

# Complete Cross-Pol Measurements of Cartridge B6-003 with OMT6-11 Replaced by OMT6-13

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This report shows that replacing the OMT in Band 6 Cartridge 003 allows cross-pol isolation to meet specifications, except for Pol 0 at 271 GHz and 275 GHz. The results are shown in [Figure 1](#) and [Figure 2](#).

The original OMT for this cartridge was OMT6-011 exhibited marginal polarization isolation ([Figure 20](#) and [Figure 22](#)). Replacing it with the recently-built OMT6-013 which has dramatically better polarization isolation ([Figure 19](#) and [Figure 21](#)) significantly improves cartridge cross-pol isolation.

[Figure 3](#) through [Figure 18](#) compare cartridge cross-pol beam patterns when OMT6-013 and OMT6-011 are installed in the cartridge. Where the Pol 0 cross-pol isolation remains above spec, at 271 GHz ([Figure 13](#) and [Figure 14](#)) and 275 GHz ([Figure 17](#) and [Figure 18](#)), contour patterns are included and illustrate how OMT6-013 produces two-lobe cross-pol beams for the cartridge. These two-lobe beams are closer the shape of theoretical patterns produced by TICRA, although their level is actually higher than the smeared patterns produced at those frequencies by OMT6-011. The measured OMT cross-pol isolation ([Figure 19](#) and [Figure 21](#)) shows no significant change at the high end of the band, so the cause of this high cross-pol remains a mystery.

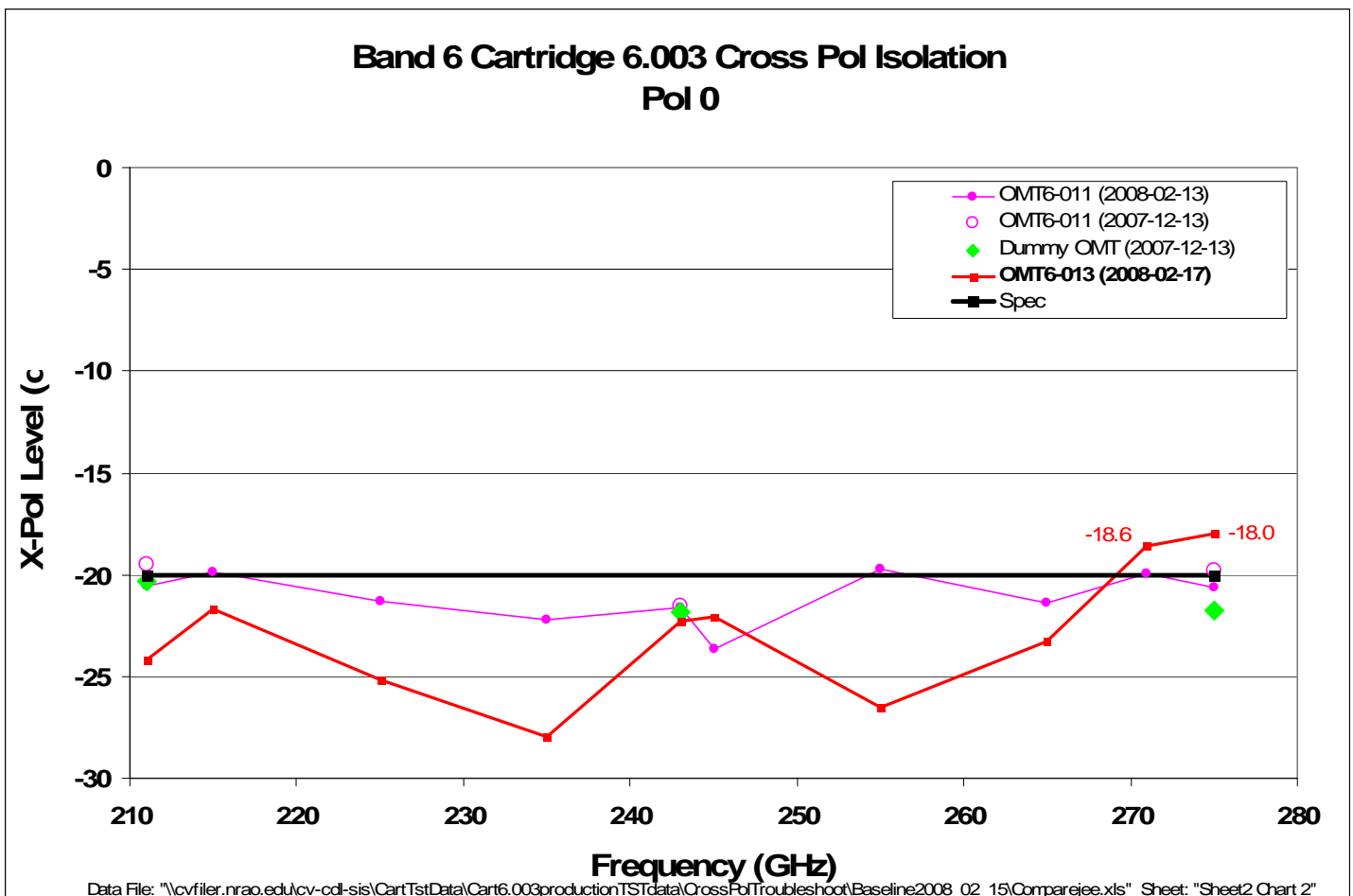
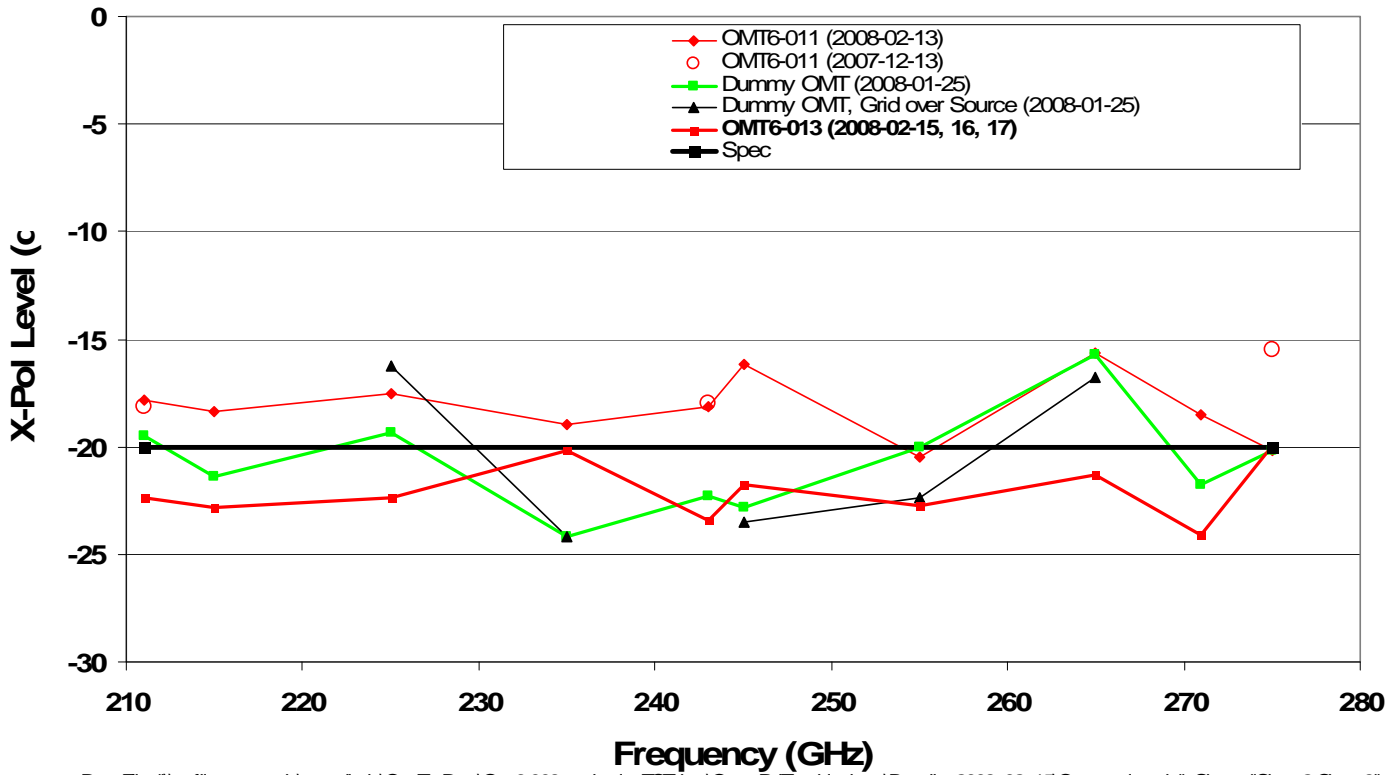


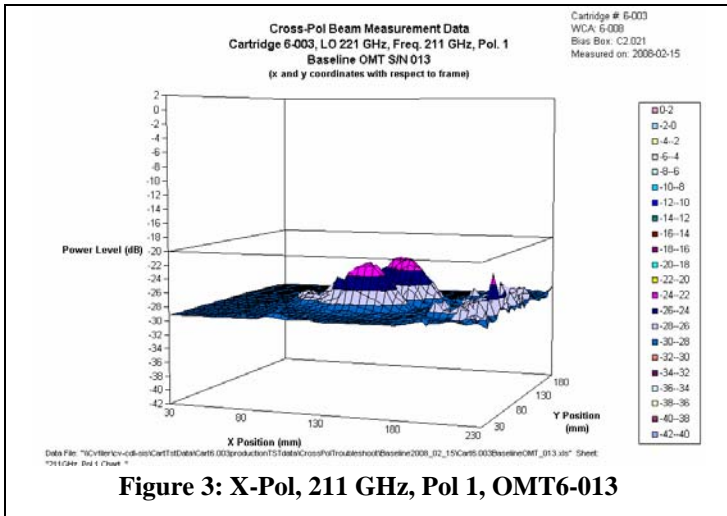
Figure 1: Cross-Pol Results, Pol 0 in Cartridge B6-003 with OMT6-011 and -013

## Band 6 Cartridge 6.003 Cross Pol Isolation Pol 1

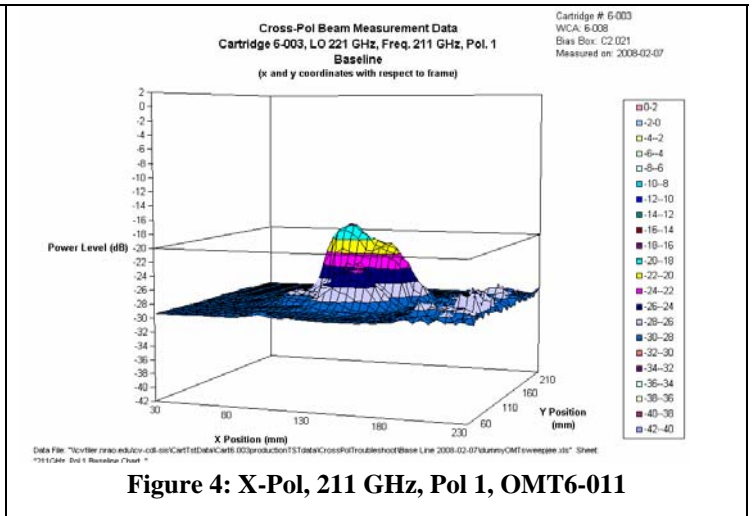


Data File: "\\cvfiler.nrao.edu\cv-cdl-sis\CartTstData\Cart6.003productionTSTdata\CrossPolTroubleshoot\Baseline2008\_02\_15\Comparejee.xls" Sheet: "Sheet2 Chart 3"

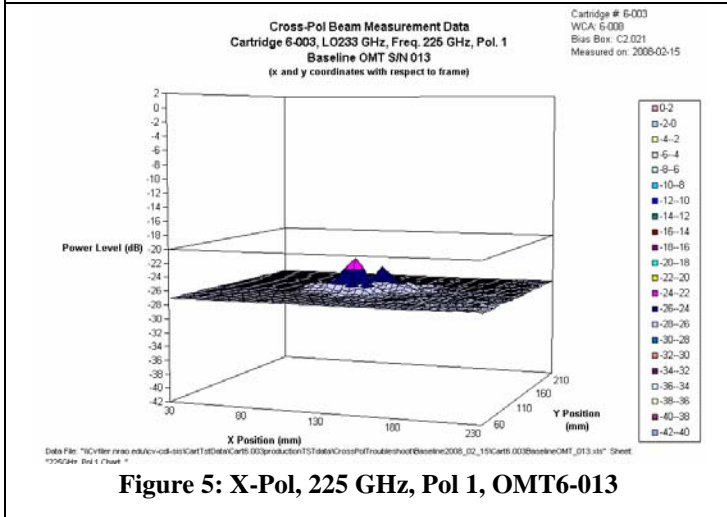
**Figure 2: Cross-Pol Results, Pol 1 in Cartridge B6-003 with OMT6-011 and -013**



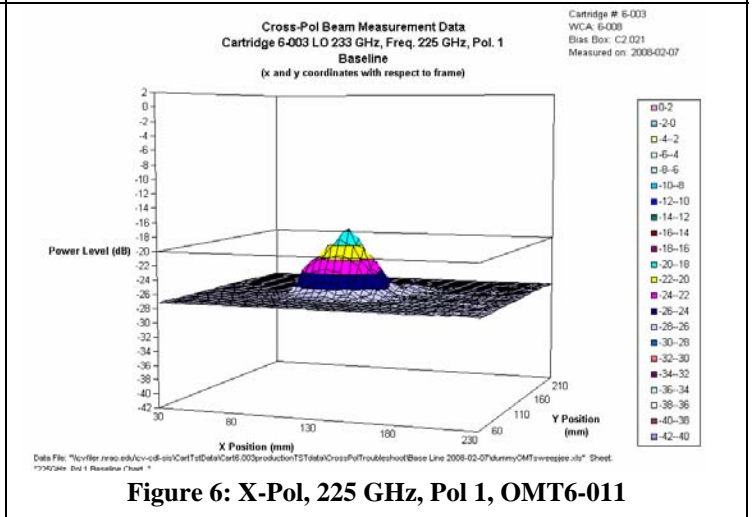
**Figure 3: X-Pol, 211 GHz, Pol 1, OMT6-013**



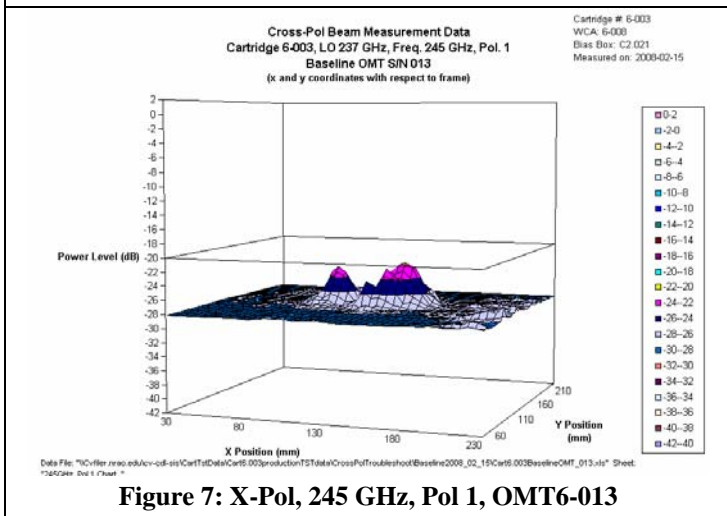
**Figure 4: X-Pol, 211 GHz, Pol 1, OMT6-011**



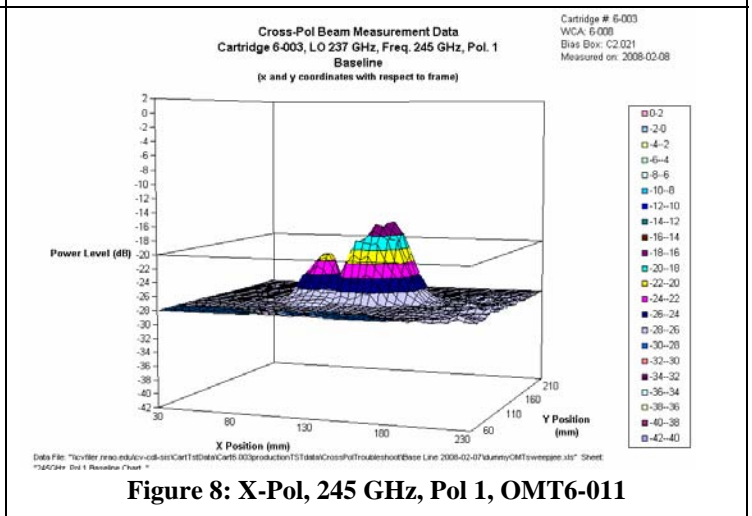
**Figure 5: X-Pol, 225 GHz, Pol 1, OMT6-013**



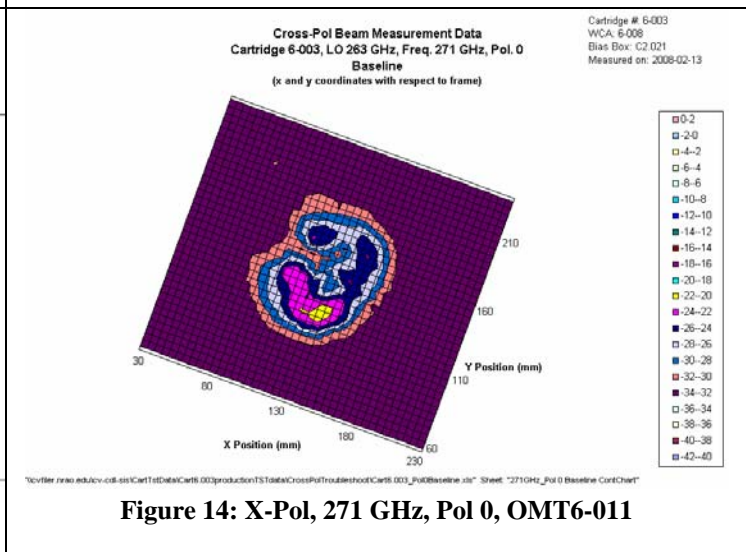
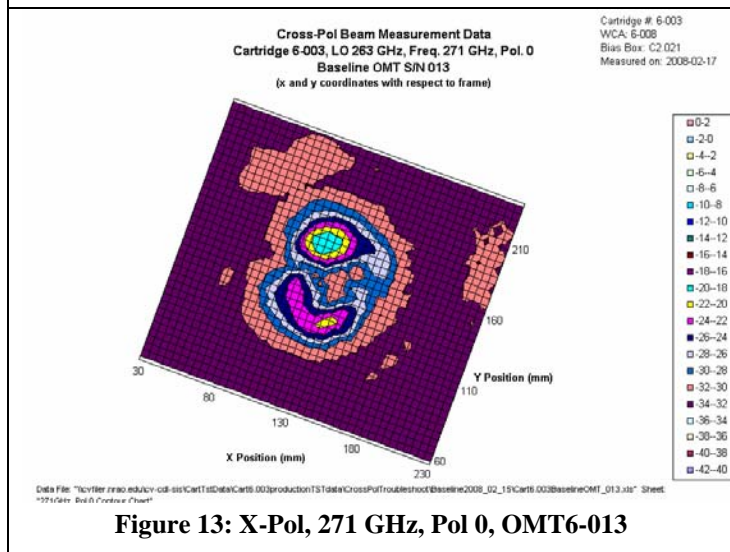
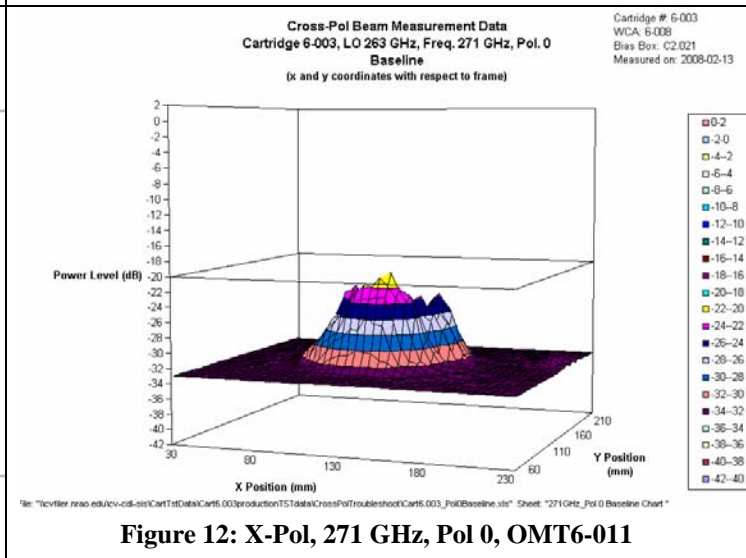
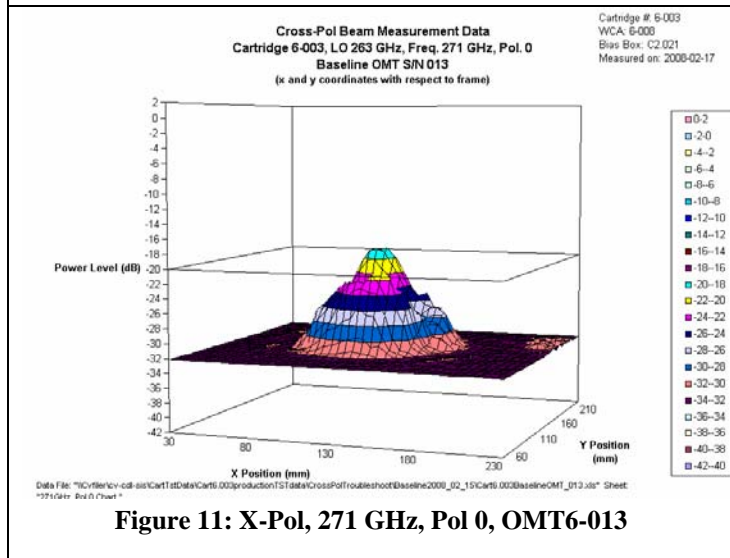
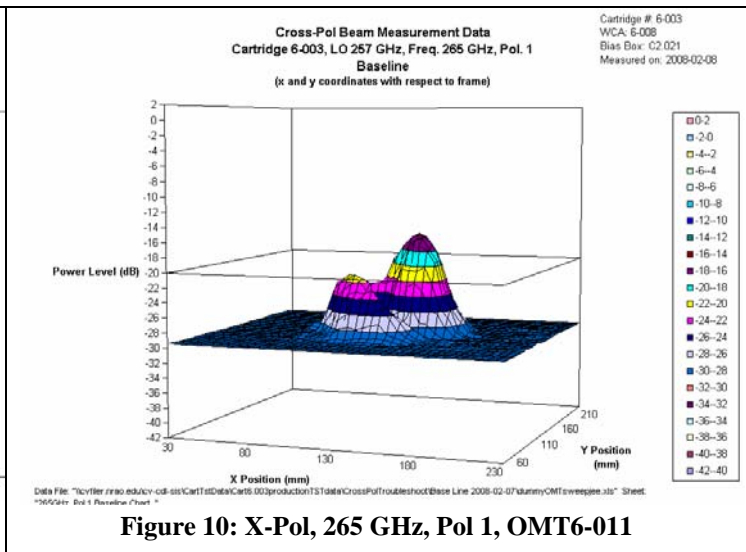
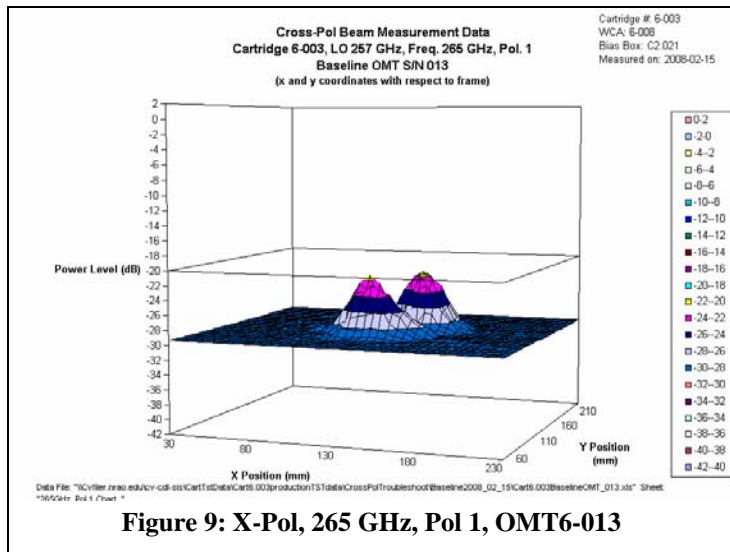
**Figure 6: X-Pol, 225 GHz, Pol 1, OMT6-011**



**Figure 7: X-Pol, 245 GHz, Pol 1, OMT6-013**



**Figure 8: X-Pol, 245 GHz, Pol 1, OMT6-011**



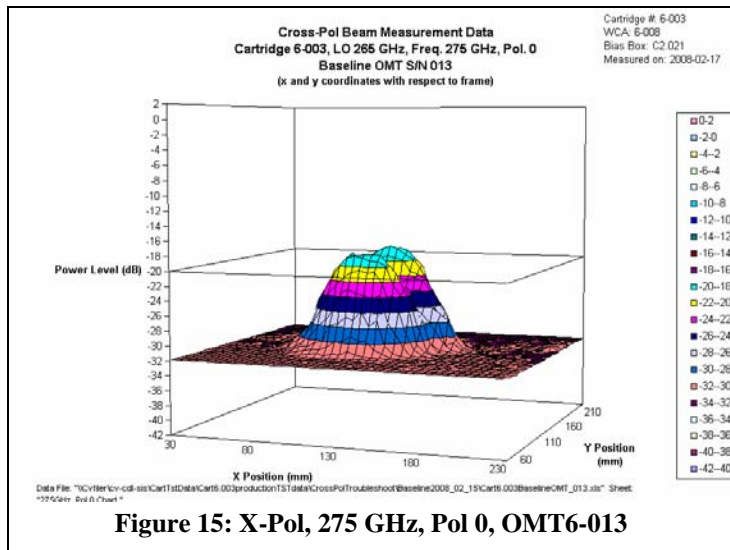


Figure 15: X-Pol, 275 GHz, Pol 0, OMT6-013

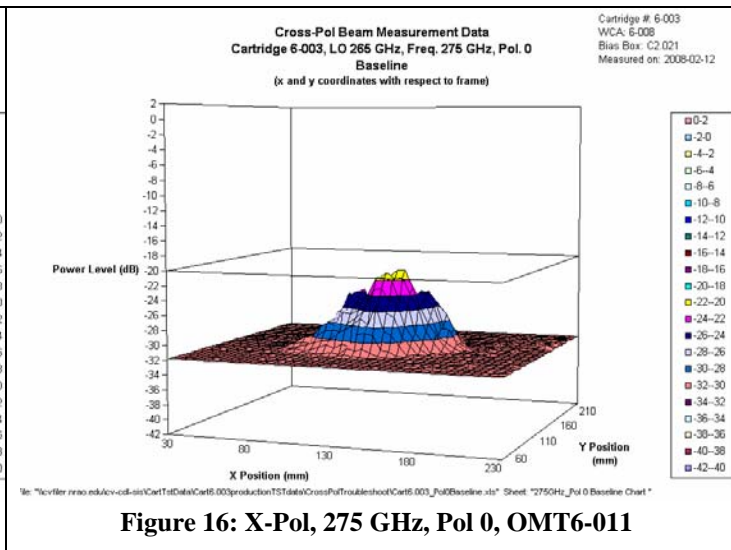


Figure 16: X-Pol, 275 GHz, Pol 0, OMT6-011

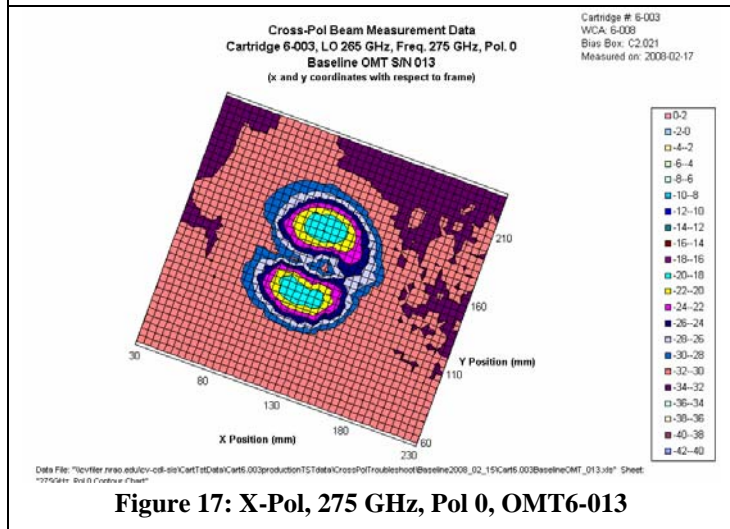


Figure 17: X-Pol, 275 GHz, Pol 0, OMT6-013

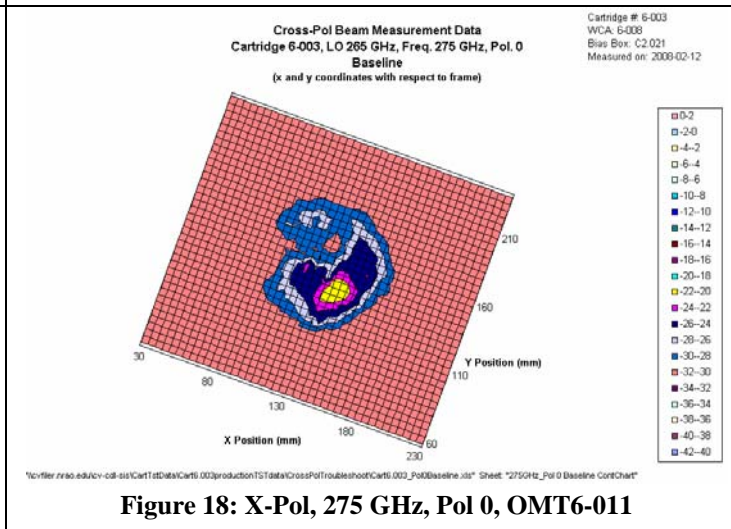


Figure 18: X-Pol, 275 GHz, Pol 0, OMT6-011

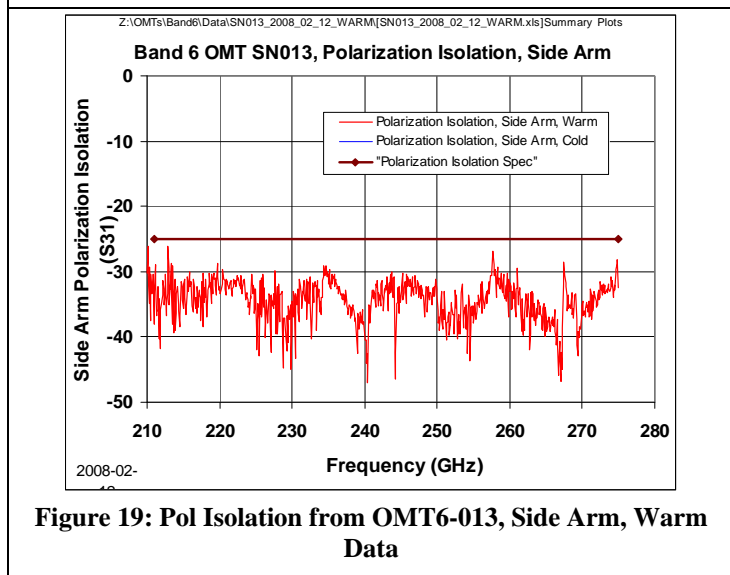


Figure 19: Pol Isolation from OMT6-013, Side Arm, Warm Data

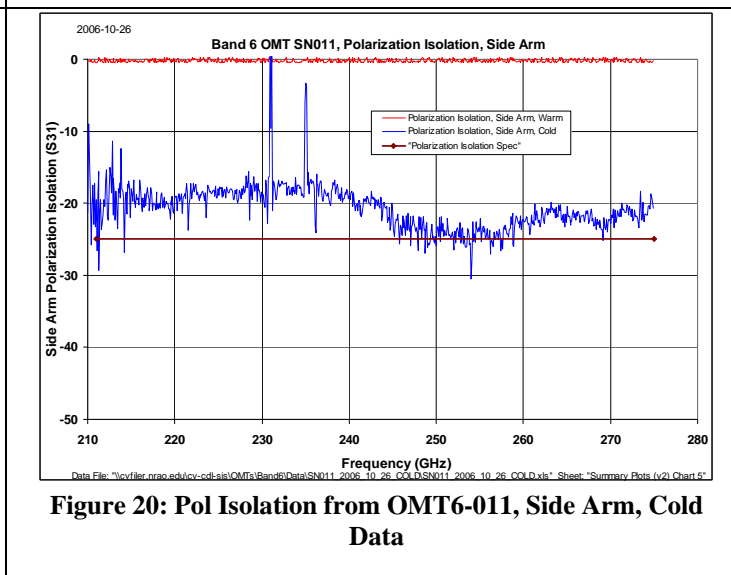
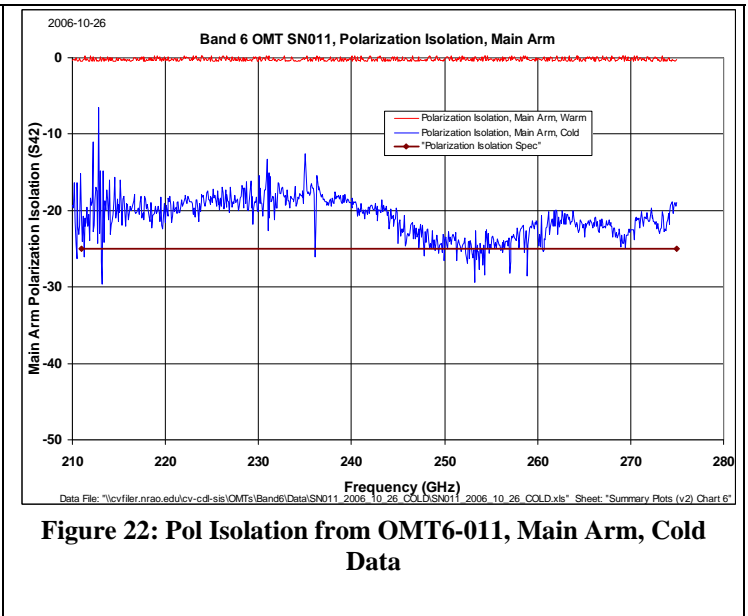
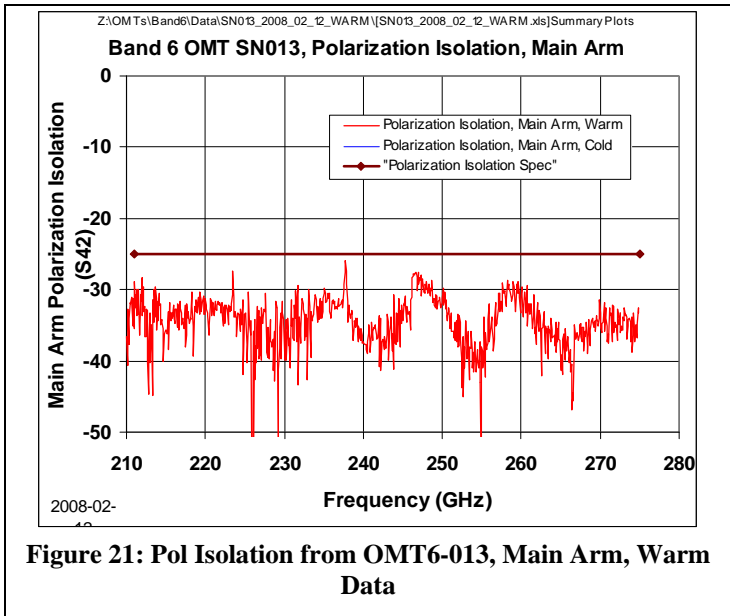


Figure 20: Pol Isolation from OMT6-011, Side Arm, Cold Data



## Appendix I: Cross-Pol Measurements of Cartridge B6-003 compared to Dummy OMT, Pol 0 and 1

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Polarization isolation has now been measured for both polarizations of B6-003. [Figure 23](#) shows the isolation for Pol 0 and [Figure 24](#) is the isolation for Pol 1. Note the Pol 1 data was reported last week [here](#) and where it is shown that the results were carefully checked for compression and for accuracy using a spectrum analyzer.

Polarization 0 isolation ([Figure 23](#)), measured initially in Dec 2007 and repeated today, shows little difference when the real OMT is replaced with the dummy OMT. Also, the data measured in Dec differs at most 2 dB from the isolation measured today.

Polarization 1 isolation ([Figure 24](#)) shows a different story. There is good repeatability at 211 GHz and 245 GHz between the Dec data and today's, but a nearly 5 dB discrepancy exists at 275 GHz. As mentioned last week, cartridge cross-pol is significantly better with the dummy OMT than with the OMT installed in that cartridge, OMT6-011.

For reference, the measured polarization isolation for just the OMT is repeated in [Figure 25](#) and [Figure 26](#).

Despite a few frequencies showing large discrepancies between the most recent data and that measured in Dec, the trend is clear and we recommend replacing OMT6-011 with one of the latest batch, which are presently undergoing measurement and should be ready for installation tomorrow, 14 Feb 2008.

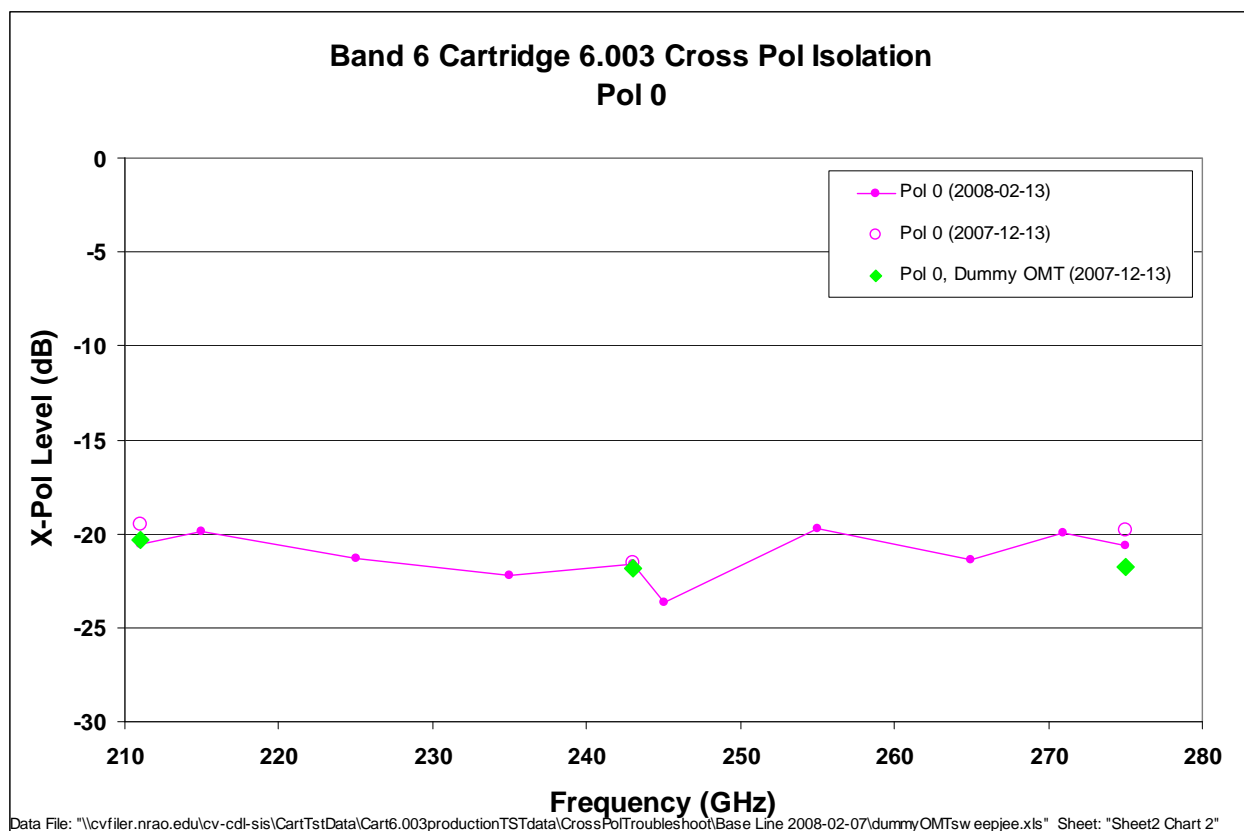


Figure 23: Polarization Isolation, Cartridge 6.003, Pol 0 ([Source](#))

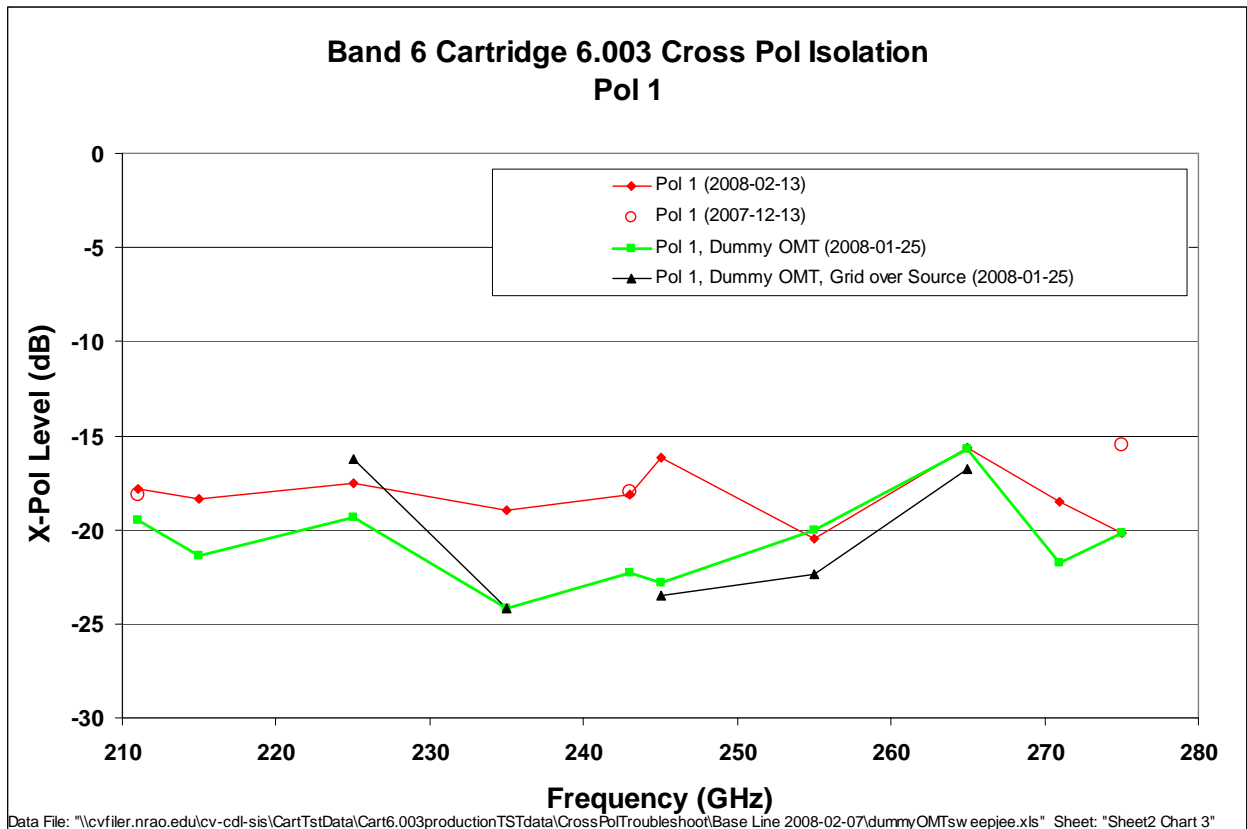


Figure 24: Polarization Isolation, Cartridge 6.003, Pol 1 ([Source](#))

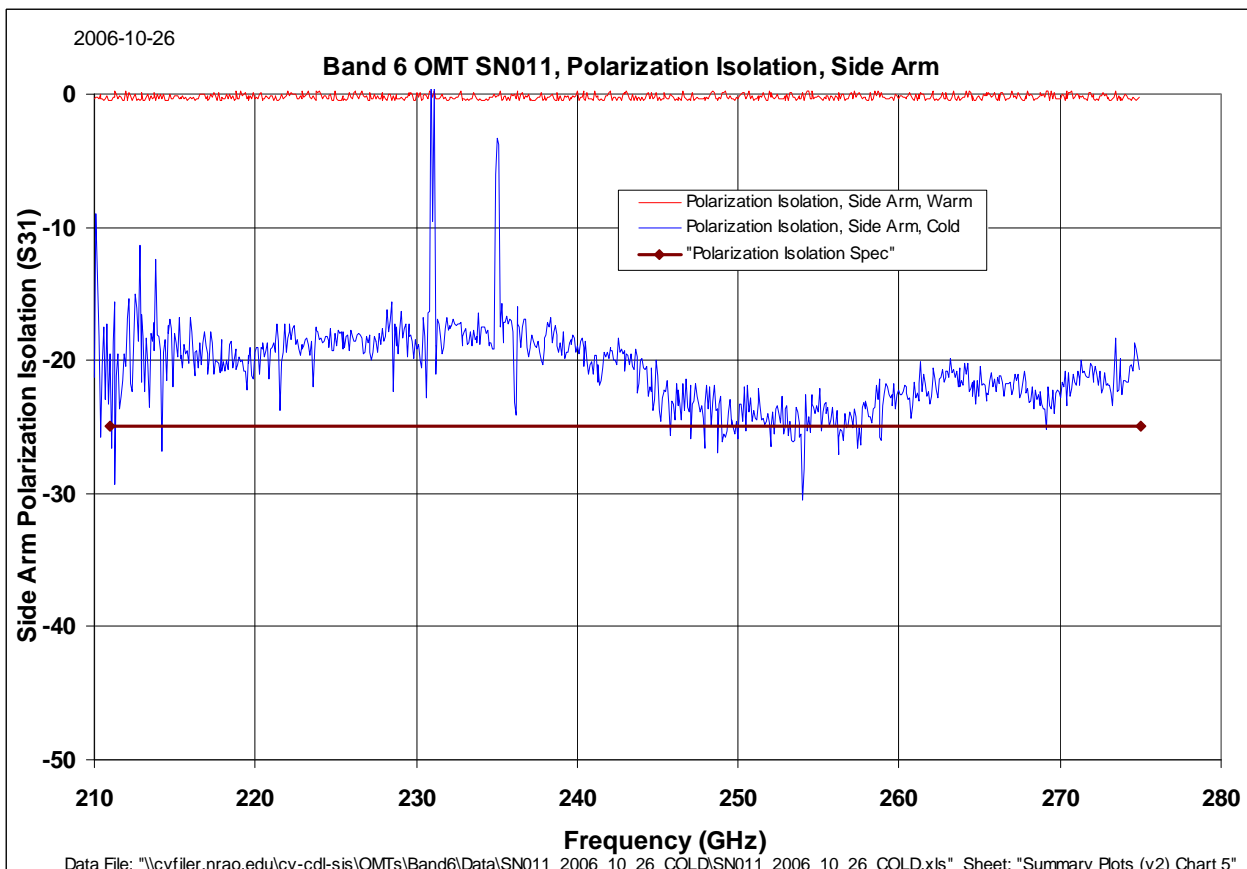




Figure 25: Polarization Isolation from OMT6-011, Side Arm

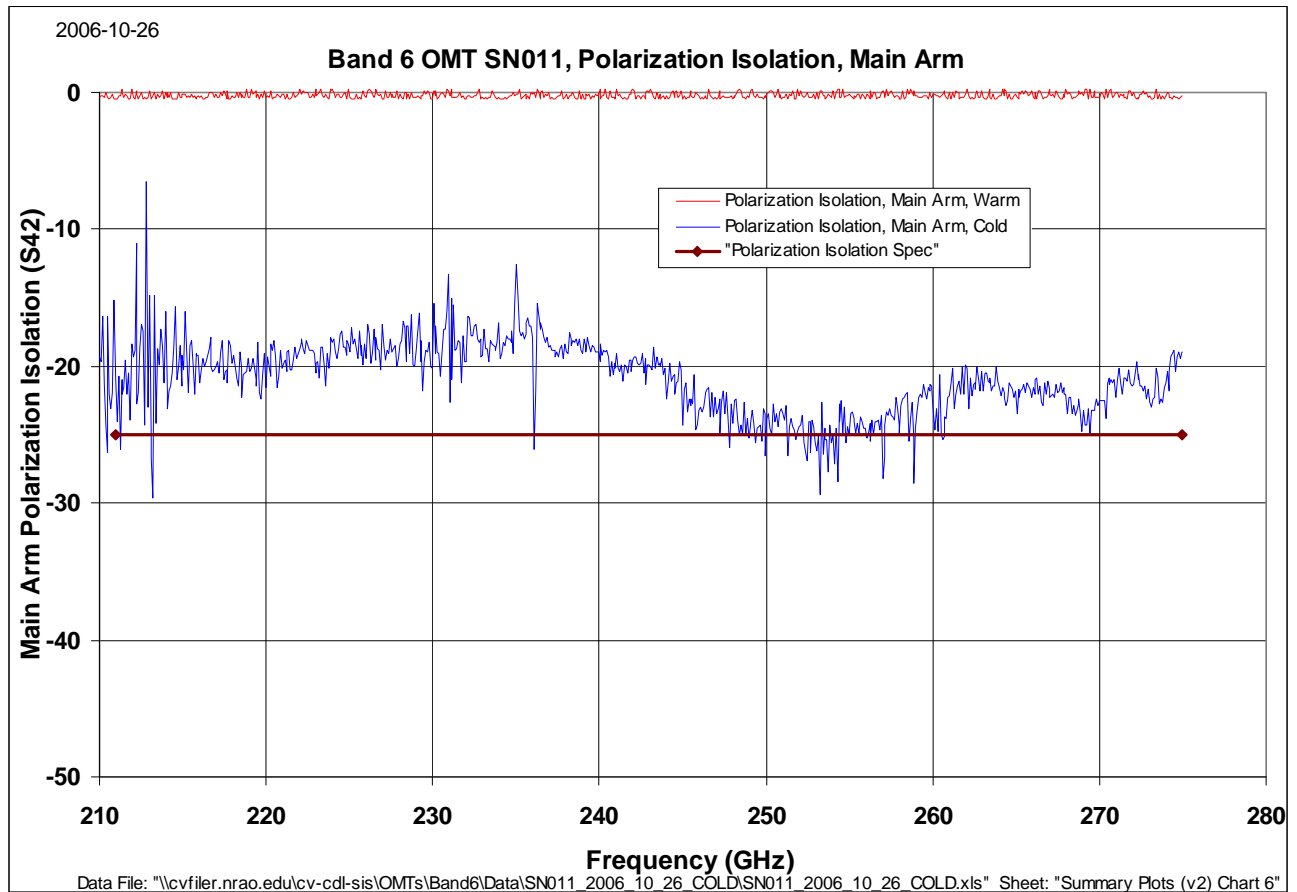


Figure 26: Polarization Isolation from OMT6-011, Main Arm