



## High dynamic range RF electronics and Control & Monitoring system for Frontend Receiver of uGMRT

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The GMRT is an aperture synthesis array of 30 fully steerable, 45 metre diameter parabolic dish antennae spread over 30 km region near Pune in western India. It is designed to operate at a range of frequencies from 50 MHz to 1450 MHz, in five distinct frequency bands. The legacy GMRT feeds and front-ends are designed to operate at five frequency bands centered at 150 MHz, 233 MHz, 327 MHz, 610 MHz and L-band extending from 1000 to 1420 MHz, with a final instantaneous bandwidth of 32 MHz.

Currently the GMRT is upgraded and provides a seamless frequency coverage from 50 to 1500 MHz, with a maximum instantaneous bandwidth of 400 MHz for increasing the sensitivity of the telescope. The GMRT front end systems are upgraded for four bands viz. Band 2 (120-240 MHz), Band 3 (250-500 MHz), Band 4 (550-850 MHz) and Band 5 (1000-1450 MHz) which are controlled and monitored by the common electronics named as Common Box.

This paper discusses about the common front-end receiver electronics (common box), which is essentially providing an additional gain of around 30 dB to all the uGMRT RF bands. The common box system is re-designed for improving the dynamic range (70 dB) and to provide state of the art control and monitoring facility. It also incorporates the control features like RF band selector, solar attenuator, channel swap, Noise calibration setting, RF on/off and sub-band filter selection setting of the front-end system.

The broadband amplifier with a very high dynamic range (OIP3 ~ 30 dBm) is designed to provide flat 33 dB gain over 50-1500 MHz. Temperature, RF power and Voltage monitoring facilities are provided to monitor the health of the system and to study the stability of front- end receiver system. The monitoring of physical temperature of the enclosure helps in studying the performance of the front-end system with the variation in ambient temperature. The Rabbit based MCM card (Monitoring and Control module) with very high processing speed and additional ports is incorporated for control and monitoring operation along with a facility to have ethernet interface over optical fibre in order to improve the reliability.