

# ACTIVECORE®

## AVQ1050 ATSC 3.0 BPS RECEIVER AND SYNCHRONIZER



### FEATURES

- ▶ ATSC 3.0 Frame emitting time synchronization
- ▶ ATSC 3.0 Preamble TAI correction
- ▶ BPS and timing information reception and redistribution
- ▶ 1PPS and 10MHz reference source
- ▶ Core component for ATSC 3.0 BPS enabled networks
- ▶ Interface to ATSC 3.0 Exciter Time Information Position (TIP) adjustment protocol
- ▶ Proprietary TxID Explorer and CIR deconvolution tools for Time of Arrival (TOA) of the earliest significant multipath component detection for ATSC 3.0 signals
- ▶ Comprehensive analysis of all stages of data distribution and service delivering from Gateway/Scheduler to in-field reception point
- ▶ Industry leading set of tools for ATSC 3.0 signal quality monitoring and troubleshooting

### Description

Based on the industry verified **ActiveCore®** Platform, the **AVQ1050** device supports two functional modes of operation – a **BPS Synchronizer** and a **BPS Receiver**. In the Synchronizer mode, it constantly measures and adjusts the emission TAI time stamp of ATSC 3.0 Frame Preamble. The adjustments are sent directly to a BPS enabled exciter via a dedicated network interface. Assuming that the broadcast signal delivers a correct TAI time stamp, in the Receiver mode the device can synchronize its clock using the ATSC 3.0 signal. Based on the carried in a PLP BPS info and the precise ATSC 3.0 Bootstrap info, the receiver can maintain a very accurate internal clock and provide reference 1PPS and 10MHz signals for external equipment. Besides the BPS functionality, the receiver offers a comprehensive set of tools for monitoring,

analyzing, and troubleshooting the RF signal quality, a detailed analysis of each component of the ATSC 3.0 physical layer framing structure, Avateq's proprietary in-band interference and link margin estimation.

Proprietary **TxID Explorer** and **CIR deconvolution** tools for Time of Arrival (TOA) of the earliest significant multi-path component detection for ATSC 3.0 signals provides an additional level of capabilities for SFN applications troubleshooting, management, and verification.

With the ability to provide spectrum sharing and bandwidth usage statistics for each service, the receiver can be used for building metered/managed content delivery networks.

### Technical Specification

<b>Main signal input "RF in":</b>		<b>10MHz:</b>	Input: 50Ω, BNC, 1Vp-p, sine Output: 50Ω, BNC, 5Vp-p, sine
Connectors:	50Ω, N-type	<b>1PPS:</b>	Input: 50Ω, BNC, TTL compatible Output: 50Ω, BNC, TTL compatible
Power level:	-70 ... +5 dBm (off-air) -50 ... +5 dBm (Tx output) -20 dBm optimum	<b>Ethernet:</b>	3x RJ45 10/100/1000
Frequency range:	100 ... 1000 MHz	<b>Form factor:</b>	1U RF Frontend module and 2U Processing module
Frequency tuning step:	1kHz	<b>Operating temperature:</b>	0 .. 50, °C
<b>IRIG-B126:</b>	Output: High density DB26	<b>Power Supply:</b>	110 - 250V, 50/60Hz AC

# AVQ1050 ActiveCore® ATSC 3.0 BPS Receiver and Synchronizer

## DATASHEET

### PHY Layer Analysis

**Parameters:** MER/SNR; MER for Bootstrap, L1, and selected PLP; Signal PAPR; Bandwidth; Freq and Sampling rate shifts; Shoulder attenuation; Emission/Spectral mask compliance; Groups Delay across bandwidth; ATSC 3.0 frame structure; Bootstrap, L1D, and L1B signaling info; LDPC BER for L1 and selected PLP.

**Plots:** Spectrum of the main lobe and in-band interference; Channel Amplitude/ Phase and Impulse responses; CCDF; Raw, Bootstrap, L1, and selected PLP constellations; Channel Impulse Response/ SFN/ Echo profile; Group delay.

**Software Interfaces:** WebGUI; SNMP v2c and v3; Email; MqTT

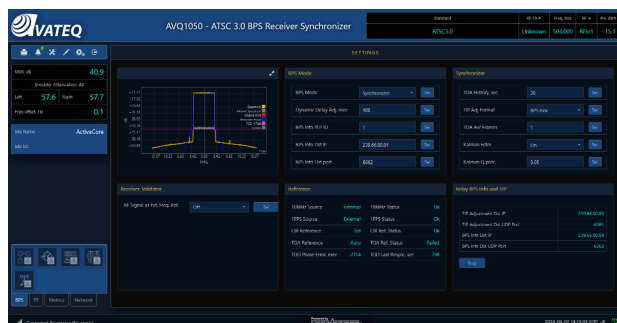
**Alarms:** Input signal level; Spectrum shoulder levels; Signal MER; CIR/ Echo profile variations; Freq shift; etc.

**Data logging and reporting:** Detailed report with parameters and plots; Event and alarm log; Main parameters time interval log.

**Additional tools:**

- Selected service streaming:
  - Reassembled DASH/ROUTE (HTTP)
  - ALP packets for sel PLP (UDP)
- ATSC 3.0 STLTP – verification and detailed analysis
- Network tools for connection verification and troubleshooting

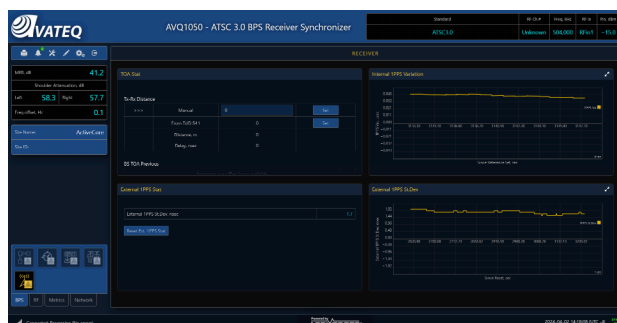
### Samples of Reported Parameters and Plots



BPS Settings



BPS TOA and TIP



BPS Receiver



BPS TOA Reference and CID deconvolution

### BPS Functionality

**Modes of operation:**

**BPS Synchronizer:** Transmission path delay estimation and adjustment

**BPS Receiver:** Test, validation, and characterization of BPS deployment

**Supported features:**

- ▶ Communication interface with transmission equipment and PID based feedback loop to adjust ATSC 3.0 TIP
- ▶ ATSC 3.0 Bootstrap Time of Arrival measurement and *bps\_info* update
- ▶ Timeline restoration based on ATSC 3.0 L1 time info
- ▶ Synchronization of the receiver clock with ATSC 3.0 L1 time info and generation of a reference for further redistribution
- ▶ Extracting, decoding, displaying, and logging *bps\_info*

### Contact Information

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### Connection Diagram

