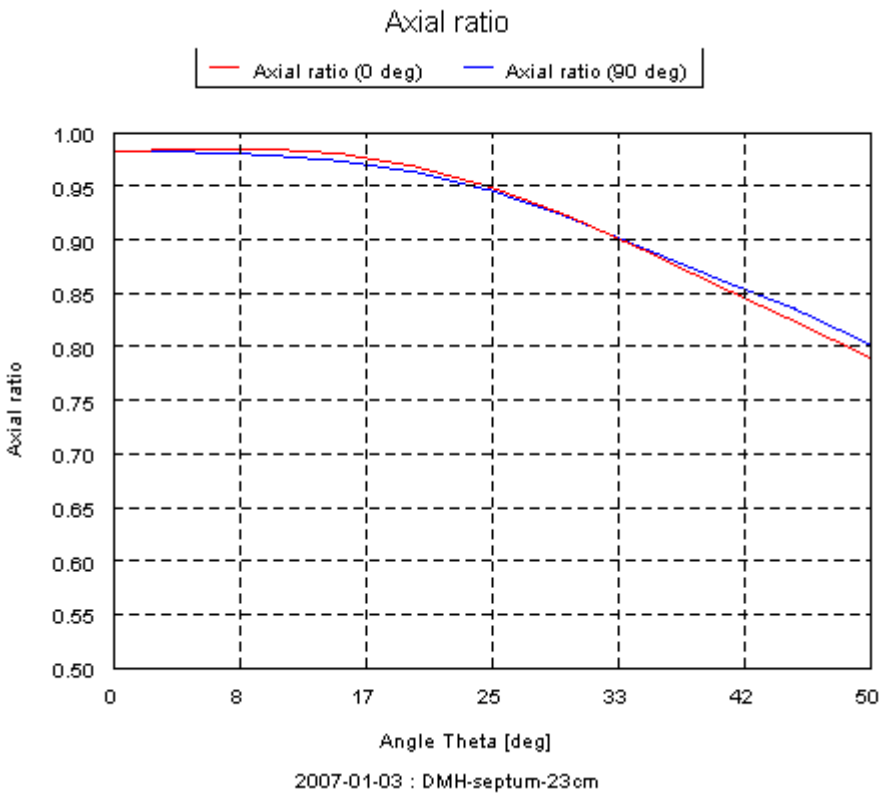
Probe position and sizes [mm]

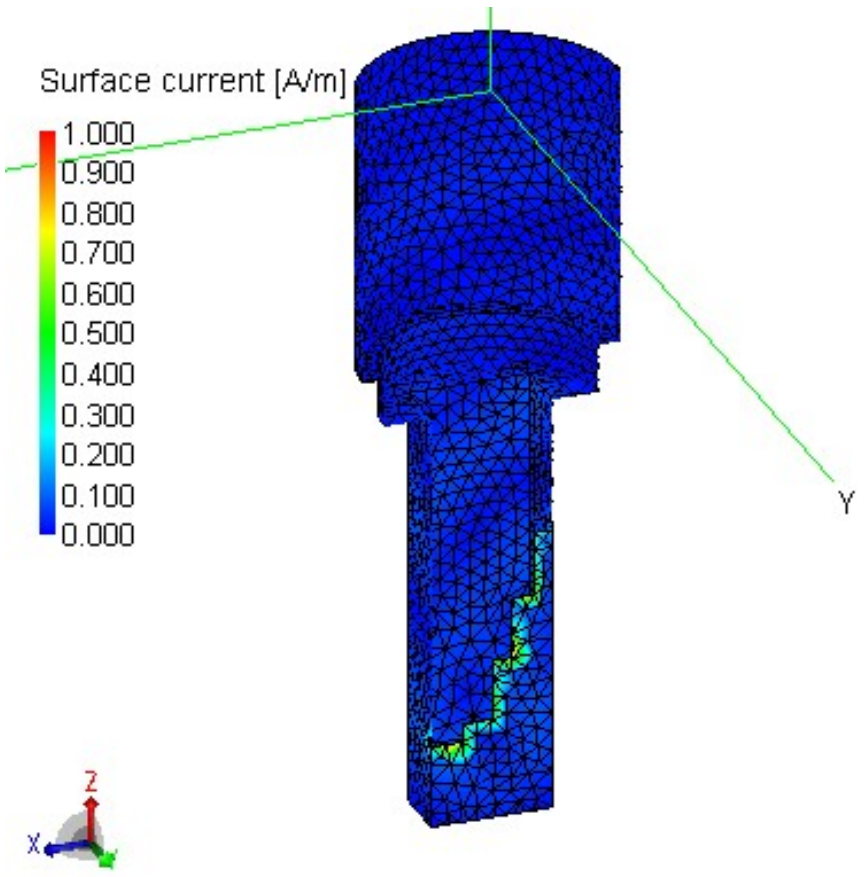


Simulation results by method of moments (FEKO 5.2)



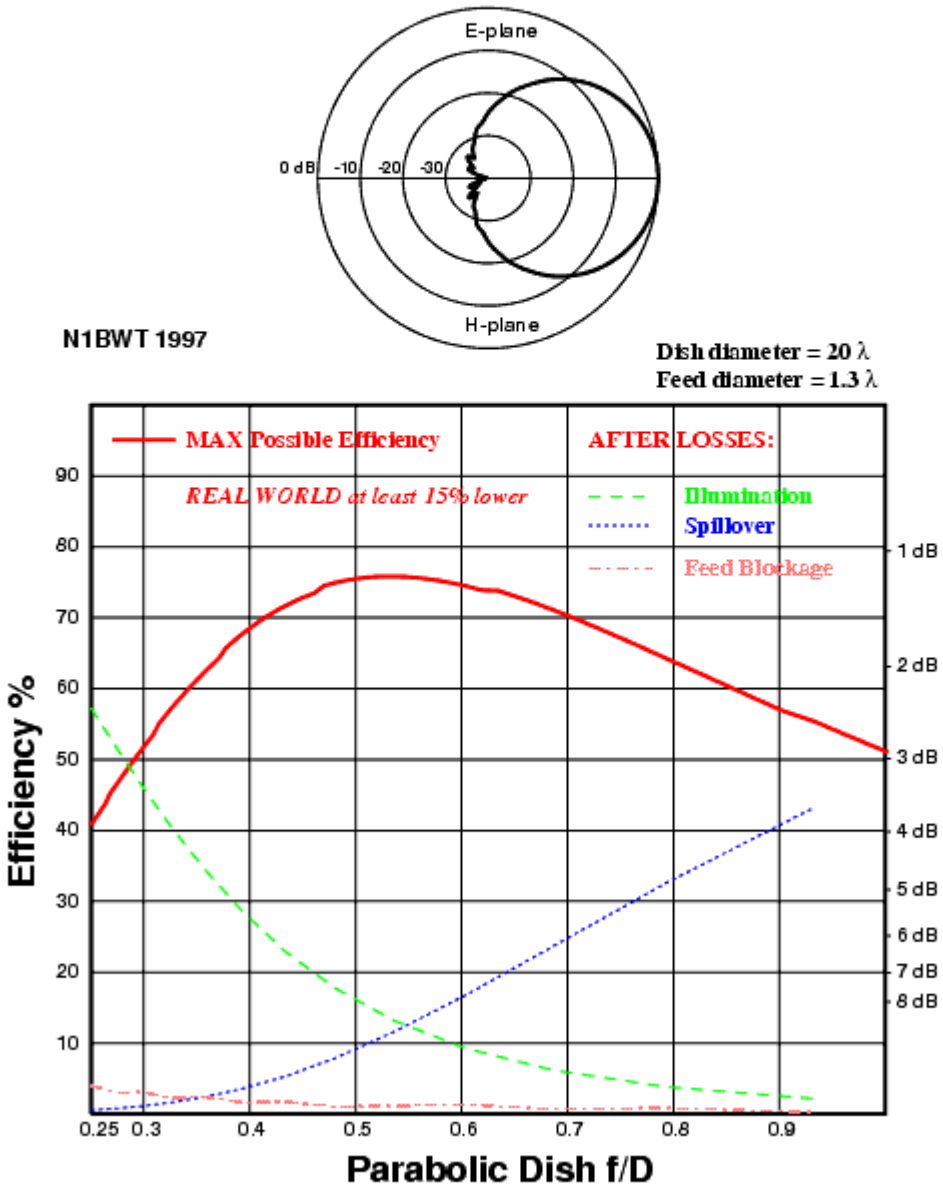



Axial ratio
Axial ratio (0 deg)
Axial ratio (90 deg)
Axial ratio
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0
8
17
25
33
42
50
Angle Theta [deg]
2007-01-03 : DMH-septum-23cm


Surface current [A/m]
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Y
Z
X

Calculated horn efficency

Stepped dual mode horn with square septum

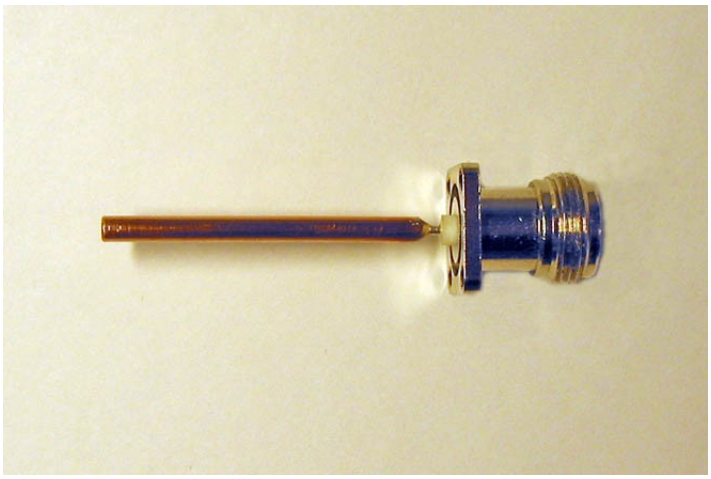


Half Angle	f/D	Edge Illum	TOTAL	Illum	Spillover	Blockage
20	1.418	-1.77 dB	31.51%	99.54%	31.83%	99.45%
25	1.128	-2.73 dB	43.98%	98.91%	44.63%	99.63%
30	0.933	-3.87 dB	55.37%	97.82%	56.76%	99.73%
35	0.793	-5.16 dB	64.30%	96.16%	67.45%	99.14%
40	0.687	-6.60 dB	71.08%	93.82%	76.31%	99.29%
45	0.604	-8.20 dB	74.48%	90.71%	83.24%	98.64%
50	0.536	-9.91 dB	75.84%	86.81%	88.41%	98.81%
55	0.480	-11.70 dB	74.93%	82.21%	92.13%	98.92%
60	0.433	-13.63 dB	71.65%	77.00%	94.71%	98.25%
65	0.392	-15.63 dB	67.64%	71.31%	96.44%	98.36%
70	0.357	-17.47 dB	62.28%	65.40%	97.59%	97.59%
75	0.326	-19.31 dB	57.19%	59.50%	98.37%	97.70%
80	0.298	-21.30 dB	51.40%	53.68%	98.89%	96.84%
85	0.273	-23.07 dB	46.21%	48.04%	99.22%	96.95%
90	0.250	-24.90 dB	40.76%	42.70%	99.45%	95.99%

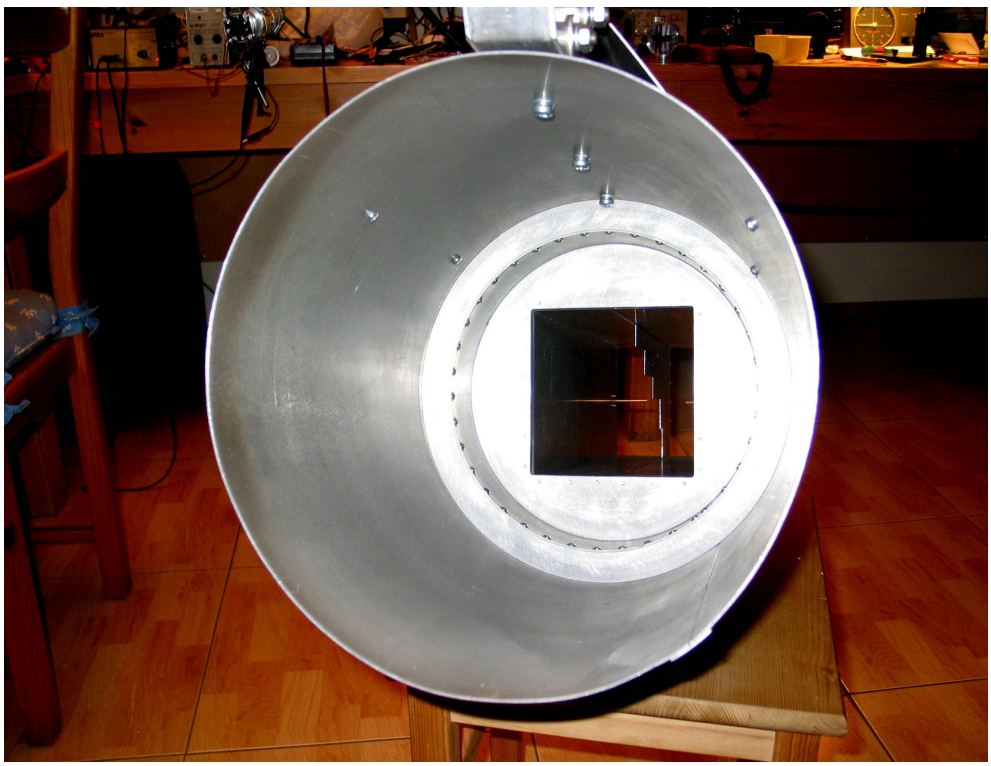
Contruction details

Overall view

Probe

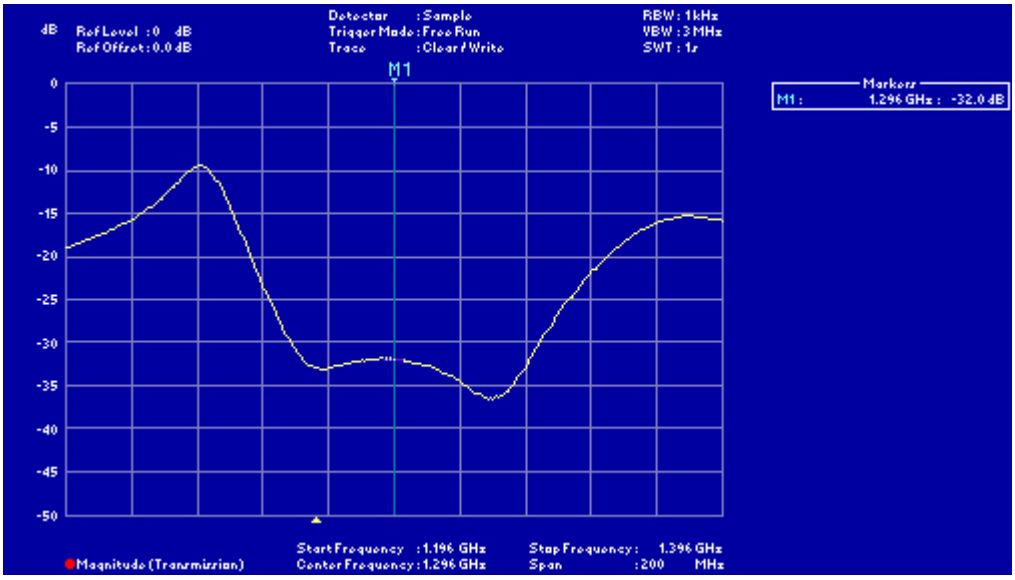


Inside view. (Rear wall is unmounted)

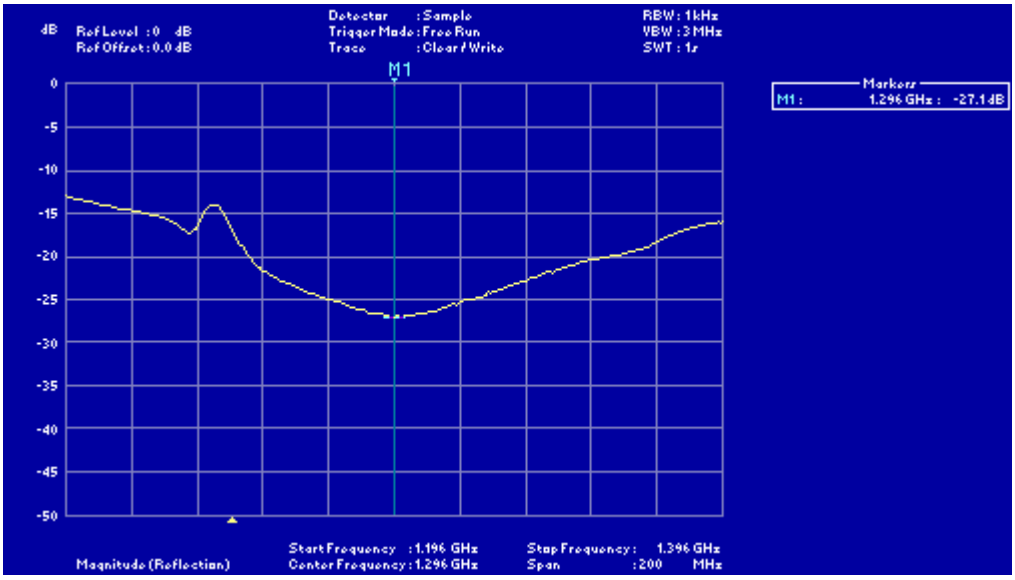


Measured results with Rohde-Schwarz FSH6

Isolation



S11



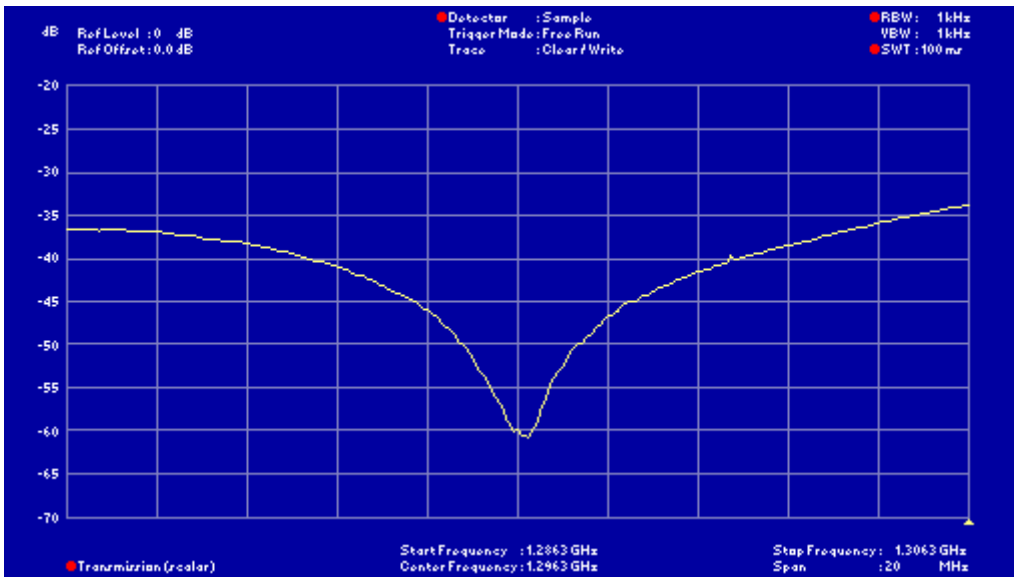
Futher adjustments

Sergei, RW3BP is suggesting a very simple method to compensate mirror reflections and improve isolation.

Put a small metal disk (like a coin) inside dual mode section. Move this disk along horn Z axis to maximize isolation. Simulation shows that small disk has not any effect on horn pattern and S11. Changing disk diameter and position you can get full isolation at one frequency.

Example. Measured isolation with 35mm diameter disk.

Disk position is 50mm beyond apperture.



73 de RA3AQ
Dmitry Dmitriev