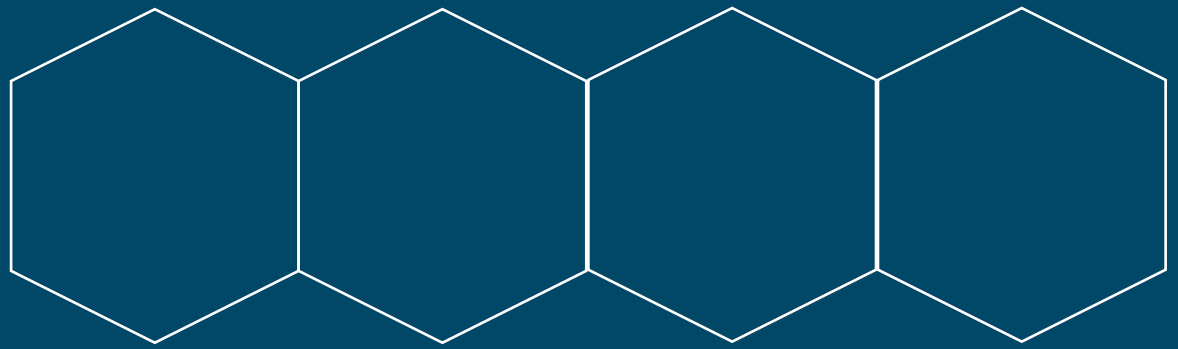
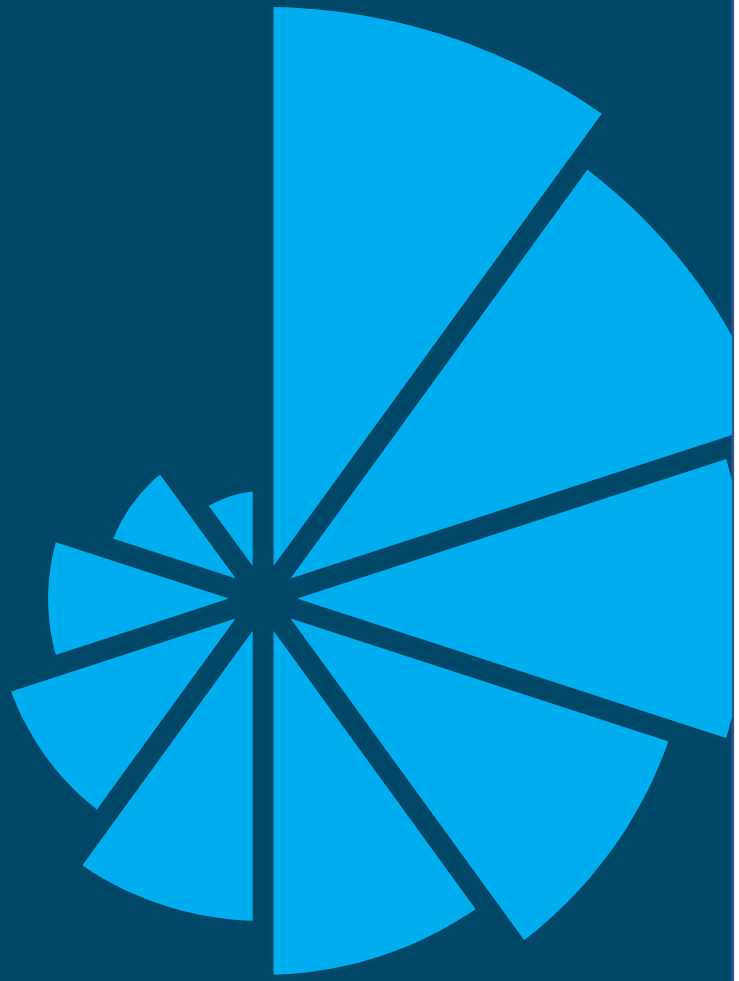
elenos group
DEDICATED RELIABLE CREATIVE

Elenos Group
World Broadcast



ELENOS BE itelco PRO TELEVISION

Introducing Itelco Products and the New Digital TV Gap Filler



Radio & TV
Broadcast Equipment
and solutions Worldwide

 | confidential | elenosgroup.com

Elenos Group

Elenos was founded in **1977** in Ferrara, Italy

- Focused on providing a wide rage of FM Transmitters, featuring the most compact and efficient products on the market *(First in the world to provide a 10KW FM in 4U only)*

Itelco Broadcast began in **1962** in Orvieto, Italy

- Specialized in digital modulation and high-power liquid-cooled systems *(Supplier of CERN for High-power amplifier involved on the Large Hadron Collider)*

BE was established in Quincy, Illinois in **1959**,

- Broadcast Electronics has an illustrious history that has played an influential role in many radio milestones

  BE offers a wide range of high quality radio broadcast products, including automation software, transmitters for AM, FM and HD Radio and Marti Electronics.

PROTELEVISION TECNOLOGIES established in Denmark, over 50 years of experience,

- Broadcast formerly Philips TV & Test Equipment, is a leading designer and manufacturer of advanced future-proof modulation solutions for Digital TV and Radio standards (DVB-T/T2, ISDB-T, DAB+, ATSC 1.0 and ATSC 3.0) represented worldwide in more than 50 countries with over 30,000 installed units in daily operation.

Today

The mission of the **Elenos group**, by utilizing its state-of-the-art production capabilities and international sales network, is to provide consumers with the best radio and TV broadcasting experience for all global modulation standards.

With over 90 years of experience in the field, the Elenos group has developed technologies for Network applications, Digital and Analog TV / FM Radio Systems, scientific RF applications and remote software control and management.

The Elenos group is an ideal partner in helping develop your networks for your next digital migration.

ELENOS

BE

itelco

PRO TELEVISION

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60.000 Installations
130 Countries
90 Years of Experience

More than 20 Centers of **EXCELLENCE**

- **Radiocomm**
- **LEGA** Ltd
- **Clyde** Broadcast Products Ltd
- **Broadcast Partners**
- **FPG SERVIS** s.r.o.
- **Nagyfrekvencia** Kft
- **RTV-TEC**
- **Roussillon** FM
- **SiteMaster** LDA
- **Matel** Elettronica Snc
- **RS** Telekomunikasyon
- **Athenas** Comunicaciòn y Logistica SL
- **Shanghai** Yi Hui Nuo Broadcast
- **PT. Solitech** multi-media & broadcast sol.
- **Vtek** Engineering Ltd
- **Headway** High Tech
- **BTSi**
- **Broadcast Solution** International Ltd
- **Cakrawala** Gemilang
- **Ponto de Apoio Tecnico**
- **Eletronico** LTDA
- **Vec** SrL

Some of our customers in Far East

- Audio Visual communicators Inc.
- Allawan Enginneering
- Aliw Broadcasting
- Baganian Broadcastind Corp
- Brigada News FM
- Brigada Mass Media Corp
- Cristian Music Power
- Capitol Broadcasting Center
- DXKB 89,1
- DXJM FM
- DJIB 96,1 FM Municipality Pamploma
- Efren Tenizo
- First United Broadcasting
- UM Broadcasting Network
- Insular Broadcasting
- Radio Mindanao
- Southern Broadcasting Network
- Primax Broadcating
- Radio Corporation Philippines
- Ramil Uy
- RMC Broadcast Corporation
- RT Broadcast Specialists

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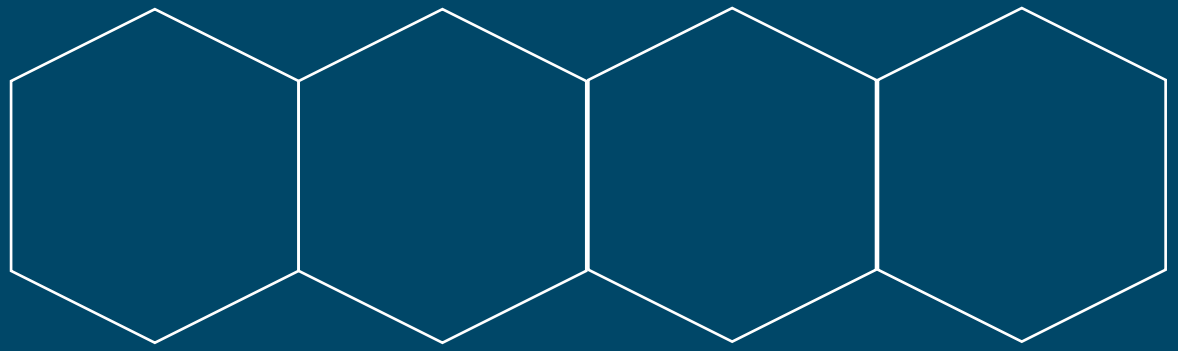

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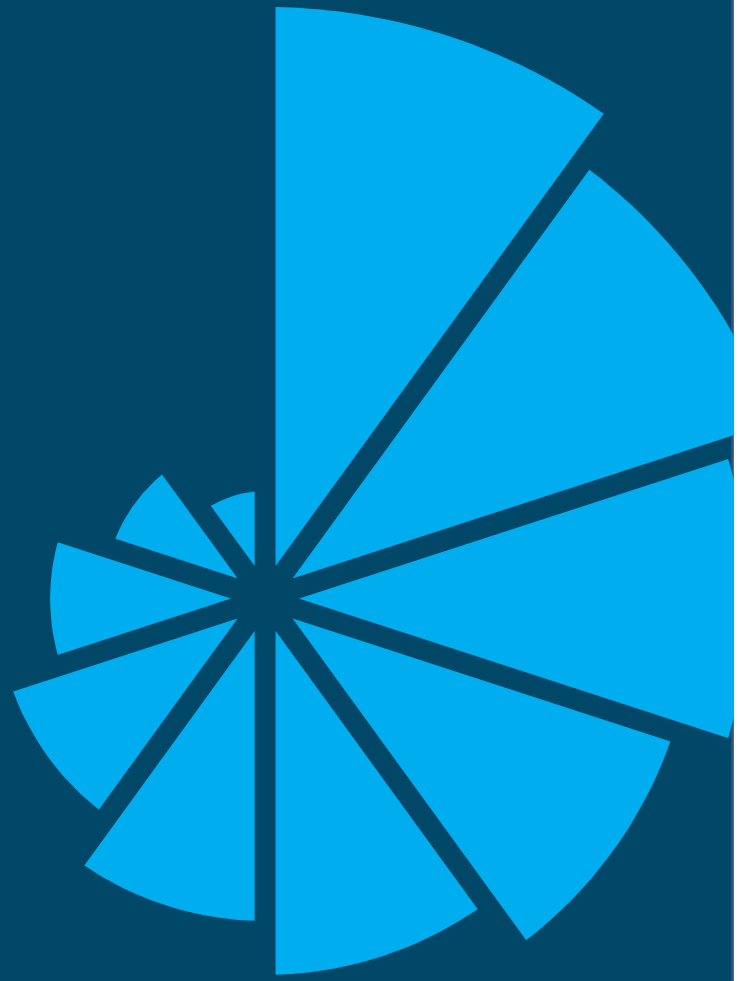

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Broadcast Equipment
and solutions Worldwide

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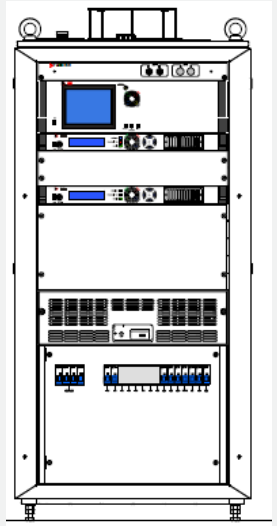
Thalna

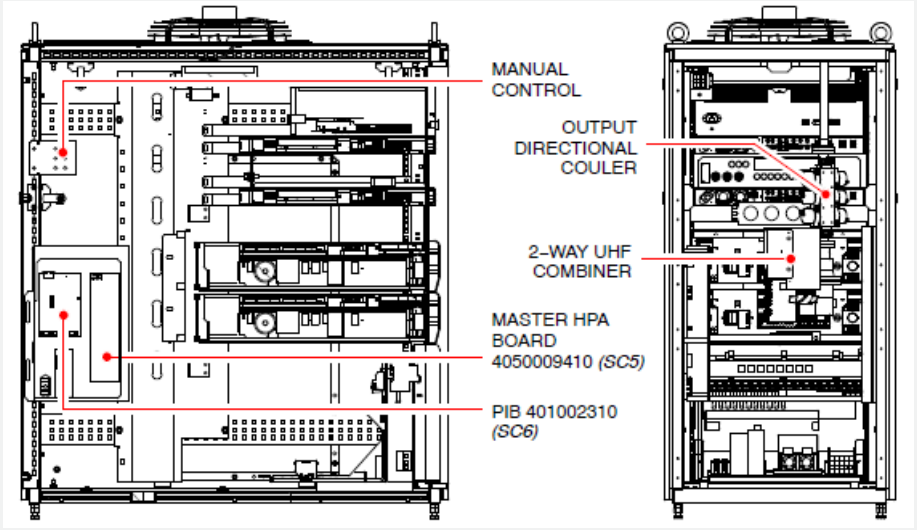
Air
Cooled Transmitters
Power Amplifiers

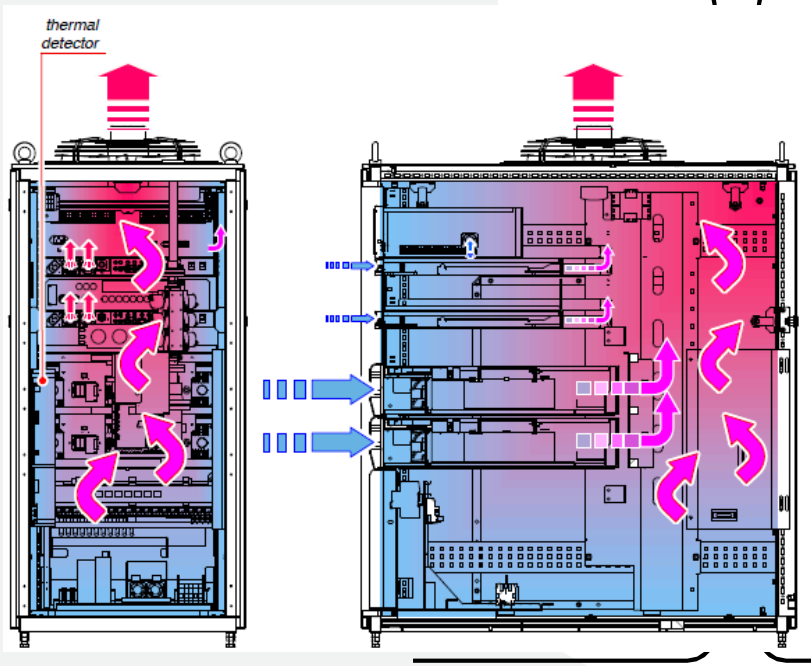
UHF 1HPA	UHF 2HPA	UHF 3HPA	UHF 4HPA	UHF 5HPA	UHF 6HPA	UHF 8HPA
700W avg	1,5kW avg	2,2kW avg	2,8kW avg	3,5kW avg	4,2kW avg	5,6kW avg
1,2kW p.s.	2,4kW p.s.	3,6kW p.s.	4,8kW p.s.	6kW p.s.	7,2kW p.s.	8,4kW p.s.

Thalna

Air
Cooled Transmitters
Power Amplifiers





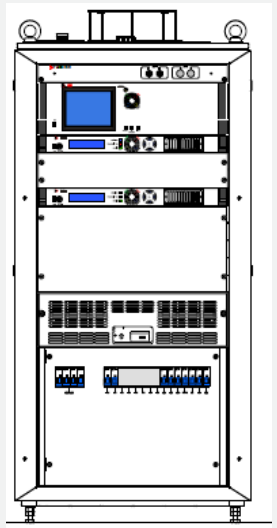


UHF 1HPA
700W avg
1,2kW p.s.

UHF 2HPA
1,5kW avg
2,4kW p.s.

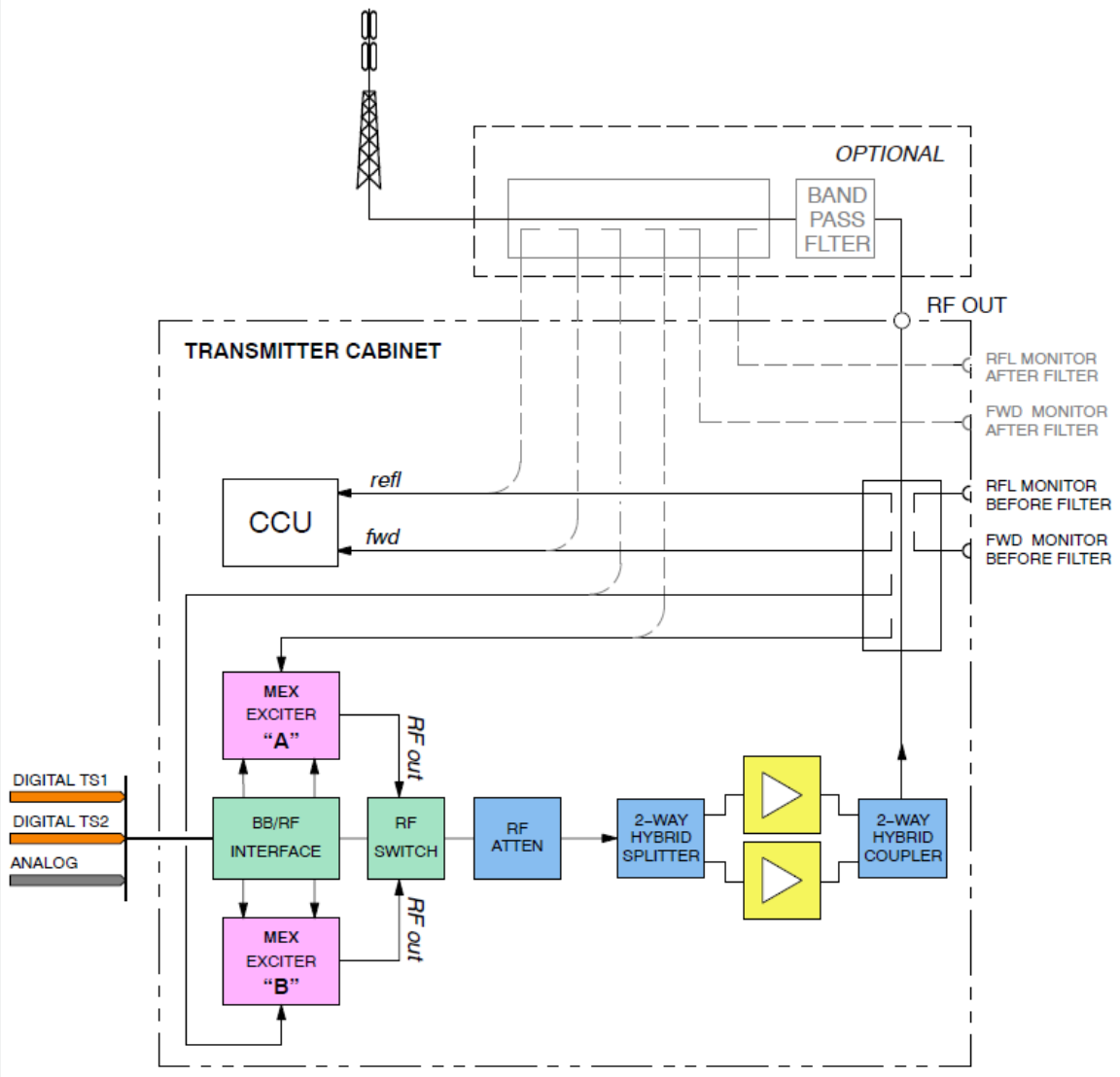
Thalna

Air
Cooled Transmitters
Power Amplifiers



UHF 1HPA
700W avg
1,2kW p.s.

UHF 2HPA
1,5kW avg
2,4kW p.s.



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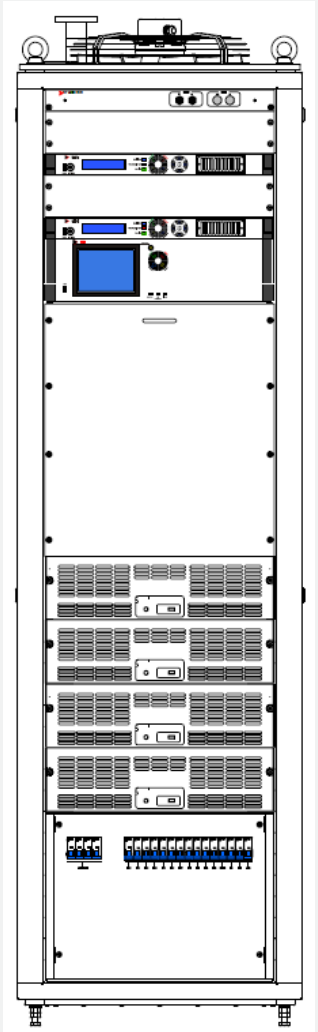
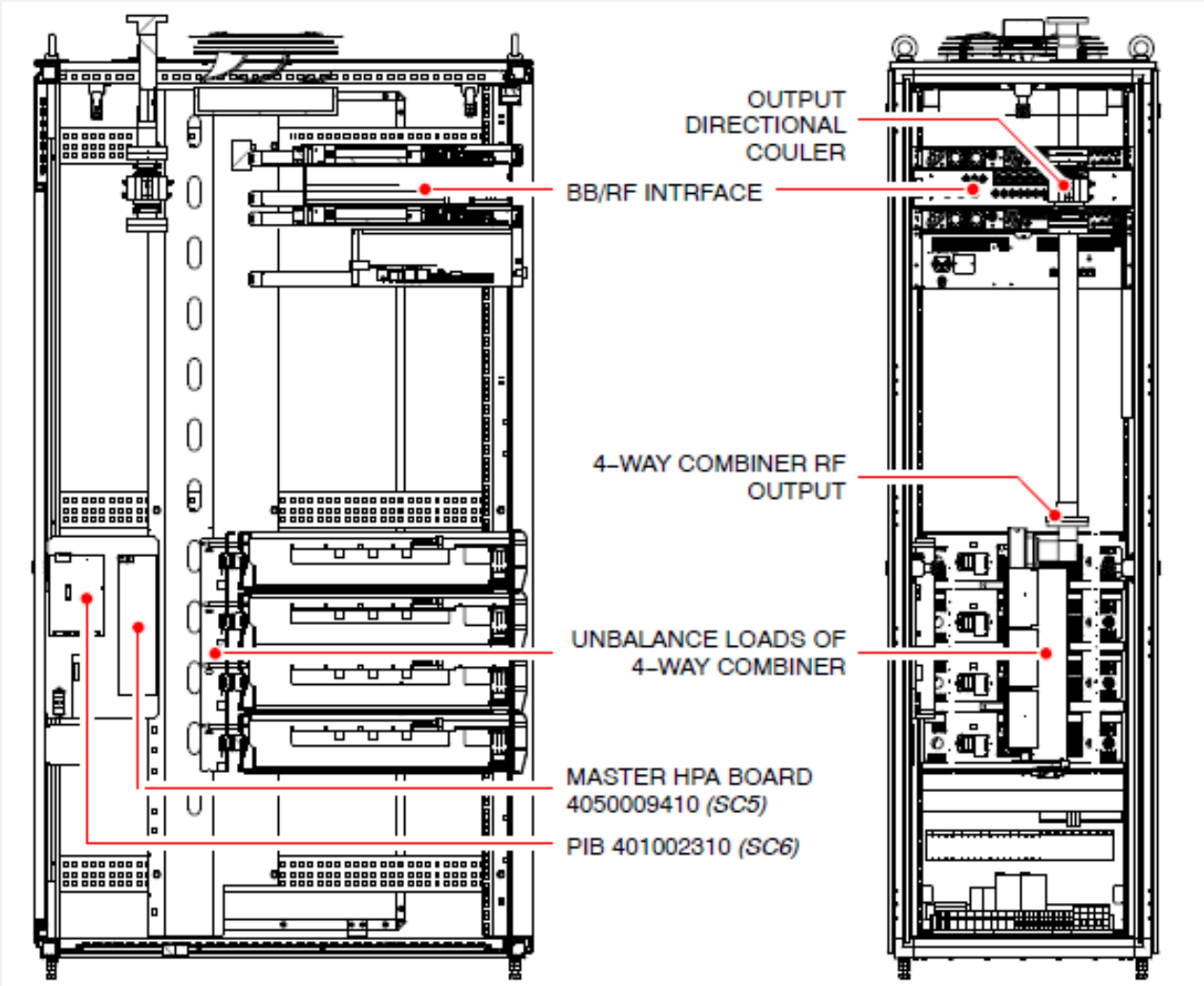
Air
Cooled Transmitters
Power Amplifiers

UHF 3HPA	UHF 4HPA	UHF 5HPA	UHF 6HPA	UHF 8HPA
2,2kW avg	2,8kW avg	3,5kW avg	4,2kW avg	5,6kW avg
3,6kW p.s.	4,8kW p.s.	6kW p.s.	7,2kW p.s.	8,4kW p.s.

Thalna

Air
Cooled Transmitters
Power Amplifiers





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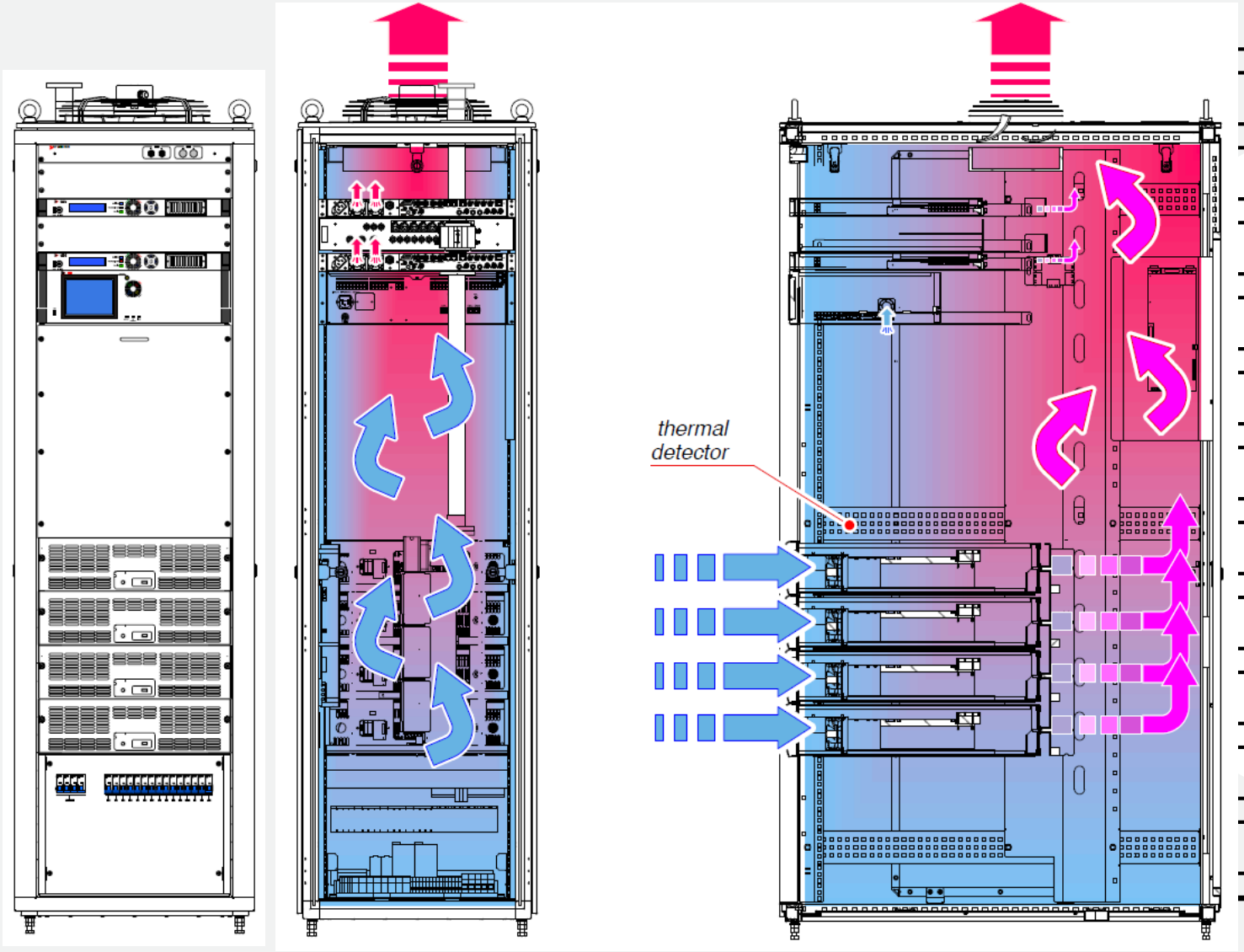
Air
Cooled Transmitters
Power Amplifiers



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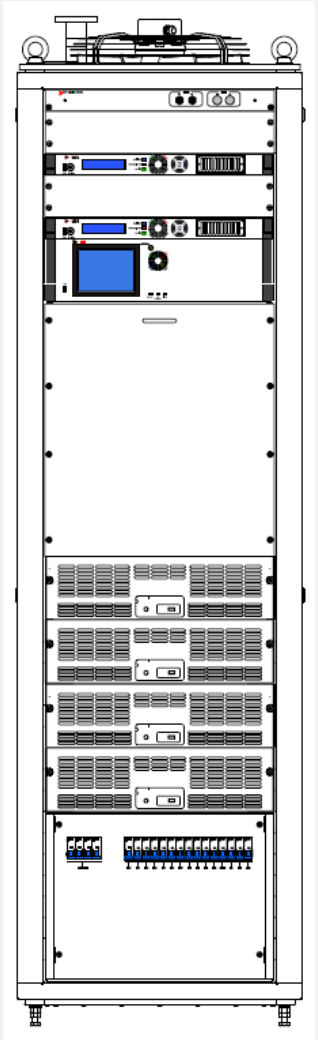
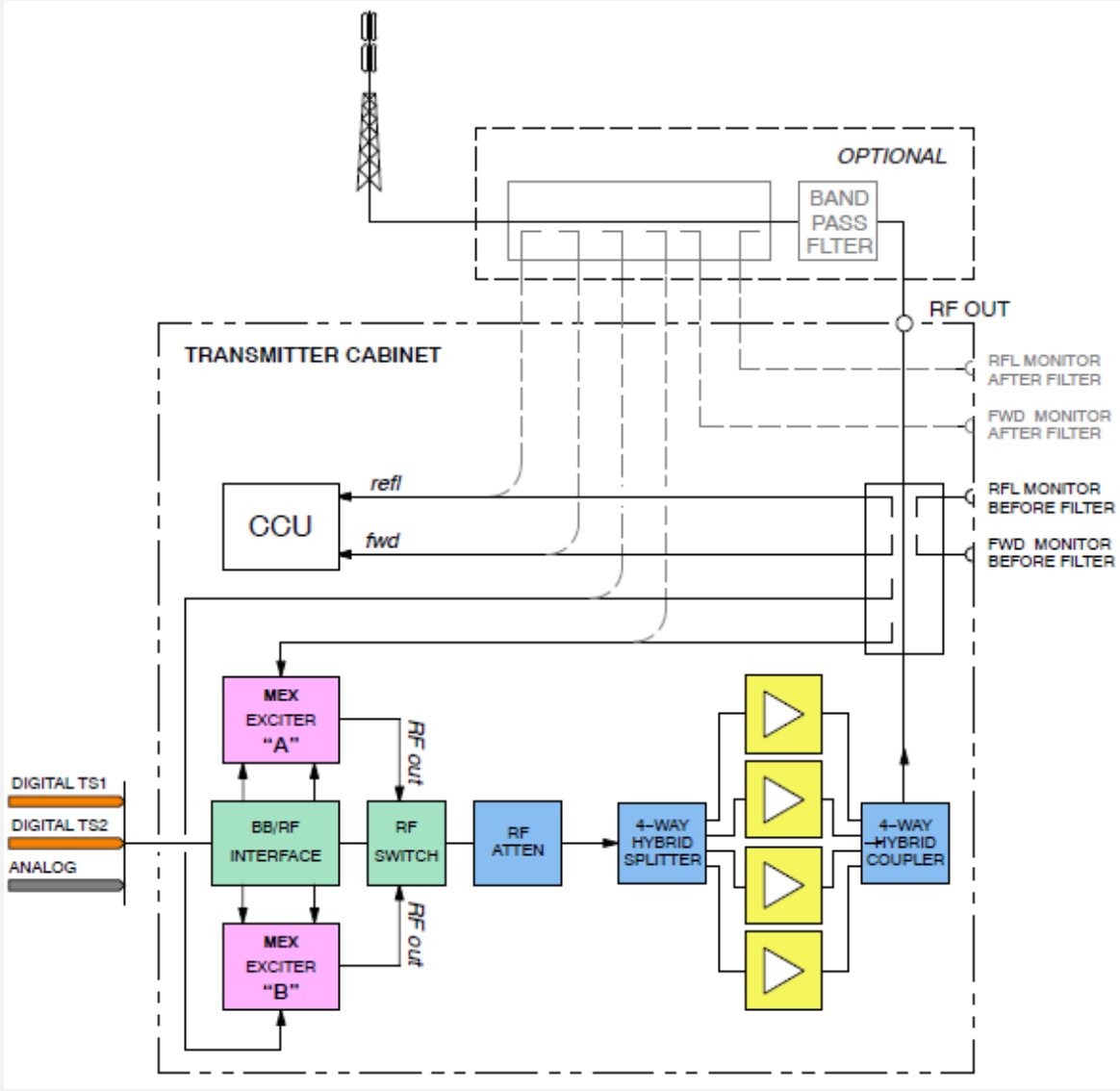
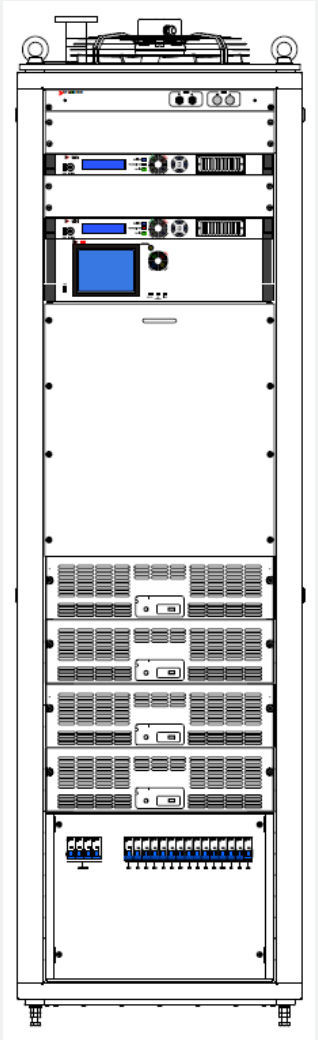
Air
Cooled Transmitters
Power Amplifiers

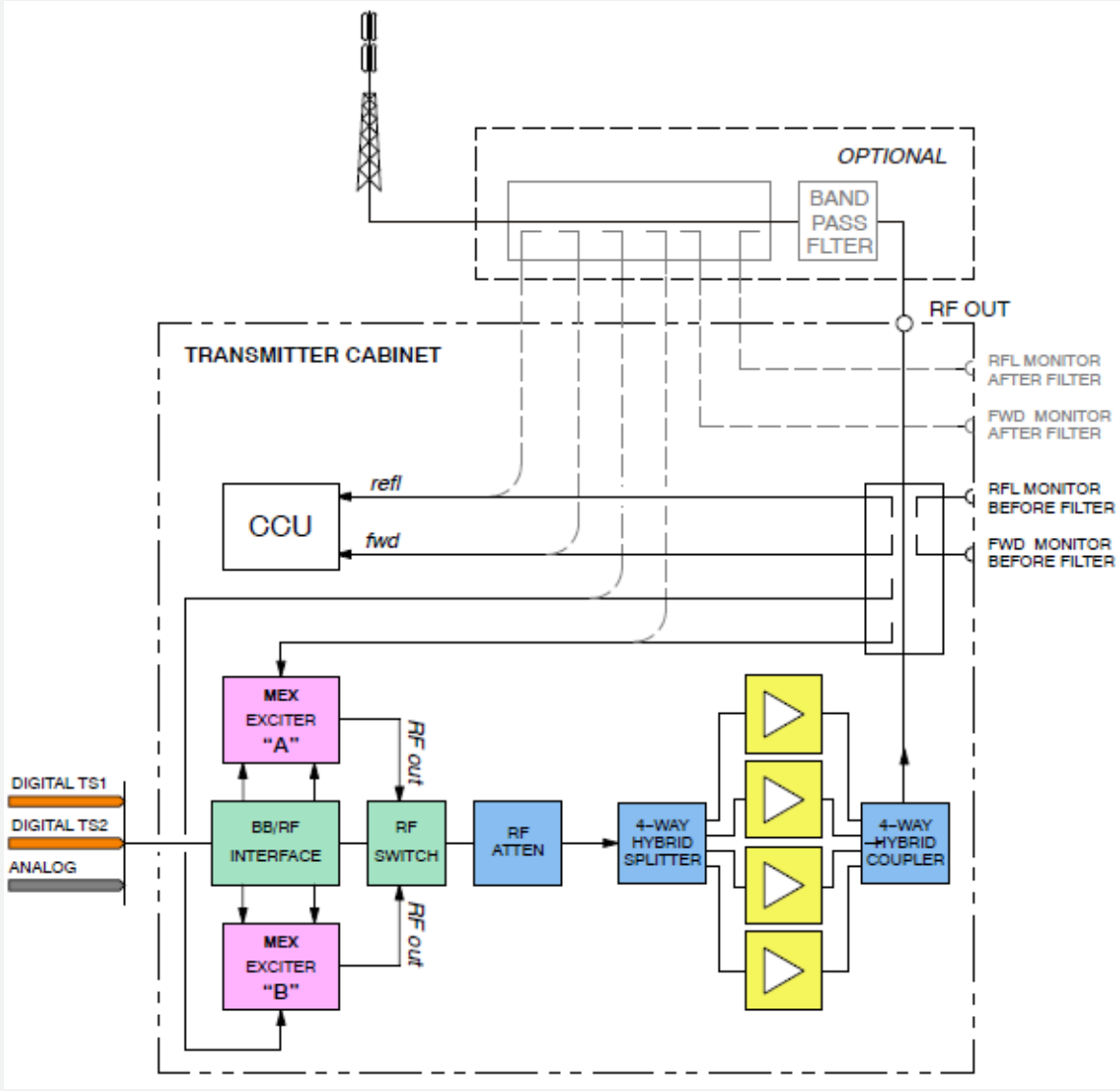




Thalna

Air
Cooled Transmitters
Power Amplifiers





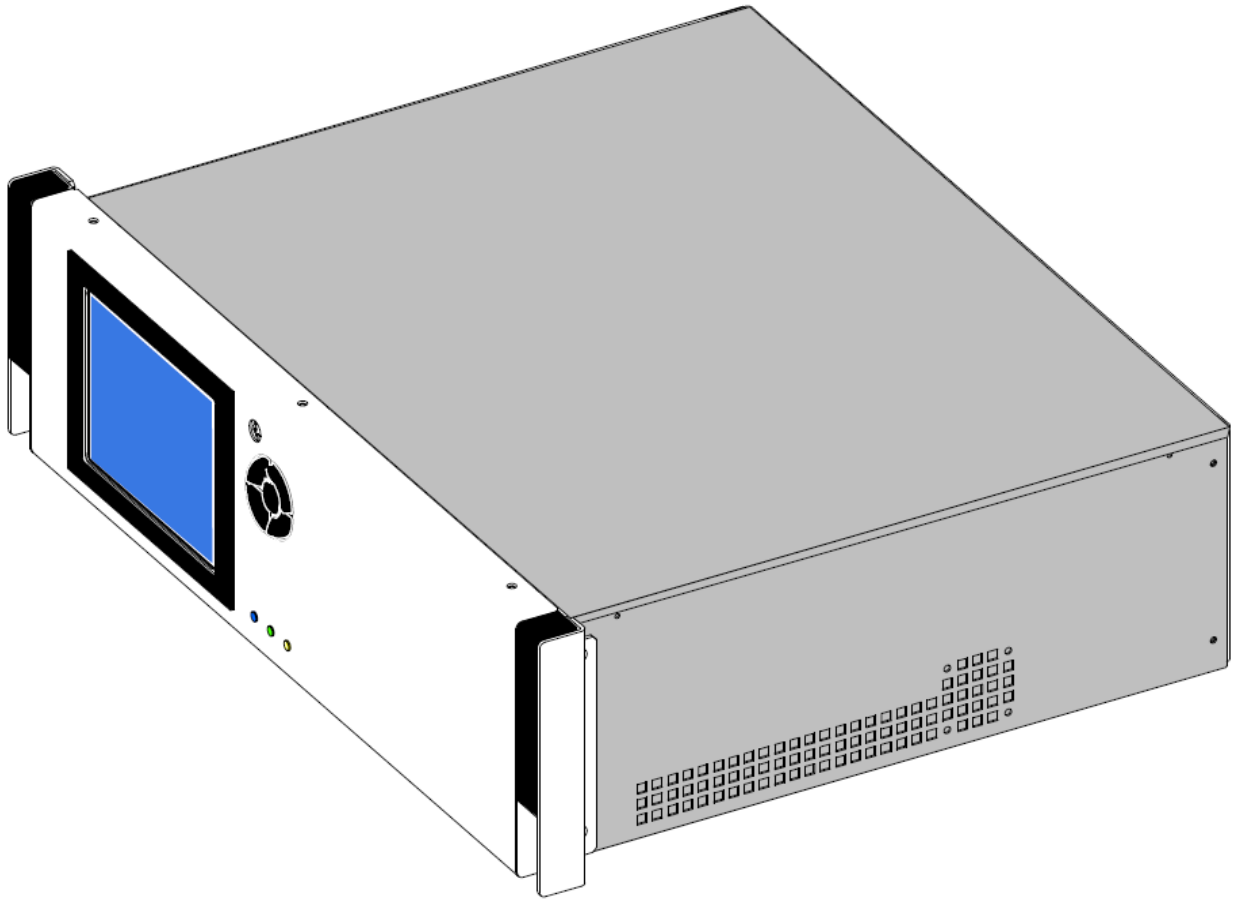
Thalna

Air Cooled Transmitters
Power Amplifiers

- MULTISTANDARD OPERATION
- Available for VHF and UHF
- Full Broadband Doherty
- HIGH EFFICENCY RF UP TO 37%
- Modular Hot Plug modules
- FULL REDUNDANCY RF and PS STAGE
- Adaptive precorrection for maximum optimization of transmitter transmission performances and power efficiency

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit



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CCU
Transmitter
Central **C**ontrol **U**nit

For Dual drive configuration

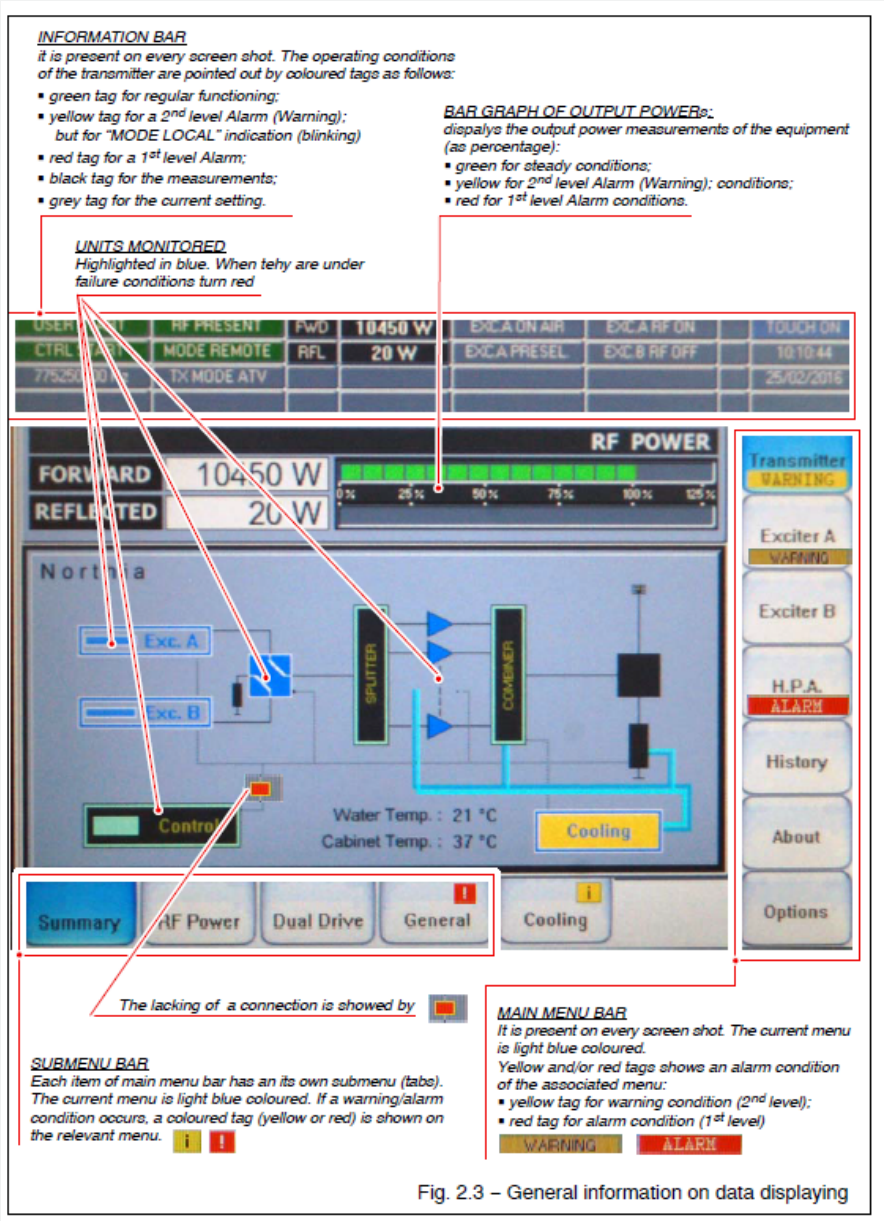
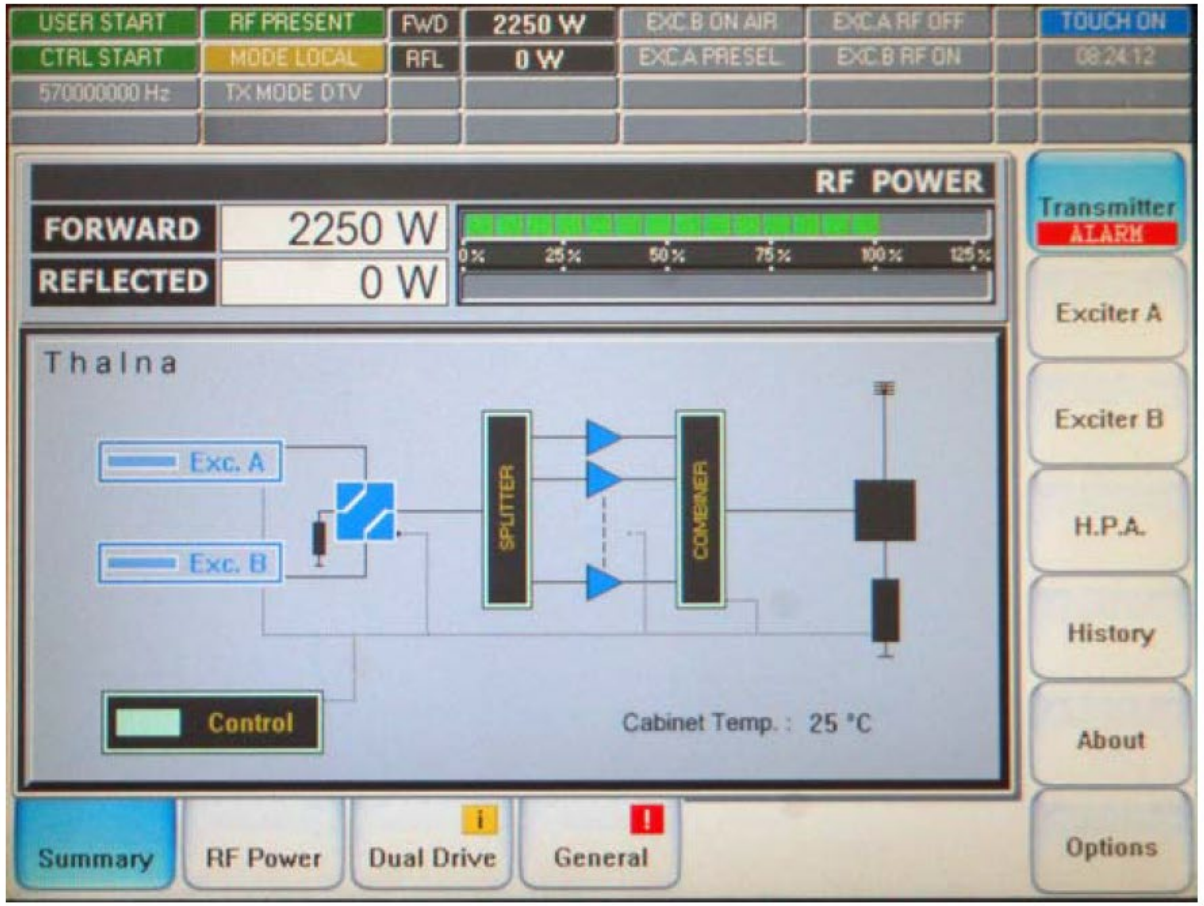


Fig. 2.3 – General information on data displaying

Thalna

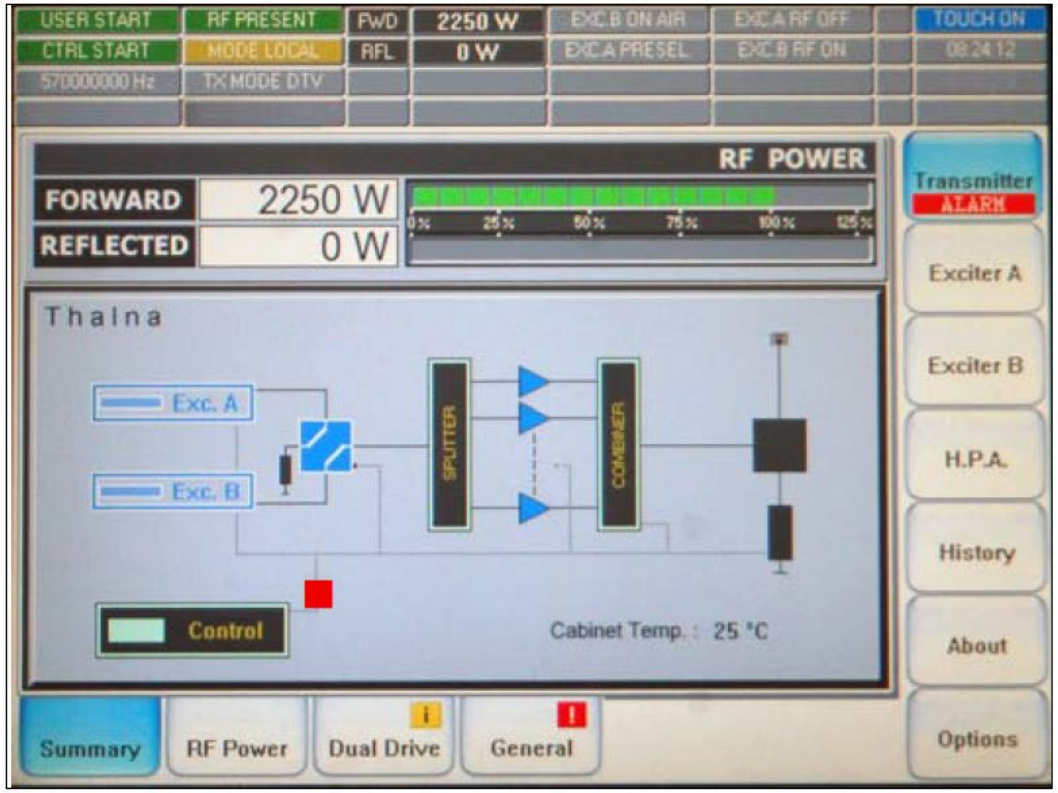
CCU
Transmitter
Central **C**ontrol **U**nit



Thalna line
Transmitter

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit



Thalna line

Transmitter/Summary

A tarnsmitter block diagram is shown. The parts blue coloured are the one monitored.

The symbol ■ on a connection, indicates the interruption of it.

Any part under failure conditions is highlighted in red.

The bars graph show the *forward* and *reflected* RF output powers (W).

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit

Thalna line

Transmitter/RF Power

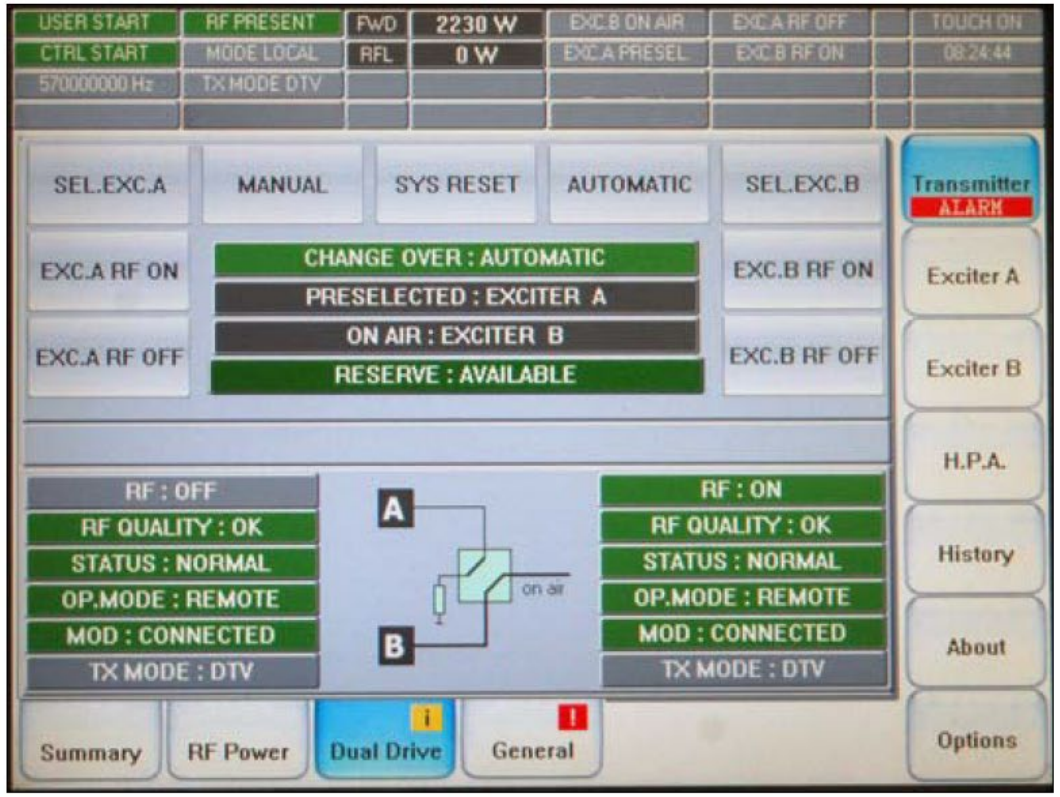
Two bars graph display the measurements of *forward* and *reflected* ouput power. When a measurement is out the allowed range, the bars graph turn *yellow* (*2nd level Alarm (Warning)*) or *red* (*1st level Alarm*) depending on the condition that causes the power reduction.

In this window it is possible *star/ing/ stopping* transmitter and setting *local/ remote* mode, pushing the relevant *command* buttons (TX START, TX STOP, LOCAL, REMOTE). RESET button allows restarting the transmitter when a *TripLockOut* alarm has occurred.

When a *command* button (TX START, TX STOP, LOCAL, REMOTE, RESET) is pushed a pop–up window is displayed which asks a confirmation of the command.

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit



Thalna line

Transmitter/Dual Drive

The window allows setting the *Dual Drive* configuration. The commands available are:

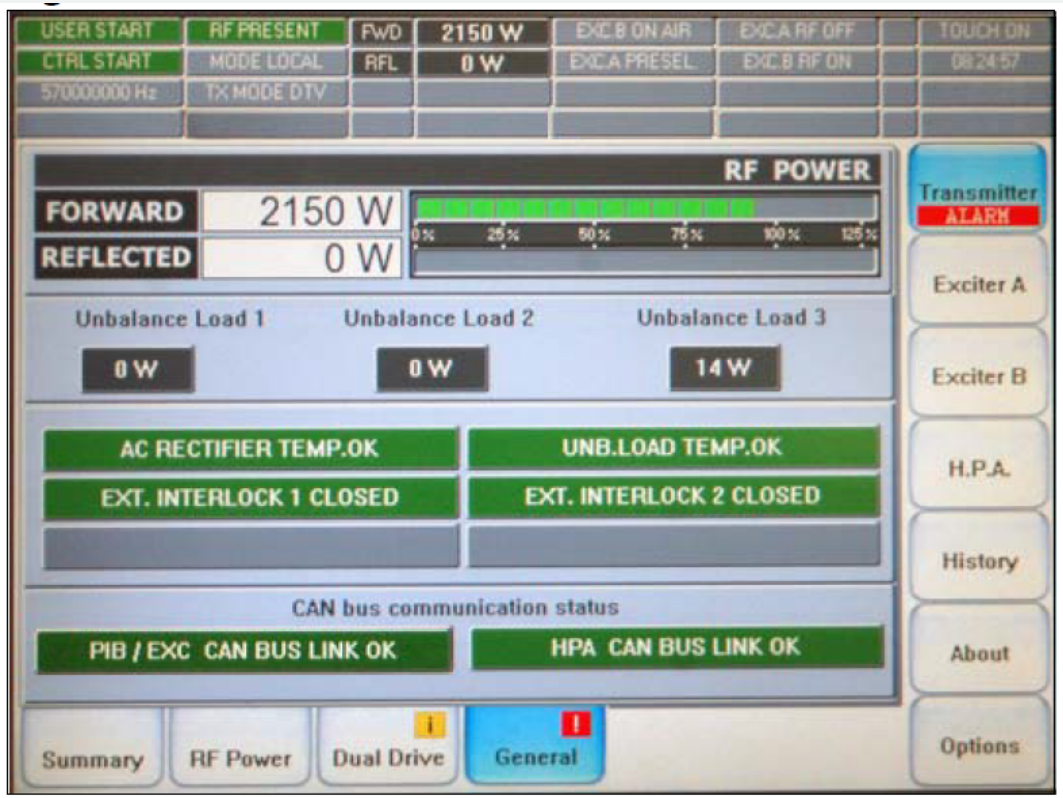
- *SEL. EXC.A/B*
  sets exciter A or B on–air,
- *MANUAL/AUTOMATIC*
  sets the type of switch–over,
- *EXC.A/B RF ON/OFF*
  switches on/off exciter A/B.
- *SYS RESET*
  resets the dual drive configuration.

When a *command* button is pushed a pop–up window is displayed which asks a confirmation of the command.

The current setup is also shown on *information bar*.

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit



Thalna line

Transmitter/General

The window displays general information on trnsmitter functioning status.

The bar graph of output power displays the current value as percentage:
- *green* for steady conditions;
- *yellow* for 2nd level Alarm (Warning); conditions;
- *red* for 1st level Alarm conditions.

When a P.I.B.or a unit is faulty, *CCU* displays the number associated to the P.I.B. or to the unit: the following Tab. 2.4 lists number of P.I.B. boards number of the unit (column 1), the arrangement inside the transmitter (column 2), the reference on TX wiring digaram (column 3) and the part number of the board (column 4).

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit

Exciter A (B)

The window allows *strating/stopping* the exciter (RF ON/RF OFF command buttons) and monitoring the operating conditions of the exciter that is:

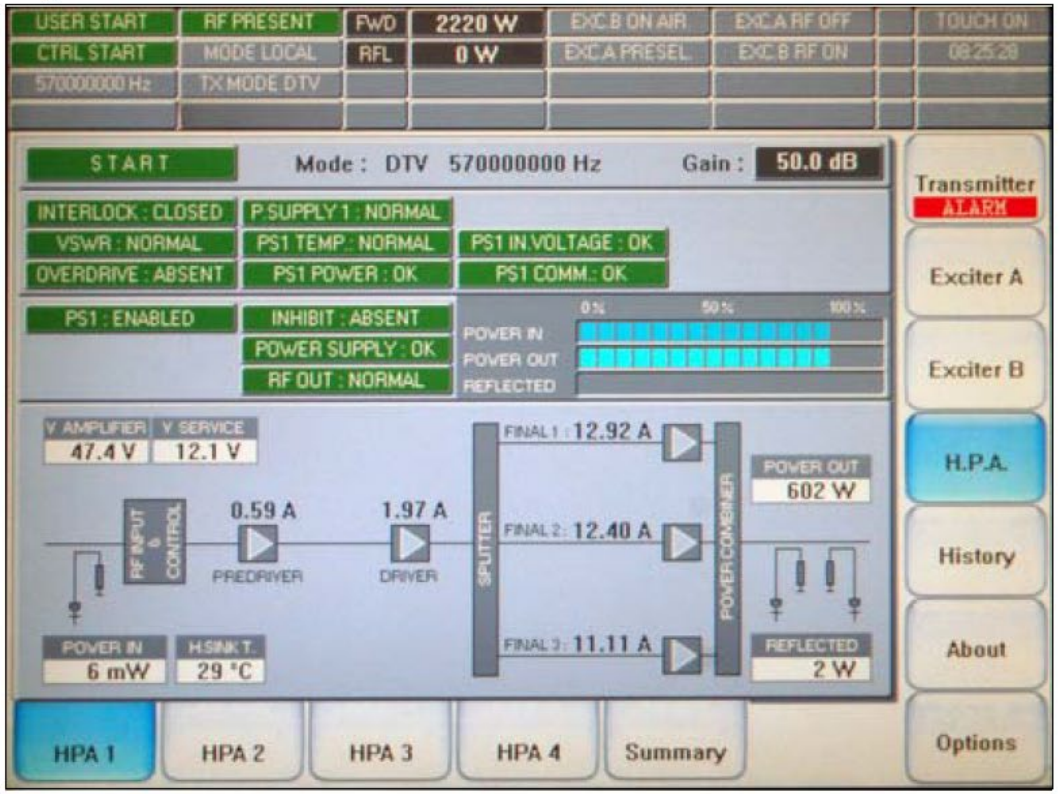
- *MUTING:* absent/present
- *STATUS:* normal/fault
- *OPERATION MODE:* local/remote
- *MOD* connected/not conn
- *RF:* present/absent
- *MODE:* ATV/DTV
  sets the type of switch–over,

When a *command* button is pushed a pop–up window is displayed which asks a confirmation of the command.

The current setup is also shown on *information bar*.

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit



Thalna line

HPA x *(for THALNA TXs)*

The window allows monitoring the operating conditions of the relevant HPA module.

A block diagram of the HPA shows the values of voltages and currents along with alarm conditions (if any).

Heat sink temperature of the RF stages is also displayed.

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit

Thalna line

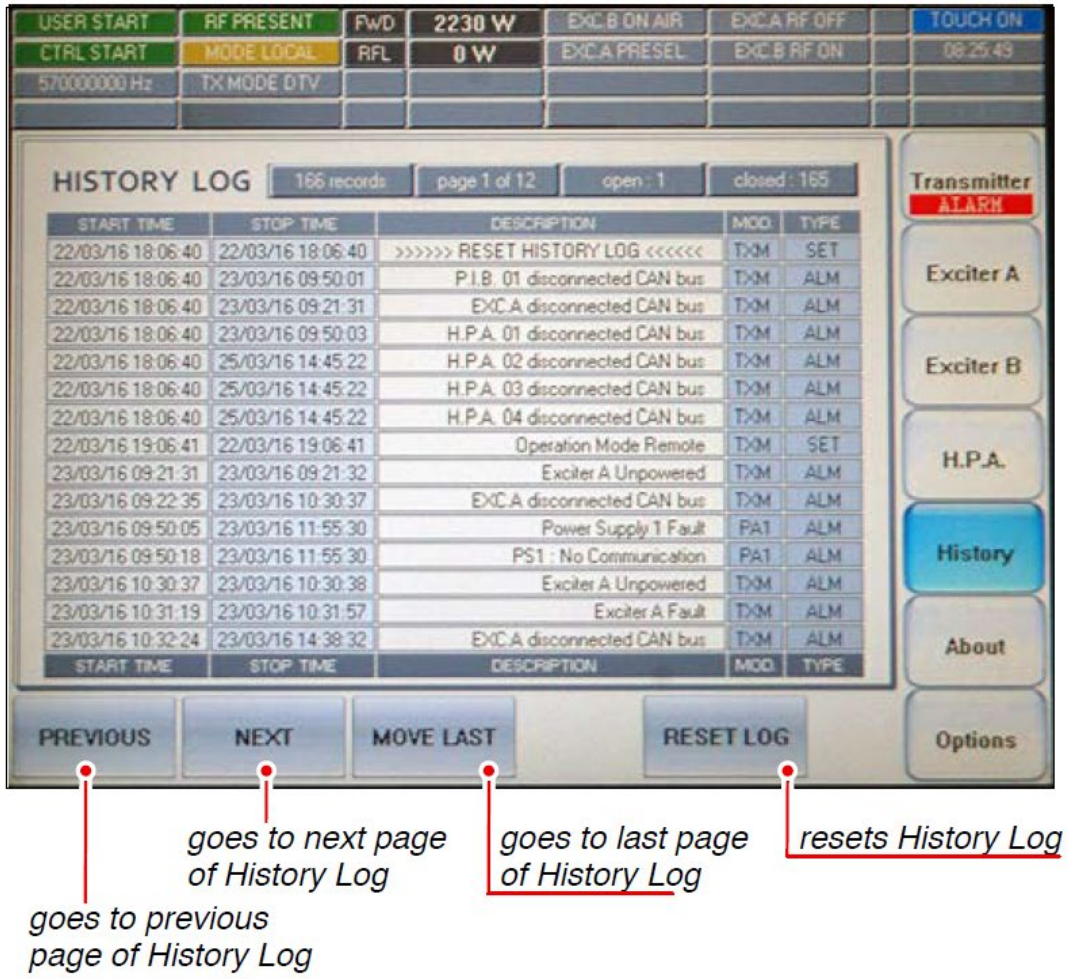
HPA/Summary *(for THALNA TXs)*

The window displays a summary of the operating conditions. For each HPA are displayed:

- *VOLTAGES:* bias and service
- *HETASINK:* temperature (°C) of heatsink RF stages
- *POWER:* input, output and reflected
- *CURRENT:* predriver, driver and final stages.

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit



History

The window displays any alarm occurred and the settings operated.

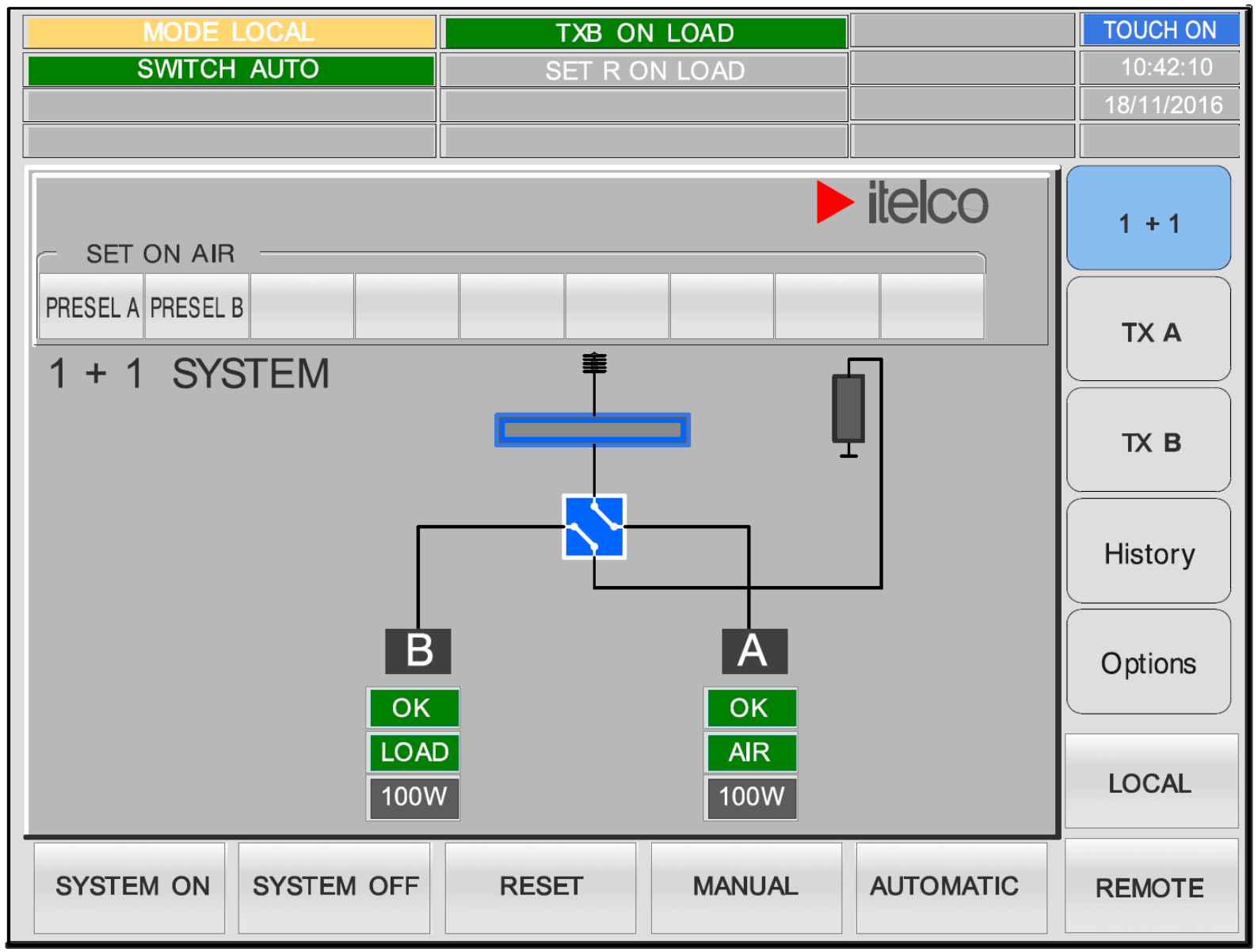
For each event is displayed:

- start and stop time
- description
- unit involved
  (TXM = transmitter; PA = power amp.)
- type of event
  (ALM = alarm 1st level; WRN = warning 2nd level; SET = setting)

The CCU is able to store more than 10.000 alarms.

Thalna

CCU
Transmitter
Central **C**ontrol **U**nit
1+1 Passive reserve configuration



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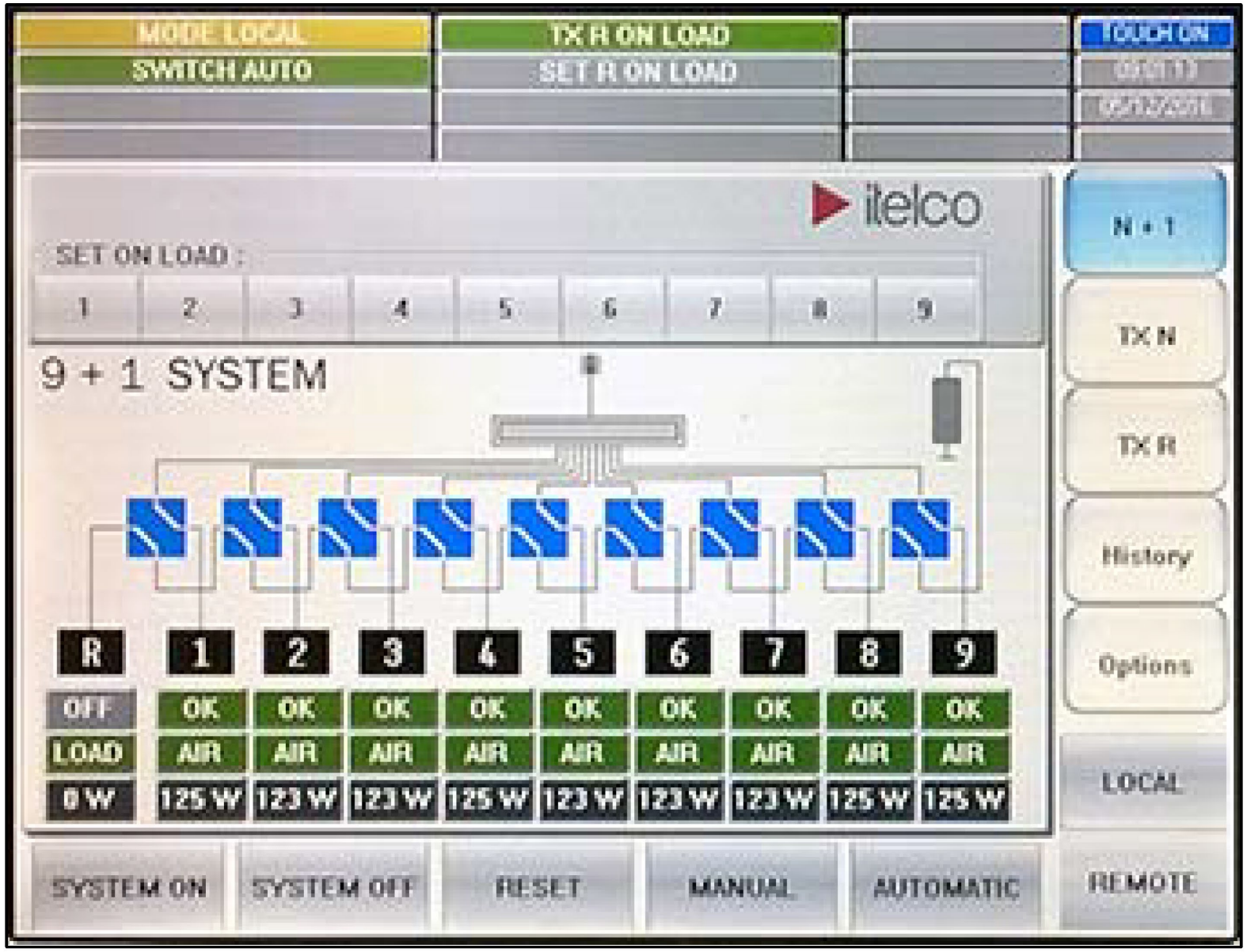
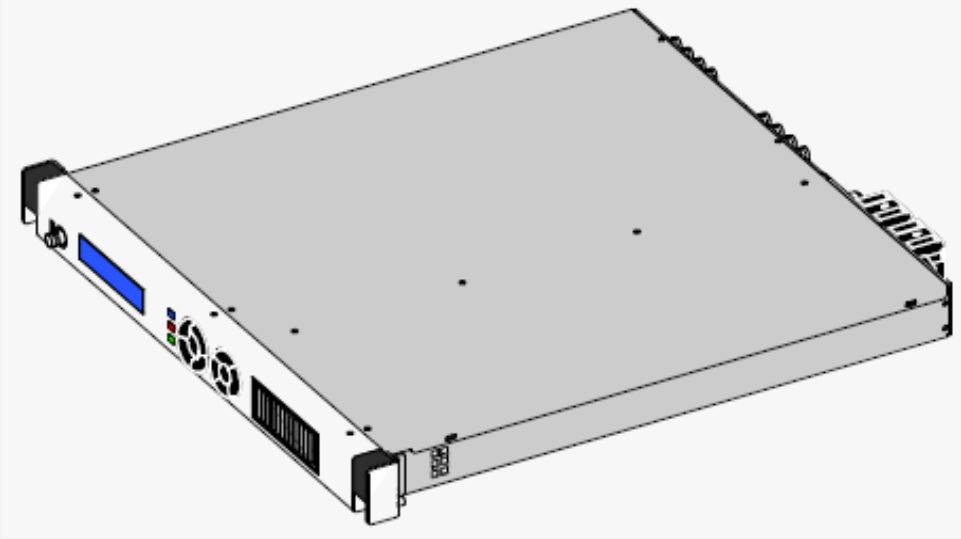
CCU
Transmitter
Central **C**ontrol **U**nit
N+1 with N up to 9

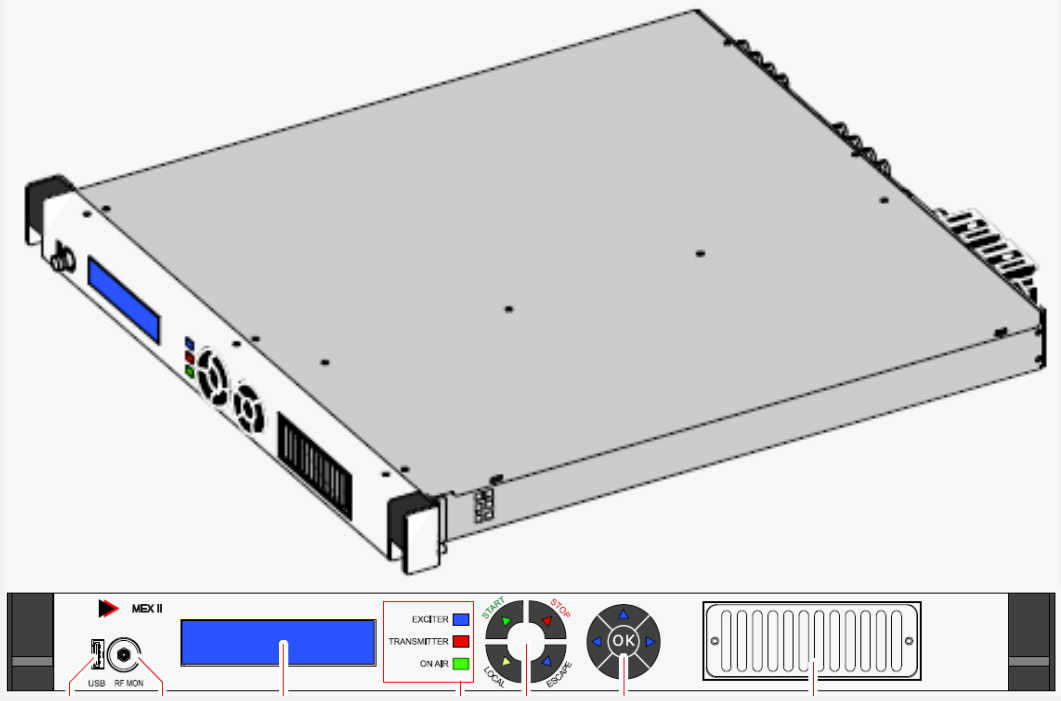


MEX II - 1Wrms
Low power multimode Exciter

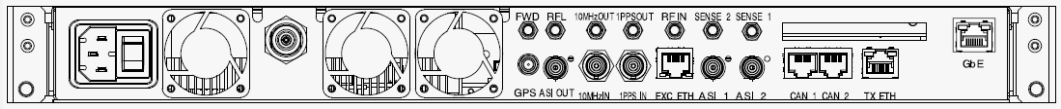


New 1 RU Design with Optional built-in Satellite Receiver

MEX II - 1Wrms
Exciter

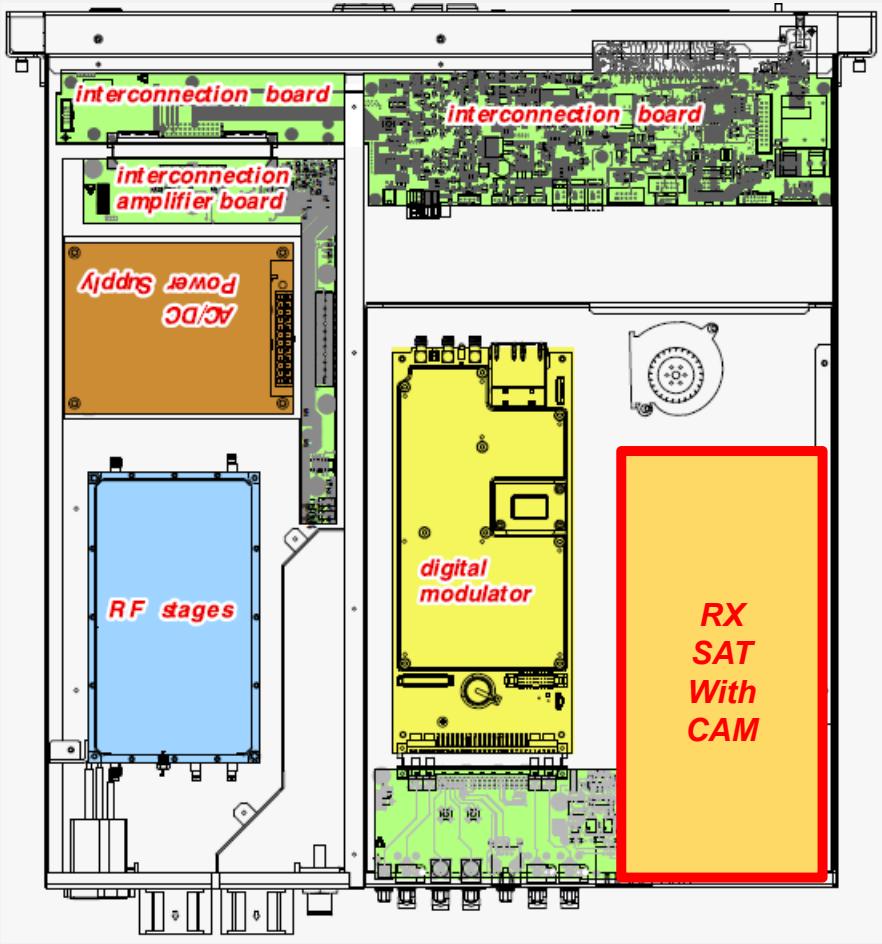


front view

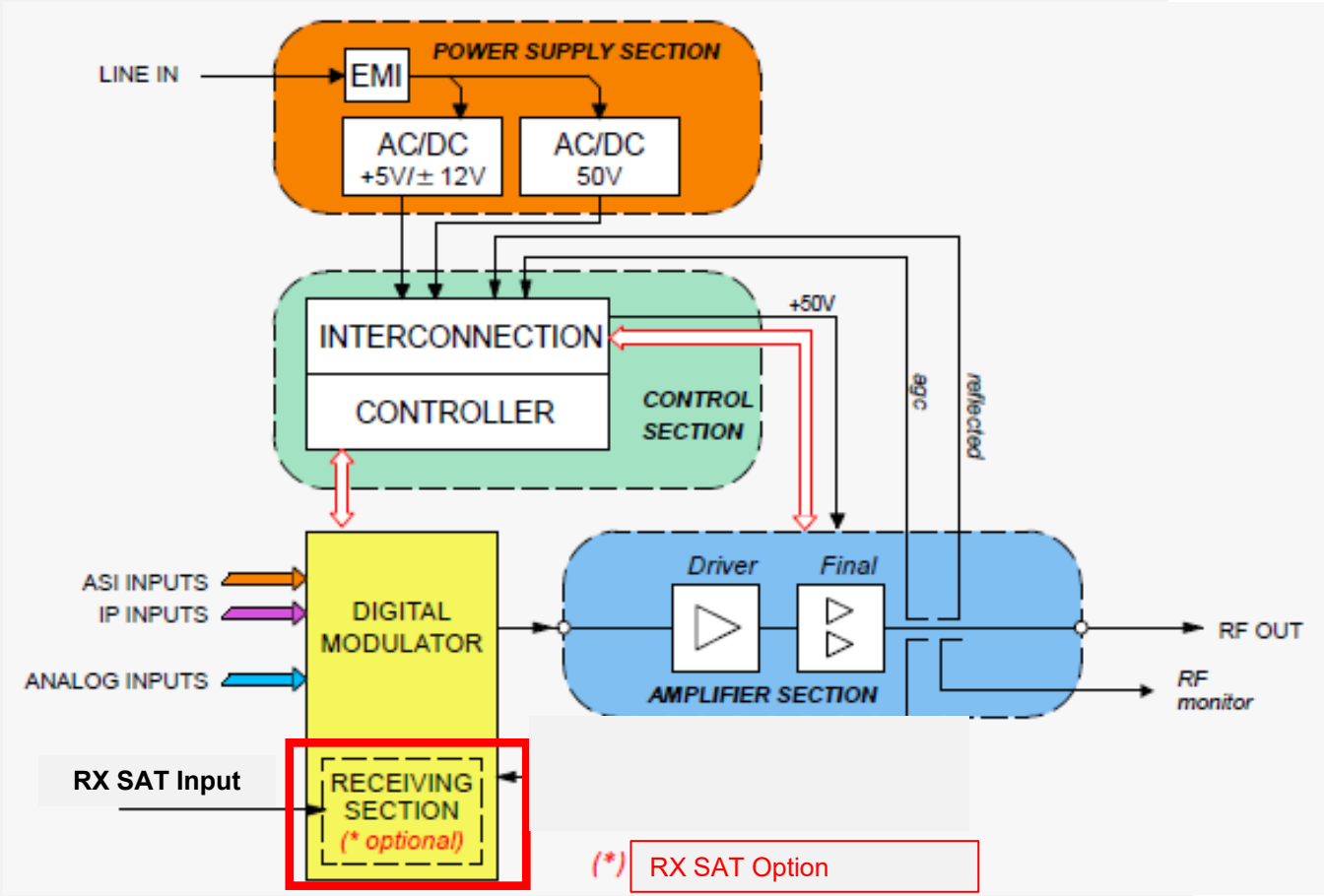


rear view

MEX II



top view



block diagram

Brief Company Introduction:

- Established in 1963 as Philips Test and Measurement
- 1964 First TV modulator introduced – more than 40 years of experience in the brodcasting market
- 1998 First generation DVB-T C-OFDM Modulator introduced (PT5775)
- Today more than 20.000 transmission site installations
- Per early 2003, PTT is owned by Managing Director Morten Simonsen

ProTelevision Today:

- Located in Copenhagen, Denmark
- High focus on R&D – 25 engineers working solely on C-OFDM technology (DSP, RF, SW, HW)
- All production outsourced to ISO Certified specialists
- Calibration, verification and test certificate of each piece of equipment done at PTT (100 hours burn in)
- DVB member (actively participated in the creation of several standards)

LEADING MANUFACTURER OF DTT MODULATORS

ISDB-T

ISDB-Tb

- ISDB-T and ISDB-Tb Homologated support
- REMUX SW option to support input TS 188 bytes
- 2x TSoIP Inputs 1Gb
- Adaptive precorrections Linear and Non linear

ISDB-T **ISDB-Tb**

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PRO TELEVISION TECHNOLOGIES

- Most Advanced Technology of Precorrection in the Broadcasting Market.

- Thanks to:
  Optimized precorrection technologies and 2) Exclusive technics of crest factor reduction,

  Optipower increases the efficiency of any amplifier from 2% to 5%

OPTI POWER®

Intuitive and user friendly WEB Graphical User Interface

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Modulator/Exciter

ATV (comming soon)

Pro Televison Technologies

- Pro Televison Technologies
- ATV Modulator
- Analog Video/Audio input
- SDI Input
- PAL and NTSC color
- G, D1, M, K, I1, K1, N, NC, I
- Exact same base module as the DTV products

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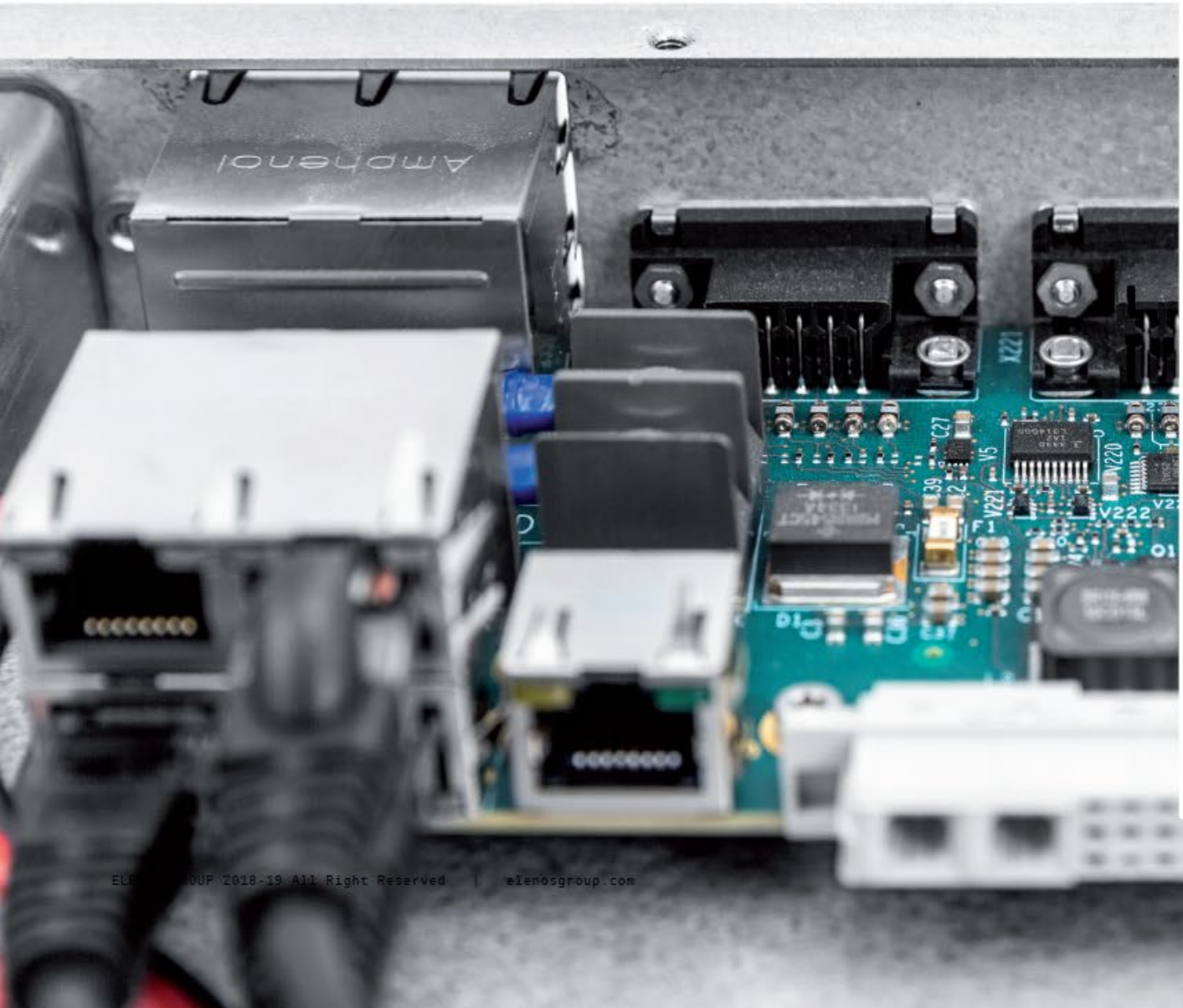

Modulator/Exciter

ISDB-T ISDB-Tb

Pro Televison Technologies

- SFN and MFN
- ISDB-T and ISDB-Tb Homologated support
- REMUX SW option to support 188 bytes TS
- 2x TSoIP Inputs 1Gb
- Digital Adaptive precorrections Linear and Non linear
- Optional OCXO and GNSS add-on modules

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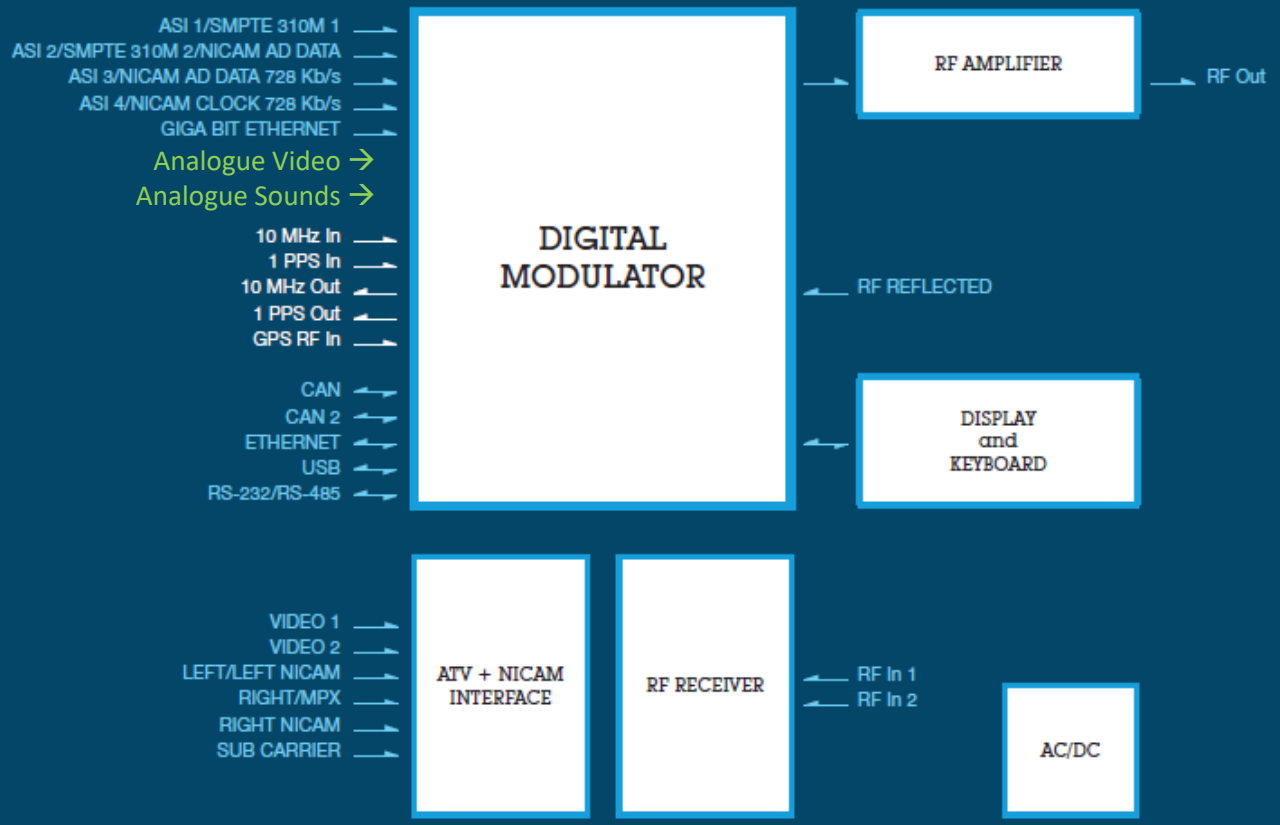
Functional Block Diagram



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DEDICATED RELIABLE CREATIVE

TV Transmitters
MEX II block diagram

Itelco Broadcast

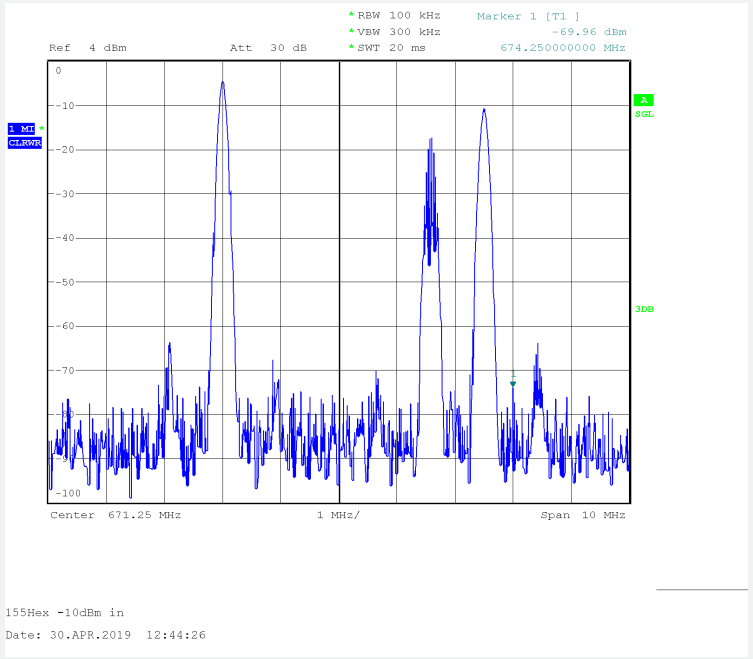
- MEX

DUAL CAST EXCITER

ANALOGUE INPUT MODULATION FOR ANALOGUE SPECTRUM TRANSMISSION

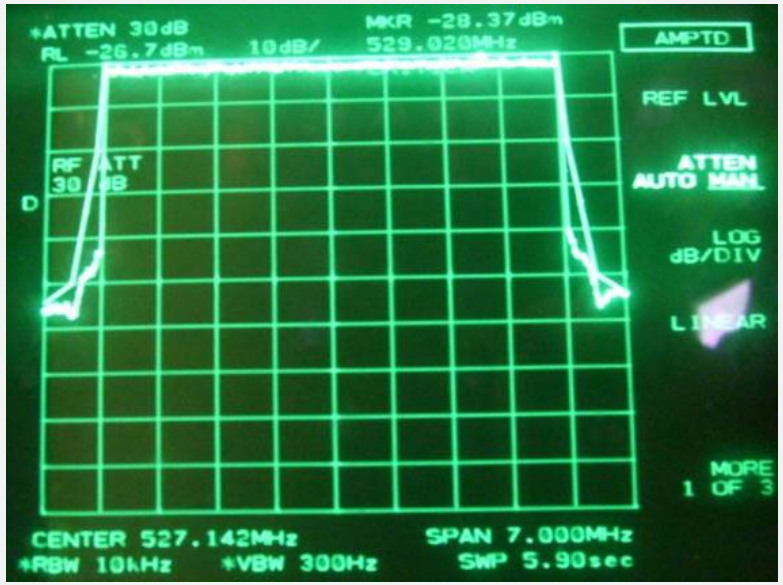
BTS DIGITAL INPUT MODULATION FOR ISDB-Tb SPECTRUM TRANSMISSION

ELENOS BE itelco PRO TELEVISION



Analogue Spectrum mask

- Only one program in 6MHz channel



ISDB-Tb

- Several programs in 6MHz channel
- Possibility of adjacent channel and coadjacent channels
- MFN or SFN network operation
- Energy saving (transmitting site and power reduction
- Head-end mobile

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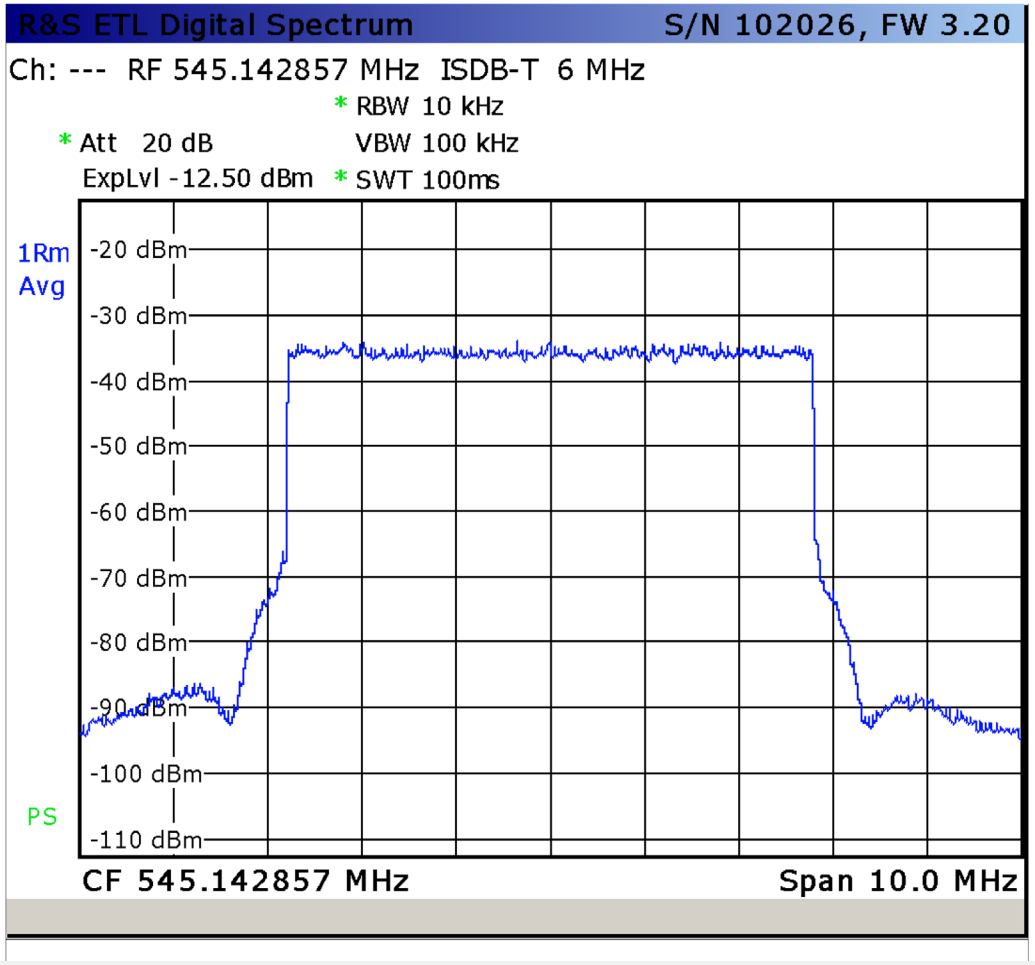
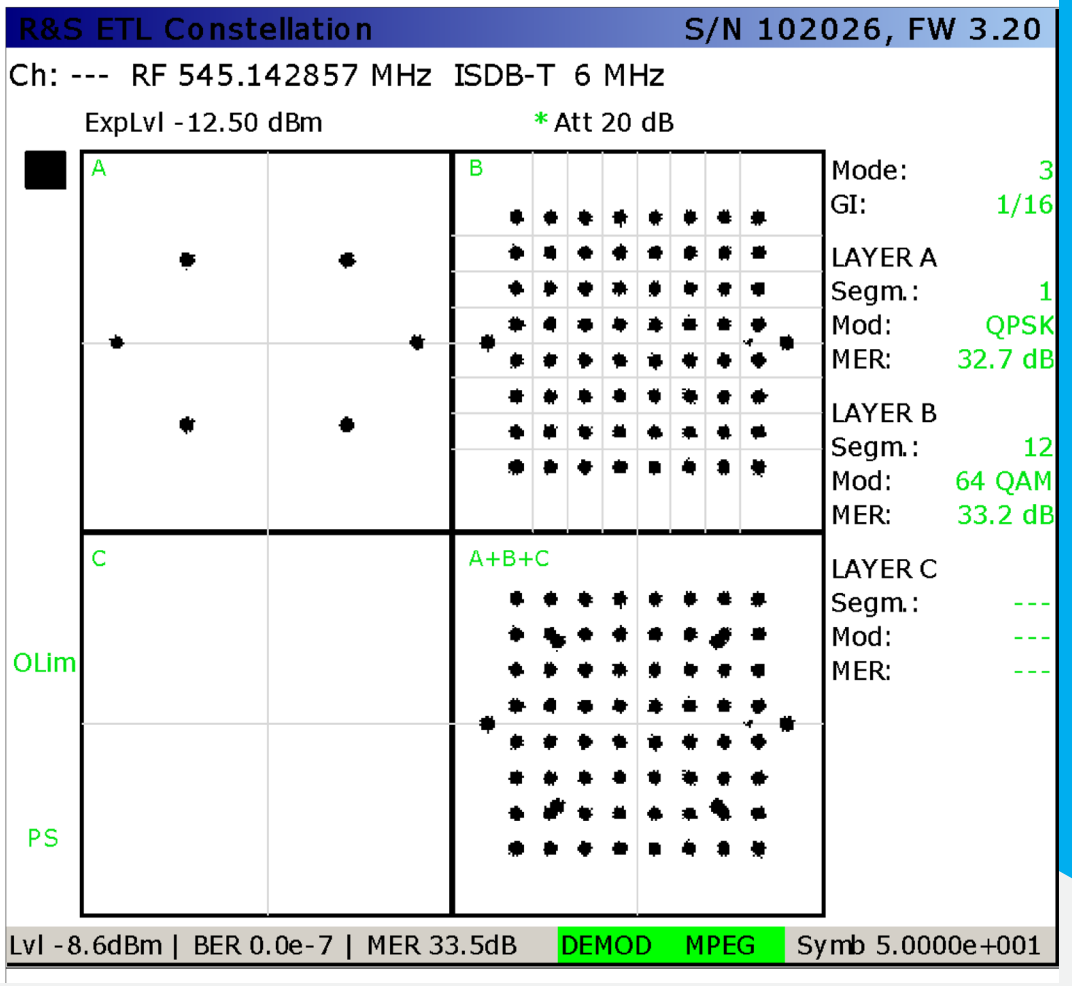
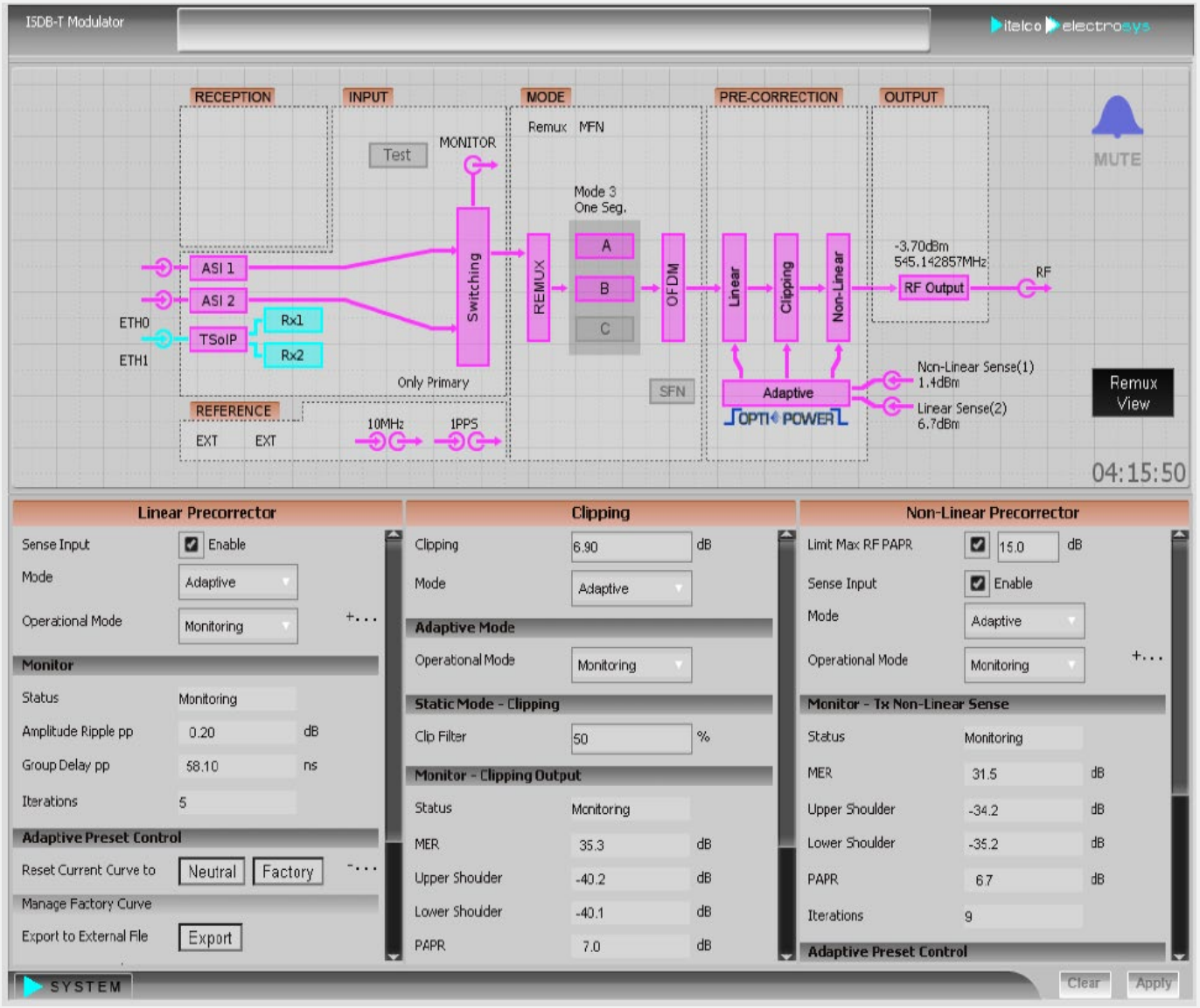
[x] Spectrum



[x] Constellation



The Group Itelco | ISDB-Tb Modulator Synoptic Control



Itelco transmitters and ISDB-Tb Advantages

Transmitters Advantages

- Ownership Cost reduction
- Power Consumption reduction thanks to the high efficiency technology
- Hot plug systems and full redundancy on RF and PS stage
- Extremely high MTBF thanks to the Itelco quality and experience

ISDB-Tb Advantages

- Several programs in 6 MHz channel
- Adjacent and coadiacent channels use
- MFN or SFN operation mode
- Head-end mobile mode available
- Service cost reduction
- Owner consumption reduction due to several
- programs in the same channel
- Multimedia Service transmission
- Transmitting site power reduction

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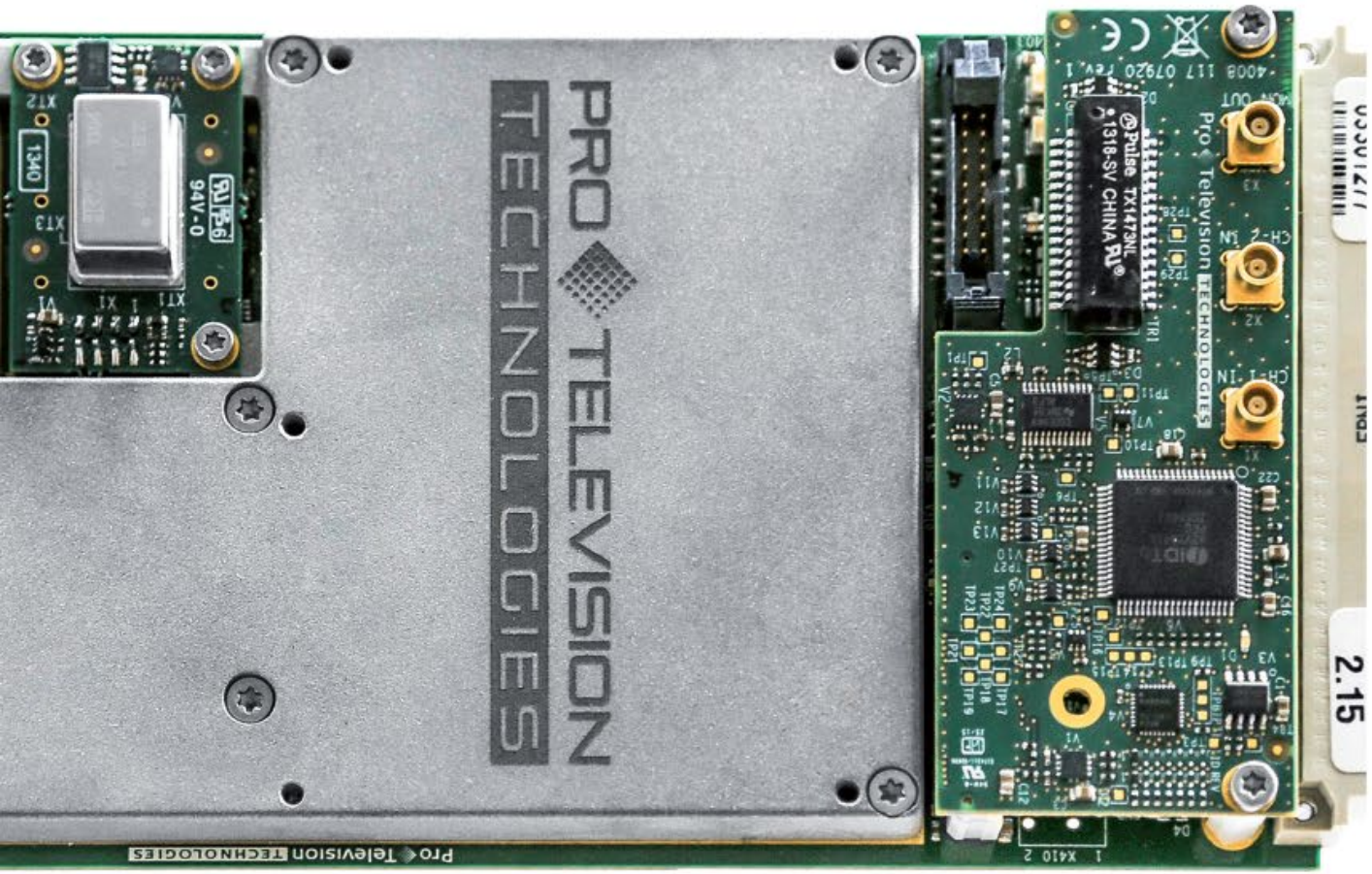

Modulator

DAB Digital Audio Broadcasting

DAB+ Digital Audio Broadcasting

Pro Televison Technologies

- DAB / DAB+ / T-DMB
- Digital Adaptive Precorrection Linear and Non-linear
- Seamless input stream switching ETI-ETI, ETI-EDI, EDI-EDI
- 2x Gigabit IP inputs with EDI protocol
- Optional OCXO and GNSS add-on modules

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