Date: 2017-09-08
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Basic functions

RMI6 is the base for the next generation of Profotos revolutionary wireless studio flash control. With a
RMI6 module in your equipment you can interact and control with a wide range of studio equipment. RMI6 transmits on the 2.4GHz band for Short Range Devices, a frequency that is free for unlicensed use in most parts of the world.

Bandwidth consumption

When considering a typical usage scenario, the device will transmit less than two seconds per hour.

47 CFR Ch 1- Subpart C conformity regarding emission designator and type of modulation

The ITU emission designator for the device is 1M00G1D, i.e. 1 MHz Bandwidth, Phase Modulation, Single Channel
containing digital information, Data transmission.

Description of spread spectrum frequency hopping schema.

Overview

RMI6 FHSS system use the 2,4 GHz ISM band organized into 22 channels which are shown in figure 1. Channels C1...C8, X1...X7 and Y1...Y7
Maximum channel transmitting time length at power of max +20 dBm/1 MHz are approx 0,5ms and receiver time slot is 1 ms. Every transmission start of one of channel C1...C8. The pattern can be pseudo or a fix pattern.

The RMI6 FHSS is backwards compatible with the Promote RMI (non FHSS) due a telegram at start using one of the channel C1...C8. That means Promote RMI (non FHSS) can received standard telegrams, but not extended telegrams. Not. extended telegrams are only used in RMI6 FHSS.

The design engineer as have in mind when communication in network that consist both FHSS and non FHSS devices that, a non FHSS compatible are not allowed to communicate in high power transmitter, the transmitter is limit to +10 dBm/1MHz. That means a FHSS compatibility unit may miss a transmitting telegrams from a non FHSS compatibility node, but the non FHSS compatibility node will probably received telegrams, due FHSS devises transmitting in high power.

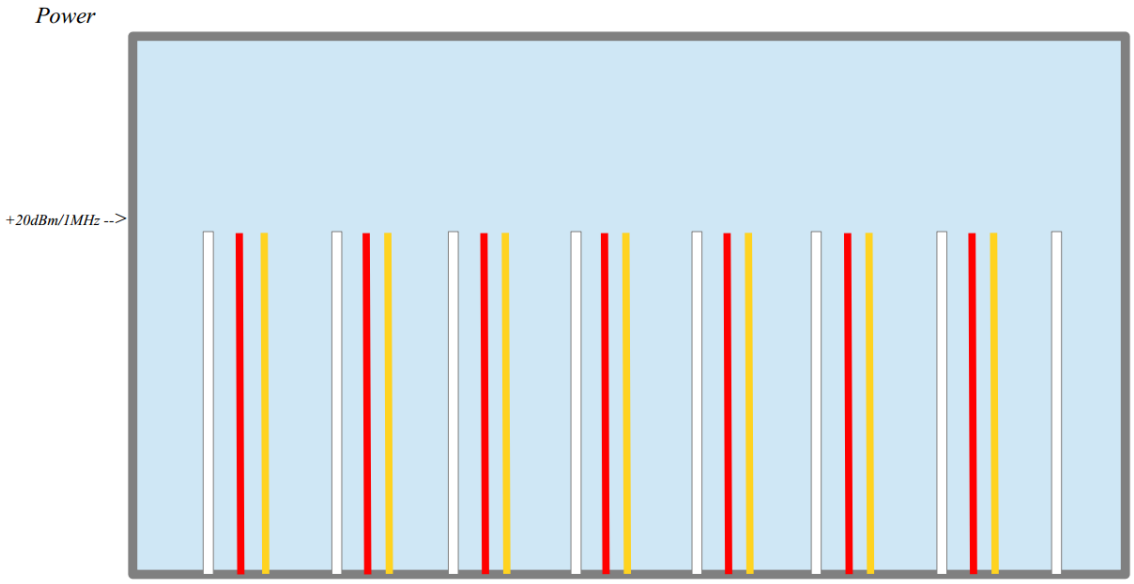
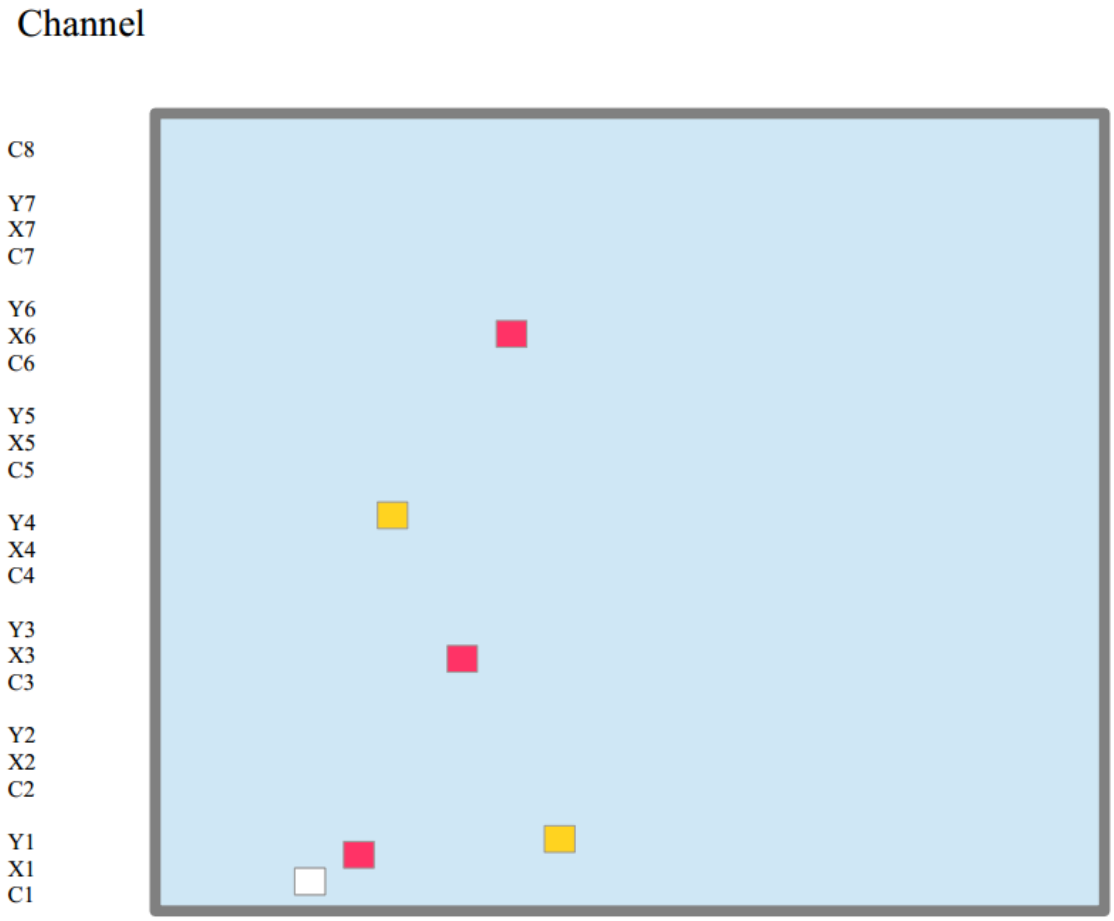


Fig1 Promote Air FHSS 29 channel raster in 2.4 GHz ISM band
Legend. White channels C1...C8. Red and Yellow channel Xn and Yn n=1...7

Synchronization

Synchronization of spread spectrum are initiated by a Air synchronize command on a Cn channel are received or a time out function. Synchronization by a timeout which occurs if no traffic is detected. On a Time Out, the Cn channel will be used to start next transmission.cIn this example (figure 2) a pseudo hopping sequence mode is used. Sequence start with C1, X1, Y4, X3,X6, Y1. An Air Command is sent on channel C1.



2 Pseudo table channel hopping sequence Time -->

Telegram transmission

Example below in fig 3 (note when reading the graph that the time line x is not in scale) show a typical TTL transmission. Have in mind, other transmissions in Promote Air protocol can be shorter, longer, have different time slot and hopping pattern, but the principal is always the same.

A TLL telegram start with a Air command “Px” and follows of two commands Es and Mx. Data is spread over the channels Z1, Y5, X5...X7, Y3...Y1 and X1...X7.
Non FHSS Air devices received Px, Es and Mx as “usually” – Due the Air FHSS Protocol is backward compatible with non FHSS devices.

A special transmitter mode is also used by the RMI6 system; A non FSHH mode and with limited RF power to +10dBm.

Note. The typical times which are given in graph (fig 3) can vary widely depending of application.

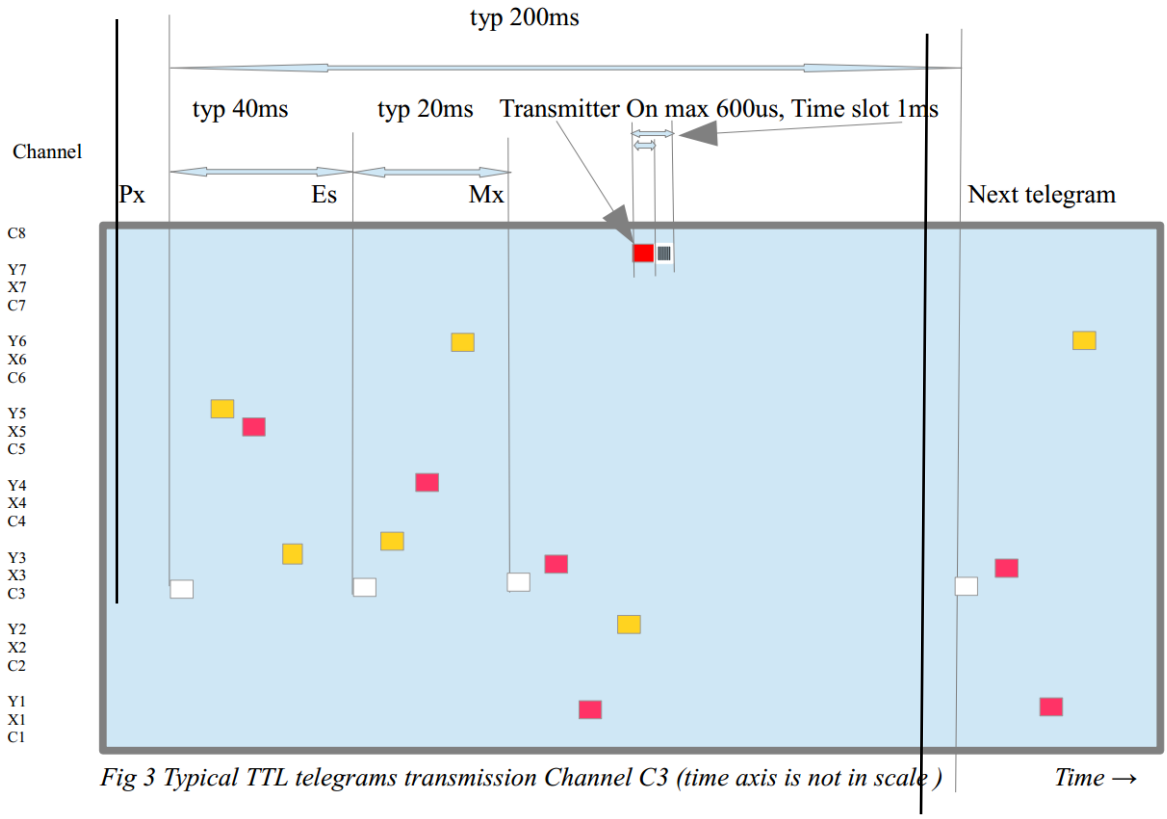


Fig 3 Typical TTL telegrams transmission Channel C3 (time axis is not in scale)

Technical specification for “RMI6 FHSS system”

0. Name “RMI6 FHSS system”
1. FHSS system, Non-adaptive, 2.4GHZ ISM Band
2. RF power maximum +20dBm /1MHz
3. Number of hopping frequency 22, Channel separation 3 MHz
4. Lowest frequency 2404 MHz
5. Highest frequency 2479.3 MHz
6. Max duty cycle 10%
7. Medium utilization 10%
8. Max Transmitter sequence <5ms, Min Transmitter Gap >5ms. Observed over a 1 second period.
9. Max Transmitter active ON time 700 us
10. Receiver Time slot 1ms
11. Integrated antenna +1dBi
12. Radio Protocol and Type : Proprietary

Channel list

Channel	Frequency	Unit
1	2403,999	MHz
2	2411,997	MHz
3	2416,996	MHz
4	2421,994	MHz
5	2426,993	MHz
6	2446,988	MHz
7	2453,987	MHz
8	2479,314	MHz
9	2406,998	MHz
10	2414,996	MHz
11	2429,992	MHz
12	2432,992	MHz
13	2435,991	MHz
14	2438,99	MHz
15	2441,99	MHz
16	2451,321	MHz
17	2456,653	MHz
18	2459,652	MHz
19	2462,318	MHz
20	2465,317	MHz
21	2468,316	MHz
22	2471,316	MHz

Description of scanning receiver compliance with 15.121 cellular band restrictions.

NA, device is not a scanning receiver.

Description of direct sequence transmitter theoretical processing gain

The output of the CC2500 is configurable between -20 to 1 dBm. The amplification of the CC2592 is optimized for CC2500 RF path port. The peak gain for the Fractus FR05 chip antenna antenna is 1.5dBi. The theoretical maximum output power thus is 19.9dBm.

Description of circuitry required by 2.1033(b)(4)

The device consists of a PIC16F1619-I/ML MCU, a CC2500 transceiver and a CC2592 amplifier. The device works as a remote control for controlling professional photography equipment such as flash generators. The MCU receives its commands from a device connected via an UART, an interrupt or an over-the-air command, generates a datagram which is transmitted via the CC2500 transceiver. The PCB is four layers with separate GND and VCC layers. The antenna is a omni directional Fractus FR05-S1-N-0-102.

15.203 antenna requirement compliance.

The module is available with an integrated chip antenna. The requirements of 15.203 are thus fulfilled.

15.245 compliance regarding location of intended use.

The device is not a field disturbance sensor.