

# 3mm primary focus receiver (84000-95500 MHz)

This is a 3-channel dual-feed system designed for VLBI observations. Since some years there exists a NASA satellite that operates a radar at 90 GHz. The radar is called CloudSat and is powerful enough too not only produce RFI, but it can also destroy the receiver when passing inside the beam. Please check the [CloudSat homepage](#) when planning 3mm observations. The CloudSat page also provides a forecast for satellite passages at specific radio observatories: [here for Effelsberg](#).

## Calibration Information

| Frequency [GHz]                                   | Channel | Polarisation | Tcal [K] | Tsys [K]      | Sensitivity [K/Jy] | SEFD [Jy] | Aperture Eff. [%] | TMB/S [K/Jy] | Main Beam Eff. [%] | FWHM [arcsec] | Last update |
|---------------------------------------------------|---------|--------------|----------|---------------|--------------------|-----------|-------------------|--------------|--------------------|---------------|-------------|
| 86.25                                             | A       | LCP          | 13.1     | 158           | 0.14               | 1154      | 4.8               | 1.38         | 10                 | 10.9          | Mar 2013    |
| 86.25                                             | B       | RCP          | 16.7     | 161           | 0.14               | 1174      | 4.8               | 1.37         | 10                 | 10.9          | Mar 2013    |
| normalized Gain curve (G = A0 + A1·Elv + A2·Elv2) |         |              |          |               |                    |           | Observed in       | confirmed    |                    |               |             |
| A0= 0.63495                                       |         | A1=2.3001E-2 |          | A2=-3.6231E-4 |                    | May 2012  |                   |              |                    |               |             |

## Comments:

- Tcal for channel C, the weather horn, is about 42 K, Tsys about 150K.
- The calibration parameters for this receiver strongly depend on the weather conditions.

## Version description for OBSINP

| RX Name                          | Wavelength [cm]                           | Frequency (center) [GHz] | Nr. of Horns |
|----------------------------------|-------------------------------------------|--------------------------|--------------|
| <b>P3mm 4-Box (84-87 GHz)</b>    | 0.3                                       | 84.0-95.5                | 1            |
| <b>Version:</b>                  | <b>Comment</b>                            |                          |              |
| 1. Cont./Line/VLBI (BW: 500 MHz) | Continuum, spectroscopy, and VLBI version |                          |              |
| 2. Pulsar (BW: 500 MHz)          | Pulsar version                            |                          |              |
| <b>Horn offsets [arcsec]</b>     | -1070.5, 1046.6                           |                          |              |

## Channel assignment in the MBFITS data files

Note that the narrow line and VLBA IF channels are usually only available when the specific line version of the receiver was selected. In addition for most receivers with narrow line channels the cables at the patch board need to be connected by the receiver group.

To select different channel numbers in OBSINP, the online plot, or the toolbox the numbers have to be specified like c(1)+c(2) to add channel 1 and 2. E.g. channel 1 and 2 contain the LCP and RCP broadband channels, then "OnlPlot pen='c(1)+c(2)'" or "toolbox use='c(1)+c(2)'" will select these channels. In OBSINP the pen can be directly specified in the receiver selection menu.

## Abbreviations:

SB: narrow band channel (Schmalband-Kanal), 100 MHz band width

BB: digital broad band channel (Breitband-Kanal), band width varies for different receivers

VLBA: VLBA IF, 500 MHz band width

BW: band width

TP: total power

| 3mm PFK (Multi-RX-Box II) |      |       |              |
|---------------------------|------|-------|--------------|
| Channel                   | IF   | Pol.  | Comment      |
| 1                         | BB   | LCP   | Horn 1, TP A |
| 2                         | BB   | RCP   | Horn 1, TP B |
| 3                         | BB   | RCP   | Horn 2, TP A |
| 4                         | VLBA | LCP   | TP A         |
| 5                         | VLBA | RCP   | TP B         |
| 6                         | VLBA | cross | cos AB       |
| 7                         | VLBA | cross | sin AB       |

## Spectroscopy modes and resolution

| BW  | nchan | nu    | Df   | Dv    | dv    |
|-----|-------|-------|------|-------|-------|
| MHz |       | MHz   | kHz  | km/s  | km/s  |
| 100 | 32768 | 85000 | 3.1  | 0.011 | 0.012 |
| 100 | 32768 | 87000 | 3.1  | 0.011 | 0.012 |
| 100 | 32768 | 89000 | 3.1  | 0.010 | 0.012 |
| 100 | 32768 | 91000 | 3.1  | 0.010 | 0.012 |
| 100 | 32768 | 93000 | 3.1  | 0.010 | 0.011 |
| 100 | 32768 | 95000 | 3.1  | 0.010 | 0.011 |
| 500 | 32768 | 85000 | 15.3 | 0.054 | 0.062 |
| 500 | 32768 | 87000 | 15.3 | 0.053 | 0.061 |
| 500 | 32768 | 89000 | 15.3 | 0.051 | 0.060 |
| 500 | 32768 | 91000 | 15.3 | 0.050 | 0.058 |
| 500 | 32768 | 93000 | 15.3 | 0.049 | 0.057 |
| 500 | 32768 | 95000 | 15.3 | 0.048 | 0.056 |

## Tcal and Tsys measurements

From: <https://eff100mwiki.mpifr-bonn.mpg.de/> - Effelsberg 100m Teleskop

Permanent link: [https://eff100mwiki.mpifr-bonn.mpg.de/doku.php?id=information\\_for\\_astronomers:rx:p3mm&rev=1380535987](https://eff100mwiki.mpifr-bonn.mpg.de/doku.php?id=information_for_astronomers:rx:p3mm&rev=1380535987)

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