ATLAS NG

UNIVERSAL BROADCAST ANALYZER

-0 MI2207-

PROMAX

NOTES ABOUT THE MANUAL

Read the user's manual before using the equipment, mainly **SAFETY RULES** paragraph.

The symbol ⚠ on the equipment means "**SEE USER'S MANUAL"**. In this manual may also appear as a Caution or Warning symbol.

WARNING AND CAUTION statements may appear in this manual to avoid injury hazard or damage to this product or other property.

ELECTRONIC MANUAL VERSION

You can access instantly to any chapter by clicking on the title of the chapter in the table of contents.

Click on the arrow ← at the top right page to return to the table of contents.

At Index, click on a page number to access the related content.

Click on the **link** or scan the **QR code** inside de video boxes ▶ in order to play a tutorial video.

USER'S MANUAL VERSION

Manual Version	Web Publication Date	Firmware Version
F6.0	June 2025	2.6.2

■Please update your equipment to the latest firmware version available.

- Last firmware download: https://www.promax.es/downloads/software/atlas/atlas-v3.0.4.zip
- Updating instructions: "Updating the meter" on page 18

WHAT'S NEW on manual F6.0

- New: Datalogger video ("Datalogger" on page 69).
- New: Adjacent Channel Power video ("Adjacent Channel Power (ACPR)" on page 82).
- New: Optical to RF converter video ("OPTICAL OPTION" on page 168).
- New: STMPE ST2110 annex option ("SMPTE ST2110 OPTION" on page 197).

- New: ST2110 specifications ("SPECIFICATIONS ATLAS NG" on page 140).
- New: Streaming analyzer specifications ("SPECIFICATIONS ATLAS NG" on page 140).
- Update: Specifications ("SPECIFICATIONS ATLAS NG" on page 140).
- Other minor updates and improvements.

NOTE: The details of changes in previous versions of the user manual can be found in the annex "PREVIOUS VERSIONS OF USER'S MANUAL" on page 214

SAFETY RULES

* The safety could not be assured if the instructions for use are not closely followed.

* Use this equipment connected only to systems with their negative of measurement connected to ground potential.

* The AL-103 external DC charger is a Class I equipment, for safety reasons plug it to a supply line with the corresponding ground terminal.

* This equipment can be used in Overvoltage Category I installations and Pollution Degree 2 environments.

* External DC charger can be used in Overvoltage Category II, installation and Pollution Degree 1 environments.

* When using some of the following accessories use only the specified ones to ensure safety:

  - Rechargeable battery
  - External DC charger
  - Car lighter charger cable
  - Power cord

* Observe all specified ratings both of supply and measurement.

* Remember that voltages higher than 70 V DC or 33 V AC rms are dangerous.

* Use this instrument under the specified environmental conditions.

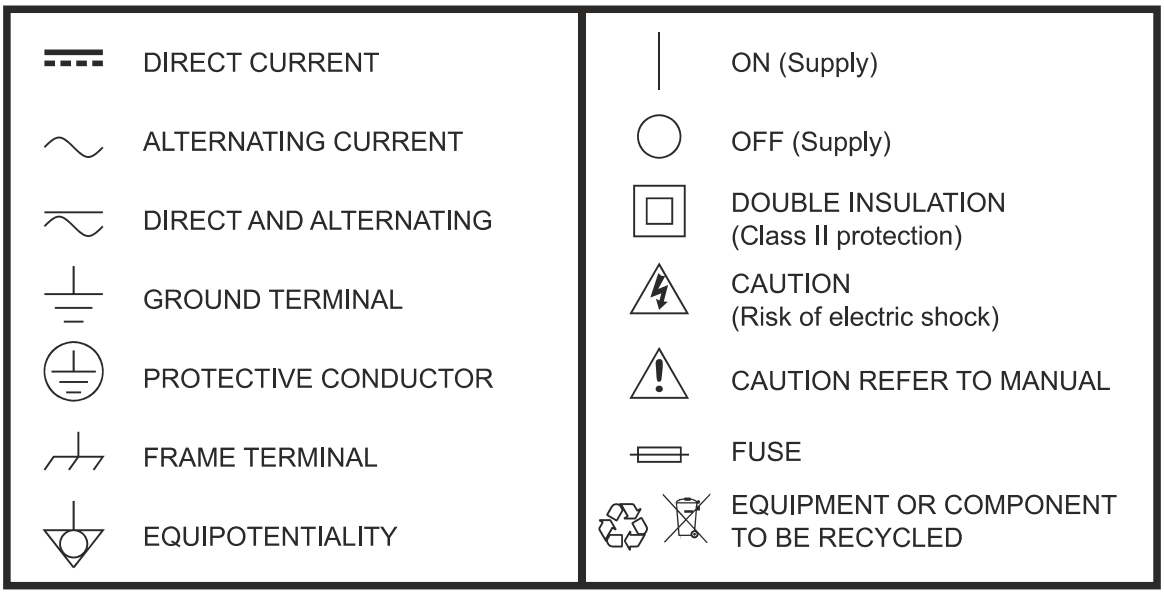
* When using the power adaptor, the negative of measurement is at ground potential.

* Do not obstruct the ventilation system of the instrument.

* Use for the signal inputs/outputs, specially when working with high levels, appropriate low radiation cables.

* Follow the cleaning instructions described in the Maintenance paragraph.

SAFETY SYMBOLS



DESCRIPTIVE EXAMPLES OF OVER-VOLTAGE CATEGORIES

* **Cat I**: Low voltage installations isolated from the mains.

* **Cat II**: Portable domestic installations.

* **Cat III**: Fixed domestic installations.

* **Cat IV**: Industrial installations.

CAUTION: The battery used can present danger of fire or chemical burn if it is severely mistreat. Do not disassembly, cremate or heat the battery above 100 °C under no circumstances.

TABLE OF CONTENTS

UNIVERSAL BROADCAST ANALYZER

ATLAS NG

1 INTRODUCTION

1.1 Description

The new **ATLAS NG** is the eighth generation of field meters that **PROMAX** launches. As each new generation, it represents an evolution from the previous, since it integrates the latest technological innovations and develops applications for the new demands and needs that have emerged in recent years.

The new **ATLAS NG** has been created with the aim to make easy the user experience. Everything has been designed so the equipment can be fully operated using the 10" multitouch display (even using wearing gloves). The friendly interface has been designed so the user has a simple tool to use but powerful. The new outer frame offers extreme ruggedness maximizing grip and ease of handling.

Figure 1.

The **ATLAS NG** is a universal analyzer that covers the most stringent requirements for broadcast professionals. It covers all standards developed by ISDB and the DVB consortium, as well as the ISDB and ATSC standard, including the next generation versions for these standards, like the ATSC 3.0.

Besides the basic functions of TV meter and spectrum analyzer for terrestrial and satellite band, the **ATLAS NG** can analyze signals from IPTV, Transport Streams, SDI, WiFi, and fiber optics. The frequency range arrives to 6 GHz,

covering the S and C bands, used by technologies like teleports or broadband wireless.

The **ATLAS NG** has a variety of input-output connectors that allows the user to work with most of the broadcast signals: N-type universal, 1PPS, FC/APC, ASI-SDI, SFP+, Ethernet among others. It also incorporates HDMI™ technology that allows audio and video output to be displayed on an external screen. Additionally, it can be connected to a network and remotely managed very easily using a standard web browser.

In an effort to facilitate its work to professionals, our long experience ensures an after sales quality service. In addition, there are software updates periodically released, that add functions and improvements to the equipment.

The **ATLAS NG** has been designed and developed entirely in the European Union. A multidisciplinary team of highly qualified professionals has dedicated effort and commitment to the development of a powerful, efficient and reliable tool. During the manufacturing process, all used materials have been subjected to a strict quality control.

Figure 2.

Introducing the ATLAS NG (01:30s)

SCAN

2 SETTING UP

2.1 Package Content

Check that your package contains the following elements:

- **ATLaS NG** Universal Analyzer.
- External DC charger.
- Mains cord for external DC charger.
- Car cable for external DC charger.
- BNC-TV IEC adapter (m/f).
- N-F Aero adapter (m/f).
- N-BNC adapter (m/f).
- N-SMA 50 adapter (m/f).
- GPS-USB receiver.
- WiFi-USB dual-band dongle.
- WiFi 4G/5G dual antenna.
- Jack cable (4V) RCA.
- Transport belt.
- Carrying bag.
- Transport suitcase.
- Handle.
- Monopod.
- Quick reference guide.

NOTE: Keep the original packaging, since it is specially designed to protect the equipment. You may need it in the future to send the analyzer to be calibrated.

2.2 Power

The **ATLAS NG** is powered by a 7.4 V built-in rechargeable LiPo battery of high quality and long operation time. This equipment can operate on battery or connected to the mains using a DC adapter. An adapter is also supplied to use with the power connector car (cigarette lighter).

2.2.1 First Charge

The equipment comes with the battery half charged. Depending on the time elapsed from first charge and environmental conditions may have lost some of the charge. You should check the battery level. It is advisable a first full charge.

2.2.2 Charging the Battery

Connect the DC power adapter to the equipment through the power connector on the left side panel (see figure).

Figure 3.

Then connect the DC power adapter to the mains via the mains cord. Ensure that your mains voltage is compatible with the adapter voltage.

For a fast charging is necessary to switch off the equipment.

If the equipment is ON, the battery charge will be slower, depending on the type of work you are doing. When connecting the equipment to the mains the mains connected symbol appears inside the battery icon.

The charger led indicates the battery status:

- **Red**: Charging.
- **Green**: Charge finished.
- **Blinking:** Battery not detected.
- **Off**: Battery discharging.

When switching on the equipment, the battery voltage is checked. If the tension is too weak to start, the equipment does not start up. In this case please charge the battery immediately.

2.2.3 Charge / Discharge Times

Average charging time with the equipment off (fast charge):

- 5 hours to achieve an 80% charge.
- 7 hours to achieve a 100% charge.

Battery life:

- With a 100% battery, the average duration is 4:00 hours.
- In TV Analyzer mode: 3 hours (mode: UHD TV with DVB-T2 demodulation).
- In SDI mode: More than 4 hours (mode: video + audio + video/audio parameters + audio level).
- In IPTV mode: More than 3:45 hours (mode: TV + audio, signal parameters, measurements).

2.2.4 Energy Saving

These options are available in the menu Settings -> Appearance.

- **Automatic Power Off**: It allows the user to select the time to power off, which is the time after which the equipment shuts down automatically unless pressing any key. Time options are: off, 1, 5, 10, 15, 30 o 60 minutes.
- **Screen timeout**: User can select a time after which the TFT screen turns off, but the equipment is still running normally. The equipment can measure (for example, making a datalogger or channel exploration) and the battery will last longer, about 10% more. The screen turns on by pressing any key. Time options are: off, 1, 5, 10, 30 or 60 minutes.

2.2.5 Smart Control Battery

The built-in battery of the equipment is of the "**smart**" type, which means that reports its state of charge. This information can be shown on screen by enabling the "**Show battery remaining time**" option. It shows the average time available next to the battery icon. In this way the user knows at any time the remaining battery level.

The remaining time charge that appears is calculated according to the work that has been doing. If the external supply is working, the average time would be reduced according to the increase in consumption that occurs.

2.2.6 Usage Tips

The battery is losing storage capacity as you go through its life. Contact your **PROMAX** distributor when necessary to replace the battery.

To extend battery life the user should follow these tips:

- In case of providing a long inactivity period of the equipment it is advisable to make every 3 months a charge / discharge cycle and a subsequent partial charge (40% aprox.).
- It is advisable to keep it in a cool place and away from heat.
- You should avoid keeping the battery for a long period of time at full load or fully discharged.
- There is not necessary to wait to fully discharge before a charge because these batteries have no memory effect.

2.3 Equipment Details

	Inputs and Outputs (03:13s)	SCAN

Figure 4. Front View.

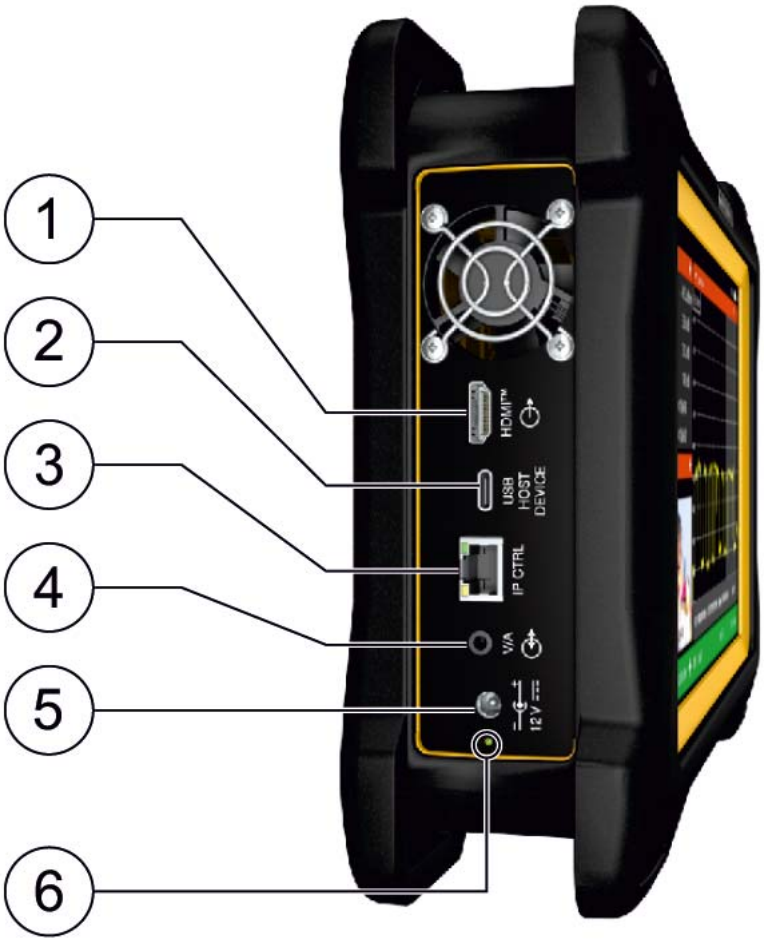


Figure 5. Left Side View.

1 Output with HDMI™ technology (supports HDMI 1.4b with 2.9 Gb/s and up to 3840x2160 @ 30 Hz).

2 USB-C Host/Device connector (selectable).

3 RJ45 connection for remote management.

4 Analogue Video/Audio input/output.

5 Power input connector.

6 LED indicator for battery charge level.

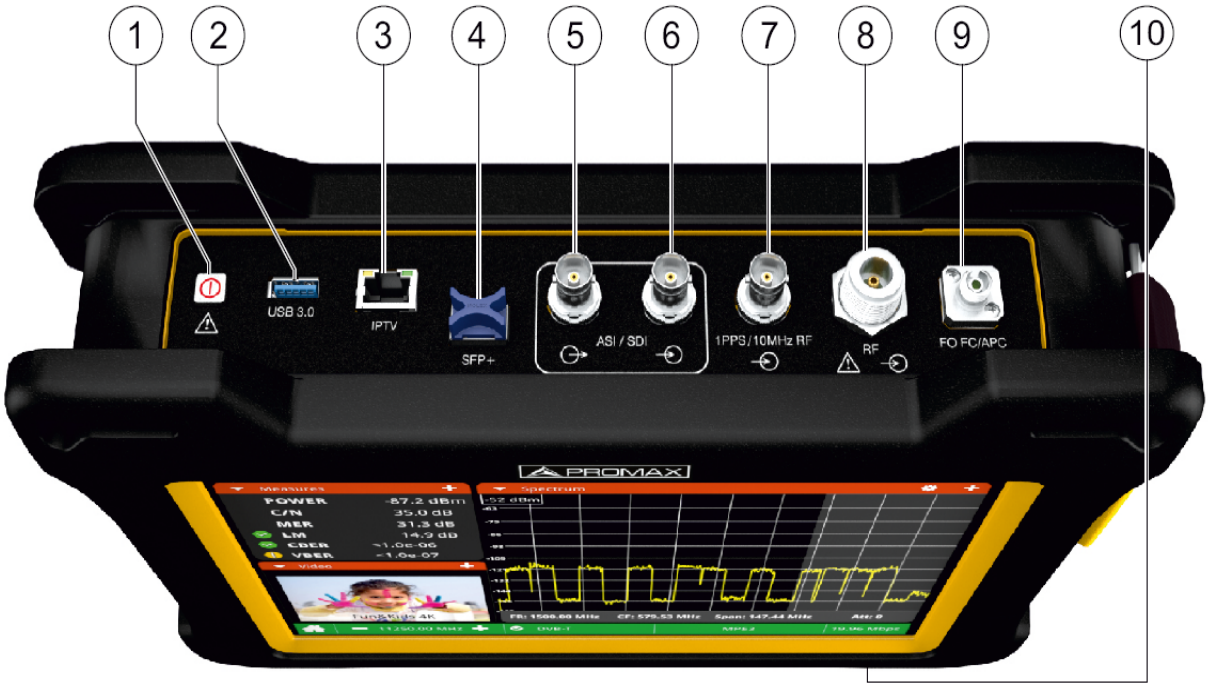


Figure 6. Top View.

1 ON/OFF. Press for an instant to switch on/off.
2 USB 3.0 port for WiFi dongle, GPS receiver or USB drive.
3 RJ45 connector for IPTV or OTT signal analysis.
4 SFP+ transceiver compatible with GE and fiber optics.
5 ASI/SDI output signal.
6 ASI/SDI input signal.
7 Input for reference synchronism signal 1PPS or 10 MHz.
8 Radio frequency input signal (RF).
9 Fiber optics input.
10 CAM module slot.

2.4 Switching On / Off

►Switching On:

1 Press the power on/off button located at the top of the device for a few moments. The SFP+ connector's LED lights will turn on, and the fans will start running to indicate that the device is booting up.

2 The boot screen appears and also a progress bar that indicates the system is loading.

3 After the system loads, it shows the same status before power off.

►Switching Off by software (recommended):

1 Press the switching off icon ⏻ at the home screen.

2 Select "Power Off" or "Reboot".

►Switching Off by button:

1 Press the ON/OFF button placed on the top of the equipment.

►Switching Off by software (Energy save):

1 Press the Settings icon ⚙ from the home screen.

2 Press the "Appearance" icon  .

3 The option "**Automatic Power Off**" allows the user to enable the automatic shutdown option. Select a waiting time (time without pressing any key and the meter not working) after which the equipment turns off automatically.

NOTE: The equipment keeps its last status (mode and screen) which is recovered when power on.

2.5 Reset

How to **RESET**: Hold down the ON/OFF key for 10 seconds until the equipment switches off.

When to **RESET**:

- **When it crashes and does not respond to any key.**
- **When it does not switch on.**
- **When it does not finish the boot process.**
- **When it does not complete the shutdown process.**

2.6 Icons

Icons on screen provide useful information about the equipment:

Icon	Description	Icon	Description
	Attenuator: The input signal has an adequate level.		Signal Quality according to threshold: Correct quality.
	Battery charging.		Signal Quality according to threshold: Quality close to threshold.
	Battery in use.		Signal Quality according to threshold: Not acceptable quality.
	RF Input Impedance: 50 Ohms.		External supply: Disabled.
	RF Input Impedance: 75 Ohms.		Outdoor unit power supply: It shows selected voltage.
	External supply (external option).		Outdoor unit power supply: It shows selected voltage and 22 kHz signal activated.

2.7 Home Menu

To access the **Home** menu from any other screen press the PROMAX logo at the left bottom corner.

From the Home menu you can access the work modes as described below.

	Home Menu (05:23s)	SCAN

- TV Analyzer: Tool to analyze and demodulate terrestrial, satellite, CATV or FM (for more details refer to "TV ANALYZER" on page 30).
- Spectrum Analyzer: Tool to measure and analyze RF signals in the complete spectrum range, from 5 MHz to 6 GHz.
- IPTV: Tool to inspect in detail IPTV streams (for more details refer to "IPTV " on page 84).
- Wi-Fi: Tool to analyze the Wi-Fi band (for more details refer to "Wi-Fi " on page 113).
- Mobile (option): Tool to analyze the 4G/5G signals (for more details refer to "MOBILE OPTION" on page 186).
- ASI: Tool to analyze Transport Streams (for more details refer to "ASI" on page 101).
- SDI: Tool to analyze SD-SDI, HD-SDI and 3G-SDI (for more details refer to "SDI " on page 122).
- TV Monitor: It allows viewing and listening to the video/audio received through the AV input (3.5 mm jack connector).

-  Manual: Access the quick guide and complete user's manual.

-  Settings: Access the settings menu (for more details refer to "SETTINGS AND PREFERENCES" on page 19).

2.8 Top Menu

To access the **Top menu** from any screen, swipe down from the top of the screen.

From the Top menu, you can access various management options. Some options are only available in certain modes.

The available options are:

- Workspace: Management of work folders.
- Task Planner: Management of scheduled tasks.
- USB: Management of USB connection type.
- GPS: Management of GPS.
- WiFi: Management of WiFi network through the WiFi modem.
- HDMI™: Management of HDMI™ technology interface.
- CAM: Management of CAM card.
- ASI: For enable/disable the ASI input/ouput.
- Antenna: Settings of antenna field strength.
- Supply Output: Management of power supply for external devices.
- Optical LNB (Option): To enable conversion of optical signals to RF.
- Volume: Management of audio volume.
- Brightness: Management of screen brightness.
- Notifications area: Latest notifications displayed on screen.

For more details refer to "Top Menu" on page 26.

2.9 Screenshot

The Screenshot function captures an image of what appears on the screen. The image is saved in PNG format.

There are 2 capture methods:

- Press and hold the PROMAX icon located in the bottom-left corner for one second.
- Swipe 3 fingers horizontally from right to left across the screen.

When the capture is done, a virtual keyboard will appear to name the file of the captured image. Pressing Enter will save the image to the workspace folder, and a screenshot notification will appear.

NOTE: The PROMAX icon may not appear on all screens; in such cases, you can try the second method.

►How to access the screenshots

1. Access the "Top" menu by swiping down from the top of the screen.
2. Select the "Workspace" option and choose your workspace folder. If you haven't created one, click on "Default."
3. In the dropdown menu, select the mode (Main, TV Analyzer...) in which the capture was taken.
4. Next, click on the "Screenshots" icon to list the captured images.
5. Tap briefly on an image to display it on the screen.
6. Tap and hold an image to view the options menu, which allows you to rename the image, delete it, preview it or copy it to a USB.

2.10 Channel Plan Editor

There are different ways to create and edit a channel plan from an existing one:

- Using the advanced tool "Channel exploration" (for more details refer to "Channel Exploration" on page 68).
- Download and edit the channel plan file from a computer. This method is described below.

►How to edit a channel plan from a computer

1. Access the **Top menu** by swiping down from the top of the screen.
2. Select the "Workspace" option and then choose the workspace folder. If you have not created any workspace folder yet, click on "Default."
3. In the dropdown menu, select the "TV Analyzer" mode.
4. Tap on the "CH Plans" icon to list all the channel plans.
5. Connect a USB memory to the USB 3.0 or USB-C port.
6. Press on the channel plan you want to edit until the options menu appears. Select the "Export to USB" option to copy the channel plan to the USB memory.
7. Safely disconnect the USB memory using the option to unmount the USB.
8. Now you can connect the USB memory with the channel plan to a computer to edit the file containing the channel plan. Use an XML editor such as XML Notepad (https://microsoft.github.io/XmlNotepad/).
9. Once edited, save the file in the root of the USB memory and connect it again to the USB port of the meter.
10. Access the "Top" menu and tap on "Workspace." In the side menu that appears, select "USB" The edited file of the channel plan will appear.
11. Tap on the channel plan until the options menu appears. Select the "Import to workspace" option to copy the channel plan to your workspace folder.
12. The edited channel plan is now available for use in the TV analyzer.

NOTE: Remember to follow the steps described in "Data Export to USB" on page 131 and disconnect the USB drive correctly to avoid data loss or damage to the device.

2.11 Use Case: Terrestrial RF Signal Tuning

The next section is a general explanation of how to tune a terrestrial RF signal, step by step. For more details refer to "TV ANALYZER" on page 30.

1. Connect the RF input signal cable to the RF input connector.
2. From the **Home** Menu press on **TV Analyzer** .
3. On the main window, press ▼ and select the **Spectrum** tool. On the small windows, you can select other tools, like the video tool to watch the demodulated signal or the measurements tool to check power and MER.
4. Swipe right from the left side or press on the bottom bar to display the tuning menu.
5. Select the **terrestrial band** .
6. Select **type of tuning**: Tune by frequency or Tune by channel .
   - **Tune by frequency**: Select a frequency to be tuned.
   - **Tune by channel**: User selects a channel to be tuned. Previously the user have to select a channel plan on the Channel Plan option. A channel plan contains a list of channels with settings for each channel (frequency, type of signal, bandwidth, etc.). When tuning by channel it will apply the settings obtained from the channel plan in first place.
7. On **Signal Type** option select **Mode**:
   - **Auto mode**: It identifies and tries to demodulate the signal automatically using the StealthID function (for more details refer to "►StealthID" on page 23).
   - **Manual mode**: The user must enter the signal type and the parameters to identify and demodulate it.
8. Select **Span** (recommended value for terrestrial: 50 MHz).
9. Adjust the **reference level**.
10. Select channel or frequency to be tuned. You can select your frequency or channel by using the tuning menu or by dragging left or right on the screen and then tapping on the signal.
11. When on the signal, the tuning bar turns green if the signal is locked. If not locked, the tuning bar does not change and maintains the red colour.
12. If locked, it tries to demodulate it. At the video tool will show the image and at signal parameters tool will show all related parameters.

2.12 Use Case: Satellite RF Signal Tuning

The next section is a general explanation of how to tune a satellite RF signal, step by step. For more details refer to "TV ANALYZER" on page 30.

1 Connect the RF input signal cable to the RF input connector.

2 From the Home Menu press on the **TV Analyzer** .

3 On the main panel, press ▼ and select the **Spectrum** tool on the main panel. On the small panels, you can select another tools, like the video tool to watch the demodulated signal or the measurements tool to check power and MER.

4 Swipe right from the left side or press on the status bar to display the tuning menu.

5 Select the **satellite band** .

6 Select **type of tuning**: Tune by frequency or Tune by channel .

- **Tune by frequency**: Select a frequency to be tuned.
- **Tune by channel**: Select a channel to be tuned. Previously you have to select a channel plan. A channel plan contains a list of channels with settings for each channel to be tuned (frequency, type of signal, bandwidth, etc.). When tuning a channel it will apply these settings in first place.

7 On **Signal Type** option select **Mode**:

- **Auto mode**: It identifies and tries to demodulate the signal automatically using the StealthID function (for more details refer to "▶StealthID" on page 23).
- **Manual mode**: The user must enter the signal type and the parameters to identify and demodulate it.

8 Select **Span** (recommended value for satellite: 100 MHz).

9 Adjust the **reference level**.

10 Select channel or frequency to be tuned. You can select your frequency or channel by using the tuning menu or by dragging left or right on the screen and then tapping on the signal.

11 When you are on the carrier, the bottom tool bar turns green when the signal is locked. If not locked, the bottom bar turns red.

12 If locked, it tries to demodulate it. On video tool shows the image and on signal parameters shows all related parameters.

2.13 Updating the meter

In order to update your ATLaS follow these steps:

1. Download the firmware from the ATLAS datasheet at the PROMAX website in order to obtain the latest version of the update file.
2. The downloaded file is in ZIP format. Unzip it and copy the UDPATE file to the root of a USB memory.
3. Restart the meter and connect it to the mains to avoid draining the battery during the update process.
4. Go to the **Settings** menu.
5. Press **Update** to enter the update screen.
6. The update screen shows in the field "last release" the current release installed on the meter.
7. At this time (not before), insert the USB drive into the USB 3.0 port or the USB Type-C port. The meter will detect the USB and analyze the file it contains.
8. After few moments (it can change according to the file size) if the update file is correct, the "Update" button turns green and shows the release number.
9. Press the "Update" button and confirm to start the update process. A bar indicates the update progress. Wait a few minutes.
10. Once finished, a pop-up window will appear informing that the software is up to date. Disconnect the USB memory and press OK. The meter will restart.
11. During the boot process, it shows the message "booting new update" in the upper left corner, indicating that the update has been successfully installed. If, on the other hand, it displays the message "rolling back" it will indicate that there has been an issue during the update (corrupt file, damaged USB drive, etc.), and the previous version will be restored.
12. At the end of the update process, check that the new release has been installed correctly. Verify that the **Release** field (in Settings -> Equipment Info) reflects the newly installed software version.

3 SETTINGS AND PREFERENCES

3.1 Settings Menu

Press **Settings** on the Home Menu to access the Settings menu.

Settings Menu (02:19s) SCAN

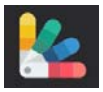
Settings are classified according to these categories:

- **General**: Equipment information and customizing options.
- **TV Analyzer**: TV analyzer settings.
- **IPTV**: IPTV settings.
- **Spectrum Analyzer**: Spectrum analyzer settings.

3.1.1 General Settings

►Equipment Information

- Provider: Provider's name.
- Name: Equipment's name.
- Serial number: Unique identification number for this equipment.
- Release: Version of software installed on the equipment.
- Free data memory: Free size of the flash memory installed on the equipment / Size of the flash memory installed for data (dataloggers, screenshots, service recording and so on...).
- Company: Name of the company which owns the equipment (set by user; protected by PIN code).
- User: Name of the equipment's user (set by user; protected by PIN code).
- Change Pin Code: It allows user to change the pin code. The default PIN is 1234.
- Product ID: Identifier name of the equipment.
- License: Information about the software licenses used.
- Report: It generates a report of the current status of the meter and it is exported to a pendrive that must be connected to the USB port.

►Appearance 

- Automatic Power Off: It allows the user to select the time to power off, which is the time after which the equipment shuts down automatically unless an user press any key. Time options are: off, 1, 5, 10, 30 o 60 minutes.
- Language: Language used on menus, messages and screens. Available languages are: English, Spanish, German, French, Polish, Portuguese and Catalan. Once the new language is selected, the equipment changes automatically to the new language.
- Screen timeout: User can select a time after which the TFT screen turns off, but the equipment is still running normally. The screen turns on by pressing any key. Time options are: off, 1, 5, 10, 30 o 60 minutes.
- Theme: It is the colour palette used on screen (dark or light).
- Show battery remaining time: It hides or shows the remaining battery time. Remaining battery time is displayed next to the battery level icon.
- Indicator: It activates the display of bars on the sides, indicating the presence of hidden menus. You need to drag from the bar toward the centre of the screen to display the menu.

►Time & Date 

- Date Format: It allows the user to change the time format (12 or 24).
- Continent: It allows the user to select continent where the meter is in order to determine if it is necessary to apply DST (Daylight Saving Time).
- Country: It allows the user to select the capital of the country where the meter is.
- Network time: It allows you to enable or disable date and time synchronization with an internet time server.

►Network 

Network parameters identify the equipment into a data network. It is necessary to connect to a PC via ethernet.

- MAC: Physical address of the equipment. It is unique and cannot be edited.
- DHCP: Enable this option to get the proper IP address when the unit is

first connected to a network. That feature contributes to make things easier to installers when debugging network access.

- IP: IP Address of the equipment into the local network.
- IP NetMask: Subnet mask of the equipment (by default 255.255.255.0).
- Gateway: IP Address of the router into the local network (by default 10.0.1.1).
- DNS 1: Option 1 of DNS (by default 8.8.8.8). DNS stands for Domain Name System and translates domain names into IP addresses so that computers can communicate with each other over the Internet.
- DNS 2: Select DNS2 (by default 8.8.4.4).

►Options 

It shows all the options that have been installed and also allows installing new options. To install a new option press on "+" and enter the option code. Available options are:

- DAB/DAB+ option. It is made up of:
  - DAB ETI Recording.
  - DAB Advanced.
  - DAB TII.
- Advanced FM option. It is made up of:
  - FM Advanced.
  - FM Histogram.
  - FM MPX Spectrum.
- Optical fibre option. It is made up of:
  - LNB Optical power.
  - RF to fiber converter.
- 4G/5G option.

For more details about the DAB option refer to "DAB/DAB+ OPTION" on page 171.

For more details about the FM Advanced option refer to "FM ADVANCED OPTION" on page 178.

For more details about the 4G/5G option refer to "MOBILE OPTION" on page 186.

If you are interested in any of these options please contact PROMAX (https://www.promaxelectronics.com/ing/contact-promax/).

►**Wizard** 

- Show wizard next restart: It allows enabling or disabling the assistant that helps the user to set the meter. When enabled, the device will turn off, and when turned back on, it will display the assistant.
- Input name: User's name.
- Input e-mail: User's e-mail.
- Input phone: User's phone.
- Input subscription: It allows the user to subscribe or unsubscribe from the updating service to keep the meter updated to the last software version available.

►**Software Update** 

- Last Release: It shows information about the current update installed on the meter.
- Update: It shows if there is an update available for download and install.

For more details about the updating process refer to "Updating the meter" on page 18.

3.1.2 TV Analyzer Settings

►**Measurements** 

- Terrestrial Units: It allows the user to select the terrestrial measurement units for the signal level. Available options are: dBm dBmV and dBµV.
- Satellite Units: It allows the user to select the satellite measurement units for the signal level. Available options are: dBm, dBmV and dBµV.
- Attenuators linked to reference level: If enabled, when the user changes the reference level, the attenuation value is adjusted according to the selected reference level, and vice versa. If disabled, both values are independent, allowing the user to change the reference level without affecting the attenuation value, and vice versa.
- Power Offset: It adds this value to the power/level measurement. When this value is different to 0 dB, next to power/level measurement an asterisk (*) is shown as a warning that offset is been applied.

- Terrestrial Downlink: If this option is enabled it allows you to set a local oscillator in terrestrial band and displays intermediate and downlink (DL) frequencies calculated from local oscillator. For example, it allows you to work with terrestrial radio-links or frequency converters.

►StealthID 

It allows the user to select the set of signal types that the meter will use while auto identifying the signal.

To enable the StealthID tool, the user must select the Auto mode in the "Signal Type" option at the Tuning menu when working in "TV Analyzer".

When the StealthID tool is working trying to identify a signal in "TV Analyzer" mode, a magnifying glass will be displayed on the tuning bar next to the type of signal that is trying to identify. If it does not lock the signal, it will move on to the next type of signal, trying it cyclically with all the signal types that are "ON" in the "StealthID" settings.

Type of signals that can be automatically detected by the meter:

- Terrestrial
  - Analog
  - Annex B.
  - FM
  - DVB-C
  - DVB-C2
  - DVB-T
  - DVB-T2
  - ISDB-T
  - ATSC
  - ATSC-3
  - DAB
- Satellite
  - DVB-S
  - DVB-S2
  - DVB-S2X (optional)
  - DSS

►Exploration configuration 

Allows the user to select the levels and attempts to identify a channel during channel exploration (for more details refer to "Channel Exploration" on page 68).

- Min. Ter. Level: It sets the minimum level for a terrestrial analogue signal to be identified when channel exploring.
- Min. Ter. Power: It sets the minimum reference level for a terrestrial digital signal to be identified when channel exploring.
- Min. FM Level: It sets the minimum power for a FM signal to be identified when channel exploring or datalogging.
- Number of attempts to lock terrestrial signal: This is the number of times the meter attempts to lock the signal of a terrestrial channel before moving on to the next channel.
- Number of attempts to lock satellite signal: This is the number of times the meter attempts to lock the signal of a satellite channel before moving on to the next channel.

►Datalogger configuration 

Allows the user to select the attempts and time when performing datalogging.

- Number of attempts to lock terrestrial signal: This is the number of times the meter attempts to lock the signal of a terrestrial channel before moving on to the next channel.
- Number of attempts to lock satellite signal: This is the number of times the meter attempts to lock the signal of a satellite channel before moving on to the next channel.
- Maximum time to make a terrestrial measurement (s): This is the maximum time the meter has to perform the measurement of a terrestrial signal.
- Maximum time to make a satellite measurement (s): This is the maximum time the meter has to perform the measurement of a satellite signal.
- Maximum time to make a FM measurement (s): This is the maximum time the meter has to perform the measurement of a FM signal.
- Maximum time to make an Analog / Generic measurement (s): This is the maximum time the meter has to perform the measurement of an analog / generic signal.

- Use Link Margin to optimize acquisition time: If this option is enabled, it uses the Link Margin measurement to improve the measurement time.

3.1.3 IPTV Settings

► Network 

Network parameters to receive IPTV signal.

- DHCP: Enable this option to get the proper IP address when the unit is first connected to a network that uses this protocol. That feature contributes to make things easier to installers when debugging network access.
- IP: IP Address of the equipment into the local network.
- Mask: Subnet mask of the equipment (by default 255.255.255.0).
- Gateway: IP Address of the router into the local network (by default 10.8.8.1).
- MAC: Physical address of the equipment. It is unique and cannot be edited.

►IGMP 

- IGMP Versions: Protocol for multicast transmissions used by the router. In case of use it, version must be selected:
  - IMGPv1: IGMP version 1. Each time user selects a multicast address, meter asks for the new multicast stream.
  - IMGPv2: IGMP version 2. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one.
  - IMGPv3: IGMP version 3. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one, from the servers approved by the user.
  - Off: It does not send any IGMP messages and discards the received ones.

3.1.4 Spectrum Analyzer Settings

►SP Measurements 

- Spectrum Units: It allows the user to select the power units (dBm, dBmV, dBuV).
- Attenuators linked to reference level: If enabled, when the user changes the reference level, the attenuation value is adjusted according to the selected reference level, and vice versa. If disabled, both values are independent, allowing the user to change the reference level without affecting the attenuation value, and vice versa.

3.2 Top Menu

To access the Top menu from any screen, swipe down from the top of the screen.

From the Top menu, you can access various management options. Some options are only available in certain modes.

The options are described below.

►Workspace Settings

It allows you to manage the workspace folders where data and resources are stored.

For more information refer to "WORKSPACES" on page 128.

►Task Planner

It allows scheduling certain tasks to run at a specific date and time. It is currently available for screenshots.

Selecting this option opens a window with the available scheduled tasks. Pressing "Add Task" opens a window that allows scheduling a task with the following settings:

- Type: Select the type of task to schedule.
- Run every (min): If the task is repetitive, select the interval between tasks.
- Start date: Start date and time of the task.
- Expiration date: End date and time of the task.

When a task is scheduled, a calendar icon appears in the top information bar, indicating that there are pending tasks to be executed.

►USB Settings

It allows managing the devices connected to the USB 3.0 port and the USB 2.0 Type-C port.

The USB 2.0 Type-C port supports two types of connections: host or slave. The appropriate option must be selected based on the connected device and its interaction with the meter.

It also allows safely unmounting the memory connected to the USB 3.0 port by pressing SDA in order to prevent damage to the memory and its data.

►GPS Settings

It allows managing the GPS connected to the USB 3.0 port or the USB-C port.

If the antenna is connected to the meter, it displays a screen showing the detected satellites, status (synchronized or not), coordinates, and other data.

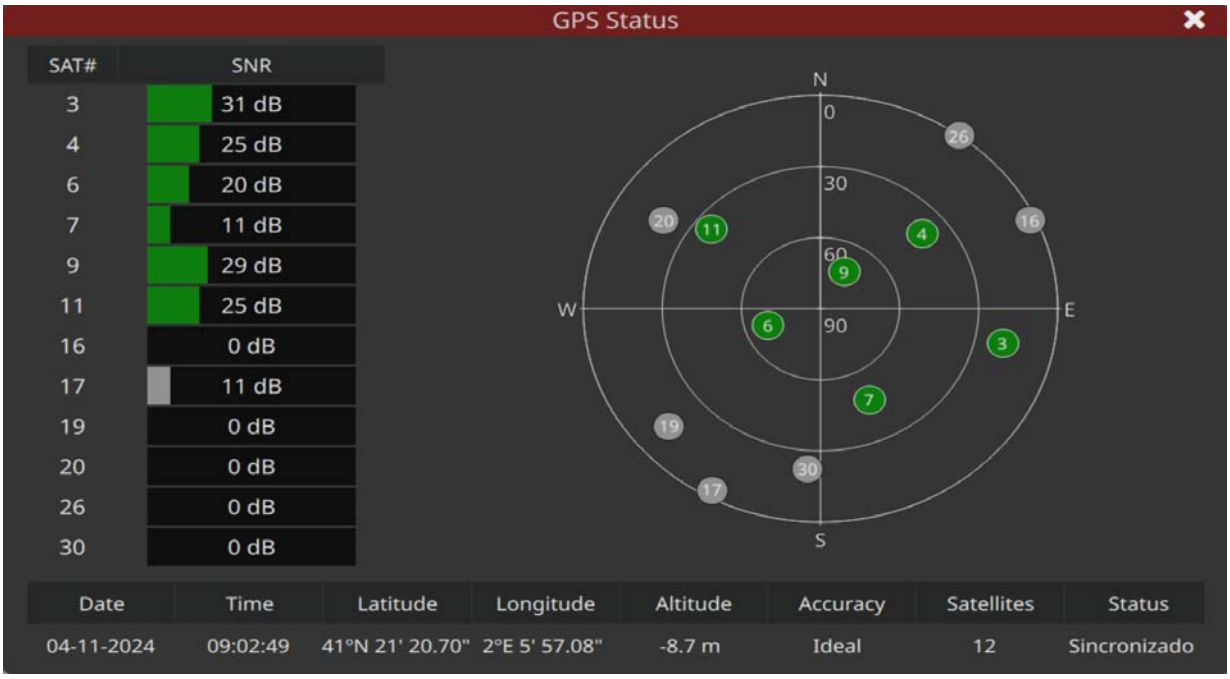


Figura 7.

►WiFi Settings

It manages the Wi-Fi connection through the USB-WiFi adapter connected to the USB port.

1 Connect the USB Wi-Fi adapter (provided with the device) to the USB 3.0 connector located at the top of the device. The adapter detects available Wi-Fi networks.

2 Access the Top menu by swiping down from the top of any screen and tapping on the Wi-Fi option to open the Wi-Fi settings window with access parameters.

3 The Wi-Fi configuration window displays the Wi-Fi networks detected by the USB Wi-Fi adapter. It also allows enabling/disabling the DHCP protocol, which automatically assigns an IP to the device. If not using this protocol, the IP, mask, and gateway must be entered manually.

►HDMI Settings

It allows you to view the resolution and other details of the interface with HDMI™ technology.

►CAM Settings

It allows you to manage the CAM card.

►ASI Settings

It allows you to enable/disable the ASI output by BNC or SFP+.

►Antenna Settings

It allows configuring the antenna field strength and input impedance at the RF input (N connector) of the meter.

The input of the meter is designed to have 50 Ω. If the input is 75 Ω, a 75/50 Ω adapter should be used at the meter's input (see optional accessories in "SPECIFICATIONS ATLAS NG" on page 140) and then select the 75 Ω option.

When selecting 75 Ω, a software correction is done, applying the 7.5 dB loss of the 'Min loss pad' impedance adapter.

► Supply Output Settings

It allows you to enable or disable external power to supply voltage to external devices (5V, 12V, or 24V). If the **External** Voltage option is selected, it will measure the voltage present in the connector but will not apply any voltage.

►Volume Settings

It allows you to increase or decrease the audio volume using a sliding bar.

Clicking on the icon on the left side of the slider mutes the audio output. Clicking on the icon on the right restores the volume to the level before it was muted.

►Brightness Settings

It allows you to increase or decrease the screen brightness using a sliding bar.

Clicking on the icon to the left of the slider lowers the brightness to the minimum, while clicking on the icon to the right increases the brightness to the maximum.

►Notification Area

It allows you to view the most recent notifications that have appeared on the screen.

4 TV ANALYZER

4.1 Introduction

The TV Analyzer mode allows you to analyze RF signals: terrestrial, satellite, CATV or FM. It can demodulate and display services for terrestrial/CATV from 45 to 1000 MHz and satellite from 250 to 3000 MHz.

TV Analyzer Introduction (02:58s)

SCAN

The TV Analyzer screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Some utilities are available only for certain types of signals.

Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window.

There are also a menu with advanced tools that the user can deploy by swiping from the right side of the screen to the left.

The tools available for the TV Analyzer are:

- Spectrum ("Spectrum" on page 35)
- Measurement ("Measurement" on page 37)
- Signal Parameters ("Signal Parameters" on page 39)
- Video ("Video" on page 40)
- Audio levels ("Audio levels" on page 41)
- SFP Parameters
- Video/Audio parameters ("Audio/Video Parameters" on page 42)
- Constellation ("Constellation" on page 43)
- Echoes ("Echoes" on page 45)
- Shoulder attenuation ("Shoulder Attenuation" on page 46)
- MER by Carrier ("MER by Carrier" on page 48)

- Spectrogram ("Spectrogram (Spectrum + Waterfall)" on page 49)
- Merogram ("Merogram (MER by carrier + Waterfall)" on page 51)
- Recording ("Recording" on page 52)
- TS Analyzer ("Transport Stream Analyzer" on page 54)
- FM ("FM" on page 60)
- Optical Power Meter ("Optical Power Measurement" on page 61)
- DAB TII ("DAB/DAB+ OPTION" on page 171)

The advanced tools available for the TV Analyzer are:

- Channel Exploration ("Channel Exploration" on page 68)
- Drive Test ("Drive Test" on page 63)
- Datalogger ("Datalogger" on page 69)
- Discover FM ("Discover FM" on page 72)
- Blind Scan ("Blind Scan" on page 71)

4.2 TV Analyzer Screen

Figure 8.

1 Triangle ▼ (all windows): It displays a menu with all available tools. Select one tool to be displayed. The same tool cannot be in more than one window (for more details about tools refer to "Tools" on page 34).

2 Plus (+) sign (small windows): It maximizes the window, switching to the main window position.

3 Gear ⚙ (main window): It displays a settings menu for the tool. It is available for some tools and only on the main window.

4 + / - sign (main window): It shows the panel in full-screen mode. To return to the previous view press on the minus sign.

5 Information Bar: It is the bar located at the top of the screen that displays additional information about the meter. Different icons may appear depending on the function in use (see "Icons" on page 11). In the image, from left to right: Band (terrestrial/satellite); name of the active workspace; attenuation enabled/disabled; antenna input impedance (50/75 Ω); external power enabled/disabled; time; battery level.

6 Status bar: It shows tuning parameters like frequency/channel selected, signal info (standard, bandwidth...), network name and Transport Stream total bitrate. Also it gives access to Tuning Settings (for more details refer to "Tuning Settings" on page 33). The Promax icon returns to the Home screen.

4.3 Tuning Settings

To display the Tuning Settings swipe right from the left side of the screen or press any field related to tuning (frequency, span...). Tuning Settings change according to the type of signal to tune.

- Band: It allows selecting between terrestrial or satellite frequency band.
- Tune by: It allows selecting between **tuning by channel** or **tuning by frequency**. If you select a channel or a channel plan it changes automatically to tuning by channel.
- Tuning Frequency: It allows selecting the frequency to tune. Select frequency value and frequency units (MHz, kHz, Hz) on the keypad. **Tune by Frequency** must be selected before enter the frequency.
- Channel Plan: It allows selecting a channel plan. Press on the "Channel plan" option to show a list of available channel plans.
- Channel: It allows selecting a channel from the channel plan. Press on the "Channel" option to show a list of available channels.
- Signal type: It displays the current standard and allows selecting another standard in the same band (terrestrial or satellite). Press on the "Signal type" option to show a list of available standards and to select the signal type working mode.
- Signal type Mode: Press on the "Signal type" option to select **Manual mode or Auto mode**. The Auto mode enables the StealthID in order to identify automatically the signal. In the Manual mode the user must select the standard of the signal type to be demodulated.
- Downlink frequency (satellite): It displays downlink (DL) frequency calculated from local oscillator value.
- Polarization (satellite): It allows the user to select the signal polarization between Vertical or Horizontal. In tuning by channel mode this option can not be changed because is defined by the channel.
- Sat Band (satellite): It allows the user to select the High or Low band frequency for satellite channel tuning. In tuning by channel mode this option can not be changed because is defined by the channel.
- Symbol Rate (DVB-S/DVB-S2/DVB-S2x): Symbol Rate determines the rate at which symbols occur. A symbol may consist of one or more bits as determined by the modulation format.
- Center Frequency: It allows the user to edit the center frequency. The center frequency is the frequency at which the screen is centered.

- Span: It allows to edit the span, which is the frequency range displayed on screen on the horizontal axis. The current span value appears at the bottom.
- Reference Level: It allows the user to edit the reference level. The reference level is the power range represented on the vertical axis. The Reference Level can be changed directly swiping up or down.
- Attenuation: It can work in Manual mode or Automatic mode. In manual mode the user must select a value of attenuation between 0 and 70. In automatic mode the system applies attenuation according to the signal.
- Capture mode: It allows specifying whether the content of the demodulated signal is TS or T2MI.
- Maximum trace hold: It records the outline of the spectrum when reaches the maximum level.
  - Enable: It enables the maximum trace hold.
  - Hide: It shows/hides the last maximum trace recorded.
  - Freeze: It holds and keeps on screen the last maximum trace.
- Minimum trace hold: It records the outline of the spectrum when reaches the minimum level.
  - Enable: It enables the minimum trace hold.
  - Hide: It shows/hides the last minimum trace recorded.
  - Freeze: It holds and keeps on screen the last minimum trace.
- PLP (DVB-T2/ATSC3).
- Profile (DVB-T2).
- Slice (DVB-C2).
- Layer (ISDBT).
- PLS (DVB-S2/DVB-S2x).
- DiSEqC commands (DVB-S/DVB-S2/DSS).

4.4 Tools

In the following sections, a description of each tool associated with the TV Analyzer is provided.

The tools are available in the dropdown menu located on the top bar of each panel of the TV Analyzer.

Some tools are only available for certain types of signals. Tools that are not available for the selected signal type will appear grayed out. When clicking on these option, a pop-up message will appear explaining why it is not available.

4.5 Spectrum

The spectrum tool shows the spectrum of the signal received from the RF input.

Spectrum (02:26s) SCAN

►Touch gestures


Tap: It places the cursor on the point.


Zoom out: It amplifies signal, reducing the span.


Zoom in: It reduces signal, amplifying the span.


Horizontal drag (spectrum): It moves along the frequency band.


Horizontal drag (tuned signal): It moves the signal over the frequency.


Vertical drag: It changes reference level.

►Screen

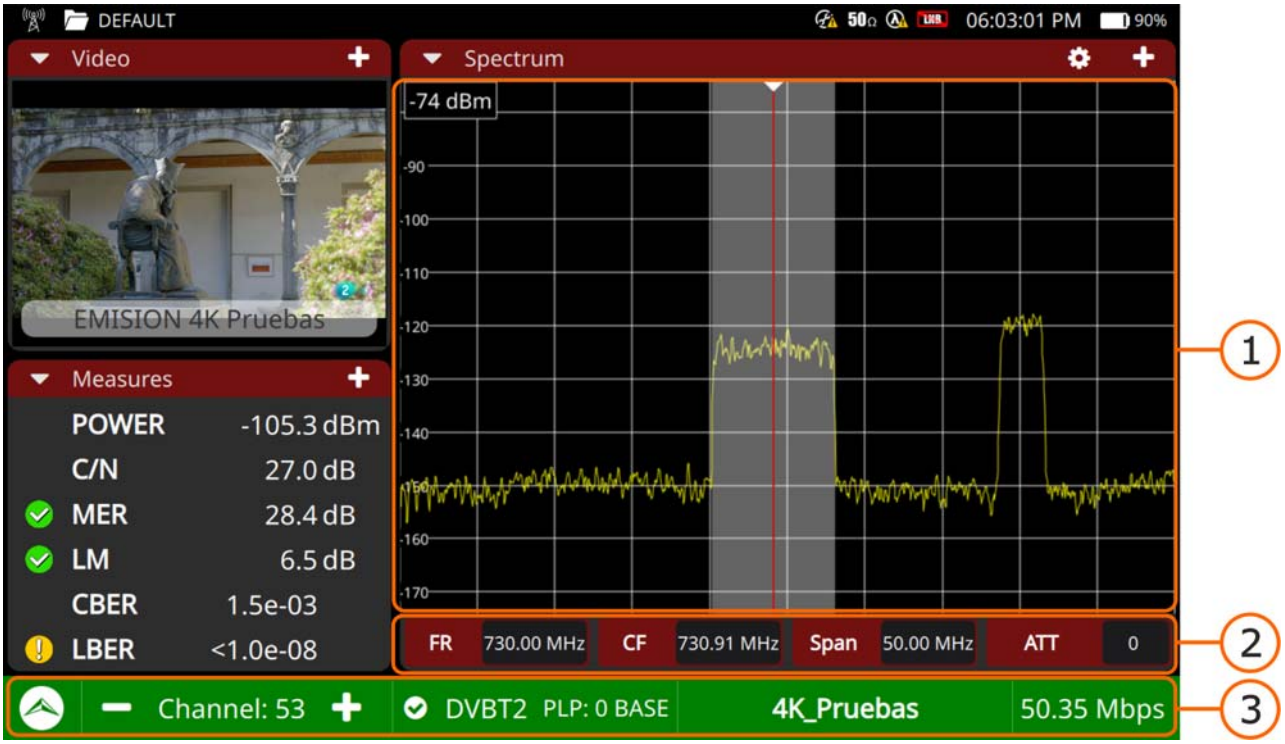


Figure 9.

1 Spectrum: The red vertical line shows the frequency been tuned. At either side there are two dotted white lines that define the signal bandwidth over which the meter is trying to identify the tuned signal. When the signal is tuned, the meter auto identifies it. The dotted lines change to a full white band falling over the tuned signal.

2 Spectrum bar: There are four fields that give quick information about the tuned frequency in this order: frequency tuned, the center frequency in the spectrum window, the span and the attenuator selected. Pressing on any of this buttons opens that field in the tuning menu.

3 Status Bar: When it turns green, it indicates that TS or ALP (for ATSC 3.0) is being received. In red, it indicates that the data stream is not being received. It also displays several fields, such as the network name and the total bitrate of the transport stream.

►Settings

Press on the gear to display the settings menu:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.

- dB/div: It allows modifying the number of dB per division on the vertical axis of the graph that displays the power. The available values are: x10, x5, x3, x2, x1.
- Marker: It defines how to display the marker: Line, marker or horizontal.
- Resolution filter: It defines the resolution bandwidth filter value. Resolution filters available are: 2 kHz (only terrestrial band), 10 kHz, 20 kHz, 30 kHz, 40 kHz, 100 kHz, 200 kHz and 1000 kHz. According to filter selected maximum and minimum span changes.
- Visible bandwidth (span): It disables or enables the display of the tuned channel bandwidth.
- Center marker: It centers the selected frequency on the screen.

4.6 Measurement

The measurement tool displays all relevant measurements for the tuned signal.

Measurements (00:53s) SCAN

►Touch gestures

Tap: Select a measurement to monitor it on the graph.

►Settings

Press on the gear to display the settings menu:

- Reset PER: It resets the PER value (Packet Error Ratio).

► **Screen**

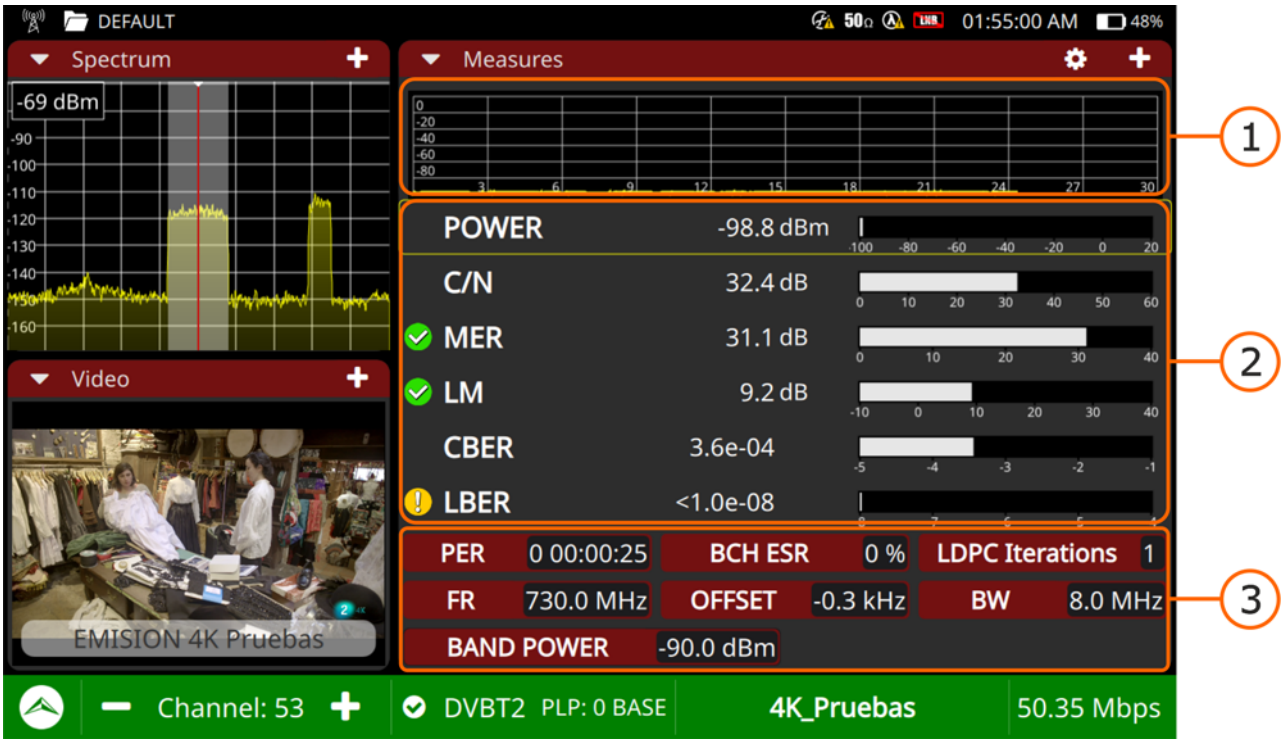


Figure 10.

1 Monitoring graph: It shows the selected measurement being plotted on a graph over time. The user can select any of the measurements available on the panel below. The selected measurement is inside a yellow frame.

2 Relevant Measurements: It shows the most relevant measurements for the tuned signal. Measurements are in numerical value and also plotted on a graph bar. The sign on the left indicates its quality.

3 Extra Measurements: It shows some extra measurements according to the signal (PER, frequency, offset, bandwidth, band power, etc.).

4.7 Signal Parameters

The signal parameters tool displays the modulation parameters of the signal being tuned and demodulated.

Signal Parameters (00:32s)

SCAN

►**Screen**

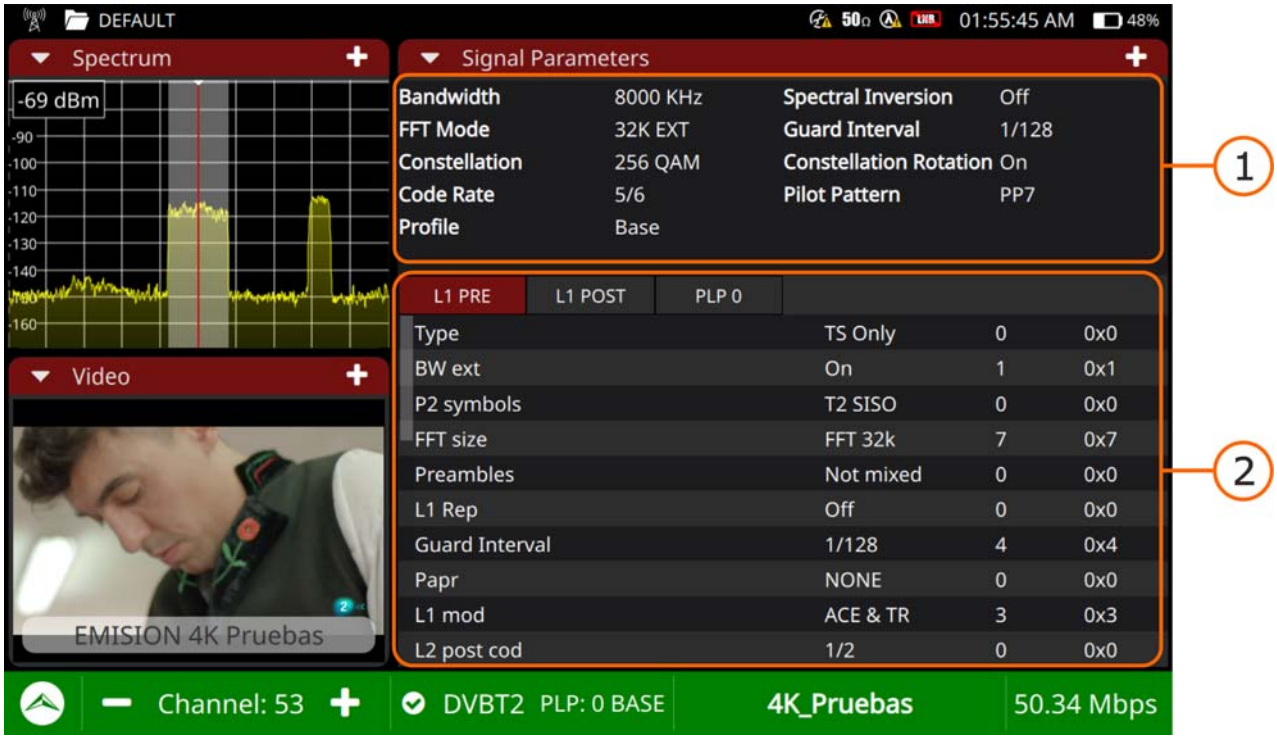


Figure 11.

1 General Panel: It displays the most relevant information.

2 Detail panel: It shows detailed data.

4.8 Video

The video tool displays one of the services carried by the signal being demodulated.

Video (01:15s) SCAN

►Screen

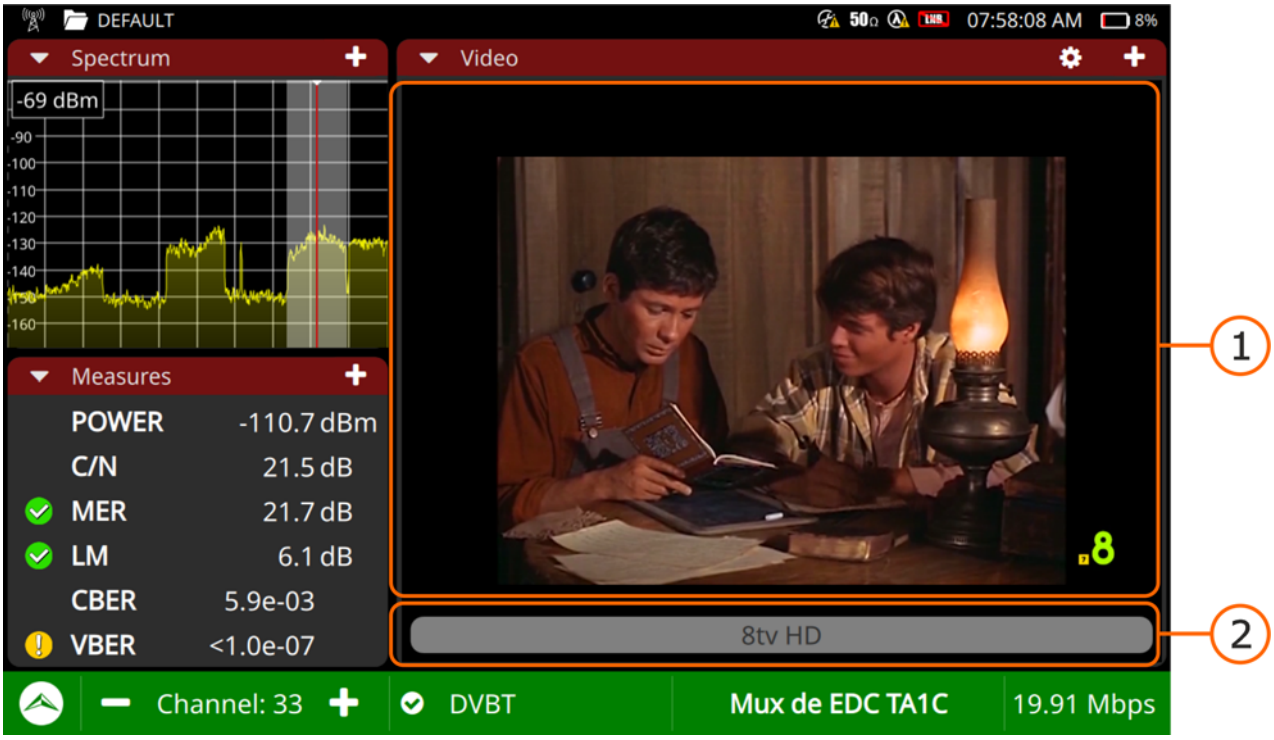


Figure 12.

1 Video Panel: It displays the demodulated service.

2 Service bar: It shows the name of the service and quality. If pressing, it opens a new window that shows all services available for the transport stream. Select one service to be displayed on screen. Each service is identified by its ID and name and it shows if it is video, audio or data. In case of video it also shows resolution (SD, HD or UHD).

►Settings

Press on the gear to display the settings menu:

- Audio: It allows the user to change language of the service in case there is more than one available.

4.9 Audio levels

The Audio level tool allows the user to visualize audio levels in a graphical way..

Audio levels (01:33s) SCAN

►**Screen**

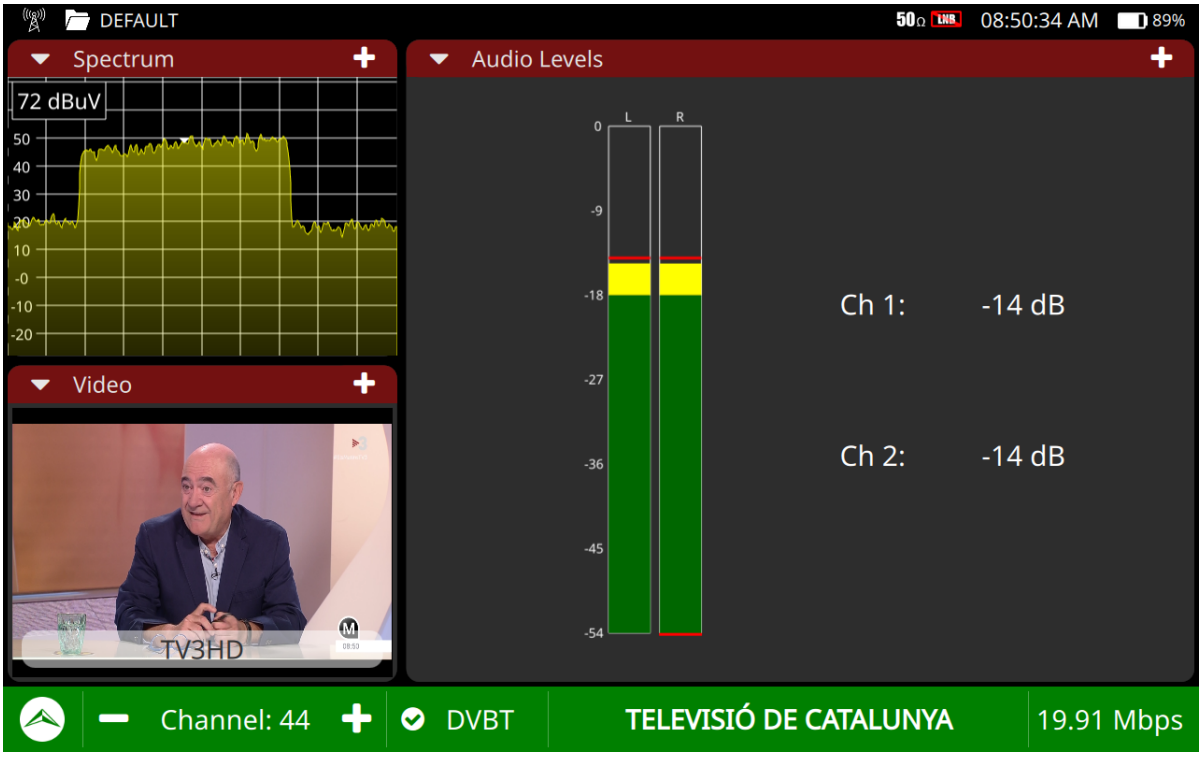


Figure 13.

1 Two bars display the audio level for the left channel and right channel respectively. The bar colour indicates the audio level:

- Red: High volume (0 dB <-> -9 dB).
- Yellow: Medium volume (-9 dB <-> -18 dB).
- Green: Appropriate volume (-18 dB <-> -54 dB).

►**Settings**

Press on the gear to display the settings menu:

- Audio: It allows the user to change language of the service in case there is more than one available.

4.10 Audio / Video Parameters

It shows details about the service selected and its video and audio layers.

Video Values (01:43s) SCAN

►**Screen**

Figure 14.

1 General Panel: It provides service information: name, provider and network name. Also Service ID, Logical Channel Number, transport stream ID, Network ID, original network ID, if the service is scrambled, audio language, subtitles language and some others.

2 Video/audio panel: On the left side shows video layer details: PID, bitrate, codec, resolution, aspect ratio and scanning rate. On the right side shows audio layer details: PID, bitrate, codec, language, sampling rate and format.

If you amplify this tool to full screen pressing on Plus it shows a new area on the left side with more details about the service layers and also about the MPD file if there is any.

4.11 Constellation

The constellation tool is used to analyze terrestrial, satellite and CATV digital signals.

	Constellation (03:06s)	SCAN

►Settings

Press on the gear to display the settings menu:

- Grid: Full grid or cross grid.
- Zoom:
- Point size: Large, medium, small, pixel.
- Clear: It clear current constellation to start plotting from scratch.

►Screen

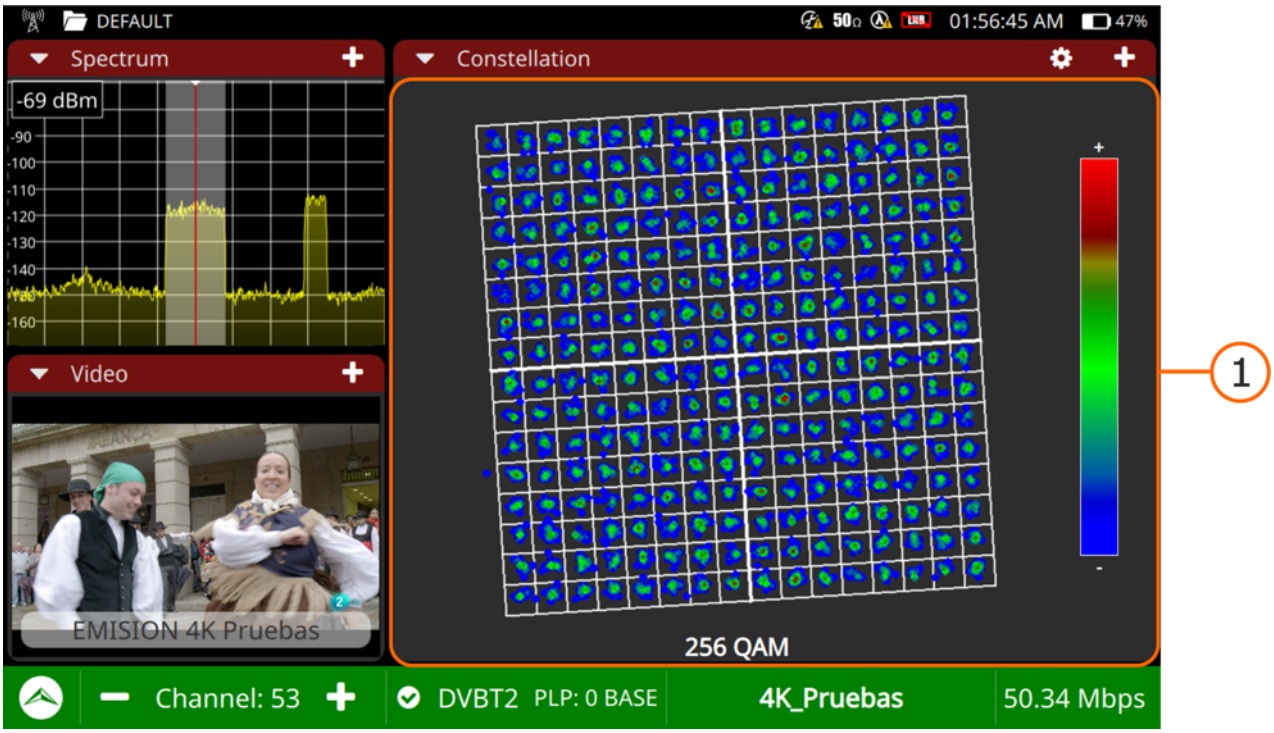


Figure 15.

1 General Panel: It displays the signal demodulated. The constellation is a pattern that shows the symbols received by the demodulator. Symbols are colour coded according to the density of points falling the same area across time. The greater amount of impacts in an area, the warmer the colour of symbols. Well defined points implies a transmission and reception system with low noise and interferences. Scattered symbols denote a higher degree of noise and interferences.

►Touch gestures

Drag: It moves around the constellation.

Zoom out: It amplifies constellation.

Zoom in: It reduces constellation.

4.12 Echoes

The echoes tool detects and displays the echoes that can occur due to multiple reception of the same digital terrestrial channel with different delays.

	Echoes (04:22s)	SCAN

► **Screen**

Figure 16.

1 Graph Panel: It shows the echoes. The horizontal axis shows time (µs) and the vertical axis shows level (dB carriers). It can display up to 10 echoes. Everything falling in between the red areas is received within the guard interval, everything falling in the read areas are outside the guard interval and therefore very damaging.

2 Measurement panel: For each echo, comparing to the main signal, shows level (dB carrier), delay (µs) and distance (km).

►Touch gestures

Tap: Tap on a table column in the measurement panel and its corresponding echo will be highlighted in blue color.

►Settings

Press on the gear ⚙ to display the settings menu:

- Zoom: To zoom out echoes graph (x1, x2, x4, x8).

4.13 Shoulder Attenuation

The Shoulder Attenuation tool measures interferences in adjacent channels that look like shoulders.

The meter takes this measurement following the guidelines corresponding to the signal standard.

▶	Shoulders Attenuation (03:03s)	SCAN

►Screen

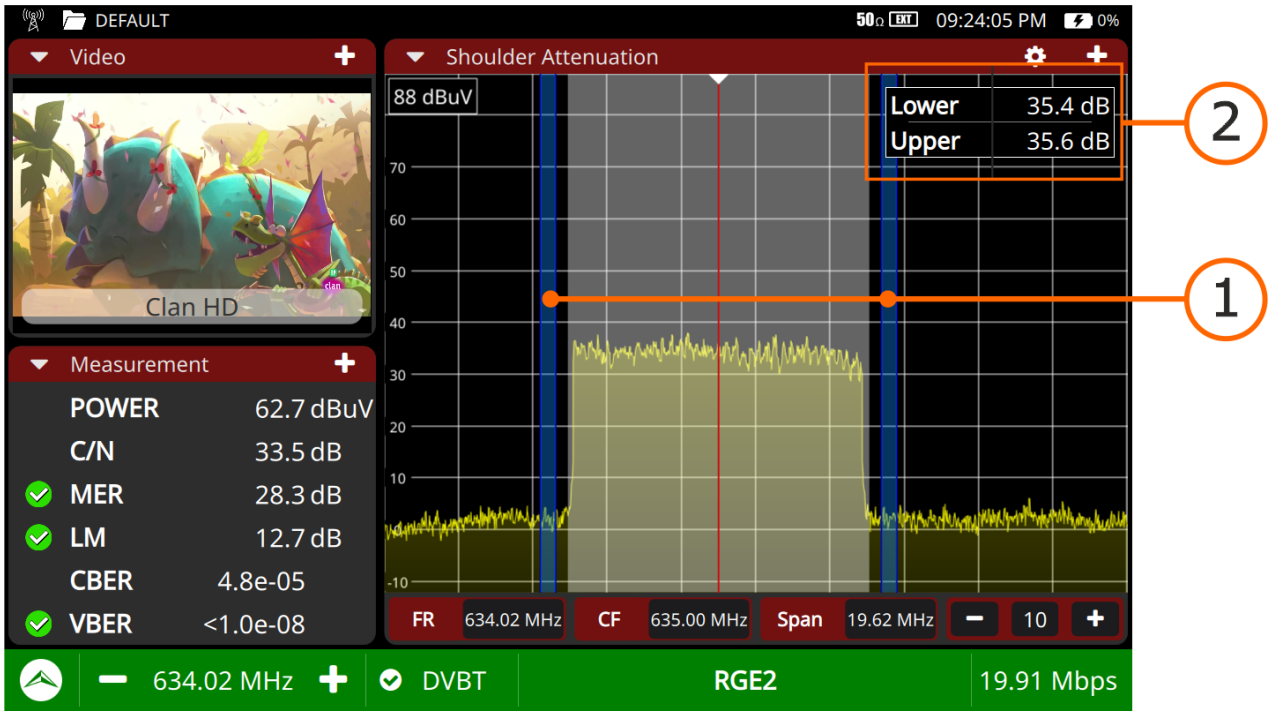


Figure 17.

1 The two blue bands on each side of the tuned channel are the areas where the shoulder attenuation measurement are taken.

2 The top right box show two values corresponding to the attenuation shoulder. The lower attenuation corresponds to the left side and the upper attenuation corresponds to the right side.

►Settings

Press on the gear to display the settings menu:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.
- Marker: It defines how to display the marker: Line, marker or horizontal.
- Resolution filter: It defines the resolution bandwidth filter value. Resolution filters available are: 2 kHz (only terrestrial band), 10 kHz, 20 kHz, 30 kHz, 40 kHz, 100 kHz, 200 kHz and 1000 kHz. According to filter selected maximum and minimum span changes.
- Visible bandwidth (span): It disables or enables the display of the tuned channel bandwidth.

- Center marker: It centers the selected frequency on the screen.

4.14 MER by Carrier

The MER by carrier tool measures the MER for each carrier in the channel and shows it graphically. This tool is useful to analyse systems where signals of different type interfere between them.

MER by Carrier (01:37s) SCAN

►**Screen**

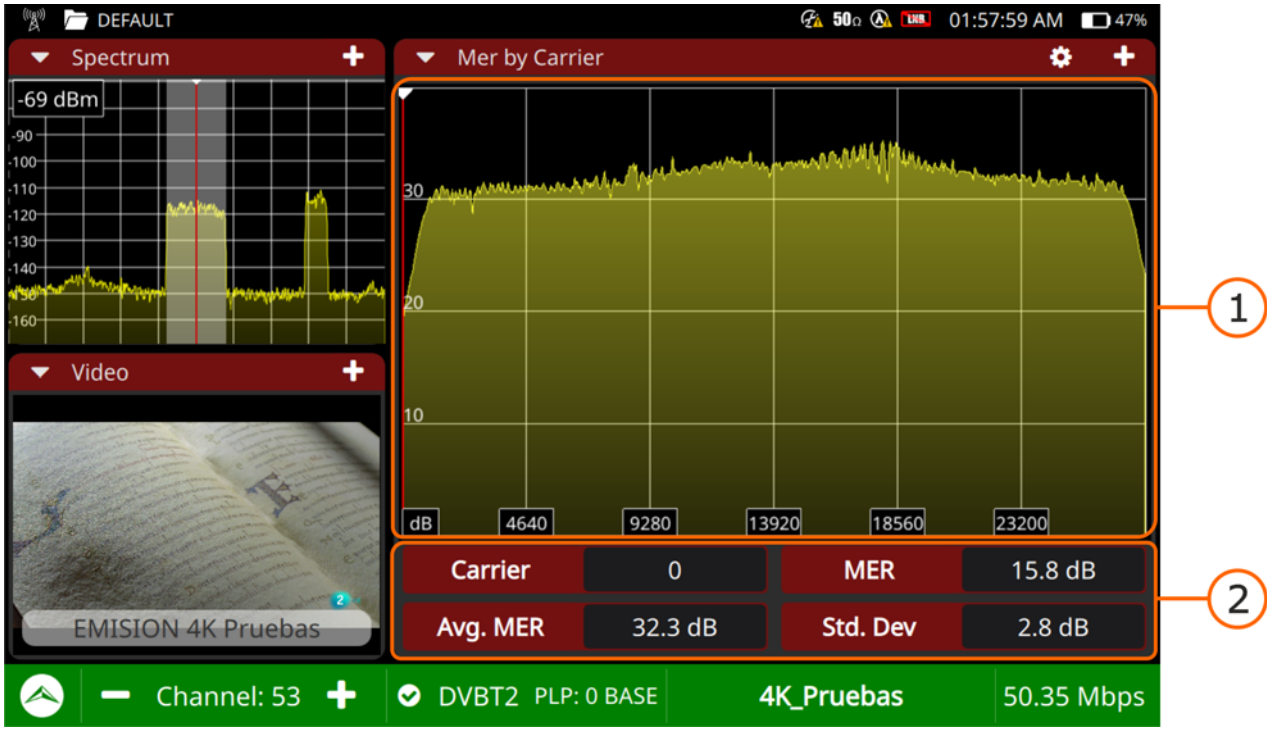


Figure 18.

1 Graphic Panel: The horizontal axis shows the number of carriers and the vertical axis shows the MER value.

2 Measurement panel: It shows the average MER for all carriers and its standard deviation. If there is an interference signal, a drop in the MER of the affected carriers will occur. The fields Carrier and MER shows these values for a single carrier selected by the user.

►Touch gestures

Tap: Select a carrier.

►Settings

Press on the gear ⚙ to display the settings menu:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.

4.15 Spectrogram (Spectrum + Waterfall)

The **Spectrogram** tool is a graph that displays the real-time evolution of the spectrum power level.

Spectrogram (01:55s)

SCAN

When changing any of the real-time chart configuration parameters such as span, center frequency, reference level, etc., the chart will reset and regenerate.

►Touch gestures

Tap: When tapping on the waterfall area, a legend will appear indicating the color corresponding to each level of power. When tapping on the spectrum area will select a carrier.

►Screen

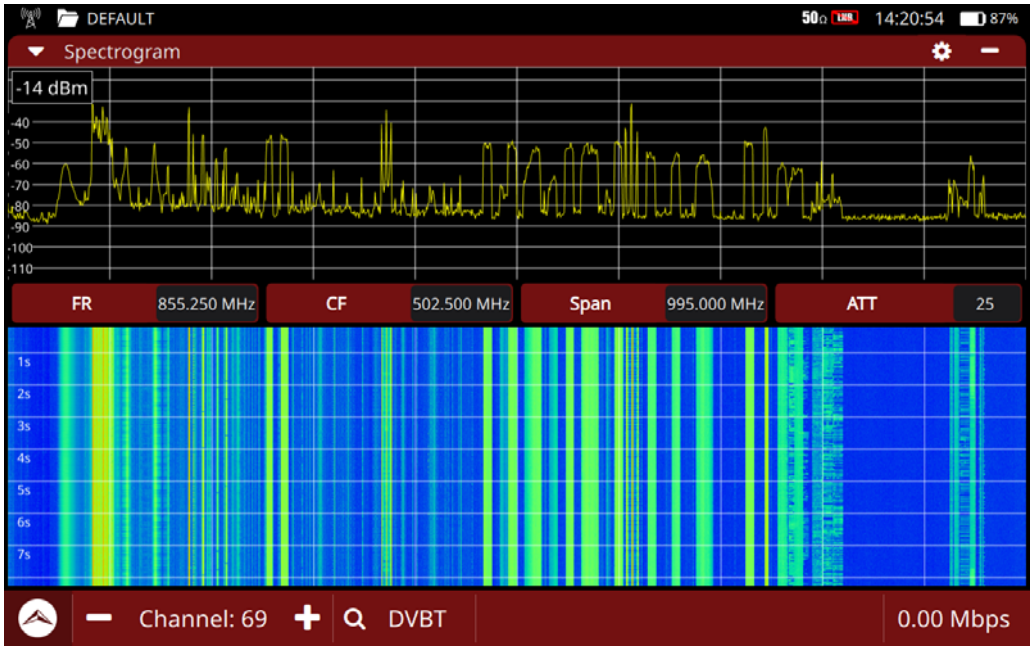


Figure 19.

In the top window, the graph shows the spectrum received by the RF input, with the horizontal axis representing the selected frequency span and the vertical axis representing power.

In the bottom window (waterfall), there is a graph where the horizontal axis represents the same frequency span as in the top window, and the vertical axis represents time. To represent the power level, a range of colours is used, going from 0 dB (cool colour) to 40 dB (warm colour).

►Settings

Press on the gear to display the settings menu:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.
- dB/div: It allows modifying the number of dB per division on the vertical axis of the graph that displays the power. The available values are: x10, x5, x3, x2, x1.
- Spectrogram duration: It defines the time window of the vertical axis that can be adjusted within a range from 1 to 60 minutes.

4.16 Merogram (MER by carrier + Waterfall)

The **Merogram** tool is a graph that shows the real-time evolution of the MER power level by carrier..

Merogram (01:58s)

SCAN

When changing any of the real-time chart configuration parameters such as span, centre frequency, reference level, etc., the chart will reset and regenerate.

►Screen

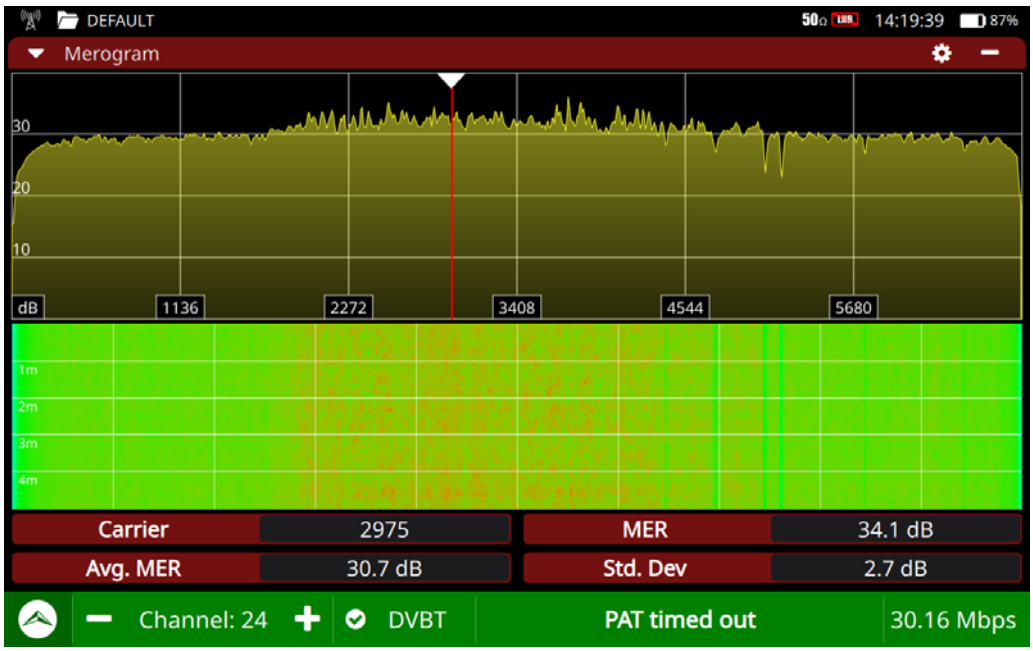


Figure 20.

In the top window, a graph displays the horizontal axis representing the number of carriers and the vertical axis showing the MER level.

In the bottom window (waterfall), there is a graph where the horizontal axis represents the same number of carriers as in the top window, and the vertical axis represents time. A range of colours is used to represent the MER level, going from 0 dB (cool colour) to 40 dB (warm colour).

►Touch gestures

Tap: When tapping on the waterfall area, a legend will appear indicating the colour corresponding to each level of power. When tapping on the spectrum area will select a carrier.

►Settings

Press on the gear ⚙ to display the settings menu:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.
- Carrier: Select a carrier.
- Merogram duration: It defines the time window of the vertical axis that can be adjusted within a range from 5 to 60 minutes.

4.17 Recording

The recording tool allows recording the full transport stream from the demodulated signal being tuned.

It also has the option to record raw signal in order to be analysed in case there was any problem locking the signal.

Recording (01:09s)

SCAN

►Screen

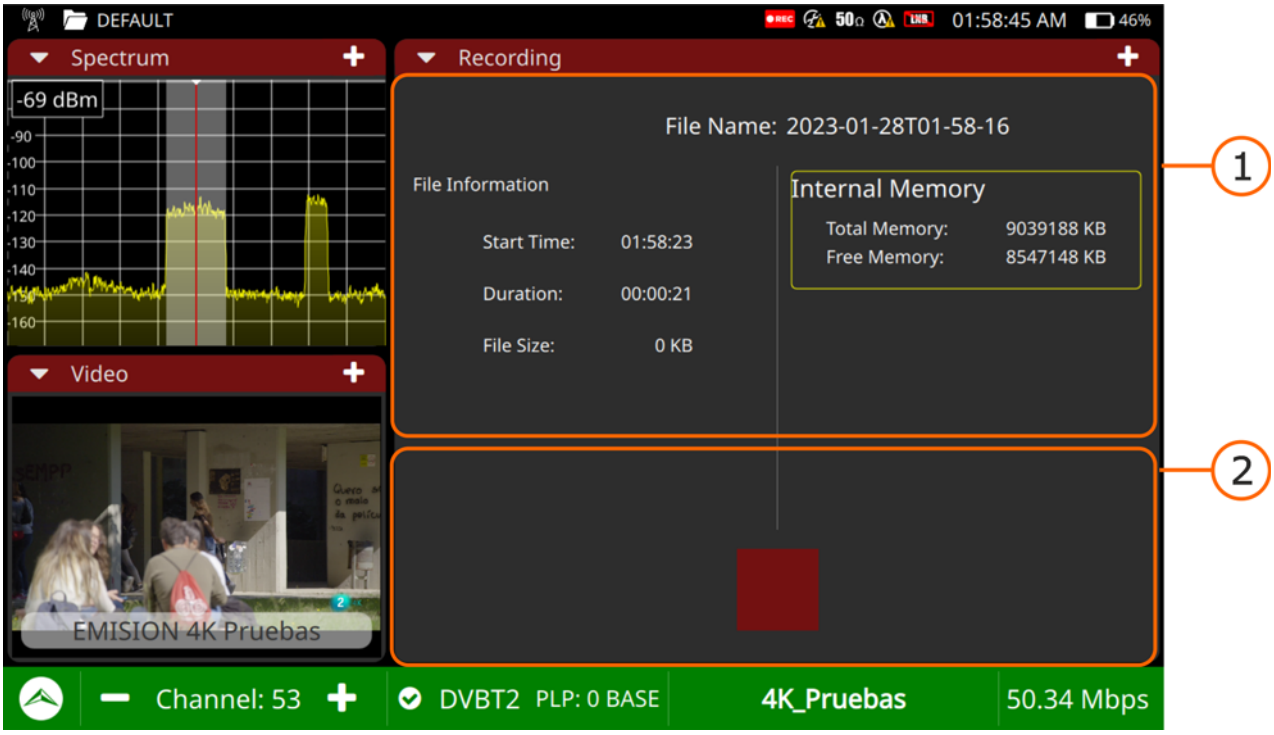


Figure 21.

1 File information Panel: On the left you can see start time, duration and file size. On the right side there is the total memory and free memory available.

2 On/Off button: It shows a red button to start/stop recording. If pressing when the button is a cercle it starts recording and when it is square it stops recording. Records are saved in the current workspace. Check the Raw Recording checkbox and follow the instructions below to record raw signal.

►Raw Recording Procedure

Raw recording is useful to analyze the signal in order to find any problems in the data stream that are not allowing to lock or demodulate the signal. It is very important to follow these steps to generate a proper raw record:

1 Disconnect the signal.

2 Check the "raw recording" option.

3 Start recording.

4 Connect the signal.

5 After a while, stop recording.

6 Access the Workspace (for more details refer to "WORKSPACES" on page 128) to get the recording. To access, deploy the Top Menu and select Workspace. Then select the current Workspace and in "Mode" select "TV Analyzer". Now press on "Recordings".

7 Press on the file to access the options menu and copy it to an USB.

8 Now the file can be analysed or send in order to find any problems that are not allowing to tune / demodulate the signal.

►Touch gestures

Tap: Tap the on/off button to start/stop recording or to check the raw recording checkbox.

4.18 Transport Stream Analyzer

The Transport Stream (TS) Analyzer is a set of tools that provides the user with a comprehensive analysis of the transport stream extracted from the digital signal being tuned. The transport stream can be received through any of the equipment inputs.

Transport Stream Tools (05:29s)

SCAN

The TS Analyser has these tools:

- TS Tables
- TS Bitrate
- TS PIDs
- TS Alarms

In the next sections each one of these tools are explained in detail.

4.18.1 Transport Stream Tables

The TS Tables tool identifies and captures the TS signal and all its metadata. All PSI and SI tables and their fields are extracted and shown on screen. In this way

you can analyze the tables and see the details of what is being transmitted and whether the information is correctly encapsulated.

►Touch gestures

Tap: To unfold tables and see its sub-fields.

►Screen

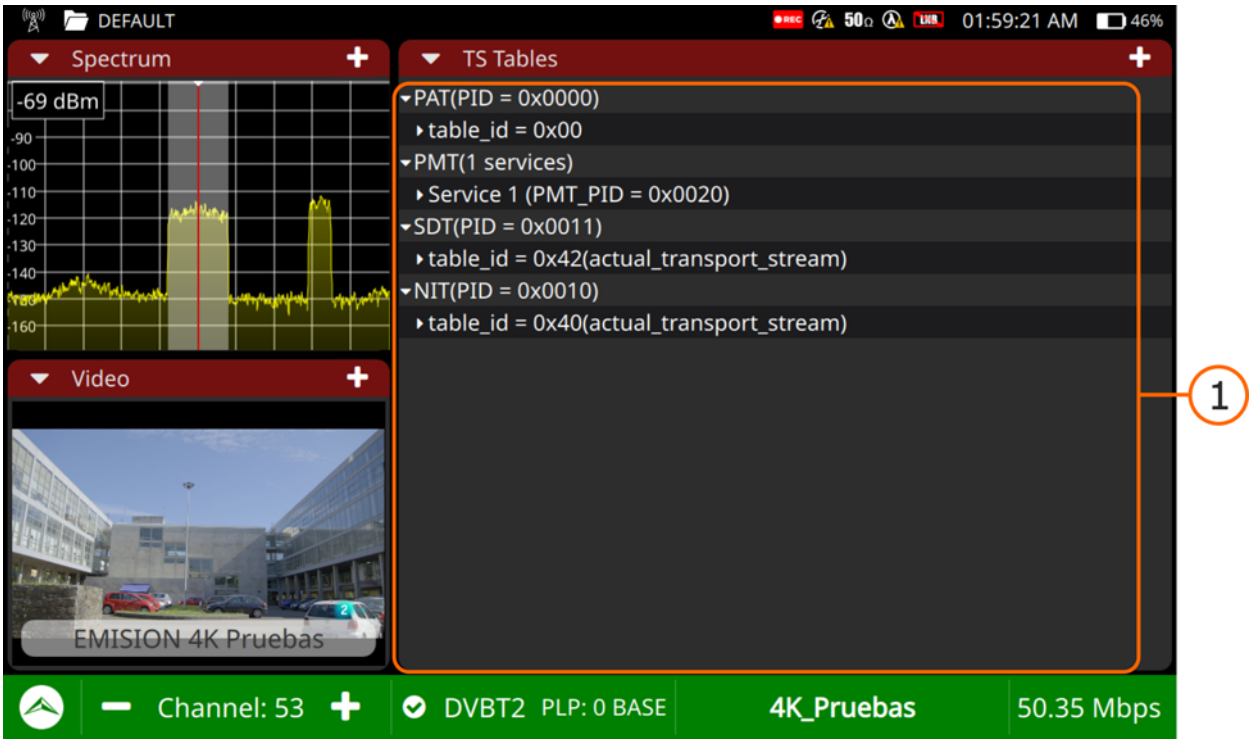


Figure 22.

1 Main window: It shows all metadata extracted from the transport stream. These are the PSI (Program Specific Information) and SI (Service Information) tables and all their related fields. They can be unfolded to see its subfields.

4.18.2 Transport Stream Bitrate

The TS Bitrate tool presents the TS bit load information graphically, numerically and in percentage terms. To do this, a circular graph is used that is updated in real time and shows how the bitrate distribution (bitrate per second) of each of

the services of the tuned multiple evolves. It also allows you to dynamically select any of the services to see their composition, which is also displayed in the form of a pie chart.

►Screen

Figure 23.

1 Services window: It shows all services in the transport stream in real time. The "Others" service indicates the amount of bitrate used by the PSI/SI tables. The pie chart indicates the percentage contribution in bitrate per service in respect to the total TS bitrate, including null packets, which are displayed in black. Below the pie chart there is the total TS bitrate and total bitrate used.

2 Selected service window: It shows video, audio and data bitrate for the selected service in real time, both in percentage and absolute value. The pie chart shows this information graphically.

►Touch gestures

Tap: To select a service.

4.18.3 Transport Stream PIDs

The TS PIDs tool lists all the PIDs in the Transport Stream. The PIDs TS tool displays a sorted PID list with a brief explanation of each PID and its minimum, maximum, and current bitrate. The bitrate is continually updated to help understand bandwidth usage.

► Screen

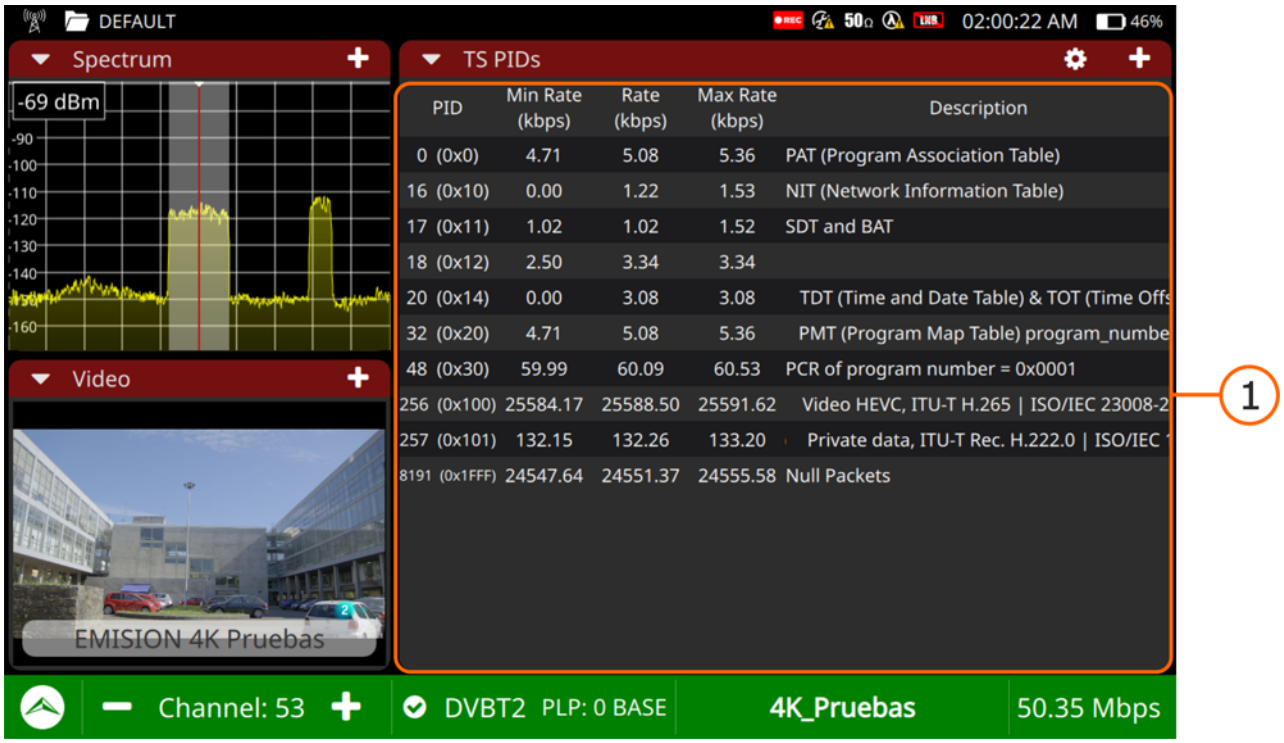


Figure 24.

1 PID Panel: It displays all the PIDs for the analyzed TS. For each PID describes its content and their minimum, average and maximum bitrates.

►Touch gestures

Drag: It moves along the PID list.

► Settings

Press on the gear to display the settings menu:

- Order by: It allows ordering by PID, bitrate, max. bitrate, min. bitrate or description.
- Reset: It resets and captures the PID list.

4.18.4 Transport Stream Alarms

The TS Alarms tool shows in real time the evolution of the TS and the alarms they produce, classified into three priority levels. The priority levels have been established in accordance with the recommendations for use of the technical regulations TR 101 290 of the DVB group.

►Screen

Figure 25.

1 Alarms Panel: It shows all the alarms classified by priority. Press on any of these alarms to enter in a specific screen for the alarm that shows a log with a list of events, a description and an option to enable/disable the alarm.

2 Events panel: It shows a graph for each alarm with all the events that have happened. Errors are shown as a red strip lasting as long as the error.

►Touch gestures

Tap: It opens an alarm to show log, description and settings menu.

► Settings

Press on the gear to display the settings menu:

- Reset: It initiates the alarm analysis from scratch.
- Restart: It initiates the capture of PSI/SI table info again followed by the alarm analysis.

► Icons

Besides each alarm there is an icon which is explained in the following table.

Icon	Description
	No errors occurred for this alarm.
	There has been an event for this alarm in the last 5 seconds.
	The event for this alarm just happened.
	The alarm is still being evaluated or there is no info in the TS to evaluate it.

4.19 FM

The FM tool tunes and takes measurements of an FM signal. It also shows RDS (Radio Data System), which is a communications protocol standard for embedding digital information in FM radio broadcast.

►Screen

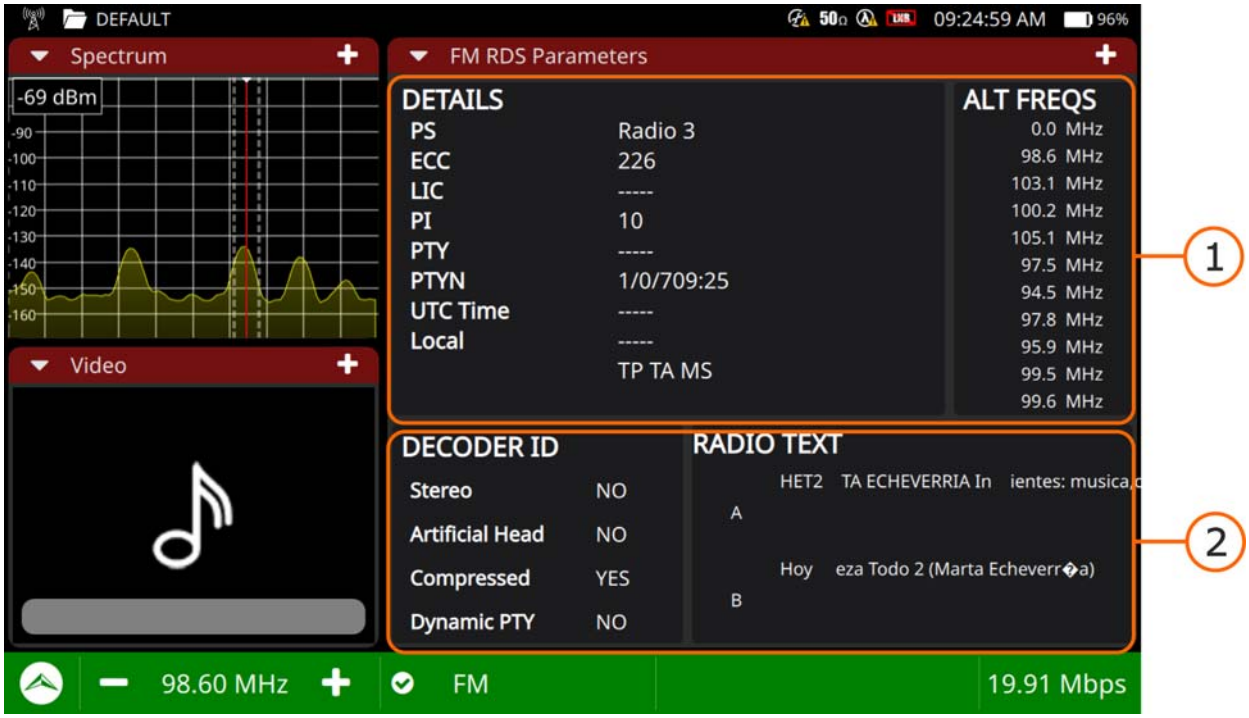


Figure 26.

1 Main window: The column on the left shows several RDS data fields. The column on the right shows alternative frequencies.

2 Extra info window: The column on the left shows different operation modes of the decoder. The column on the right shows extra text information.

►RDS Data

- PS: Programme service.
- ECC: Extended country code.
- LIC: Language Identification Code.
- PI: Programme Identification.
- PTY: Program type.

- PTYN: Program type name.
- UTC Time: Universal time.
- Local: Local time.

4.20 Optical Power Measurement

The meter has an FP/APC input that allows connecting fiber optics to take different measurements.

	Optical Power Measurement (01:00s)	SCAN

To measure power in the whole optical band you must follow these steps:

1. Connect the optical signal to the meter's optical input (FC-APC connector).
2. From the TV Analyzer mode, access the Top menu swiping down.
3. Select the Optical Power icon.
4. In the ENABLE field, select ON to start the measurement.
5. If everything is correct, a bar will appear on the screen indicating the total power for the optical band, ranging from 800 to 1700 nm.

► **Screen**

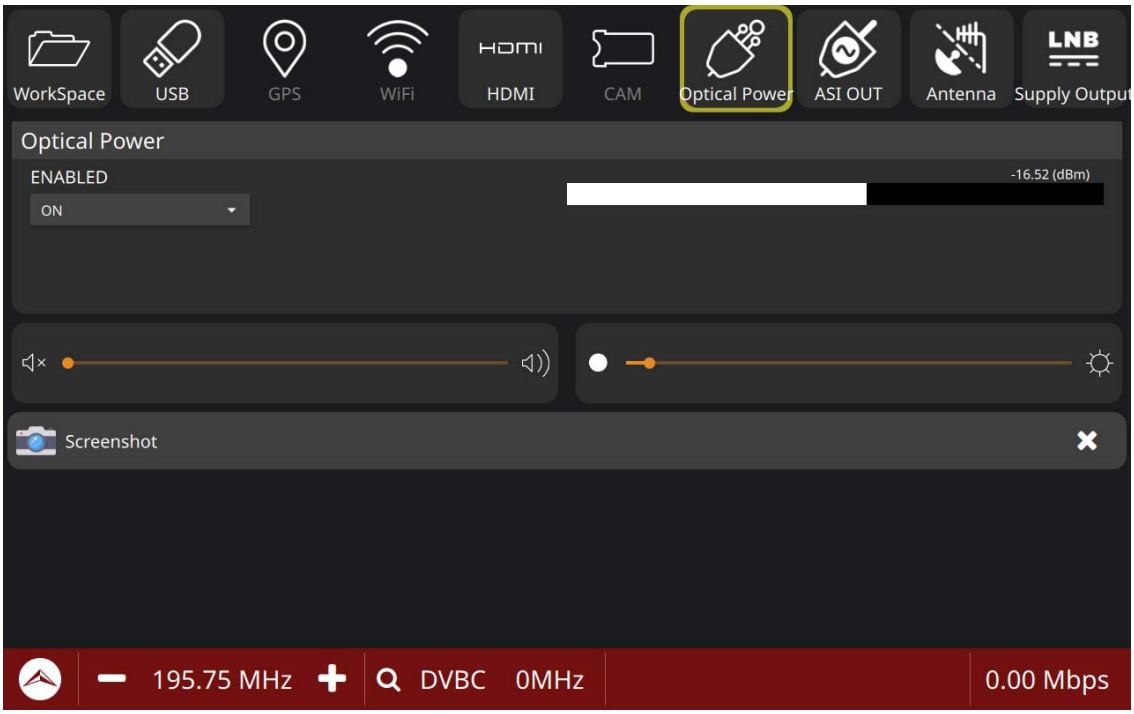


Figure 27.

1 The first bar shows the optical power in the full optical bandwidth.

To take measurements by optical band or make RF conversions for optical LNB, it is necessary to install the optical fiber option (for more details refer to "OPTICAL OPTION" on page 168).

4.21 Advanced Tools

In the next sections each advanced tool for the TV Analyzer is explained. Now, these are the available ones:

- Drive Test
- Channel Exploration
- Datalogger
- Discover FM
- Blind Scan

NOTE: Advanced tools make use of a large amount of the meter's resources, so some functions may not be available while the advanced tool is running. Make sure to exit or finish the advanced tool in order to use the meter in the usual manner.

4.22 Drive Test

The Drive Test tool allows you to carry out a drive test in order to map the coverage of a specific transmitter.

Drive Test (07:06s) SCAN

To perform a Drive Test the user must follow these stages:

- Create a Drive Test task
- Set the GPS receiver
- Run the drive test
- Export the drive test
- Exit the drive test

Next it is explained each one of these stages:

► Creating a Drive Test task

1 From the TV Analyzer mode, access the Advanced Tools menu by swiping from the right side of the screen to the left and tap on "Drive Test".

2 The Drive Test screen allows you to create a new Drive Test task or select one already created.

3 Previously to create a drive test task, tune a channel to use it as a reference to carry out the drive test (for more details refer to "Use Case: Terrestrial RF Signal Tuning" on page 16).

4 To create a new Drive Test task tap on the "+" sign and fill in all the fields:

- Name: Name that identifies the task.
- Description: Description of the task.
- Audio enabled (OFF/ON): When enabled it sounds an alarm in case the analyzer gets unlocked from the channel.

- GPS Alarm (OFF/ON): When enabled it generates an alarm if the GPS receiver gets unlocked from the satellite.
- Select Mode (Auto/Manual): It allows the user to choose among two modes of operation. The "Auto" mode takes measurements automatically, according to the sampling time. The "Manual" mode takes measurements every time the user press the measurement button.
- Span Time (s): Defines the length of the time axis in the plot that is displayed when the Drive Test starts.
- Sample Time (s): Time between samples when working in Auto mode.

5 When finish tap on "Save" to save the Drive Test task.

6 Exit the Drive Test tool by swiping from the right side of the screen to the left and pressing on the cross next to "Drive Test" or select the drive test task just done to start the Drive Test.

►Screen

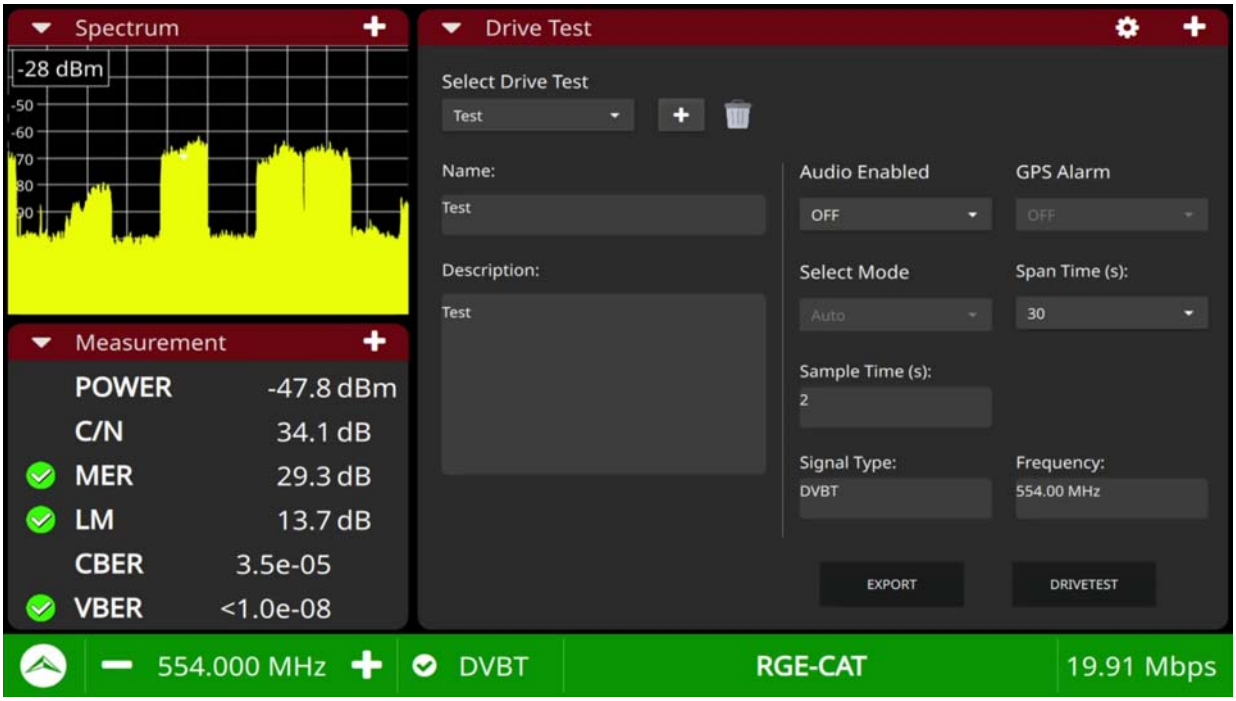


Figure 28. Drive Test task screen

► Setting the GPS receiver (in case it is need it)

1 Swipe down from the top of any screen to access the Top Menu.

2 Connect your GPS receiver to the USB 3.0 port. It should appear a notification "GPS Inserted".

3 Tap on the "GPS" option to access the GPS Status screen.

4 The GPS Status screen shows all the satellites detected by the GPS receiver and which ones are locked to (in green).

5 It also shows SNR measurements and geo-position data.

6 If all is correct the user can follow to the next stage.

►Screen

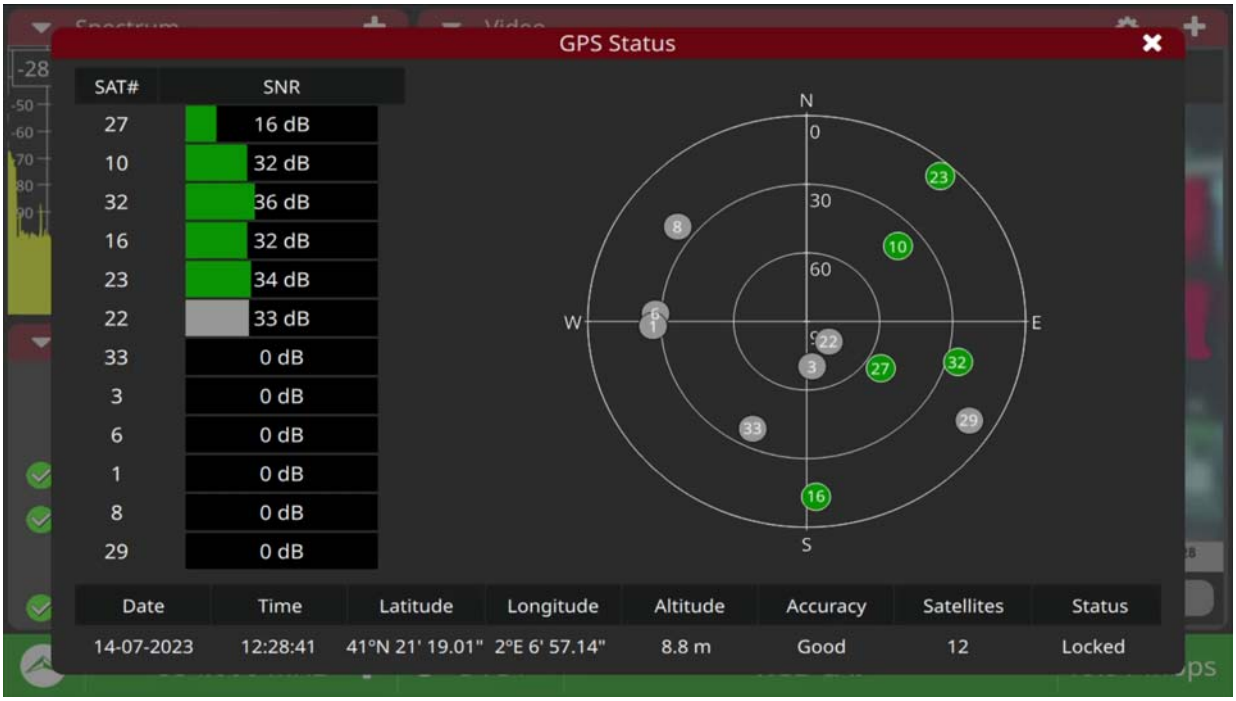


Figure 29. GPS Status screen

► Running a Drive Test task

1 From the TV Analyzer mode, access the Advanced Tools menu by swiping from the right side of the screen to the left and tap on "Drive Test".

2 On the "Select Drive test" select one of the drive test tasks previously created and tap on "Drive Test".

3 Now press on the "Drive test" button to go to the Drive Test screen.

4 The Drive test screen shows the drive test data plotted on the main panel. The left top panel will show the spectrum and the left bottom panel will show measurement. These panels cannot be changed during the drive test.

5 To launch the drive test press on "Start". It may appear some warning messages before the test. If you agree, press OK.

6 When starting, it first tunes the channel saved in the task and then starts plotting measurements over time. All data measurement and geolocation data is saved in a file that can be recovered after the drive test task finishes.

7 During the drive test task, if it is needed, the user can pause it pressing on "Pause" and resume it pressing on "Resume".

8 Press on "Finish" to end the drive test task. It shows a confirmation message. If you agree, press OK.

►Screen

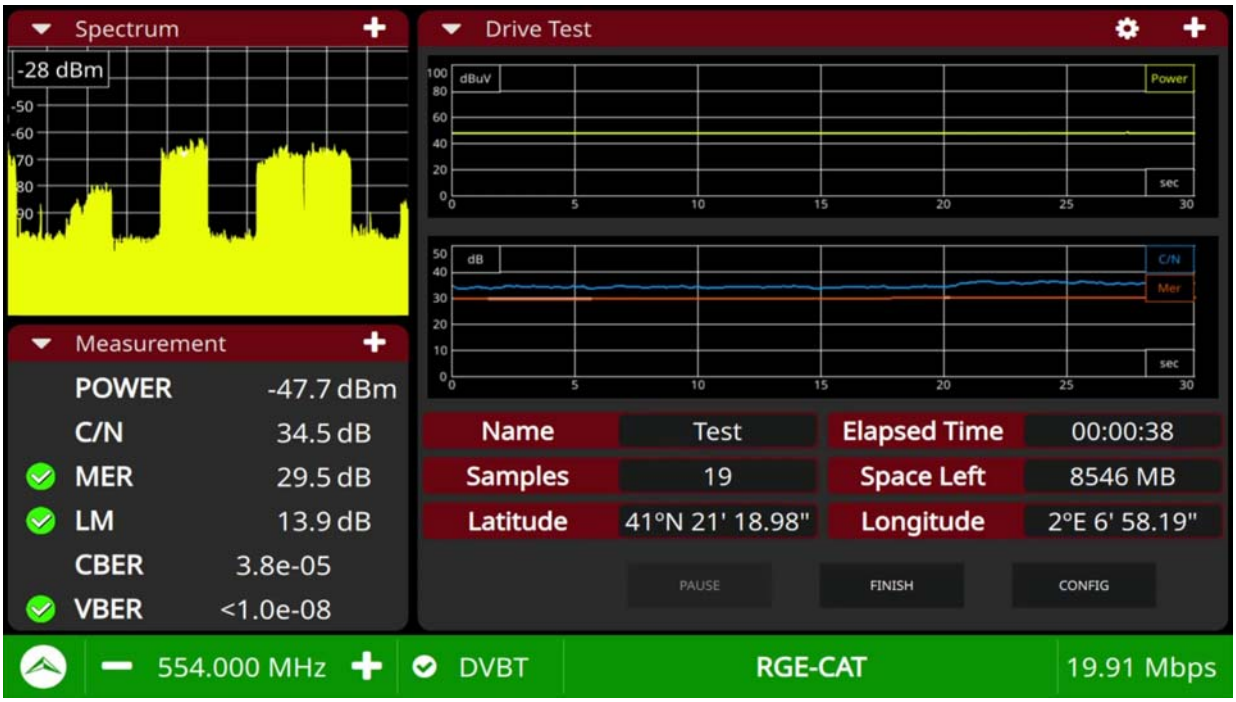


Figure 30.

1 Plot showing power level measurement over time.

2 Plot showing C/N and MER measurement over time.

3 Drive Test data: task name, samples taken, elapsed time, space left, latitude & longitude.

4 Options:

- Config: Access to drive test task data.
- Pause/Resume: It pauses or resumes the drive test.
- Finish: It ends the drive test.

5 Spectrum.

6 Measurement.

► Exporting Drive Test data

1 Once the drive test task is done we can recover the measurements taken. From the TV Analyzer mode, access the Advanced Tools menu by swiping from the right side of the screen to the left and tap on "Drive Test".

2 In the dropdown menu, select the Drive Test task done to export its data.

3 Tap the "Export" button. It opens a windows that allows the user to select where to download data between internal memory or a USB memory and also the file format among KML, CSV or XLSX.

4 KML format can be used in Google Earth or other programs to overlay measurements on a map.

►Screen

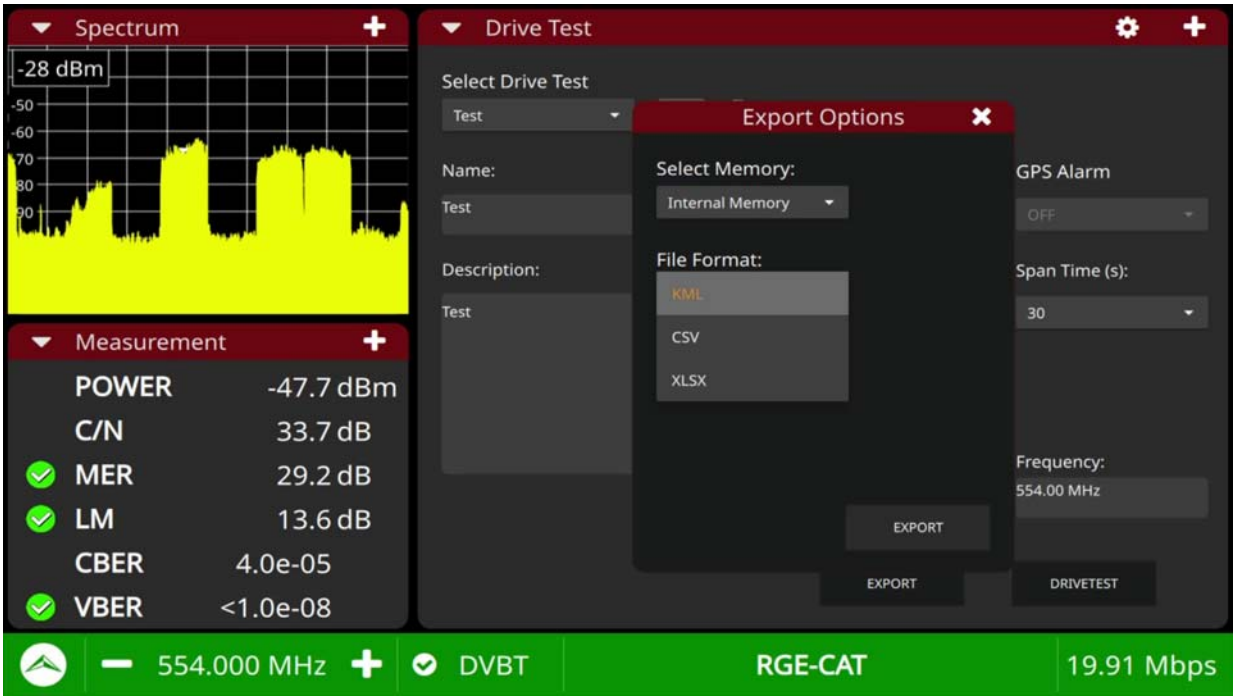


Figure 31.

► **Exit the Drive Test task**

1 The Drive Test is a high level function and it needs all the resources of the meter. For this reason some other functions cannot be working simultaneously with the drive test. You must quit the Drive Test tool in order to work as usual.

2 To quit the Drive Test there are two options:

- Press the Finish button at the Drive test screen.
- Swipe from the right side of the screen to the left and tap on the cross next to "Drive Test".

4.23 Channel Exploration

The Channel Exploration function performs a scan of the RF spectrum (terrestrial or satellite) using another previously selected channel plan as a template. It detects where there are active signals within that channel plan and on which channels a signal is being received. With this information, it scans those channels, looking for emissions and identifying them.

Channel Exploration (04:37s) SCAN

► **Operation**

1 From the **Home** menu press "Settings".

2 From the "TV Analyzer" area on Settings, press on "Exploration Config".

3 From this section, the user can adjust the minimum levels for the system to try to identify the signal and the number of attempts to lock it (for more details, refer to "►Exploration configuration" on page 24).

4 Return to the Home screen and press "TV Analyzer".

5 Slide to the right from the left side of the screen to display the tuning settings or press any field related to tuning (frequency, span...).

6 Select the channel plan that will serve as a reference for scanning channels.

7 Now access the **Advanced Utilities** menu by sliding from the right side of the screen to the left and press "Channel Exploration" to start the scan.

8 When the scan starts, all the channels from the reference channel plan will appear on the screen. The screen will show how the system goes through channel by channel trying to detect and demodulate the signal on each one.

9 At the bottom there is a progress bar with the number of channels scanned and detected.

10 During the scan, to skip channels press on "Skip". If for any reason you want to abort the full scan and exit the tool, open the Advanced Utilities menu again and press the cross on "Channel Exploration".

11 When finished, each channel can present one of the following states, identified by these icons:

- Ok (channel identified): The channel power exceeds the threshold defined in the settings. It has been demodulated and identified.
- Unknown (low signal): The channel does not reach the power threshold defined in the settings.
- Error (channel not identified): The demodulator discards the channel, as it may exceed the power threshold but could not be demodulated or identified.

12 The identified channels are selected by default and will be saved in the channel plan when clicking the "Save" button. By clicking on a channel, the meter will display the channel spectrum in the "Spectrum" tool and attempt to lock onto it.

13 The remaining channels (unknown or incorrect) are discarded unless the user manually adds them. To manually add a channel, press and hold the channel for two seconds. Do the same to deselect it.

14 After selecting channels, press "Save" to save the new channel plan with a user-assigned name.

15 The newly created channel plan will become the active channel plan and will be available in the channel plan list.

4.24 Datalogger

The Datalogger function generates a file that stores the measurement results for each channel in the selected channel plan at a specific test point.

The test point represents the physical location of the connector to which the device is connected to perform the measurement.

The measurements taken can be exported later to a file for analysis.

	**Datalogger (03:14)**	SCAN 

► Configuration and Creation of a new Datalogger

1. From Home, access the "Settings" option and then click on "Datalogger Config".
2. This screen displays all the parameters to configure the datalogger. For more details, please refer to "►Datalogger configuration" on page 24.
3. Next, in TV Analyzer mode, select the channel plan on which the datalogger will be performed.
4. Still in TV Analyzer mode, access the Advanced Utilities menu by swiping from the right side of the screen to the left, and then click on "Datalogger".
5. The Datalogger screen will open. Tap the "Test & Go" icon to start measuring and recording data.

► Running the Datalogger

1. After tapping "Test & Go," the datalogger will start. Upon initiation, a new datalogger and a measurement point will be automatically generated, both with generic names.
2. The screen will display the measurement process channel by channel, along with the tuning status of each channel in the form of an icon.
3. At the bottom of the screen, the name of the test point being measured will appear, along with a progress bar indicating the channel plan status (both as a percentage and by the number of channels, partial and total).
4. The "Skip" button allows you to interrupt the measurement process of the current channel (in case it is not of interest or if it gets stuck for an extended period).
5. Once completed, it will display a table with the results obtained.

► Results Table for the Datalogger Test Point

1. Once completed, a table will be displayed with the measurement results from the datalogger.

2 The results table displays the name of the test point, the date and time, and the results for each channel: name, type, power, C/N, MER, LM, CBER, LBER/ VBER, and STATUS.

3 At the bottom, there are three options: a trash can icon that deletes the test point and its results, the "reacquire" option that overlays new results onto the current ones, or "back," which returns to the datalogger screen.

► Edition and Export of Datalogger

1 From the Datalogger screen, tap on the "Select Datalogger" box to display the available dataloggers.

2 Select one datalogger.

3 The details related to the selected datalogger will appear: Name, description, channel plan, and test points.

4 The trash can icon next to the datalogger allows you to delete it.

5 The description field allows the user to enter free text.

6 The "Test Points" field displays all available test points. If you tap on the table icon next to a test point, it will show the results table for that test point.

7 The "Add Test Point" button allows you to add another test point to the selected datalogger and start a new measurement process that will be added to the current datalogger.

8 The "Export" button allows you to export a datalogger to a file. The export options let you choose between internal memory or external memory, as well as the file format, which can be PDF, CSV, or XLSX..

4.25 Blind Scan

The "Blind Scan" function uses an ML algorithm to automatically search for and detect available television channels within a specific frequency range, without any prior knowledge or configuration. This is typically done to identify all channels being broadcasted in a particular area.

Blind Scan (03:12s) SCAN

Although the "Blind Scan" function can find channels, it may also detect unwanted signals or those causing interference. Therefore, it is often necessary to manually filter or exclude certain channels based on their quality or content.

4.26 Discover FM

The Discover FM function scans the terrestrial RF spectrum dedicated to FM (frequency modulation). It detects where active signals are present within that frequency range and identifies which channels are receiving signals. With this information, it explores those channels with signals, searching for and identifying broadcasts.

► Operation

1 From the **Home** screen, tap on "Settings."

2 From the "TV Analyzer" section in Settings, tap on "Configure Scan."

3 From this section, the user can adjust the minimum FM level for the system to attempt to identify the signal and the number of attempts to synchronize with it (for more details, refer to "►Exploration configuration" on page 24).

4 Return to the Home screen and tap on "TV Analyzer."

5 Now, access the **Advanced Utilities** menu by swiping from the right side of the screen to the left, and tap on "Discover FM" to start the scan.

6 When the scan begins, all the channels in the reference channel plan will appear on the screen. The screen will show the system processing channel by channel, attempting to detect and demodulate the signal in each one.

7 At the bottom, a progress bar appears, showing the number of channels scanned and detected.

8 During the scan, you can skip a channel by pressing "Skip". If, for any reason, you wish to abort the entire scan and exit the tool, reopen the Advanced Utilities menu and tap the cross on "Discover FM."

9 At the end of the scan, each channel can display one of the following statuses, identified by these icons:

- Ok (Channel identified): The channel power exceeds the threshold set in the settings. It has been demodulated and identified.
- Unknown (Insufficient signal): The demodulator discards the channel since it does not reach the power threshold defined in the settings.
- Error (Channel not identified): The demodulator discards the channel because, although it may exceed the power threshold, it could not be demodulated or identified.

10 The identified channels are selected by default and will be saved in the channel plan when clicking the "Save" button. By clicking on a channel, the device will display the channel spectrum in the "Spectrum" tool and attempt to lock onto it.

11 The remaining channels (unknown or erroneous) are discarded unless the user manually adds them. To manually add a channel, press and hold the channel for two seconds. Do the same to deselect it.

12 At the end of channel selection, press “Save” to store the new pipeline with a user-assigned name.

13 The newly created channel plan will become the active channel plan and will be available in the list of channel plans.

5 SPECTRUM ANALYZER

5.1 Introduction

The Spectrum Analyzer mode shows and measures the incoming signal based on its frequency. In this mode, the device displays a visual representation of the signal's frequency spectrum and offers features typical of professional spectrum analyzers. The equipment is calibrated across a continuous frequency range from 5 MHz to 6 GHz.

The Spectrum Analyzer mode has a wide range of applications:

- Verifying that TV signals are transmitted at the correct frequency without interfering with other signals.
- Detecting wireless signals, such as cellular or Wi-Fi networks, that might disrupt our TV signal.
- Identifying issues related to signal attenuation and quality.

Spectrum Analyzer (05:27s) SCAN

►Touch Gestures


Tap: Selection, position and dragging of marker. Selection and dragging of trace/marker window.


Zoom out: Magnifies the signal, reducing the span.


Zoom in: Reduces the signal, increasing the span.


Horizontal dragging: Moves along the frequency band.


Vertical dragging: Changes the reference level.

5.2 Spectrum Analyzer Screen

► General Screen

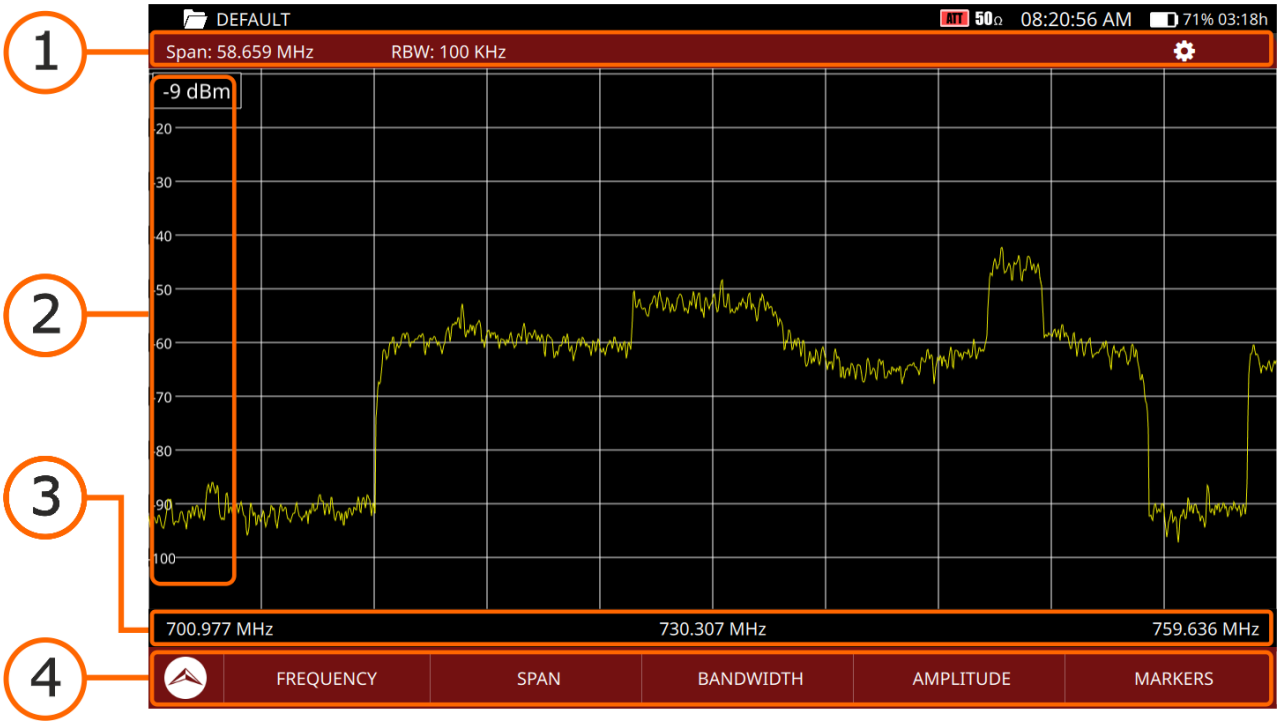


Figure 32.

1 Upper section (from left to right): Span, Resolution Bandwidth (RBW) and additional settings (gear icon).

2 Side section: Reference level or amplitude.

3 Lower section (from left to right): Frequency (start / center / stop).

4 Adjustment bar: It shows the most used settings options. Pressing on one gives access to the main settings menu, going to that specific option:

- Frequency
- Span
- Bandwidth resolution
- Amplitude
- Markers.

►Trace and Markers Screen

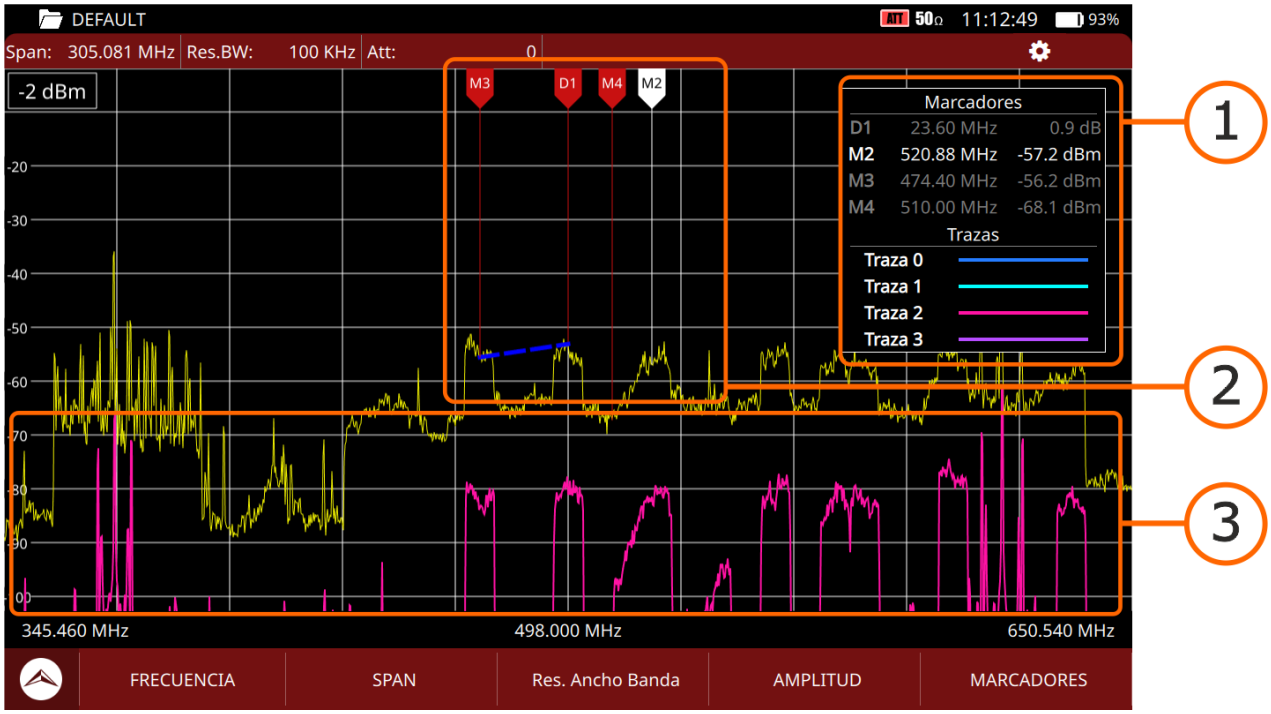


Figure 33.

1 Window with markers and traces. The white marker identifies the selected marker. The marker labeled with a "D" is the Delta marker. The Delta marker shows the difference relative to the reference marker.

2 Markers are identified by their label and color. The selected marker is identified by its white color. The Delta marker is identified by the initial "D." The reference marker for the Delta marker is identified by a dashed blue line connecting the two.

3 he traces display a snapshot of the spectrum.

5.3 Spectrum Settings

To display the **Spectrum Settings**, swipe right from the left side of the screen or tap on any of the options in the bottom Settings bar. Once in the settings menu, swipe up or down to access all available options, which include:

- Center frequency: It allows modifying the center frequency, which is the frequency where the spectrum is centered on the screen. The center frequency changes if the start or end frequency is adjusted.
- Start frequency: It allows modifying the start frequency, which is the frequency where the spectrum display begins on the screen.

- Stop frequency: It allows modifying the final frequency, which is the frequency where the spectrum display ends on the screen..
- Span: The span is the range of frequencies displayed on the screen. The span value changes if the start or stop frequency is adjusted, up to its maximum value.
- Reference level: It allows modifying the reference level. The reference level is the range of power level represented on the vertical axis.
- Attenuation: It can operate in Manual or Automatic mode. In manual mode, the user must select an attenuation value between 0 and 70. In automatic mode, the system applies attenuation based on the signal.
- Resolution bandwidth: The resolution bandwidth (RBW) defines the bandwidth of the filter used to separate signal peaks. The smaller the RBW, the greater the ability to distinguish signals with close frequencies. However, this also increases sweep time (the screen updates less frequently). Available resolution filters: 2 kHz (only for terrestrial band), 10 kHz, 20 kHz, 40 kHz, 100 kHz, 200 kHz, and 1000 kHz. Depending on the selected filter, the minimum and maximum allowable span changes.
- Marker selected: It allows selecting one of the four available markers. Once selected, it can be enabled/disabled, its frequency can be edited, its type modified, or it can be set as the reference marker. To do so, use the lower menus. The selected marker appears in white on screen.
- Marker enabled: It allows enabling/disabling the selected marker. When enabled, the marker will appear on the screen placed at its frequency. It is also shown in the marker window, which is by default located at the top-right corner of the screen.
- Marker type: It allows defining the type of the selected marker. The Marker (M) type is the standard marker, while the Delta (D) type shows the difference in frequency and power relative to the reference marker. The Delta marker is identified on the screen with a "D" before the number.
- Marker frequency: Frequency at which the selected marker is placed.
- Reference Marker: Selection of the reference marker, which will be used for measurements in relation to the delta marker. To select the reference marker, the delta marker must first be selected in the "Selected Marker" field. The reference marker and the delta marker will be connected by a dashed blue line.
- Detector type: It allows the user to select between Peak Detector, Negative Peak, or RMS. The Peak Detector detects positive peak signals, while the Negative Peak Detector detects negative peak signals. Both are mainly used for modulated analog signals. The RMS detector calculates the average power and is the appropriate option for digital modulations.
- Trace selected: Selection of one of the four available traces. Once selected, it can be enabled/disabled or hide/show. To do so, use the lower menus.
- Trace enabled: It allows the user to enable/disable the selected trace. When enabled, the spectrum trace will be captured. The active trace

appears in a window in the top-right corner, displaying the colour that identifies it.

- Trace visible: It makes the capture of the selected trace visible. The trace is identified by its colour, which appears in a window in the top-right corner, displaying the colour that identifies it.
- Maximum trace hold: It captures the spectrum when it reaches the maximum level.
  - Enable: It enables the maximum trace hold.
  - Hide: It hides/shows the maximum trace.
  - Freeze: It captures and holds the current maximum trace.
- Minimum trace hold: It captures the spectrum when it reaches the minimum level.
  - Enable: It enables the minimum trace hold.
  - Hide: It hides/shows the minimum trace.
  - Freeze: It captures and holds the current minimum trace.
- Spectrum heatmap: Displays power using a color gradient to indicate power levels. Warm colors (such as red, orange, and yellow) represent higher power levels, while cool colors (such as blue and green) represent lower power levels.

5.4 Additional Settings

The additional settings appear when tapping on the gear icon located in the upper left corner:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.
- dB/div: It allows modifying the number of dB per division on the vertical axis of the graph that displays the power. The available values are: x10, x5, x3, x2, x1.

5.5 Advanced tools

In the next sections each advanced tool for the Spectrum Analyzer is explained. Now, these are the available ones:

- Channel Power
- Spectrogram
- Adjacent Channel Power
- Occupied Bandwidth

NOTE: Advanced tools make use of a large amount of the meter's resources, so some functions may not be available while the advanced tool is running. Make sure to exit or finish the advanced tool in order to use the meter in the usual manner.

5.6 Channel Power

The Channel Power tool displays the total power within a user-defined frequency bandwidth.

Channel Power SCAN

► Operation

1. From Spectrum Analyzer mode, access the Advanced Tools menu by swiping left from the right side of the screen and tapping on "Channel Power.
2. The Channel Power screen displays two dashed vertical lines representing the channel bandwidth. The bottom part shows the total power within the channel bandwidth and the occupied bandwidth.
3. Tap on the "Channel Bandwidth" option in the options bar or in the Spectrum Settings menu.
4. Enter the desired channel bandwidth value.
5. Then, adjust the spectrum display to center the signal to be measured within the specified bandwidth
6. Tap on the "Span" or "Amplitude" option in the options bar or in the Spectrum Settings menu to adjust the span and reference level as needed for better spectrum visualization.
7. The channel power and the frequency of the selected bandwidth are displayed at the bottom of the spectrum
8. After finish, close the "Channel Power" tool. To exit "Channel Power", return to the Advanced tools menu by swiping from right to left on the screen and tap on the "Channel Power (x)" option.

►**Screen**

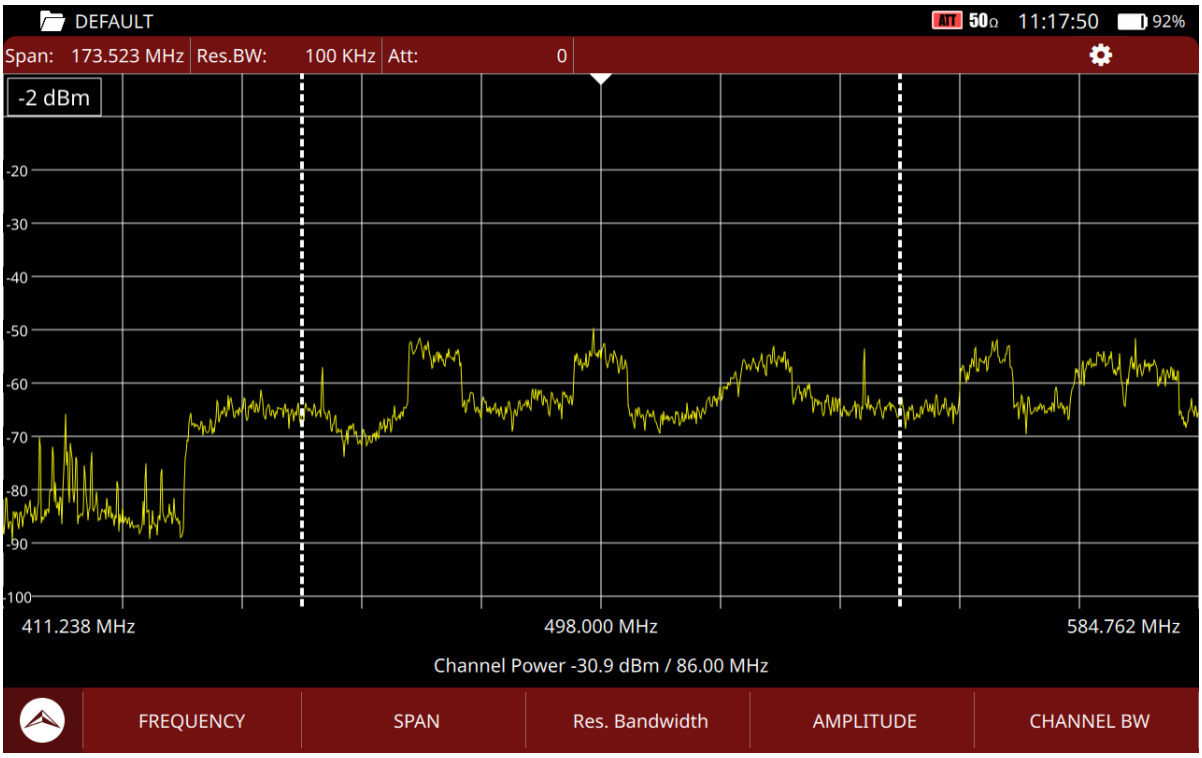


Figure 34.

5.7 Spectrogram (Spectrum + Waterfall)

The **Spectrogram** tool is a graph that displays the real-time evolution of the spectrum power level.

Spectrogram (01:55s)

SCAN

When changing any of the real-time chart configuration parameters such as span, centre frequency, reference level, etc., the chart will reset and regenerate.

►**Touch gestures**

Tap: When tapping on the waterfall area, a legend will appear indicating the colour corresponding to each level of power.

►Screen

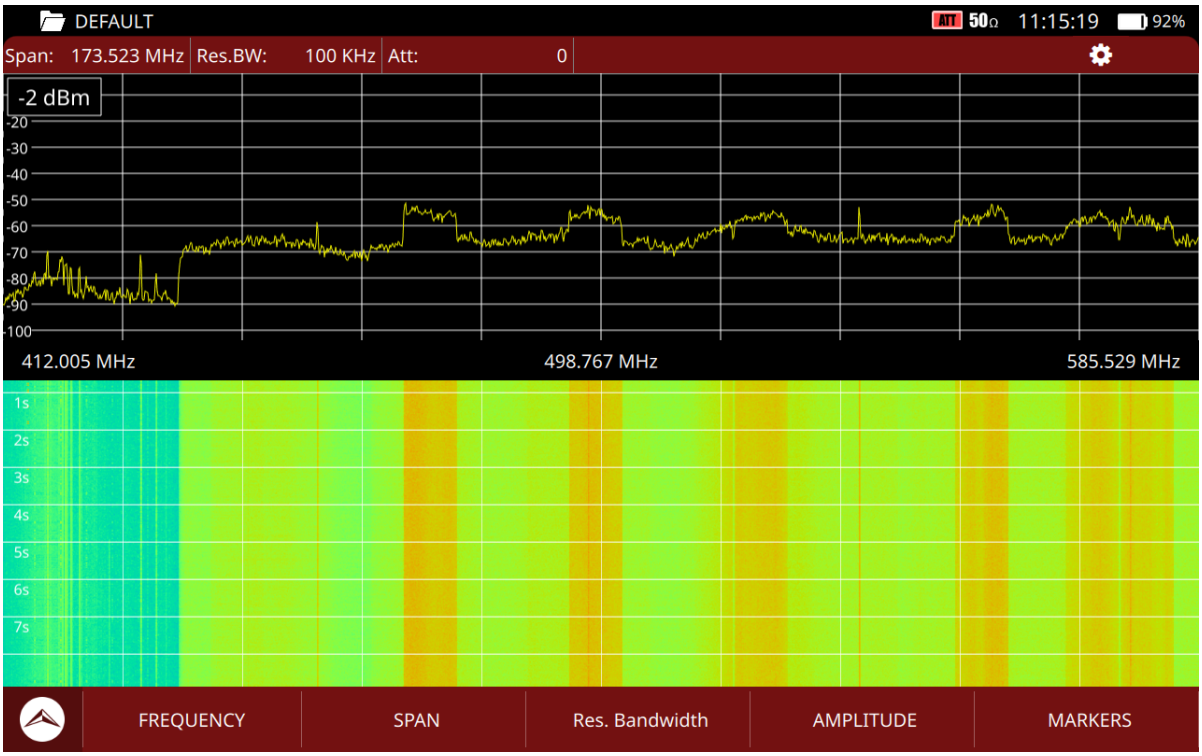


Figure 35.

In the top window, the graph shows the spectrum received by the RF input, with the horizontal axis representing the selected frequency span and the vertical axis representing power.

In the bottom window (waterfall), there is a graph where the horizontal axis represents the same frequency span as in the top window, and the vertical axis represents time. To represent the power level, a range of colors is used, going from 0 dB (cool color) to 40 dB (warm color).

►Settings

Press on the gear to display the settings menu:

- Line Mode: It defines the spectrum trace mode: Line, solid or gradient. Line shows only the spectrum outline. Solid shows the spectrum with a yellow background. Gradient shows the spectrum with a gradient of yellow background.
- dB/div: It allows modifying the number of dB per division on the vertical axis of the graph that displays the power. The available values are: x10, x5, x3, x2, x1.
- Spectrogram duration: It defines the time window of the vertical axis that can be adjusted within a range from 1 to 60 minutes.

5.8 Adjacent Channel Power (ACPR)

Adjacent Channel Power Ratio (ACPR) refers to the amount of power leaked into adjacent channels from the main channel. In other words, it measures the amount of interference a signal may cause to other systems operating on adjacent frequencies.

A high ACPR means the signal is causing significant interference in neighboring channels, which can lead to issues in other communication systems. On the other hand, a low ACPR indicates that the signal is mainly concentrated at its frequency, allowing for more efficient spectrum usage.

The analyzer breaks down the signal into its frequency components and measures the power in the main channel and adjacent channels. The result is the ratio between the power in the adjacent channel and the power in the main channel, expressed in dB.

Adjacent Channel Power (02:06)

SCAN

►**Screen**

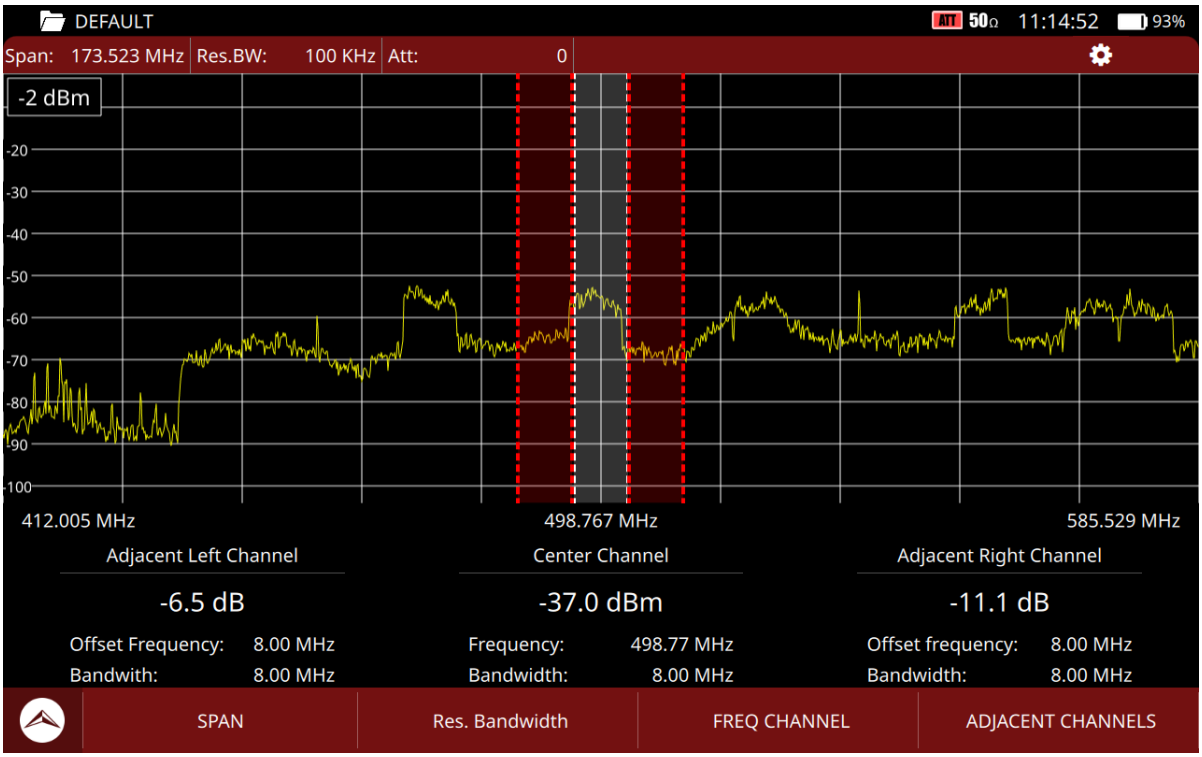


Figure 36.

5.9 Occupied Channel Bandwidth (OCBW)

The Occupied Channel Bandwidth (OCBW) is a measure of the bandwidth occupied by a signal within a specific channel. Measuring OCBW helps determine the efficiency of a signal transmission and its potential interference with other signals.

The spectrum analyzer is tuned to a specific channel and measures the bandwidth of the signal within that channel at a certain power level. The OCBW is calculated as the difference between the upper and lower frequency limits of the measured bandwidth.

Occupied Channel Bandwidth

SCAN

►Screen

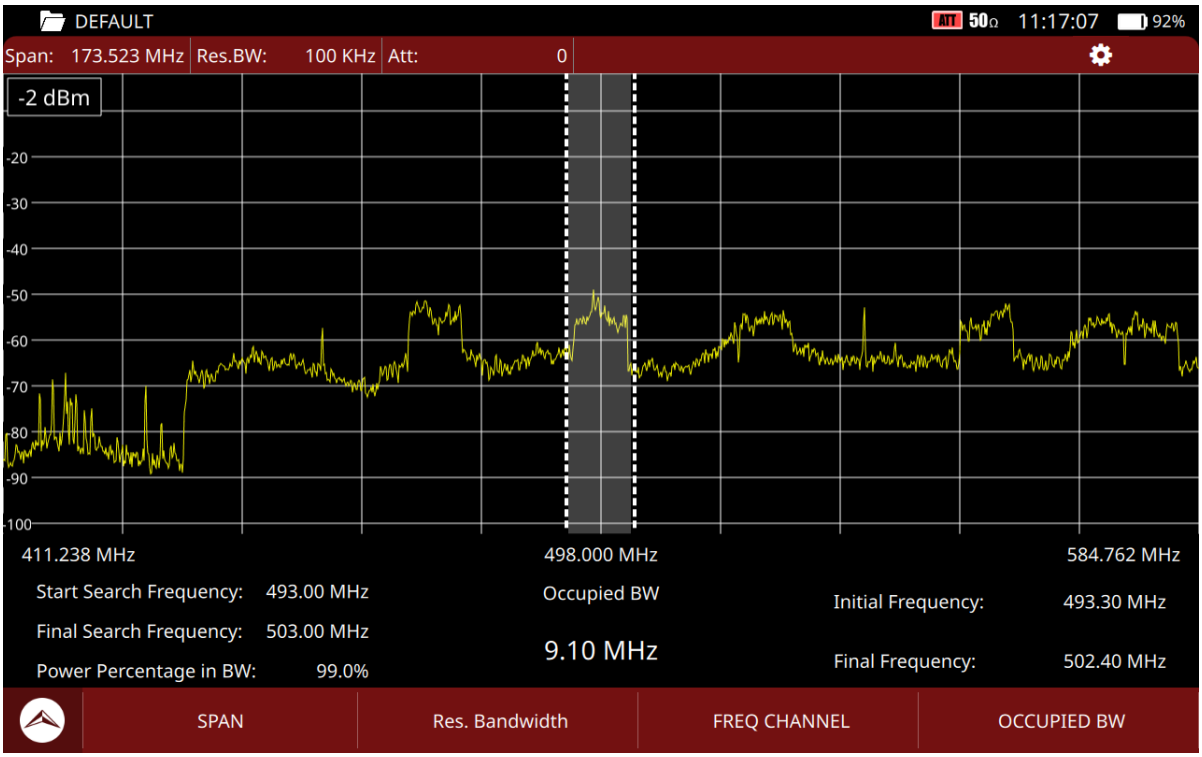


Figure 37.

6 IPTV

6.1 Introduction

IPTV stands for TV over IP networks. It actually means TV over any type of IP packet based distribution network. They can be referred to as LAN (Local Area Network), ethernet, computer networks, etc. With the growth of LAN based TV distribution systems, having an IPTV input in your field strength meter becomes a handy feature.

The equipment allows you to receive television programmes coming from IPTV networks. The multicast IPTV stream should carry MPTS or SPTS in order to be analyzed and decoded. It is also able to work with networks where there are redundant SPTS multicast streams with the same IP but different source.

Those programmes can be displayed on the screen together with other important service information. Although some concepts are similar, signal quality assessment metrics is not the same in IPTV as it is in digital TV over RF. The equipment offers you the measurements you need to understand, identify and correct the new problems that can be found in this new type of television distribution networks.

IPTV analyzer (06:41s) SCAN

6.2 Operation

1. Connect the IPTV input/output signal to the equipment through the IPTV interface located on the top side of the meter.
2. Press the **Settings** option from the **Home** menu.
3. At IPTV settings, press on the option "Network" and "IGMP" to set configuration (for more details refer to "IPTV Settings" on page 25).
4. Back to the **Home** menu and press on the **IPTV** option to enter the IPTV tool.
5. To display the Streaming Settings swipe right from the left side of the screen or press on any field related on the Status bar.

6 Streaming settings show information and allows user to select one multicast/ unicast and other parameters:

- Multicast Group / Unicast IP address and port.
- Transport Stream standard.
- SAPSDP info: It shows info contained in the multicast (Session Announcement Protocol and Session Description Protocol).
- Discovered Multicast: It shows all multicast discovered in the network. For each one shows IP address, port, bitrate and source IP.
- VLAN: It allows entering the VLAN tag to identify data packets belonging to a specific virtual network. Otherwise, select "All traffic".
- TS capture mode: Select TS or T2-MI.

7 If the received IPTV signal is correct and the meter successfully locks onto the TS or T2MI, the tuning bar turns green and some data from the streaming is displayed: stream address, Ethernet connection icon, received standard, name that identifies the stream and bitrate. The meter automatically identifies if it is an RTP/UDP protocol.

8 Now some tools can be used to obtain more information about the signal. The IPTV Analyzer screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the inverted triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

9 The tools available to analyze the IPTV signal are:

- Video
- IPTV measurements
- IPTV signal parameters
- IPTV Packet Rate
- IPTV IPAT
- Ping Request
- Video/Audio Parameters
- Audio levels
- TS analyzer
- SFP Parameters

10 Select one tool for each panel to analyze the signal.

In the next sections each IPTV Analyzer tool is explained in detail.

6.3 Video

The video tool decodes and visualizes the image for the selected multicast/ unicast service.

►Screen

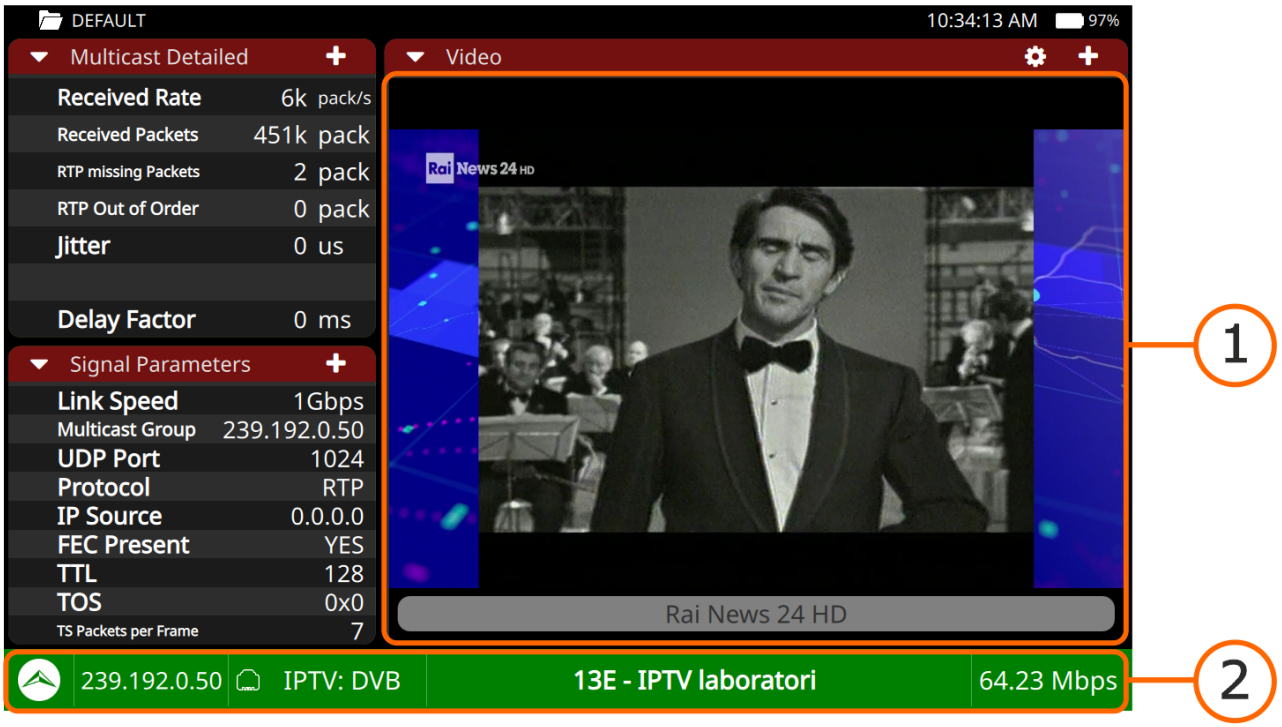


Figure 38.

1 Video image. At the bottom shows the name of the service. When you press on the image, the name of the service being viewed will appear. Tapping again, a list of services available in the multiplex will appear.

2 Status bar: It displays streaming parameters such as IP, modulation, network name, and total bitrate of the Transport Stream. It also provides access to streaming settings. The Promax icon returns to the Home screen.

►Touch gestures

Tap: When you tap on the image it shows the service name. Pressing again it opens a list of available services in the multiplex.

►Settings

Press on the gear to display the tool settings:

- Audio: Select one of the audio layers available for the service.

6.4 IPTV Measurements

It shows measurements of the received multicast IP traffic.

►Screen

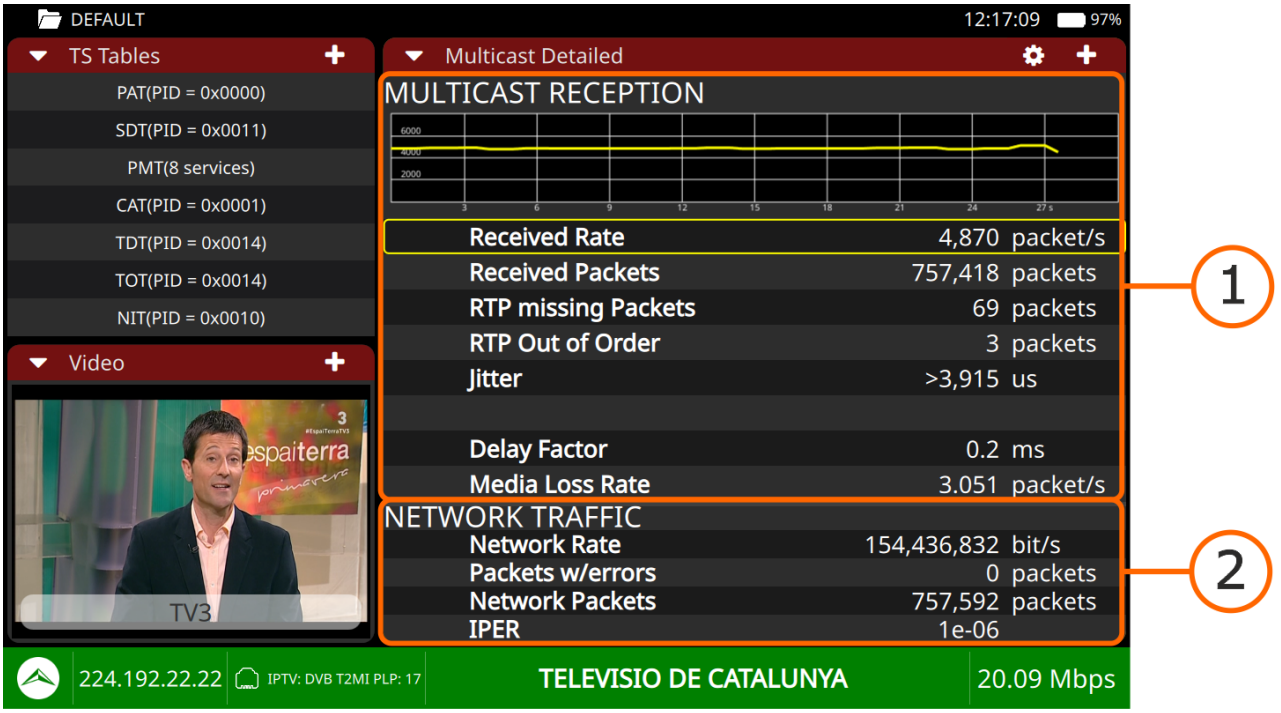


Figure 39.

1 Multicast reception: It displays several measurements about the received multicast and a graph of one selected measurement over time. To visualize all the measurements and two graphs, you have to view it in full screen. The available measurements are:

- Received rate
- Received packets
- RTP missing packets
- Duplicated RTP
- RTP out of order
- Jitter
- Delay factor (max amount of time that a packet waits in the buffer before being released)

- Media loss rate (the higher this number the worse the overall viewing experience; only for RTP traffic)
- Max IPAT (max interarrival packet time)
- FEC status (Forward Error Correction)
- Reordered FTP
- Fixed packets
- Overflow
- TS packets per frame

2 Network traffic: It displays several measurements about the network traffic:

- Total network bitrate
- IPER (packet error rate)
- Packets with errors
- Total network packets.

►Touch gestures

Tap: Select the multicast measurement to be drawn on the graph.

►Settings

Press on the gear to display the tool settings:

- Reset: It restarts all the measurements.

6.5 IPTV Signal Parameters

The IPTV signal parameters tool displays all data related to the IPTV signal.

►**Screen**

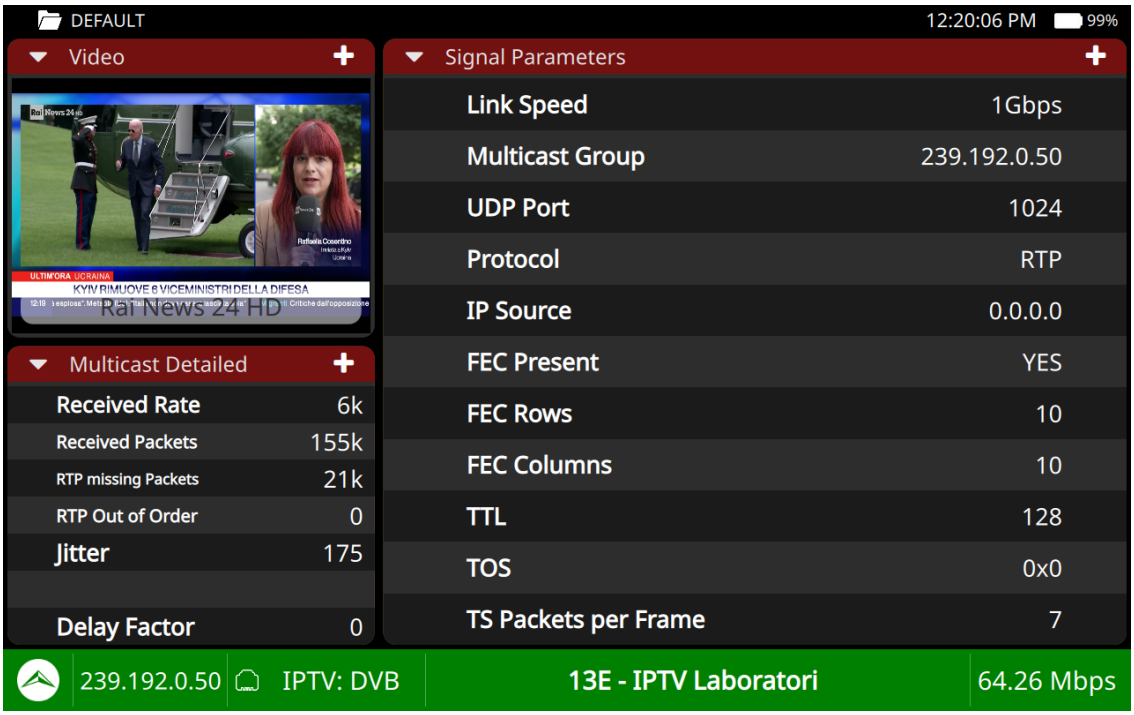


Figure 40.

1 Available parameters:

- Link speed
- Multicast group
- UDP port
- Protocol
- IP Source
- FEC
- FEC rows
- FEC columns
- TTL
- TOS
- TS packets per frame

6.6 IPTV Packet Rate

The IPTV Packet Rate tool shows the number of IP packets being received from the current multicast/unicast stream over time.

►**Screen**

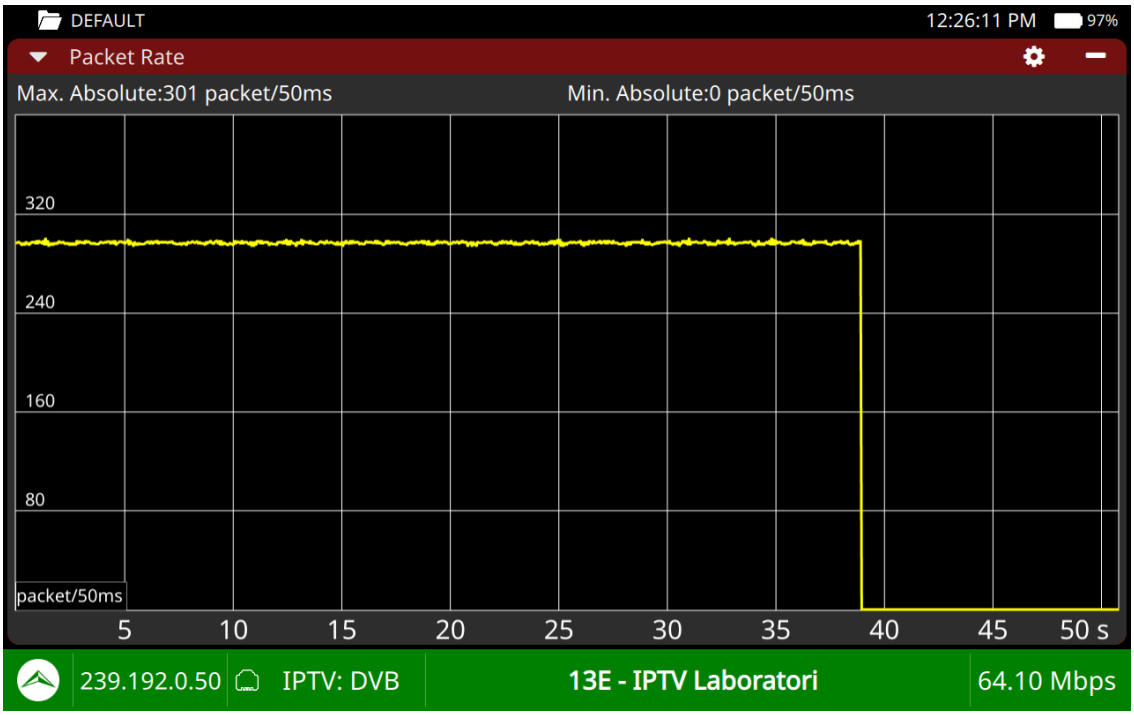


Figure 41.

1 Graph showing the reception of packets over time. The top fields show the amount absolute of maximum and minimum packets received per unit of resolution.

►**Settings**

Press on the gear ⚙ to display the tool settings:

- Resolution: It allows you to change graph resolution. Available values are: 1, 5, 10, 50, 200 and 1000 ms.

6.7 IPAT - Inter Packet Arrival Time

The IPAT tool displays a graph with the percentage of IP packets that are received and the time between them in order to check the continuity of the reception of the selected stream.

►Screen

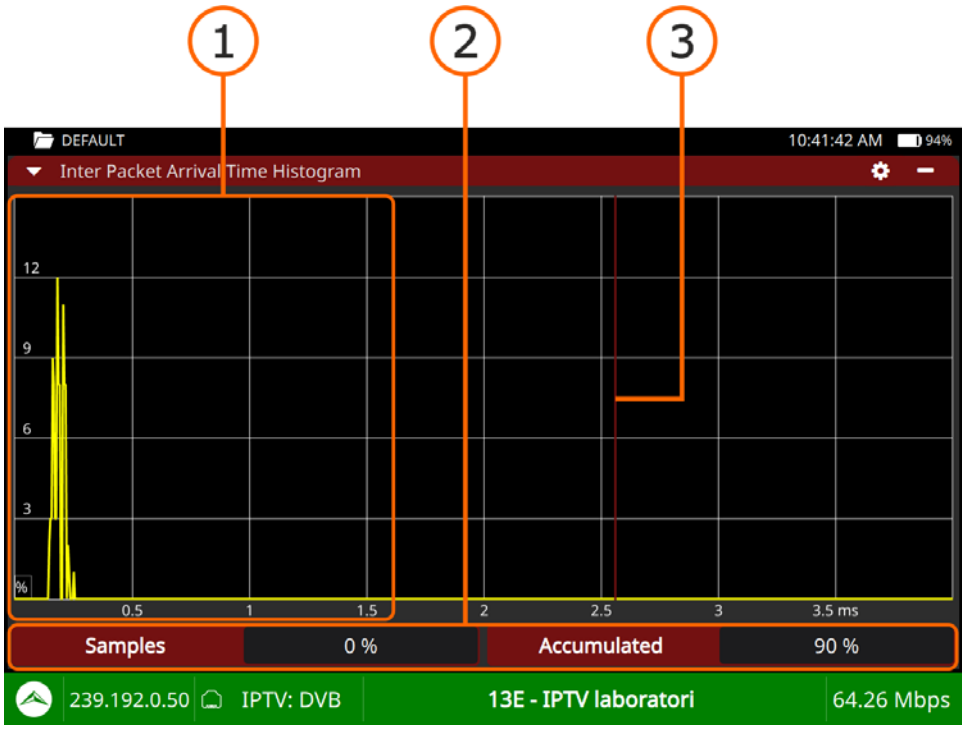


Figure 42.

1 Histogram that represents the percentage of IP packets received on the vertical axis and the time between packet arrivals on the horizontal axis. Most values should be around small values, otherwise there may be a network problem.

2 Information: The "Samples" field refers to the percentage of packets used for the graph that are equal to or below the threshold. The "Accumulated" field shows the cumulative percentage of packets that are above the threshold.

3 Red vertical line: Selected threshold for time between packet arrival. Press left or right to change the threshold.

►Settings

Press on the gear to display the tool settings:

- Erase: It deletes all data received and starts over.
- Span: It allows to change the span. Available values are: 4, 8, 40, 200, 400 and 1920 ms.

6.8 PING Request

It allows sending one or several PINGs to other devices in the network.

►Screen

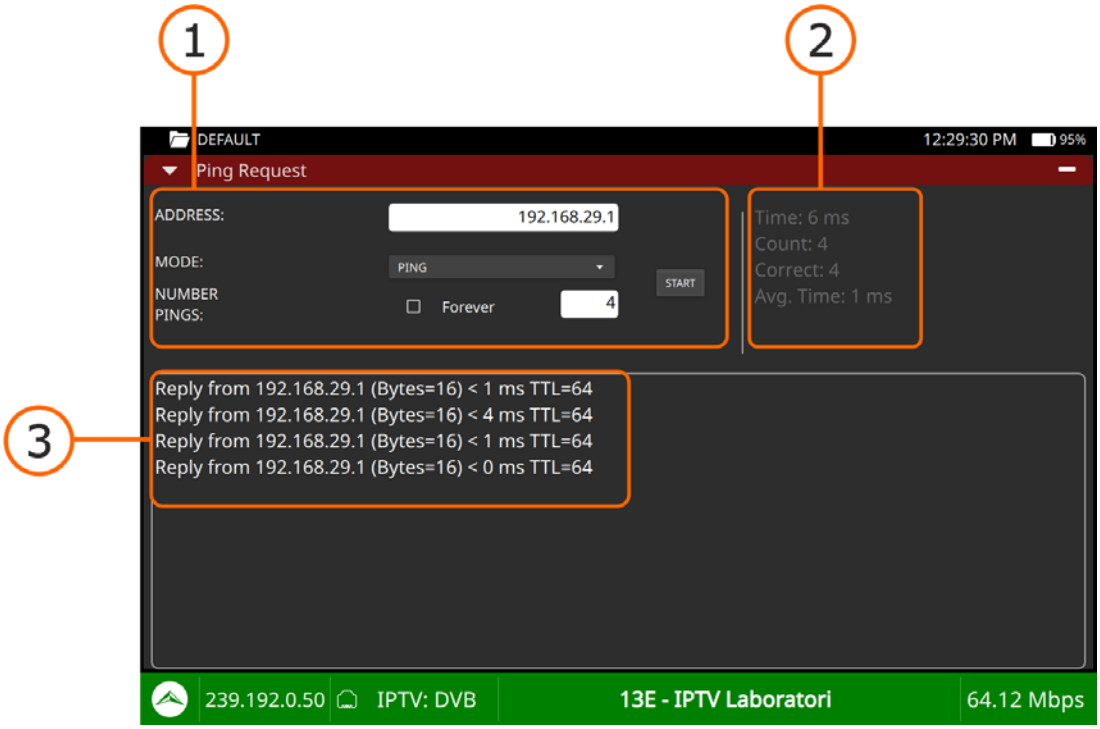


Figure 43.

1 Data fields: It shows several parameters to set previously to use it.

- Address: IP where to send the PING.
- Mode: PING, trace or average. PING mode confirms if a given unit can get any response from another machine in the same network or external network. TRACE mode shows all routers between the meter and the IP address measuring transit delays of packets across the network. Average mode shows average delay between two points in the network and also changes in this delay.
- Number of PINGs: Select a number of PINGs to send or check the "forever" box to send PINGs continuously.
- Start: It starts sending PINGs.

2 Results: It shows the data report after sending pings.

- Time
- Pings count
- Correct pings
- Average time

3 Ping replies: It shows the replies from the pings sent.

►Touch gestures

Tap: Press on the fields to select an option or edit a value.

6.9 Video / Audio Parameters

The Video/Audio Parameters tool displays all metadata related to the video and audio layers and other services (teletext, apps, hybrid TV, etc.).

►Screen

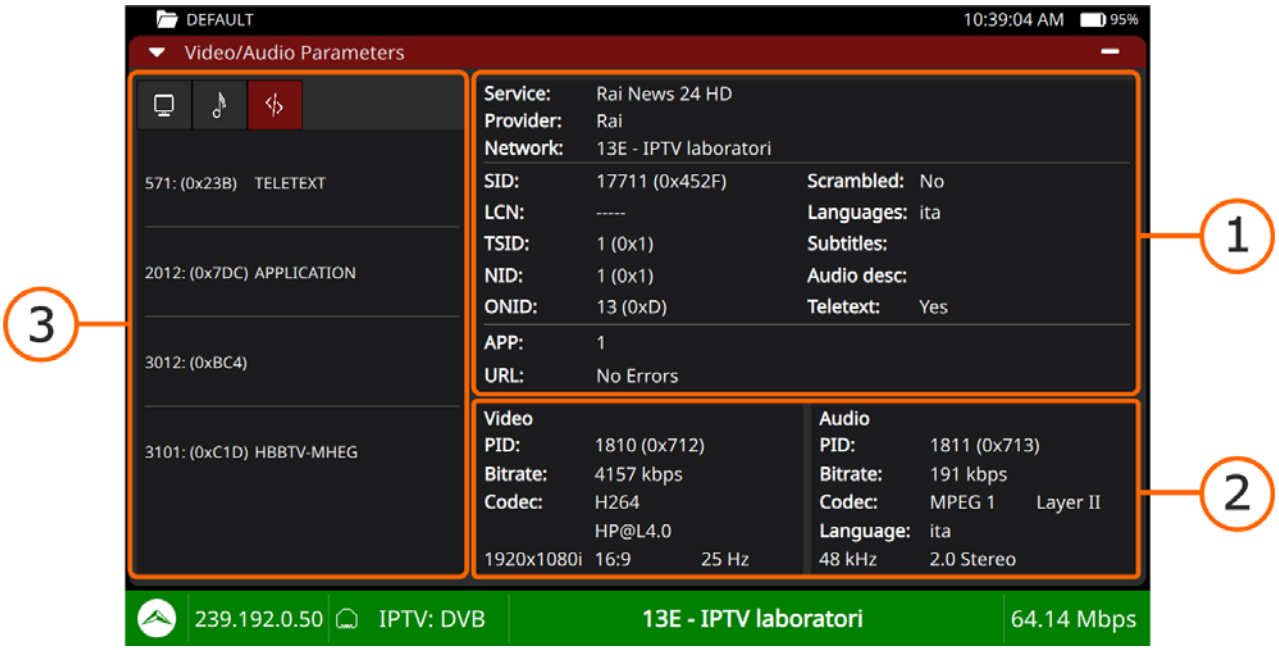


Figure 44.

1 General Parameters:

- Service / Provider / Network
- SID; LCN; TSID; NID; ONID
- Scrambled; languages; subtitles; audio desc; teletext
- APP; URL

2 Video / Audio Parameters:

- Video: PID; bitrate; codec
- Audio: PID; bitrate; codec; language

3 (at full screen) Information about PID (packet identifier) of video, audio and other services (teletext, hybrid, etc.).

►Touch gestures

Tap: Press on an icon to obtain more information about audio, video and others services.

6.10 Audio Levels

The Audio Levels tool measures the volume of the left and right channels of the selected service.

►Screen

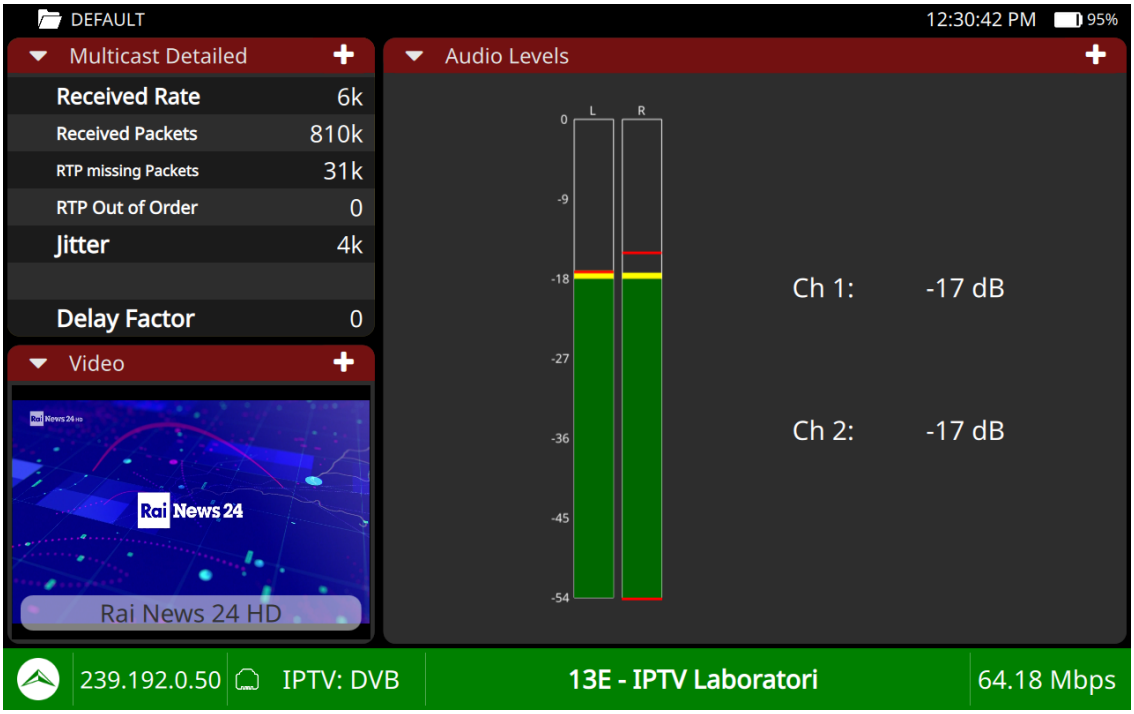


Figure 45.

1 Two bars display the audio level for the left channel and right channel respectively. The bar colour indicates the audio level:

- Red: High volume (0 dB <-> -9 dB)
- Yellow: Medium volume (-9 dB <-> -18 dB)
- Green: Proper volume (-18 dB <-> -54 dB).

►Settings

Press on the gear to display the tool settings:

- Language: It allows you to change the audio language.

6.11 TS Analyzer

The TS Analyzer tool performs a detailed analysis of the embedded transport stream. This tool includes these functions:

- Tables Analyzer
- Bitrate
- PIDs
- Alarms - TR 101 290

In the following sections, each of them is described.

6.12 Tables Analyzer

The Tables Analyzer tool shows the PSI/SI tables from the TS. All components and contents of tables can be consulted by deploying the nodes. So the user can analyse the tables and see in detail what is being transmitted and if the information is properly encapsulated.

►Touch gestures

Tap: Tap on the table name to unfold it and see its sub-fields.

►**Screen**

Figure 46.

1 Main window: It shows all metadata extracted from the transport stream. These are the PSI (Program Specific Information) and SI (Service Information) tables and all their related fields. They can be unfolded to see its subfields.

6.13 TS Bitrate

The TS Bitrate tool shows in a graphical way, and also by numbers and percentage the TS bitrate. A pie chart, which is updated in real time, shows the evolution of the bitrate distribution for each one of the services in the tuned multiplex. It also allows selecting any of the services to check its composition, which is also shown on a pie chart.

►Screen

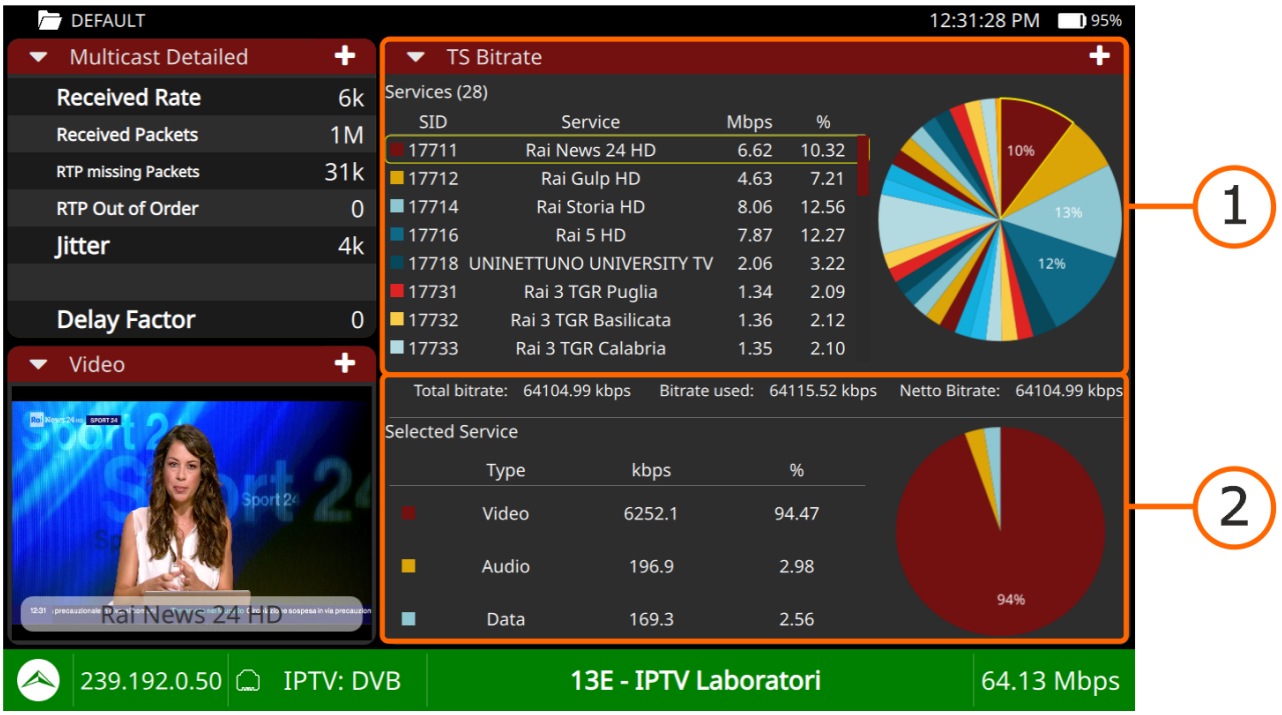


Figure 47.

1 Services window: It shows all services in the transport stream in real time. The "Others" service indicates the amount of bitrate used by the PSI/SI tables. The pie chart indicates the percentage contribution in bitrate per service in respect to the total TS bitrate, including null packets, which are displayed in black. Under the chart, the total bitrate of the TS is shown, along with the total used bitrate (the sum of the bitrate for all PIDs in the TS) and the net bitrate (total bitrate minus null packets). If there is no reuse of PIDs, the used bitrate should match the total bitrate.

2 Selected service window: It shows bitrate for video, audio and data for the selected service in real time, both in percentage and absolute value. The pie chart shows this information graphically.

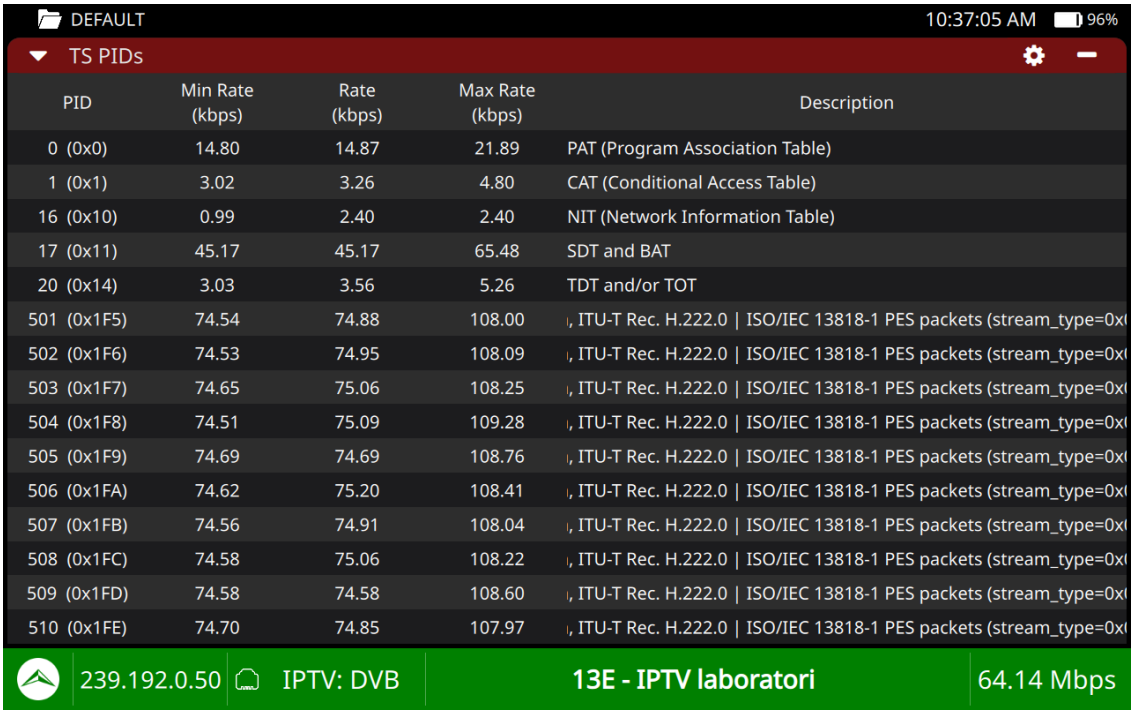
►Gestos táctiles

Tap: Select a service.

6.14 PIDs Analyzer

The PIDs Analyzer tool shows an ordered PID list with a short explanation of each PID and its minimal, maximum and average bitrate. Bitrate is refreshed continuously to help in understand bandwidth usage.

►Screen



PID	Min Rate (kbps)	Rate (kbps)	Max Rate (kbps)	Description
0 (0x0)	14.80	14.87	21.89	PAT (Program Association Table)
1 (0x1)	3.02	3.26	4.80	CAT (Conditional Access Table)
16 (0x10)	0.99	2.40	2.40	NIT (Network Information Table)
17 (0x11)	45.17	45.17	65.48	SDT and BAT
20 (0x14)	3.03	3.56	5.26	TDT and/or TOT
501 (0x1F5)	74.54	74.88	108.00	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
502 (0x1F6)	74.53	74.95	108.09	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
503 (0x1F7)	74.65	75.06	108.25	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
504 (0x1F8)	74.51	75.09	109.28	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
505 (0x1F9)	74.69	74.69	108.76	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
506 (0x1FA)	74.62	75.20	108.41	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
507 (0x1FB)	74.56	74.91	108.04	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
508 (0x1FC)	74.58	75.06	108.22	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
509 (0x1FD)	74.58	74.58	108.60	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x
510 (0x1FE)	74.70	74.85	107.97	, ITU-T Rec. H.222.0 | ISO/IEC 13818-1 PES packets (stream_type=0x

Figure 48.

1 PID window: It shows all the PIDs of the analyzed TS. For each PID it shows its content and minimum, average and maximum bitrates.

►Settings

Press on the gear to display the tool settings:

- Order by: This options allows you to sort PIDs by name, bitrate, max bitrate, min bitrate or description.
- Reset: It restarts PID analysis.

►Touch gestures

Drag: To move along the PID list.

6.15 TS Alarms - TR 101 290

The TS Alarms (TR 101 290) tool displays in real time the evolution of the TS and the alarms that may occur. The list of alarms are classified in three priority levels, according to TR 101 290 guidelines by DVB group.

►Screen

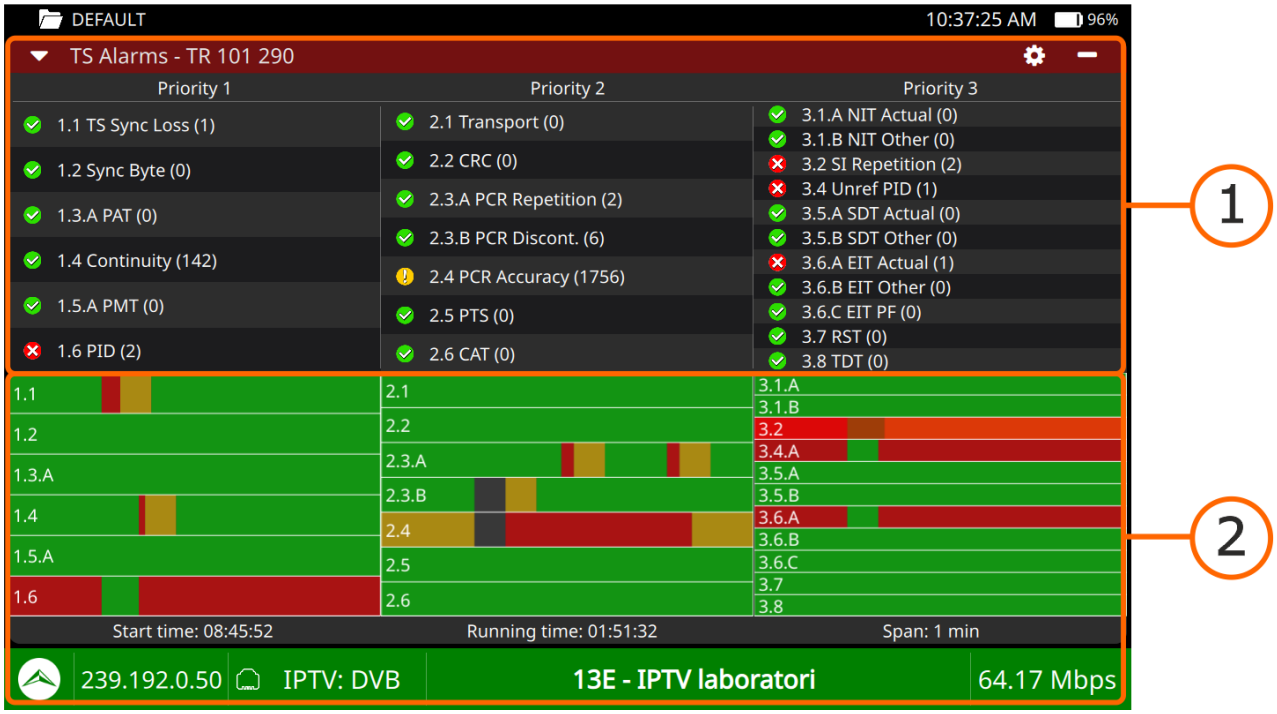


Figure 49.

1 Alarms window: It shows all the alarms classified by priority. Press on any of these alarms to enter in a specific screen for the alarm that shows a log with a list of events, a description and an option to enable/disable the alarm.

2 Events window: It shows a graph for each alarm with all the events that have happened. Errors are shown as a red strip lasting as long as the error.

►Settings

Press on the gear ⚙ to display the tool settings:

- Reset Running Alarms: It initiates the alarm analysis from scratch.
- Restart TS Analysis and Alarms: It initiates the capture of PSI/SI table info again followed by the alarm analysis.

►Gestos táctiles

Tap: When tapping on an alarm it shows log, description and settings menu.

► Icons

Besides each alarm there is an icon which is explained in the following table.

Icon	Description
	No errors occurred for this alarm.
	There has been an event for this alarm in the last 5 seconds.
	The event for this alarm just happened.
	The alarm is still being evaluated or there is no info in the TS to evaluate it.

7 ASI

7.1 Introduction

Asynchronous Serial Interface (ASI), also known as DVB-ASI or TS-ASI, is a method of transmitting digital and cable television signals. It is responsible for transporting an MPEG transport stream (MPEG-TS) through a coaxial cable or optical fiber, being especially used in broadcasting.

The ASI standard is defined by CENELEC and is part of the DVB standards. Regarding its technical specifications, ASI transports MPEG data serially at a constant speed of up to 270 Mbps. The most common packet size in ASI is 188 bytes, although a size of 204 bytes is also supported that includes Reed error correction -Solomon.

ASI is used in ATSC, DVB-T, DVB-S and other broadcast signals. It works as a unidirectional transmission designed for coaxial cable at speeds ranging up to 200 Mbps and has the capacity to transport one or several already compressed SD, HD, UHD or audio programs, the ASI signal being the final result of video compression and audio for later distribution or transmission.

In summary, the Asynchronous Serial Interface (ASI) plays a fundamental role in the transmission of digital and cable television signals. Its robustness and flexibility make it an indispensable tool for transporting a wide variety of video and audio formats.

7.2 Operation

1. Connect the ASI signal to the meter through the ASI/SDI input connector.
2. From the **Home** menu press on **ASI** 

.
3. To display the settings swipe right from the left side of the screen or press on the status bar.
4. Settings show information and allows selecting these parameters:
   - Transport Stream standard: Select if it is DVB, ISDB or ATSC.
   - TS capture mode: Select TS or T2-MI.
5. If the received ASI signal is correct and the meter successfully locks onto the TS or T2MI, the status bar turns green and displays the signal standard, the name that identifies the stream and its bitrate.
6. Now tools can be used to obtain more information about the signal. The ASI Analyzer screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any panel to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

7 The tools available to analyze the ASI signal are:

- Video/Audio Parameters.
- Video.
- Recording.
- Audio Levels.
- TS Analyzer.
- SFP Parameters.

8 Select one tool for each window to analyze the signal.

In the next sections each ASI Analyzer tool is explained in detail.

7.3 Video / Audio Parameters

The Audio/Video tool shows all metadata related to the video and audio layers.

Video Values (01:43s)

SCAN

►**Screen**

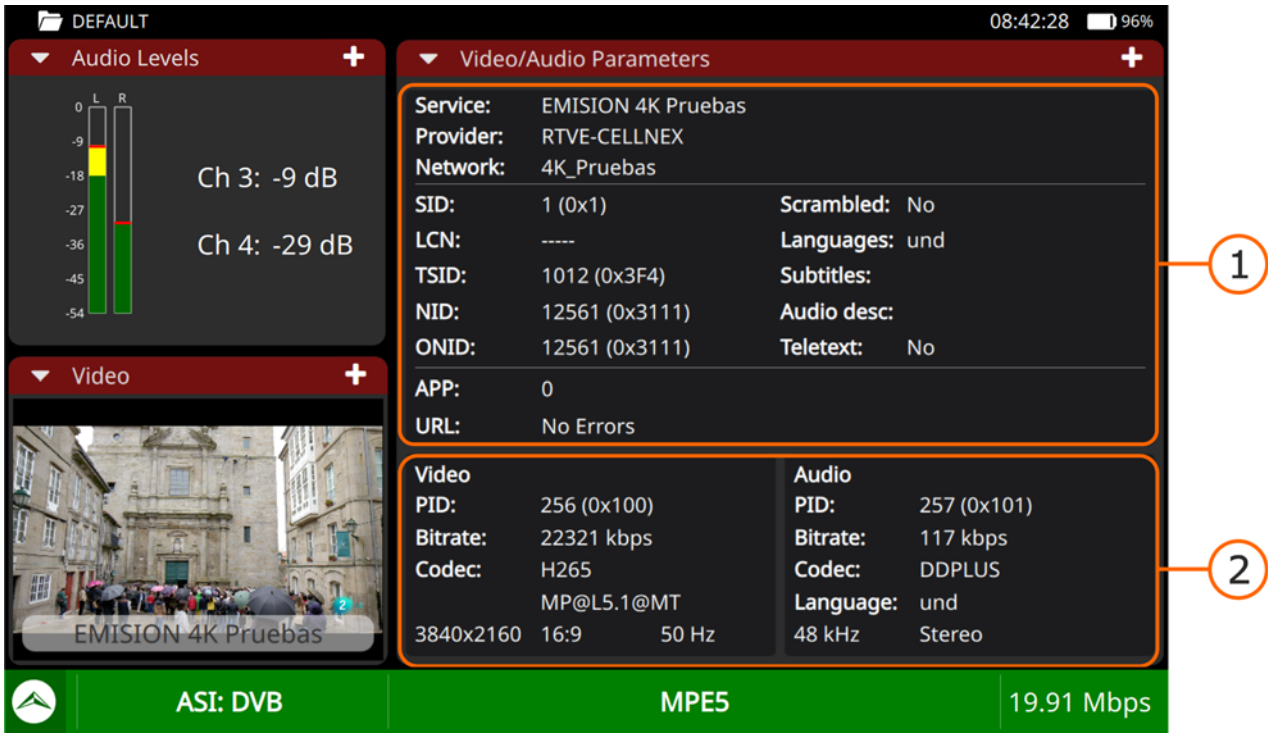


Figure 50.

1 General panel: It provides service information: name, provider and network name. Also Service ID, Logical Channel Number, transport stream ID, Network ID, original network ID, if the service is scrambled, audio language, subtitles language and some others.

2 Video/audio panel: On the left side shows video layer details: PID, bitrate, codec, resolution, aspect ratio and scanning rate. On the right side shows audio layer details: PID, bitrate, codec, language, sampling rate and format.

7.4 Video

The video tool displays one of the services carried by the transport stream.

Video (01:15s) SCAN

►Screen

Figure 51.

1 Video Panel: It displays one service from the transport stream.

2 Service bar: It shows the name of the service. If pressing, it opens a new window that shows all services available for the transport stream. Select one service to be displayed on screen. Each service is identified by its ID and name and it shows if it is video, audio or data.

►Settings

Press on the gear ⚙ to display settings:

- Audio: It allows the user to change language of the service in case there is more than one available.

7.5 Recording

The recording tool allows recording the full transport stream.

It also has the option to record raw signal in order to be analysed in case there was any problem locking the signal.

Recording (01:09s) SCAN

►**Screen**

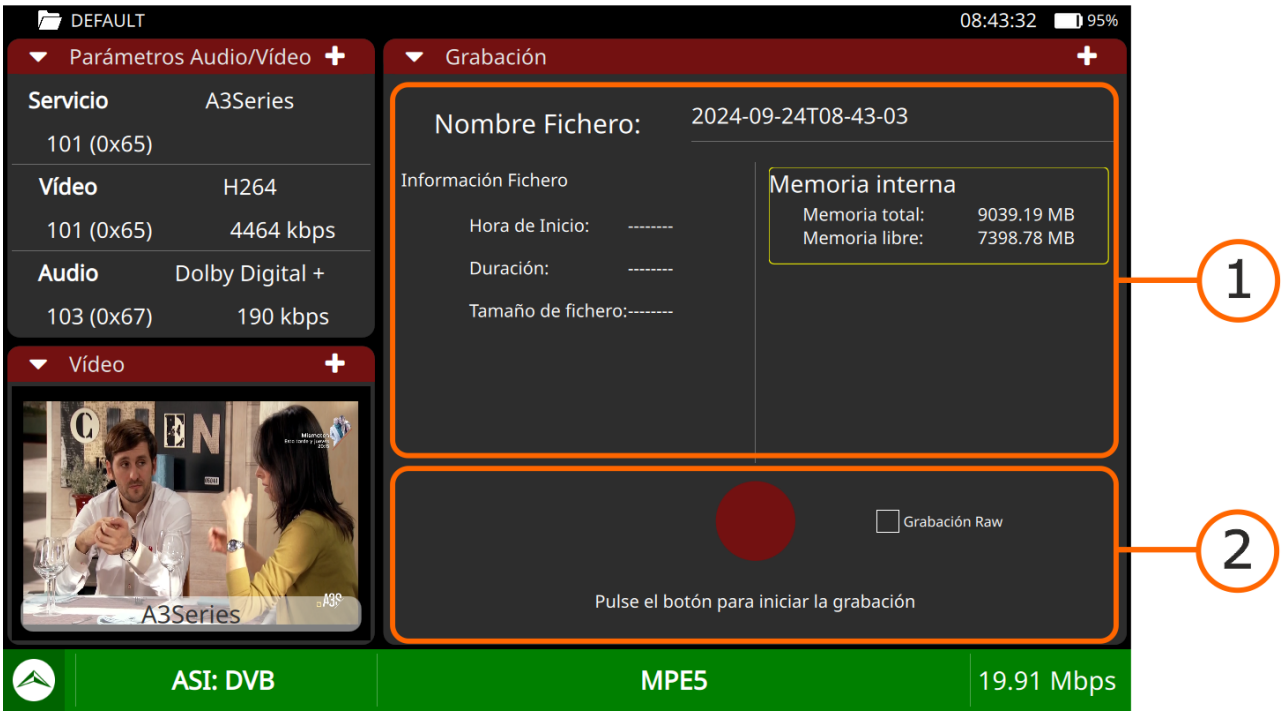


Figure 52.

1 File information Panel: On the left you can see start time, duration and file size. On the right side there is the total memory and free memory available.

2 On/Off button: It shows a red button to start/stop recording. If pressing when it is a round button it starts recording and when it is square it stops recording. Records are saved in the current workspace.

►Raw Recording Procedure

It is very important to follow these steps to generate a proper raw recording:

1. Disconnect the signal.
2. Check the raw recording checkbox.
3. Start recording.
4. Connect the signal.
5. After a while, stop recording.
6. Access the Workspace (for more details refer to "WORKSPACES" on page 128) to get the recording.
7. Deploy the Top Menu and select Workspace. Now select your current workspace and on "Mode" select "ASI". Then press "Recording".
8. Press on the file to access the options menu and copy it to an USB.
9. Now the file can be analysed or send to find any problems that are preventing to tune / demodulate it.

►Touch gestures

Tap: Tap the on/off button to start/stop recording or to check the raw recording checkbox.

7.6 Audio levels

The Audio level tool allows the user to visualize audio levels in a graphical way..

Audio levels (01:33s)

SCAN

►**Screen**

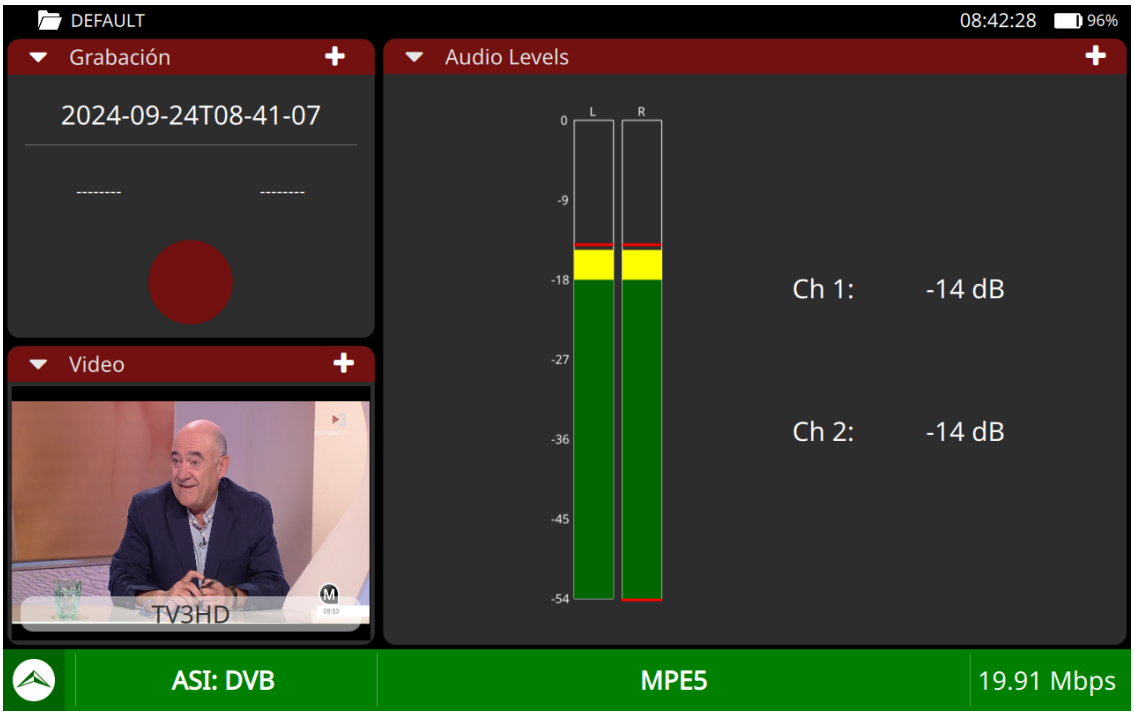


Figura 53.

1 Two bars display the audio level for the left channel and right channel respectively. The bar colour indicates the audio level:

- Red: High volume (0 dB <-> -9 dB).
- Yellow: Medium volume (-9 dB <-> -18 dB).
- Green: Appropriate volume (-18 dB <-> -54 dB).

7.7 Transport Stream Analyzer

The Transport Stream (TS) Analyzer is a set of tools that provides the user with a comprehensive analysis of the transport stream.

Transport Stream Tools (05:29s)

SCAN

The TS Analyser has these tools:

- TS Tables
- TS Bitrate

- TS PIDs
- TS Alarms

In the next sections each one of these tools are explained in detail.

7.7.1 Transport Stream Tables

The Tables Analyzer tool shows the PSI/SI tables from the TS. All components and contents of tables can be consulted by deploying the nodes. So the user can analyse the tables and see in detail what is being transmitted and if the information is properly encapsulated.

►Screen

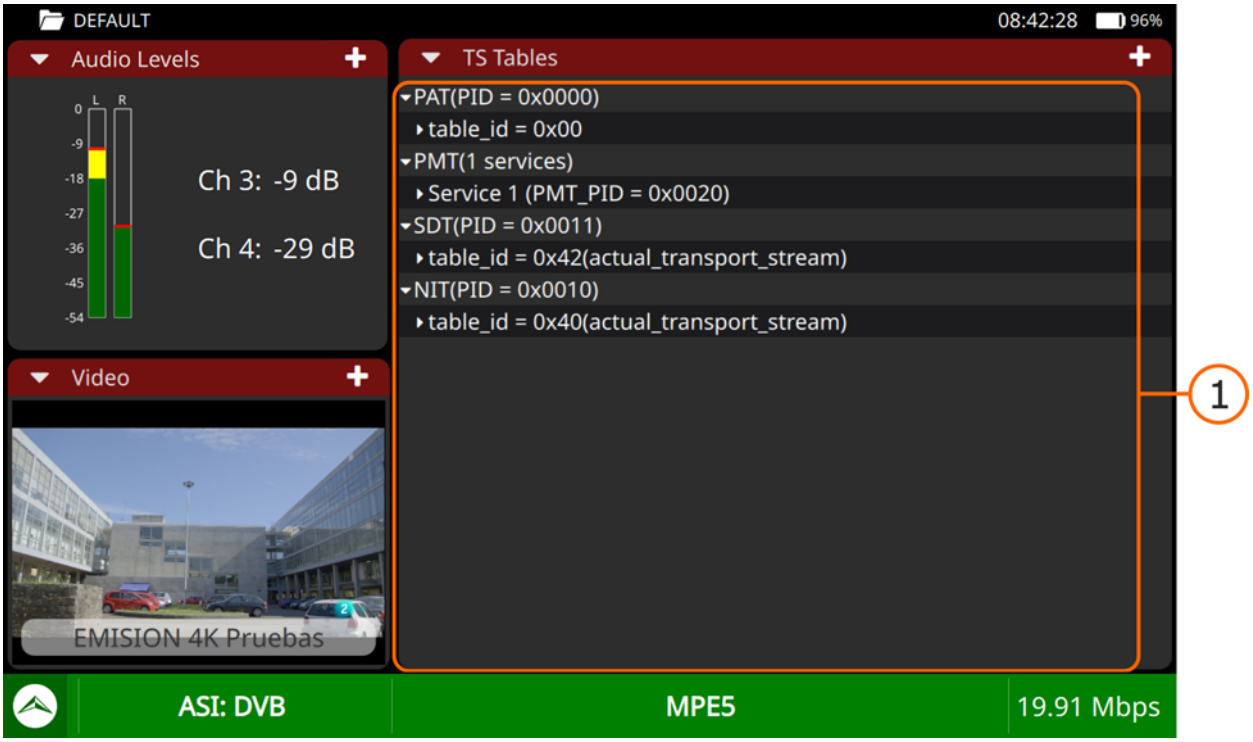


Figure 54.

1 General Panel: It shows all metadata extracted from the transport stream. These are the PSI (Program Specific Information) and SI (Service Information) tables and all their related fields. They can be unfolded to see its subfields.

►**Touch gestures**

Tap: To unfold tables and see its sub-fields.

7.7.2 Transport Stream Bitrate

This function shows the TS bitrate in a graphical way, and also by numbers and percentage. A pie chart, which is updated in real time, shows the evolution of the bitrate distribution for each one of the services in the transport stream. It also allows selecting any of the services to check its composition, which is also shown in a pie chart.

►**Screen**

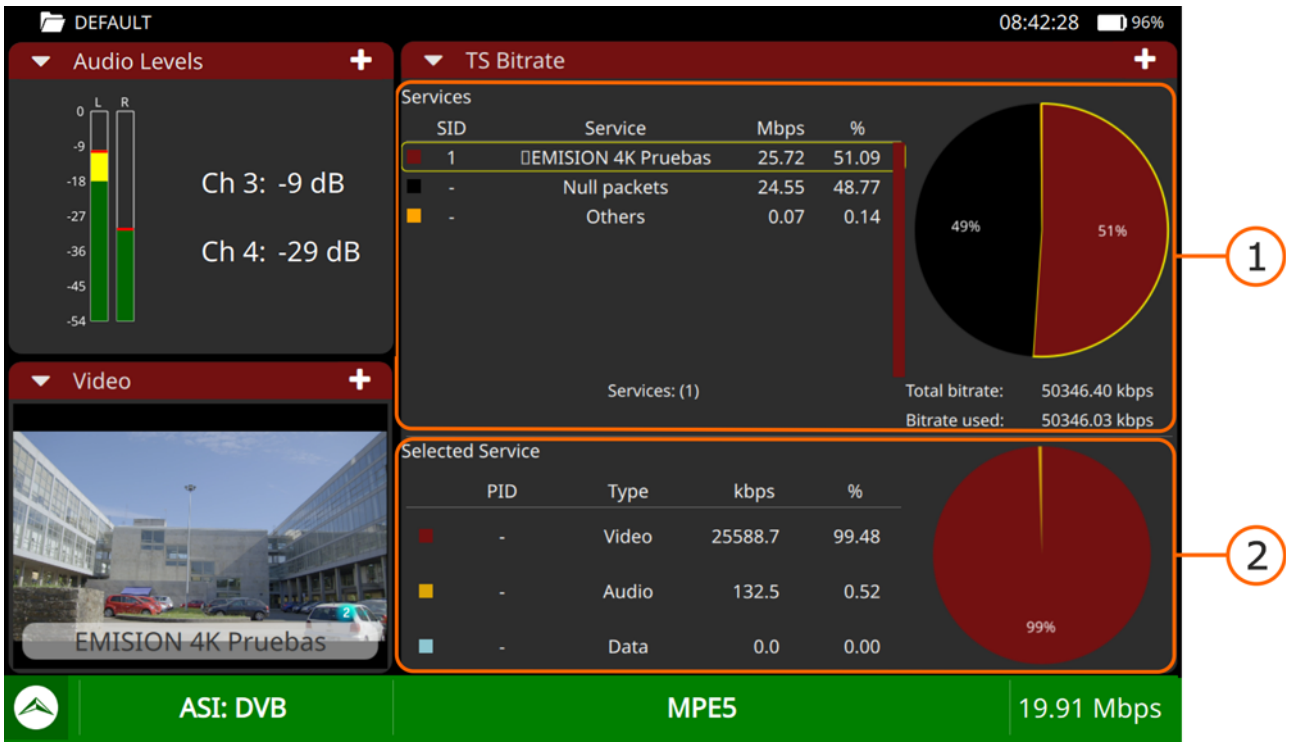


Figure 55.

1 Services panel: It shows all services in the transport stream in real time. The "Others" service indicates the amount of bitrate used by the PSI/SI tables. The pie chart indicates the percentage contribution in bitrate per service in respect to the total TS bitrate, including null packets, which are displayed in black. Below the pie chart there is the total TS bitrate and total bitrate used.

2 Selected service panel: It shows video, audio and data bitrate for the selected service in real time, both in percentage and absolute value. The pie chart shows this information graphically.

►**Touch gestures**

Tap: To select a service.

7.7.3 Transport Stream PIDs

The Transport Stream PIDs tool shows an ordered PID list with a short explanation of each PID and its bitrate. Bitrate is refreshed continuously to help in understand bandwidth usage.

► **Screen**

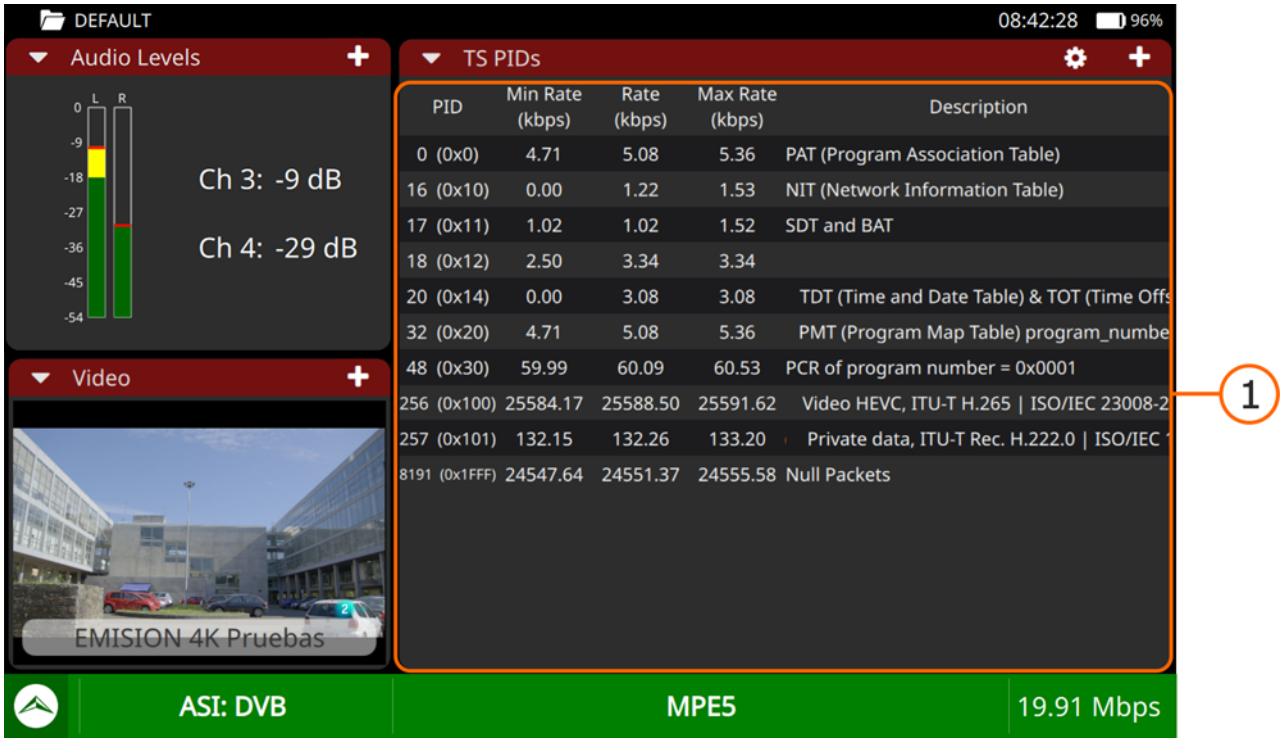


Figure 56.

1 PID Panel: It displays all the PIDs in the analyzed TS. For each PID describes its content and their minimum, average and maximum bitrates.

►**Touch gestures**

Drag: It moves along the PID list.

► **Settings**

Press on the gear to display settings:

- Order by: It allows ordering by PID, bitrate, max. bitrate, min. bitrate or description.
- Reset: It resets and captures the PID list.

7.7.4 Transport Stream Alarms

The TS Alarms tool is a dynamic tool that displays in real time the evolution of the TS and the alarms that may occur. The priority levels of alarms are set according to the recommendations by technical standards TR 101 290 from the DVB group.

►**Screen**

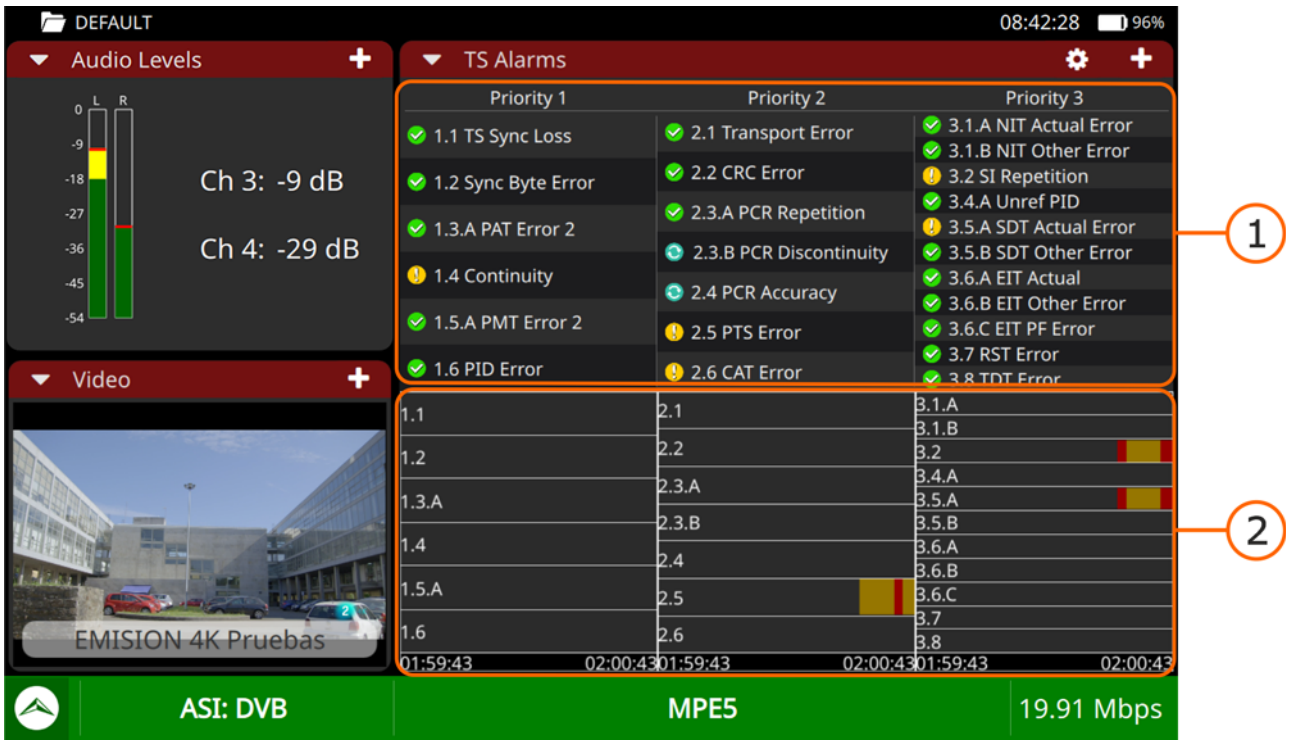


Figure 57.

1 Alarms Panel: It shows all the alarms classified by priority. Press on any of these alarms to enter in a specific screen for the alarm that shows a log with a list of events, a description and an option to enable/disable the alarm.

2 Events panel: It shows a graph for each alarm with all the events that have happened. Errors are shown as a red strip lasting as long as the error.

►Touch gestures

Tap: It opens an alarm to show log, description and settings menu.

► Settings

Press on the gear to display settings:

- Reset: It initiates the alarm analysis from scratch.
- Restart: It initiates the capture of PSI/SI table info again followed by the alarm analysis.

► Icons

Besides each alarm there is an icon which is explained in the following table.

Icon	Description
	No errors occurred for this alarm.
	There has been an event for this alarm in the last 5 seconds.
	The event for this alarm just happened.
	The alarm is still being evaluated or there is no info in the TS to evaluate it.

8 Wi-Fi

8.1 Introduction

Wi-Fi technology allows wireless connectivity and communication between devices in the 2.4 and 5 GHz frequency bands. These bands are also used by other technologies such as Bluetooth, wireless USB, home automation, cordless phones, security cameras, microwave ovens, etc., which can interfere with the device's signal.

For this reason, and due to the growing number of devices using wireless technology, a tool that deeply analyzes these types of signals is essential to detect problems and ensure quality in Wi-Fi communication.

Wi-Fi (04:52s)

SCAN

The Wi-Fi Analyzer screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window.

The tools available for the Wi-Fi Analyzer are:

- Wi-Fi Spectrum
- Wi-Fi Scan
- Wi-Fi Parameters
- Measurements.

8.2 Operation

1 Connect the USB Wi-Fi adapter (supplied with the equipment) to the USB 3.0 port located at the top of the device. The adapter will detect Wi-Fi networks.

2 Connect the omni-directional antenna (supplied with the equipment) to the RF input of the device. The antenna will detect the Wi-Fi band spectrum.

3 Access the **Home** menu on the main screen. Tap on Wi-Fi to access the Wi-Fi band analysis tool.

8.3 Wi-Fi Analyzer Screen

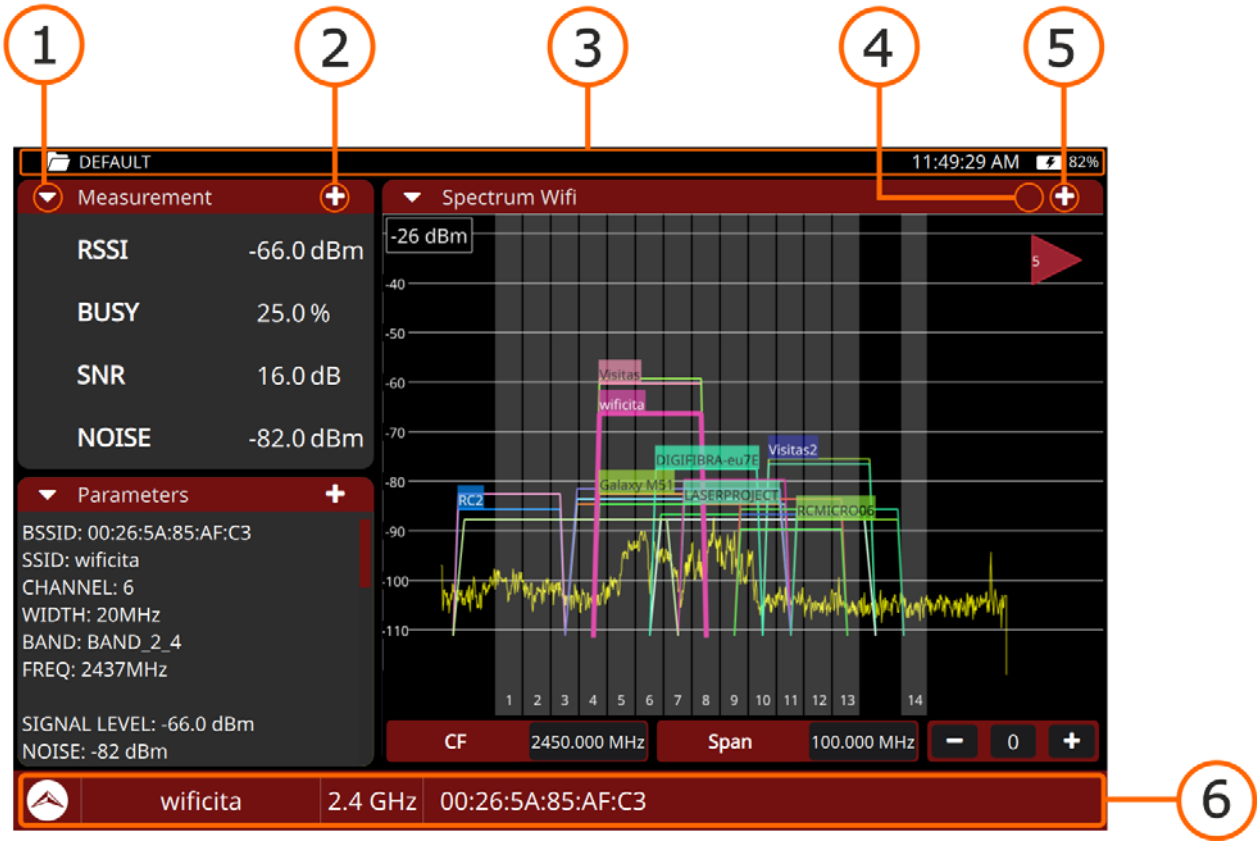


Figure 58.

1 Triangle ▼ (all windows): It displays a menu with all available tools. Select one tool to be displayed. The same tool cannot be in more than one window (for more details about tools refer to "Tools" on page 115).

2 Plus (+) sign (small windows): It maximizes the window, switching to the main window position.

3 Info bar: It is the bar at the top of the screen. From left to right, it displays: the name of the workspace, time, and battery level.

4 Gear ⚙ (main window): It displays a settings menu for the tool. It is available for some tools and only on the main window.

5 + / - sign (main window): It shows the panel in full-screen mode. To return to the previous view press on the minus sign.

6 Status bar: Displays settings parameters such as band, access point name, and MAC address. It also provides access to Wi-Fi settings (for more details, see the next section). The Promax logo returns to the Home screen.

8.4 Wi-Fi Settings

To display the Wi-Fi settings, swipe right from the left side of the screen or tap on the band in the status bar.

- Wi-Fi Band: It allows you to select the 2.4 GHz Wi-Fi band, the 5 GHz band, or both.
- Central Frequency: It allows you to select the frequency that will be displayed in the centre of the screen. You need to tap the number and then select the frequency unit (GHz, MHz, kHz).
- Span: It allows you to edit the span, which is the range of frequencies displayed on the screen along the horizontal axis. The current span value appears below the spectrum.
- Attenuation: The user must select an attenuation value between 0 and 70.
- Trace max hold: Saves the outline of the spectrum when it reaches the maximum level.
  - Enable: It activates the maximum trace hold.
  - Hide: Hides/shows the last captured maximum trace.
  - Freeze: It captures and holds the last maximum trace on the screen.
- Trace min hold: Saves the outline of the spectrum when it reaches the minimum level.
  - Enable: It activates the minimum trace hold.
  - Hide: Hides/shows the last captured minimum trace.
  - Freeze: It captures and holds the last minimum trace on the screen.
- Spectrum Heatmap: It allows you to activate or deactivate the heatmap.

8.5 Tools

In the following sections, each tool of the Wi-Fi Analyzer is explained. They are the following:

- Wi-Fi Spectrum
- Wi-Fi Scanner
- Wi-Fi Parameters
- Wi-Fi Measurements

8.6 Wi-Fi Spectrum

The Wi-Fi Spectrum utility displays the spectrum of the Wi-Fi band overlaid with the detected access points. With this tool, you can determine the occupancy of each channel, how many APs share the same frequencies, and the activity present at each point of the spectrum.

All the information displayed is intended to help the user determine the best location to place the AP or to analyze any interference that may be occurring in the spectrum.

►Touch gestures


Tap: Select access point / change band.


Zoom out: Amplifies the signal by reducing the span.


Zoom in: Reduces the signal by amplifying the span.


Horizontal Dragging: Moves the signal across the frequency.


Vertical Dragging: Changes the reference level.

►**Screen**

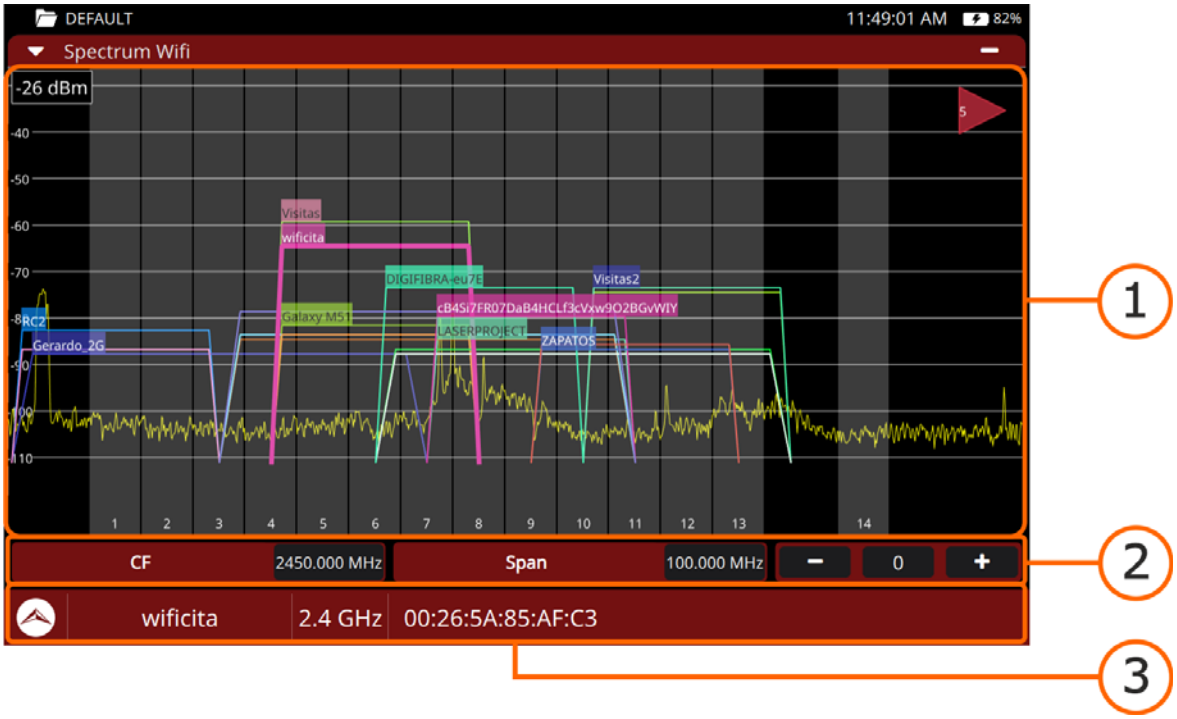


Figure 59.

1 Spectrum and Access Points.

2 Settings bar: Centre frequency, Span and Attenuation.

3 Status bar: Access Point, band and MAC.

8.7 Wi-Fi Scanner

The Wi-Fi Scanner tool displays all detected access points along with their main parameters.

►**Touch gestures**

Tap: Selection of Access Point.

Vertical dragging: Vertical scrolling through the access points.

►**Screen**

Figure 60.

- SSID (Service Set ID): Name of the access point (AP).
- RSSI: Power at which the AP is being received. This power is measured by the Wi-Fi dongle.
- Channels: Central channel of the Access Point.
- Width: Width of the Access Point.
- Band: Band to which the access point belongs.
- Auth: Type of security used to access the Access Point.
- BSSID (Basic Service Set ID): MAC of the Access Point.
- Device: Name of the manufacturer of the device that provides the infrastructure. It is not always available.

8.8 Wi-Fi Parameters

The Wi-Fi Parameters tool displays a detailed report of the selected Access Point.

►Touch gestures

Vertical dragging: Vertical scrolling through the parameters.

►Screen

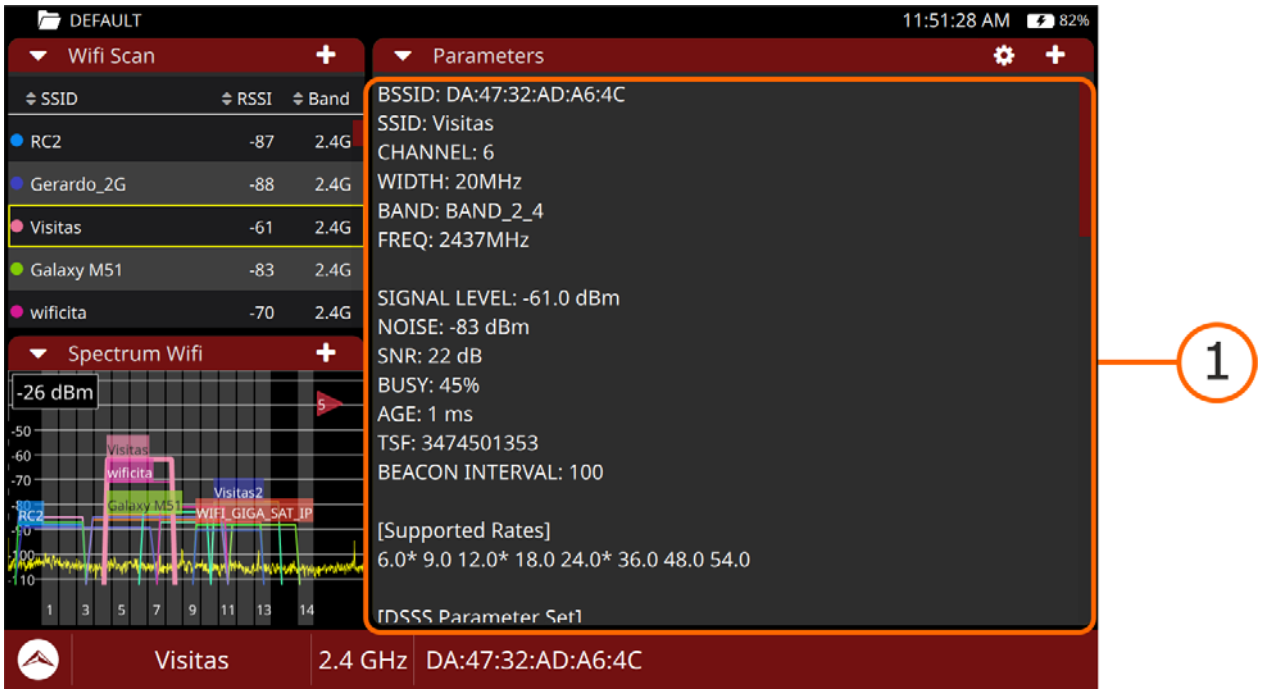


Figure 61.

1 Details of the selected access point.

►Settings

Press on the gear to display a settings menu for this tool:

- Export: It allows exporting the information displayed on the screen to the internal memory.

8.9 Wi-Fi Measurements

The Wi-Fi Measurements tool displays information about the most relevant measurements of the selected access point and shows them on the screen.

►Touch gestures

Tap: Selection of measurement to display in the graph.

►Screen

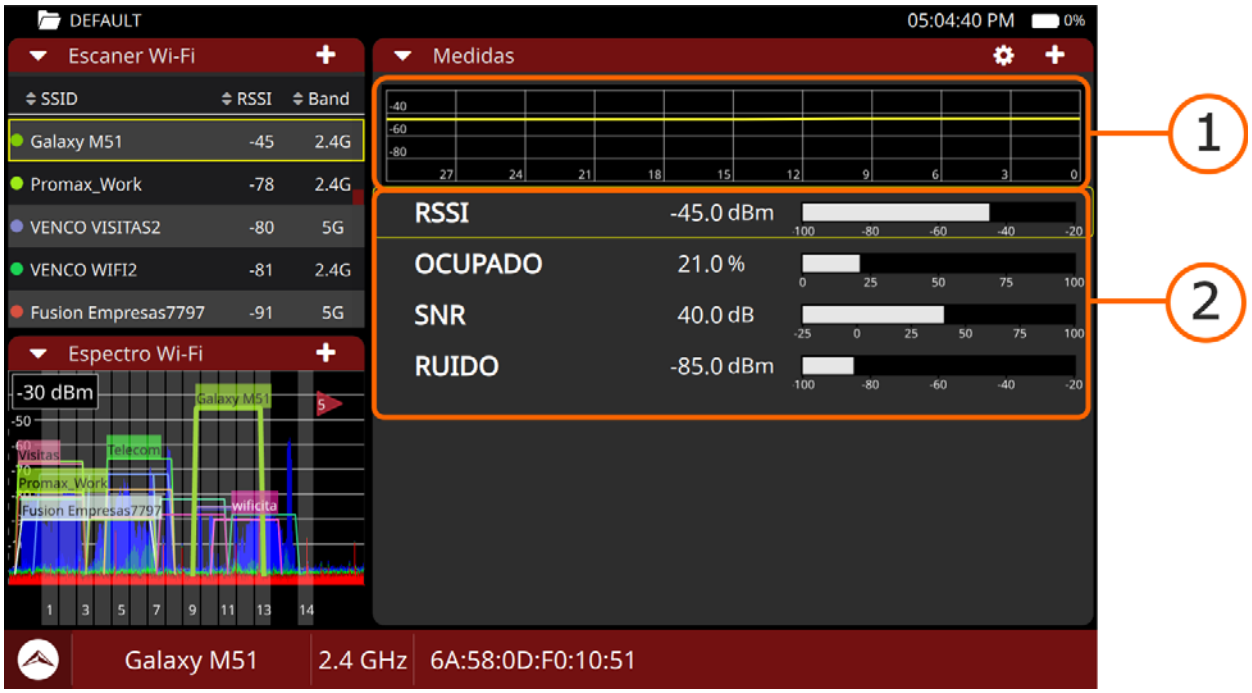


Figure 62.

1 Graph of the selected measurement.

2 Available measurements:

- RSSI (Received Signal Strength Indicator): Power of the selected Access Point measured by the USB Wi-Fi adapter (also called "dongle"). The dongle measures the power of a single AP, while the meter measures the power of an area of the spectrum where multiple APs may exist. For this reason, and due to the different types of antennas used by both devices, the power measured by the dongle and by the spectrum may not match.
- Busy: Percentage of channel usage. This measurement is based on the time the channel is used. This measurement can help decide whether the channel can accommodate another AP.

- SNR (Signal to Noise Ratio): SNR measurement provided by the USB Wi-Fi adapter for the selected channel / Access Point.
- Noise: Noise level of the selected Access Point.

►Settings

Press on the gear to display a settings menu for this tool:

- Reset.

9 SDI

9.1 Introduction

SDI (Serial Digital Interface) is a standard for transmitting digital video and audio signals. It is widely used in broadcasting environments and other professional applications for connecting cameras, video switchers, routers and other video production equipment.

SDI supports various video resolutions, from standard-definition to ultra-high definition and provides a reliable and high-quality method for transmitting video signals over relatively long distances. It can also carry embedded audio signals.

SDI has evolved over time, with different versions accommodating higher resolutions and data rates to meet the demands of advancing video technologies. It continues to be a crucial standard in professional video production and broadcasting.

SDI analyzer (02:56s)

SCAN

9.2 Operation

1 Connect the SDI signal to the equipment through the ASI/SDI input connector.

2 From the Home menu press on **SDI** .

3 If the received SDI signal is right, the status bar turns green and shows the message "SDI locked". Once it is locked, it shows also the signal type, if it is SDI SD, HD or 3G (it does not support higher resolutions).

4 Now tools can be used to obtain more information about the signal. The SDI Analyzer screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

5 The tools available to analyze the SDI signal are:

- Audio levels.
- Video/Audio Parameters.
- Video.
- Eye Diagram.
- SFP Parameters.

6 Select one tool for each window to analyse the signal.

In the next sections each SDI Analyzer tool is explained in detail.

9.3 Video

The video tool displays the received video signal.

►Screen

Figure 63.

1 Video image. The version of the SDI signal is identified at the bottom (SD, HD or 3G; it does not support higher resolutions).

9.4 Audio Levels

It shows the volume and other parameters related to the audio of the SDI locked signal.

►Screen

Figure 64.

1 Audio Levels: Displays up to 8 pairs of audio channels. The bar graph indicates the audio level in dB. Each bar is coloured (green, yellow, or red) according to the level reached. In the lower part, you can enable (green) or disable (grey) each channel individually by clicking on the channel number.

2 Channel metadata: The drop-down menu allows you to select a group of channels and view their metadata. The metadata available is based on the AES standard for audio transmission, and includes information such as format, sampling rate, emphasis, mode, bitrate, size, and level.

►Touch gestures

Tap: Enable (green) / disable (grey) the audio channel.

9.5 Video / Audio Parameters

The Video/Audio Parameters tool displays all metadata related to the video and audio layers.

►Screen

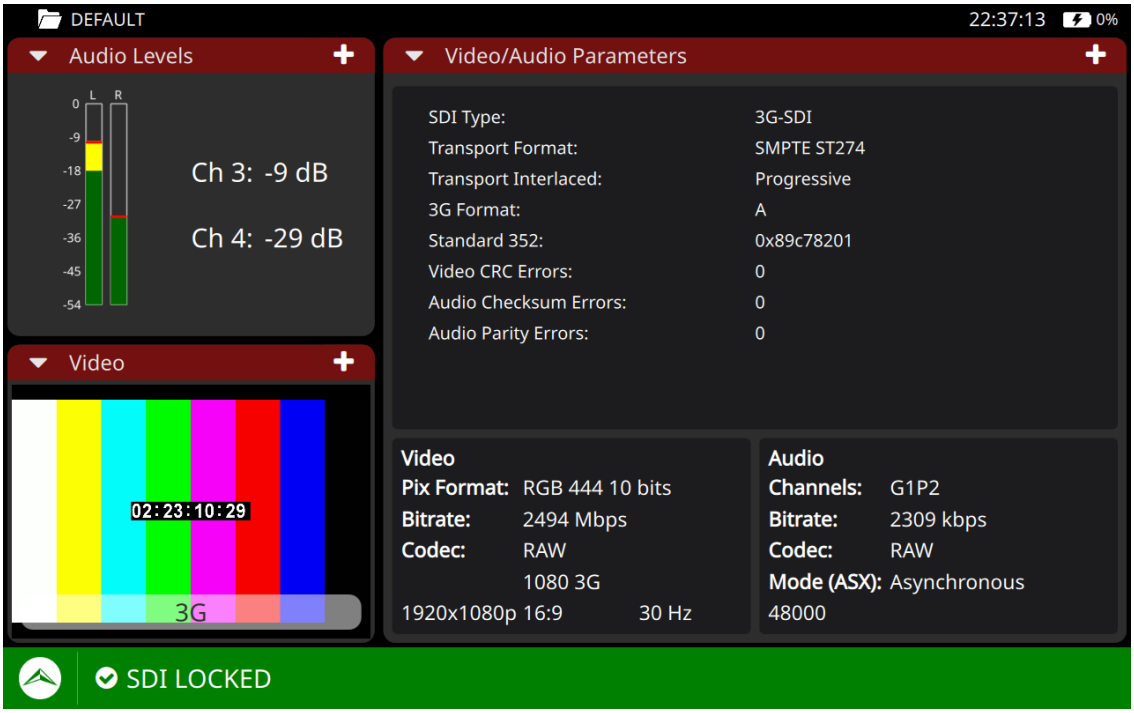


Figure 65.

1 General Parameters:

- SDI Type (SD, HD or 3G)
- Transport format
- Transport interlaced
- Format:
- Standard
- Video CRC errors
- Audio checksum errors
- Audio parity errors

2 Video Parameters:

- Pixel format
- Bitrate
- Codec

3 Audio Parameters:

- Channels
- Bitrate
- Codec

•Mode

9.6 Eye Diagram (statistical)

The statistical eye diagram tool displays detected erroneous bits, allowing observation of when SDI signal reception is poor.

The comparison between the optimally sampled SDI signal and a second sampling shifted in time and voltage provides an analysis of the reception margin. The meter performs this comparison thousands of times for each sampled point within the duration window of a bit. The result is a statistical measurement represented on a colour scale, with warmer colours indicating more deviations from the optimal sample.

To facilitate interpretation of the eye scan, a mask can be activated, providing a clear visual indication of how open or closed the eye is. If warmer colours appear within this mask, they indicate defective SDI signal reception, which will affect the quality of the received video and audio.

►Screen

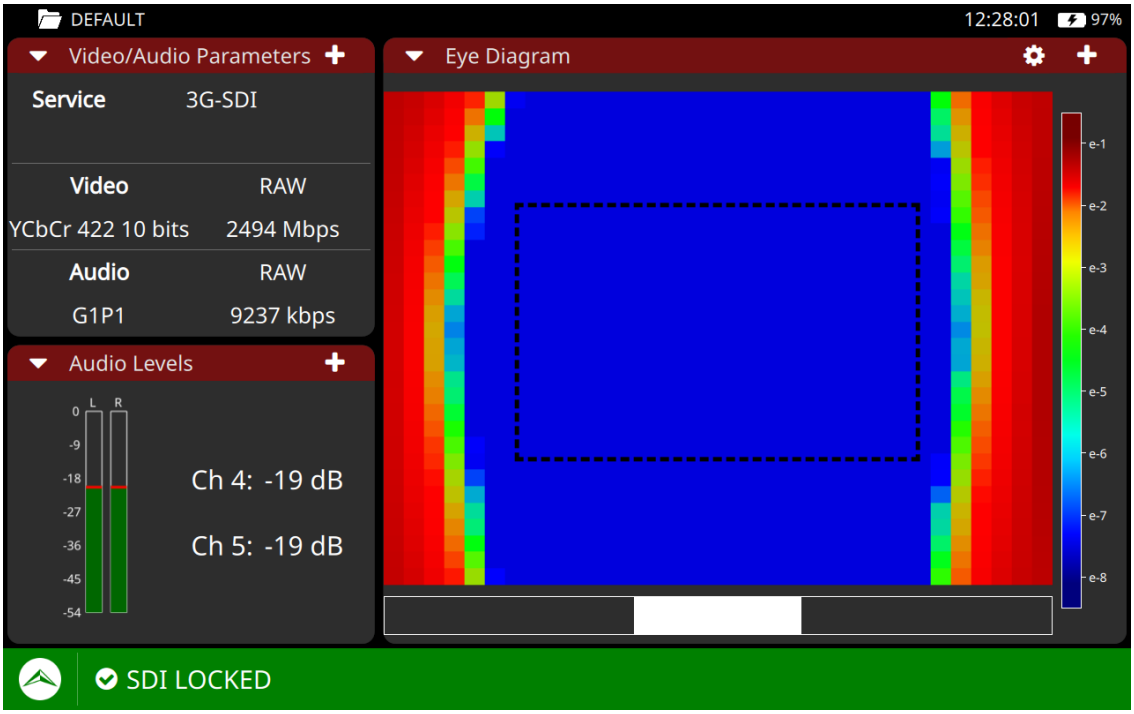


Figure 66.

1 Eye Diagram. The dashed box is the mask that determines the eye threshold zone. The more open the eye is (the blue area), the better the signal is being received. If the blue area closes, it indicates a problem with the reception.

2 Bit error ratio bar: This is a color-coded scale that indicates the number of error bits with respect to the reference, from 10E-8 to 10E-1.

3 Progress bar: Each cycle represents a scan of the eye. During a scan, all the points on the screen are sampled and compared with the reference value.

►Settings

Press on the gear to display settings:

- Mask: This option allows enable or disable the mask. The mask is a rectangular area that is superimposed on the eye diagram and defines the region that indicates that the signal is within the acceptable range.
- Steps: The number of steps determines the resolution of the eye scan. A higher number of steps will result in a higher resolution eye diagram, but it will also take longer to scan the eye. A 4-step value is a balanced choice between speed and resolution.
- Pre-scaling: This is the number of measurements taken at each point in order to develop the statistics.

10 WORKSPACES

10.1 Description

The tool Workspaces is a function that allows the user to easily create a folder to store and manage data independently from other folders. Measurements, channel plans, screenshots and any other data associated will be stored in its folder. These data can later be exported a visualized to a PC.

Each workspace contains a subfolder for each operation mode. The files generated during the use of each mode are saved in the corresponding subfolder. For example, if a screenshot is taken in SDI mode, the file with the captured screen image will be in the SDI subfolder, whereas if the capture is done in Spectrum Analyzer mode, it will be in that other subfolder.

If the user does not create any workspace, data will be stored in the default folder (named "DEFAULT").

Workspaces (04:59s) SCAN

10.2 Workspace Management

Next, we describe how to manage the workspaces in order to create a new one, remove, load, etc.:

1. The active workspace appears in the upper left corner of the screen. This is the folder where all files generated during the use of the equipment are stored.
2. Swipe down from the top of any screen to access the Top menu.
3. From the Top menu select "Workspaces" to access the workspaces and resources management screen.
4. A screen will appear showing all available workspaces. The active folder appears outlined by a box.
5. The side menu allows you to switch between "Workspaces" and "Resources". Select "Workspaces".
6. To create a new workspace press on the "Add" icon.

7 To access the options menu, press and hold your finger on one of the workspaces. A pop-up menu will appear with the following options:

- Open: it opens the selected folder for viewing and managing data.
- Load: it loads the selected folder as a workspace. From this moment on, the workspace name will appear in the upper left corner. All data will be saved in this workspace. **A workspace can be load only from the Home screen.**
- New Workspace: it creates a new workspace (the same as the botton "Add").
- Rename: it renames the selected workspace.
- Remove: it removes the selected workspace ("default" workspace cannot be removed).
- Export to USB: it copies the selected workspace to a USB connected to the USB port of the meter.

8 Select an option.

10.3 Data File Management

Next, it is described how to access and manage the files inside the workspaces:

1 Swipe down from the top of any screen to access the Top Menu.

2 From the Top menu, tap on the "Workspace" option to access the Workspace management screen.

3 A screen displaying all available workspaces will appear.

4 The side menu allows you to switch between "workspaces" and "resources". Tap on "workspaces".

5 Tap on a workspace to access the data stored in that folder.

6 From the workspace, select the working mode from the dropdown menu. The working mode is the mode during which the data has been stored. The available working modes are:

- Main (Home screen).
- TV Analyzer.
- Spectrum Analyzer.
- IPTV.
- ASI.

- SDI.
- WiFi.
- Mobile (option).
- TV Monitor.

7 Now, at the top toolbar, you can find all the type of data available for the selected mode. Depending on the selected working mode different data can appear. They are:

- Tools
- CH Plans
- Dataloggers
- Drive Test
- Recordings
- Screenshots
- Quality
- Multicasts

8 When you tap on one of these data types, it will show a list with all the related files.

9 Files can be selected one by one by clicking on the box next to the file, or a multiple selection can be made by clicking on the box in the header.

10 When you long-press on a file, a menu pops up, providing the following actions:

- Rename: It allows you to change the name using the virtual keyboard.
- Remove: It deletes the file after confirmation.
- Export to USB: It copies the file to the USB memory connected to the USB 3.0 port of the meter.
- Preview Screenshot: The screenshot is displayed on the screen (it will also be previewed by clicking directly on the file).

11 Select the desired option from the menu.

WARNING! When exporting data, **do not disconnect the USB drive directly from the equipment**, as the information contained could be lost.

Follow the process described in the next section to ensure that the data is properly preserved.

►**Screen**

Figura 67.

1 Left Sidebar: choose between wokspaces or resources.

2 Dropdown menu: select the Operation Mode.

3 Top toolbar: select the type of data.

4 File list: select a file to export, rename or remove. These files can be sorted by name, size, or date by clicking on the corresponding column.

10.4 Data Export to USB

The following describes how to export data from the equipment to a USB flash drive. It is important to follow these steps to ensure that the data is exported correctly:

1 Access the files you wish to export as described in the previous section.

2 Connect a USB drive to the USB 3.0 port located at the top of the equipment.

3 When a USB flash drive is connected, the system scans the USB for compatible files. During this process, a spinning wheel will appear above the USB icon. Until this scanning process is complete, operations involving the USB drive cannot be performed.

4 If the USB drive is detected, a notification will appear, and the option **USB (sda)** will show up in the left sidebar along with the icons for update and eject.

5 Select the file or files to export.

6 Press and hold the file or files to export until the option menu appears.

7 Select the "Export to USB" option.

8 The files will be copied to the USB drive. If they are large, a notification will indicate that the copying is in progress.

9 Once copied, click on **USB (sda)** in the left sidebar and then press the **Update** icon. The screen should refresh and display the files that were just copied.

10 If everything is correct, click on the **Eject** icon to disconnect the USB drive.

11 Remove the USB drive from the equipment.

12 Connect the USB drive to a PC to access the data.

10.5 Resources Management

The "Resources" folder is a repository of common data for all the workspaces. This folder stores a large number of files that can be exported to the currently selected workspace at any given time.

For example, in the case of channel plans, we can keep in our workspace only the channel plans that we regularly use. If we ever need a different channel plan, we can simply export it from the resources folder.

To use the Resources folder:

1 Swipe down from the top of any screen to access the Top menu.

2 From the Top menu select "Workspaces" to access the workspaces and resources management screen.

3 The side menu allows you to switch between "Workspaces" and "Resources". Select "Resources".

4 Select the operation mode from the dropdown menu. The available operation modes are:

- TV Analyzer.
- Spectrum Analyzer.
- IPTV.

5 Now, at the top toolbar, you can find all the tools with available resources. Depending on the selected operation mode different tools can appear. They are:

- Tools
- CH Plans
- Quality
- Multicasts

6 When you tap on one of these data tools, it will show a list with all the related files.

7 Files can be selected one by one by clicking on the box next to the file, or a multiple selection can be made by clicking on the box in the header.

8 When you long-press on a file, a menu pops up, providing the following actions:

- Rename: It allows you to change the name using the virtual keyboard.
- Remove: It deletes the file after confirmation.
- Export to USB: It copies the selected files to the USB memory plugged into the USB port of the meter.
- Import to Workspace: It copies the selected files to the current workspace.

9 Select the desired option from the menu.

10.6 Case of use: Accessing saved data

I have captured the spectrum in TV Analyzer mode and saved it with the name "test". Now I want to view it on my PC. How do I do it?

1 Access the Top menu by swiping down from the top of the screen.

2 Tap on the "Workspaces" option. The Workspaces screen will appear.

3 Tap on the workspace folder that was selected at the time of the screenshot (if no workspace was created, select the "default" option).

4 Connect a USB memory to the USB 3.0 port.

5 In the Work Mode dropdown menu, select the "TV Analyzer" mode.

6 On the toolbar, click on "Screenshots.".

7 The list of captured files should appear, and one of them should be a file named "test". Long-press on the file name and from the popup menu, select "Export to USB" to copy the file to the USB memory.

8 Safely eject the USB memory from your meter and connect it to your PC in order to view the image.

10.7 Case of use: Loading a Workspace

I want to load a workspace called "test" where I have saved all the measurements taken at an installation. How do I do it?.

1 Go to the Home menu by clicking on the Promax icon located in the bottom-left corner. **Workspaces can only be loaded from the Home screen**.

2 Access the Top menu by swiping down from the top of the screen.

3 Tap on the "Workspace" option. The Workspace screen will appear.

4 Press and hold the workspace you want to load until a pop-up menu appears.

5 In the pop-up menu, select the "Load" option.

6 A message will appear indicating that the workspace has been loaded.

7 From this moment, the workspace loaded is the enabled folder where all screenshots, measurements, and data generated is stored.

8 The name of the loaded workspace will appear in the top-left corner of all screens.

11 WEBCONTROL

11.1 Introduction

The webControl function allows you to connect remotely to the meter in order to visualize measurements and operate on it. The meter must be connected to a data network. To connect to meter from a remote access device use just a standard web browser.

WebControl tools are:

- Console: It emulates and allows you to interact with the meter in first person.
- Streaming V/A: It displays the video signal that the meter is receiving in real time on an external device screen.

The next section explains how to configure the meter to be able to connect remotely.

webControl (02:49s) SCAN

11.2 Settings and Remote Access

► Meter Settings

1 The meter can be connected to a data network via an Ethernet cable or via WiFi. To access the configuration parameters:

- Ethernet network: From the meter, access the preferences options by pressing the "Installations" key for 1 second. Go to the "Network" tab where you can find the configuration parameters to register in the network.
- WiFi network: Connect the USB WiFi adapter to the USB 3.0 port. Access the Top menu by swiping your finger from top to bottom of the screen. Select the WiFi opton to access the WiFi network configuration settings.

2 Select DHCP ON, if you connect the meter to a network with a router or server with DHCP protocol enabled. Then the network will set automatically the parameters in the meter. If not, follow the next steps to set the meter.

3 On "IP Address" box enter the meter IP. Use an IP in the same range used by your PC in the local network (if you do not know these data see "find out

local network data" section). For instance, if the IP for your PC is 10.0.1.18, the meter must have a free IP in the same range, like 10.0.1.50.

4 In the "Mask" box, enter the mask value, which should be the same as the one used by the local network (usually 255.255.255.0; if you do not know these data see "find out local network data" section).

5 To connect the meter from an external network, fill in the "Gateway" with the info obtained from the local network. In the DNS fields, you can either leave the default values or assign others.

6 Connect the meter to a data network with Internet access. You can use an Ethernet cable connected to the IP CTRL port or in case of WiFi network, connect the USB WiFi adapter to the USB 3.0 port, select the network and enter the password.

► Find out Local Area Network Data (LAN)

1 To obtain data from the Ethernet network where your meter is connected, you should use a PC connected to this same network.

2 From the PC click on Start menu in Windows. On the Search box write CMD and press Enter.

3 In opens a command line window. Write IPCONFIG and press enter.

4 It displays a window with some lines with info. On line "Local Network Ethernet Adapter" see line "IPv4 Address". This is the local IP for your PC. Write down this IP. Also write down "Subnet Mask" and "Default Gateway". This data is needed to configure the meter by hand.

► Remote Access

1 From a remote access device (PC, mobile device) run a standard web browser (Chrome recommended).

2 On the address bar write the address to remotely access the meter. To view or edit this IP address, go to Settings -> Network.

3 If the connection is successful, it should appear on screen the webControl access screen (see figure).

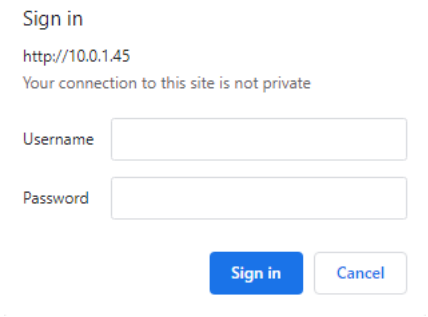


Figure 68.

4 Enter user and password and press "Start Session" to access the webControl.

5 User and password by default are:

- **Username: atlas**
- **Password: password**

NOTE: The webControl uses ports 80, 8080, 9999.

In the browser, JavaScript must be enabled in order to use the webControl.

There are many ways to connect to the meter from an external network. If you have follow these instructions and you fail to connect the webControl, please contact PROMAX technical assistance and we will help you (promax@promax.es).

11.3 Remote Console

► Description

Console screen allows you to interact remotely with the meter like you were in front of it. To interact with the meter you can use the mouse pointer as a touch on screen.

► **Screen**

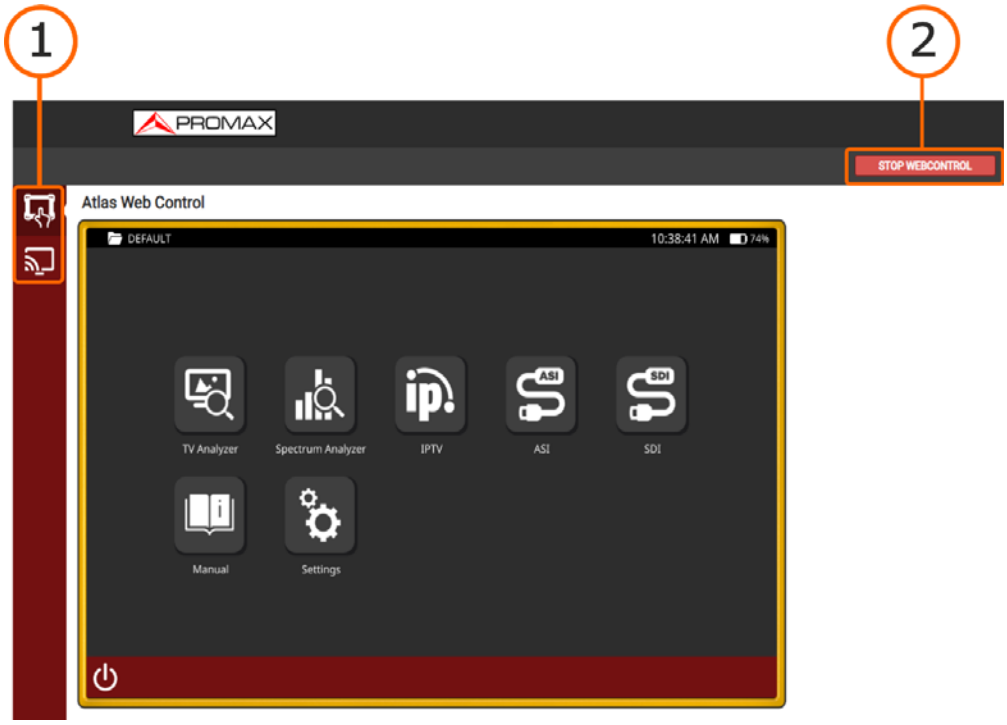


Figure 69.

1 Selected function (Console).

2 Start / Stop console emulation button. To start emulation press on "start webcontrol". The meter will display the message "webserver in use" and it cannot be used while emulation is running. To end the emulation press on "stop webcontrol" or on the device itself, which will prompt for confirmation.

11.4 Video / Audio Streaming

► **Description**

The "Video/Audio Streaming" function allows displaying the video signal that the meter is receiving in real time on an external device screen.

► **Operation**

1 Press the Streaming icon located on the left side of the screen.

2 A new tab will open in the browser, displaying the video being streamed by the meter.

3 To exit the Streaming function, close the browser tab.

► **Screen**

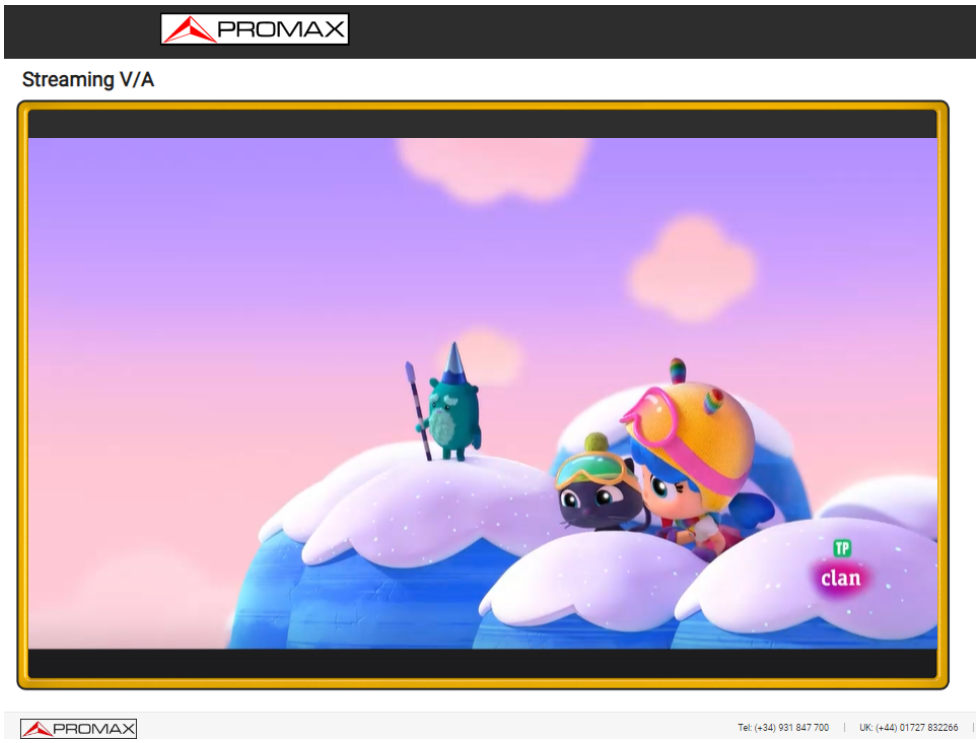


Figure 70.

1 Video and audio transmitted by the meter to a browser via the Ethernet connection.

12 SPECIFICATIONS ATLAS NG

12.1 General

► Inputs and Outputs

Parameter	Value	Additional Data
RF Input		
Connector	N female 50 Ω	
Maximum Input Power	15 dBm	5 MHz - 20 MHz
	23 dBm	20 MHz - 6 GHz
Maximum Input Voltage	50 Vrms	DC - 100 Hz (with AL-103)
	30 Vrms	DC - 100 Hz
Optical Input		
Connector	FC-APC/h	
Optical Power Measurement Range	800 - 1700 nm	
ASI/SDI Input		
Connector	BNC female 75 Ω	Up to 3 Gbps
Electrical	200 m cable lenght at 3 Gbps Nominal 800 mVp-p 1.4V common mode	
ASI/SDI Output		
Connector	BNC female 75 Ω	Up to 3 Gbps
Electrical	300 mVp-p min 850 mVp-p max 8 mV common mode	3 Gbps
Work modes	Loop	Signal goes in through the SDI input and comes out through the SDI output
	Pattern	Genera una carta estática de 1080p
10 MHz / 1PPS Reference Input		
Connector	BNC female high impedance	min. 150 mV; max. 5 V
SFP+		
Connector	SFP+	MSA
IPTV		
Connector	RJ45	
Type	Ethernet 10 Mbps / 100 Mbps / 1 Gbps	
Analogue Video Input		
Input Connector	Multipole Jack	Zin=75 Ω
Sensibility	1 Vpp	75 Ω; positive video
Analogue Audio Input		

Parameter	Value	Additional Data
Input Connector	Multipole Jack	Zin=3 kΩ; same input as video
Digital Video / Audio Output		
Output Connector	Supports HDMI 1.4b with 2.9 Gb/s	Resolution up to 3840x2160 @30 Hz
Audio Output		
Output Connector	Multipole Jack 32 Ω	Stereo; to connect headphones or external speakers
Speakers	2 stereo speakers	
USB Interface 3.0		
Connector	USB type A	
File systems supported	FAT32, exFAT, NTFS, ext3, ext4	
Features	Mass Storage Host	Can read and write on a pendrive USB
	USB CDC	CDC: Communication device class (GPS, probes)
USB Interface 2.0		
Connector	USB type C	
File systems supported	FAT32, exFAT, NTFS, ext3, ext4	
Features	Two modes: master or device	
	Master: mass storage host, USB CDC	For GPS, probes
	Device: Virtual COM	Remote control of the equipment through remote commands
IP Interface (control IP)		
Connector	RJ45	Labeled IP CTRL
Type	Ethernet 10 / 100 Mbps / 1 Gbps	
Communication Software	webControl	
	Remote commands	
CAM		
Connector	DVB-CI compliant CAM module input	
WiFi Interface		
Type	Wireless standard 802.11 abgn	Dongle-Wifi connected to USB port
		Dongle must be validated by PROMAX
Remote control Interfaces		
Interfaces	RJ45 Ethernet; WiFi	
Remote control	JSON: sending and receiving remote commands with JSON files	All interfaces
	webControl: web technology using a standard browser	RJ45, WiFi
Monitor Display		
Monitor	10.1" TFT touch panel	

Parameter	Value	Additional Data
Aspect Ratio	16:9	
Format	1280 x 800 dots	(RGB); (W) x (H)
Brightness	850 cd/m^2	
External Unit Power (through the RF input connector)		
Terrestrial Supply	External	
	5 V	Up to 500 mA
	12 V	Up to 500 mA
	24 V	Up to 250 mA
Satellite Supply	External	
	5 V	Up to 500 mA
	13 V	Up to 500 mA
	15 V	Up to 500 mA
	18 V	Up to 500 mA
22 kHz Signal Voltage	0.65 V ± 0.25 V	Selectable in Satellite band
22 kHz Signal Frequency	22 kHz ± 4 kHz	Selectable in Satellite band
DiSEqC Generator	DiSEqC 2.x (DiSEqC 1.2 commands implemented)	DiSEqC is a trademark of EUTELSAT
SATCR / SCD (EN50494)	Available	DiSEqC 1.2 available
dCSS / SCD2 (EN50607)	Available	Compatible with LNB SKY UK According DiSEqC 2.x
LNB Band	Ku / Ka / C	
Polarity	Horizontal / Vertical, Right / Left	

►Operation Modes

Parameter	Value	Additional Data
TV Analyzer	Available	
Spectrum Analyzer	Available	
IPTV	Available	
WiFi	Available	
TV Monitor	Available	
ASI IN	Available	
SDI	Available	
TV Monitor	Available	
Mobile	Option	

►Channel Plans

Parameter	Value	Additional Data
CCIR	Available	
OIRT	Available	
STDL	Available	
FCC	Available	
EIA	Available	

►Datalogger

Parameter	Value	Additional Data
Stored Data	Signal type, all measures available for the detected signal type, and time stamp, PSI info for each measured channel	If GPS is connected to USB port, the equipment stamps GPS coordinates in each measurement made. For DVB-T2, DVB-C2 or ATSC 3.0 signals it saves information from all PLPs. In case of Satellite signal it also saves polarization.
Timestamp	Date and time at each measured channel	

►Mechanical Features

Parameter	Value	Additional Data
Dimensions	304x218x83 mm	(W) x (H) x (D)
Weight	3.4 kg	Without installed options
Volume	5,5 cm^3	

►Power Supply

Parameter	Value	Additional Data
Internal Battery	7.4 V; 18.3 Ah	LiPo Smart battery
Battery Operation Time	between 3 and 4 hours	With smart power management
TV Analyzer	3 hours aprox.	con UHD TV y demodulación DVB-T2
SDI Mode	more than 4 hours	with video + audio + audio/video parameters + audio level
IPTV Mode	more than 3:45 hours	With TV + audio + signal parameters + measurement
Spectrum Analyzer Mode	4 hours aprox.	1 marker enabled
WiFi mode	3:30 houras aprox.	at 2,4 GHz band
Charging time	7 h (100%)	5 h (80%)
External Voltage	12 ± 2 V DC	
Consumption	40 W	
Energy saving	Auto power off TFT Off Standby mode	Configured by user The standby mode will be available in next releases

►Operating Environmental Conditions

Parameter	Value	Additional Data
Altitude	Up to 2000 m	
Temperature Range	From 5 °C to 45 °C	Automatic disconnection by excess of temperature
Max. Relative Humidity	80%	Up to 31°C; decreasing lineally up to 50% at 40 °C.

NOTE: Equipment specifications are set in these environmental operating conditions. Operation outside these specifications is also possible. Please check with us if you have specific requirements.

►Included Accessories

Parameter	Value	Additional Data
1x AL-103	External DC charger	
1x CA-005	Mains cord for external DC charger	
1x AA-103	Car cable for external DC charger	
1x CB-096	Rechargeable Li-Po battery	7.4 V; 18.3 Ah; built-in
1x AD-050	BNC - TV IEC adapter (m/f)	(m: male; f: female)
1x AD-053	N - F Aero adapter (m/f)	
1x AD-059	N - BNC adapter (m/f)	
1x AD-062	N - SMA 50 adapter (m/f)	
1x AG101	GPS-USB receiver	
1X AW010	WiFi-USB dual-band dongle	
1x AM-071	WiFi 4G/5G dual antenna	
1x CC-046	Jack cable (4V) RCA	
1x DC-309	Transport belt	
1x DC-306	Carrying bag	
1x DC- 229	Transport suitcase	
1x DC-308	Handle	
1x MN-001	Monopod	
1x DG0399	Quick reference guide	

NOTE: It is recommended to keep all the packing material in order to return the equipment, if necessary, to the Technical Service.

►Optional accessories

Parameter	Value	Additional Data
AD-061	50/75 N - BNC adapter (m/f)	

12.2 TV Analyzer Mode

12.2.1 Supported Standards

► **DVB-T**

Parameter	Value	Additional Data
Modulation	COFDM	
Margin of power Measurement	-85 dBm to +23 dBm	+20 dBµV to +130 dBµV
Power measurement accuracy	± 1,5 dB	
Sensibility	< -86,7 dBm	@1000 MHz QPSK 5/6 8K 8 MHz
Frequency resolution	1 kHz	
Measurement	Power, CBER, VBER, MER, PER, C/N and Link Margin	
Tuning Range	45 - 1000 MHz	
C/N	50 dB	
MER	Max.: 39 dB; Min.: 2 dB	Freq: 698 MHz; BW=8MHz; mode=8K
Standard compliant	European Standard for DVB-T	ETSI EN 300-744 v.1.6.1
	All European Standards for static and portable equipment and targeting upcoming Digital Europe e-book requirements	NorDig-Unified Test Specs ver2.5.0 DTG D-Book 8.0 IEC 62216

► **DVB-T2**

Parameter	Value	Additional Data
Profiles	T2-Base, T2-Lite	
Modulation	COFDM	
Margin of power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
Power measurement accuracy	± 1,5 dB	
C/N	50 dB	
MER	Max.: 38 dB; Min.: 9dB	Freq: 698 MHz; BW=8MHz; mode=8K
Sensibility	TBD	
Frequency resolution	1 kHz	
Measurement	Power, CBER, C/N, LBER, MER, Link Margin, BCH ESR, LDP Iterations and PER	Measurement of LBER below 1E-10
Tuning Range	45 - 1000 MHz	
Standard compliant	European Standard for DVB-T2	ETSI EN 302-755 v1.3.1
	All European Standards for static and portable equipment and targeting upcoming Digital Europe e-book requirements	NorDig-Unified Test Specs ver2.5.0 DTG D-Book 8.0 IEC 62216

► **ISDB-T**

Parameter	Value	Additional Data
Modulation	COFDM	
Margin of power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
Power measurement accuracy	± 1,5 dB	

Parameter	Value	Additional Data
C/N	50 dB	
MER	Max.: 39 dB; Min.: 1 dB	Freq: 698 MHz; BW=8MHz; mode=8K
Sensibility	TBD	
Frequency resolution	1 kHz	
Measurement	Power, CBER, VBER, MER, PER, C/N, PER and Link Margin	
Tuning Range	45 - 1000 MHz	
Standard compliant	ARIB Transmission System for DTT Broadcasting	ARIB STD-B31 v2.2

► DVB-C

Parameter	Value	Additional Data
Modulation	QAM	
Margin of Power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
C/N	50 dB	
MER	Max: 45 dB; Min: 1 dB	Freq: 698 MHz; 6875 KSym/s
Power measurement accuracy	± 1,5 dB	
Sensibility	-67dBm	995MHz/256QAM/SR=6,95MS/s
Frequency resolution	1 kHz	
Measurements	Power, BER, MER, PER, C/N, PER and Link Margin	
Tuning Range	45 – 1000 MHz	
Standard compliant	Digital Video Broadcating for cable systems	ETSI EN 300-429 v1.2.1
	NorDig-Unified Test Specification	ver 2.5
Symbol Rate	1700 - 7200 kbauds	

► DVB-C2

Parameter	Value	Additional Data
Modulation	QAM	
Margin of Power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
C/N	50 dB	
Power measurement accuracy	± 1,5 dB	
Sensibility	TBD	
Frequency resolution	1 kHz	
Measurements	Power, CBER, MER, PER, C/N, LBER, BCH ESR, LDP Iterations, PER	
Tuning Range	45 - 1000 MHz	
Standard compliant	Digital Video Broadcating for cable systems	ETSI EN 300-769 v1.2.1

► J83 Annex B

Parameter	Value	Additional Data
Modulation	QAM	
Margin of Power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	

Parameter	Value	Additional Data
MER	Max: 44 dB; Min: 20 dB	Freq: 698 MHz; 64QAM
Sensibility	-69 dBm	@ 995 MHz; 256QAM, 5361 MS/s, rolloff=0.12
Frequency resolution	1 kHz	
Measurement	Power, BER, MER, PER, C/N and Link Margin	
Tuning Range	45 - 1000 MHz	
Standard compliant	International Telecommunication Union standard	ITU-T J.83 v3.0

► ATSC 1.0

Parameter	Value	Additional Data
Modulation	8VSB	
Margin of Power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	
MER	Max: 42 dB; Min: 14 dB	Freq: 698 MHz
Sensibility	TBD	
Frequency resolution	1 kHz	
Measurement	Power, SER, VBER, MER, PER, C/N and Link Margin	
Tuning Range	45 - 1000 MHz	
Standard compliant	ATSC Digital Television Standard	ATSC A/53-part 2 (2011)

► ATSC 3.0

Parameter	Value	Additional Data
Modulation	COFDM	
Margin of Power Measurement	-87 dBm to +23 dBm	+20 dBµV to +130 dBµV
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	
MER	Max: 40 dB; Min: -4 dB	Freq: 698 MHz; BW=6 MHz; mode=8K
Sensibility	TBD	
Frequency resolution	1 kHz	
Measurement	Power, CBER, MER, PER, C/, LBER, BCH ES	
Tuning Range	45 - 1000 MHz	
Standard compliant	ATSC Digital Television Standard	ATSC A/321 (2016) ATSC A/322 (2017) ATSC A/330 (2016)

► Analogue TV

Parameter	Value	Additional Data
Tuning range	45 - 1000 MHz	
Frequency resolution	1 kHz	
Colour System	PAL, SECAM and NTSC	
Standard Supported	M, N, B, G, I, D, K and L	

Parameter	Value	Additional Data
Sensibility	40 dBµV for a correct synchronism	
C/N	52 dB	

► DVB-S

Parameter	Value	Additional Data
Modulation	QPSK	
Margin of Power Measurement	-80 dBm to +20 dBm (@27,5 MS/s)	+35 dBµV to +127 dBµV (@27,5 MS/s)
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	
MER	Max: 34 dB; Min: 2 dB	Freq: 1500 MHz; SR= 27,5 MS/s; CR=1/2
Sensibility	-77 dBm	@2340 MHz SR= 27,5 MS/s
Frequency resolution	1 kHz	
Measurements	Power, CBER, VBER, MER, C/N and Link Margin	
Symbol Rate	1,1 - 80 Msym/s	
Tuning Range	250 – 3000 MHz	

► DVB-S2

Parameter	Value	Additional Data
Modulation	QPSK, 8PSK, 16APSK, 32APSK and low QPSK	Long frames and short frames
Margin of Power Measurement	-80 dBm to +20 dBm (@27,5 MS/s)	+35 dBµV to +127 dBµV (@27,500 MS/s)
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	
MER	Max: 30 dB; Min: 0 dB	Freq: 1500 MHz; SR= 27,5 MS/s; CR=1/2
Sensibility	-77 dBm	@2340 MHz SR= 27,5 MS/s
Frequency resolution	1 kHz	
Measurements	Power, CBER, LBER, MER, PER, C/N, BCH ESR and Link Margin	
Symbol Rate	500 ksym/s - 80 Msym/s	The TS provided by the demodulator will only be processed if the bitrate is below 200 Mbit/s.
Supporting	TS, GPS and GCS MODCODs CCM, ACM and VCM	
Tuning Range	250 – 3000 MHz	

► DSS

Parameter	Value	Additional Data
Modulation	QPSK	
Margin of Power Measurement	+35 dBµV to +115 dBµV	
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	
Sensibility	TBD	

Parameter	Value	Additional Data
Frequency resolution	1 kHz	
Measurements	Power, CBER, VBER, MER, PER, C/N and Noise Margin	
Tuning Range	250 - 3000 MHz	

► DVB-S2x (optional)

Parameter	Value	Additional Data
Modulation	QPSK, 8PSK, 8APSK-L, 16APSK, 16APSK-L, 32APSK, 32APSK-L, 64APSK, 64APSK-L, 128APSK, 256APSK, 256APSK-L	Long frames and short frames
Margin of Power Measurement	-80 dBm to +20 dBm (@27,5 MS/s)	+35 dBµV to +127 dBµV (@27,5 MS/s)
Power measurement accuracy	± 1,5 dB	
C/N	>= 50 dB	
MER	Max: 30 dB; Min: 0 dB	Freq: 1500 MHz; SR= 27,5 MS/s; CR=1/2
Sensibility	TBD	
Frequency resolution	1 kHz	
Measurements	Power, CBER, LBER, MER, C/N, BCH ESR, PER and Link Margin	
Symbol Rate	200 ksym/s - 80 Msym/s	The TS provided by the demodulator will only be processed if the bitrate is below 200 Mbit/s.
Supporting	TS, GPS and GCS CCM, VCM y ACM MODCODs	
Tuning Range	250 - 3000 MHz	

► FM

Parameter	Value	Additional Data
Tuning range	45 - 1000 MHz	
Frequency resolution	1 kHz	
Accuracy of level measurement	± 1,5 dB	
Sensitivity	8 dBµV / -99 dBm	S+N/N = 12 dB
Measurement	Level, C/N	
RDS information	Available	

12.2.2 TV Analyzer Tools

► Spectrum

Parameter	Value	Additional Data
Tuning range	5 MHz - 3 GHz	
Markers	1	It shows frequency, level, frequency difference and level difference
Reference Level	Selectable	linked or not to attenuators
Attenuator	5 dB steps	Automatic / manual mode

Parameter	Value	Additional Data
Digital channels measurement	Power, C/N	Units: dBuV, dBmV, dBm
Advanced functions	Trace max hold	
	Trace min hold	
	dB / div: 10, 5, 2, 1 dB	
Measurement resolution	0,1 dB	
Measurement accuracy	± 1.5 dB	
Frequency accuracy	± 6 kHz	
Frequency resolution	270 Hz	
Accuracy of frequency reference	< 2 ppm	It includes initial deviation, temperature response, and aging during the first year.
Terrestrial sweep	25 ms	RBW = 100 kHz; scan rate:39,8GHz/s
Satellite sweep	40 ms	RBW = 100 kHz; scan rate: 52 GHz/s
Indicators	Saturation	
Markers	Absolute and referenced	
Scan rate	40 GHz/sec	
Displayed Average Noise Level (DANL)	< - 153 dBm/Hz	Terrestrial (5 MHz - 50 MHz)
	< - 161 dBm/Hz	Terrestrial (50 MHz - 1 GHz)
	< 160 dBm/Hz	Satellite (250 MHz - 2,34 GHz)
Dynamic	70 dB	
Display Range	Noise floor up to +23 dBm / 130 dBµV	
Return lost (RL)	< - 10 dB	5 MHz - 3 GHz; Atenuattion = 0 dB
	<= - 11 dB	5 MHz - 3 GHz; Atenuattion >= 5 dB
Terrestrial Band		
Tuning range	5 - 1000 MHz	
Tuning mode	Channel or frequency	
Tuning Accuracy	± 1 kHz	
Frequency Accuracy	< ± 2270 Hz	Internal reference = 10 MHz; Resolution filter = 2 kHz
	< ± (ppm x 1000 Hz) ±270 Hz	External reference = 10 MHz; Resolution filter = 2 kHz; ppm: PPM external reference
Resolution Bandwidth (RBW)	2, 10, 20, 40, 100, 200, 1000 kHz	
Span		
Span settings	numeric value or predefined	
Span predefined values	10, 50, 200, 500, 995 MHz	
Minimum Span	10 kHz	
Maximum Span	995 MHz	
Span according to RBW	40 MHz - 200 kHz	RBW = 2 kHz
	250 MHz - 1 MHz	RBW = 10 kHz
	450 MHz - 1 MHz	RBW = 20 kHz, 30 kHz, 40 kHz
	995 MHz - 10 MHz	RBW = 100 kHz, 200 kHz, 1 MHz
Amplitude		
Max input voltage	50 Vrms DC @100 Hz	with AL-103 AC adapter
	30 Vrms DC @100 Hz	
Max level input	15 dBm	5 - 20 MHz
	23 dBm	20 MHz - 6 GHz
Satellite Band		
Tuning range	250 - 3000 MHz	

Parameter	Value	Additional Data
Tuning mode	Channel or frequency	
Tuning accuracy	± 2.5 kHz	
Frequency Accuracy	< ± 4950 Hz	Internal reference = 10 MHz; Resolution filter = 2 kHz
	< ± (ppm x 2340 Hz) ±270 Hz	External reference = 10 MHz; Resolution filter = 2 kHz; ppm: PPM external reference
Tuning Resolution	10 kHz	
Resolution Bandwidth (RBW)	2, 10, 20, 40, 100, 200, 1000 kHz	
Measurement range	20 dBµV - 130 dBµV	
Scan Rate	52 GHz/s (sweep time = 40 ms)	RBW=100 kHz
Span		
Span settings	numeric value or predefined	
Span predefined values	10, 50, 200, 500, 1000 MHz, full	
Minimum Span	10 kHz	
Maximum Span	2750 MHz	
Span according to RBW	40 MHz - 200 kHz	RBW = 2 kHz
	250 MHz - 1 MHz	RBW = 10 kHz
	450 MHz - 1 MHz	RBW = 20 kHz, 30 kHz, 40 kHz
	2100 MHz - 10 MHz	RBW = 100 kHz, 200 kHz, 1 MHz
LNB		
Band	Ku / Ka / C	
Polarity	Horizontal / Vertical, Left / Right	

► Video

Parameter	Value	Additional Data
Codecs	MPEG-1	
	MPEG-2	HD, MP, HL up to 1080p6
	H.264	CBP, MP, High Profile Level 5.2 up to 1080p240 / 4Kp60
	H.265 4K UHD	MMP L5.1 8b/10b up to 4Kp60

► Audio

Parameter	Value	Additional Data
Codecs	MPEG-1	
	MPEG-2	
	AAC; HE-AAC	
	Dolby Digital (DD) and Dolby Digital + (DD+)	
	Dolby AC-4	

► Transport Stream

Parameter	Value	Additional Data
Communication Protocol	MPEG-2	
Packets	188 or 204 bytes	Automatic detection
Max. Bitrate	200 Mbit/s	
Max. Recording Bitrate	200 Mbit/s	

Parameter	Value	Additional Data
Recording	Internal memory or external USB	
Recording Internal Memory	8 GB	
TS Analyser		
Standards supported	DVB, ATSC, ISDB-T SCTE	
PSI Tables	PAT, PMT, NIT, CAT	Árbol jerárquico de tablas
SI Tables	NIT, BAT, SDT, EIT, TDT, TOT	Árbol jerárquico de tablas
Alarms	Alarm log	According to standard ETSI TR101 290 v1.2.1
Bitrate analyser	Data info and pie chart	
PIDs	Identied packet list	

► Other Tools

Parameter	Valor	Additional Data
Echoes	Available for DVB-T, DVB-T2, DVB-C2, ISDB-T, ATSC 3.0	
Constellation	Available for DVB-T, DVB-T2, DVB-C, DVB-C2, DSS, DVB-S, DVB-S2, DVB-S2X, ISDB-T, J83 Annex B, ATSC 3.0	
Shoulder Attenuation	Available	
MER by Carrier	Available	
Optical power measurement	Available	
TS Recording	Available	
ALP Recording	Available	
T2MI analyser	Real-time decapsulation of a PLP	

► Advanced Tools

Parameter	Value	Additional Data
Drive Test	Available	
Channel exploration	Available	
Datalogger	Available	
Task Planner	Available	
Blind Scan (Discover SAT)	Available	Discovers transport packet streams from satellite spectrum and creates a channel plan.
Discover FM stations	Available	Discover FM Stations from spectrum and creates a channel-plan.
Discover DAB channels	Available	Discover DAB channels from spectrum and creates a channel-plan

12.3 Spectrum Analyzer Mode

Parameter	Value	Additional Data
Tuning range	5 MHz - 6 GHz	
Accuracy of frequency reference	< 2 ppm	It includes initial deviation, temperature response, and aging during the first year.
Frequency resolution	270 Hz	Resolution filter (RBW) = 2 kHz
Frequency accuracy		Resolution filter (RBW) = 2 kHz
from 5 MHz to 3 GHz	<±6270 Hz	Internal reference: 10 MHz
	< ±(ppm x 3000 Hz) ±270 Hz	Referencia externa: 10 MHz Example: ppm external reference 0.045ppm. < ± (0.045 x 3000 +270) = < ± 405 Hz
from 3 GHz to 6 GHz	< ±12270 Hz	Referencia interna: 10 MHz
	< ±(ppm x 6000 Hz) ±270 Hz	Referencia externa: 10 MHz Ejemplo: ppm referencia externa de 0.045ppm. < ± (0.045 x 6000 +270) = < ± 540 Hz
Scan rate	52 GHz/s (sweep time = 114 ms)	5.995 GHz; RBW=100 kHz
Frequency span	10 kHz to full span (5.95 GHz)	
Predefined span values	10, 50, 200, 500 MHz, 1 GHz, 3 GHz, 5.995 GHz	
Resolution Bandwidth (RBW)	2, 10, 20, 30, 40, 100, 200, 1000 kHz	
Span according to RBW	40 MHz - 200 kHz	RBW = 2 kHz
	250 MHz - 1 MHz	RBW = 10 kHz
	450 MHz - 1 MHz	RBW = 20 kHz, 30 kHz, 40 kHz
	6 GHz - 10 MHz	RBW = 100 kHz, 200 kHz, 1 MHz
Display range - Noise floor	up to +23 dBm / 130 dBµV	
Measurement	Channel power	Configurable Bandwidth: - minimum: resolution bandwidth value - maximum: 5.95 GHz
Markers	4 markers	Absolute / referenced
Reference Level	Selectable	Linked or not to attenuators
Attenuators	Pasos de 5 dB	Modo manual
Scan time	250 ns a 0.149 s	
Amplitude		
Max input voltage	50 Vrms DC a 100 Hz	con alimentador AL-103
	30 Vrms DC a 100 Hz	
Max level input	15 dBm	5 - 20 MHz
	23 dBm	20 MHz - 6 GHz
Displayed Average Noise Level (DANL)	< -156 dBm/Hz	freq: 5 MHz - 65 MHz
	< -156 dBm/Hz	freq: 65 MHz - 3 GHz
	< -147 dBm/Hz	freq: 3 MHz - 4.425 GHz
	< -146 dBm/Hz	freq: 4.425 GHz - 6 GHz
Measurement range	+12 to -93 dBm	freq: 5 MHz - 20 MHz
	+20 to -93 dBm	freq: 20 MHz - 3 GHz
	+20 to -91 dBm	freq: 3 MHz - 4,425 GHz
	+20 to -92 dBm	freq: 4,425 GHz - 6 GHz
Uncertainty in level measurement	< ± 1.5 dB	
Measurement resolution	0.1 dB	

Parameter	Value	Additional Data
Dynamic range	MD > 71 dB	freq: 5 MHz - 20 MHz
	MD > 75 dB	freq: 20 MHz - 3 GHz
	MD > 70 dB	freq: 3 MHz - 4,425 GHz
	MD > 68 dB	freq: 4.425 GHz - 6 GHz
Return Loss	RL <= - 10 dB	freq: 5 MHz - 3 GHz; attenuation = 0 dB
	RL <= - 11 dB	freq: 5 MHz - 3 GHz; attenuation >= 5 dB
	RL <= - 7 dB	freq: 3,77 GHz; any attenuation
	RL <= - 10 dB	freq: 3 GHz - 4,425 GHz
	RL <= - 10 dB	freq: 4,425 GHz - 6 GHz; any attenuation

12.4 IPTV Mode

Parameter	Value	Additional Data
Source	RJ45	
Main features	Supports VLAN networks	
	Multicast discovery	
	Audio/video service play	
	T2MI reception	
	BTS reception	
	TS Analyzer	
Streaming simultaneous reception in real time	1	
Unicast	UDP Port Protocol: RTP, UDP	IP Packets: it is mandatory that each ethernet packet contains an integer number of TS packets which can be from 1 to 7.
Multicast	IP: 224.0.0.0 - 239.255.255.255 Ports: 1024 - 65535	
Protocols	IGMP v1, v2, v3 ARP ICMP DHCP	

Parameter	Value	Additional Data
Measurement	Received rate (packets/s)	
	Received packets	
	RTP missing packets	
	RTP out of order	
	JITTER	
	Delay factor	Maximum time that a multicast stream packet is inside the receiving equipment's buffer. Measurement taken during the last second of data reception. Recommended value < 100 ms
	Media lost rate	Ratio of lost packets compared to the received packets from the multicast stream (RTP only). Recommended value < 0,005 packets/s
	MAX IPAT	
	FEC Status	
	Reordered RTP	
	Fixed Packets	
	Overflow	
	TS Packets info	
Video play	H265 4K UHD (MP L5.1 8b/10b hasta 4kp60) H264 (CBP, MP, HP L5.2 hasta 1080p240 / 4Kp60) MPEG-2 (HD, MP, HL hasta 1080p6)	
Audio play	MPEG-1, MPEG-2 AAC, HE-AAC Dolby Digital (DD), Dolby Digital + (DD+) Dolby AC-4	
Charts	Packet rate Histogram with Jitter measurement Inter packet arrival time	
VLAN	Available	
SFP+	The TS (ASI) received via IPTV can be transmitted to FO using the SFP+ module	EB60LC1T-MM-13F. 3G/SD-SDI SFP Optical LC 1T Medium reach MSA SM 1310nm
Network Traffic Measurement	Network rate	
	Network Packets	
	Packets with errors	
	IPER (ITU Y.1540) Recommended value (per quality service): class 0-4 < 1.0 E-4 class 5: unspecified class 6-7 < 1.0E-6	Population of interest: all Ethernet frames received on the interface.

Parameter	Value	Additional Data
Signal Parameters	Link speed	10 Mbit/s, 100 Mbit/s, 1Gbit/s
	Multicast group	
	UDP Port	
	Protocol: UDP, RTP	
	IP source	
	FEC (present, rows, columns)	
	TTL (time to live)	
	TOS	
	TS pacekts per frame	

12.5 ASI Mode

► Transport Stream

Parameter	Value	Additional Data
Reception	TS T2MI (not decapsulated)	Restricts TS to ASI input Real-time decapsulation of a PLP
Packets	188 or 204 bytes	Automatic detection
Video Info	Type, bitrate, format, aspect ratio, frequency, profile, PID	Bitrate info displayed in tables and pie chart
Service Info	Network, provider, NID, ONID, scrambled/free, TSID, SID, LCN	
Audio Info	Type, bitrate, format, frequency, mono/stereo, language, PID	
Max. Recording Bitrate	200 Mbit/s	
Max. bitrate input / output	200 Mbit/s	
Recording	Internal memory or external USB	
Recording Internal Memory	8 GB	
SFP+	You can receive or transmit TS over Optical Fiber using the SFP+	SFP+ module approved for Reception: EB60LC1R-MM-P. 3G/SD-SDI SFP Optical LC 1R Medium reach PIN MSA SFP+ module approved for Transmission: EB60LC1T-MM-13F. 3G/SD-SDI SFP Optical LC 1T Medium reach MSA SM 1310nm

► Transport Stream Tables & Alarms

Parameter	Value	Additional Data
PSI Tables	PAT	Program Association Table
	PMT	Program Map Table
	NIT	Network Information Table
	CAT	Conditional Access Table

Parameter	Value	Additional Data
SI Tables	NIT	Network Information Table
	BAT	Bouquet Association Table
	SDT	Service Description Table
	EIT	Event Information Table
	TDT	Time and Date Table
	TOT	Time and Date Table
Max. Bitrate	200 Mbit/s	
Alarms	Alarms log	According to ETSI standard TR101 290 v1.2.1

12.6 SDI Mode

Parameter	Value	Additional Data
Connector	SDI-3G	
SDI Input	3 GBit/s	
SDI Output	3 GBit/s	Generation of static pattern 1080p60
SFP+	SDI reception via fiber optics	SFP+ certified module: EB60LC1R-MM-P. 3G/SD-SDI SFP Optical LC 1R Medium reach PIN MSA
	SDI transmission (static pattern 1080p60) via fiber optics	SFP+ certified module: EB60LC1T-MM-13F. 3G/SD-SDI SFP Optical LC 1T Medium reach MSA SM
Measurement	Statistical eye	Compatible with simultaneous video/ audio playing
	CRC error	
Audio monitoring	Up to 16 channels AES3	
	Channel status	
	LPCM audio loudness meter	
Video / Audio Supported formats (autodetected)		
SD-SDI SMPTE 259-C	video standard: PAL sampling structure: 4:2:2 Y'CB'CR' 10-bit or 8-bit	Rate: 50
	video standard: NTSC sampling structure: 4:2:2 Y'CB'CR' 10-bit or 8-bit	Rate: 59.94
HD-SDI SMPTE 292	video standard: SMPTE 274 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 1080p: 23.98, 24, 25, 29.97, 30 Rate: 1080i: 50, 59.94, 60 Rate: 1080PsF: 23.98, 24, 25, 29.97, 30
	video standard: SMPTE 296 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 720p: 23.98, 24, 25. 29.97, 30, 50, 59.94, 60
	video standard: SMPTE 2048-2 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 1080p: 23.98, 24, 25, 29.97, 30

Parameter	Value	Additional Data
3G-SDI Level A SMPTE 425-A	video standard: SMPTE 274 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 1080p: 50, 59.94, 60
	video standard: SMPTE 274 Sampling structure: 4:4:4 Y'CB'CR' or RGB 10-bit Sampling structure: 4:4:4:4 Y'CB'CR'A or RGBA 10-bit	Rate: 1080p: 23.98, 24, 25, 29.97, 30 Rate: 1080i: 50, 59.94, 60 Rate: 1080PsF: 23.98, 24, 25, 29.97, 30
	video standard: SMPTE 296 Sampling structure: 4:4:4 or 4:4:4:4 Y'CB'CR' or RGB 10-bit	Rate: 720p: 23.98, 24, 25. 29.97, 30, 50, 59.94, 60
	video standard: SMPTE 2048-2 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 1080p: 47.95, 48, 50, 59.94, 60
	video standard: SMPTE 2048-2 Sampling structure: 4:4:4 Y'CB'CR' or RGB 10-bit Sampling structure: 4:4:4:4 Y'CB'CR'A or RGBA 10-bit	Rate: 1080p: 23.98, 24, 25, 29.97, 30 Rate: 1080PsF: 23.98, 24, 25, 29.97, 30
3G-SDI Level B-DL SMPTE 425 B-DL	video standard: SMPTE 372 sampling structure: Same as SMPTE 372	
Dual Link HD-SDI SMPTE 372	video standard: SMPTE 274 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 1080p: 50, 59.94, 60
	video standard: SMPTE 274 Sampling structure: 4:4:4 or 4:4:4:4 Y'CB'CR' or RGB 10-bit	Rate: 1080p: 23.98, 24, 25, 29.97, 30 Rate: 1080i: 50, 59.94, 60 Rate: 1080PsF: 23.98, 24, 25, 29.97, 30
	video standard: SMPTE 2048-2 Sampling structure: 4:2:2 Y'CB'CR' 10-bit	Rate: 1080p: 47.95, 48, 50, 59.94, 60
	video standard: SMPTE 2048-2 Sampling structure: 4:4:4 Y'CB'CR' or RGB 10-bit Sampling structure: 4:4:4:4 Y'CB'CR'A or RGBA 10-bit	Rate: 1080p: 23.98, 24, 25, 29.97, 30 Rate: 1080PsF: 23.98, 24, 25, 29.97, 30
SFP+	Allows SDI reception over fiber optic through SFP+	EB60LC1R-MM-P. 3G/SD-SDI SFP Optical LC 1R Medium reach PIN MSA
	Allows sending the SDI content from an internal test pattern over fiber optic using the SFP+	EB60LC1T-MM-13F. 3G/SD-SDI SFP Optical LC 1T Medium reach MSA SM 1310nm

12.7 WiFi Mode

Parameter	Value	Additional Data
Interface	Dongle-Wifi connected to USB port	Dongle must be validated by PROMAX
Standards	Wireless standard 802.11 ac/a/b/g/n	802.11ac 2x2 compliant with MU-MIMO
Max. data rates	54 Mbps for 802.11g 300 Mbps for 802.11n 866,7 Mbps for 802.11ac	

Parameter	Value	Additional Data
ISM bands	2.412 - 2.484 GHz 5.150 - 5.850 GHz	
Measurements		
RSSI (dBm)	Range: -100 dBm to -20 dBm	Received Signal Strength Indicator
Occupied AP (%)	0 - 100%	
SNR (dB)	Available	Signal to noise ratio
Noise (dBm)	Available	

12.8 Streaming Analyzer Mode

Parameter	Value	Addotional data
Interface	RJ45 1 Gbps	Connect to the input labeled as "IP CTRL"
Streaming protocol	SRT version 1.4.4	
Payload type	Transport Stream	
TS Analysis	DVB/ATSC tables, bitrates, PID list, alarms TR 101 290	
TS measurement	Video/Audio decoding and parameters. Audio levels	
Modes	Listener: sender equipment starts the SRT handshake.	User must specify the local port where Atlas is waiting the connection
	Caller: Atlas starts the SRT handshake	User must specify the IP and port of the sender (target), and optionally the local port of Atlas. This local port might be useful if firewalls in the network support Outbound NAT Source Port (that is, NAT port rewrite is disabled).
	Rendez-vous: both Atlas and sender equipment try to start the SRT handshake.	User must specify the IP and port of the sender (target). Local port must be the same as target port.
Encryption	AES. Passphrase from 10 up to 80 characters.	must be the same used in the sender.
Measurements	Received buffer (graph)	acknowledged packets stored the receiver's buffer
	Receive rate (graph)	receiving rate in Mbps
	Bandwidth (graph)	estimated bandwidth of the network link
	RTT (graph)	smootheed round trip time in ms
	Packets received	total number of packets received, including retransmitted
	Packets lost	total packets missing (reordered or lost)
	Packets retransmitted	total retransmitted packets
	Packets ACK sent	total number of ACK control packets sent
	Packets NACK sent	total number of NACK control packets sent
	Negotiated latecy	latency of the sender
	Bytes lost	total bytes missing, belonging to packets reordered or lost

12.9 Options

► Fibre Optics

Parameter	Value	Additional Data
Descriptive Code	OP-006-PS	
Selective Optical Power Meter		
Connector	FC-APC/h	
Optical Measure bands	1310 nm ± 50 nm; 1490 nm ± 10 nm; 1550 nm ± 15 nm	
Optical Power Measurement Dynamic Range	- 49,9 dBm - +10 dBm	Accuracy ± 0,5 dB
Optical Power Measurement Range	800 - 1700 nm	Without optical filters
Isolation between optical bands	> 43 dB	
Optical to RF Converter		
RF Terrestrial conversion	Available	
RF Satellite conversion	Low-horizontal band Low-vertical band High-horizontal band High-vertical band	
Dynamic range of conversion	TBD	
RF terrestrial band converted	5 - 1000 MHz	Cable link and optical TDT
RF satellite band converted	950 - 5450 MHz	IF Satellite optical installations

► DAB / DAB+

Parameter	Value	Additional Data
Descriptive Code	OP-006-DAB	
Tuning range	45 - 1000 MHz	
Frequency resolution	1 kHz	
Margin of Power measurement	-95 dBm - +20 dBm	Accuracy ± 1,5 dB
Sensitivity	-95 dBm	
Tools	TII, Echoes, Constellation, MERxCARRIER	
	ETI complete record	
Measurement	Power, C/N, MER, CBER	Max. measurement MER = 40 dB
	MSC CBER, FIC CBER	
	Frequency offset, bandwidth	
	FIB Ratio	

► Advanced FM

Parameter	Value	Additional Data
Descriptive Code	OP-006-FM	
Tuning range	45 - 1000 MHz	
Frequency resolution	1 kHz	
Accuracy of level measurement	± 1,5 dB	
MPX deviation	Up to 100 kHz	Accuracy < ± 2 kHz

Parameter	Value	Additional Data
MPX power		Up to 100 kHz Accuracy < ± 0.2 dB
Sensitivity	8 dBµV / -99 dBm	S+N/N = 12 dB
Tools	Histogram	ITU-R SM. 1268-4 all samples and accumulated. ITU-R SM. 1268-2 all samples and accumulated.
	MUX spectrum	
Measurement	Level, C/N, MPX power	
	Frequency offset, bandwidth	
	Frequency deviation: left (L), right (R), L+R, L-R, MPX, RDS, Pilot	
	Level: left (L), right (R), L+R, L-R, MPX	
RDS information	Available	

► Mobile

Parameter	Value	Additional Data
Descriptive Code	OP-006-T	Requires hardware installation
Technology	Multimode: 4G and 5G	mode NSA (non standalone) mode SA (standalone)
SIM	Dual (two slots)	
Standard	3GPP Releases 16	
Maximum Data Rate	Download: 2.4 Gbps Upload: 900 Mbps	5G SA Sub-6
	Download: 3.4 Gbps Upload: 550 Mbps	5G NSA Sub-6
	Download: 1.6 Gbps Upload: 200 Mbps	LTE
Measurement	RSSI (dBm)	Received Signal Strength Indicator
	RSRP (dBm)	Reference Signal Received Power
	RSRQ (dB)	Reference Signal Received Quality
	SINR (dB)	Signal-to-noise and Interference Ratio
	SRXLEV (dB)	Only for 5G. Not in 4G.
Parameters	MCC	Mobile Country Code
	MNC	Mobile Network Code
	CELL ID	Cell identification
	Physical Cell ID	Physical Cell Identification
	TAC	Tracking area code
	ARFCN	Absolute Radio-Frequency Channel number
	Band	Operator working band
	Mode	Operator mode technology
	Uplink / Downlink bandwidth	
	Uplink / Downlink frequency	
	SCS	Sub carrier spacing. It is the spacing between subcarriers within a 4G or 5G communication channel.

Parameter	Value	Additional Data
Functions	Channel scan	Function to scan different bands and find active operators.
	Channel monitoring	Function to monitor one or more bands, obtaining quality measurements and parameters of the operators in each band. This function, if activated, will perform an infinite polling until it is stopped.
Supported bands		
5G NR NSA	n1/ 2/ 3/ 5/ 7/ 8/ 12/ 13/ 14/ 18/ 20/ 25/ 26/ 28/ 29/ 30/ 38/ 40/ 41/ 48/ 66/ 70/ 71/ 75/ 76/ 77/ 78/ 79	
5G NR SA	n1/ 2/ 3/ 5/ 7/ 8/ 12/ 13/ 14/ 18/ 20/ 25/ 26/ 28/ 29/ 30/ 38/ 40/ 41/ 48/ 66/ 70/ 71/75/ 76/ 77/ 78/ 79	
LTE-FDD	B1/ 2/ 3/ 4/ 5/ 7/ 8/ 12/ 13/ 14/ 17/ 18/ 19/ 20/ 25/ 26/ 28/ 29/ 30/ 32/ 66/ 71	
LTE-TDD	B34/ 38/ 39/ 40/ 41/ 42/ 43/ 48	
LTE LAA	B46	

► SDI - ASI Optical Output

Parameter	Value	Additional Data
Descriptive Code	OP-006-OT	

► SDI - ASI Optical Input

Parameter	Value	Additional Data
Descriptive Code	OP-006-OR	

► SMPTE ST2110

Parameter	Value	Additional Data
Descriptive Code	OP-006-ST	It requires SFP+ module
SFP+		
Type	Embrionix EB22LCSD-SM	It complies with the MSA interoperability standard.
Conectors	LC	Hot-pluggable
TX Wavelength	850 nm	
Maximum input power	0 dB	
Operating temperature	0ºC - +70ºC	
Tasa de datos	SD, HD, 3G	
Audio / Video		
Video reception	1 primary flow 1 secondary flow	
Video resolution	HD 4:2:2	720p50/60 1080i25/30 1080p30
Audio reception	Up to 4 primary and secondary flows	
Audio channels	Up to 16 channels	AES67 standard

Parameter	Value	Additional Data
Broadcast IP protocols	Ember+ BESS NMS (IS-04, IS-05)	Supports VLAN
Precision Time Protocol (PTP)	PTP version 2 IEEE 1588 SMPTE profile ST2059-2	The system works with 2 PTP sources
SFP+ parameters / measurements	Part number	EB22LCSD-SM
	TX wavelength	lambda used to transmit data (850 nm)
	TX out power	power used to transmit data (mW)
	Potencia de entrada receptor	potencia recibida (mW)
	Temperature	current temperature of SFP+ module (ºC)
	Temperature alarm indicator	
Video / audio SDI signal	Video CRC errors	counter of number of video packets with CRC errors
	Audio Checksum errors	counter of number of audio packets with CRC errors
	Audio parity errors	counter of number of audio packets with parity errors
	Video bitrate	
	Audio bitrate	
	Audio levels	- Measurement of the audio level for each received audio channel. - Maximum number of audio channels: 16. - Mixing of selected audios are audible. - Audios organised by groups. Total groups 4
PTP parameters / measurement	PTP status	Not locked, coarse locked, fine locked
	Syncs	number of Sync packets received from master PTP
	PTP mode	Multicast, hybrid, unicats
	Follow ups	number of Follow-up packets received from master PTP
	Delay requests	Número de paquetes Delay request enviados al master PTP
	Delay requests (ms)	2000, 1000, 500, 250 and 125 ms
	Delay responses	number of Delay Responses received from master
	Drop follow sync	Follow-up packets not received
	Drop Delay responses	Delay Responses packets not received
	Announce timeout (intervals)	master PTP missed announcement packets to declare PTP master as lost.
	Server PTP mode	multicast, hybrid, unicast
	Version	PTP version of master PTP
	Presence	Absent, Present
	Domain (0 - 127)	PTP master domain number
	VLAN ID (1 - 4094)	PTP VLAN tag. For untagged, use VLAN 0
	Quality of Service (QoS): 0 - 63	DSCP

Parameter	Value	Additional Data
SFP+ ST2110 management	Support for Virtual Lan (VLAN)	
	Static or DHCP mode available	
	Total Recived packets counter	
	Total Transmitted packets counter	
Video flow	Support for Primary and Secondary (backup) video flow	
	Enable reception	ON / OFF
	Received Packets counter	
	RTP errors counter	
	Destination IP address	multicast IP address of video flow to receive
	Destination UDP port	port of video flow to receive
	Source IP	IP address of the server that manage the video streaming
	Source UDP Port	port used for the server that manage the video streaming
	VLAN ID	tag VLAN
	VLAN match	VLAN ON / OFF
	TTL	Time-to-live of received packets
	sender type	- Narrow Linear: (isochronous sender) packets received at a fixed interval - Narrow Gapped: packets received with SDI blanking intervals - Wide: received packets can have large gaps between them
	RTP payload	96 for video
	RTP SSRC	received synchronization source filtering value
	Resolution	1920x1080 1280x720 2048x1080
	Video scan	interlaced, progressive
	Transport scan	interlaced, progressive
	Rate (fps)	video interlaced (fields/s): 50, 50.94, 60 video progressive (frames/s): 25, 29.97, 30, 48, 50, 59.94, 60
	Pixel format	YCbCr: 422 YCbCr: 444 RGB
Audio map	Advanced function that allows to combine received audio channels in groups to configure the SDI audio stream.	
Seamless switch monitor	Monitoring of delays between Primary and Secondary flows of each stream (one pair of video streams, and 4 pairs of audio streams).	Low delay is required to perform a seamless switch (glitch-free) between Primary and Secondary flow.
	"Impaired" flag asserts if a required switching between Primary and Secondary has failed (black frames or distortion will occur).	

Parameter	Value	Additional Data
Audio flow	Support for 4 audio streams	Each stream with one Primary and one Secondary (backup) flow
	Enable reception	ON / OFF
	Received Packets counter	
	RTP errors counter	
	Destination IP address	multicast IP address of audio flow to receive
	Destination UDP port	port of audio flow to receive
	Source IP	IP address of the server that manage the audio streaming
	Source UDP Port	port used for the server that manage the audio streaming
	VLAN ID	tag VLAN
	VLAN match	VLAN ON / OFF
	TTL	Time-to-live of received packets
	AES Packet time: 1 ms, 125 us, 250 us, 333 us, 500 us	Audio time that is conveyed in one AES packet. If 16 audio channels are used, this time must be 500us os less
	RTP Payload	97 for audio
	RTP SSRC	received synchronization source filtering value
	Sampling Rate (Hz)	48000 Hz
	Channels	Up to 16 channels
	Format	ST2110-30 (PCM AES67) ST2110-31 (AES3)

13 MAINTENANCE

13.1 Instructions for Returning by Mail

Instruments returned for repair or calibration, either within or out of the warranty period, should be sent with the following information: Name of the Company, name of the contact person, address, telephone number, receipt (in the case of coverage under warranty) and a description of the problem or the service required.

13.2 Considerations about the Screen

This paragraph offers key considerations regarding the use of the colour screen, taken from the specifications of the manufacturer.

In the TFT display, the user may find pixels that do not light up or pixels that are permanently lit. This should not be regarded as a defect in the TFT. In accordance with the manufacturer quality standard, 9 pixels with these characteristics are considered admissible.

Pixels which are not detected when the distance from the surface of the TFT screen to the human eye is greater than 35 cm, with a viewing angle of 90° between the eye and the screen should not be considered manufacturing defects either.

It is advisable a viewing angle of 15° in the 6.00 o'clock direction in order to obtain the optimum visualization of the screen.

13.3 Cleaning Recommendations

The equipment consists of a plastic case and a TFT screen. Each element has its specific cleaning treatment.

►Cleaning the Screen

The TFT screen surface is VERY DELICATE. It has to be cleaned with a soft fabric cloth (cotton or silk), always making the same move from left to right and from top to bottom, without putting pressure on the screen.

The TFT screen has to be dry-cleaned or with a product specifically designed for TFT screens, by slightly dampening the cloth. NEVER use tap or mineral water, alcohol or conventional cleaning products, because they contain components that can damage the screen.

Turn off the equipment to locate dirt on the screen. After cleaning, wait a few seconds before turning on.

►Cleaning the Plastic Case

The equipment has to be disconnected before cleaning the case.

The case must be cleaned with a solution of neutral soap and water, using a soft cloth dampened with this solution.

Before use, the equipment has to be completely dry.

Never clean with abrasive soaps, chlorinated solvents or aromatic hydrocarbons. These products may degrade the case.

i OPTICAL OPTION

This annex contains operating instructions for the next option:

- OP-006-PS: Selective measurement of Optical Power and RF conversion.

The optical input measures the total power transmitted through the fiber optic cable. With this option the equipment can measure each of the three wavelengths (lambdas) that are transmitted through the fiber optic cable.

The optical to RF selective converter has a photosensor for each wavelength, which obtains the RF signal carried by each one. With this module, user can measure terrestrial or cable (up to 1 GHz) networks or optical LNB for satellite antennas (up to 5.45 GHz), so that the installer does not need any additional equipment to measure this type of installations.

i.1 Optical option Installation

1. From **Home** press on **Settings**.
2. Press on **Options** on the **General** settings row.
3. The Options screen shows a list of the tools that are already installed.
4. The Optical option consists of the **LNB Optical Power** tool.
5. If this tool does not appear on the screen, it means that the Optical option is not installed. To install this option, press the "+" and enter the option code.
6. The option code for the Optical option is a unique code for the meter. Contact PROMAX if you are interested in this option (https://www.promaxelectronics.com/ing/contact-promax/).

i.2 RF to Optical Conversion

1. Connect the fiber optic cable to the FC/APC input connector.
2. From **Home** press on **TV Analyzer** .
3. Swipe down from the top of the screen to display the Top menu.

4 Select the **LNB Optical** option from the Top menu. Select **ON** in the field **Enabled**.

5 In the Select lambda (nm) field, choose one of the three available wavelengths (lambda) (1310, 1490, and 1550 nm). Select the lambda that you wish to convert to RF.

6 On the right side, a power meter for each lambda appears. It should display the power for the selected lambda.

7 From this point, the meter is converting the selected lambda from the optical signal to RF. To indicate the conversion is enabled, an icon with the selected lambda will appear in the top bar.

i.3 Optical LNB tuning

1 Select the lambda you wish to convert to RF as described in the previous section.

2 From **Home** press on **TV Analyzer** .

3 On the main window, press ▼ and select the **Spectrum** tool. On the small windows, you can select other tools, like the video tool to watch the demodulated signal or the measurements tool to check power and MER.

4 Swipe right from the left side or press on the status bar to display the tuning menu.

5 Select the **satellite band** .

6 Select **type of tuning**: Tune by frequency or Tune by channel .

- **Tune by frequency**: The user selects a frequency to tune (downlink or LNB). Additionally, they must select the parameters to tune the signal: polarization (vertical, horizontal) and band (low, high).
  - Low Vertical: 950 - 1975 MHz
  - Low Horizontal: 3400 - 4425 MHz
  - High Vertical: 1975 - 3000 MHz
  - High Horizontal: 4465 - 5450 MHz
- **Tune by channel**: Select a channel to be tuned. Previously you have to select a channel plan. A channel plan contains a list of channels with settings for each channel to be tuned (frequency, type of signal, bandwidth, etc.). When tuning a channel it will apply these settings in first place.

7 On **Signal Type** option select **Mode**:

- **Auto mode**: It identifies and tries to demodulate the signal automatically using the StealthID function (for more details refer to "►StealthID" on page 23).
- **Manual mode**: The user must enter the signal type and the parameters to identify and demodulate it.

8 Select **Span** (recommended value for satellite: 100 MHz).

9 Adjust the **reference level**.

10 Select channel or frequency to be tuned. You can select your frequency or channel by using the tuning menu or by dragging left or right on the screen and then tapping on the signal. In the case of frequency tuning, you can select either the Downlink frequency or the LNB tuning frequency.

11 When you are on the carrier, the bottom tool bar turns green when the signal is locked. If not locked, the bottom bar turns red.

12 If locked, it tries to demodulate it. On video tool shows the image and on signal parameters shows all related parameters.

ii DAB/DAB+ OPTION

ii.1 Description

This annex contains operating instructions for the next option:

- OP-006-DAB: Measurement for DAB and DAB+ digital radio.

The DAB (Digital Audio Broadcasting) is a digital radio standard, designed for both home and portable receivers to broadcast terrestrial and satellite audio and also data. It works with Band III and frequencies.

The DAB+ is an evolution of DAB using the AAC + audio codec. It also includes Reed-Solomon error correction, which makes it more robust. DAB receivers are not compatible with DAB+ receivers.

ETI (Ensemble Transport Interface) is the output stream for a DAB/DAB+ multiplexer. The ETI is divided in several layers with information about the radio signal. It is similar to the transport stream obtained when multiplexing a TV signal.

The DAB+ option has some exclusive tools such as the ETI record. It is also able to decode and show images (slideshow) that some broadcasters sent to complement audio services.

Also some standard tools such as Echoes, Constellation and MER by carrier are also available on DAB/DAB+.

DAB and DAB+ Analysis (11:06s) SCAN

ii.2 Installing DAB/DAB+ option

1 From the **Home** menu press on **Settings**.

2 Press on **Options** at General Settings section.

3 The Options screen shows a list of tools already installed.

4 The DAB/DAB+ option is made up of three tools. These tools should appear on the list:

- **DAB Advanced**
- **DAB ETI Recording**
- **DAB TII**

5 If these tools are not on screen, then the DAB/DAB+ option is not installed. To install this option press on "+" and enter the option code.

6 The option code for the DAB/DAB+ option is a unique code for the meter. Contact PROMAX if you are interested in this option (https://www.promaxelectronics.com/ing/contact-promax/).

ii.3 DAB/DAB+ Tuning

1 Connect the RF input signal cable to the RF input connector.

2 From the **Home** Menu press on **TV Analyzer** .

3 On the main window, press ▼ and select the **Spectrum** tool. On the small windows, you can select other tools, like the video tool to watch the demodulated signal or the measurements tool to check power and MER.

4 Swipe right from the left side or press on the tuning bar to display the tuning menu.

5 Select the **terrestrial band** .

6 Select **type of tuning**: Tune by frequency or Tune by channel .

- **Tune by frequency**: User selects a frequency to be tuned.
- **Tune by channel**: User selects a channel to be tuned. Previously the user have to select a channel plan on the Channel Plan option. A channel plan contains a list of channels with settings for each channel (frequency, type of signal, bandwidth, etc.). When tuning by channel it will apply the settings obtained from the channel plan in first place.

7 On **Signal Type** option select **Mode**:

- **Auto mode**: It identifies and tries to demodulate the signal automatically using the StealthID function (for more details refer to "►StealthID" on page 23).
- **Manual mode**: The user must enter the signal type and the parameters to identify and demodulate it.

8 Select **Span** (recommended value for terrestrial: 50 MHz).

9 Adjust the **reference level**.

10 Select channel or frequency to be tuned. You can select a frequency or channel by using the tuning menu or by dragging left or right on the screen and then tapping on the signal.

11 When on the signal, the tuning bar turns green if the signal is locked. If not locked, the tuning bar does not change and maintains the red colour.

12 If locked, it tries to demodulate it. At the video tool will show the image and at signal parameters tool will show all related parameters.

ii.4 DAB Advanced Measurements

1 From the **Home** Menu press on **TV Analyzer** .

2 On the main panel, press ▼ and select the **Measurement** tool.

3 The **DAB Advanced** tool shows extra measurements for the DAB/DAB+ signal.

►Screen with DAB Advanced measurements

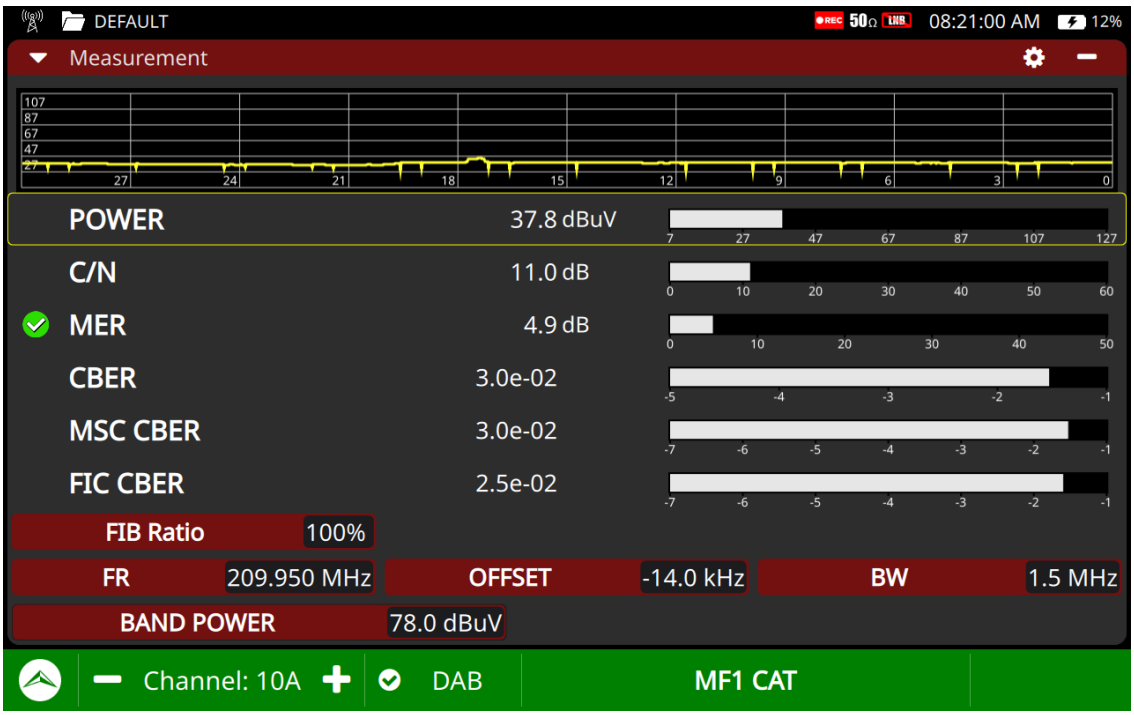


Figure 71.

► DAB/DAB+ advanced measurements

- **MSC CBER**: CBER for MSC (*Main System Channel*). It is part of ETI containing audio and images.

- **FIC CBER**: CBER for FIC (*Fast Information Channel*). It is part of ETI containing information about the configuration of the ETI itself, such as number and type of services.
- **CBER**: Bit error ratio for DAB/DAB+ channel (it includes all the ETI content).
- **FIB Ratio**: FIC quality ratio. It is calculated from wrong packets detected by CRC. 100% is the top quality level.

►Touch gestures

Tap: Select a measurement to monitor it on the graph.

►Settings

Press on the gear to display settings:

- Reset PER: It resets the PER value (Packet Error Ratio).

ii.5 DAB ETI Recording

The DAB ETI recording tool allows recording the DAB ETI (Ensemble Transport Interface) which is the data stream that carries all the radio stations and information within a DAB/DAB+ signal.

It also has the option to record raw signal in order to be analysed in case there was any problem locking the signal.

	Recording (01:09s)	SCAN

►Screen

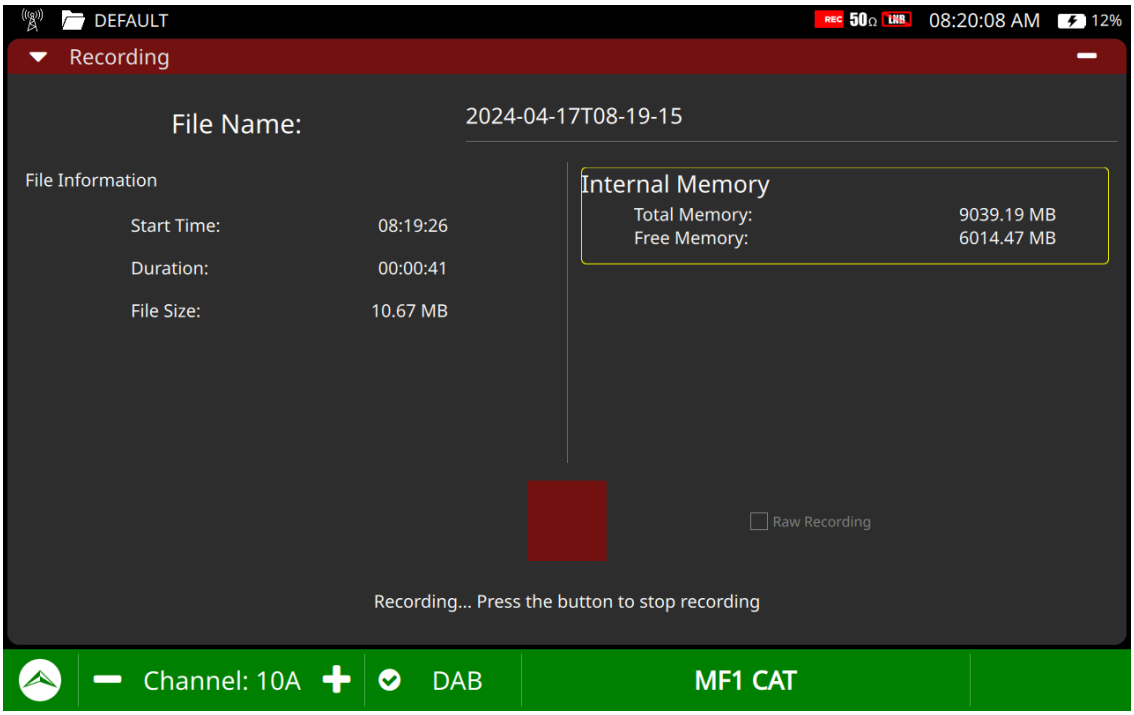


Figure 72.

1 File information Panel: On the left you can see start time, duration and file size. On the right side there is the total memory and free memory available. The name of the file is generate from the current date and time.

2 On/Off button: It shows a red button to start/stop recording. When the button is a cercle it starts recording. When the button is square it stops recording. Records are saved in the current workspace. To record a raw signal check the box "Raw Recording" and follow the instructions below.

►Raw Recording Procedure

Raw recording is useful to analyze the signal in order to find any problems in the data stream that are not allowing to lock or demodulate the signal. It is very important to follow these steps to generate a proper raw record:

1 Disconnect the signal.

2 Check the "raw recording" option.

3 Start recording.

4 Connect the signal.

5 After a while, stop recording.

6 Access the Workspace (for more details refer to "WORKSPACES" on page 128) to get the recording.

7 Deploy the Top Menu and select Workspace. Then select the current Workspace and in "Mode" select "TV Analyzer". Now press on "Recordings".

8 Press on the file (eti format) to access the options menu and copy it to an USB.

9 Now the file can be analysed or send in order to find any problems that are not allowing to tune / demodulate the signal.

►Touch gestures

Tap: Tap the on/off button to start/stop recording or to check the raw recording checkbox.

ii.6 DAB TII

The DAB TII tool shows information that identifies transmitters (TII) from the ETI locked. The graph on screen shows PRS and null symbols.

►Screen

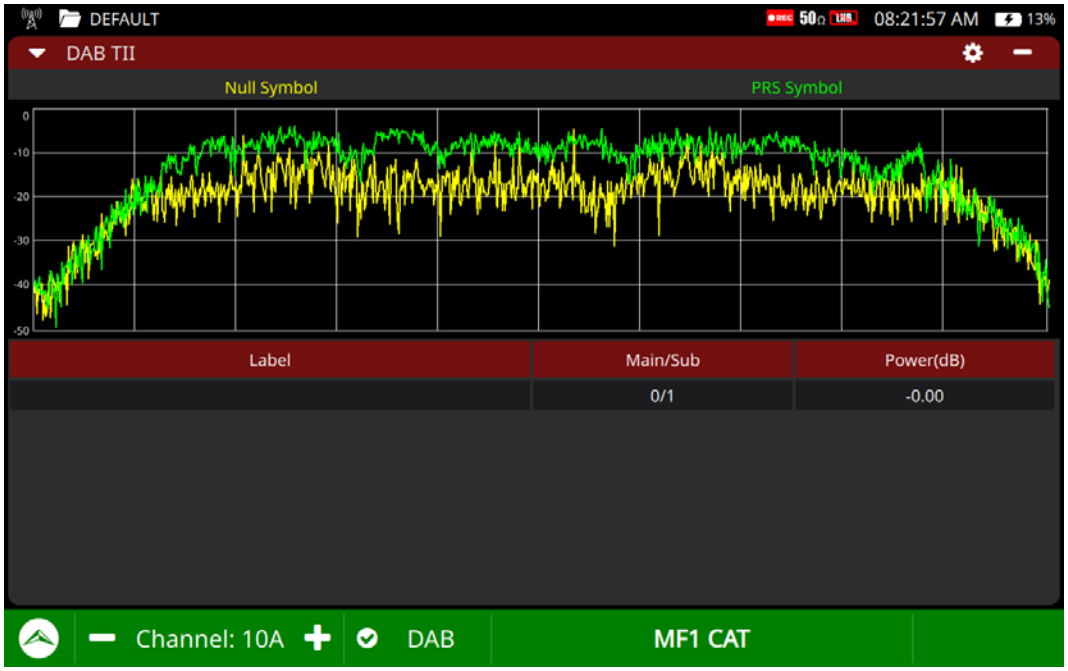


Figure 73.

1 PRS symbol spectrum (green) and null (yellow). Using the Settings menu you can display each one separately. It also allows you to select the display of the null symbol with or without transmitter information.

2 Transmitters data. Transmitters are ordered from highest to lowest power. It also allows you to select one of the transmitters by tapping on it. Data shown are as follows:

- Transmitter Identification label.
- Main identifier (Main) and sub-identifier (Sub) of the transmitter.
- Power of transmitter in relation to most powerful transmitter.

►Touch gestures

Tap: Select a transmitter.

► Settings

Press on the gear to display settings:

- Show: It allows displaying on screen the PRS symbol, the Null symbol or both.
- Null Symbol: It allows showing the Null symbol with or without TII.

iii FM ADVANCED OPTION

iii.1 Description

This annex contains operating instructions for the next option:

- OP-006-FM: Advanced measurements for FM analogue radio.

The Advanced FM adds tools and advanced features for FM measurement and demodulation.

Some of the included measurements are the signal level for the demodulated multiplex and the deviations of the subcarriers that form the multiplex. The added utilities display the FM multiplex spectrum and the FM histogram deviation.

Advanced FM (03:38s) SCAN

The Advanced FM screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window.

iii.2 Advanced FM option Installation

1 From **Home** press on **Settings**.

2 Press on **Options** on the **General** settings row.

3 The Options screen shows a list of tools that are already installed.

4 The Advanced FM option is made up of three tools. These tools should appear on the list:

- **FM Advanced**
- **FM Histogram**
- **FM MPX Spectrum**

5 If this tool does not appear on the screen, it means that it is not installed. To install this option, press the "+" and enter the option code.

6 The option code is a unique code for the meter. Contact PROMAX if you are interested in this option (https://www.promaxelectronics.com/ing/contact-promax/).

iii.3 FM Tuning

1 Connect the cable with the input signal to the RF input connector.

2 From the **Home** menu, press on **TV Analyzer** .

3 On the main window, press ▼ and select the **Spectrum** tool. On the small windows, you can select other tools, like the video tool to watch the demodulated signal or the measurements tool to check power and MER.

4 Swipe right from the left side or press on the bottom bar to display the tuning menu.

5 Select the **terrestrial band** .

6 Select **type of tuning**: Tune by frequency or Tune by channel .

- **Tune by frequency**: Select a frequency to be tuned.
- **Tune by channel**: User selects a channel to be tuned. Previously the user have to select a channel plan on the Channel Plan option. A channel plan contains a list of channels with settings for each channel (frequency, type of signal, bandwidth, etc.). When tuning by channel it will apply the settings obtained from the channel plan in first place.

7 On **Signal Type** option select **Mode**:

- **Auto mode**: It identifies and tries to demodulate the signal automatically using the StealthID function (for more details refer to "►StealthID" on page 23).
- **Manual mode**: The user must enter the signal type and the parameters to identify and demodulate it.

8 Select **Span** (recommended value for terrestrial: 50 MHz).

9 Adjust the **reference level**.

10 Select channel or frequency to be tuned. You can select your frequency or channel by using the tuning menu or by dragging left or right on the screen and then tapping on the signal.

11 When on the signal, the status bar turns green if the signal is locked. If not locked, the tuning bar does not change and maintains the red colour.

12 If locked, it tries to demodulate it. At signal parameters tool will show all related parameters.

iii.4 FM Advanced measurements

1 From the **Home** Menu press on **TV Analyzer** .

2 On the main window, press ▼ and select the **Measurement** tool.

3 The **FM Advanced** tool shows extra measurements for the FM signal.

►Screen

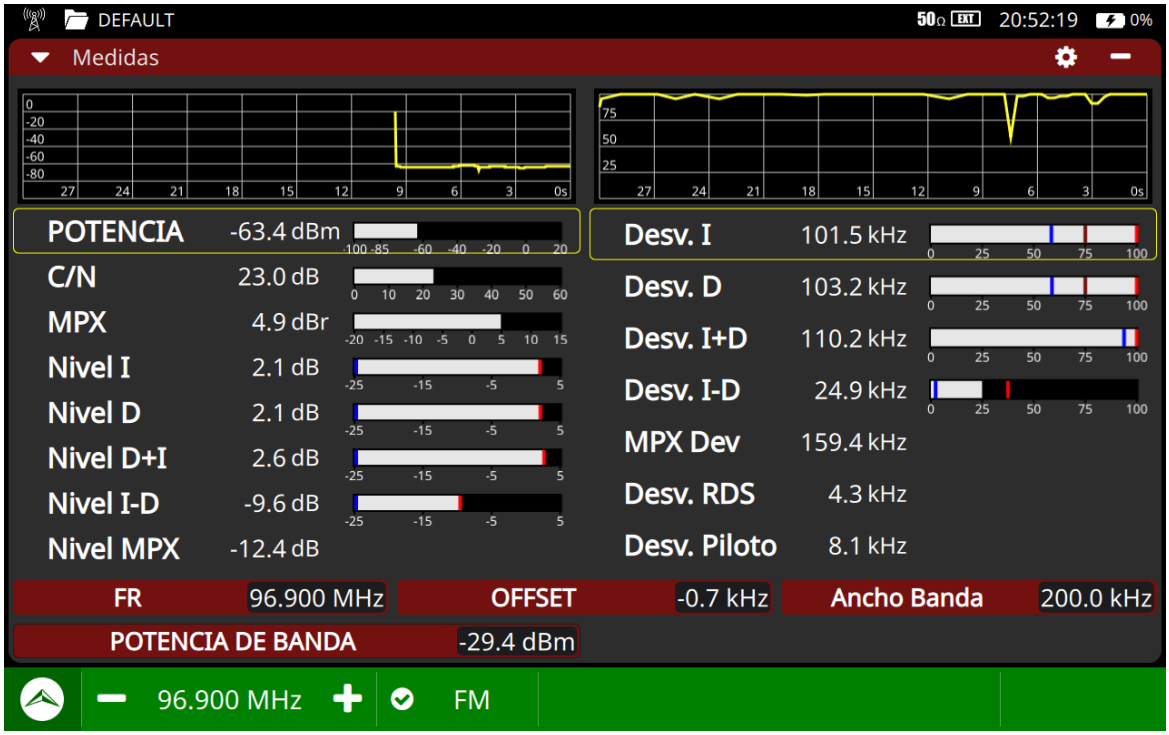


Figure 74.

► FM Advanced Measurements

- **MPX**: FM Multiplex level (dBr = dB relative to reference level).
- **Level L**: Left channel level.
- **Level R**: Right channel level.

- **L+R Level**: L+R component level (left + right), also known as mono, for MPX.
- **L-R Level**: L-R component level (left + right), also known as stereo, for MPX.
- **MPX Level**: FM Multiplex level (dBr = dB relative to reference level).
- **L Dev**: Frequency deviation caused only by L channel (once decoded).
- **R Dev**: Frequency deviation caused only by R channel (once decoded).
- **L+R Dev**: Frequency deviation caused only by L+R (or mono) component of MPX.
- **L-R Dev**: Frequency deviation caused only by L-R (or stereo) component of MPX.
- **MPX Dev**: Deviation of whole band pass filtered MPX.
- **RDS Dev**: Frequency deviation caused only by RDS subcarrier.
- **Pilot Dev**: Frequency deviation caused only by stereo pilot (19 kHz tone) component of MPX.
- **Offset**: Frequency offset between the transmitter and the received tuned frequency.

►Touch gestures

Tap: Select the measurement to be monitored on screen.

►Settings

Press on the gear  to display settings:

- Reset: It restarts measurements.
- Visual options: It shows level or power measurement on the main window.

iii.5 Tools

In the following sections, each specific tool for Advanced FM is explained. They are as follows:

- RDS FM Parameters
- FM Histogram

- FM MPX Spectrum

iii.6 RDS FM Parameters

RDS (Radio Data System) is a system that allows FM radio stations to transmit additional digital data alongside the conventional audio signal. This data can be received by compatible devices, such as car radios or home audio equipment, which display additional information on the receiver's screen.

►Screen

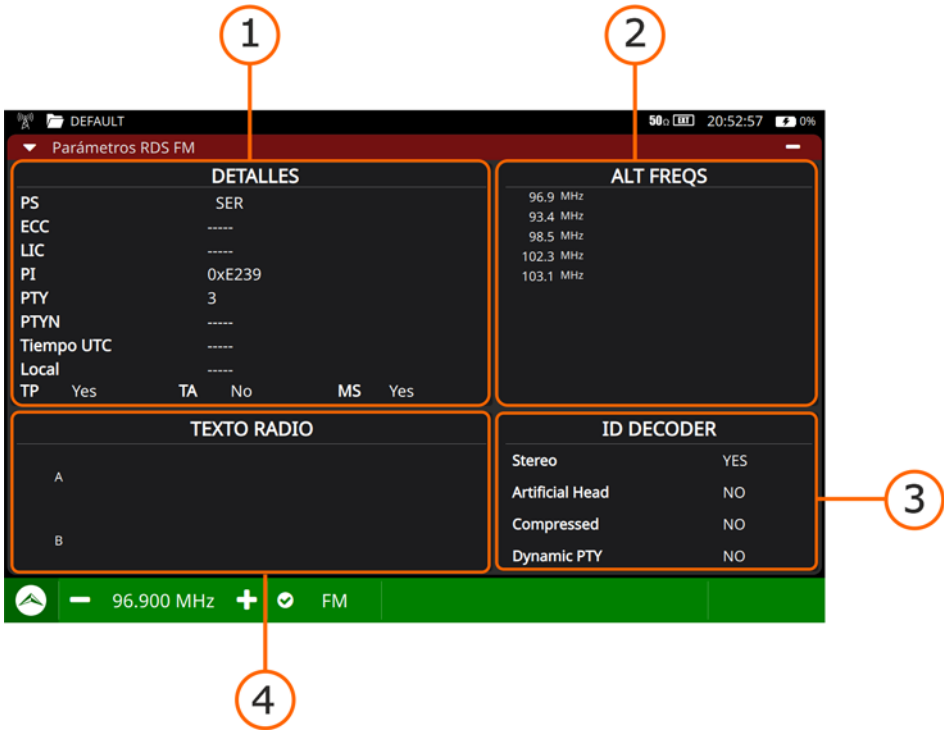


Figura 75.

1 Detailed information.

- PS: Program Service Name. The name of the radio station.
- ECC: Extended country code.
- LIC: Language Identification Code.
- PI: Programme Identification.
- PTY: Program Type.
- UTC Time: Universal time.
- Local: Local time.
- TP: Traffic program.
- TA: Traffic announcement.

- MS: Music/Spoken switcher.

2 Alternative frequencies.

3 Radio text.

4 Decoder identification.

iii.7 FM Histogram

The FM histogram shows a graph with the distribution of measurements of deviations in FM multiplexing.

►Screen

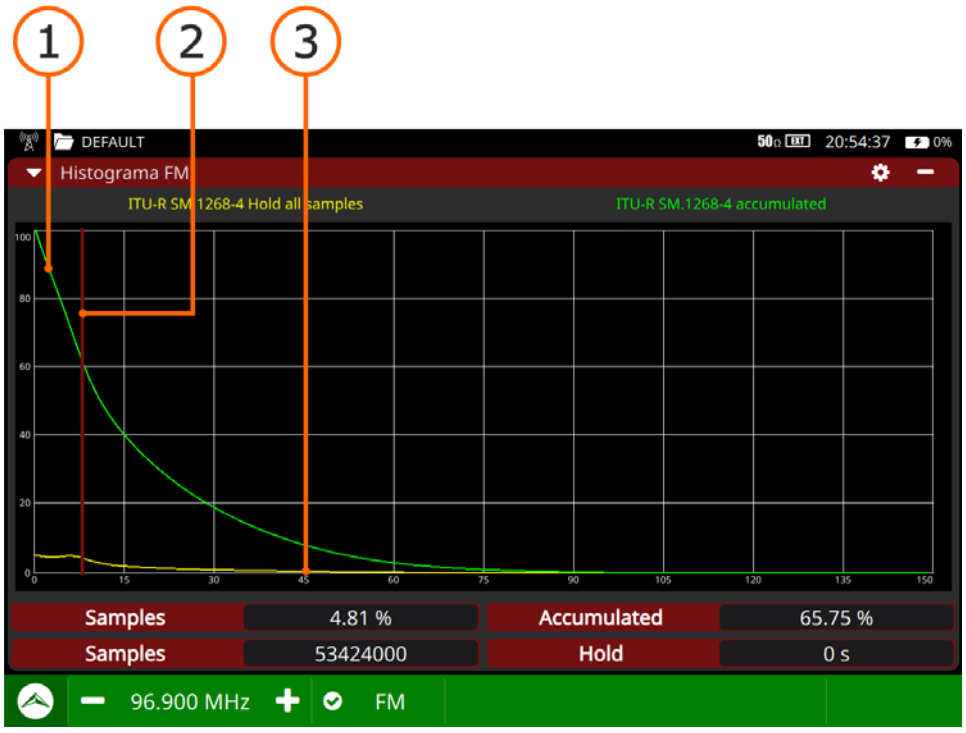


Figura 76.

1 Green line: Cumulative percentage of sample values for FM MPX deviation (measured according to the selected standard).

2 Red vertical line: Selected threshold for FM MPX deviation (typical value: 75 kHz). Press left-right to adjust the threshold.

3 Yellow line: Percentage of FM MPX deviation values (measured according to the selected standard).

4 Measurements:

- Samples: Percentage and total number of FM MPX deviation samples equal to the threshold (yellow graph).
- Cumulative: Percentage of FM MPX deviation samples that are equal to or above the threshold (green graph).
- Hold: Sample retention time.

►Touch gestures

Tap: Threshold selection.

►Settings

Press on the gear to display settings:

- Retain samples
  - All: Take samples continuously.
  - Time: Take samples for a limited period of time.
- Time: Selection of the time period for taking samples.
- Standard
  - All samples: Histogram calculated according to the ITU-R SM 1268-4 standard. It accumulates all frequency deviation values in the histogram.
  - Max 50 ms: Histogram calculated according to the ITU-R SM 1268-2 standard. It measures the maximum frequency deviation value over 50 ms and accumulates it in the histogram.
- Reset: It clears and resets the histogram.

iii.8 FM MPX Spectrum

The FM MPX Spectrum utility displays the FM multiplex spectrum over a frequency range of 100 kHz. It shows all the subcarriers that make up the FM multiplex. It provides an overview of the FM multiplex that can help identify issues.

►**Screen**

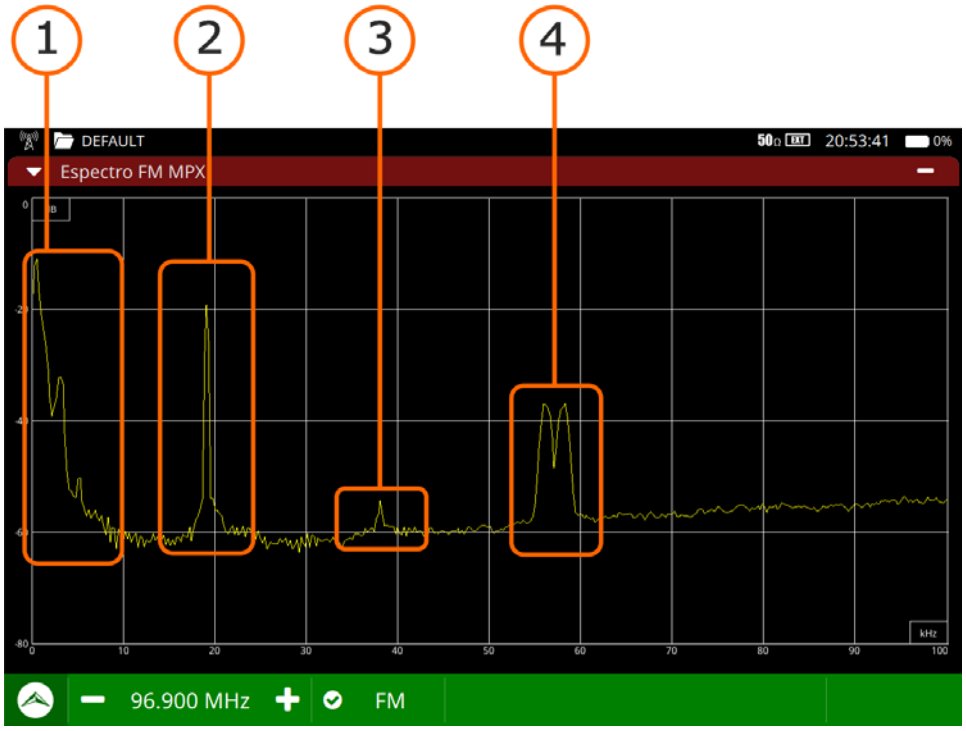


Figura 77.

1 Sub-carrier L+R.

2 Stereo pilot.

3 Sub-carrier L+R.

4 Sub-carrier RDS.

iv MOBILE OPTION

iv.1 Descripción

This annex contains operating instructions for the next option:

- OP-006-T: Mobile measurements for 4G / 5G signals.

In an increasingly interconnected world, the demand for fast and reliable mobile networks is essential. 4G and 5G technologies represent significant advancements in data transmission capacity, latency, and coverage, providing the necessary infrastructure for applications such as mobile technology and the growing Internet of Things (IoT).

Accuracy in measuring 4G/5G signals is crucial to ensure the efficiency and reliability of mobile networks. With this 4G/5G signal measurement tool, users will be able to analyze these types of signals in depth to detect issues such as interference and signal degradation, thus ensuring the highest quality in communication.

	4G/5G (07:08s)	SCAN

The Mobile measurement screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. The tools available for the Mobile Analyzer are:

- Spectrum
- Parameters
- Measurements
- Channel scan
- Channel monitoring
- Speed Test

iv.2 Mobile option Installation

1 From **Home** press on **Settings**.

2 Press on **Options** on the **General** settings row.

3 The Options screen shows a list of tools that are already installed.

4 The Mobile option consists of the **Mobile option** tool.

5 If this tool does not appear on the screen, it means that it is not installed. To install this option, press the "+" and enter the option code.

6 The option code is a unique code for the meter. Contact PROMAX if you are interested in this option (https://www.promaxelectronics.com/ing/contact-promax/).

iv.3 Operation

1 Connect the omnidirectional antenna (provided with the meter) to the RF input of the device. The antenna detects the spectrum where the 4G/5G standard bands are located.

2 Insert SIM1 or SIM2 into the slots located at the bottom of the device if you intend to tune to a specific operator's channel. Having two SIM cards allows working with two different operators.

3 If necessary, go to the Settings -> Mobile menu to configure the Roaming and APN options:

- Roaming: It allows enabling or disabling roaming to access the network from outside the operator's home country.
- APN: It allows entering the access point name to connect to the operator's network.

4 Exit the Settings menu and go to the Home menu on the main screen. Tap on Mobile to access the 4G/5G band analysis tool. The first time it starts, it will take about thirty seconds.

5 When starting up, it tunes to a channel corresponding to the operator of the inserted SIM. If there is no SIM it will tune a random channel.

iv.4 Mobile Analyzer Screen (4G/5G)

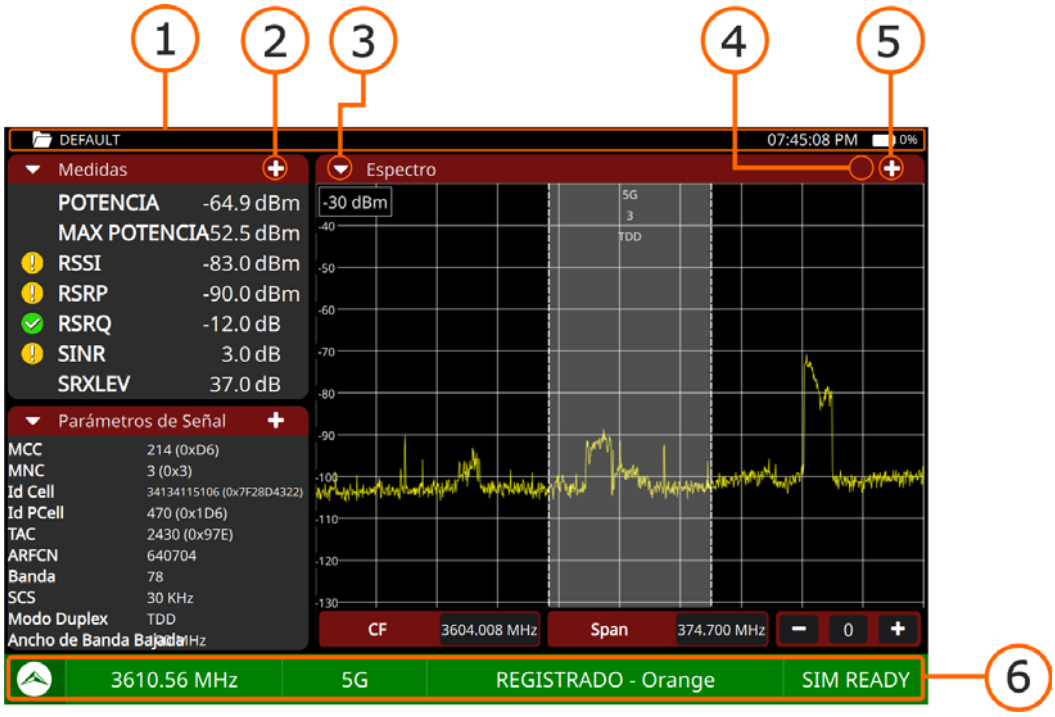


Figure 78.

1 Info Bar: It is the bar at the top of the screen. From left to right, it displays the current working folder, the time, and the battery level.

2 Plus (+) sign (small windows): It maximizes the window, switching to the main window position.

3 Triangle ▼ (all windows): It displays a menu with all available tools. Select one tool to be displayed. The same tool cannot be in more than one window.

4 Gear ⚙ (main window): It displays a settings menu for the tool. It is available for some tools and only on the main window.

5 + / - sign (main window): It shows the panel in full-screen mode. To return to the previous view press on the minus sign.

6 Status bar: Displays settings parameters such as band, access point name, and MAC address. It also provides access to Mobile settings (for more details, see the next section). The Promax logo returns to the Home screen.

iv.5 Tuning Settings

To display the Tuning Settings, swipe right from the left side of the screen or tap on the standard in the status bar.

- SIM slot: It allows selecting SIM1 or SIM2.
- PIN Mobile: In case of inserting a SIM, enter the PIN.
- Band: It allows selecting the working band for 4G or 5G standard.
- 4G Mobile band: It allows selecting the bands to be analyzed for the 4G standard.
- 5G Mobile Band: It allows selecting the bands to be analyzed for the 5G standard.
- Span: It allows you to edit the span, which is the range of frequencies displayed on the screen along the horizontal axis. The current span value appears below the spectrum.
- Attenuation: The user must select an attenuation value between 0 and 70.
- Maximum trace hold: Options to enable, hide, or freeze the maximum hold.
- Minimum trace hold: Options to enable, hide, or freeze the minimum hold.
- Spectrum heat map: Allows you to enable or disable the heat map.

iv.6 Tools

In the following sections, each tool of the Mobile Analyzer will be explained. They are as follows:

- Spectrum
- Parameters
- Measurement
- Channel scan
- Channel monitoring
- Speed test

iv.7 Spectrum

The Spectrum tool displays the spectrum of the operating band for the 4G/5G standard, ranging from 5 MHz to 6 GHz.

►Touch gestures

Zoom out: It amplifies signal, reducing the span.

Zoom in: It reduces signal, amplifying the span.

Horizontal drag (spectrum): It moves along the frequency band.

Vertical drag: It changes reference level.

►Screen

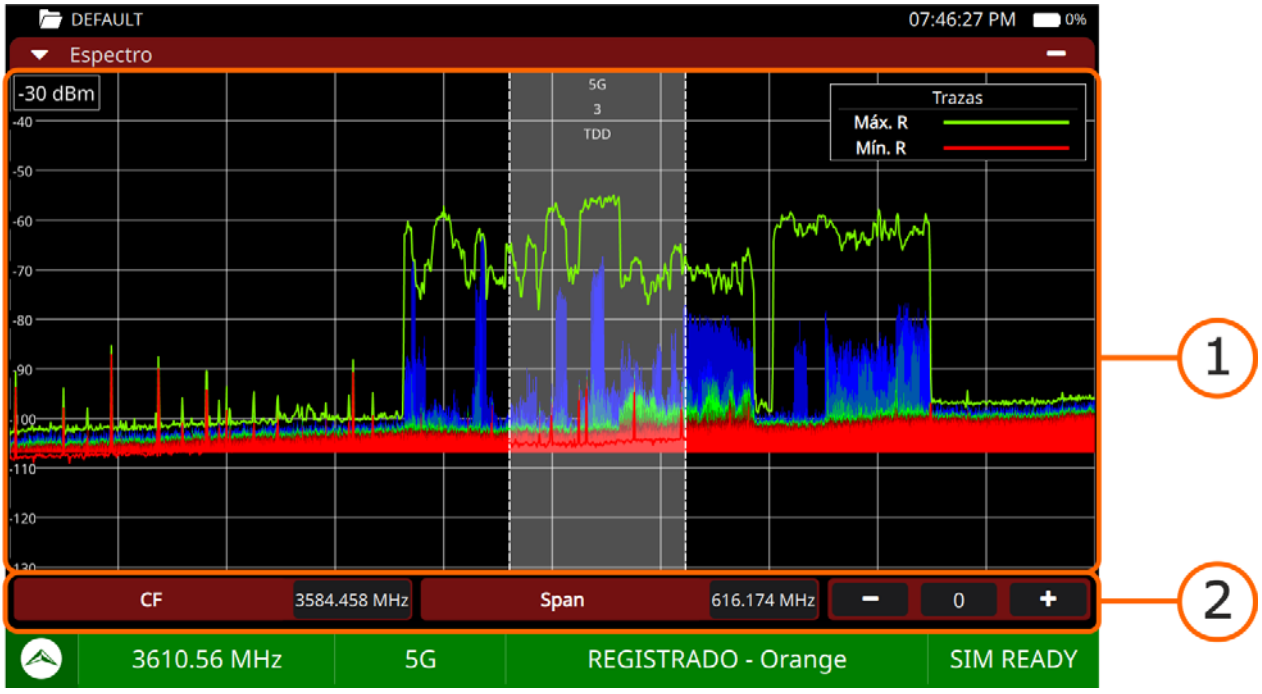


Figure 79.

1 Spectrum with the tuned channel displayed between two dashed white lines.

2 Settings bar: Central frequency, Span, and attenuation.

iv.8 Signal Parameters

The Signal Parameters tool displays parameters related to the tuned channel.

►Screen

Figure 80.

1 Detailed information of the tuned channel.

- MCC: Country code.
- MNC: Operator identifier.
- Id Cell: Cell identifier.
- Id PCell: Physical cell identifier.
- TAC: Unique identifier assigned to a specific tracking area within a MSC service area.
- ARFCN: Absolute radio frequency channel number.
- Band: Band in which the operator works.
- SCS: Distance between subcarriers within a 4G or 5G communication channel.
- Duplex mode: Type of multiplexing (FDD or TDD)
- Downlink bandwidth.

iv.9 Measurements

The Measurements tool displays information about the most relevant measurements of the tuned channel and shows their temporal evolution in a graph.

►Touch gestures

Tap: Measurement selection to display on the graph.

►Screen

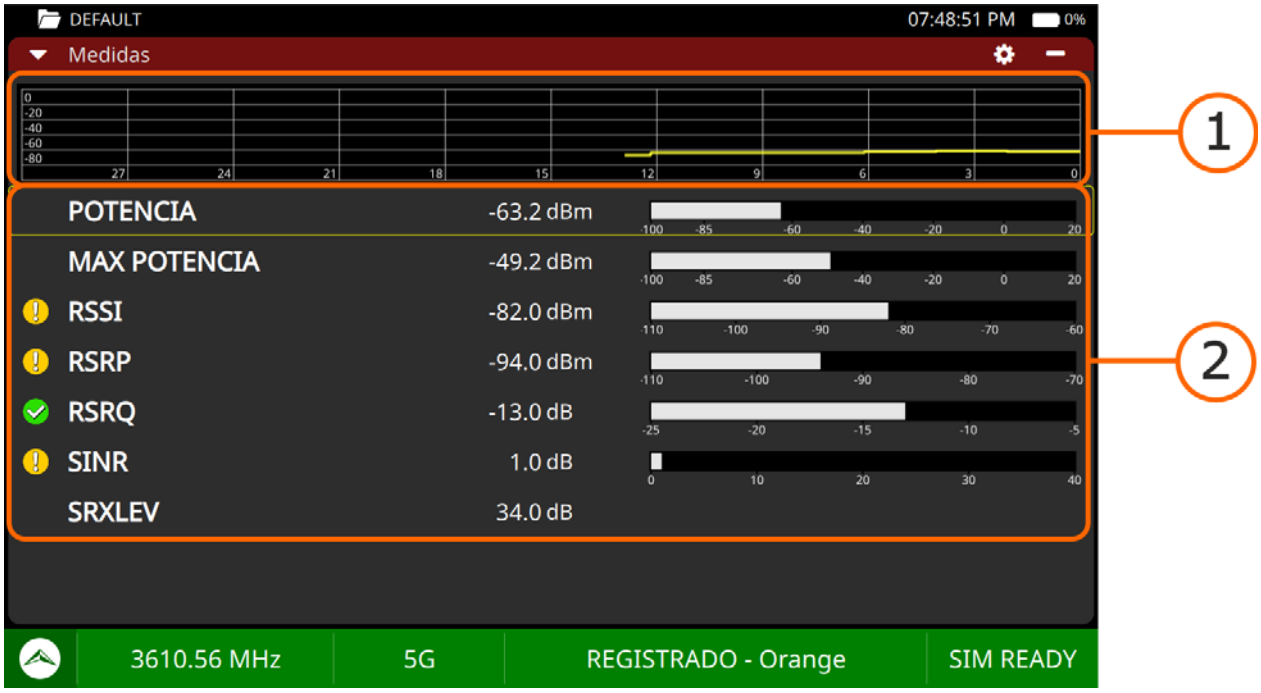


Figure 81.

1 Graph of the selected measurement.

2 Available measurements:

- Power (calculated over a time interval, configurable in settings).
- Maximum power (calculated over a time interval, configurable in settings).
- RSSI (Received Signal Strength Indicator): Power of the selected channel. It is the indicator of the intensity of the received signal, which is the linear average for the total power measured in specific OFDM symbols within the defined bandwidth. This power includes symbol power, noise, and interference.

- RSRP (Reference Signal Received Power): Received power of the reference signal. It is the linear average power of the signal resource elements specified in the 3GPP standard for this purpose.
- RSRQ (Reference Signal Received Quality): Received quality of the reference signal. It is the average of the RSRP and RSSI measurements.
- SINR (Signal Interference to Noise Ratio): Signal-to-noise and interference ratio. It is the ratio between the linear averages of the power of resource elements defined by the standard and that of the noise plus interferences.
- SRXLEV: Reception level value for cell selection (dB). It is used to decide whether the terminal should switch to another cell. A negative value indicates that a cell change is necessary.
  - SRXLEV = Qrxlevemeas - QrxlevMin
  - Qrxlevemeas = RSRQ
  - QrxlevMin = minimum power that a terminal must receive to be able to access the cell.

►Settings

Press on the gear to display a settings menu for this tool:

- Mean power interval: Time interval for calculating power and maximum power.

iv.10 Scan

The Scan utility allows you to perform a scan to identify the operators that are part of the 4G/5G standard bands and various related parameters.

►Touch gestures

Tap: Select option.

Vertical drag: Vertical dragging along the channel list.

► **Screen**

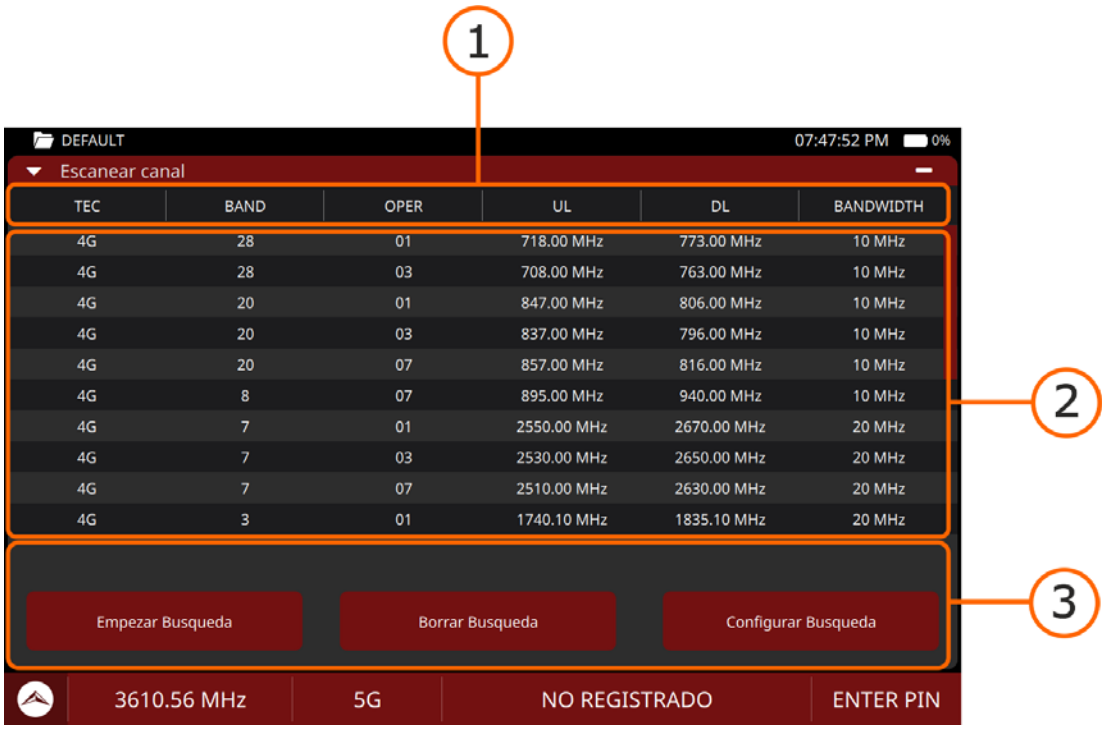


Figure 82.

1 Parameters associated with each operator:

- TEC: 4G or 5G technology
- BAND: Band
- OPER: Operator to which it belongs
- UL: Uplink
- DL: Downlink
- BANDWIDTH

2 List of scanned operators.

3 Scan options:

- Start scan: Start scanning the bands.
- Remove search: It clears the scan results.
- Configure search: Allows you to select the bands to be scanned.

iv.11 Monitoring

The Monitoring utility allows using the device for continuous monitoring.

▶Touch gestures

Tap: Select option.

Vertical drag: Vertical dragging along the channel list.

▶Screen

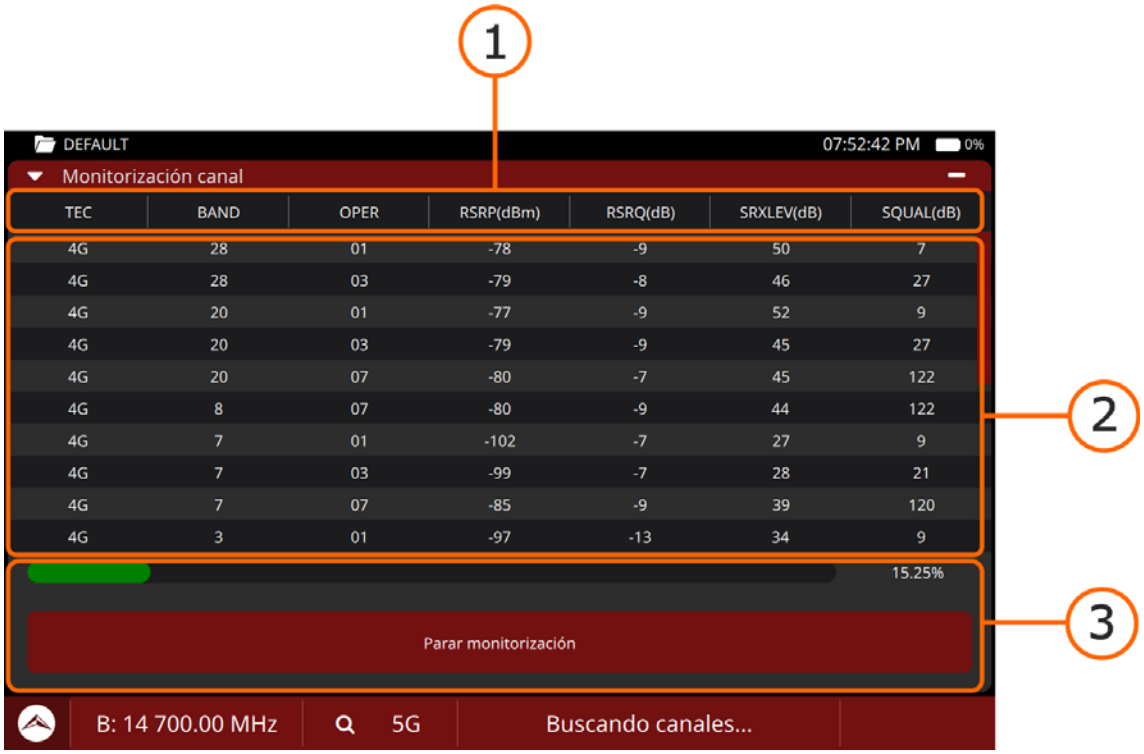


Figure 83.

1 Parameters and measurements for each operator. The displayed measurements are the result of the latest scan:

- TEC: 4G or 5G technology
- BAND: Band
- OPER: Operator
- RSRP (dBm): Power received from the reference signal.
- RSRQ (dB): Quality received from the reference signal.
- SRXLEV (dB): Reception level value for cell selection.
- SQUAL (dB): Cell quality value.

2 List of bands to monitor.

3 Monitoring options:

- Start monitoring: Start continuous monitoring of the bands.
- Remove monitoring: Remove data from monitoring.

- Set monitoring: Select the band to monitor.
- Stop monitoring: Stop monitoring.

iv.12 Speed Test

The Speed Test tool performs a speed test for the selected operator. For it to work, the device must be connected to a data network using a SIM card.

To ensure that the data network connection is established correctly, the access point name (APN) must be verified in Mobile Settings, and the date and time must be checked in General Settings.

►Screen

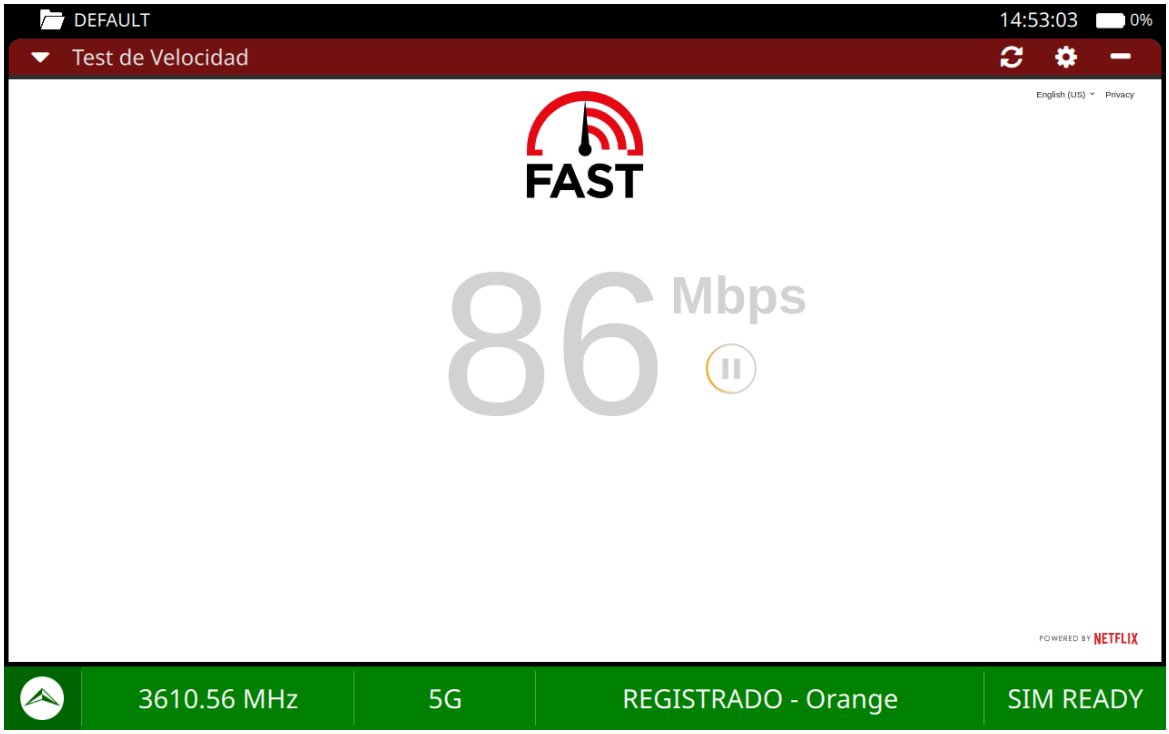


Figure 84.

v SMPTE ST2110 OPTION

v.1 Description

This annex contains operating instructions for the next option:

- OP-006-ST: Recepción y análisis estándar ST2110.

SMPTE ST 2110 is a set of standards developed by the Society of Motion Picture and Television Engineers (SMPTE). Its purpose is to enable real-time transmission of video, audio, and ancillary data (such as subtitles, timecode synchronization, etc.) over IP networks. This set of standards is primarily used in professional media production and broadcast environments that aim to replace or complement traditional SDI-based setups.

The use of IP networks in broadcasting offers multiple advantages. First, scalability: an IP network allows for easy expansion of the number of channels and devices compared to traditional SDI cabling. Flexibility is another key benefit, as a single Ethernet cable can carry multiple video and audio streams simultaneously. In terms of cost, it is more efficient, as it leverages standard IT infrastructure such as switches and network cables. Additionally, interoperability is significantly improved, facilitating integration with computer systems, streaming services, and modern media platforms.

The main families within the SMPTE ST 2110 standard are divided into several key sections. ST 2110-10 focuses on system and synchronization, defining the core architecture and timing mechanisms. ST 2110-20** addresses uncompressed video, specifying how raw video is transported over IP networks. **ST 2110-30** deals with PCM audio, detailing how to transmit linear audio—typically 48 kHz PCM—over the same network. Finally, **ST 2110-40** covers ancillary data, including metadata, subtitles, timecodes, and other supplementary information.

Introducing SMPTE ST 2110 (00:56s) SCAN

v.2 ST 2110 option installation

1 From **Home** press on **Settings**.

2 Press on **Options** on the **General** settings row.

3 The Options screen shows a list of tools that are already installed.

4 If ST2110 is installed, should appear on the list as **ST2110** option.

5 If this tool does not appear on the screen, it means that it is not installed. To install this option, press the "+" and enter the option code.

6 The option code is a unique code for the meter. Contact PROMAX if you are interested in this option (https://www.promaxelectronics.com/ing/contact-promax/).

v.3 Operation

1 Connect the cable carrying the ST 2110 streams to the SFP+ or BNC connector.

2 From the Home menu, select the SDI / ST2110 option to access the SDI / ST2110 analysis screen.

3 To configure the input and output options for ST 2110 streams, access the Top menu by swiping down from the top of the screen and select SDI. In the available options, choose the connector used for the incoming signal SFP+ (MSA) or BNC under the "Input" setting, and if necessary, enable output through BNC or SFP+.

4 Close the Top menu and return to the SDI / ST2110 analysis screen.

5 If the received SDI signal is correct, the status bar will turn green and the message "SDI/ST2110 locked" is displayed.

6 In the status bar, there are also shortcuts to configuration parameters for some of the available tools:

- PTP: PTP measurements.
- SFP Mgmt: SFP network management.
- Video: Video flow.
- Audio: Audio flow.
- A. Map: ST2110 to SDI audio mapping.

7 Now the associated tools can be used to obtain more information about the signal. The SDI/ST2110 analysis screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. Click on the "+" sign to expand the panel or "-" to reduce it again.

8 The tools related to the ST2110 signal are:

- SFP parameters.
- ST2110.

9 By clicking on "ST2110," the full list of available tools will be displayed:

- PTP measurements.
- SFP network management.
- Video flow.
- Audio flow.
- Seamless switch monitor.
- Audio map ST2110 to SDI.

10 Select a tool to display it in each panel and analyze the signal.

▶	Starting SMPTE ST 2110 (01:58s)	SCAN

The following sections explain each of the tools of the ST2110 analyzer..

v.4 SFP Parameters

If the SFP+ connector is used for signal input, the 'SFP Parameters' tool can be used to display diagnostic information about the SFP+ module which allows the user to see whether the module is functioning properly.

▶	SFP Parameters (00:50s)	SCAN

►**Screen**

Figure 85.

1 Available SFP parameters:

- Type
- Compatibility
- Bitrate
- Vendor name
- OUI vendor
- Part number
- TX wavelenght
- TX bias
- TX out power
- RX input power
- Current temperature
- Temperature alarm

v.5 PTP Measurements

The PTP Measurements tool allows the user to monitor and analyse the Precision Time Protocol (PTP) which is critical for synchronizing devices in professional media environments, especially for live video and audio over IP networks.

PTP measurements (02:59s) SCAN

►Screen

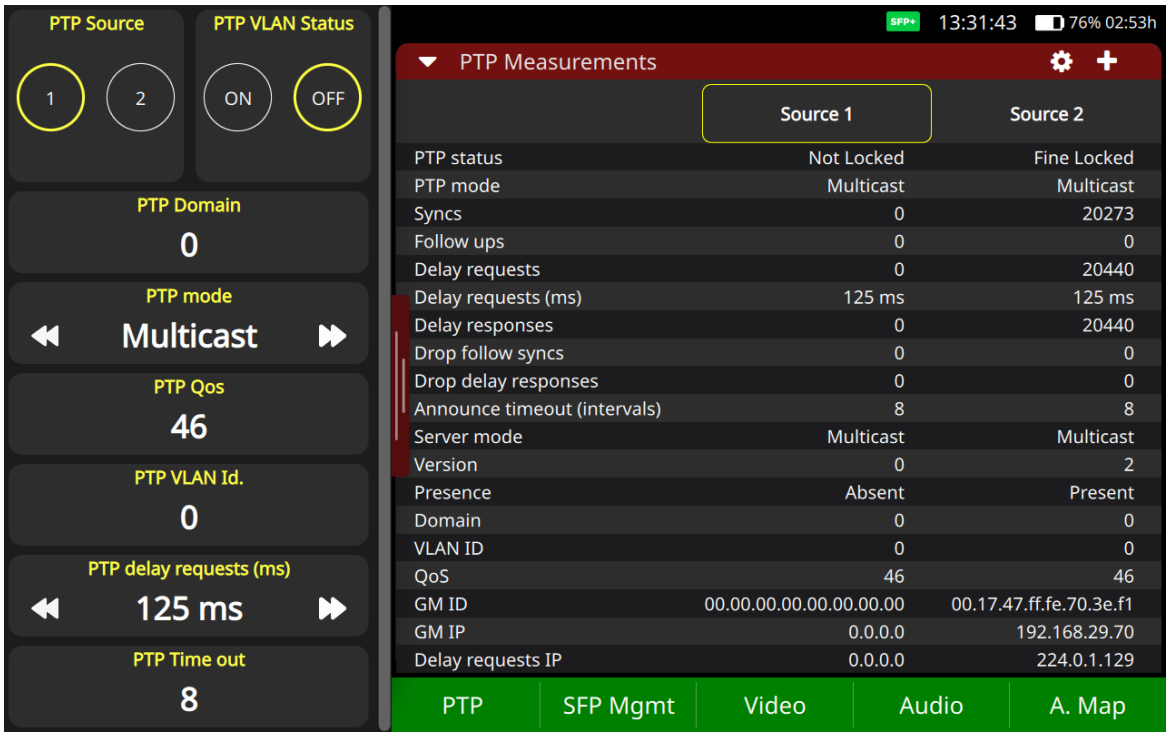


Figure 86.

1 PTP measurements:

- PTS status
- PTP mode
- Syncs
- Follow ups
- Delay requests
- Delay requests (ms)
- Delay responses
- Drop follow syncs
- Drop delay responses
- Announce timeout (intervals)
- Server mode
- Version
- Presence
- Domain
- VLAN IDE
- QoS
- GM ID
- GM IP
- Delay requests IP

►Settings

To display the PTP measurements settings swipe right from the left side of the screen or press on PTP at the status bar.

- PTP source
- PTP VLAN status
- PTP domain
- PTP mode
- PTP QoS
- PTP VLAN Id
- PTP delay requests (ms)
- PTP time out

v.6 SFP Network Management

The SFP Network Management tool allows for viewing and configuring the parameters of the network through which the ST2110 signal is transmitted.

SFP network management (01:10s) SCAN

►**Screen**

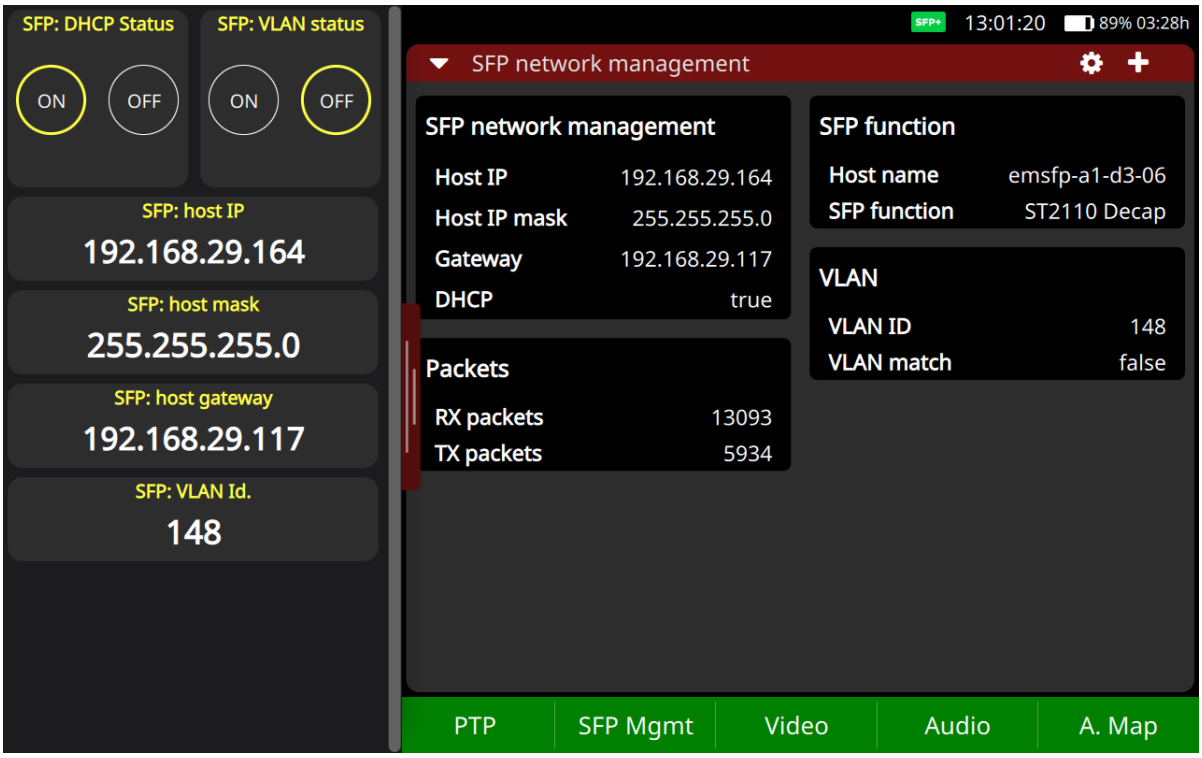


Figure 87.

1 SFP network management:

- SFP network management
  - -Host IP
  - -Host IP mask
  - -Gateway
  - -DHCP
- Packets
  - -RX packets
  - -TX packets
- SFP function
  - -Host name
  - -SFP function

- VLAN
  -VLAN ID
  -VLAN match

►Settings

To display the **SFP network management** settings, swipe right from the left side of the screen or press on **SFP Mgmt** at the status bar.

- DHCP status
- VLAN status
- host IP
- host mask
- host gateway
- VLAN Id

►Touch gestures

Pulsar: Posiciona el cursor en el punto.

v.7 Video flows

The Video flows tool allows user to analyse how uncompressed video is transmitted over IP networks using the SMPTE ST 2110 suite of standards.

Video flows (03:32s)

SCAN

►**Screen**

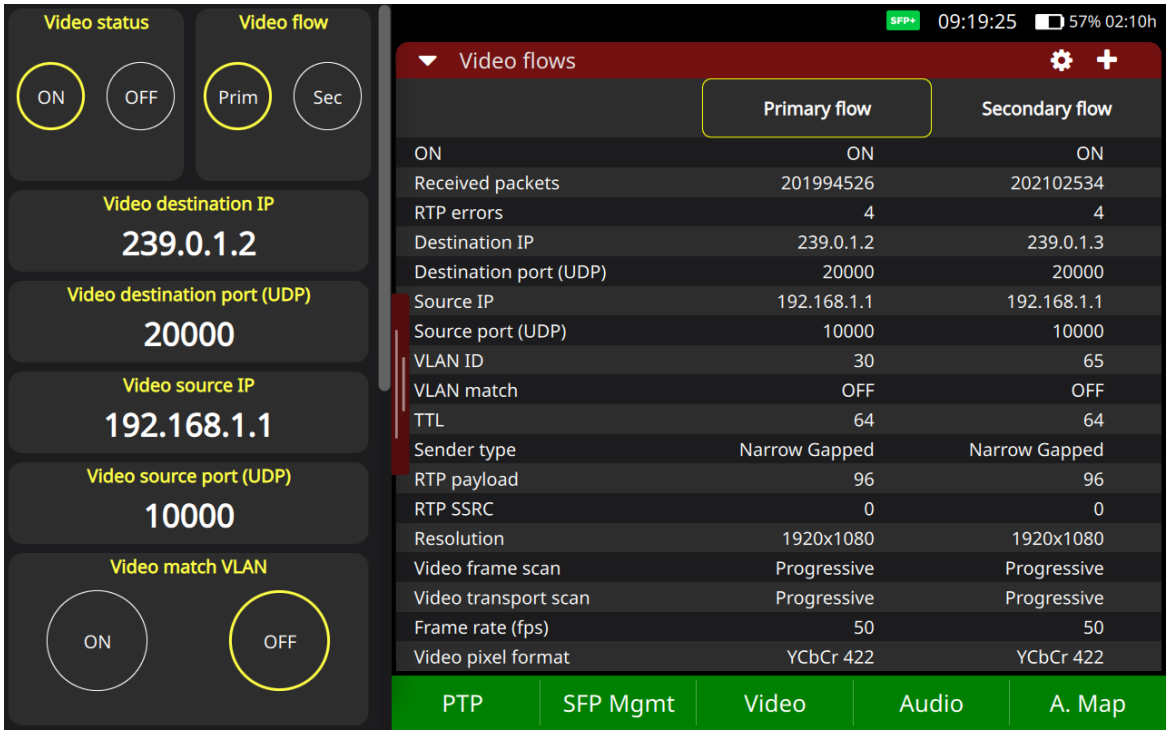


Figure 88.

1 Video flows (primary flow / secondary flow):

- ON/OFF
- Received packets
- RTP errors
- Destination IP
- Destination port (UDP)
- Source IP
- Source port (UDP)
- VLAN ID
- VLAN match
- TTL
- Sender type
- RTP payload
- RTP SSRC
- Resolution
- Video frame scan
- Video transport scan
- Frame rate (fps)
- Video pixel format

►Settings

To display the **Video flows** settings, swipe right from the left side of the screen or press on **Video** at the status bar.

- Video status
- Video flow
- Video destination IP
- Video destination port (UDP)
- Video source IP
- Video source port (UDP)
- Video match VLAN
- Video VLAN Id.
- Sender type
- Video resolution
- Frame scan
- Transport scan
- Video frame rate
- Pixel format

v.8 Audio flows

The **Audio flows** tool allows users to analyse how uncompressed audio is transmitted over IP networks using the SMPTE ST 2110 suite of standards.

Audio flows (01:45s) SCAN

►**Screen**

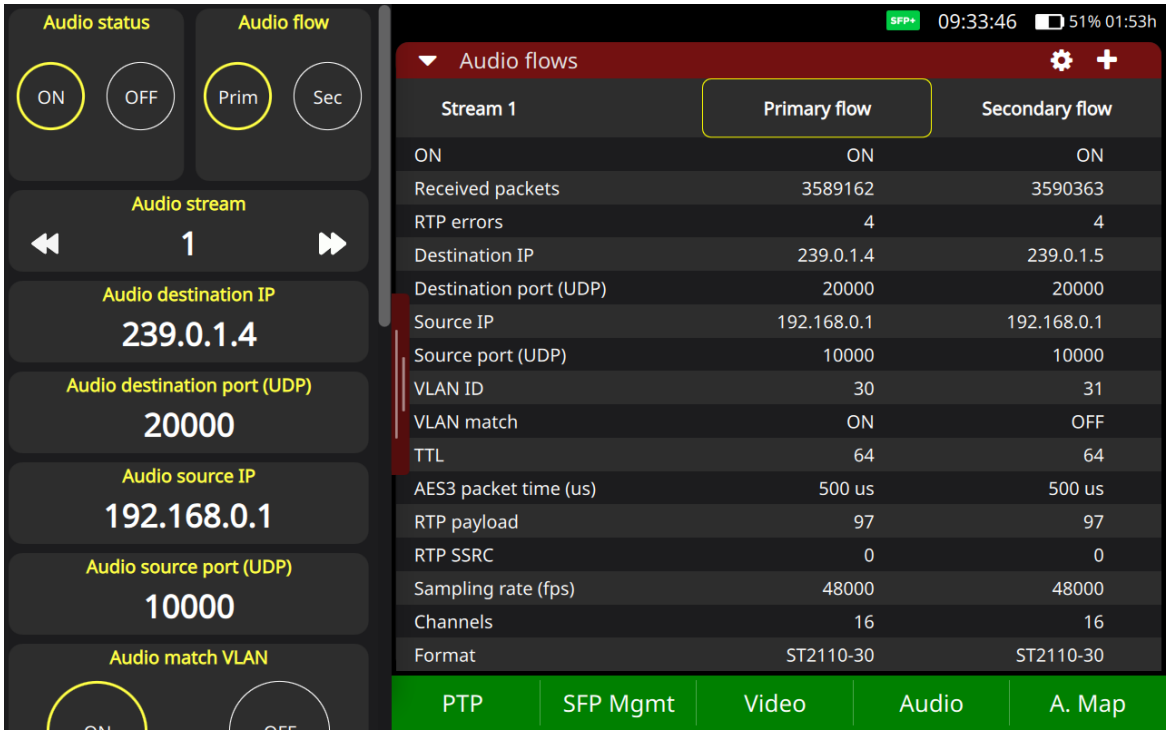


Figure 89.

1 Audio flows (primary flow / secondary flow):

- ON/OFF
- Received packets
- RTP errors
- Destination IP
- Destination port (UDP)
- Source IP
- Source port (UDP)
- VLAN ID
- VLAN match
- TTL
- AES3 packet time (us)
- RTP payload
- RTP SSRC
- Sampling rate (fps)
- Channels
- Format

►**Settings**

To display the **Audio flows** settings, swipe right from the left side of the screen or press on **Audio** at the status bar.

- Audio status
- Audio destination IP
- Audio destination port (UDP)
- Audio source IP
- Audio source port (UDP)
- Audio match VLAN
- Audio VLAN Id.
- Audio format
- Audio packet time
- Audio channels number

v.9 Seamless Switch Monitor

The Seamless switch monitor shows 5 graphs depicting the latency between the primary and secondary streams for the video flow and four audio flows selected.

Monitor seamless switch (00:30s)

SCAN

►**Screen**

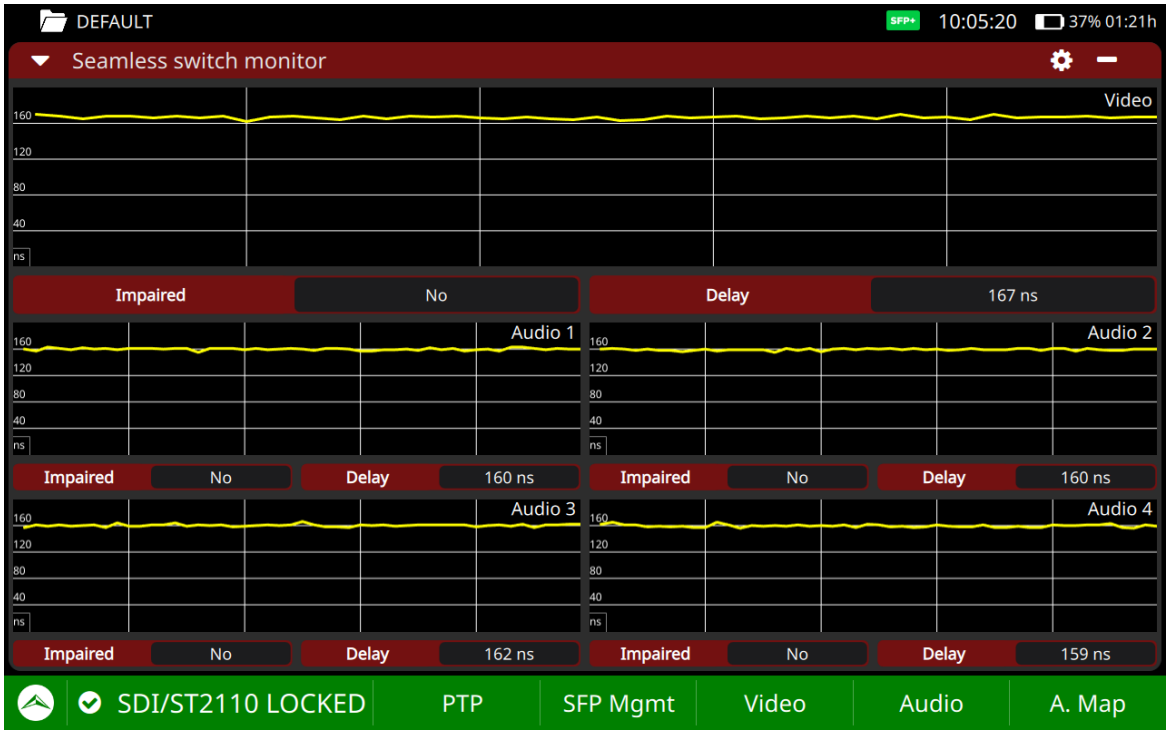


Figure 90.

1 Top panel: Latency (ns) between the primary and secondary video streams.

2 Bottom panel: Latency (ns) between the four primary and secondary audio streams.

v.10 Audio map ST2110 to SDI

The **ST2110 to SDI Audio Map** tool visualizes the audio streams and how they are embedded in each of the 16 SDI audio channels.

Audio map ST2110 to SDI (00:55s)

SCAN

►Pantalla

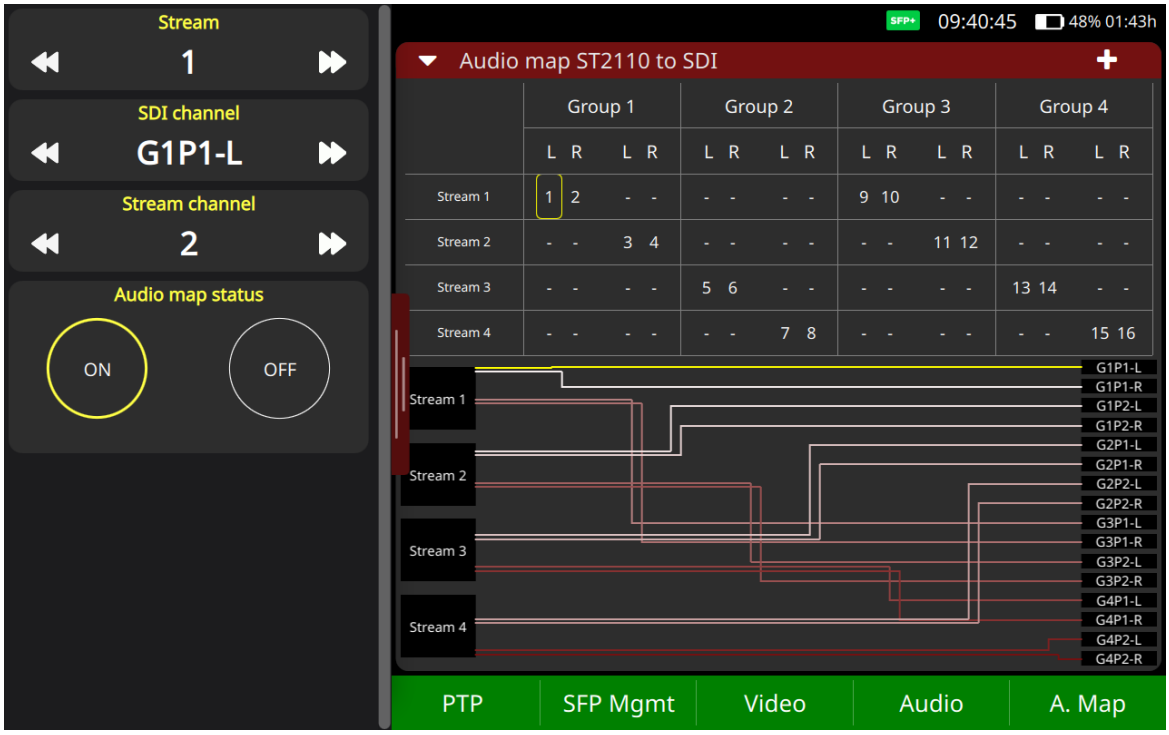


Figure 91.

1 Top panel: It displays the streams and the channels assigned to each group.

2 Bottom panel: It shows the mapping with the channel assignment of each stream.

►Settings

To display the **Audio flows** settings, swipe right from the left side of the screen or press on **Audio** at the status bar.

- Stream
- SDI channel
- Stream channel
- Audio map status
- Audio channels number

vi ADDITIONAL INFORMATION

vi.1 Additional Documents

On the PROMAX website you can find additional information to go deeper in some aspects related to the field strength meter.

Name	Description	Link	
PROMAX Download Area	Documentation related to PROMAX equipment	http://www.promaxelectronics.com/ing/downloads/user-manuals	
ATLaS	Datasheet of ATLaS at the PROMAX website with links to all downloadable content	https://www.promaxelectronics.com/ing/products/tv-cable-satellite-signal-and-spectrum-analyzers/atlas/the-atsc-30-and-dvb-universal-broadcast-analyzer/	
Signals Description	Brief definition of all signals and parameters detected by the meter	https://www.promax.es/downloads/manuals/English/signals-description.pdf	
DiSEqC Commands	Description of DiSEqC commands for remote control of antennas	https://www.promax.es/downloads/manuals/English/diseqc-commands.pdf	
Firmware	Last release of the updating file for the meter (2.5.1)	https://www.promax.es/downloads/software/atlas/atlas-v2.5.1.zip	

vi.2 Social Networks

Name	Link	
Twitter	@PROMAX_news	
Linkedin	https://www.linkedin.com/company/promax-electronica/	
Facebook	https://www.facebook.com/promaxelectronics/	
YouTube	https://www.youtube.com/user/PROMAXElectronics	

vii MULTIMEDIA CONTENT

The following table shows all the links to video tutorials included in this manual:

Chapter	Title	Link	QR Code
1. Introduction	Introducing the ATLAS NG	https://youtu.be/KYArk4qbBgc	
2. Setting Up	Inputs and outputs	https://youtu.be/nxaKZi93W-Q	
2. Setting Up	Home Menu	https://youtu.be/VS-wk48tupI	
3. Settings and Preferences	Settings Menu	https://youtu.be/H0ruPDo97pM	
4. TV Analyzer	TV Analyzer Introduction	https://youtu.be/x9cYqCwDpOo	
4. TV Analyzer	Spectrum	https://youtu.be/c6_NIUXoeuc	
4. TV Analyzer	Measurements	https://youtu.be/ZAvGjzLSqjk	
4. TV Analyzer	Signal Parameters	https://youtu.be/ZAvGjzLSqjk?t=54	
4. TV Analyzer	Video	https://youtu.be/c4fA5oXJ7Go	
4. TV Analyzer	Recording	https://youtu.be/aE4h9lktrgE	
4. TV Analyzer	Constellation	https://youtu.be/PIVX95fCgQE	
4. TV Analyzer	Video Values	https://youtu.be/Ww84wTu9wwk	
4. TV Analyzer	MER by Carrier	https://youtu.be/bdgpY1_M2JQ	
4. TV Analyzer	Spectrogram	https://youtu.be/mbNizyQL1-0	
4. TV Analyzer	Merogram	https://youtu.be/fjHxDvTLrCQ	
4. TV Analyzer	Echoes	https://youtu.be/4Q1uxtyyn70	

Chapter	Title	Link	QR Code
4. TV Analyzer	Transport Stream Analyzer	https://youtu.be/MllPQ-T__PE	
4. TV Analyzer	Audio levels	https://youtu.be/38x7ozsjxjw	
4. TV Analyzer	Shoulders Attenuation	https://youtu.be/HFEWls3zSeY	
4. TV Analyzer	Optical Power Measurement	https://youtu.be/d9H9NAMvPxc	
4. TV Analyzer	Drive Test	https://youtu.be/Fa2WQocZU-s	
4. TV Analyzer	Channel Exploration	https://youtu.be/0WnmD922znk	
4. TV Analyzer	Blind Scan	https://youtu.be/c0IbmIlHFe0	
5. Spectrum Analyzer	Spectrum Analyzer	https://youtu.be/7gX-FaUaxfI	
5. Spectrum Analyzer	Spectrogram	https://youtu.be/mbNizyQL1-0	
5. Spectrum Analyzer	Occupied channel band	https://youtu.be/18HS6MKvQao	
6. IPTV	IPTV Analyzer	https://youtu.be/xJDE5p3BHf8	
8. WiFi	WiFi	https://youtu.be/_zu52kl8UWU	
9. SDI	SDI Analyzer	https://youtu.be/tcuINH1vTZw	
11. Workspaces	Workspaces	https://youtu.be/GalvHQw5w9Y	
12. webControl	webControl	https://youtu.be/JtKQXymTRbg	
i. DAB/DAB+	DAB and DAB+ Analysis	https://youtu.be/UUa25AFdDWM	
ii. FM Advanced	Advanced FM	https://youtu.be/ZKGHtfFsbqY	
iii. Mobile	4G/5G	https://youtu.be/pZm90-bejtU	

viii PREVIOUS VERSIONS OF USER'S MANUAL

Manual Version	Web Publication Date	Firmware Version
F5.0	January 2025	2.5.0
F3.0	May 2024	2.1.2
F2.0	September 2023	1.5.0

WHAT'S NEW on manual F5.0

- New: Task Planner ("►Task Planner" on page 26).
- New: Blind Scan ("Blind Scan" on page 73).
- New: Discover FM ("Discover FM" on page 72).
- New: Streaming V/A ("Video / Audio Streaming" on page 138).
- New: Datalogger ("Datalogger" on page 69).
- New: Spectrum Analyzer chapter ("SPECTRUM ANALYZER" on page 74).
- New: WiFi function ("Wi-Fi " on page 113).
- New: Advanced FM option ("FM ADVANCED OPTION" on page 178).
- New: Mobile option ("MOBILE OPTION" on page 186).
- New: Optical option ("OPTICAL OPTION" on page 168).
- New: VLAN settings ("Operation" on page 84).
- New: Spectrogram ("Spectrogram (Spectrum + Waterfall)" on page 49).
- New: Merogram ("Merogram (MER by carrier + Waterfall)" on page 51).
- Improvement: Procedure to export data to an USB ("Data Export to USB" on page 131).
- Improvement: Settings dB/div ("►Settings" on page 36).
- Improvement: Screenshot preview ("Screenshot" on page 14).
- Improvement: Maximum and minimum hold ("Tuning Settings" on page 33).
- Improvement: Hidden menu indicator ("►Appearance" on page 20).
- Improvement: Mute option ("►Volume Settings" on page 29).
- Update: Battery life specs ("Charge / Discharge Times" on page 5).
- Update: Icon table ("Icons" on page 11).
- New: Annex about changes of manual ("PREVIOUS VERSIONS OF USER'S MANUAL" on page 214).
- Update: Accessories ("►Included Accessories" on page 144).
- Update: Top Menu ("Top Menu" on page 26).
- Update: New videos ("MULTIMEDIA CONTENT" on page 212).
- Update: Specifications ("SPECIFICATIONS ATLAS NG" on page 140).
- Improvement: Procedure to load a workspace ("Case of use: Loading a Workspace" on page 134).
- Other minor updates and improvements.

WHAT'S NEW on manual F3.0

- New: IPTV chapter ("IPTV " on page 84).
- New: SDI chapter ("SDI " on page 122).
- New: ASI chapter ("ASI" on page 101).
- New: DAB/DAB+ option ("DAB/DAB+ OPTION" on page 171).
- New: Raw recording ("►Raw Recording Procedure" on page 53).
- Improvement: Stealth ID icon and explanation ("►StealthID" on page 23).
- New: Channel exploration ("Channel Exploration" on page 68).
- Update: Workspace multiple file selection and menus re-organized ("WORKSPACES" on page 128).
- New: New section on Equipment info ("►Equipment Information" on page 19).
- New: Exploration config ("►Exploration configuration" on page 24).
- New: Datalogger config ("►Datalogger configuration" on page 24).

WHAT'S NEW on manual F2.0

- New: Booting up sequence ("► Switching On:" on page 10).
- New: Advanced tool: Drive Test ("Drive Test" on page 63).
- New: Shoulder Attenuation tool ("Shoulder Attenuation" on page 46).
- New: Audio levels tool ("Audio levels" on page 41).
- Improvement: New section "Screenshot" ("Screenshot" on page 14).
- Improvement: New section "Firmware update" ("Updating the meter" on page 18).
- Improvement: New section "Channel plan Edition" ("Channel Plan Editor" on page 15).
- Improvement: New section "Top menu" ("Top Menu" on page 13).
- Improvement: New chapter "Workspaces" ("WORKSPACES" on page 128).
- Update: Description of input impedance option ("Top Menu" on page 13).
- Update: More and better specifications ("SPECIFICATIONS ATLAS NG" on page 140).
- Update: Change of side micro-USB connector to USB-C ("Equipment Details" on page 7).
- Update: Optical power meter ("Optical Power Measurement" on page 61).
- Update: New videos ("MULTIMEDIA CONTENT" on page 212)
- Update: HDMI trademark.
- Improvement: Better figures definition.
- Others: Other minor updates and improvements.

ix INDEX

PROMAX TEST & MEASUREMENT, S.L.U.

Francesc Moragas, 71
08907 L'Hospitalet de Llobregat (Barcelona)
Spain

Phone: 93 184 77 00 - International: (+34) 93 184 77 02
e-mail: promax@promaxelectronics.com

www.promaxelectronics.com