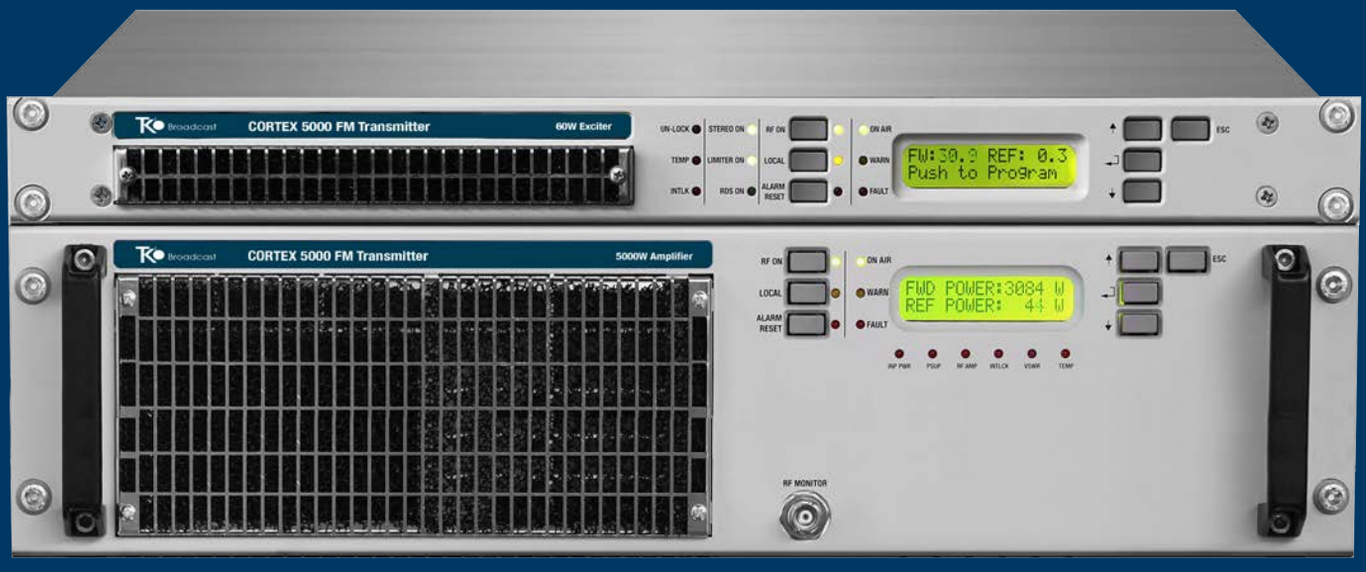
BROADCAST & SCIENCE EQUIPMENT

SENSOR 5000

5000W Modular FM Transmitter

IBOC and DRM ready

SENSOR 5000
5000W



SENSOR 5k 5000W
World-class Performance FM TRANSMITTER

Only option for High-End sound lovers with the need to broadcast from extreme weather environments

Ultimate solution from 30W to 100kW, AXON and SENSOR guarantees superior quality, reliability and professional features.

AXON and SENSOR are the TOP SELLER IN GOVERNMENTAL, PRIVATE NETWORKS, COMMERCIAL AND COMMUNITY RADIO STATIONS

Its unmatched features and outstanding technical characteristics makes it ideal for any FM broadcasting applications like:

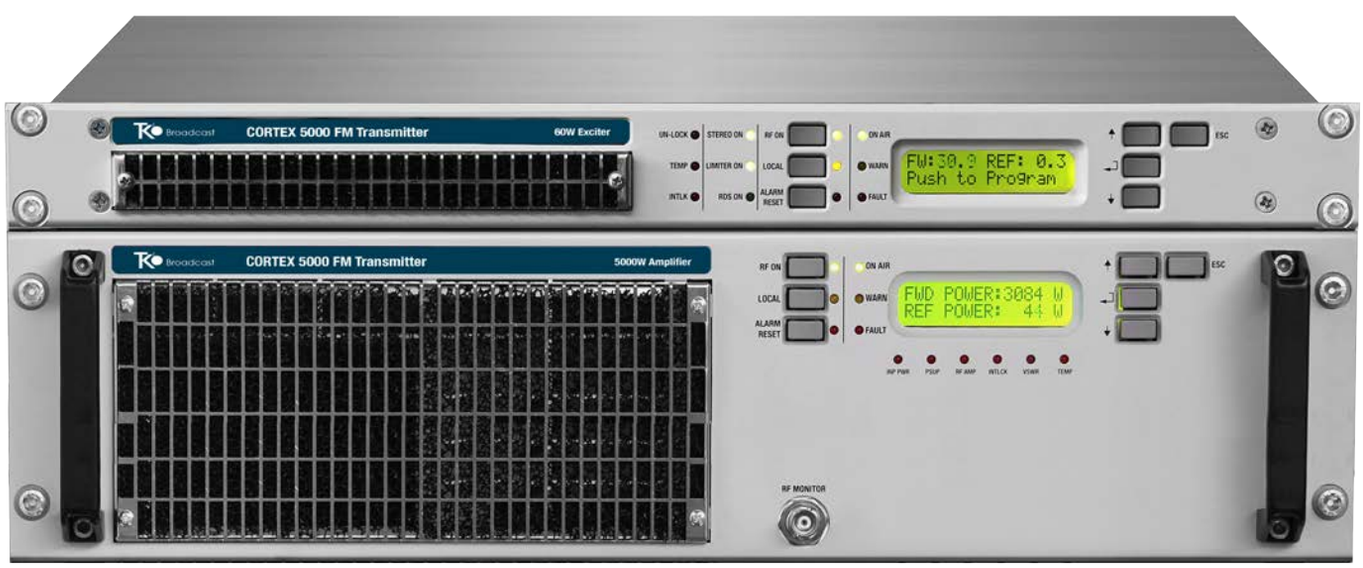
- Community radios FM transmitter
- Commercial radios FM transmitter
- Religious radios FM transmitter
- Educational radios FM transmitter
- Other non-profit radio groups FM transmitter
- Big National Networks FM transmitter
- Public Radios FM transmitter
- Drive-in movies radios FM transmitter
- Theatres radios FM transmitter
- Stadiums radios FM transmitter
- Politic Radios FM Transmitter

SENSOR modular architecture

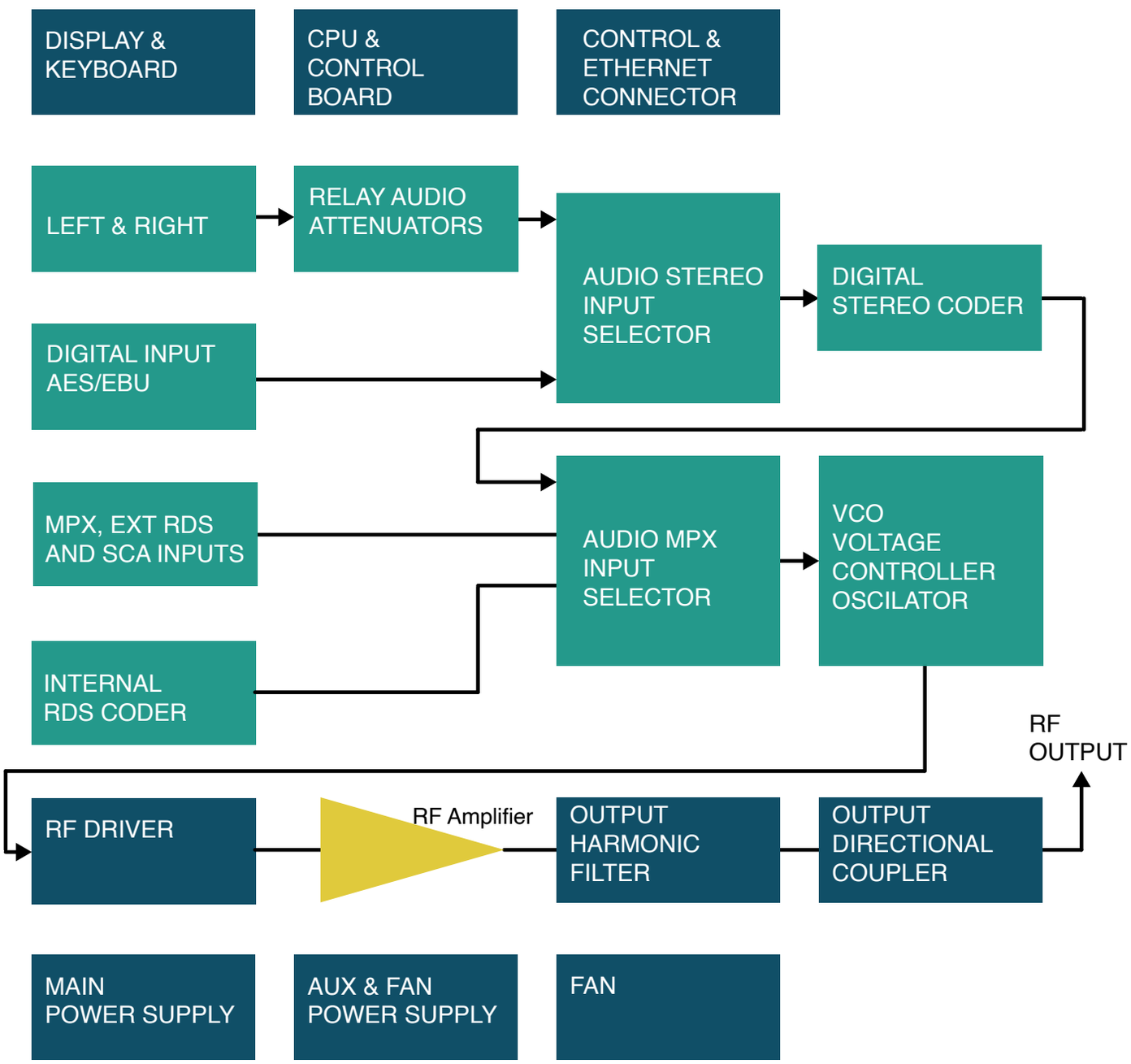
SENSOR is a Medium and High-Power FM Transmitter with Modular architecture: each component of the system is housed on a separate case: single or double Exciter, FM Amplifiers.

SENSOR is the synthesis of robustness, easy maintenance, low energy consumption, Web Remote Control and a Big Sound.

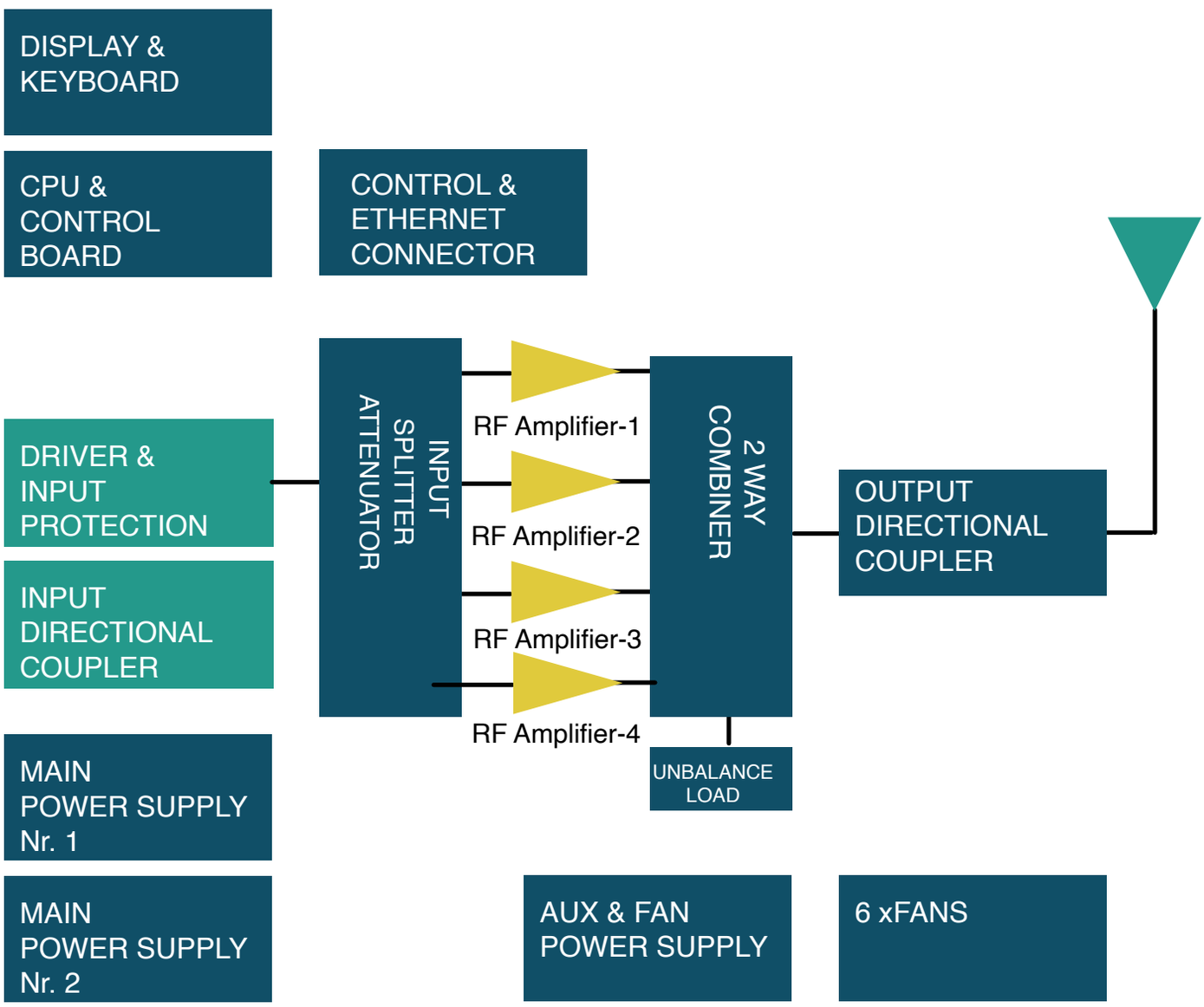
Designed for high-power requirements, it offers extreme high efficiency and makes it ideal for FM applications where the energy cost is crucial.
The 50-volt LDMOS technology delivers a dramatic increase in power density, lower operating costs and reduced cost of ownership over the life of the transmitter.



SYNAPSE Exciter BLOCK DIAGRAM



CELL BLOCK DIAGRAM



AXON 500 GENERAL TECHNICHAL CHARACTERISTICS

Power Output

- Output power: 5**000W**. Adjustable from 0W to maximum power.
- Maximum output power:**5500W**.
- Output Connector: **7/8 type**
- Overall efficiency: **75%**
- RF Efficiency: **85%**

ELECTRICAL and PHISICAL

- AC Input Power: 230/400 VAC ±15%, 50/60 HZ(+/- 3HZ) single phase or 3-phase+N
- Power Consuption. 7000VA
- Power factor > 0.99
- Cooling: Forced air
- MTBF > 20.000 Hours

ENVIRONMENTAL

- Operating temperature: -10°C to +50°C.
- Max Operating Altitude: 4000 mt.
- Relative Humidity Range: 0 to 95% non condensing.
- Protection against Lightening, Dust and Corrosion

PHYSICAL DIMENSIONS

- Mounting: 4 unit cabinet
- Large= **450** cm
- Depth= **410** cm
- Height= **180** cm
- Weight: **24** Kg

PACKAGE DIMENSIONS

- Large= **470** cm
- Depth= **430** cm
- Height= **200** cm
- Weight: **25** Kg

RADIOELECTRICS CHARACTERISTICS

- IBOC and DRM Ready Transmitter
- Frequency Range: 87.5 ÷ 108.00 MHz, Programmable in 10 KHz steps
- On request 66 ÷ 74 MHz (OIRT), 76 ÷ 90 MHz (JPN) Bands.
- Frequency Stability: better than ±150Hz from -10 to +50°C
- Modulation capability max deviation: +/-150kHz.
- Frequency Control: Synthesizer μprocessor control.
- Output Impedance: 50 ohm.
- Display: forward/reflection power and modulation indicator
- Type of Modulation: Direct frequency modulation of carrier frequency. F3E Stereo with Sub-carrier and Mono.
- Lock in Time: Typ. 4 second.
- Off Lock Attenuation: ≥ -80 dBc.
- Modulation Mode: Mono, Stereo, Multiplex, SCA, RDS, Aux.
- Pre-emphasis: Flat(0)/50/75 μs selectable from front panel.
- Asynchronous AM S/N Ratio: -60 dB below reference carrier. 100% AM modulation @ 400 Hz, without FM modulation.
- Synchronous AM S/N Ratio: -60 dB below reference carrier. 100% AM modulation@ 400 Hz with FM modulation ±75 KHz @ 400 Hz.
- RF Harmonics: Exceeds ETSI/EBU/CCIR/FCC requirements. better than 84 dbc
- RF Spurious: Exceeds ETSI/EBU/CCIR/FCC requirements. better than 84 dbc
- Output power on/off and adjustable from front panel and remotely.
- Overall Efficiency up to 80%.
- Monitor RF: -60 dBc, BNC connector
- VSWR: 1.5:1 Maximum with automatic fold-back at higher VSWR
-

MONAURAL OPERATION

- Audio Input Impedance: 600 ohm balanced, 15 Kohms unbalanced.
- Audio Input Level: -6 to +12 dBm. (Other range on request)
- Input Connector: XLR female.
- Audio Frequency Response: ±0.15 dB, 30 Hz to 15 KHz.
- Total Harmonic Distortion + Noise: 0.03% @ 400 Hz
- Intermodulation Distortion: 0.03%, 1 KHz/1.3 KHz, 1:1 ratio
- Transient Intermodulation Distortion: 0.03%, 2.96KHz square wave and 14 KHz sine wave.
- FM S/N Ratio: -89 dB RMS detector, -85 dB below ±75 KHz deviation, 50 μs de-emphasis, weighted.

MULTIPLEX OPERATION

- Composite Input Impedance: 5 Kohm unbalanced.
- Composite Input Level: 3.5Vp-p for ±75KHz deviation.
- Input Connector: BNC female.
- Composite Amplitude Response: : ≤ ± 0.1dB, from 30Hz to 53kHz
- Total Harmonic Distortion + Noise: 0.03% @ 400 Hz
- Intermodulation Distortion: 0.03%, 1 KHz/1.3 KHz, 1:1 ratio
- Transient Intermodulation Distortion: 0.03%, 2.96 KHz square wave and 14 KHz sine wave.
- FM S/N Ratio: -89 dB RMS detector, -85 dB below ±75 KHz deviation, 50 μs de-emphasis, weighted.

STEREO OPERATION

- Audio Input Impedance: 600 ohm balanced, 15 Kohm unbalanced.
- Audio Input Level: -12 to +12 dBm.
- Input Connector: XLR female.
- Audio Frequency Response: ±015 dB from 30 Hz to 15 KHz.
- Total Harmonic Distortion + Noise: 0,03% @ 400 Hz
- Intermodulation Distortion: 0,02%, 60Hz /7kHz 4:1 ratio +4dBu
- Transient Intermodulation Distortion: 0.03%, 2.96 KHz square wave and 14 KHz sine wave.
- FM S/N Ratio: -85 dB RMS detector, -82 dB below ±75 KHz deviation, 50 μs de-emphasis, weighted.
- Stereo Separation: 30÷80 Hz ≥ -53 dB, 80Hz÷15 KHz ≥ -65 dB (Typ. 70 dB).
- Crosstalk attenuation: Main to Sub -55 dB 30 Hz to 15 KHz
- 38 KHz Suppression: ≥ -70 dB (typ. -85 dB).
- Pilot Frequency: 19 KHz ± 1 Hz
- Phase Pilot: ± 2° adjustable
- Output Pilot: 1 Vpp., BNC female
- Audio Filter Attenuation: ≥ -55 dB @ 19 KHz, > -45 dB 20 KHz to 100 KHz.
- Modes: Stereo, Mono L+R, Mono L, Mono R.

AES/EBU OPERATION

- Input Level: -10dBfs to 0dBfs
- Input Connector: XLR female, optical TOS-LINK.
- Input Impedance: 110 ohm.
- Data Format: S/PDF,AES/EBU, IEC958, EIAJCP340/1201.
- D/A Converter: 24 bit.
- Sampling Frequency: from 32 to 96 KHz with automatic selection
- Stereo separation (crosstalk): ≥50dB,100Hz to 5kHz
- Amplitude response: ≤ ± 0.1dB, from 30Hz to 15kHz
- FM S/N Ratio: -85 dB below ±75 KHz deviation, 50 μs de-emphasis, weighted.

SCA, RDS, AUX OPERATION

- Input Connector: BNC female
- Input Impedance: 3 Kohm.
- Input Level: -3 to +6 dBm.
- Frequency Response: ±0.2 dB, 40 KHz to100 KHz.
- Input Connector: BNC female. Most SCA, RDS, AUX, performance parameters are determined primarily by the generator used.

AUXILIARY CONNECTIONS

- N°2 RS485: Serial Interface connector RJ45 back panel.
- Telemetry Interface: connector DB25F back panel.

ENVIRONMENTAL

- Operating temperature: -10°C to +50°C.
- Max Operating Altitude: 4000 mt.
- Relative Humidity Range: 0 to 95% non condensing.
- Protection against Lightening, Dust and Corrosion

OPTIONS AVAILABLE

Wide range of options available reduces the need of any additional equipment:

- High performances Stereo Encoder
- Digital AES/EBU
- Dynamic RDS Encoder with TMC Function
- AOIP Audio Over IP
- WEB TCP/IP and SNMP connectivity for remote Access
- Japanese (JPN), Russian (OIRT) and more bands are options available.
- Parallel Remote Control Connector Interface

HIGHLIGHTS

- Analogue and Digital Ready for HD Radio and DRM
- SENSOR is built by CELL 2500 FM and Pulse Amplifier
- CELL amplifier, equipped to work in stand-alone, allows easy maintenance on site
- Low level power input to the CELL Amplifiers modules
- Hot plug-in power supply standard market available for Instant replacement, easy maintenance, without off-air.
- The power supply is self-protected, and grants more reliability thanks its wide voltage range.
- Modular Architecture with very light amplifier modules (less than 17kg/34lbs each) provides Maximum Redundancy in Ultra compact size 2U for each amplifier module
- Fully RF and power supply redundant
- A single CELL Amplifier can be put on air as back-up of a bigger transmitter.
- Multiport Combiner and Splitter
- All system parts are assembled on separate components: splitter, combiner, unbalanced dummy loads, control logic.
- Solid State LDMOS technology up to 80% High Efficiency constant at any power level
- Total spectral purity: better than -90 dBc spurious and harmonics. I grant highest RF signal quality.
- Double exciter with automatic change over (option)
- Delayed energized of the system and overvoltage surge protection (option)
- Energy Saving Weekly scheduler output power derating for energy consumption optimization management.
- N+1 and Backups systems
- Web control logic Touch Screen BRAIN Control Unit
- Friendly User Interface with LCD front panel display, Direct Keys and LEDs indicator. It shows transmitter status and allows smart browsing with ENTER and ESC Keys.
- Remote control by TCP/IP: WEB + SNMP of all signal parameters
- Parallel Remote-Control Connectors
- Made in aluminium, Air filter and PCB boards tropicalized
- Aluminium air ducted.
- Copper Carrier on active power components such as LDMOS or unbalanced loads resistors
- Easy maintenance
- High Reliability and robustness
- High precision Mechanical construction
- Uninterrupted service thanks to free failure design intelligent software protections
- Protection against Lightning, Dust and Corrosion
- Full- range power supply: 180-260 vac mains voltage
- Designed to be rough itself. All components that determine the reliability are over-dimensio-

ned. The Heatsink, LDMOS, Fans, Unbalanced load resistors and Power supply.

- Sturdy and careful packaging ensures a safe journey to your destination.
- Top seller in Governmental, Private Networks, Commercial and Community radio stations
- Compliant with all the standard: ETSI – CCIR – FCC. Meets all the most rigorous electro-magnetic quality standards
-

SENSOR architecture

The transmitter with modular architecture is composed by:

- Stand alone Low Power SYNAPSE 30W Exciter
- High Efficiency Solid State FM Amplifiers CELL 2500
- Multiport splitters
- Multiport combiner
- Unbalanced power load 2 to 10 inputs
- FM single or double exciter.
- WEB control logic.
- Rack.
- Breakers
- External power supply for Dummy Load

CELL 5000 FM and Pulse Amplifier is the core of SENSOR

It represents th e base of all configurations.
It was **obsessively optimized** for best results, in this way, big broadcast systems benefit and share this optimization.
The CELL RF Amplifier has 3,5kW output power.
Thanks, of the size, 3 HE it is fits up to 10 in a standard 19-inch rack.
In the CELL Amplifier was **Maximized**:

- Efficiency
- Reliability
- Electro-magnetic performance
- Protections
-

And minimizes:

- weight
- power consumption
- heat produced on the site

CELL amplifier, equipped to work in stand-alone allows easy maintenance on site

A key to make easy the maintenance is to have the possibility to test and repair the amplifier module in laboratory or in the site without special tools required.
It's necessary to remark than in most modular systems from other manufacturers, the RF module contains only the amplification part.
When it is pulled out, it has no power supply, no fans, no logic, no output filter. It is impossible to repair under these conditions. The repair can only be carried out in the manufacturer factory by specialized technicians.
The conditions to make easier the maintenance is:
1) To be possible test and repair the amplifier module on site or in laboratory.
2) It doesn't need any special tools.
The CELL amplifier is equipped with: power supply, fans, control logic, output filter and protections. All the parts needed to work in stand-alone.
To make the maintenance on it only and external exciter, a dummy load and energy cord with standard plug are needed. No special tools or connectors are needed

CELL Amplifier low level power input

The CELL amplifier has an input pre-driver. The power necessary to drive it less than 1 W.
Inside the amplifier there is a 10 dB attenuator.
This feature allows to drive big power transmitters with a small 30W Exciter, moreover allows to install and attenuator/isolator on the input of the Splitter.
The benefits of this configuration are:

- All the family SENSOR uses the same exciter model
- The input attenuator, together with the pre-amplifier grants always an optimum load to the exciter.
- Never the exciter stops by VSWR coming back from the amplifiers

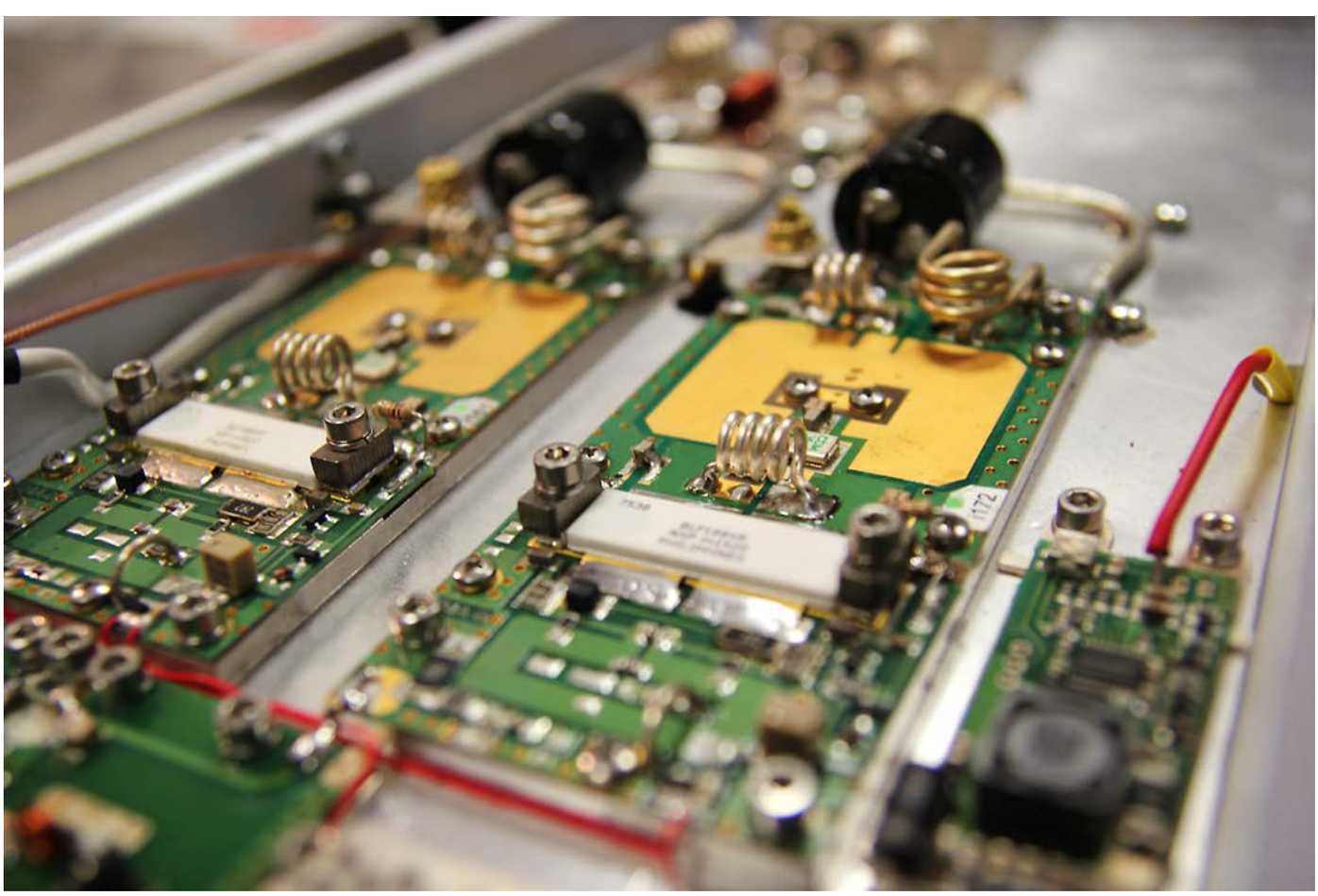
In fact, the exciter is not driving direct the input of the LDMOS but is driving a perfect resistor load.

In a 10kw transmitter with 4 x 2,500W, when the first module is missing, 1300 W arrive, if you turn

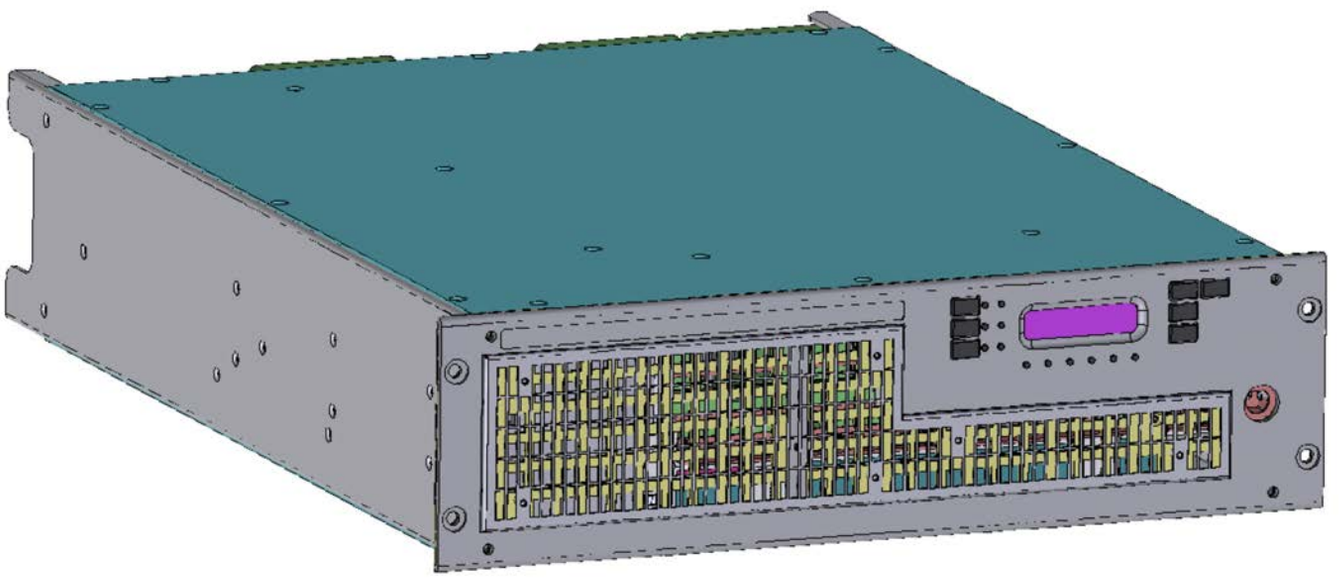
CELL 5k/1 5000W

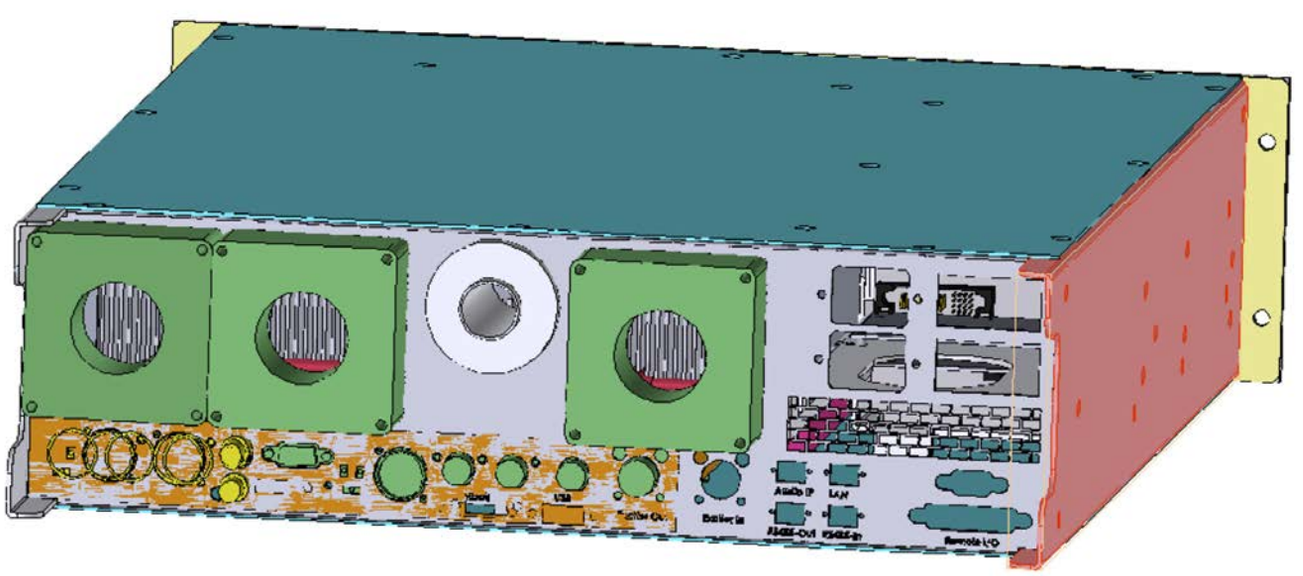
RF and Radio-electrical and Electrical Characteristics

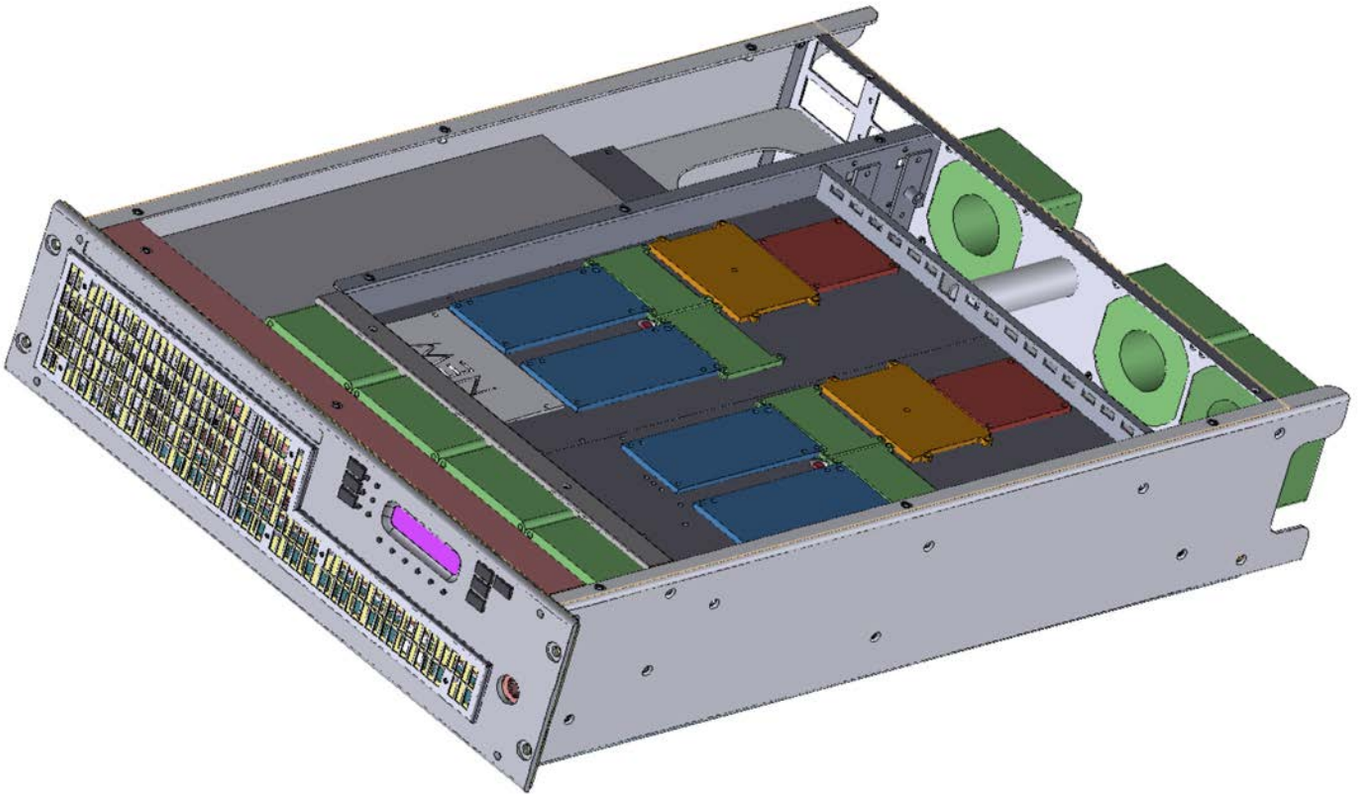
- High Efficiency LDMOS 50V 6th generation Planar Technology
- VSWR > 65:1 @ all Phase Angles, designed for enhanced ruggedness ISM applications and plasma generators.
- Total spectral purity: > -100 DBC SPURIOUS, > - 84 DBC HARMONICS, > - 84 DBC HARMONICS
- CELL RF Amplifier has 2,5kW output power in 2 HE occupancy.
- Natural outclass green technologies up to 88% RF efficiency and up to 79% overall efficiency
- EFFICIENCY is maintaining constant at any frequency an at any power level thanks to an intelligent algorithm that control the Voltage Power Amplifier and the Bias
- Planar architecture
- The output filter broad band keeps optimum performances on spectral purity without needing of tuning.
- Integrated AC Mains filtering.
- Integrated lightning protection
- Full Range, 90V to 250V Power Supply.

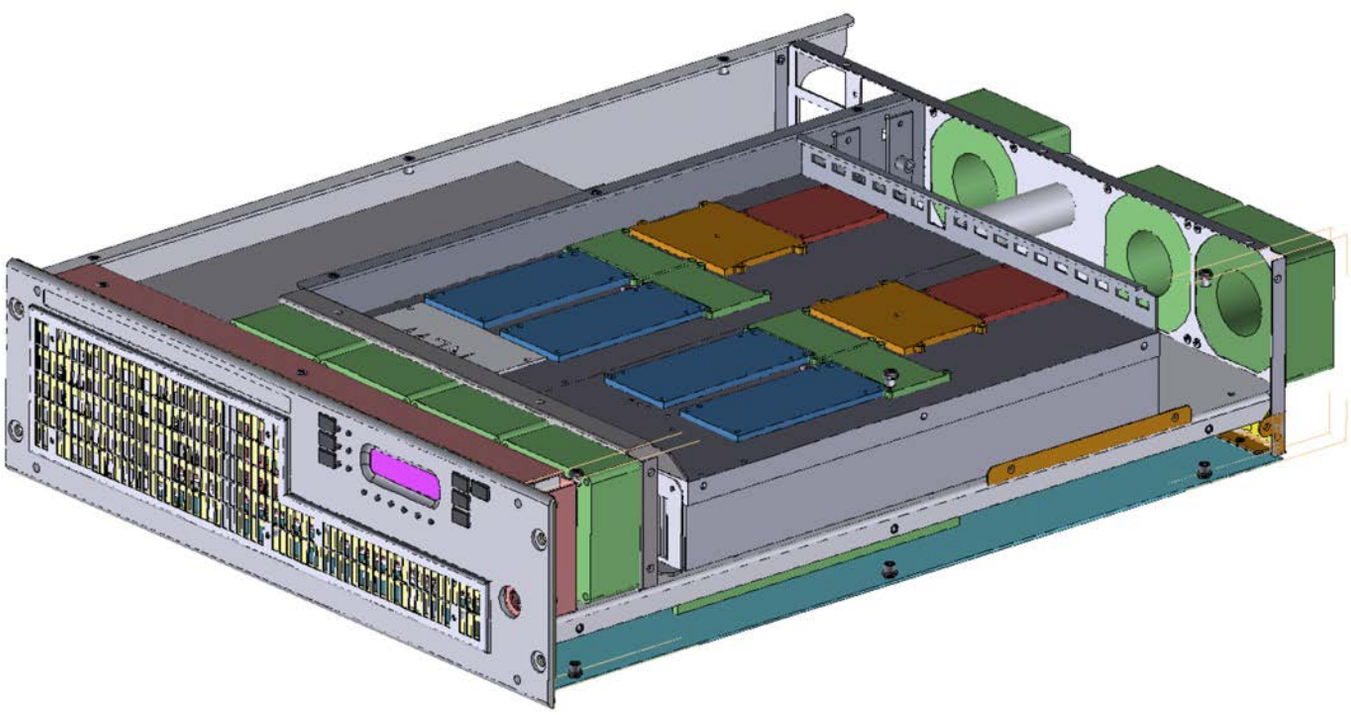


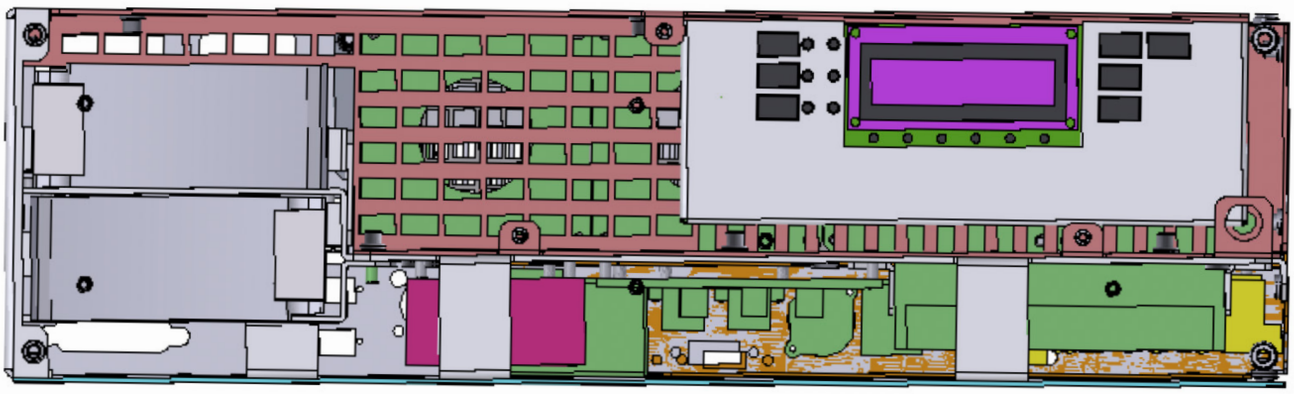
CELL 5000 3D Views

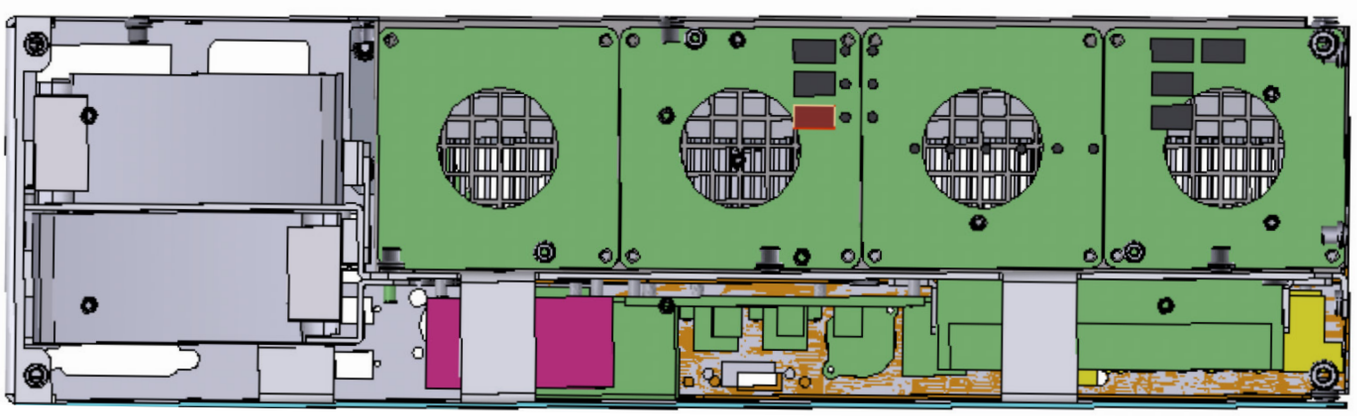


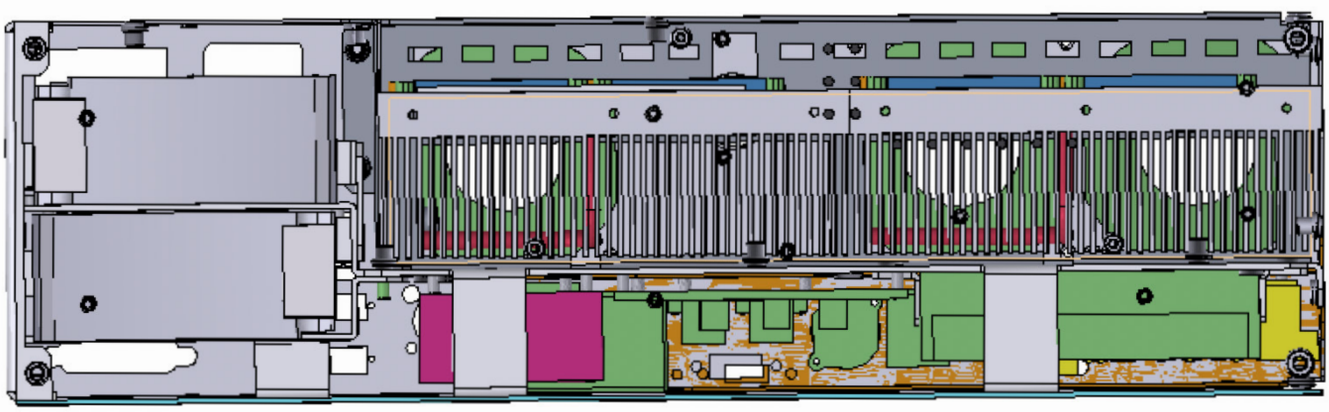


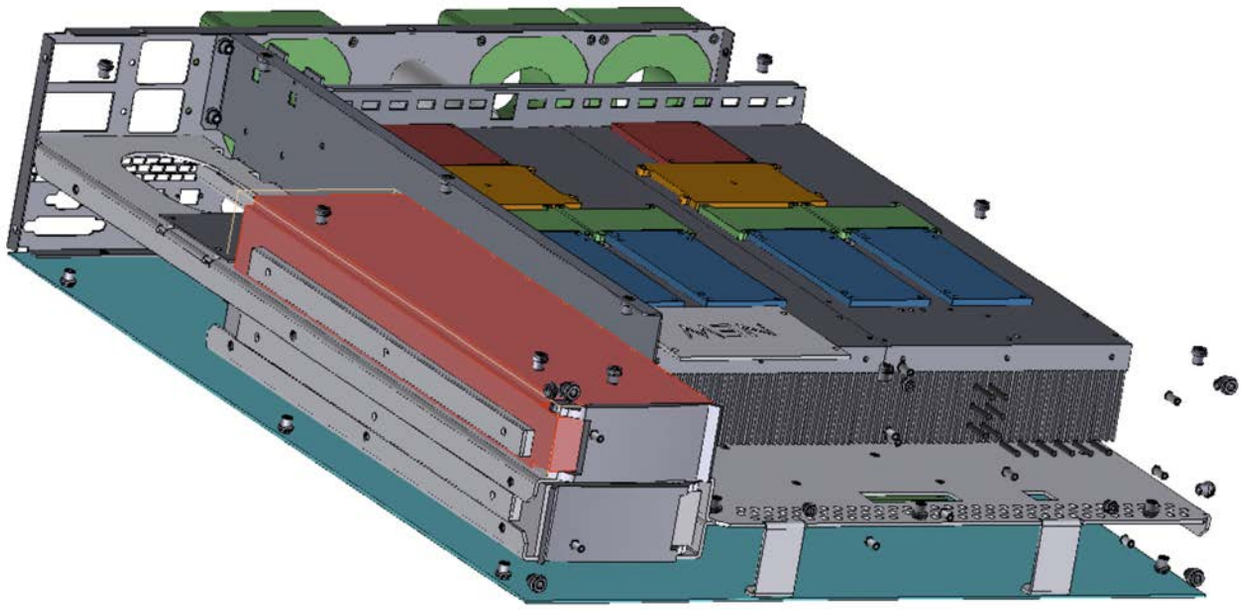


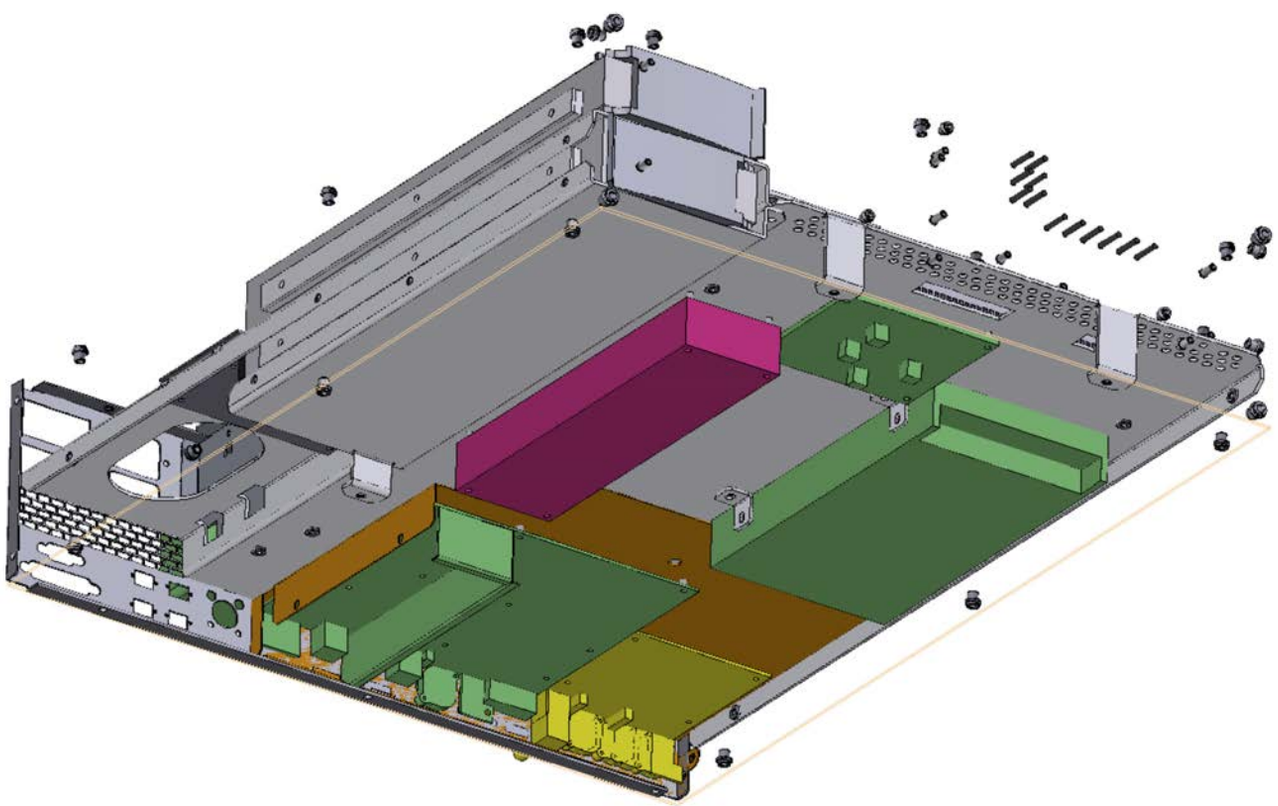


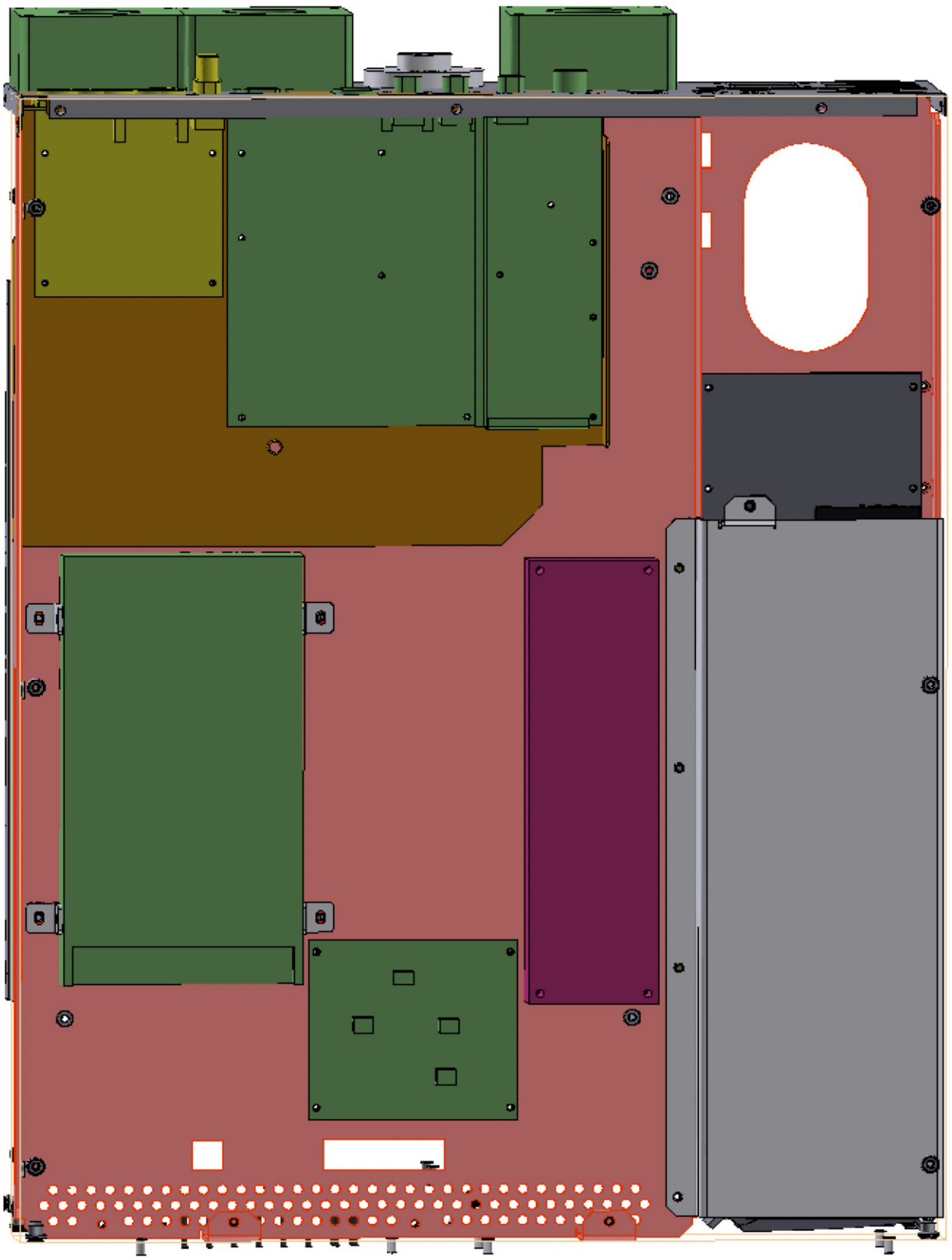


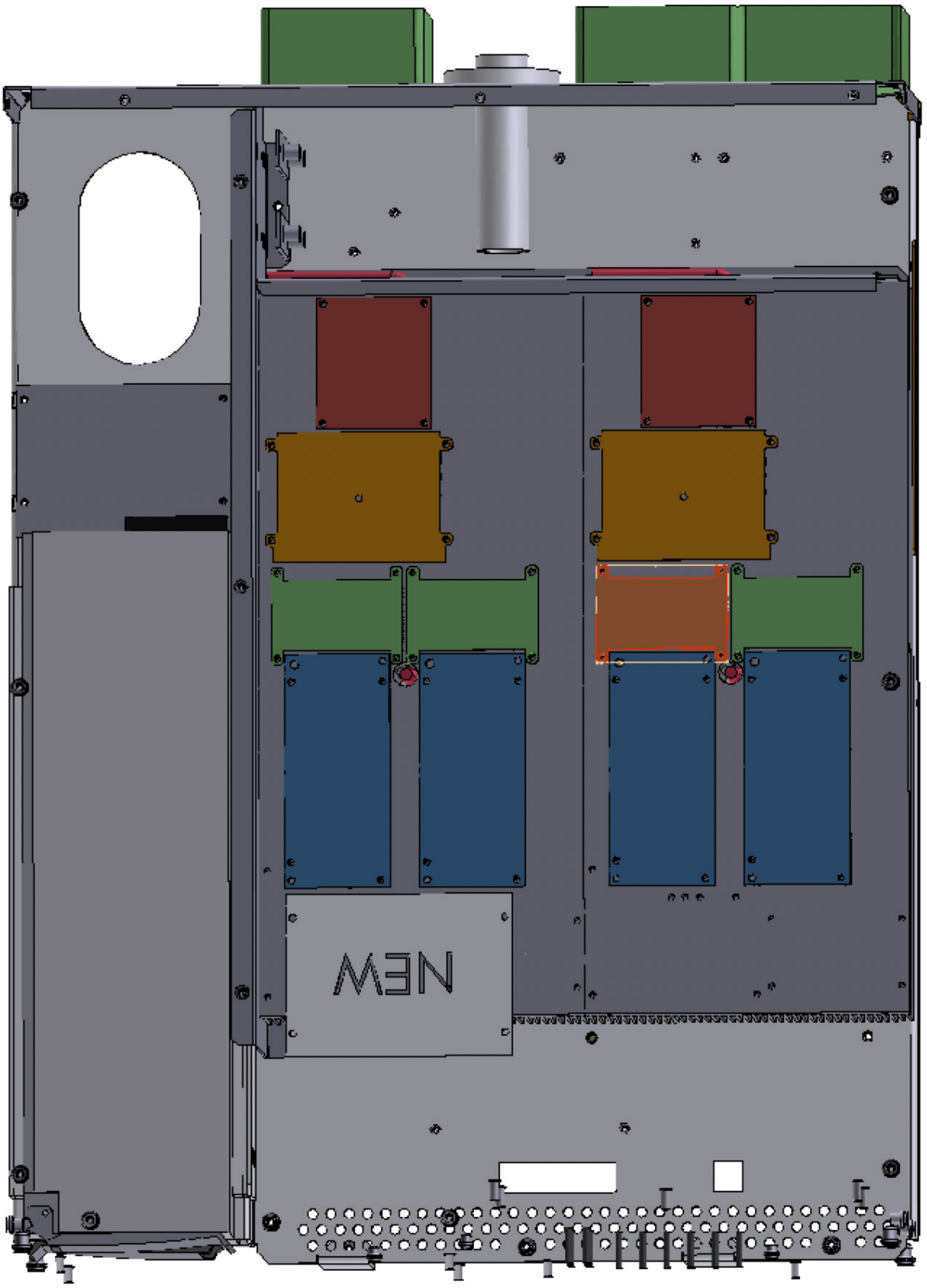











NEW

Double exciter with automatic change over (option)

The SENSOR FM transmitter optionally mounts a double exciter system.

In a redundant modular system, all components are multiple and work in parallel. This means that the malfunction of one of them cannot permanently stop the transmission. The only component that is not in parallel but in series with the rest of the system is the exciter. For this reason, the exciter is the system's only bottleneck.

The double exciter of the SENSOR starts working automatically when it detects the malfunction of the exciter in the air. It automatically switches the failed exciter to the dummy load and connects the spare exciter in its place.

The artificial load, always connected to the reserve exciter, allows the technician to test the exciter on site, without having to disconnect it from the transmitter and possibly repair it on site.

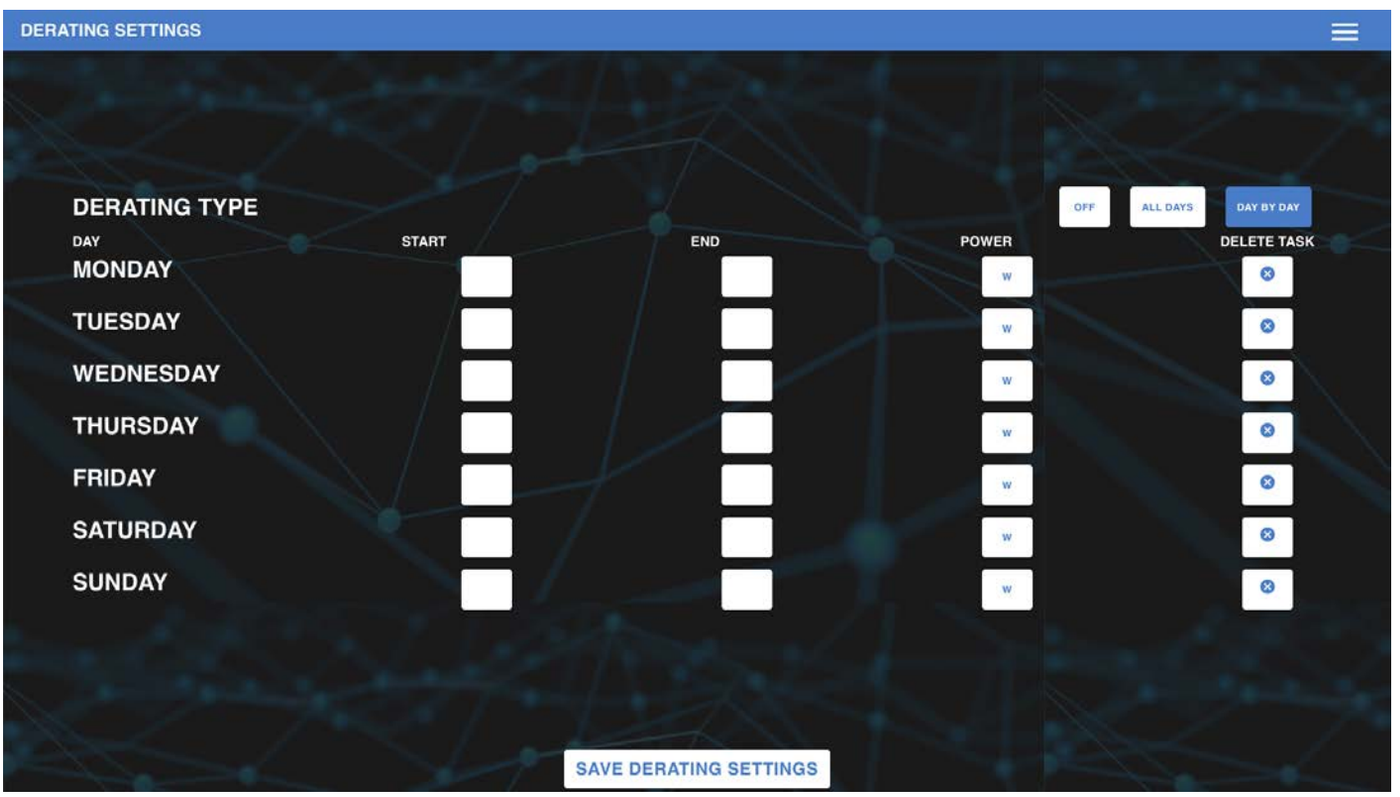
User Interface:

LCD front panel display, Direct Access Keys command and LEDs indicators allows immediate control and visualization of the overall status of the transmitter.
Quick and easy navigation trough menus create a User Interface friendly, simple and intuitive together an immediate learning, full control and measurements of all working parameter: Output Power, Frequency (from 87.5 to 108 MHz), SCAs, Stereo/Mono/MPX, Dynamic Limiter etc.

- Direct access to main commands and smart navigation keys with esc command
- Overall status showing by leds allows immediate recognition of the operational conditions of the transmitter
- Smart browsing of all the transmitter parameters
- Touch screen brain control unit: the control unit have the specific function to supervise the transmitter, even in case of failure of it (or turned off) manual control of the transmitter guarantee perfect operation.

Energy Saving with High Efficiency and Scheduler Power Derating

- AXON and SENSOR use Solid State RF power devices, 6th generation LD-MOS. They are High Efficiency and VSWR 65:1 tolerant. This characteristic provides high reliability and low energy consumption.
- An intelligent algorithm maintains the high Efficiency constant at any power.
- This algorithm controls the Voltage of the Power Supply and the Bias.
- Thanks to this, the efficiency is very high at any frequency and at any output rate power.
- Weekly scheduler output power derating for energy consumption optimization management.
- It’s possible to scheduler each day of the week with several events for day



Remote Control by TCP/IP: WEB + SNMP of all parameters

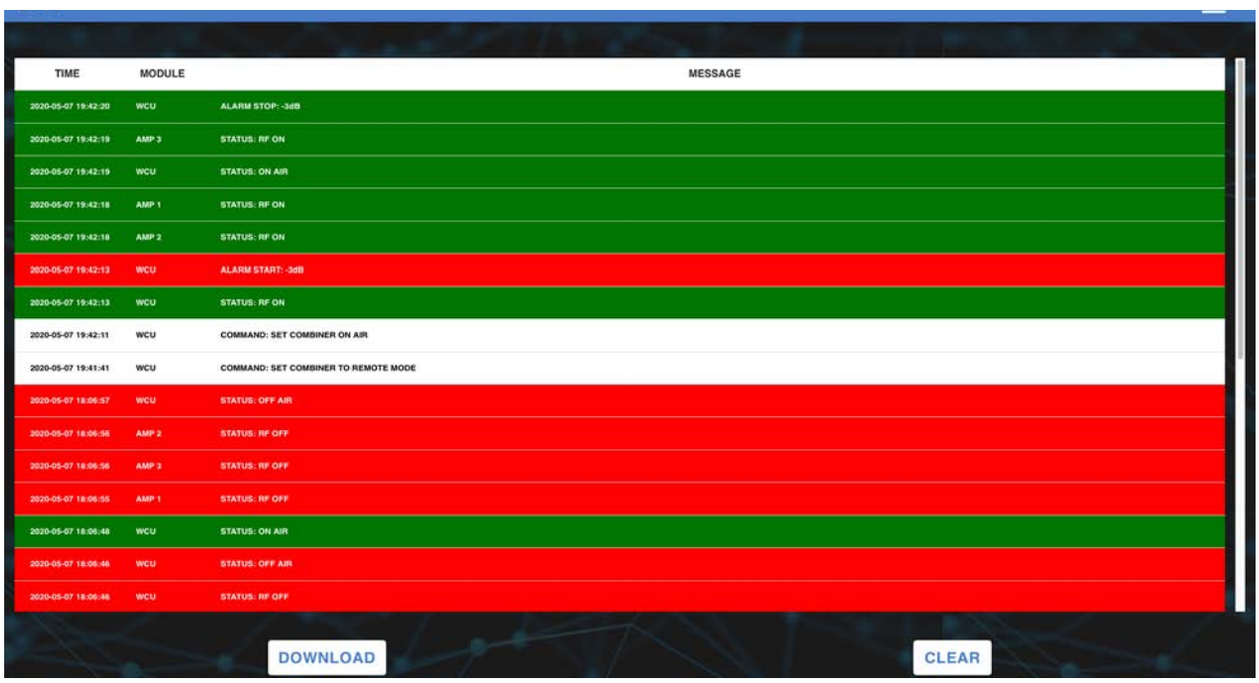
AXON and SENSOR has the most advanced WEB remote control of the market

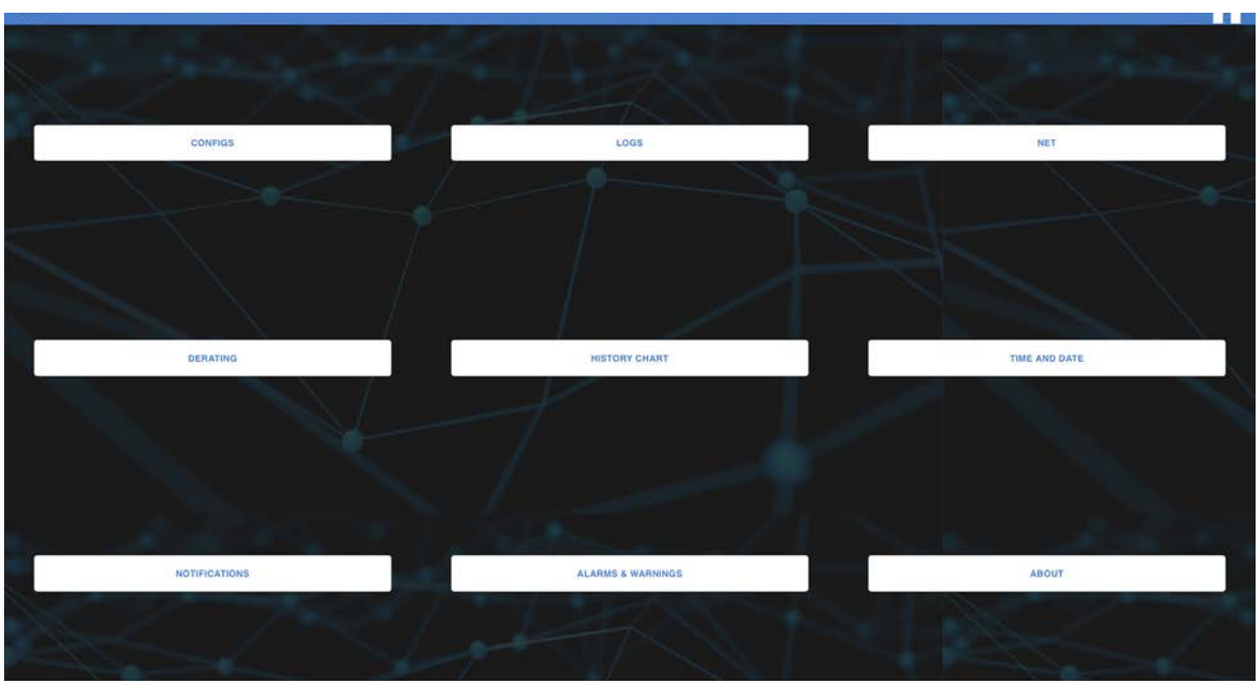
- Direct internet connection: SENSOR have direct connection to internet without the help of any external box or accessories.
- Extremely detailed web control with all main parameters fully controllable and adjustable, available. .
- It's has a graphics interface. Runs on any kind of devices: any PC browser, smartphones IOS or Android and tablets
- All this devices works without proprietary tools or Apps. Not need to install any specific software.
- An unique characteristic of the WEB remote control is: it sent email in case of alarms or warnings.
- It's possible program when to send info mails. The info mail are send Daily or weekly. This mails reporting the full status of all working parameters of the transmitter.
- Web log file: Up to 64000 events stored in the web board. It can save the log file in the PC in common text format (.txt)
- Remotely upgradable
- Remote control by TCP/IP: WEB + SNMP of all signal parameter
- MIRROR Network Mirror System Web log file: Up to 64000 events stored in the web board. The log file is saved in the PC in common text format (.txt)
- Full Local or Remote control by login username and password.
- Host Logic and tele-measurement (TM, TC & TA).
- Display of forward/reflection power value and reflection high alarm.
- SNMP v2c with Traps and Informs
- Extremely detailed web control with all main parameters fully controllable and adjustable, available without proprietary tools.
- Remote deep diagnostic capability: handle huge quantity of information to perform remote deep diagnosis.
- Measurements of more than 100 operational parameters including current, voltage and temperatures of each power supply and each RF module
- It safety handle huge quantity of information to perform remote deep diagnosis
- N+1 Profiles connector: provides 7 different memories selection. Memory settings are located in the internal memory and can be selected remotely and locally.
- Parallel Remote-Control Connector Interface with dry contact relay outputs and opto-isolated inputs with the following signals available: on/off, local/remote, alarm status, RF higher than a pre-set threshold, reset of alarms.

AMPLIFIERS

MODULE	CONNECTED	REMOTE	ON/OFF	FAULT	FWD	RFL	PWR SET	PWR IN	IPA	VPA	TEMP
AMP 1	◉	◉	◉	◉	300 W	0 W	300 W	640 mW	16 A	19 V	15 °C
AMP 2	◉	◉	◉	◉	300 W	0 W	300 W	619 mW	16 A	18 V	15 °C
AMP 3	◉	◉	◉	◉	301 W	0 W	301 W	568 mW	17 A	18 V	15 °C
AMP 4	◉	◉	◉	◉	300 W	0 W	300 W	594 mW	18 A	18 V	17 °C
AMP 5	◉	◉	◉	◉	301 W	4 W	301 W	635 mW	17 A	18 V	16 °C
AMP 6	◉	◉	◉	◉	300 W	7 W	300 W	670 mW	18 A	18 V	17 °C
AMP 7	◉	◉	◉	◉	301 W	0 W	301 W	574 mW	16 A	19 V	15 °C
AMP 8	◉	◉	◉	◉	300 W	3 W	300 W	604 mW	16 A	18 V	16 °C
AMP 9	◉	◉	◉	◉	300 W	0 W	300 W	609 mW	17 A	17 V	15 °C
AMP 10	◉	◉	◉	◉	301 W	4 W	301 W	619 mW	16 A	18 V	14 °C

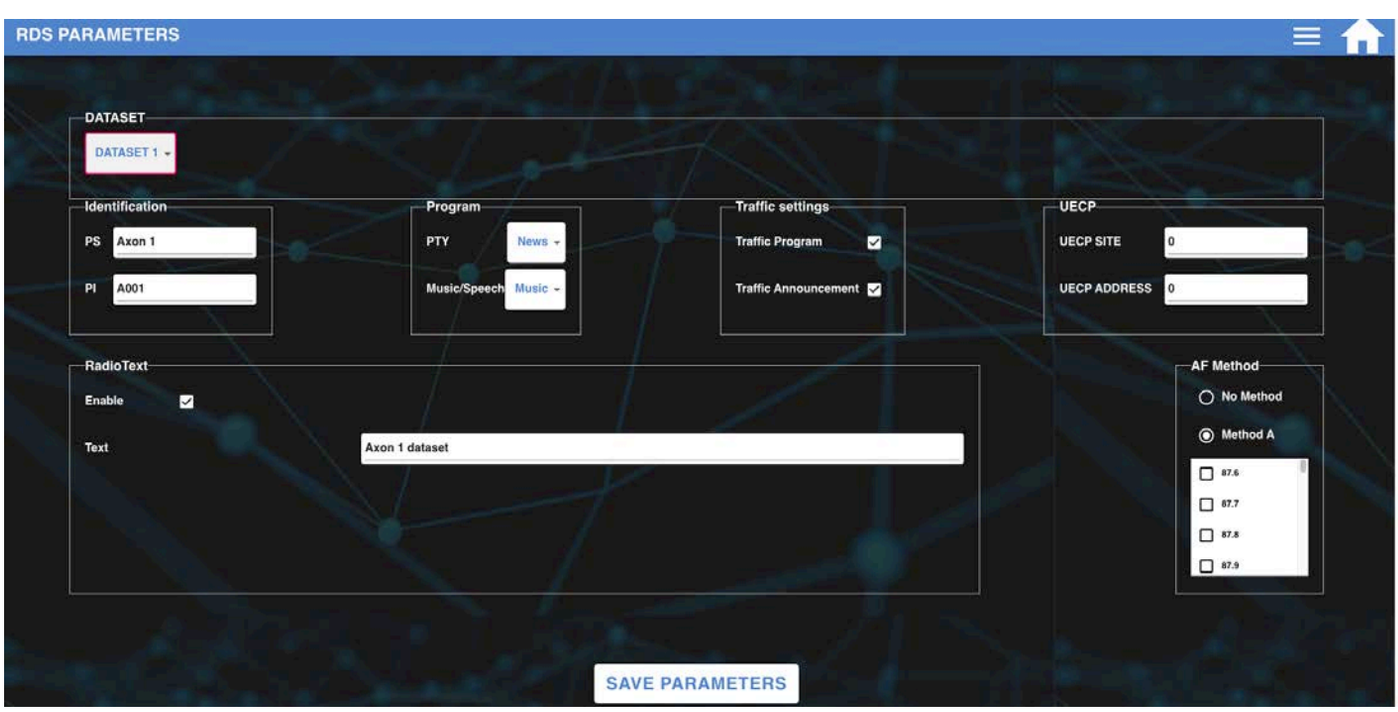

HISTORY
100
75
50
25
0
15:30 07/05
Amplifier RF Temp#1 : 26 °C
Amplifier RF Temp#2 : 23 °C
Amplifier RF Temp#3 : 24 °C
15:50 22/04 11:45 24/04 15:05 24/04 12:30 05/05 15:50 05/05 17:00 06/05 13:55 07/05 19:45 07/05
Amplifier RF Temp#1 Amplifier RF Temp#2 Amplifier RF Temp#3
TOTAL POWER
FWD POWER
RFL POWER
IPA
VPA
TEMP
DEV
FREQ


TIME MODULE MESSAGE
2020-05-07 19:42:20 WCU ALARM STOP: -3dB
2020-05-07 19:42:19 AMP 3 STATUS: RF ON
2020-05-07 19:42:19 WCU STATUS: ON AIR
2020-05-07 19:42:18 AMP 1 STATUS: RF ON
2020-05-07 19:42:18 AMP 2 STATUS: RF ON
2020-05-07 19:42:13 WCU ALARM START: -3dB
2020-05-07 19:42:13 WCU STATUS: RF ON
2020-05-07 19:42:11 WCU COMMAND: SET COMBINER ON AIR
2020-05-07 19:41:41 WCU COMMAND: SET COMBINER TO REMOTE MODE
2020-05-07 18:06:57 WCU STATUS: OFF AIR
2020-05-07 18:06:56 AMP 2 STATUS: RF OFF
2020-05-07 18:06:56 AMP 3 STATUS: RF OFF
2020-05-07 18:06:55 AMP 1 STATUS: RF OFF
2020-05-07 18:06:48 WCU STATUS: ON AIR
2020-05-07 18:06:46 WCU STATUS: OFF AIR
2020-05-07 18:06:46 WCU STATUS: RF OFF
DOWNLOAD
CLEAR


CONFIGS
LOGS
NET
DERATING
HISTORY CHART
TIME AND DATE
NOTIFICATIONS
ALARMS & WARNINGS
ABOUT

Dynamic RDS OPTION: Web Programmable. Specialy design to work as back-up in N+1 Systems

- Designed to work in N+1 Systems, puts automatically on air the RDS program of the fault transmitter
- Fully dynamic FM broadcast RDS encoder with independent communication port
- Control interface based on ASCII commands and UECP SPB-490 protocol
- Text features include dynamic PS, parsing, scrolling, tagging, fixed messages, scheduling and HTTP reading
- Excellent compatibility with broadcast automation systems
- Control software includes powerful Windows GUI application
- Supports control from external PHP/ASP scripts
- Easy and fast set-up
- Excellent spectral purity, direct digital RDS signal synthesis; compliant with EN 50067 / EN 62106
- Six switchable program sets (with optional DSN and PSN setting)
- Internal real-time clock incl. backup battery
- No special 19 kHz input needed - pilot tone internally recovered from MPX signal using digital PLL
- RS232 port to select the data set or inizialize any service



Maintenance highlights

Shock and vibration during the transport process can compromise the result of an installation. Optimizing the CELL Amplifier dimension and weight allows a small and smart package Small weight and dimensions help to meet the most demanding transport conditions for: Hermetic temperature control vibration and Shock Isolation handling light packs aid the health of the operators.

- All the WIRED LINE shares the same spare parts
- COPPER CARRIER: all components than needs heat dissipation such as LDMOS or unbalanced power resistors are mounted on a copper carrier to improve heat dissipation and greatly facilitate maintenance, in fact in cases where LDMOS is mounted directly on the heat sink, it causes high heat sink dissipation and it becomes almost impossible to heat the weld.
- HOT PLUG-IN POWER SUPPLY STANDARD MARKET AVAILABLE for Instant replacement, easy maintenance, without off-air. The power supply plug-in modules can be safely removed from the front panel without interrupting the transmission.
- MODULARITY with very light amplifier modules (less than 17kg/34lbs each)
- Maximum redundancy
- Ultra-compact size 2u for each amplifier module
- Air protection: all the internal components are designed to avoid the direct contact with the air, mainly the air coming in from the fans, this avoid all the failures produced by the air corrosion.
- Fully RF and power supply redundant
- Modularity with very light amplifier modules (less than 17kg/34lbs each)
- A single cell amplifier can be put on air as back-up of a bigger transmitter.
-

HOT PLUG-IN POWER SUPPLY

Delayed energized of the system and overvoltage surge protection

Prevents against peaks and high variation voltages, typical events after mains power blackout
The SENSOR family is equipped with protection systems against interruptions, micro-interruptions, overvoltage and mains discharges integrated in the standard configuration of the transmitter.
In particular conditions with extreme problems of bad electricity, sometimes, it is decided to strengthen these protections with an external protection system.
Extreme protection, it has all the functions to allow total protection of the transmitter even in cases of

Protections

There are two kinds of protection: Fast Hardware Protection and Soft Software Protections
In some conditions, like a short-circuit on the antenna or coaxial cable, the protection must be hardware and act in few nanoseconds. In fact, the software in this case is not fast enough to grant the protection of the equipment.
When the fault condition is soft, like the increase of VSWR caused by snow or humidity, a software protection can be use.
On the SENSOR series of FM Transmitter are implemented both: Fast Hardware Protections and Soft Software Protections.
The software protection reduces the output power without on-air interruption, keeping the RF devices always within the safe operating parameter.
The transmitter is protected in case of:

- Environmental over-temperature
- Cooling failure
- Amplifier breakdown
- Over and Under Voltage DC
- Over and Under Voltage AC
- RF and Power Supply Temperature
- RF Coaxial Output Open or Short Circuit Able of a long working time on Short/Open loads at all phase angles without any damage.
- Load mismatching, antenna short/open circuit.
- Delayed energized of the system after Mains Power Blackout prevents against peaks and high variation voltages typical of this event.
- Each module is equipped with a logic controller that allows full control by a local operator.
- Capability of a long working time on Short/Open loads at all phase angles without any damage.

Beyond the Hardware or Software protection, the transmitter is designed to be rough itself, to keep it functioning perfectly even in the worst case of operating conditions.

To achieve this, the important components of the transmitter are over-dimensioned or with hardware protected:

- 6th generation LD-MOS High Efficiency and VSWR 65:1.
- Over-dimensioned switching power supply with PFC (Power Factor Corrector)
- Over-dimensioned Heat Sinks and Fans
- Integrated AC Mains filtering
- Integrated lightning protection
- Integrated overvoltage spikes on the mains protection.

Reliability and robustness designed to be rough itself

Over

dimensioned all the components that determine the reliability: heatsinks, fans, dummy loads, LD-MOS, power supply

- Air filter: it gives high protection to the internal components, mounted on the front panel and easy to clean or replace.
- Totally made in aluminium: for minimum weight and maximum robustness.
- The PCB boards and the wiring are fully tropicalized by a specific coating for electronic assembly.
- These precautions guarantee a long life in extreme environmental conditions, preventing damage due to corrosion and erosion, protecting the components from the inclemency of the tropical climate. Defend from humidity, salt and pollution.
- • Over-dimensioned heatsinks.
- • Over-dimensioned fans.
- • Unbalanced dummy loads are twice the quantity needed
- • LDMOS RF amplifiers are 30% more powerful than the needed. They are 65:1 VSWR tolerant
- • Power supply deliver 30% more of power than the quantity used by the equipment at full rated power.
- • Integrated AC Mains filtering
- • Integrated lightning protection
- • Integrated overvoltage spikes on the mains protection
-

Final test and Burn-in

To get maximum reliability from a transmitter there are no shortcuts: good design, good component quality, and many, really many hours of work and time spent on final test and burn-in.
The final test, together with the “burn-in” are the only key to making a transmitter work well. It is a “sine qua non” condition.
Our engineers are obsessed with taking the final test for as long as possible, checking every detail, not neglecting a single parameter. When the transmitter has given the “pass” it must be perfect.

Mechanical construction

- The equipment is housed into a compact rack 2 Unit Aluminium cabinet
- Exclusive design of the air flow inside the transmitter guide the air into aluminium ducts avoiding contact with the electronic components
- Every component that produces heat is mounted on a heat sink
- Air passes exclusively into the aluminium heat sink avoiding contact with the electronic components.
- All the cover screws are 5mm diameter. Typically, 3mm are used but after open the cover just one time some of them are always broken. A big effort was made to develop mechanics with big screws and great advantage on facility to manipulate the transmitter when needed to open or close the covers making easy the maintenance.
- The mechanics parts of the transmitter are all made in aluminium. It provides low weight and robustness.

N+1 and Backups systems

- Conventional standby systems such as: exciter standby, (n+1) Transmitter standby, passive standby and active output stage standby can be implemented.
- No additional control units are needed for the exciter standby and the active amplifier standby.

Compliant with all the standard: ETSI – CCIR - FCC.

SENSOR meets all the most rigorous electromagnetic quality standards

Packing

Shock and vibration during the transport can compromise the result of an installation. Optimizing the CELL Amplifier dimension and weight allows a small and smart package Small weight and dimensions help to meet the most demanding transport conditions for: Hermetic temperature control vibration and Shock Isolation handling light packs aid the health of the operators.

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