

ANY1022 RF Layer Monitoring Receiver Operational Manual

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1 Introduction to ANY1022 product family

In the context where broadcasters are concerned about providing the highest QoS with extending coverage of the existing transmitters and, at the same time, reducing their network OPEX costs and limiting impact on the environment, Anywave introduces **ANY1022 RF Layer Monitoring Receiver** as an extension of its product line. The new generation of the product is based on ActiveCore[®] Platform and addresses broadcasting industry today's the most demanding needs for monitoring and diagnostic of:

transmitter system performance

transmitted signal quality

off-air signal quality

on-channel and in-band interference

SFN/Echo profile at a reception point

ANY1022 RF Layer Monitoring Receiver performs not only critical RF estimations of MER, signal spectrum and emission mask providing early diagnostic of the signal possible degradation before any impairment is noticeable to the end Customer. The **Receiver** also provides indispensable tools to off-air applications including monitoring of SFN networks.

Anywave's **RF Layer Monitoring Receivers** currently cover virtually all broadcasting industry standards. The list of supported by **ANY1022** standards includes:

ATSC/MH 1.0 ATSC 3.0 DAB/DAB+/T-DMB DTMB DVB-S/S2/2x DVB-CID DVB-T/H/T2 ISDB-T CMMB

proprietary modulation schemes including hybrid "satellite-terrestrial" architectures.

Primarily targeted to embedded applications the receiver has been designed as an easy-to-use and cost-effective solution. It can be integrated into the transmitter system for remote monitoring applications or used as a stand alone unit during day-by-day operations, in-field and production tests.

Being integrated into a transmitter system the receiver can also be used as the transmitter site monitoring and controlling platform.

2 Description

2.1 Application

The Monitoring Receiver is designed to perform continuous monitoring of the signal quality and report comprehensive set of critical parameters. The reported values can be used also for monitoring, diagnosing and troubleshooting transmitter system performance and QoS in the broadcast area.

The Receiver's sophisticated Alarm Management System is designed and tuned to timely inform an operator about potential changes in signal quality and to perform preventive actions without the need for the operator's immediate involvement.

The Receiver also provides a comprehensive set of plots allowing the operator to visually analyze monitored and estimated parameters.

All monitored parameters and available plots are automatically updated with user adjustable update rate.

Monitoring task can be executed continuously or once upon operator's request depending on the Receiver scheduled operation.

Figure 1 presents the Receiver application block diagram.



Figure 1. Application Block-Diagram

The Receiver is mainly targeted to the following applications:

- a) monitoring signal quality at the transmitting site;
- b) monitoring signal quality at re-transmitting facilities;
- c) monitoring signal quality at a signal reception point.
- d) SFN/Echo profile monitoring

Once set, the Receiver does not require user's intervention for its day-by-day 24/7 operation.

The Receiver is equipped with 2 RF inputs IN1 and IN2. Both inputs are identical and switchable remotely through the Receiver User control Interface (UI). Although the signal could be supplied to both inputs simultaneously, the Receiver can access only one of them at a time. For example, in order to collect the most comprehensive set of

parameters from a transmitter system, it is advised to connect the Receiver to the High Power Amplifier (HPA) output directly and the transmitter output band-path filter (BPF).

Information and results from both inputs are presented on a common set of plots. Both inputs share the same alarm and data log resources, as well as input sensitivity and broadcast standard specific settings.

Though the receiver has an internal high-quality reference source, in order to obtain the most accurate estimations, an external, common to the transmitter system source of 10MHz, is preferable. The Receiver can be optionally equipped with an internal GPS/GLONASS receiver.

All necessary calculations, algorithmic support, controlling and data presentation functionality are done by the Receiver internally and do not require any additional external resources. All results, including plots, are presented on the Receiver WEB UI available through supporting [see 3.1 - ANY1022 WEB UI] WEB browsing functionality devices including hand-helds and smartphones.

2.2 External Interfaces and Indicators

The Figure 2 below presents rear panel views for 1U Rack mounted ANY1022.



Figure 2. ANY1022 Rear Panel Connectors

ltem #	Connector type	Name	Comment
1	N-type - F, 50 Ohm	RF IN	RF sampling port for input signal
2	DB9-F	Relay Port	Please refer to Table 6 for DB9 Relay Port pin- out
3	BNC - F, 50 Ohm	1PPS IN	Input for an external 1PPS signal synchronized with UTC
4	BNC - F, 50 Ohm	10M IN	Input for an external 10 MHz reference source
5	RJ45 Socket	REMOTE	The Receiver main control and communication interface
6	AC INPUT	AC power Entry	Power Supply 85-264V, 47~63Hz
7	DC INPUT	DC power Entry	Reserved

Table 1. Rear panel connectors

In addition to the status reported on GUI, the Receiver operating conditions can be visually monitored using its front panel LED indicators.



ltem #	Name	Functionality
1	Power	Green - Receiver is powered On
2	Status	Red - an internal hardware error has been detected.
3	Alarm	Red - there is at least one active alarm. The decision about an alarm event is made based on the Receiver alarm properties set through WEB control interface.

Table 2. Front Panel Indicators

2.3 Functionality

In order to estimate signal quality and transmitter system performance, the Receiver calculates results on a sample of the signal. The signal samples are captured at regular intervals.

The Receiver internal source of 10MHz reference can be synchronized (locked) to an external 10MHz. The Receiver is programmed to automatically switch to the external source once it is detected at the designated input. UI indicates which source of the reference frequency is currently in use.

For UTC related measurements, for example, SFN shifts, the Receiver uses 1PPS signal which can be generated internally by the Receiver or provided from an external source. The internally generated 1PPS signal is obtained from two sources – an integrated GPS/GLONASS receiver if an antenna connected to "GPS Ant." port or from an internal frequency source (a VCO) which is not synchronized with the UTC. Switching between 1PPS sources is done automatically. The external 1PPS source has the highest priority followed by the integrated GPS/GLONASS receiver.

All reported by the Receiver results can be conditionally divided into the following groups.

First group is related to the signal general statistics. Reported parameters in this group include input signal power level, signal PAPR, shoulder attenuation, signal central frequency offset, emission mask, etc.

Parameters of the second group include transmitter performance and channel characterization such as non-linear¹ and linear distortions in a form of AM-AM/AM-PM

¹ this parameter is not available for all standards; please refer to the standard specific section of the manual

curves, channel Frequency/Amplitude responses and Group Delay, amplitude and phase errors, etc.

Next group of the reported parameters is broadcast standard specific. The parameters include signal SNR/MER/EVM, framing structure, transmission modes, used modulation, guard interval length, etc.

Provided SFN/Echo Profile with "variation range" thresholds can be used for SFN monitoring applications. E-mail or SNMP trap notifications can be generated in case the profile has changed more than defined by the thresholds.

CCDF plots can be additionally used for transmitter system verification.

Obtained results are compared against user defined thresholds. Alarms are triggered in case of exceeding the thresholds values. Depending on alarm configuration the following actions can be undertaking:

- generating and sending an SNMP trap;

- sending an email notification with site ID, time stamp and alarm type included in to the message body;

- controlling the "Relay Port" contacts available on the Receiver rear panel.

3 Controls and Settings

The Receiver can be fully configured and controlled though its WEB based UI which is accessible from any WEB "browsing" enabled device including hand-held devices and smart phones.

The WEB UI is considered the default Interface responding to all needs of daily routine signal diagnostics.

3.1 ANY1022 WEB UI

WEB GUI requires following WEB Browser versions:

Mozilla Firefox version 20.0.1 or newer; OR Microsoft Internet Explorer 9 or newer; OR Google Chrome version 2.0.1410.64 or newer; OR Safari version 5.1.7 or newer.

WEB GUI Requires Cookies are to be enabled.

Using the Receiver WEB UI is a convenient way of operating the device thanks to interface flexibility and availability on different platforms.

3.1.1 Setting up network parameters

The default IP Address of the Receiver is **192.168.254.254**. In order to communicate with the device through a web browser, configure a computer to be on the same subnet as ANY1022. This will allow you to have access to the Receiver Control Panel to tune network settings according to the required by your network parameters.

After setting network parameters of the computer/device running a WEB browser (Host) the following steps are recommended:

- verify basic communication between the Host and Receiver; you should be able to connect to the Receiver using the WEB browser by entering the Receiver IP address and see its WEB UI main page. Please refer to Figure 3 (1) below;
- make sure that the "Connection" bar is green and "Connected" status is present, Figure 3 (2);
- by pressing "Control Panel" (5) switch to the Receiver Control Panel Log-in page (Figure 4) and enter a password for Administrator level of access. The default password is "admin";
- once logged-in, navigate to Control Panel->System->Network (Figure 5) and adjust the Receiver Network interface settings.

Note: In order the new settings take effect, the Receiver should be re-started. The preferable way of the re-start is to set System Restart control to "On" (and press Update) on Control Panel->System->Restart System page of the Receiver WEB UI.

-8

	€ 0 192168.254.254/	C Q. Search	☆ @ ♥ ♣	↑ ⊕ ≡
1	(A)	AVQ1022 - RF LAYER MONITORING RECEIVER ATSC3.0 554	lq, Hz RF in 1000000 RFin 1	Pin, dBm Scale
1	MER, dB 39,1 Shoulder Attainuation, dB	a sindahasi kulukukukukukukukukukukukukukukukukukuk		Spectrum Inbiand Spectrum Emission mask FCC - 4788 Center
	ActiveCore Stor ID:d			
6	_ह . त			
(MAAAA	
	Image: Single state Image: Single state			Vecone.
4	2 3 4 5			

Figure 3. UI Main Page with Available Result and Navigation Controls:

1 – The Receiver IP address; 2 – Connection status; 3 – Report Generation; 4 – Active Alarms; 5 – Control Panel; 6 – Available Plots and Statistics²; 7 - NTP Synchronization Status; 8 – Plot Tools

(A)		
Control Panel RF Layer Monito	ring Receiver	
	Please Login	
	Password	
	+〕 Log in	
Connected		

Figure 4. Log-in Page

² Set of Available Plots and Statistics is standard dependable

(A)			💄 Admin 👻
Control Panel R	F Layer Monitoring Receiver		
Status	Network		
Configuration	Eth0 IP Address	192.168.254.254	0.0.0.0 255.255.255.255
Alarms	Eth0 Netmask	255.255.255.0	0.0.0.0 255.255.255.255
NMS	Eth0 Gateway	192.168.254.1	0.0.0.0 255,255,255,255
System	DNS Server	8.8.8.8	0.0.0.0 255.255.255.255
Site Access Settings <u>NUMP</u> Time Licensed Standards Reset parameters to default Restart System Downloads Settings Backup & Restore Stored Files & Uploads		Update	
Connected: Processing (No erro	rs)		

Figure 5. Network Settings

3.1.2 WEB User Interface (UI)

The WEB UI consists of screens conveniently representing the monitored signal parameters and plots.

The Receiver Main (or default) WEB page layout is presented in Figure 3.

Navigation between the UI pages is done by pressing icons from area 6, Figure 3, of the main window providing an intuitive interface to all parameters and settings of the receiver.

In order to connect to the Receiver and call the UI, a user should enter the Receiver IP address to the WEB browser address bar.

In order to eliminate a casual set of parameters (specifically helpful while using hand-held devices), any manual interaction via WEB UI requires confirmation by pressing "Update" button on the page. The confirmation window pops up every time a parameter has been changed or set.

WEB GUI provides three levels of access to the Receiver:

- "monitoring" level provides access to the Receiver basic monitoring functionality - reported statuses, numeric results and plots; in order to operate the receiver at this level, no password is required;

- "operator" level provides an additional access to parameters which are responsible for alarm configuration and management through the device Control Panel; a default password for this level is "**user**";

- "administrator" level gives full control over the Receiver settings, alarm management functionality and remote upgrade are accessible; a default password is "admin".

Both passwords can be changed from Administrator level through **Control Panel ->** System -> Access Settings.

Please refer to 3.1.1 on how to access the Control Panel.

3.1.3 Receiver Configuration

The Receiver main functionality can be configured using **Control Panel->Configuration->Settings** page.

The Settings page contains controls for setting-up the Receiver according to the expected signal central frequency, strength, reception condition and etc.

As an example, Figure 6 presents settings available for ATSC 3.0 standard. Most of the settings presented on this page are common to all broadcast standards supported by the Receiver.

(A)				💄 Admin 👻
Control Panel R	F Layer Monitoring Receiver			
Status	Settings			
Configuration	Command	Run	~	
<u>Settings</u> Site Info	Active Input	RFin1	~	
Alarms	Rx gain, dB	AGC	~	
NMS	Central Freq, Hz	554000000		50000000 2150000000
System	Spectral Only	Off	~	
	Channel Mode	Tx Output	~	
	Equalizer	Off	~	
	Channel Filter	Off	~	
	Result Update Rate Reduction	0		0 100
		Update		
Connected: Processing (No erro	rs)			

Figure 6. Receiver Settings. An Example for ASTC 3.0

For the full list of broadcast standard specific settings and their functional description, please refer to the correspondent section of this manual.

Common for all broadcast standards settings are listed below.

- "Command" sets the Receiver into Run or Idle (Stop command) state; it is advised to stop the Receiver before firmware or license file upgrades and switching between standards.

- "Active Input"³ defines which input of the Receiver is selected;
- "**Rx gain, dB**" defines the Receiver front-end gain or AGC mode;
- "Frequency, Hz" sets signal central frequency;
- "Spectral Only"; only spectral parameters and plots are calculated and displayed;
- "Channel Mode" defines channel estimation modes; it is recommended to use TX out mode when the Receiver samples signal directly from a transmitter system input or when there is no SFN/Multipath environment; use Off-Air option if working in SFN environment with multiple echoes.
- "Equalizer" switches On/Off the Receiver internal equalizer;
- "Channel Filter" switches On/Off the Receiver channel filter; the channel filter bandwidth is standard dependable;
- "Result Update Rate Reduction" allows reducing the Receiver result update rate in proportion to the entered value; for example, setting n means that the results will be updated with n times reduced rate; this option allows reducing load to the network link between the Receiver and Host.

3.1.4 Defining a pre-set Emission mask

Though the Receiver does Spectral measurement based on a default Emission mask defined in the correspondent broadcast standard, a user can change the pre-set emission mask using **Control Panel->Configuration-> Emission mask controls**, Figure 7.

³ Supported only by a Receiver with two inputs.

(A) Control Panel D	ashboard			L Admin	•
RF Layer Monit	tor				
Status	Emission mask				
Configuration	Mask	Vertex 0		Y	
Settings Emission mask	Offset	2.9		-50 50 MHz	
Site Info	Attenuation	-31		-199 30 dB	
Alarms	Enabled	Yes	~		
NMS		Update			
System	Offset	2.9 Enable	ed	Yes	
	Attenuation	31			
	Offset Attenuation	32 Enable	Þe	Yes	
	Offset Attenuation	4.5 Enable -96	ed	Yes	
	Offset Attenuation	0 Enable	эd	No	

Figure 7. Pre-set Emission Mask

The Emission mask can be defined by a set of points (Vertexes) with frequency offsets related to the central frequency and required attenuation.

Any individual point can be enabled or disabled.

Resolution bandwidth, used for calculation of the emission, is predefined and selected according to the broadcast standard requirements.

3.1.5 Alarm Management

The Receiver alarm management is accessible through **Control Panel->Alarms** path, see Figure 8. The management options provide a convenient way for enabling/disabling alarms, assigning actions undertaken in case of an alarm triggering, setting thresholds for the monitored parameters, maintaining alarm log, etc.

Control Panel	Dashboard		👤 Admin 👻
RF Layer Mor	nitor Avateq 1010m		
Status	Alarm Properties		
Configuration	Alarm	System restarted	~
Alarms	Alarm Enabled	On	
<u>Alarm Properties</u> Thresholds	Trap Notification on Alarm	Off	
Log Management Alarm Email Settings	Email Notification on Alarm	Off	
Alarm Log	Relay 1 on Alarm	Off	
NMS	Relay 2 on Alarm	Off	
System	Set Alarm Integration Time	0	0200
	Clear Alarm Integration Time	0	0200
	Alarm Severity Level	Informational	
		Update	
	System restarted		
	Alarm Enabled Email Notification on Alarm	On Trap Notification on Alarm	m Off Off

Figure 8. Alarm Properties

Available through the alarm management options are as following:

a) alarm properties (**Control Panel->Alarms->Alarm Properties**), see Figure 8, where a user can individually enable or disable an alarm, assign to the alarm an action undertaken in the event of the alarm triggering, Alarm Set and Clear integration time and severity level.

b) alarm Upper and Lower threshold settings (**Control Panel-> Alarms-> Thresholds)**, see Figure 9, defining a parameter "safe" variation range.

F Layer Mon	itor Avateq 1010m		
itatus	Thresholds		
Configuration	Pin, Low (dBm)	-50	-70 5
larms	Pin, High (dBm)	0	-70 5
Alarm Properties	MER, Low (dB)	20	0 100
Log Management Alarm Email Settings	MER, High (dB)	60	0 100
Alarm Log	Frequency Shift, Low (Hz)	-1500	-150000 150000
MS	Frequency Shift, High (Hz)	1500	-150000 150000
ystem	Lower Shoulder, Low(dB)	20	0 100
	Lower Shoulder, High(dB)	80	0 100
	Upper Shoulder, Low(dB)	20	0 100
	Upper Shoulder, High(dB)	80	0 100
	SFN Drift, High (usec)	250	0500
	SFN Drift, Low (usec)	-250	-500 0
	Echo Amplitude (db)	10	0 100
	Echo Time Offset (usec)	10	0 100
		Update	

Figure 9. Alarm Thresholds

c) Alarm Log File Properties (**Alarms->Log Management**), see Figure 10 two functional set of controls are related to the alarm log and parameter variation log files. The first set allows changing the Alarm Log display properties and clearing/resetting the log file. The second set controls Parameter Variation Log File allowing adjusting data storing periodicity and clearing/resetting the File.

(A)	Control Panel	Dashboard		👤 Admin 👻
RF Lay	er Mor	nitor Avateq 1010m		
Status		Log Management		
Configuration		Clear Alarm Log	No	
Alarms		Logs Display In Reverse	No	
Alarm Prope Thresholds Log Manage Alarm Email Alarm Log	erties ement Settings	Variations Log Periodicity Clear Variations Log	1 No v	1 240 min
NMS			opidio	
System				
Connecte	d: Processing (N	o errors)		

Figure 10. Alarm and Variation Log Management

d) e-mail notification settings (**Alarms->Alarm Email Settings**), see Figure 11. Please, consult your network administrator for proper server settings.

(A)	Control Panel	Dashboard		💄 Admin 👻
RF La	yer Mor	nitor Avateq 1010m		
Status		Alarm Email Settings		
Configuratio	n	SMTP Server Host	smtp.example.com	
Alarms		SMTP Server Port	25	065535
Alarm Pro Threshold	perties Is	Use SSL/TLS	No	~
Alarm Ema Alarm Log	gement all Settings	SMTP Server User Name		
NMS		SMTP Server Password		
System		Email From		
		Email To		
			Update	
Connec	ted: Processing (N	o errors)		

Figure 11. Alarm Email Settings

e) alarm log and a list of currently active alarms (Alarms->Alarm Log)

(A) Control Panel	Dashboard	👤 Admin 👻
RF Layer Mon	litor	
Status	Alarm Log	
Configuration	Active Alarms	
Alarms	Left shoulder out of range Fri Nov 17 10:12:30 2017	
Alarm Properties Thresholds Log Management Alarm Email Settings <u>Alarm Log</u>	1: Fri Nov 17 09:52:13 2017: Left shoulder out of range Set 2: Fri Nov 17 09:52:13 2017: Left shoulder out of range Cleared 3: Fri Nov 17 09:52:15 2017: Left shoulder out of range Set 4: Fri Nov 17 09:52:16 2017: Left shoulder out of range Cleared 5: Fri Nov 17 09:52:16 2017: Left shoulder out of range Set 6: Fri Nov 17 09:52:17 2017: Left shoulder out of range Cleared	Î
NMS	7: Fri Nov 17 09:52:18 2017: Left shoulder out of range Set 8: Fri Nov 17 09:52:19 2017: Left shoulder out of range Cleared	
System	9: Fri Nov 17 09:52:20 2017: Left shoulder out of range Set 10: Fri Nov 17 09:52:20 2017: Left shoulder out of range Cleared 11: Fri Nov 17 09:52:21 2017: Left shoulder out of range Set 12: Fri Nov 17 09:52:22 2017: Left shoulder out of range Cleared	
	 12. Fri Nov 17 09:52:23 2017: Left shoulder out of range Set 13. Fri Nov 17 09:52:24 2017: Left shoulder out of range Set 14. Fri Nov 17 09:52:26 2017: Left shoulder out of range Cleared 15. Fri Nov 17 09:52:28 2017: Left shoulder out of range Cleared 17. Fri Nov 17 09:52:28 2017: Left shoulder out of range Set 18. Fri Nov 17 09:52:28 2017: Left shoulder out of range Cleared 17. Fri Nov 17 09:52:28 2017: Left shoulder out of range Cleared 18. Fri Nov 17 09:52:28 2017: Left shoulder out of range Cleared 19. Fri Nov 17 09:52:29 2017: Left shoulder out of range Cleared 19. Fri Nov 17 09:52:31 2017: Left shoulder out of range Cleared 20. Fri Nov 17 09:52:31 2017: Left shoulder out of range Cleared 21. Fri Nov 17 09:52:31 2017: Left shoulder out of range Cleared 21. Fri Nov 17 09:52:31 2017: Left shoulder out of range Set 	
Connected: Processing (No	p errors)	

Figure 12. Alarm Log

3.1.6 Downloading Variation Log and SNMP MIB Files

Two files are available for downloading from the Receiver. They are Parameter Variation Log file containing time stamped records with measured values and SNMP MIB file. Figure 13 below shows the files and access path to the downloading controls.

The Receiver provides an automated log recording feature accessible through **Alarms->Log Management** (see Figure 10).

Parameter Variation Log records are created only while the Receiver's current command is "RUN" (3.1.3). The Log file is stored in the Receiver internal non-volatile memory as a comma separated text file (CSV). It is available for downloading from the Downloads menu (see Figure 13).



Figure 13. Downloadable Files

3.1.7 Backup and Restore Receiver Settings

The complete set of the Receiver current settings can be backed up and restored using a menu available from **Control Panel ->System ->Settings Backup & Restore.**

3.1.8 NMS and SNMP User Settings

NMS settings are accessible through NMS **Control Panel->NMS->Properties**, see Figure 14. NMS User Management

(A)	Control Panel	Dashboard		👤 Admin 👻
RF La	yer Mor	nitor		
Status		Properties		
Configuratio	n	User	User 1	×
Alarms		User Name		
NMS		Authorization Type	SHA	~
Properties		Auth. Password		
System		Priv. Type	DES	v
		Priv. Password		
			Update	
Connect	ted: Processing (N	o errors)		

Figure 14. NMS User Management

Figure 15 below presents SNMP parameters which are available through **Control Panel->System->SNMP.** SNMP v.2 and v.3 are supported.

Status	SNMP			
Configuration	SNMP enabled	No	~	
Alarms	SNMP Protocol Version	V2		
NMS	SNMP Access	V2 V3		
System	Community (SNMPv2)	public		
Site Access Settings Network	SNMP Notifications	Off	~	
SNMP Set Time	SNMP Notification Type	Inform	~	
Licensed Standards Reset parameters to default Restart System	SNMP Notifications Target IP Address	0.0.0.0		
Downloads Settings Backup & Restore Stored Files & Unloads		Update		

Figure 15. SNMP Management

3.1.9 Setting Time

The Receiver have two sources of time. Depending on user's application the Receiver can use its internal Real Time Clock engine or an external source with NTP capabilities.

A preferred source can be selected from **Control Panel->System->Set Time** menu, see Figure 16. The selected source is used for "time stamping" of all events during the Receiver operation.

Control Panel Das	shboard		💄 Admin 👻
RF Layer Monito	or		
Status	Set Time		
Configuration	Set year	2017	1900 3000
Alarms	Set month	1	112
NMS	Set day	1	131
System	Set hour	0	023
Site Access Settings	Set minutes	0	059
SNMP Set Time	Set seconds	0	059
Licensed Standards Reset parameters to default Restart System	NTP synchronization enabled	Off	
Downloads Settings Backup & Restore	NTP server address		
Stored Files & Uploads	NTP synchronization interval	60	60 604800 sec
		Update	
	Current time Fri Nov 17	System time source	(Local RTC)
Connected: Processing (No. erro	15)		Powered By

Figure 16. Set Time

The Receiver internal RTC can be manually set by entering new values in correspondent fields - Set year, Set month, etc.

If NTP based synchronization is enabled, the Receiver will be trying to connect to NTP server every "NTP synchronization interval". Current status of the NTP synchronization is reported in the Status line on the Receiver UI Main Page (Figure 3, 7).

3.1.10 Resetting to Default Settings

There are two ways to reset The Receiver settings to their defaults. The settings include all user defined parameters including the Receiver network configuration – IP address, Gate Way and Mask.

If the Receiver can be reached through Ethernet connection, i.e. it responds to its IP address and WEB UI is available, the most convenient way to reset the settings is to use **ControlPanel->System->Reset Settings to Default** menu.

In the situation when there is no access to the unit through Ethernet (for example, if the Receiver IP address is lost or unknown) a hardware based reset can be performed. For the hardware Reset pins 2 and 3 of the "Relay" DB9 connector (the unit rear panel) should be shortened for 10 seconds with the following power cycling of the unit.

The hardware Reset step by step procedure is:

- Power up the unit;
- Wait for approximately 60 seconds until the unit fully booted;
- Make short pins 2 and 3 of the Relay DB9 connector located on the unit rear panel;
- Wait for 10 seconds;
- Release the pins;
- Power cycle the unit.

The default settings are now in effect.

3.1.11 Remote Upgrade

The Receiver can be remotely upgraded using **Control Panel->System->Stored Files & Uploads** menu.

It is recommended to save the Receiver current settings (3.1.7) before upgrading the unit.

The Receiver configuration can be restored at any time by restoring its previously stored settings.

The Receiver remote upgrade procedure includes the following steps:

1. Navigate to the **Stored Files & Uploads** menu page (Figure 17).

(A)			٤	L Admin 🗸
Control Panel RF	Layer Monitorin	g Receiver		
Status	Stored File	s & Upload	S	
Alarms	Filename	Size	Actions	
NMS	license.lic	730	▲ Download ★ Delete	
System	File Upload			
Site Access Settings Network SNMP RTC Heartbeat Licensed Standards Reset parameters to default Restart System Downloads Settings Backup & Restore Stored Files & Uploads	Browse			Upload
Connected: Idle (No errors)			Pow ACTIV	

Figure 17. Stored Files and Uploads

2. Click **Browse** to locate an upgrade image file (*.img).

3. Click "Upload" to initiate file transfer and system upgrade sequence.

4. Wait for the upgrade completion notification and a prompt to restart the unit (Figure 18).



Figure 18. Upgrade Completion

Note: The first start-up of the unit after upgrade takes a bit longer since the upgrade image consistency is being verified. The system automatically rolls back to the previous image in case of any issues with the newly downloaded image are discovered.

3.2 Broadcast Standard Licensing

The Receiver can be configured for supporting different broadcast standards. Though no additional software packages required for supporting the multi-standard functionality, a user can select only among licensed to a particular unit standards.

A list of the licensed standards is available through **Control Panel->System->** Licensed Standards menu (Figure 19).

Selecting a licensed item from the list forces the Receiver switch to the selected standard.

(A) Control Panel D	ashboard		💄 Admin 👻
RF Layer Monit	tor		
Status	Licensed Standards		
Configuration Alarms	Standard	ATSC3.0 V Off DVB-TH	
NMS		ATSC DAB DTMR	
System Site		ISDB-T CMMB DVB-T2	
Access Settings Network SNMP Set Time		DVB-S/S2x ATSC3.0	
Licensed Standards Reset Settings to Default Restart System Downloads			
Settings Backup & Restore Stored Files & Uploads			
Connected: Processing (No er	Tors)		

Figure 19. Licensed Standards

3.2.1 License upgrade

The number of supported by the Receiver standards can be changed by uploading a new license file generated by the Receiver manufacture. The upload procedure is very similar to the Receiver upgrade. The only difference is in the downloadable file which is *avqlicense.lic* in this case.

The new license file is in effect after the Receiver reset.

3.3 WEB GUI Special Features

3.3.1 Plot Common Tools

A set of Tools available for a plot can be opened by Tools icon in the upper right corner of the plotting area. Please refer to Figure 3, item 8.

The available set of tools might differ for different plots providing the most convenient way for working with a particular plot.

There are two controls available from the Tools menu. The controls are Autoscale and Mode. By default all plots use Autoscale. The plot is automatically scaled on X and Y axes in order to maximize the plotting area. In Autoscale no additional plot Modes can be selected.

In order to access different Modes, the Autoscale control should be switched Off. Figure 20 below presents Modes Plot area tools when Autiscale is Off.



Figure 20. Plot Common Tools and Modes

- "Normal" mode can be used if no auto scaling is required;
- "Markers" tool allows conveniently setting several markers on the plot, see Figure 21. Marker position can be individually adjusted using "Edit" icon in the Marker table.



Figure 21. Markers

- "Cross bar" tool is useful for a quick relative measurement between any two points of the plot, see **Error! Reference source not found.**.
 - "Manual Scale" tool is a convenient way for adjusting Min/Max and Step (unit per division) values for a plot.

3.3.2 Echo Profile Variation Range Tool

Available for CIR/Echo Profile plot "Variation Range" tool allows setting "windows" defining a range of acceptable variations of each selected peak. The window size is defined by "Echo Amplitude +/- Threshold, db" and "Echo time offset +/- Threshold, usec" thresholds defined on Control Panel->Alarms->Thresholds page (Figure 9).



Figure 22. CIR/Echo Plot Variation Range Tool

3.3.3 Report

By pressing Report Icon on the Receiver WEB Main page (Figure 3, item 3) a "snapshot" report can be generated and stored on a local machine. The report contains all numerical data and plots and can be used for further analysis or troubleshooting.

4 Broadcast standard specifics

4.1 ATSC 1.0 (A/53 and A/153)

A member of ActiveCore[®] ANY1022 product family, **ANY1022ATSC** is an RF layer Monitoring Receiver and Signal Analyzer for **A/53** and **A/153 ATSC Digital Television Standards**.

Table below presents	a list of available	plots and monitored	parameters.
----------------------	---------------------	---------------------	-------------

General Signal	Signal PAPR, dB	
Parameters:	Signal Power, dBm	
General Spectral	Shoulder Attenuation, dB (According to FCC requirements)	
Parameters:	Bandwidth, MHz	
	Frequency Offset, Hz	
	Sampling Rate Shift, Hz	
ATSC A/53 and	MER, dB	
A/153 specific	EVM, %	
parameters:	SNR, dB	
	Pilot amplitude error, dB	
	Pilot phase error, degree	
	Amplitude (AM-AM), dB and Phase (AM-PM) error, degree	
	Output signal Group Delay, micro seconds	
	Signal Inversion	
	Channel Emission Mask according to FCC requirements	
Available Plots:	Spectrum and in-band interference	
	Eye / Level Diagram	
	Non-Linear - HPA AM-AM, AM-PM	
	Group Delay, Frequency and Amplitude Response	
	CIR/Echo Profile Plot	
	CCDF Plot	
	Channel Frequency Response	
	Event History and Alarm log	
	History of Shoulder Attenuation / Group	
	Delay/MER/SNR/PAPR variation	
	Transmitter SFN Drift	

Table 3. Monitored Parameters and Plots

The list of monitored parameters, available plots and alarm events are constantly reviewed and extended. Please refer to the product data sheet for the most updated information.

4.1.1 ATSC 1.0 Settings

Settings available for ATSC 1.0 standard is presented in Figure 23. ASTC 1.0 Settings.

(A)	Control Panel	Dashboard	Admin 🗸

RF L	ayer	Mor	nitor
------	------	-----	-------

Status	Settings		
Configuration	Command	Run	
Settings Emission mask	Active Input	RFin1 ~	
Site Info	Rx gain, dB	AGC	
Alarms	Central Freq, Hz	100000000	50000000 1000000000
NMS	Measurement Mode	Off Air ~	
System	Equalizer	Tx Output Off Air	
	Spectral Only	Off ~	
	Result Update Rate Reduction	1	1200
		Update	
Connected: Processing (No errors)			

Figure 23. ASTC 1.0 Settings

There are two Measurement Modes in ATSC 1.0 standard – "Off Air" and "Tx Out". "Off Air" mode should be used for off-air measurements especially in presence of dynamic channel and/or strong echoes. Non-linear distortion measurements -Amplitude/Phase Errors and AM-AM/AM-PM plots - are not available in this mode.

"Tx Out" mode should be used for when the Receiver samples signal directly at a transmitter output and non-linear distortions are to be numerically estimated.

4.1.2 SFN Drift

Transmitter signal SFN Drift is measured as a shift of ATSC Data Field Sync over time. It is recommended using an external source of 1PPS signal for the drift precise measurements.

SFN drift history and its instant value are presented in a graphical form on the SFN drift plot.

Available on the plot "Set Reference Point" control allows setting the drift calculation start point.

ANY1022 alarm management system can be tuned to trigger an alarm event in case the drift exceeds a threshold. Please refer to Figure 9.

For ANY1022ATSC version of the receiver the threshold is hardcoded and set to +/-15 nanoseconds as specified in A/153 part 2:2011.

4.1.3 ATSC Receiver Performance in the Presence of Echoes

The Receiver performance and its ability to demodulate signal largely depends on the applied to the signal channel and presence of strong echoes that might exist at the Receiver input. For the echo removing and channel compensation, ANY1022 uses a state-of-the-art equalizer which effectively increases the Receiver tolerance to the echoes and channel imperfections. Besides other factors the equalizer performance depends on number of filter taps used in the equalizer, i.e. "equalizer length", that, in its turn, can affect processing time and the Receiver parameter update rate.

Though the "longer" equalizer allows removing stronger echoes in a wider delay range, it is recommended setting "Equalizer" control On only when it is really necessary.

The ANY1022 ATSC Receiver implements an equalizer capable of removing preand post echoes in a wide range of amplitudes and delays. Table 4. Echo Cancelling Performance below defines the equalizer performance in terms of the echo level and time distance related to the main signal lobe.

Echo relative amplitude, db	Delay, microseconds, Echo canceller Off / On	Remaining echo relative amplitude, dB
-15	±4 / ±11.8	> - 2530
-10	±1.86 / ±5.6	> - 2530
-5	±0.6 / ±2.04	> - 2530

Table 4. Echo Cancelling Performance

4.1.4 ATSC 1.0 Statistics and Plots

(A) AV	Q1022 - RF LAYER MONITORING RECEIVER Standard Freq, Hz RF in ATSC 1000000000 RFin1	Pin, dBm Scale
SNR, dB 43.0 Shoulder Attenuation, dB	Statistics	
60.0 Night 60.8	General	
Site Name: Site ID:	Input RF power (dBm) 0 Signal Scale 0.99 RMS 11924.52 Equalizer Or PAPR (dB) 8.01 Channel Filter Of	Ŧ
	Standard Specific	
	Bandwidth (MHz) 6 EVM (%) 0.46 Spectrum Inversion Not inverted Residual GD (usec) 0.000 Frequency Shift (Hz) -3.1 Amplitude Error (dB) 0.00 Sample Rate Shift (Hz) 0.16 Phase Error (degree) 0.37 MER (dB) 41.98 Pilot Ampl Error (degree) -0.001	
	Offsets, MHz Levels L, dB Levels R, dB 3.00 -59.95 -60.77 3.50 -69.61 -69.95 4.00 -69.64 -70.07 4.50 -69.65 -70.06 6.00 -69.91 -70.20 9.00 -70.32 -70.86	
2017-12-19 16:31	s)	FCORE®

Figure 24. ATSC 1.0 Signal Statistics



Figure 25. ATSC 1.0 Eye Diagram

((A))		Standard	Freq, Hz	RF in	Pin, dBm	Scale
	Q1022 - RF LAYER MONITORING RECEIVER	ATSC	1000000000	RFin1	0.0	0.9
SNR, dB 43.4				80		
Shoulder Attenuation, dB					Concluintin	
Left 59.8 Right 60.8						
Frequency Shift, Hz -0.4						
Site Name: ActiveCore Site ID:					123 A 4	
					1	
					*	
					i i i	
					8 	
2017-12-19 16:36						
🚔 🇳 🗘,						0 ups
NTP -CO- at Connected: Processing (No error	s)				/eco	RE•

Figure 26. ATSC 1.0 Constellation Diagrams

4.2 ATSC 3.0 (A/322)

A member of ActiveCore[®] ANY1022 product family, **ANY1022ATSC30** is an RF layer Monitoring Receiver and Signal Analyzer for A/322 **ATSC 3.0 Digital Television Standard**.

Table below presents a list of available plots and monitored parameters.

General Signal	- Signal PAPR, dB
Parameters:	- Signal Power, dBm
General Spectral	- Shoulder Attenuation, dB (According to FCC requirements)
Parameters:	- Bandwidth, MHz
	- Frequency Offset, Hz
	- Sampling Rate Shift, Hz
ATSC 3.0 specific	- Bootstrap, L1B, L1D MERs, dB
parameters:	- Selected for processing PLP raw and final MER ⁴ , dB
	- System MER, dB ⁵
	- Number of LDPC iterations per FEC block for L1B/D parts of
	ASTC 3.0 frame and selected PLP
	- L1B, L1D and selected PLP BER before LDPC decoding
	- L1B, L1D parity check results
	 List of detected TxIDs with their time offsets

⁴ Two MER estimations are available – raw and final; PLP raw (total) MER might be affected by LDM layer. A final MER is calculated after LDM subtracted.

⁵ System MER is calculated as an average of Bootstrap, L1B/D and selected PLP MERs

	 List of available PLPs Detailed Bootstrap, L1B and L1B information LLS info⁶ Output signal Group Delay, micro seconds Signal Inversion Chappel Bandwidth and Emission Mask according to ECC
	requirements
Available Plots:	 Spectrum and in-band interference Channel Group Delay, Frequency and Amplitude Response CIR/Echo Profile Plot CCDF Plot Bootstrap, L1B and L1D constellations Selected PLP constellation Event History and Alarm log History of Shoulder Attenuation / Group Delay/MER variation
	- Transmitter SFN Drift

4.2.1 SFN Drift

Transmitter signal SFN Drift is measured as a shift of ATSC 3.0 Bootstrap over time. It is recommended using an external source of 1PPS signal for the drift precise measurements.

SFN drift history and its instant value are presented in a graphical form on the SFN drift plot.

Available on the plot "Set Reference Point" control allows setting the drift calculation start point.

ANY1022 alarm management system can be tuned to trigger an alarm event in case the drift exceeds +/- GI.

4.2.2 ATSC 3.0 Statistics and Plots

Below are examples of available ATSC 3.0 signal data and statistics presented in numerical format.

⁶ There are some limitations on LLS info availability; please contact Anywave technical support for details

(A)	AVQ1022 - RF LAYER MONI			Standard Freq, Hz RF in Pin, dBm Scale ATSC3.0 1000000000 RFin1 0.0 0.4
MER, dB 18.2 Shoulder Attenuation, dB Left 8.2 Right 36.5 Frequency Shift M2 04.0.0	RMS PAPR (dB) Frequency Shift (H Sample Rate Shift	10.1 regin chouse (sc) 4101.09 Residual GD (usec) 10.91 Signal Scale z) -818.17 Equalizer (Hz) 0	1.507 0.43 On	<u>, i i i i i</u>
Ste Name: ActiveCore	Channel Bardwidth (MHz)	6 Spectrum Inversion	Not inverted	
	Spectral mask			
		Offsets, MHz Levels L, dB Levels R, dB 3.00 -16.50 -42.95 3.50 -14.60 -42.91 4.00 45.65 42.07		
		4.00 -15.65 -42.97 4.50 -16.86 -43.10 6.00 -15.50 -43.02 9.00 -37.20 -43.22		
	TxID List			
	TxID Delay 1 (usec) 4937 -16.64	Delay 2 Delay 3 Delay 4 (usec) (usec) (usec) -19.10 -14.18 -20.98	Delay 5 (usec) -11.28	
	PLPs in System	1		
2018.01.03 13:03		ID Layer Select LLS 0 Core Selected Not present 1 Core Select Present		
🚔 🦧 🗞				

Figure 27. ATSC 3.0 Statistics

A user can select a PLP to be monitored (MER, BER) and plotted by clicking on "Select" option from the PLPs in System table (Figure 27). ID of the currently processed PLP is indicated in Processed PLP section of the signal statistic page.

ANY1022ATSC30 provides convenient tools for detailed analysis of ATSC 3.0 signaling info. The signaling info is available in a "raw" format as presented and decoded in the Bootstrap and L1B/D parts of the frame, please refer to Figure 28 below.



Figure 28. ATSC 3.0 Signaling

4.2.3 Channel Estimation Modes

ANY1022ATSC30 allows performing channel estimation in two distinctive modes (Figure 29):

- "Off-Air SFN" mode is recommended mode for multipath environment that is a typical application for SFN and in-field measurements;
- "Tx Output" is the preferable mode for channel estimation mode in application where no multipath echoes or SFN transmission are expected. It is also recommended to use this mode for measurements performed directly at a transmitter system output including a band-pass filter response.

(A) c	Control Panel	Dashboard			💄 Admin 👻
RF Laye	er <mark>Mo</mark> r	nitor			
Status		Settings			
Configuration		Command	Run	~	
Settings Emission masł	k	Active Input	RFin1	~	
Site Info		Rx gain, dB	AGC	~	
Alarms		Central Freq, Hz	100000000		950000000 2150000000
NMS		Spectral Only	Off	~	
System		Channel Mode	Tx Output	~	
		Equalizer	Off-Air SFN Tx Output		
		Result Update Rate Reduction	1		1200
			Update		
Searching f	for device				

Figure 29. ATSC 3.0 Channel Estimation Modes

4.3 DTMB (GB20600-2006)

A member of ActiveCore[®] ANY1020 product family, **ANY1020DTMB** is an RF layer Monitoring Receiver and Signal Analyzer for **GB20600-2006 compliant Digital Television Terrestrial Broadcasting System**.

Table below presents a list of available plots and monitored parameters.

General Signal	-	Signal PAPR, dB
Parameters:	-	Input signal power, dBm
General Spectral	-	Shoulder Attenuation, dB (GB20600-2006 requirements)
Parameters:	-	Bandwidth, MHz
	-	Frequency Offset, Hz
	-	Sampling Rate Shift, Hz
DTMB specific:	-	MER, dB

	 Amplitude (AM-AM), dB and Phase (AM-PM) error, degree Output signal Group Delay, micro seconds Signal Inversion Channel Mask according to GB20600-2006 requirements PN and Guard Interval length DTMB mode: Single or Multi carrier
Available Plots:	 Spectrum Constellation MER variation from symbol to symbol Non-Linear - HPA AM-AM, AM-PM curves Group Delay, Frequency and Amplitude Response Echo Profile Plot CCDF Plot Channel Frequency Response Event History and Alarm log History of Shoulder Attenuation / Group Delay/MER/SNR/PAPR variation Transmitter SFN Drift

4.3.1 DTMB Receiver Settings

Figure 30 below presents settings available when the Receiver is operating in DTMB standard. Most of the setting are common to all supported standards.

Control Panel Das	shboard			💄 Admin 👻
RF Layer Monito	or			
Status	Settings			
Configuration	Command	Run	~	
Settings Emission mask	Active Input	RFin1	~	
Site Info	Rx gain, dB	AGC	~	
Alarms	Central Freq, Hz	100000000		9500000002150000000
NMS	Spectral Only	Off	~	
System	Bandwidth	8 MHz	~	
	Equalizer	On	~	
	Channel Filter	Off	~	
	Result Update Rate Reduction	1		1200
		Update		
Connected: Processing (No error	rs)			

Figure 30. DTMB Specific Settings

DTMB specific settings include:

- **"Bandwidth"** selects bandwidth of the expected signal; allows selection of 8, 7 or 6 MHz bandwidth;

4.3.2 SFN Drift

Transmitter signal SFN Drift is measured as a shift of DTMB frame over time. It is recommended using an external source of 1PPS signal for the drift precise measurements.

SFN drift history and its instant value are presented in a graphical form on the SFN drift plot.

Available on the plot "Set Reference Point" control allows setting the drift calculation start point.

ANY1022 alarm management system can be tuned to trigger an alarm event in case the drift exceeds a threshold.

For ANY1022DTMB the threshold is hardcoded and set to ±GI length.

4.3.3 DTMB Receiver Performance in the Presence of Echoes

The Receiver performance and its ability to demodulate signal largely depends on the applied to the signal channel and presence of strong echoes that might exist at the Receiver input. For the echo removing and channel compensation, ANY1022 uses a state-of-the-art equalizer which effectively increases the Receiver tolerance to the echoes and channel imperfections. Besides other factors the equalizer performance depends on number of filter taps used in the equalizer, i.e. "equalizer length", that, in its turn, can affect processing time and the Receiver parameter update rate.

Though the "longer" equalizer allows removing stronger echoes in a wider delay range, it is recommended setting "Equalizer" control On only when it is really necessary.

The ANY1022DTMB Receiver implements an equalizer capable of removing preand post echoes in a wide range of amplitudes and delays. Table 4 below defines the equalizer performance in terms of the echo level and time distance related to the main signal lobe.

Echo relative amplitude,	Delay, microseconds,	Remaining echo relative		
db	Echo canceller Off / On	amplitude, dB		
<-20	±3.00 / ±50.0	< - 2530		
-15	±2.76/±13.3	< - 2530		
-10	±1.33 / ±6.67	< - 2530		
-5	±0.53 / ±2.65	< - 2530		

Table 5.	Echo	Cancelling	Performance
----------	------	------------	-------------

4.3.4 DTMB Statistics

Figure 31 below presents DTMB signal statistics and available numerical data. Please refer to the common to all broadcast standards sections of the Manual for the full set of plots and data provided by ANY1022 Receiver.



Figure 31. DTMB Statistics

4.4 DAB/DAB+/T-DMB

A member of ActiveCore[®] ANY1020 product family, **ANY1020DAB** is an RF layer Monitoring Receiver and Signal Analyzer for **DAB/DAB+/T-DMB** standards.

Table below presents a list of available plots and monitored parameters.

General Signal	- 3	Signal PAPR, dB
Parameters:	-	Input signal power, dBm
General Spectral	- (Shoulder Attenuation, dB
Parameters:	- 1	Bandwidth, MHz
	-	Frequency Offset, Hz
	- 3	Sampling Rate Shift, Hz
DAB/DAB+/T-DMB	- [MER, dB
specific	- 1	DAB Mode
parameters:	- 1	DAB Modulation
	-	FFT Size
	- 3	Signal Inversion
	- (Guard Interval
	- /	Amplitude (AM-AM), dB and Phase (AM-PM) error, degree
	- (Output signal Group Delay, micro seconds

	 FIC FIB errors and BER before Viterby Ensemble and MSC info TII list with time offsets Channel Mask at predefined offsets according to ETSI EN 300 401
Available Plots:	 Spectrum Constellation Diagram Symbol MER Diagram Non-Linear - HPA AM-AM, AM-PM curves Group Delay, Frequency and Amplitude Response Echo profile Plot CCDF Plot Channel Frequency Response Event History and Alarm Log Parameter log Transmitter SFN Drift

4.4.1 DAB/DAB+/T-DMB Receiver settings

Figure 32 below presents settings available when the Receiver is operating in DAB/DAB+/T-DMB standard.

Control Panel Dast	iboard			👤 Admin 🗸
RF Layer Monito	r			
Status	Settings			
Configuration	Command	Run	~	
Settings	Active Input	RFin1	~	
Site Info	Rx gain, dB	AGC	×	
Alarms	Central Freq, Hz	100000000		950000000 2150000000
NMS	Spectral Only	Off	~	
System	SFN Sync	Off		
	Channel Mode	Tx Output	~	
	Equalizer	On	~	
	Channel Filter	Off	~	
	Result Update Rate Reduction	1		1 200
		Update		
Connected: Processing (No errors	3)			

Figure 32. DAB Receiver Settings

4.4.2 SFN Sync

SFN Sync option activates ANY1022DAB functionality allowing to synchronize (to bind) the SFN Echo profile pattern with the unit internal clocks. Once synchronized the pattern (Echo) peaks are displayed in the order regardless of the main signal, i.e. the signal from Main transmitter, position or amplitude changes. The sync allows to adjust and monitor delays from different transmitters in SFN networks.

Current SFN Sync status is reported on the unit Control->Status page, section "Reference and timing", see Figure 33 below.

Equalizer In Multichannel Environment	Off	Channel Filter	Off
Reference and timing			
10MHz Reference Source SFN Sync Status	Internal No	1PPS Source	Internal
Network			
Eth0 IP Address Eth0 Gateway	192.168.254.254 192.168.254.1 8 8 8 8 8	Eth0 Netmask Eth0 Mac Address	255.255.255.0

Figure 33. DAB SFN Pattern Sync

4.4.3 Channel Estimation Modes

ANY1022DAB allows performing channel estimation in two distinctive modes (Figure 32):

- "Off-Air SFN" mode is recommended mode for multipath environment that is a typical application for SFN and in-field measurements;

"Tx Output" is the preferable mode for channel estimation mode in application where no multipath echoes or SFN transmission are expected. It is also recommended to use this mode for measurements performed directly at a transmitter system output including a band-pass filter response.

4.4.4 SFN Drift

Transmitter signal SFN Drift is measured as a variation of NULL symbol appearance at the transmitter system output of each transmission frame over time. It is recommended using an external source of 1PPS signal for the drift precise measurements.

SFN drift history and its instant value are presented in a graphical form.

Available on the plot "Set Reference Point" control allows setting the drift calculation start point.

ANY1022 alarm management system can be tuned to trigger an alarm event in case the drift exceeds a threshold.

For ANY1022DAB version of the receiver the threshold is hardcoded and set to +/-GI/2 duration of the correspondent DAB mode.

4.5 DVB-S/S2/2x and DVB-CID

A member of ActiveCore[®] ANY1022 product family, **ANY1020DVBS** is an RF layer Monitoring Receiver and Signal Analyzer for EN 300 421, ETSI EN 302 307, ETSI EN 302 307 – 2 and ETSI TS 103 129 **DVB-S/S2/S2x and DVB-CID Standards.**

Table below presents a list of available plots and monitored parameters.

General Signal	-	Signal PAR, dB
Parameters:	-	Input signal power, dBm
General Spectral	-	Shoulder Attenuation, dB;
Parameters:	-	Bandwidth, MHz
	-	Frequency Offset, Hz;
DVB-S/S2 specific	-	MER, dB
parameters:	-	EVM, %
	-	SNR, dB
	-	STED, STEM
	-	Eb / No
	-	Signal Inversion
	-	Signal Format DVB-S/S2/S2x
	-	DVB-CID presence and decoding
	-	Constellation and ModCod
	-	FEC frame format, according to ETSI EN 302 307
	-	DVB-S2/S2x pilots presence
	-	Spectrum mask
Available Plots:	-	Spectrum
	-	In-band interference spectrum ⁷
	-	Constellation
	-	Echo Profile Plot
	-	Signal CCDF Plot
	-	Decoded DVB-CID info
	-	MER variation
	-	Event History and Alarm Log
	-	History of Shoulder Attenuation/ MER/PAR variation

4.5.1 DVB-S/S2/S2x Receiver Settings

below presents settings available when the Receiver is operating in DVB-S/S2 mode.

⁷ For DVB-S2 only

Control Panel Da	shboard		💄 Admin 👻
RF Layer Monit	or		
Status	Settings		
Configuration	Command	Run ~	
Settings Emission mask	Active Input	RFin1 ~	
Site Info	Rx gain, dB	AGC ~	
Alarms	Central Freq, Hz	100000000	950000000 2150000000
NMS	Spectral Only	Off v	
System	Symbol Rate (Symbols/sec)	27500000	5000000 50000000
	Roll Off	0.35 ~	
	DVB-CID decode	Off ~	
	Result Update Rate Reduction	1	1200
		Update	
Connected: Processing (No erro	ors)		Powered By

Figure 34. DVB-S/S2/S2x Receiver Settings

DVB-S/S2/S2x mode specific settings include:

- "Symbol Rate" allows specifying DVB-S/S2/S2x signal Symbol Rate;
- "Roll Off Factor" is used to set Roll Off Factor;
- "DVB-CID decode On/Off" switches On/Off DVB-CID decoding functionality.

4.5.2 DVB-S/S2 Statistics and Plots

Below only specific to DVB-S/S2/2x broadcast standard plots and available numerical data are presented. Please refer to the common to all broadcast standards sections of the Manual for the full set of plots and data provided by ANY1022 Receiver.



Figure 35. DVB-S/S2/S2x Spectrum with In-band DVB-CID Signal

(A)	AVQ1022 - RF LAYER MONITORING RECEIVER	Standard DVB-S/S2	Freq, Hz	RF in RFin1	Pin, dBm	Scale
MER. dB 36.3 Shoudder Attenuation, dB 1 Let 45.5 Right 46.2 Frequency Shit, Hz -165.5 3 Bite Name: ActiveCore 3	General 0 Signal Scale 0.07 Input RF power (dBm) 0 Signal Scale 0.07 RMS 714.13 Frequency Shift (Hz) -105.52 PAPR (dB) 10.64 Sample Rate Shift (Hz) 0					
	Standard Specific Format DVB-S2x MER (dB) 36.34 ModCod 256APSK SNR (dB) 37.62 ModCod 124/180 EVM (%) 0 FECFRAME LDPC-64800 STED (dB) 0.001 Pilot Not present STEM 0.002 Spectrum Inverted Eb/No (dB) 19.562 Residual GD 0.014 (usec) 0.014					
	Offsets, MHz Levels L, dB Levels R, dB 2.75 -0.08 -0.21 5.50 0.08 -0.25 11.00 -0.66 -1.29 12.37 -1.42 -2.60 13.75 -2.95 -4.75 16.50 -10.02 -11.81 19.25 -39.40 -40.12 22.00 -39.36 -40.04 29.14 -39.53 -40.44					
NTP -00- and Connected: Processing (No error	(5)		₹I.§		ECOI	RE

Figure 36. Signal General and DVB-S/S2 Specific Statistics



Figure 37. DVB-CID Info



Figure 38. DVB-S2x Constellation

5 Relay and Unit Reset DB9F Pin-out

Functionality	Pin number	Alarm State/Pins
Relay 2	1 – NO	Alarm Off (4->1)
	4 - COM	
	6 – NC	Alarm On (4->6)

Relay 1	7 – NO	Alarm Off (8->7)
	8 - COM	
	9 – NC	Alarm On (8->9)
Unit Reset to defaults	2 – VDD reset	2->3
	3 – IN reset	

Table 6 Relay DB9F Pinout

CAUTION:

Any changes/modifications not approved by Anywave could void the user's authority to operate the equipment.