Technical Description

Reactive Convoy Jammer

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Content

1 Main features

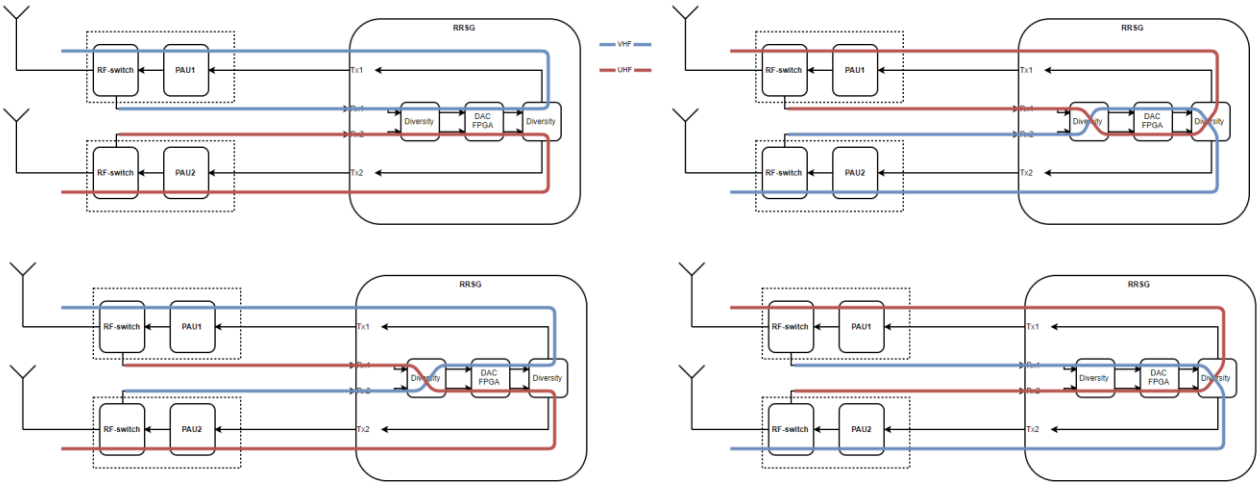
The Jammer operates as a blocker to avoid wireless communication and connection. Every band can be activated independently. The system is fully reactive, active or hybrid, therefore offers excellent performance and efficiency. The system is adjustable in the frequency range between 20MHz – 6000MHz (optional > 6000MHz).

The system contains independent RF power amplifiers modules with scalable RF power, followers (signal generator) modules containing 2 bands with a bandwidth of 300MHz each. The 300MHz bands can be shifted in the RF spectrum depending on the customer needs (in the range 20MHz – 6GHz). All adjustments and control figures are done over a GUI.

Trough all the mentioned facts, the system is adjustable in size, frequencies and power output accordingly the customer needs.

1.1 Antenna diversity

Each follower module has two switches, and the PA has one RX and TX switch. Using this function an antenna diversity for Rx and Tx can be programmed. Four modes can be implemented and programmed. Picture below shows the possible modes.



1.2 Jamming Algorithms

1. Continuous jamming – jammer generates signal in user programable ranges. Input RF signal has no influence on output. This mode includes algorithms as:
   - Barrage permanent – device is generating noise signal on defined frequencies with defined power,
   - Custom permanent – device uses previously saved signal, bandwidth and numbers of carriers can be adjusted and uploaded from a preloaded file
   - Waveforms can be generated accordingly customer needs
2. Reactive jamming – jammer reacts on RF input signal by generating/replaying signal on output with predefined power. This mode includes algorithms as:
   - Reactive – generating output signal when input power is above a defined threshold
   - Reactive – generating an output signal according to input signal
   - Reactive – generating an output signal according to input signal, if there is no signal detected in the programmed band, the signal generator create in the whole band a white noise with maximum power

   Both active and reactive jamming can be combined in the same band (hybrid)

2 Follower (Signal Generator Module)

The follower has two options to disrupt. Follow (reactive, responsive) mode and active mode.

In follower mode, the follower listens to signals which are present. Then it determines the frequencies and generates an interference signal only on the received frequency.

In active mode, the listening is omitted, and an interference signal is generated constantly. This can be done white noise or a predefined signal.

Settings:

A follower has 2 bands, and each band can cover up to 300MHz frequency range. The 300MHz can be between 20MHz and 6000MHz. This is defined by entering the start and stop frequency. In this range, one can define the so-called sub bands.

A sub band defines exactly which frequencies have to be disturbed in the 300MHz and in which mode. A sub band can be with a maximum width of the 300MHz. For each sub band, the power can be defined. The power can be up to a maximum of 16 dBm and is set to 0 dBm by default.

In follow mode, the input sensitivity threshold of each sub-band can be set. This specifies how large a signal must be to be detected. This can be between -110 dBm and 0 dBm (depending on the adjusted BW).

It is possible to set both modes at each frequency. This means that follow and active sub bands can overlap.

The 2 RX and the 2 TX can be swoped by software within each other.

- Module dimensions (L x W x H): 245 x 130 x 40 mm
- Weight: 1120g

3 Power Amplifier Modules

There are three types of PA, low frequencies from 20 MHz to 700 MHz, middle frequencies from 700 MHz to 2700 MHz and for high frequencies 2700MHz – 6000MHz (optional up to 40GHz). It amplifies the input signal up to 50dBm (100W) to the output port.

A RF switch is integrated in the PA. This allows to use the same antenna as a receiving and transmitting antenna.

The PA can be set to have the amplification permanently on or off, or to switch in auto mode. In auto mode, the PA is switched on/off according to the timing. In addition, the operator can define the output power between 0dBm to 50dBm.

The RF-switch setting is made via the PA itself. There are 4 different states. There is the RX mode, which routes the antenna input to the RX port. TX mode, which routes the antenna input to the TX port. And there is the switch mode, which switches the antenna input to TX or RX according to timing.

Available PA's.

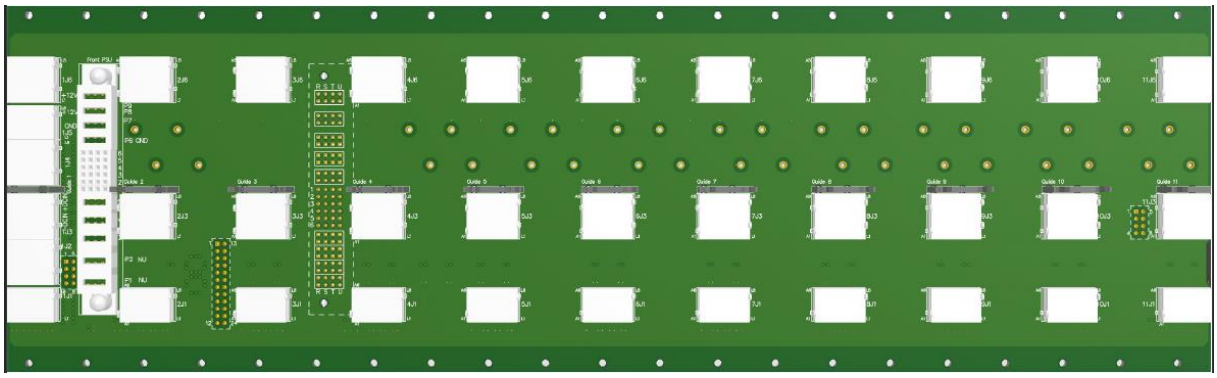
Typ	from	to	power
PAL	20 MHz	620 MHZ	100W
PAM	600 MHz	2700 MHz	100W
PAH	2700 MHz	6000 MHz	100W

- Module dimensions PAL/PAM: (L x W x H): 245 x 130 x 40 mm
- LPA and MPA weight: 2240g
- Module dimensions PAH: (L x W x H): 245 x 130 x 80 mm
- HPA weight: 4500g

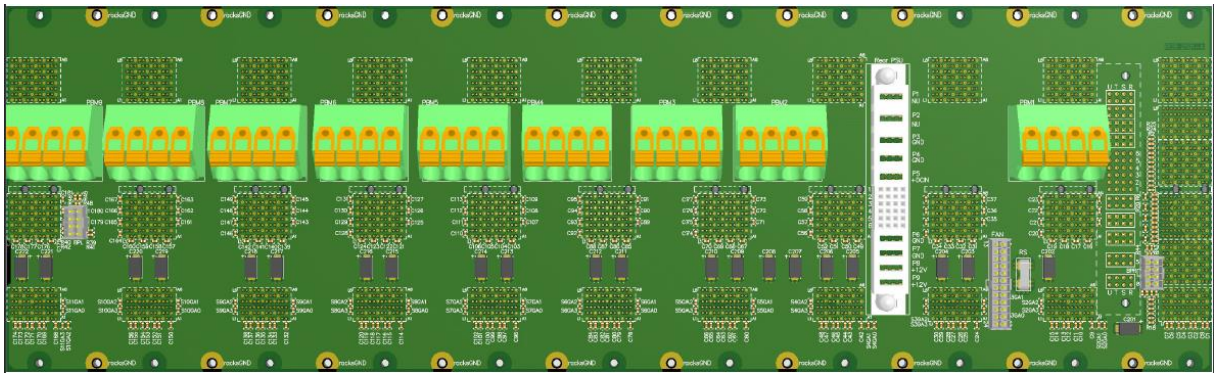
4 Backplane

The backplane connects all modules together for communication, power supply and synchronization.

Front:



Back:



- Dimensions (L x W x H): 430 x 130 x 42 mm
- Weight: 750g

5 Antennas

The antennas are optimized for the dedicated ranges. All antennas are 50 Ohm. For the application as convoy Jammer two omni antenna are in the range of 20MHz – 620MHz, a 800-2690 MHz X-Pol Panel Antenna, two omni antenna in the range of 900MHz – 2700MHz and a 200-6000 MHz omni Antenna are used.

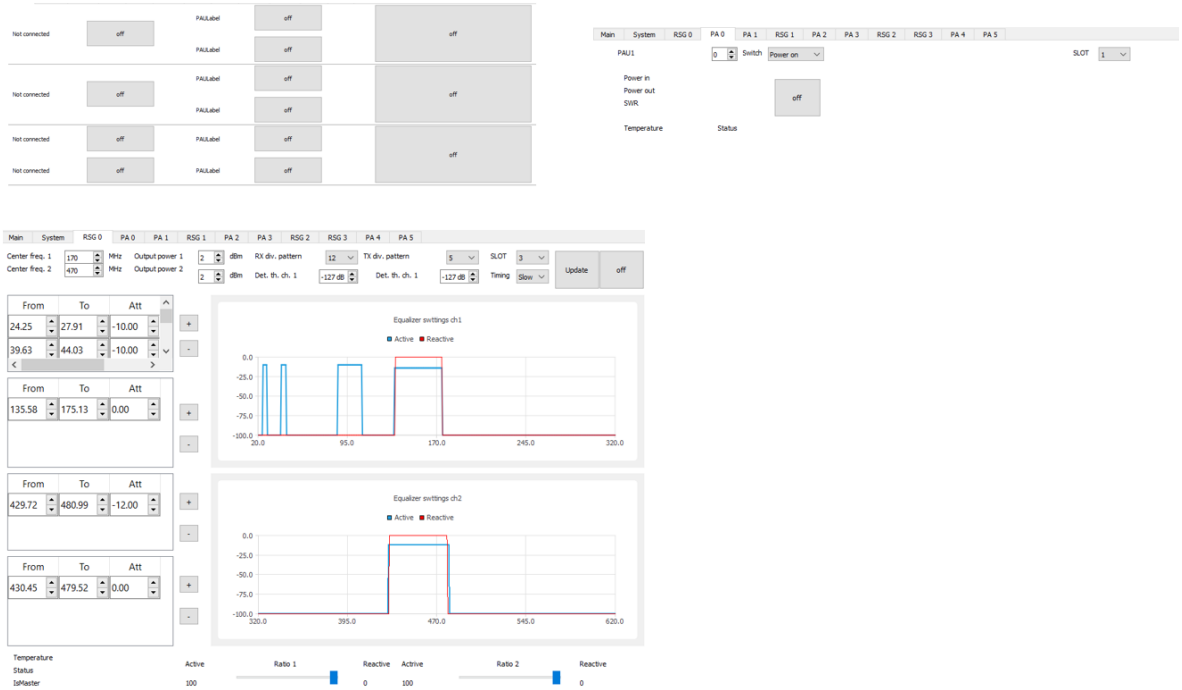
6 Housing

The dimensions of the Jammer housing are according the final design in frequencies and power, the following pictures are examples:

7 GUI (graphical interface)

With the GUI the operator can program the frequencies, the power and the jamming application as barrage, discrete signals and reactive. The operator can also program notch frequencies (gaps) which should not be jammed. The GUI can be designed / customized on special request as per user needs. However, a standard GUI is provided.

The Jammer offers a variety of indications and alarms. All units are permanently monitored. In case a warning or failure occurs, the operator will be informed through a tone and/or on the screen.



8 Operational Power Source

The system uses 9V – 36V, backed by a battery this guarantees an independent power from an alternator or the grid according to the capacity of the battery. The system is directly connected to the battery and the battery is directly connected to the charger, which is either on AC (grid anywhere in the world) or additional alternator.

9 Remote Login (only if User allows)

If allowed by the end user, remote access can be established via modem and landline connection through the internet. The system supplier can support upon request the maintenance personnel of the user.

10 Car Platform

Through the fact that the system is small and modular, the system will fit in almost all brands of cars in the market.

10.1 Car example

Toyota Landcruiser

10.2 Mounting Plate

The mounting plate will be attached at the car cassis and the system will be attached to the mounting plate.