

# RUWH1000<sup>®</sup> Series

## Low power UHF Transposers

Maximum Wideband Energy Efficiency to expand Digital TV networks coverage



**WHET<sup>®</sup>** Wideband High Efficiency Transmitters

## Reliability and efficiency

Simple installations for confined spaces

**Egatel**

# RUWH1000<sup>®</sup> Series

## Ultra-compact Transposers & Gapfillers

### Flexibility and Efficiency in low power

The new High Efficiency transposers and gapfillers series is an ideal solution to expand Digital TV networks coverage. Its ultra-compact design (1U) provides full flexibility and multiple configurations in space-constrained low power retransmitting stations.

Its high selectivity allows them to work smoothly in presence of adjacent channels and integrates a powerful Echo Canceller suppresses installation feedbacks (SFN).

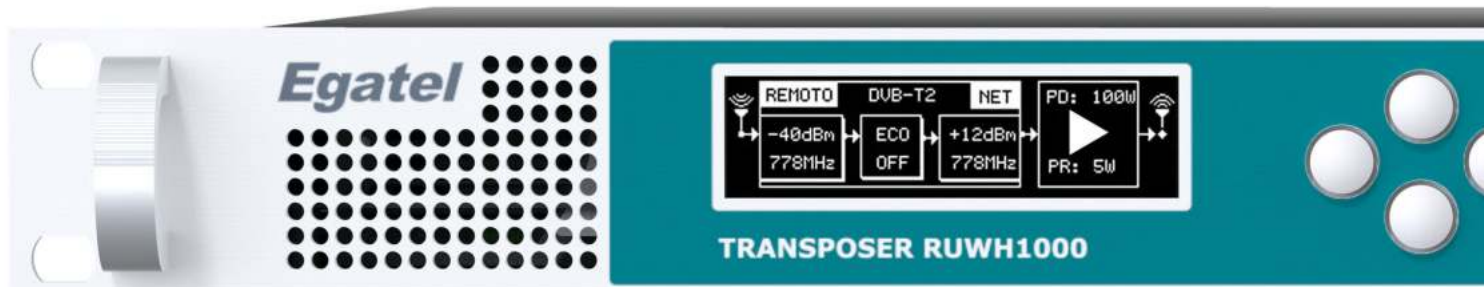
A built-in advanced Digital Adaptive Precorrection system makes it possible to automatically deliver the optimal level of correction for the over-the-air signal and a friendly Web GUI which enables the complete transposer management in local or remote mode, the tasks of monitoring and maintenance are extremely simple.

Table of models

RUWH1000 (**)	RUWH1050 (*)	RUWH1200 (*)	RUWH1101
Power (before the filter) COFDM	5 Wrms	25 Wrms	100 Wrms
Power (before the filter) ATSC	5 Wrms	25 Wrms	125 Wrms
Output RF connector	N (F) 50 ohm		

(\*\*) The models are referenced according to standard:  
RUWH10x0 - DVB-T/H/T2, RUWH10x0B - ISDB-T/TB, RUWH10x0A - ATSC  
Example: RUWH1101B - 100 Wrms ISDB-T/TB. Other configurations of output power and number of amplifiers, on request.

(\*) No Doherty.



# Benefits and key features

## 1. Leading efficiency wideband TV transposers

- Doherty technology
- Wideband advantages

## 2. Full versatility, adaptable to any broadcast network

- Compact design
- Powerful echo canceller
- Adaptive Digital Precorrection
- QoS analyzer

## 3. Quick start-up and easy operation

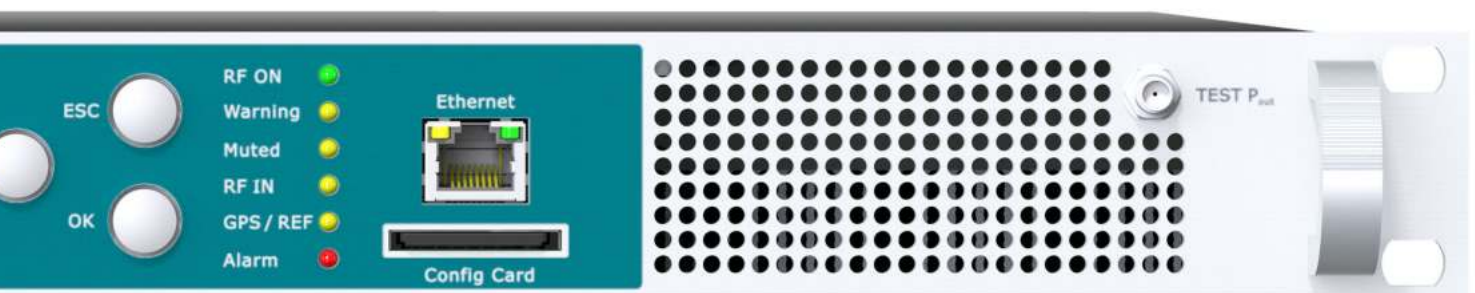
- Intuitive operation
- Instantaneous configuration via SD card

## 4. High reliability

- Redundant configurations
- Optimum cooling system design

## 5. Service and support

- Rigor and professionalism



# Wideband Doherty Technology.

## Leading efficiency

**WHET**® Wideband High Efficiency Transmitters

### ■ Doherty Technology

Energy efficiency is a key factor for network operators by the time of selecting TV transmitting equipment. The main reason is the energy cost, since after ten years of operation it can represent up to three times the initial investment.

The adoption of Doherty Technology makes possible to boost energy efficiency values up to 42%, representing an improvement of almost 50% over traditional technology systems.

Despite all its advantages, classical Doherty topology has an inconvenient: It is an inherently narrowband technology. It involves that so far, the power amplifiers had to be precisely adjusted to work optimally in their RF channel. Therefore, when a channel change was requested, the network operator had to modify the power amplifiers or replace them with new ones. Obviously, this also greatly complicates the maintenance tasks, management and logistics of spare units.

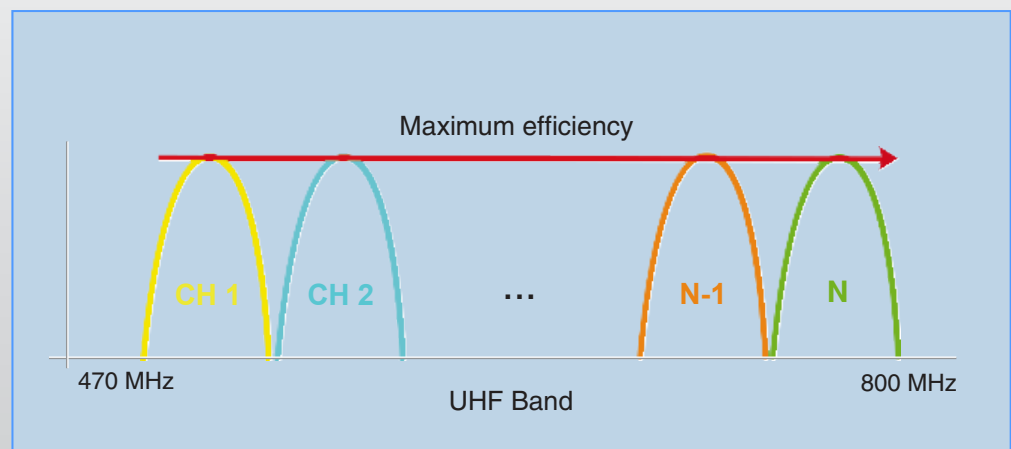
### ■ Wideband advantages

The RUWH1000 Series, equipped with Wideband Doherty Technology, overcomes the drawbacks of classical Doherty technology while keeping all the benefits. Thus definitively ends with trade-offs. You don't need to waste frequency agility to optimize energy efficiency.

Although it is a low power series, the energy efficiency has a big impact in expenses due to the large number of equipment needed in low power networks.

### Efficiency optimization throughout the UHF band

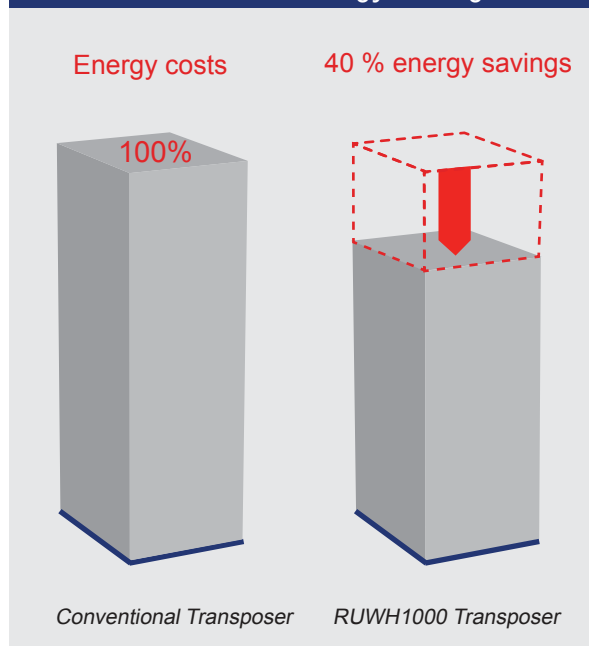
RUWH1000 Series transposers as part of N +1 system, main and reserve, are identical. The associated cost with equipment replacement is reduced and simplified.



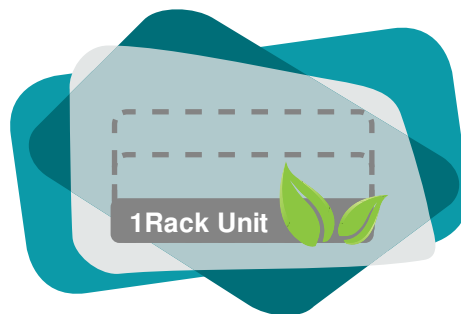
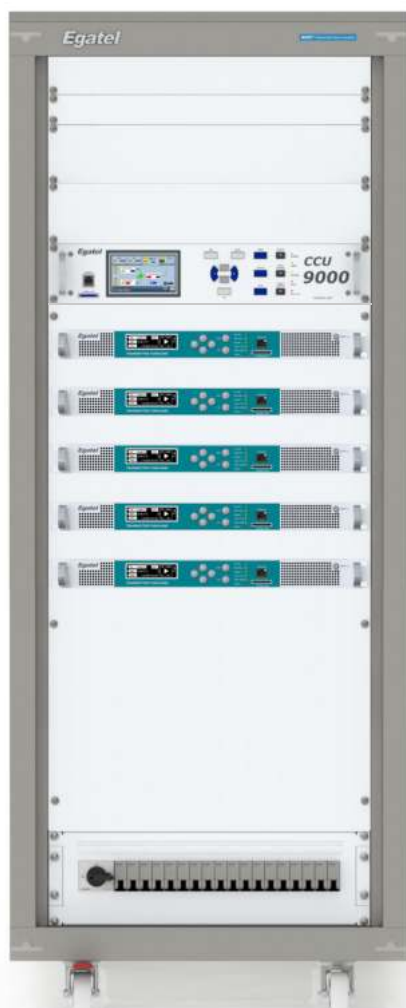
This series achieves energy efficiency up to 38% for COFDM and 42% for ATSC waveforms. The efficiency is maintained throughout the UHF range, so no adjustment is required at the time of changing the RF channel of operation. Moreover, with the wideband technology there is only one reference for the power amplifiers, which drastically simplifies the management of spare parts.

An example that illustrates the benefits of wideband Doherty systems is the N+1 configuration. With classic Doherty technology, each main transmitter must be perfectly adjusted to its transmission channel in order to get the maximum efficiency. On the other hand, the reserve transposer must be able to replace any of the main. Therefore, it cannot work in Doherty mode and its energy efficiency is lower. As a consequence, the design of the power supply network of the entire system becomes more complex. Moreover, it is necessary to handle different types of spare parts.

### WHET Series energy savings



Equipped with Wideband Doherty Technology, all RUWH1000 transposers comprising an N + 1 system are identical, main and reserve, the power consumption of the whole system is optimal and homogeneous. Furthermore, working with just a unique reference leads to reduction in maintenance and logistics cost.



**Superior space-saving  
GREATER EFFICIENCY**

4+1 rack configuration.  
5 x RUWH1101 transposer + CCU9000 Control Unit

# Versatile & adaptable

## All features of WHET series in only 1U high

### WHET<sup>®</sup> Wideband High Efficiency Transmitters

#### ■ Compact design

The RUWH1000 family, ready to work with the major international Digital TV standards: DVB-T / H, DVB-T2, ATSC and ISDB-T/TB and with an ultra-compact design, is oriented to low power and space-constrained installations where provides a high level of flexibility. It is the best solution for covering shadowed areas or providing coverage to small towns located in complicated geographical areas.

The versatile and adaptable system allows broadcasters to choose from a multiple configurations according to their requirements.

The use of LDMOS-50 volts transistors technology, the optimum design of Wideband Doherty amplifier stage and the matching networks, allows reaching an outstanding power density, up to 125 Wrms in only 1U.

The high level of integration considerably relaxes the space requirements for installation. This is a key factor in those locations suffering a lack of space. Considering the cost per square meter, saving space also means saving money.

#### ■ Echo canceller

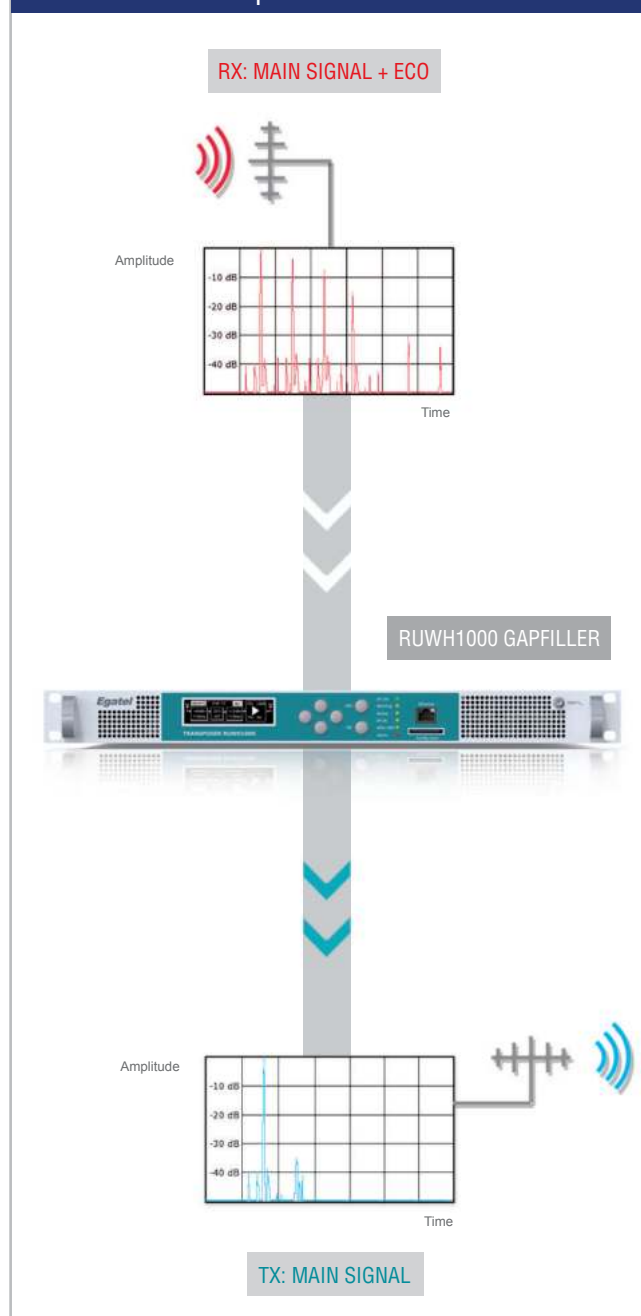
Depending on the isolation between transmitting and receiving antenna, the feedback of the radiated energy can lead in the generation of unwanted echoes which can make the TV transmission unfeasible.

RUWH1000 series is equipped with a powerful and quick echo canceller. This device is able to adapt dynamically to the conditions of isolation of the site, even if they are extreme, so that echoes of up to 25dB can be attenuated.

The echo canceller works together with an Anti Oscillation System (AOS) that prevents the transposer entering into an unstable state. The AOS controls the output power of the transposer in such a way that it ensures that the quality of the output signal is always the best according to the isolation conditions.

Moreover, the current echo level is available through the front display, an SNMP agent or via the Web Server, providing a handy tool when performing on-site maintenance tasks.

#### Echo canceller operation



## Adaptive Digital Precorrection

The adaptive digital precorrection system enables the equalization of the signal easily and quickly. It can be activated manually, by a programmed trigger or it can run continuously and adaptively. The processing power of the precorrector allows to achieve unbeatable Shoulders and MER values, ensuring the highest quality in the transmitted signal and improving energy efficiency.

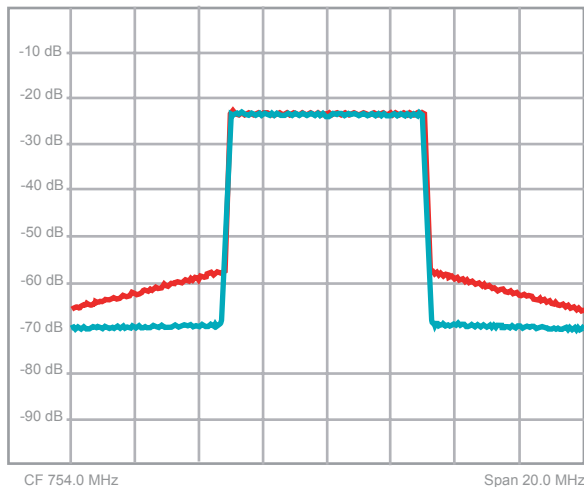
It offers for all OFDM standards the advantage of crest factor reduction implemented by a proprietary technology, that allows without any negative impact on MER, to reduce the signal crest factor enhancing the transposer efficiency.

Furthermore, applying state-of-the-art technology, RUWH1000 series has implemented Direct RF generation which helps to optimize the broadcast signal quality.

## Integrated QoS analyzer (DVB-T, DVB-T2, ISDB-Tb)

The transposer integrates a HW demodulator to provide with Shoulders, MER, BER and PER values. This feature allows to evaluate the quality of the signal in real time and to access this information remotely through the Web server or an SNMP client. Therefore, it saves unnecessary trips to unattended sites and the use of an external analyzer to check the output signal.

### Output signal optimization



DIGITAL APADTATIVE PRECORRECTION

INTEGRATED QoS ANALIZER:  
MER, BER, PER, SHOULDERS.

■ Signal without precorrection

■ Signal with precorrection



## 4K UHDTV transmission via DVB-T2 Ready

# Quick start up and easy operation

All the blocks that make up the transmitter chain are shown in the upper half. A simple color coding is used to check instantly the status of individual blocks; to read or modify any parameter, just click and drag the corresponding block to drop it in the bottom of the screen, where the parameters of up to three different blocks can be displayed. The GUI has been designed to never lose sight of the transposer status.

## Intuitive operation

The RUWH1000 series offers network operators all the convenience during the start up, operation and maintenance of the transmitter.

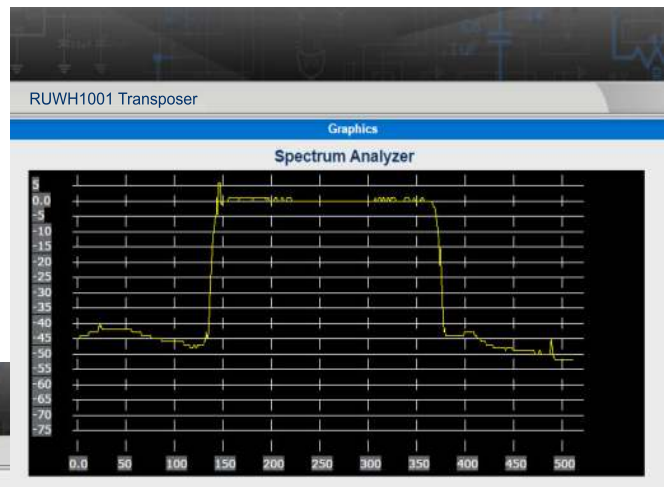
Through an integrated display in the front panel, users can easily access to the whole configuration of the transposer without any other need.

It also integrates the most powerful and friendly Web Server on the market. The Graphical User Interface (GUI) divides the screen into two parts.

## Instantaneous configuration via SD card

The new series includes an SD card to store the whole configuration of the transposer, so the start up of a new transposer or the configuration of a spare unit is done in seconds, this is also particularly useful to put in operation N+1 systems quickly.

### Web GUI spectrum analyzer



### Web GUI Homepage

**RUWH1000 Transposer**

Home System Users Close session

EXCITER: Out: ON, Forward Pow: 125W

INPUT FREQ: 739 Mhz

CPU TEMP: 64.38 °C

OUTPUT FREQ: 533 Mhz

AMPLIFIER STAGE: I.X.A.I.N.T.E.R., Amplifier stage control, Turbine OK

RF INPUT

Input Frequency (Hz)	739000000
Minimum Input Level (dBm)	-70
Max. Undesired Ratio (dB)	30

Measures

Input Level (dBm)	-38
Wideband Level (dBm)	-32
Desired/Undesired Ratio (dB)	0

ADAPTIVE

Prec. ON/OFF	ON
Non Lin. Precorrection System	ADAPTIVE
Non Linear Prec. Mode	CONTINUOUS
Adap. Status	RUNNING
Enhanced Memory Effect	OFF
PAPR Reduction	ON
PAPR Reduction Mode	LOW SPURS
Linear Precorrection System	ADAPTIVE
Linear Adap. Prec.	OFF
Shoulders Alarm Thold (dB)	35

RF OUTPUT

Output Frequency (Hz)	533000000
Pout Exciter Attenuation (dB)	5.0
Bandwidth	6 MHz
Standard	ATSC

Measures

Pout Exciter (dBm)	1
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# High reliability

## ■ Redundant configurations

The transposers together with a CCU9000 Control Unit can be configured to set up N+1 systems. The extremely compact design concept allows to integrate N +1 systems in only one rack.

The Control Unit is equipped with a high resolution graphical display through which is easy to locally set or change any parameter and to perform an assessment of the transmission chain at a glance. Similarly, the control unit provides remote access to the transposers through a powerful Web GUI or via the SNMP protocol.

## ■ Optimum cooling system design

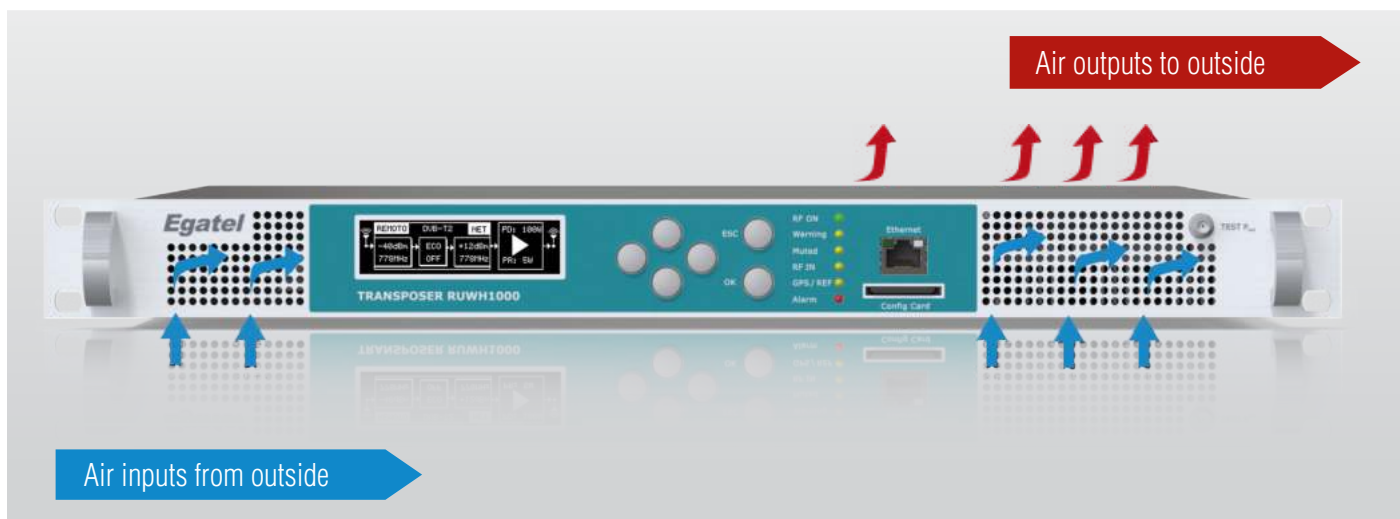
The RUWH100 series monitors and manages its own cooling system and holds its remote management.

Each transposer has three fans that allow a correct operation without and external air conducting unit. Furthermore, the fans can be easily and quickly hot-swapped from the back making it easy maintenance tasks.

The built-in fans automatically run at a variable speed according to the cooling requirements at any time, contributing to increase the energy efficiency and the transmitter lifetime.

## Cooling system

RUWH1000 - back view



# Service and support

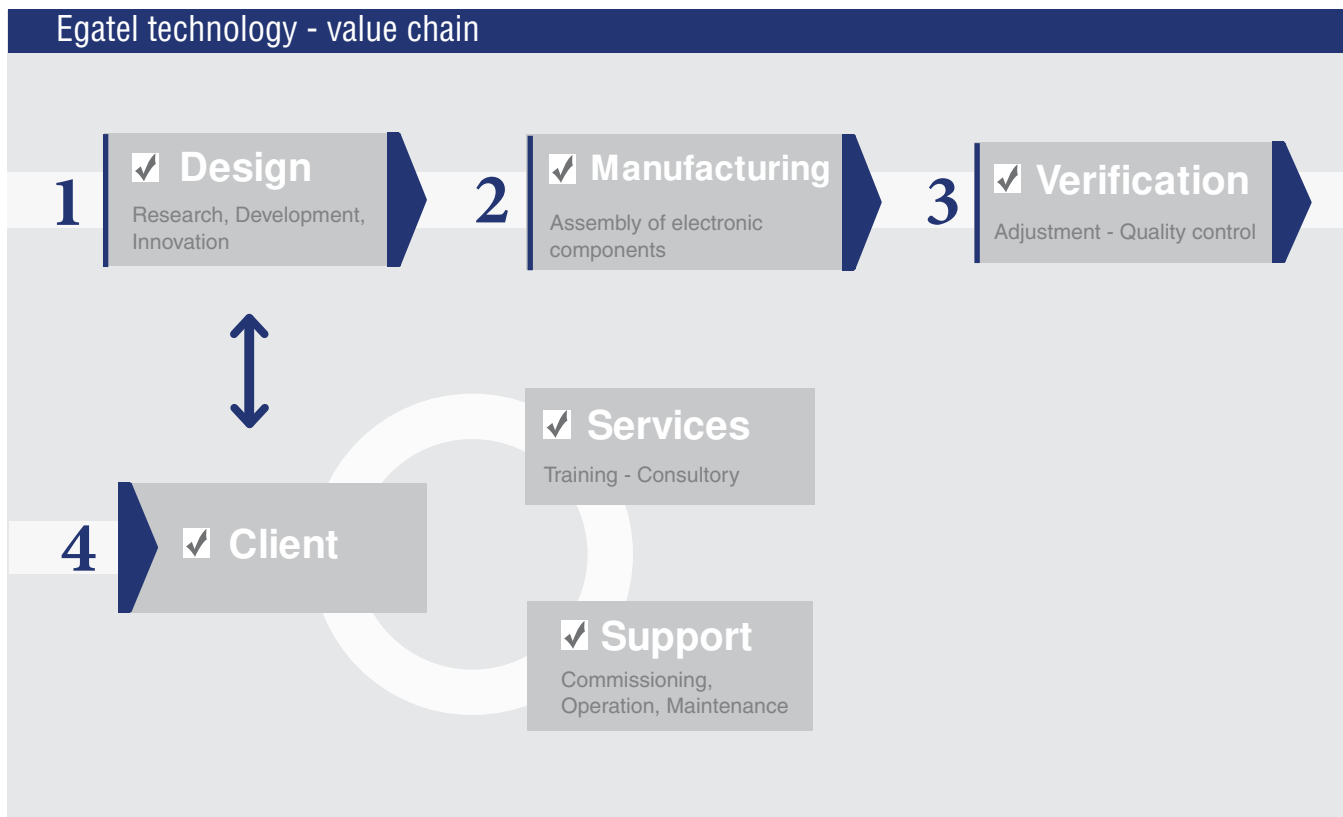
## ■ Rigor and professionalism

All processes that add value from the design stage to the manufacturing of the transmitters are carried out in-house. The company owns dedicated facilities for the mount of electronic components with several production lines equipped with the most advanced machines on the market. Therefore, the quality control throughout the production process is kept at Egatel, reaching the maximum reliability.

The international recognition achieved by the company is due not only to the supply of high technology products, but also to the wide range of services offered. They go a step beyond, with dedicated staff to provide full assistance during commissioning and normal operation or to offer qualified training, adding value and completing the process that begins when a customer trust in Egatel.

Each project is undertaken with the maximum level of commitment, accomplishing the delivery times and adapting to the demands of each customer, being aware of the importance of a professional attitude in their loyalty.

Egatel is integrated in Comsa Corporación, which is one of the biggest industrial groups in Spain within the sectors of infrastructure and technology. The group has a strong activity all around the five continents and it is established in 18 countries. The customers benefit from this wide international presence and the stability provided by a multinational company, guaranteeing local support and the purchase of Egatel equipment as a safe investment.



## Technical specifications

Transposer	
<b>RF Input</b>	
Signal type	One DTV channel
Frequency band	150 - 900 MHz (continuous tuning)
Sensitivity	- 80 ... 0 dBm
Selectivity (Pi = -40 dBm)	> 60 dB
Noise figure	< 8 dB
Connector	N (F) 50 ohm
Return losses	> 18 dB
<b>Echo canceller</b>	
Cancellation level	> 40 dB
Maximum echo level	+25dBc (over main signal)
<b>Clock and synchronization</b>	
Internal reference	40 MHz
External 10 MHz reference	Level: 100 mV - 3 Vpp. Connector: BNC (F)
<b>RF Output</b>	
Frequency range	470 ... 800 MHz
Channel bandwidth	6, 7, 8 MHz plus 1.7, 5 and 10 MHz for DVB-T2
Resolution	1 Hz
<b>Local and remote control</b>	
Keyboard and LCD Display	Local operation through LCD display and keyboard on front panel
Front and rear RJ-45	Ethernet network management interface for local and remote operation via SNMP agent / Web Browser
Parallel interface	Floating contacts for messages and commands
<b>Digital Adaptive Precorrection (*)</b>	
Non-Linear	Amplitude: $\pm 6$ dB / Phase: $60^\circ$
Linear	Amplitude: $\pm 3$ dB / Delay: $\pm 500$ ns
Clipping	12 dB
Operation mode	Continuous / Automatic (triggering: time/shoulder level)
Monitoring:	
- Shoulder level	Measurement of left and right shoulder level
- Precorrection status	Running / Stopped
General	
RF/IF - IF/RF conversion	Direct digital conversion (zero IF)
Operating temperature	0 ... 45°C
Relative humidity	95% max. (non-condensing)
Supply voltage	Single - phase: 100VAC ... 240VAC, 47... 63Hz / 48 Vdc
Dimensions (WxHxD mm)	483 (19") x 44,4 (1U) x 444 mm
Weight	8 Kg approx.
Cooling	Forced air

(\*) Static linear and non-linear precorrection is included as default. Digital Adaptive Precorrection is optional but can be activated at any time through a software key..

**Remark:** To comply with the out-of-band emissions regulations and with the required shoulder attenuation, the RF output of the transposers must be connected to an appropriate filter.



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