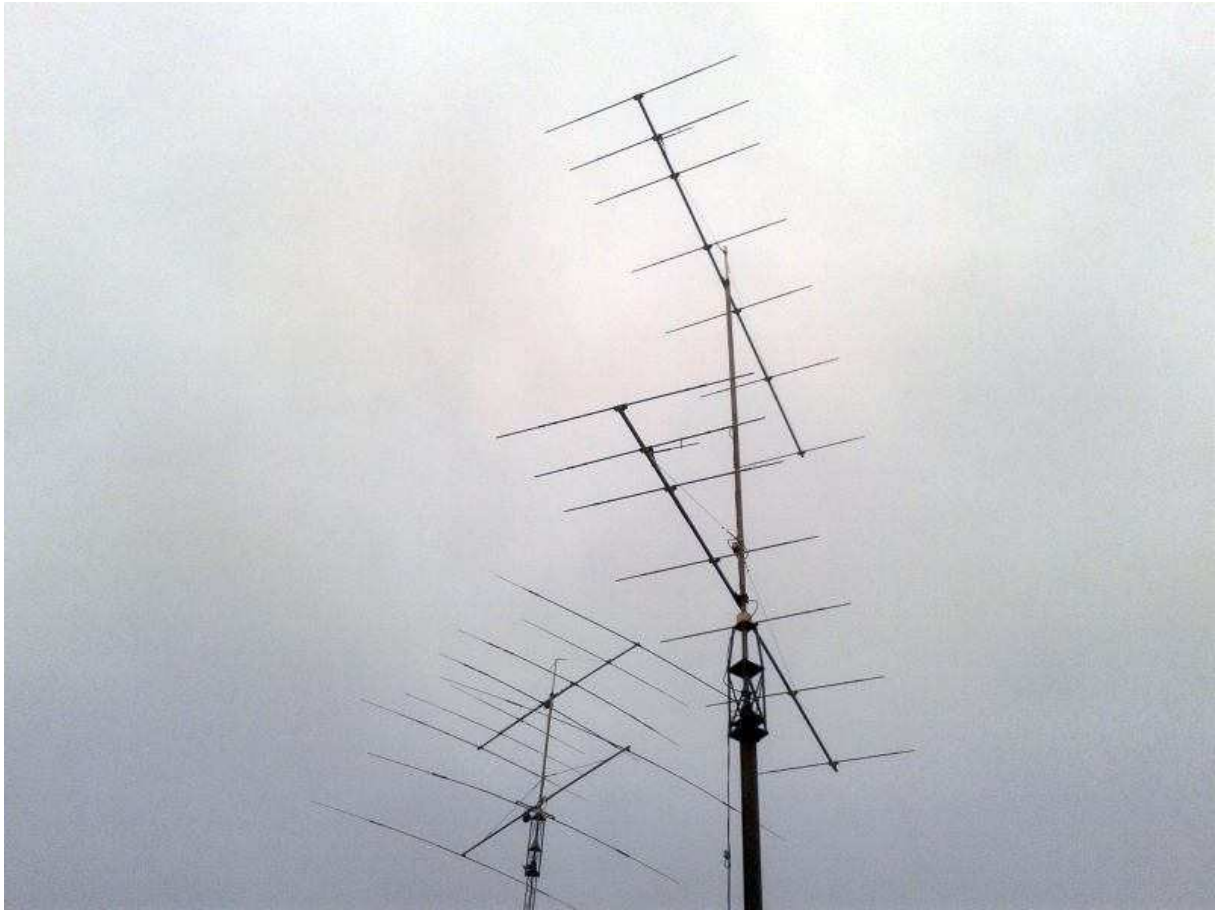

DF9CY

7 Element Antenna

For 50 MHz (Version2)

A rework of the 2012 design published on www.df9cy.de

DF9CY 7 Element Antenna for 50 MHz (Version 2)

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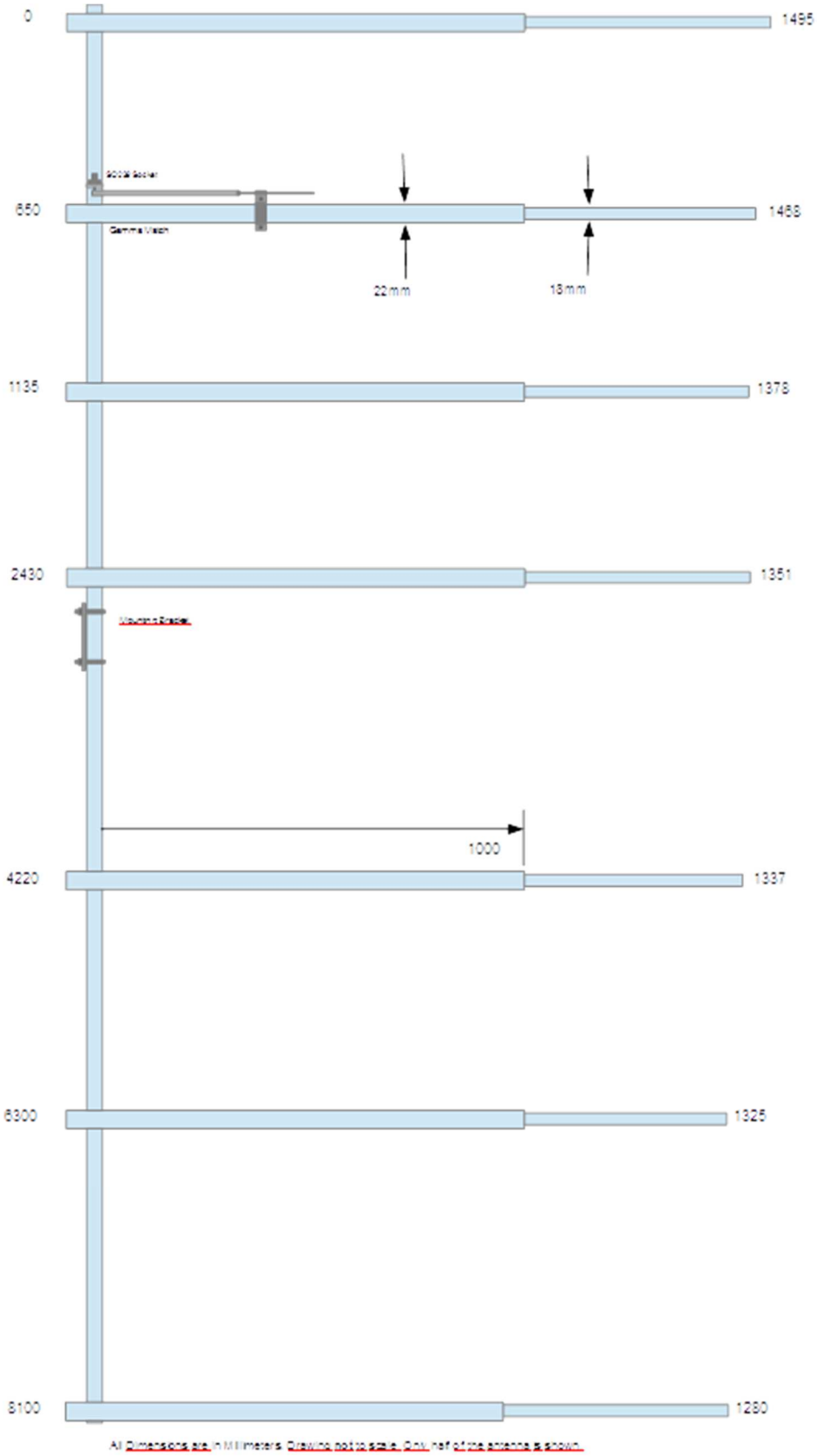
Design Target

This antenna has performed extremely well as Version 1 at the location of DL3LE, where there are working a stack of two antennas.

The antenna has some slight changes in elements lengths and positions resulting in a little higher gain and a better useful bandwidth. Backlobes and sidelobes are almost unchanged and still very good.

DF9CY 7 Element Antenna for 50 MHz (Version 2)

The Design



DF9CY 7 Element Antenna for 50 MHz (Version 2)

The antenna is based on a (still) commercially available 50 MHz antenna of six elements. It is available from ZX-Antennas. The simulation started from an existing design of Martin Steyer DK7ZB. I had to modify several parameter until the target had been reached.

Modifying the Antenna

Modification is easy. Put all components together as it is described in the manual which is delivered with this antenna. Do not fix the outer tip of each element. Move the outer tip inside until each section is as *exactly* long as the values given in the drawing here. Now put a marking through the 3mm hole. Drill a 3mm hole at the marking and fix the element using the self-cutting screw. That is it.

Tuning the antenna

A good idea is to mount the antenna clear from any metal surrounding pointing straight into the sky with the reflector (the longest element / its back) about 2m above the ground.

The antenna has to be tuned on the Gamma-Match using the position of the clamp to the element and with the length of the small inner tube which forms a capacitor with the larger outer tube. With a VSWR meter attached you should move the inner tube and the clamp until you get a very good matching on 50.150 MHz. This procedure usually does take only a few minutes. Fix everything and you are done.

Finishing the antenna

You may put some seal on the SO239 socket to prevent water going into your antenna cable.

Noise down

Another very good idea is to form a choke of 4 turns of coaxial cable with a diameter of about 12cm close to the antenna socket. This helps keeping RF away from the outer skirt of the cable getting into your shack and other way round prevents noise from the house getting into the antenna.

Additions

You may put a low-noise preamplifier close to the antenna. I have very good experience with doing so.

Stacking

You may stack a set of two antennas. The experience of DL3LE with Version 1 antennas is excellent.

DF9CY 7 Element Antenna for 50 MHz (Version 2)

About the performance of the antenna

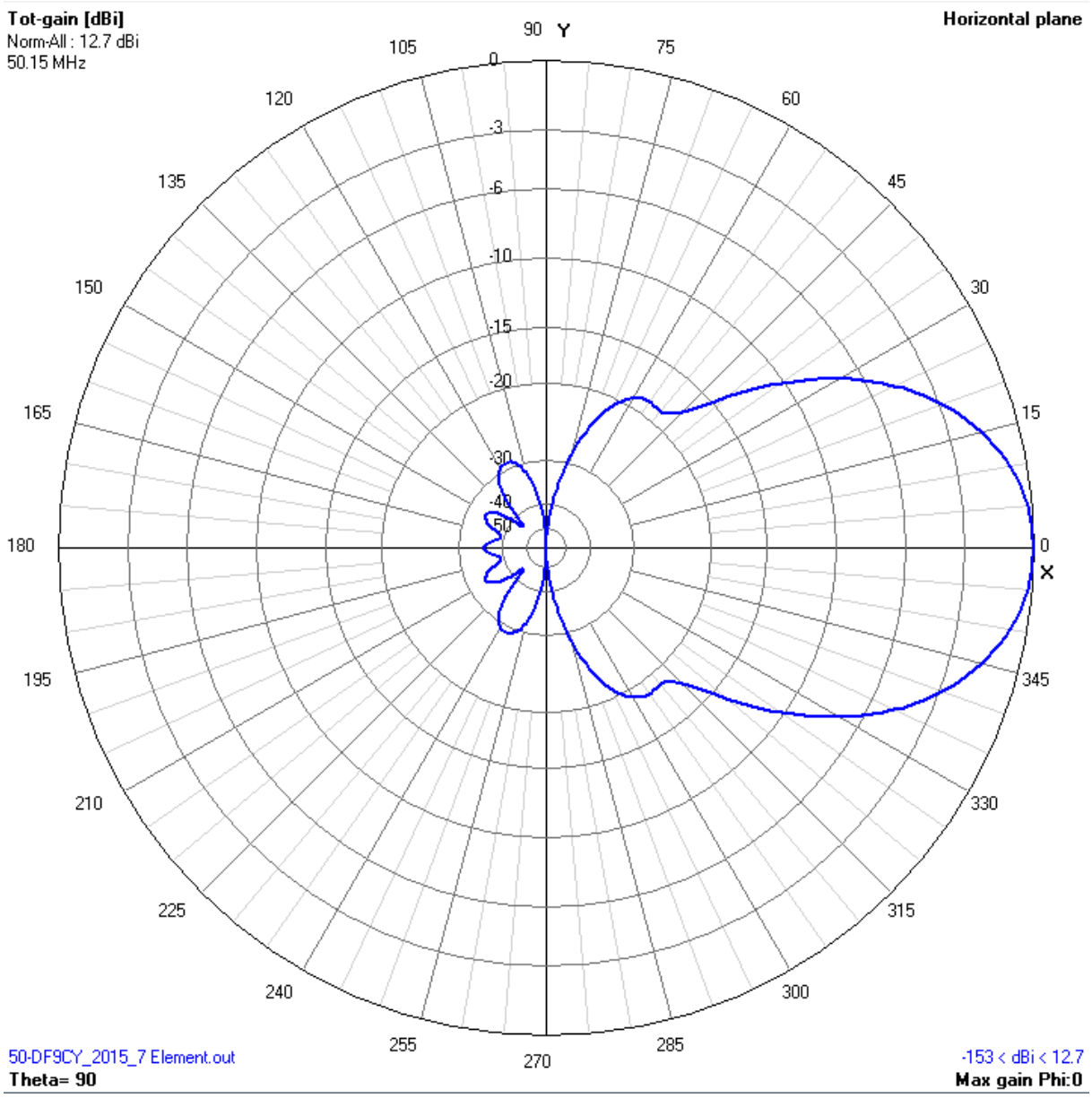


Abbildung 1: Horizontal antenna diagram

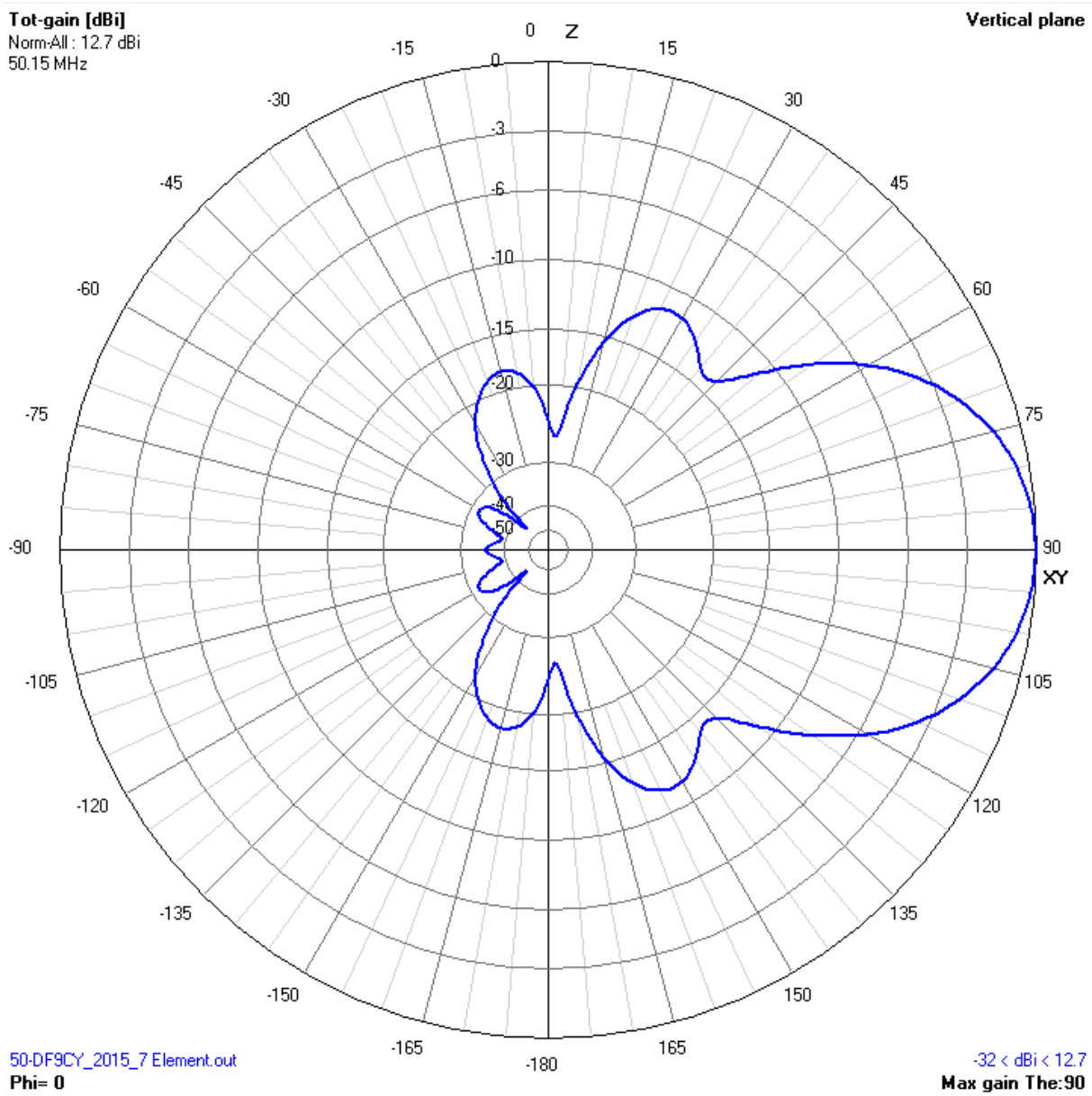


Abbildung 2 : Vertical antenna diagram

These antenna diagrams show an overall very good performance with a good gain and a very good Front-to-Back ratio.

DF9CY 7 Element Antenna for 50 MHz (Version 2)

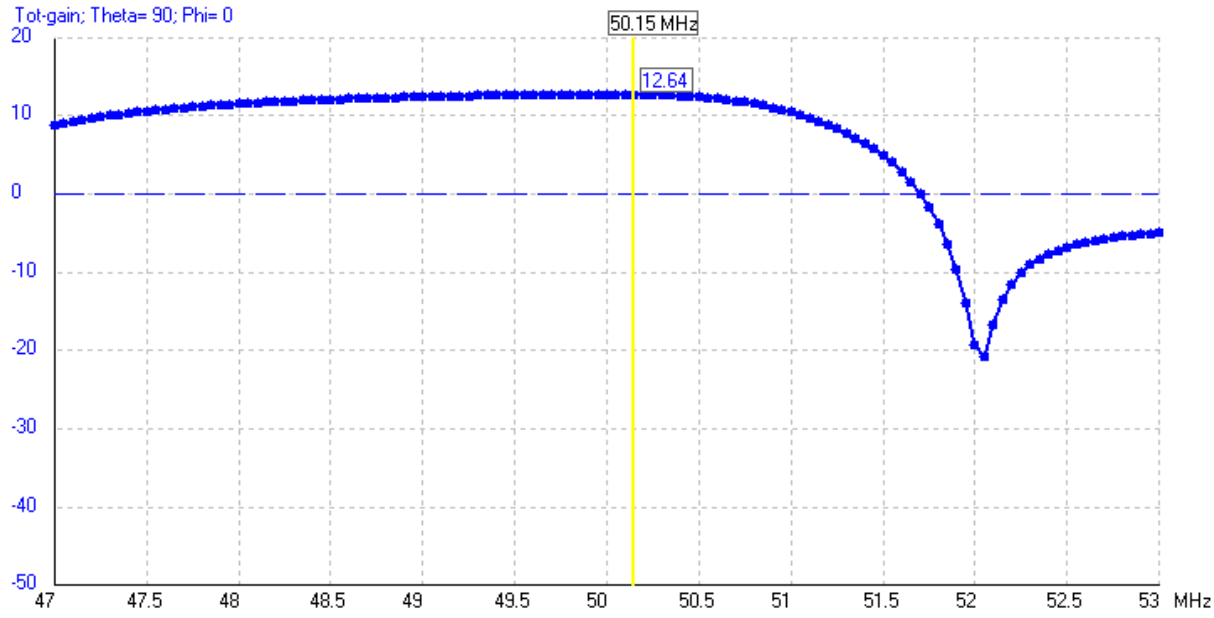


Abbildung 3 : Gain of the antenna

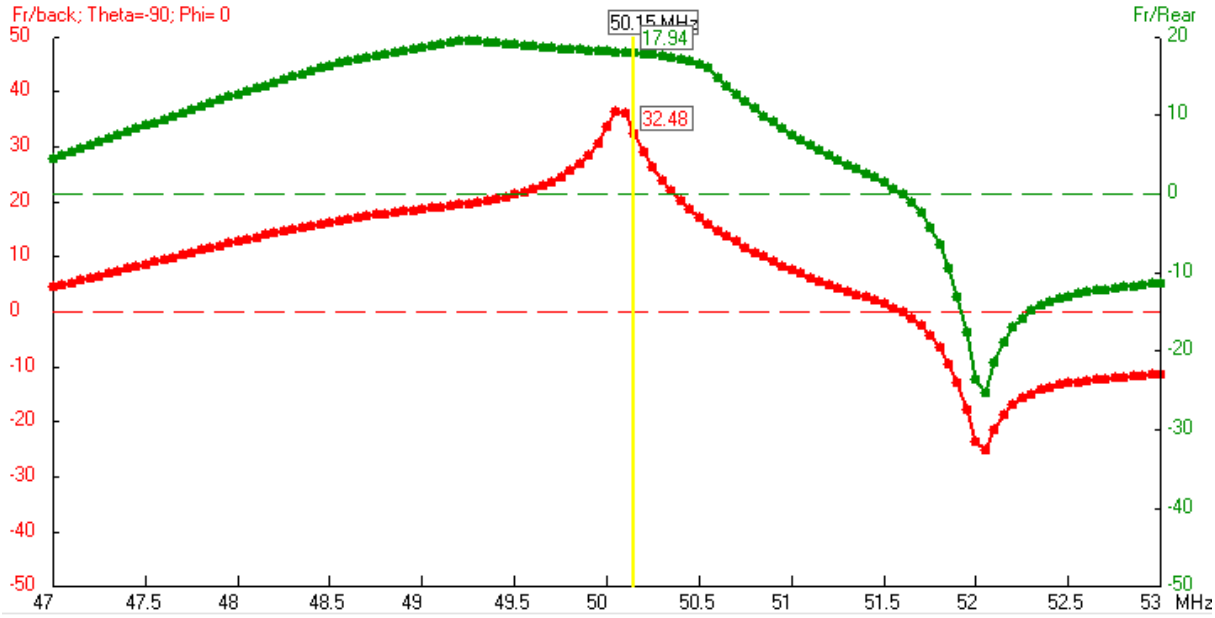


Abbildung 4 : Front-to-Back ratio of the antenna

DF9CY 7 Element Antenna for 50 MHz (Version 2)

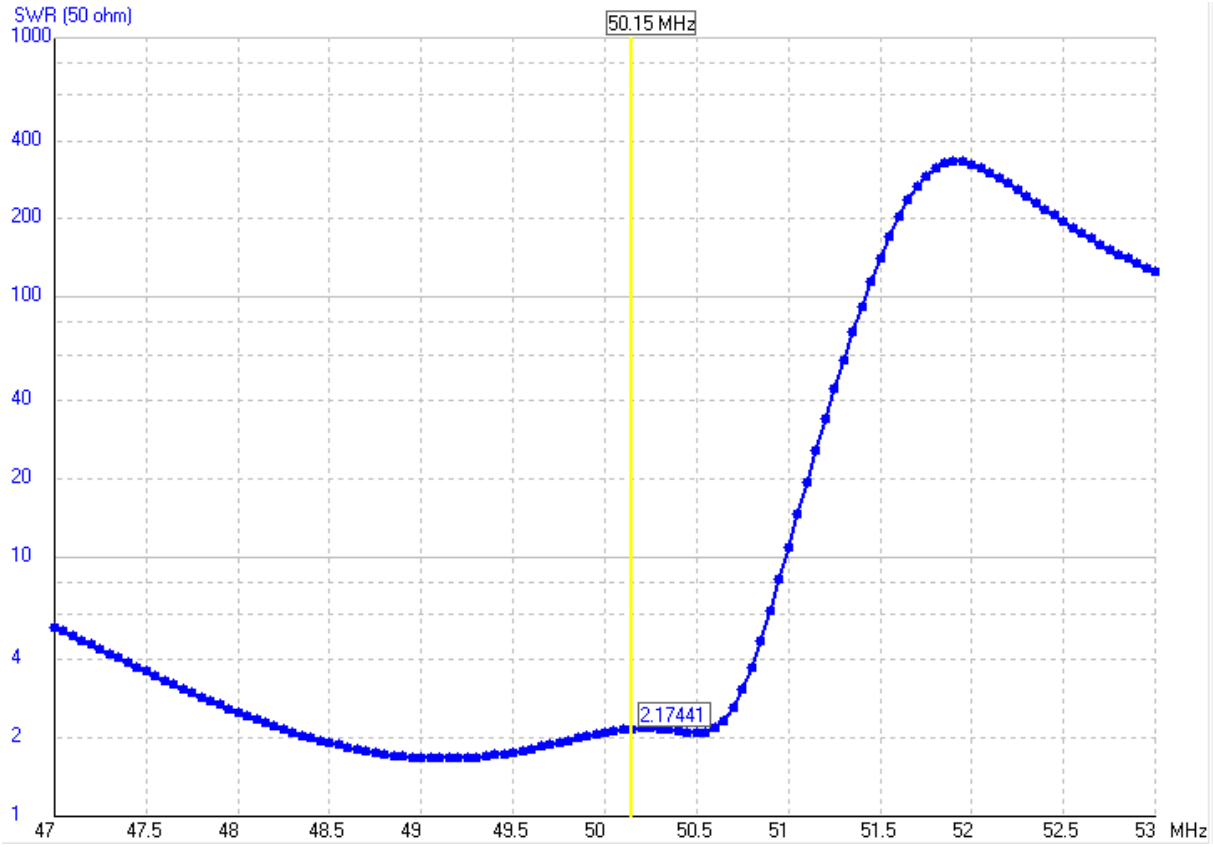


Abbildung 5 : VSWR based on 16 Ohm

The 16 Ohm impedance shown here can easily be matched to 50 Ohm with the Gamma-match. You can even put the resonance higher or lower. It will be quite broad banded.

Real Performance

Free space diagrams are interesting, but how does it perform over real ground? This can be simulated as well. You will have about 6 dB added to the gain of the free-space calculation.

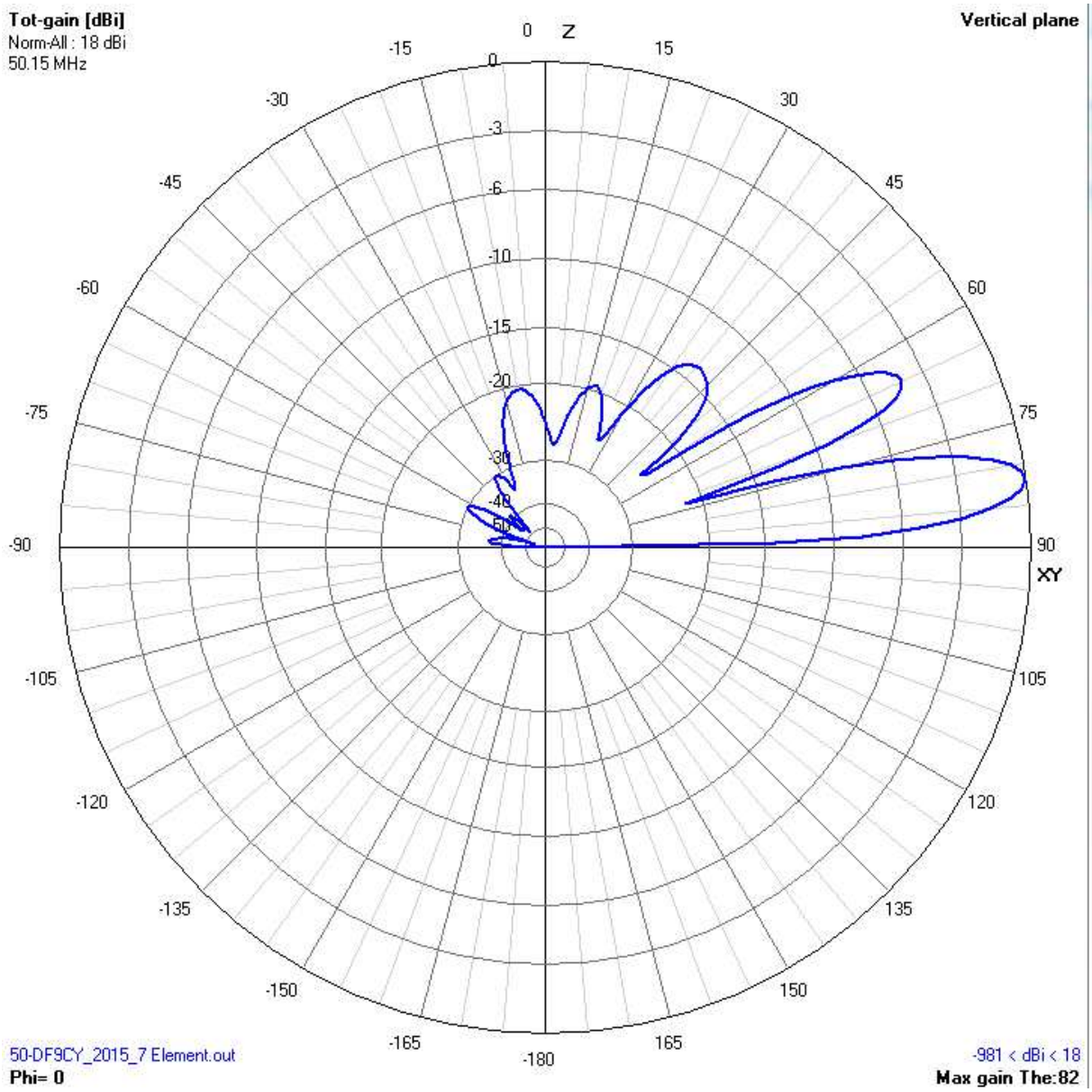


Abbildung 6 : Real Ground (Rich Agric) Simulation

The antenna in this simulation is mounted 14m above ground. It will be a good DX performer and produce strong signals in Sporadic-E opening as well.

A 3-D View

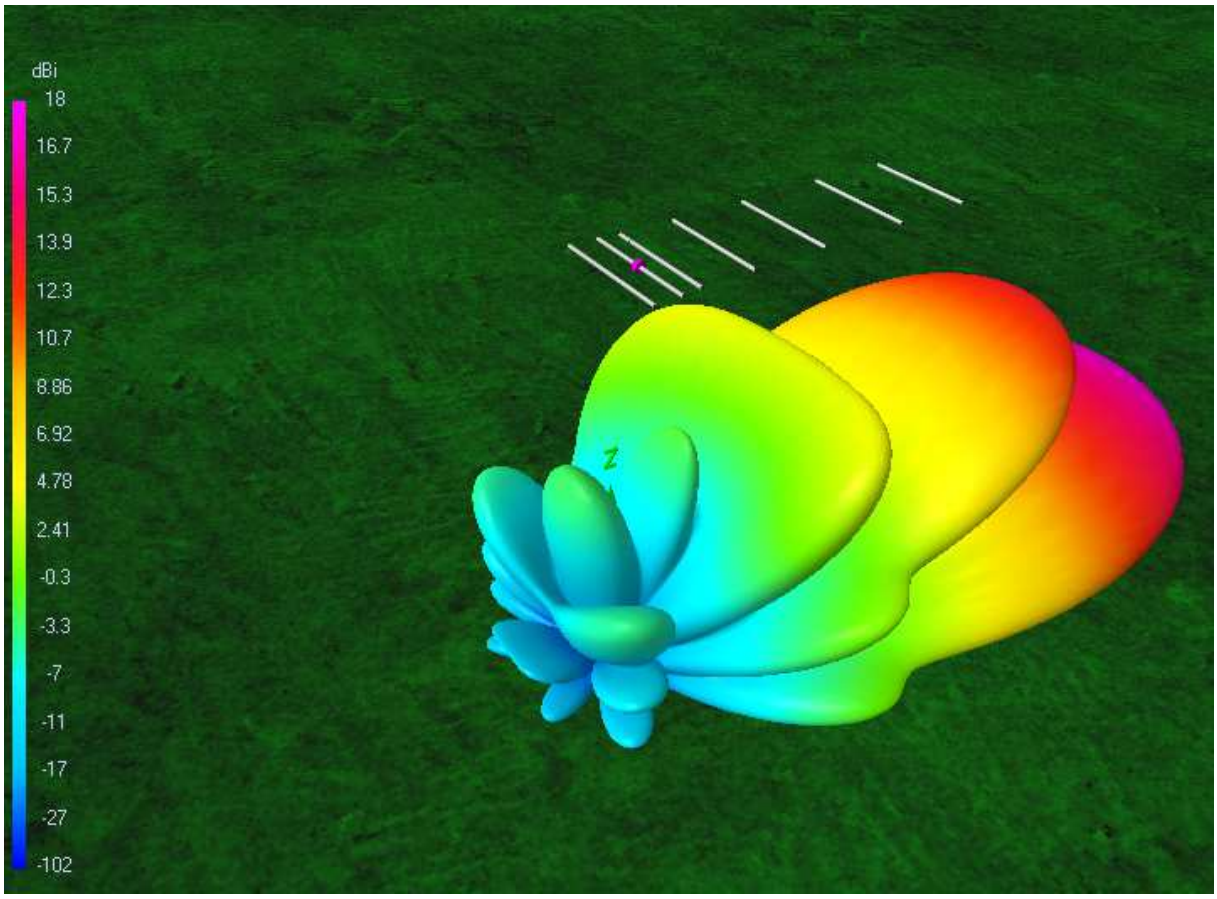


Abbildung 7 : 3-D Diagram

Here is a 3-D view of the antenna. It has a very good pattern and a good F/B ratio.

Stacking the antenna

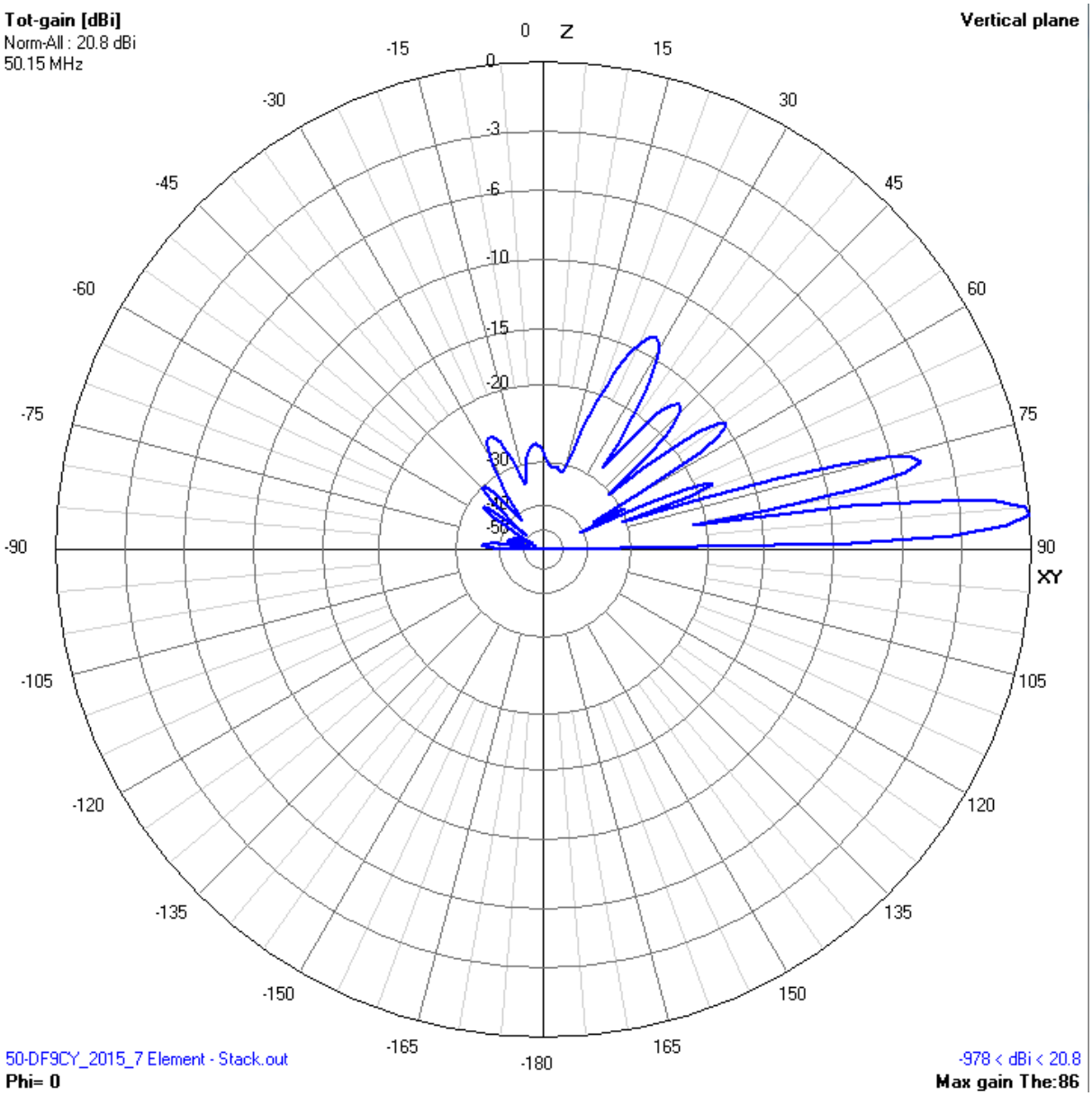


Abbildung 8 : Antenna stack in 15m and 22m above ground

Stacking this antenna in 15m and 22m above ground results in an amazing high gain of almost 21 dB. Of course this includes about 6 dB of ground gain. You should be able to make even contacts over the moon as reflector with quite low power.

DF9CY 7 Element Antenna for 50 MHz (Version 2)

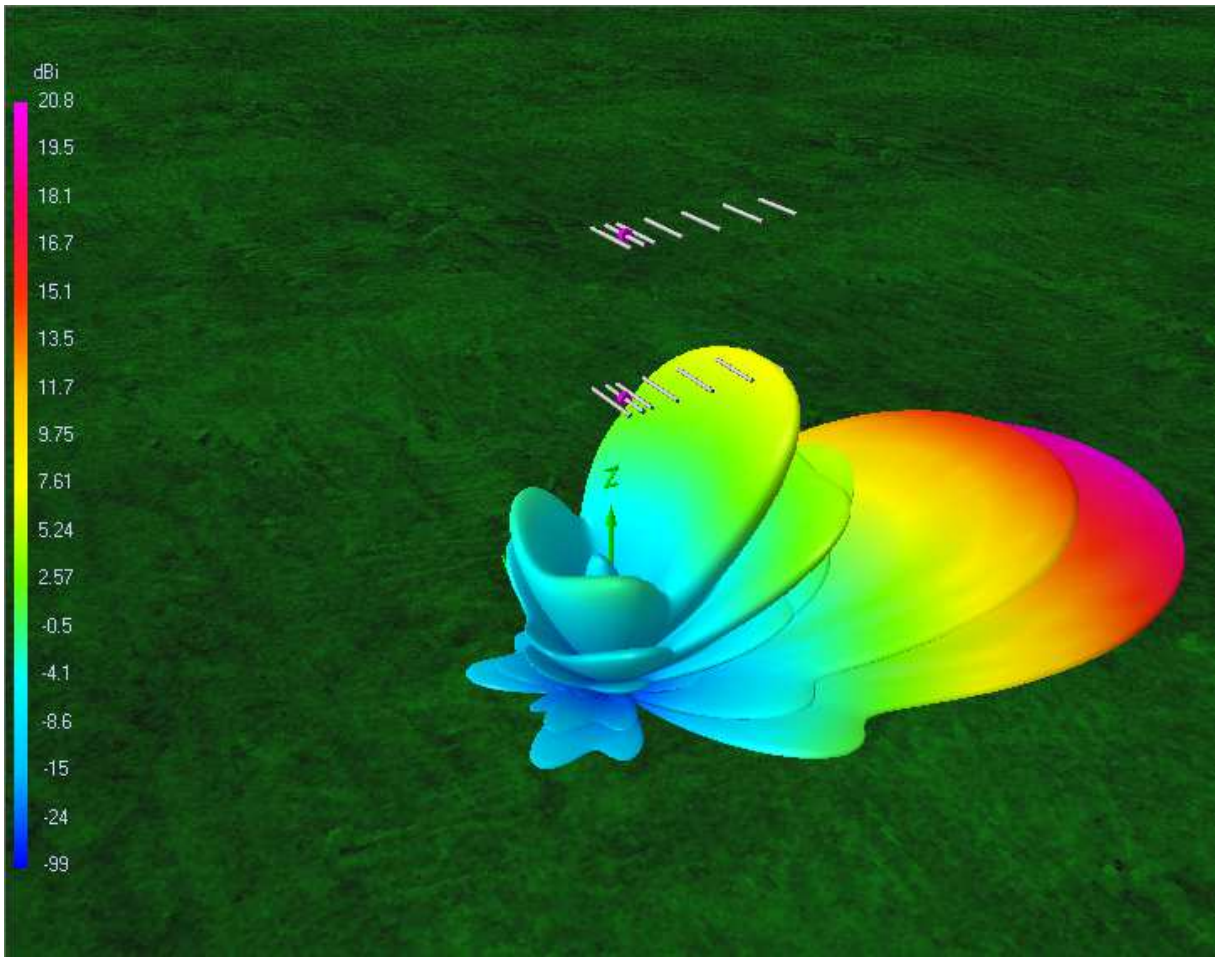


Abbildung 9 : 3D - View of the antenna pattern of this stacked antenna

Have fun with this antenna !

73 de Christoph DF9CY

Mail to : df9cy@web.de

DF9CY 7 Element Antenna for 50 MHz (Version 2)

Simulation file

Here is the 4NEC2 simulation file of the 7 Element antenna:

```
CM ZX6-7 ZX DF9CY new Design (derived DK7ZB) at 10m incl boom
CE
SY RAD=0.011
SY RAD1=0.009
SY RADB=0.025
SY ZA=10
SY OFFS=0.00     'Offset Z of Driven Element
SY CEL=1.000     'Central Element section
SY E1L=1.495     'Half Element Length
SY E2L=1.468
SY E3L=1.378
SY E4L=1.351
SY E5L=1.337
SY E6L=1.325
SY E7L=1.280
SY E1P=0.0       'Element Position
SY E2P=0.65
SY E3P=1.135
SY E4P=2.430
SY E5P=4.220
SY E6P=6.300
SY E7P=8.100
GW      1       7       E1P     -CEL    ZA      E1P     0       ZA      RAD     'Element Centre left
GW      2       7       E2P     -CEL    ZA+OFFS E2P     CEL     ZA+OFFS RAD
GW      3       7       E3P     -CEL    ZA      E3P     0       ZA      RAD
GW      4       7       E4P     -CEL    ZA      E4P     0       ZA      RAD
GW      5       7       E5P     -CEL    ZA      E5P     0       ZA      RAD
GW      6       7       E6P     -CEL    ZA      E6P     0       ZA      RAD
GW      7       7       E7P     -CEL    ZA      E7P     0       ZA      RAD
GW      8       7       E1P     0       ZA      E1P     CEL     ZA      RAD     'Element Centre right
GW      9       7       E3P     0       ZA      E3P     CEL     ZA      RAD
GW      10      7       E4P     0       ZA      E4P     CEL     ZA      RAD
GW      11      7       E5P     0       ZA      E5P     CEL     ZA      RAD
GW      12      7       E6P     0       ZA      E6P     CEL     ZA      RAD
GW      13      7       E7P     0       ZA      E7P     CEL     ZA      RAD
GW      14      7       E1P     E1L     ZA      E1P     CEL     ZA      RAD1    'Left Taper
GW      15      7       E2P     E2L     ZA+OFFS E2P     CEL     ZA+OFFS RAD1
GW      16      7       E3P     E3L     ZA      E3P     CEL     ZA      RAD1
GW      17      7       E4P     E4L     ZA      E4P     CEL     ZA      RAD1
GW      18      7       E5P     E5L     ZA      E5P     CEL     ZA      RAD1
GW      19      7       E6P     E6L     ZA      E6P     CEL     ZA      RAD1
GW      20      7       E7P     E7L     ZA      E7P     CEL     ZA      RAD1
GW      21      7       E1P     -CEL    ZA      E1P     -E1L    ZA      RAD1    'Right Taper
GW      22      7       E2P     -CEL    ZA+OFFS E2P     -E2L    ZA+OFFS RAD1
GW      23      7       E3P     -CEL    ZA      E3P     -E3L    ZA      RAD1
GW      24      7       E4P     -CEL    ZA      E4P     -E4L    ZA      RAD1
GW      25      7       E5P     -CEL    ZA      E5P     -E5L    ZA      RAD1
GW      26      7       E6P     -CEL    ZA      E6P     -E6L    ZA      RAD1
GW      27      7       E7P     -CEL    ZA      E7P     -E7L    ZA      RAD1
GE      1
LD      5       1       0       0       24900000
LD      5       2       0       0       24900000
LD      5       3       0       0       24900000
LD      5       4       0       0       24900000
LD      5       5       0       0       24900000
LD      5       6       0       0       24900000
LD      5       7       0       0       24900000
LD      5       8       0       0       24900000
LD      5       9       0       0       24900000
LD      5       10      0       0       24900000
LD      5       11      0       0       24900000
LD      5       12      0       0       24900000
LD      5       13      0       0       24900000
LD      5       14      0       0       24900000
LD      5       15      0       0       24900000
LD      5       16      0       0       24900000
LD      5       17      0       0       24900000
LD      5       18      0       0       24900000
GN      2       0       0       0       15      0.01
EK
EX      6       2       4       0       1       0       0
FR      0       0       0       0       50.15   0
EN
```