

RAy2-24 operational description

RAy2-24 is a device for high-speed point-to-point microwave link operating in 24GHz ISM frequency band. It is full outdoor software defined radio device. The final installation consists of a parabolic antenna and RAY2-24 device. The device consists of a radio board and a modem board. Radio board contains the receiver and transmitter circuitry, a microcontroller (MCU) to control the basic radio functionality. Modem board consists of baseband processor for signal processing of the digital data and management processor. There is only one type of the device. Transmitter and receiver tuning range is from 24.05 GHz to 24.25 GHz.

Antenna

The parabolic antenna is tuned to the 24.05 – 24.25 GHz frequency band. The radio unit is connected via circular waveguide to the parabolic antenna. Tx and Rx signal is separated by waveguide orthomode transducer.

Receiver

The receiver is a dual conversion superheterodyne type with a first intermediate frequency at 1960 MHz. The incoming signal is boosted by a low noise amplifier (LNA). Planar bandpass filter follows the LNA to eliminate the out-of-band signals and prevent desensitisation in subsequent stages. Filtered and boosted input signal is downconverted to the first IF frequency by means of a mixer and local oscillator (RxLo1). Receiver mixer contains frequency doubler thus RxLo1 output frequency is for both units within the range of 11.045 – 11.145 GHz with frequency step 250 kHz. The choice of this frequency also determines the channel the receiver is operating at. After channel filtering and amplification, the IF signal is downconverted and demodulated once again by means of a second mixer and local oscillator (RxLo2) tuned to 1960 MHz. Demodulated baseband I/Q signals are filtering through the tunable baseband filter. All oscillators are phase-locked loop oscillators controlled by onboard MCU.

Transmitter

Input baseband I/Q signal are upconverted to the first intermediate frequency in single quadrature mixing stage by the help of the transmitter local oscillator (TxLo2) with the frequency 2325 MHz. TxLo2 is a phase-locked loop controlled oscillator with frequency step 125 kHz. After low pass filtering, amplification and power regulation is transmitting signal upconverted to the output transmitting frequency by means of a mixer and local oscillator (TxLo1). TxLo1 is a phase-locked loop controlled oscillator. Transmitter mixer contains a frequency doubler thus TxLo1 output frequency is within the range of 10.8625 – 10.96250 GHz with frequency step 250 kHz. There is planar bandpass filter before a last stage of transmitter. The last stage of the transmitter is output power amplifier. All oscillators are phase-locked loop oscillators controlled by onboard MCU.

Antenna connections and grounding

Please refer to Section 6 (Installation) of the User Manual also provided with the certification application documents.