

3-bit continuum test at Ka-band with a wide separation in the basebands. Source = g192

I did a 3-bit test of a source I knew (G192) and had a comparison dataset at Q-band from the VLA. The observations were made in Ka-band (27 to 34 GHz) with an extra wide separation of basebands. The data were not edited before I ran the pipeline. I just ran the pipeline, split out the data, ran `statwt` in CASA to re-weight the final data and imaged. The resulting image is attached (contours are at 3, 5, 7 & 9 sigma).

The noise is what I expect and the image is what I expect. The total flux of the central component is a little low but it could be due to the change in frequency. I'll have to look into this more. Still, the bottom line is: the 3-bit samplers are producing images with noise very near the theoretical limit (as estimated by the Exposure Calculator).

Summary:

Measurements from the image:

Natural Weighting:

RMS= 1.10×10^{-5} Jy/bm = 0.000011 Jy/bm = 11 microJy/bm

Central Component:

Peak = 1.5 mJy/bm, Total flux = 2.1 mJy

Southern source: Unresolved flux = 0.155 mJy/beam

Estimate the theoretical RMS noise level with the Exposure calculator:

I have 25 scans on G192, each one is about 50s long for a total of ~20min on source. 24 antennas (assume this because several basebands were flagged and several more data were flagged by the pipeline).

A array

High elevation (50-90deg) – elevation plot shows G192 was observed between 65 and 72deg elevation)

Average Winter weather

Frequency in the band runs from ~27 GHz to 34.5 GHz

Frequency	Theoretical RMS noise (24 ants)	theory RMS (25 ants)
27 GHz	10.3 microJy/bm	9.8 microJy/bm
33 GHz	10.8 microJy/bm	10.4 microJy/bm
34.5 GHz	12.0 microJy/bm	11.5 microJy/bm

Comparison (At Q band versus this Ka band observation):

VLA A+C array: peak = 1.7 mJy/bm, total flux = 3.05 mJy

VLA A+PT: peak = 1.1 mJy/bm, total flux = 2.74 mJy

Total flux density of these observations is low relative to previous measurements but this could easily be because the observation is at a different frequency. The northern jet 0.5" from the central peak is detected (two brightest spots)

A new source is detected in the south (due to higher sensitivity of this observation than all previous measurements).

