



Memorandum

To: File ALMA #: FEND-40.02.06.01-032-A-REP

From: John Effland
Dave Schmitt

Date: 2007-01-23

Revisions: 2007-01-23 jee Initial
2007-01-23 jee Enlarged Graphs
2007-01-24 dfs Added additional Figures to Section 2 for Clarity

Subject: Comparison of Sidelobes in Cartridge B6-004 with RAL and GoreTex IR Filters

1. Results

Table 1, Table 2, and Table 3 compare beam patterns at signal frequencies of 211, 229, and 265 GHz measured with RAL infrared filters and with GoreTex Filters. The frequencies were selected because the first measured cartridge (B6-001) exhibited the largest sidelobes there.

Although a comparison of patterns at 211 GHz (Table 1) are inconsistent, sidelobes clearly remain at 229 and 265 GHz with the GoreTex filters in place of RAL's filters as shown in Table 2, and Table 3.

The cause of the significant decrease in SNR when using the GoreTex filters cannot be explained by a change in source power level. Table 4 compares the absolute levels when using RAL and GoreTex filters and the beam total power is nearly the same.

Details of the filter replacement are given in Section 2 below.

Table 1: Beam Patterns, 211 GHz

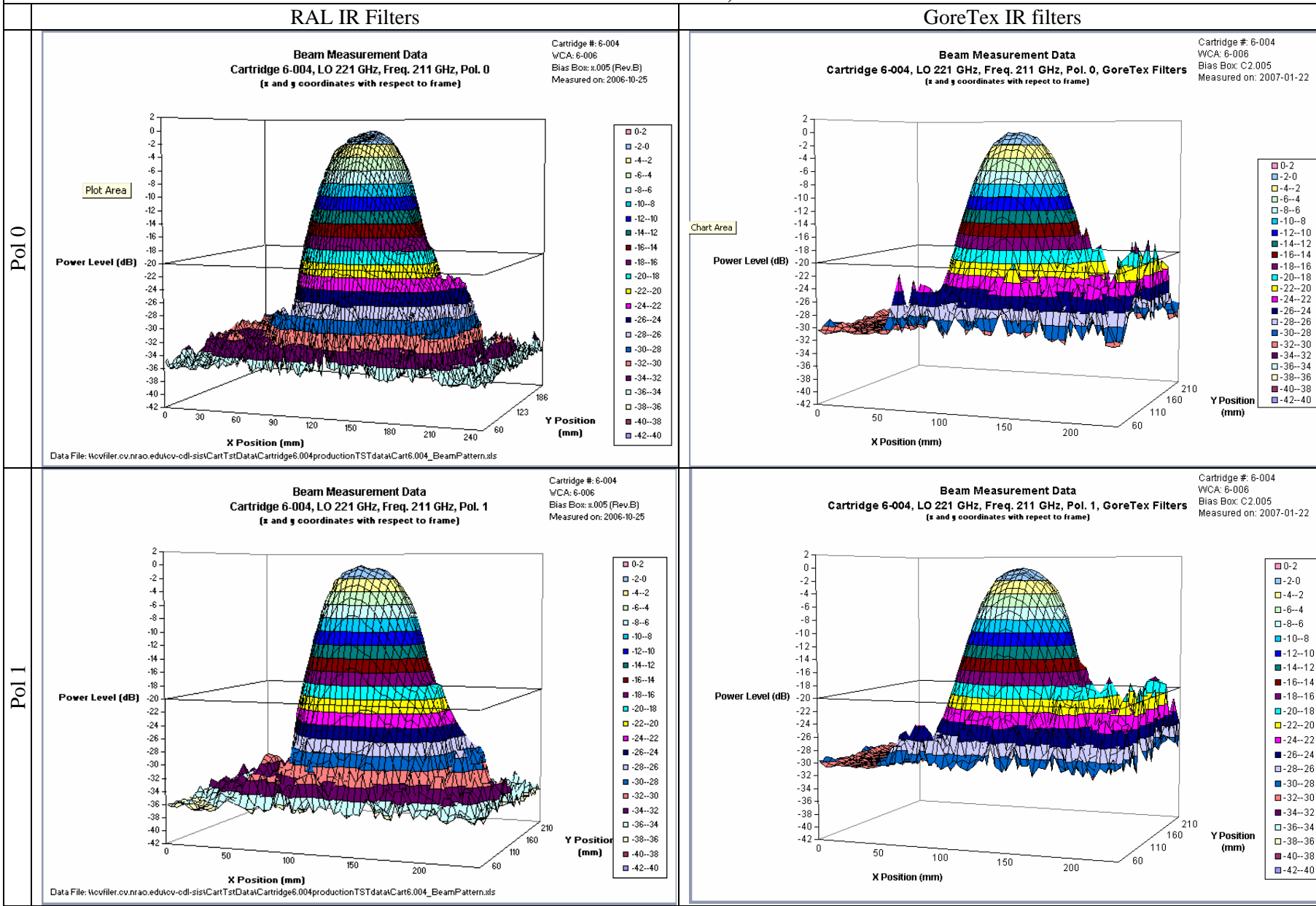


Table 2: Beam Patterns, 229 GHz

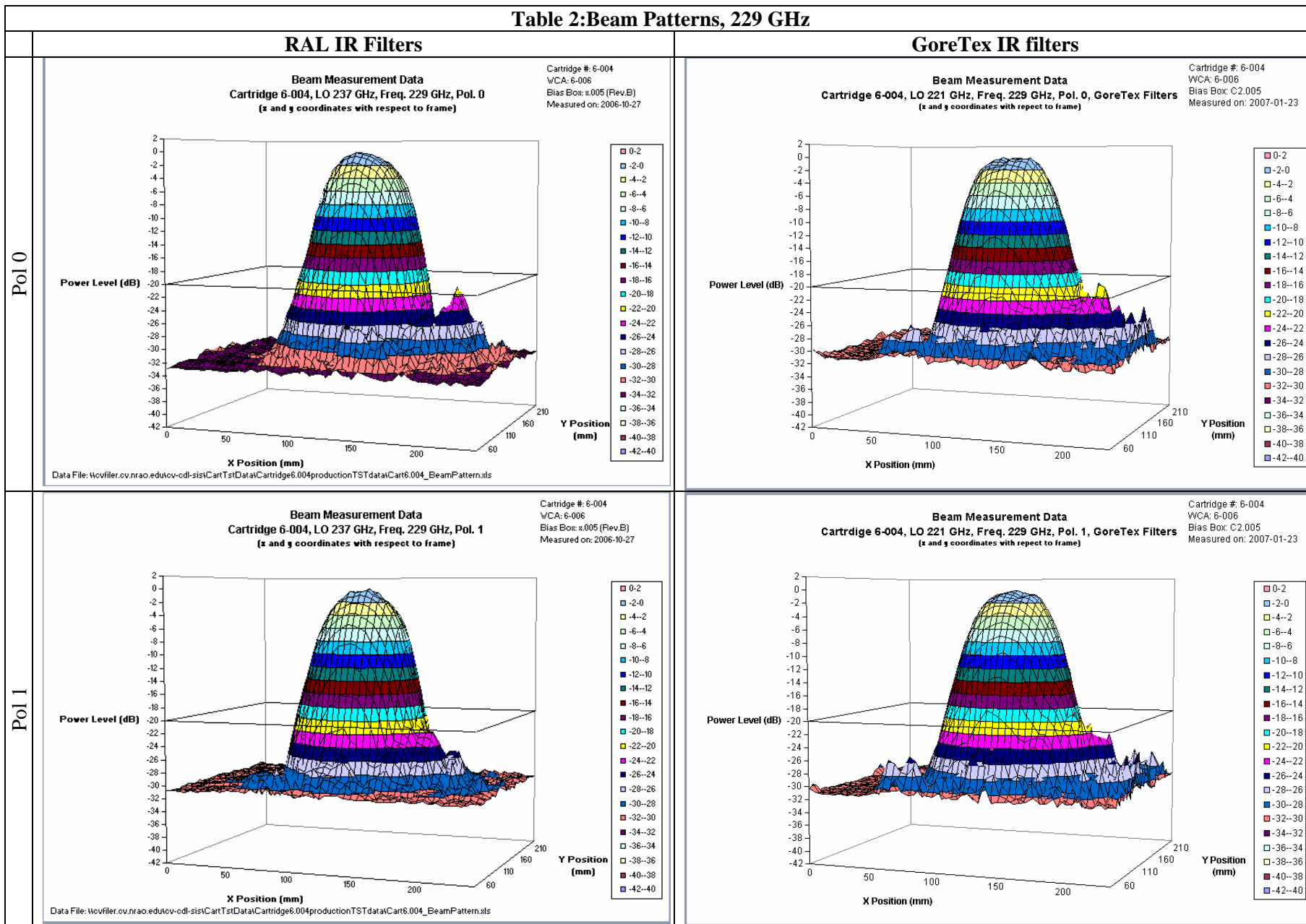


Table 3: Beam Patterns, 265 GHz

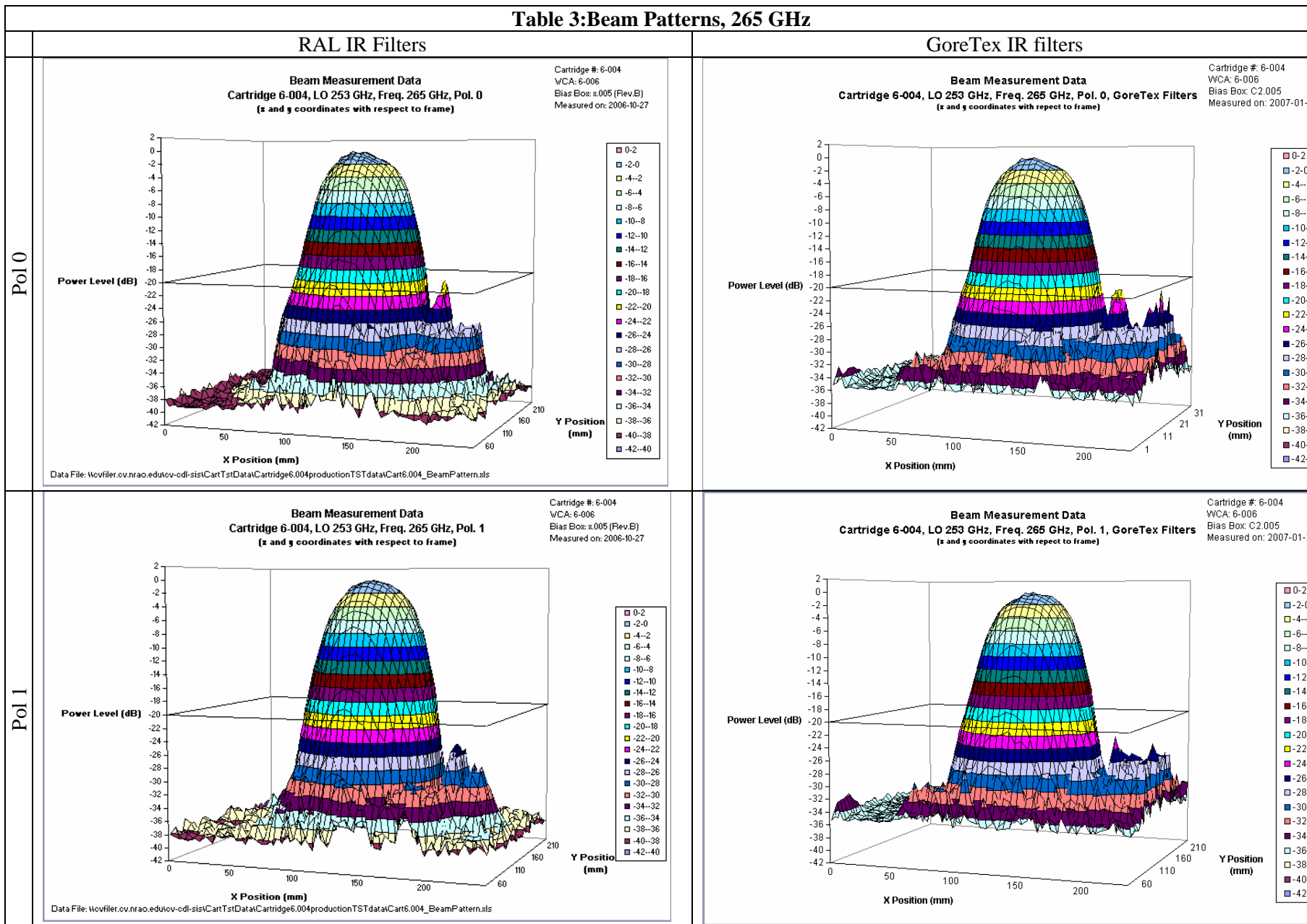
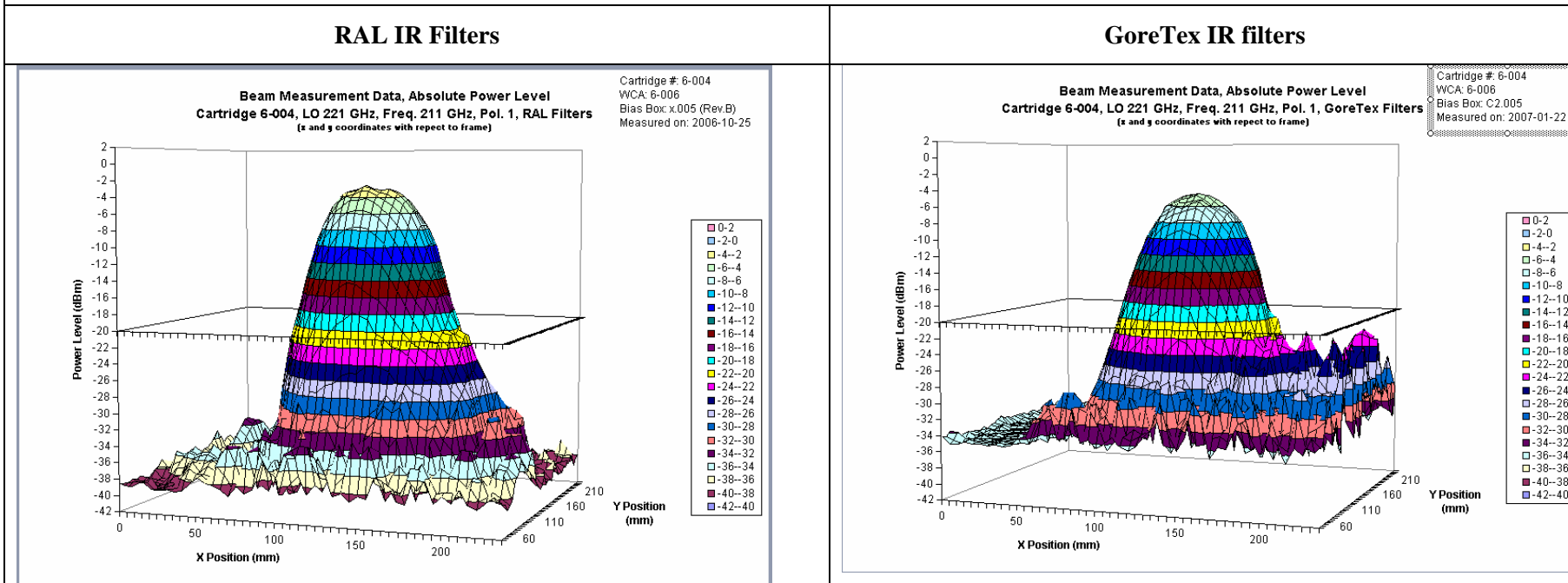


Table 4: Absolute Power Level Comparison, 211 GHz, Pol 1



2. Filter Changes

The following modifications were made to the optics of the Band 6 cartridge test set cryostat on 2007-01-18.

Replacement of the IR filter on the 15K stage of the cartridge test set dewar consisted of; removing the existing single layer of 0.5 mm Mupor mounted flat with a 65 mm clear aperture. This was replaced with two layers of 0.5mm Gore Tex sandwiched together with the same 65 mm clear aperture, Figure 1.

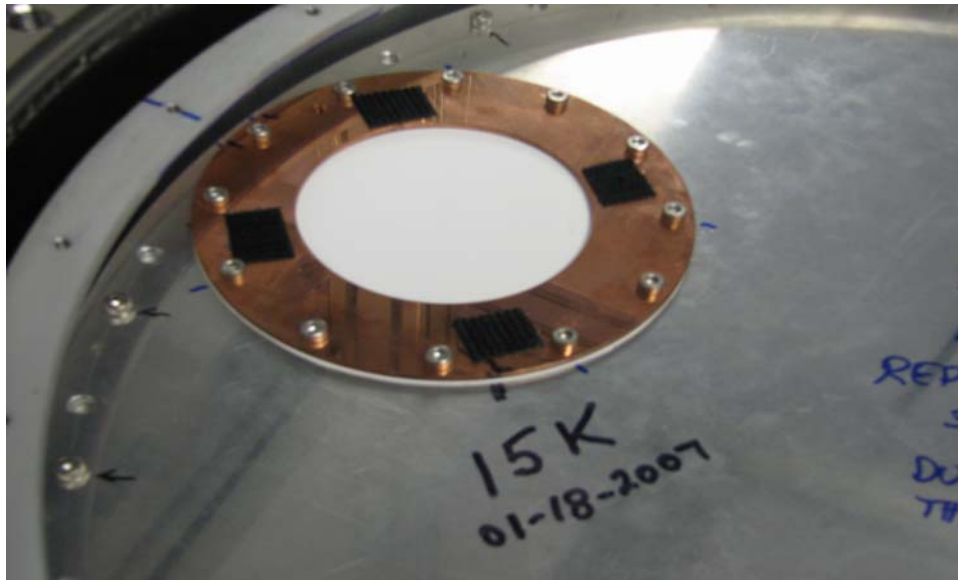


Figure 1: Filter 15K Stage; 2-layer Gore Tex

Replacement of the 110K stage IR filter consisted of; removing the molded PFA filter which was mounted at an angle of 2.4 degrees to the beam, Figure 2.

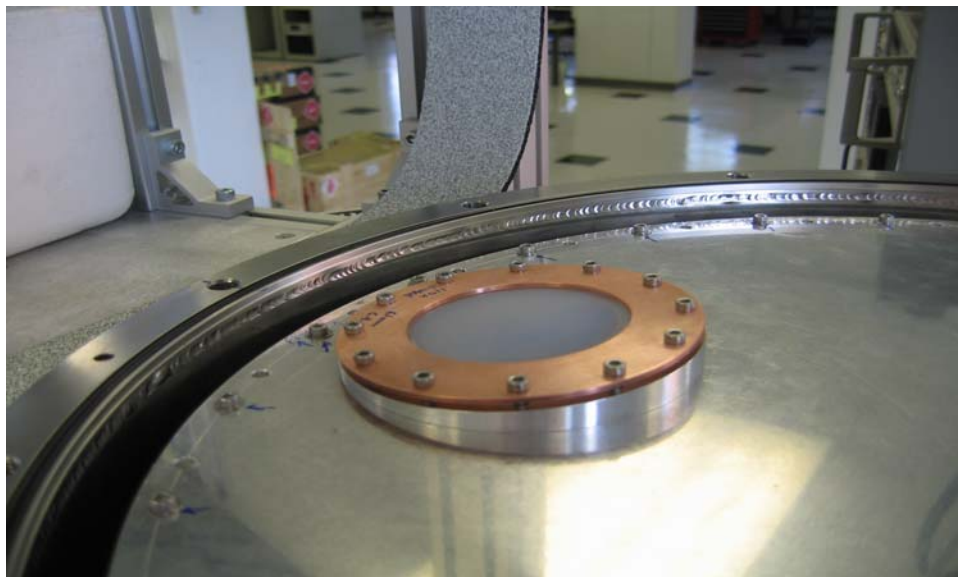


Figure 2: 110K Stage Filter with PFA Filter

This was replaced with a single layer of 0.5 mm Gore Tex mounted flat to the 110K plate with a 1/16" G-10 filter ring and a 61 mm clear aperture, Figure 3.



Figure 3: Gore Tex Filter, 110K Stage

No alterations were made to the configuration of the vacuum window at this time. It is an ALMA quartz vacuum window with a 50 mm clear aperture, mounted normal to the top of the cryostat.

Also no alterations were made to the absorbing foam that is installed in the test set cryostat at this time, Figure 4, 5, 6. Although the foam mounted on the cold cartridge, as shown in Figure 5, was not installed for this test.

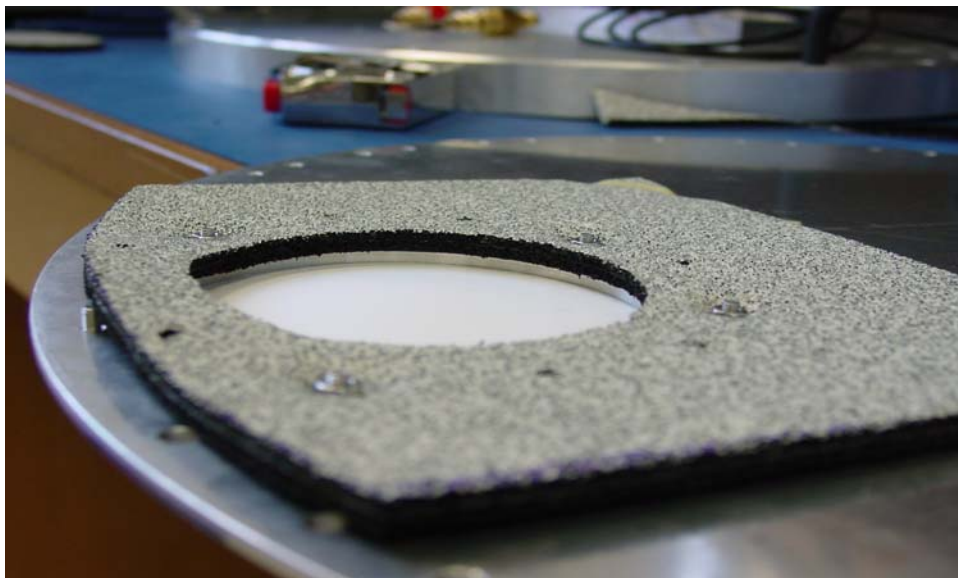


Figure 4: AN-72 Absorber on Underside of 15K Stage

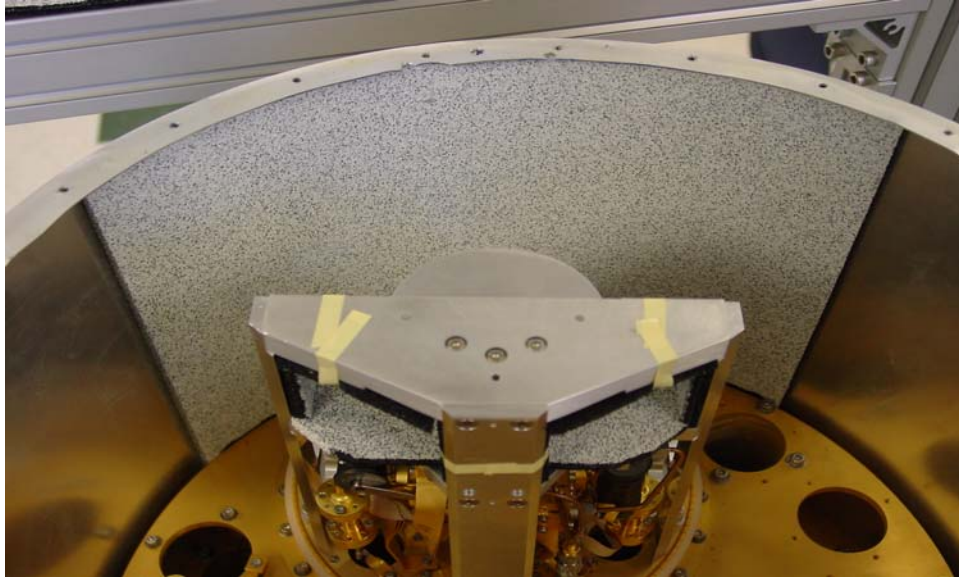


Figure 5: AN-72 Absorber on Cryostat Wall

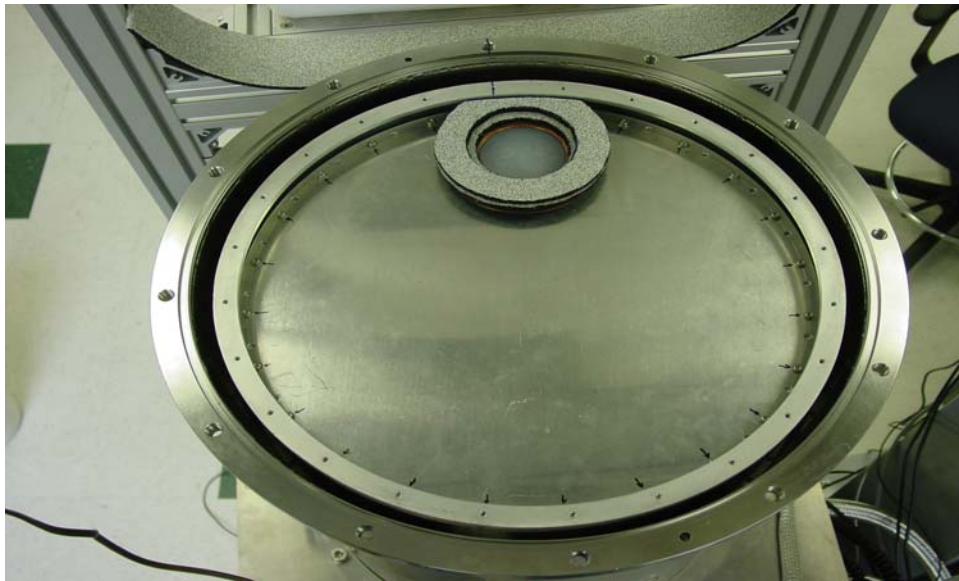


Figure 6: AN-72 Rings Surrounding IR Filter on Top of 15K Stage

Figure 7 is a graphical representation of the orientation of the cartridge in the test set, with the present coordinate axis of the beam scanner shown.

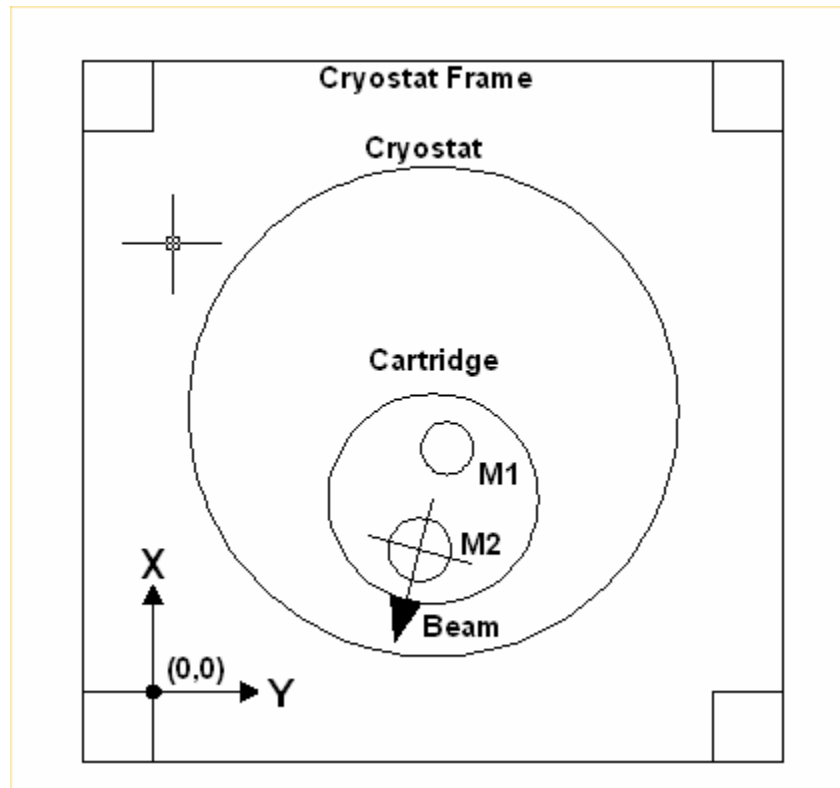


Figure 7: Orientation of Cartridge in Test Set with Beam Scanner Coordinate Axis Shown.