AVQ1020 ActiveCore®
RF Layer Monitoring Receiver and Signal Analyzer

OFDM Constellation:

32PSK Signal Analysis:

Transmitter System Calibration and Verification:

Non-linear distortions:

Linear distortions:

AVQ1020 Implementation for Digital TV and Radio Broadcasting Standards:

Standard specific measurements:

<table>
<thead>
<tr>
<th>Model</th>
<th>Standards</th>
<th>Additional standard-specific parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVQ1020ATSC</td>
<td>ATSC A/53 and ATSC A/153</td>
<td>spectral mask conformance to FCC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AM-PM distortions</td>
</tr>
<tr>
<td>AVQ1020DVBT</td>
<td>DVB-T, DVB-H, and DVB-T2</td>
<td>DVB-T2 LI Tone Amplitude and Phase Linear</td>
</tr>
<tr>
<td>AVQ1020SCOTB</td>
<td>ISDB-T and ISDB-Ts</td>
<td>MER per Symbol per Slot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Constellation per Slot</td>
</tr>
<tr>
<td>AVQ1020DAB</td>
<td>DAB, DAB+, and D-THB</td>
<td>RF decoding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TII decoding</td>
</tr>
<tr>
<td>AVQ1020CMMB</td>
<td>CMMB</td>
<td>Scrambling option</td>
</tr>
<tr>
<td>AVQ1020DTMB</td>
<td>DTMB</td>
<td>OFDM &amp; single carrier modes</td>
</tr>
<tr>
<td>AVQ1020DVBS</td>
<td>DVBS/S2</td>
<td>In-band interference</td>
</tr>
</tbody>
</table>

Contact Information:

AVATEQ CORP.
3355 - 14th Ave, Unit 18
Markham, ON L3R 0H5
Canada
Phone: 1.416.342.0761
Fax: 1.416.342.0608
Email: info@avateq.com
Web: www.avateq.com

Features:

- Monitoring and measurement of RF Modulated Layer at the transmitter output;
- Real performance metrics of the transmitter system;
- Combination of functional and measurement capabilities with cost effectiveness of the Receiver/Analyzer guarantees the ideal solution for monitoring RF signal quality of remote transposers, re-broadcast links, repeaters, and unmanned sites without additional costly RF test equipment;
- Comprehensive set of critical RF measurements including signal MER/SNR, frequency spectrum, shoulder attenuation, frequency shift, etc.
- Estimation of signal distortions at the transmitter system output caused by the system non-linearly - AM-AM/AM-PM curves and band-path filtering - group delay, amplitude and phase responses with an ability to use the estimated numbers in a form of complex LUT and FIR for non- and linear pre-correction;
- Early indication of signal degradation as a result of the transmitter system components aging or operational parameters variations;
- An embedded solution for remote applications, in-field diagnostics, production testing and design verification;
- Flexible solution with the in-field upgrade capability including diagnostic and monitoring features that can be tuned to meet the most demanding requirements of customer’s application;
- Rich plotting capabilities for data visualization;
- Transmitter site monitoring device with rich set of hardware interfaces;
- Event log.

Introduction

Based on ActiveCore® Platform, AVQ1020 is a monitoring receiver and signal analyzer for all major digital broadcasting standards including proprietary modulation schemes. It has been designed as an easy-to-use and cost-effective solution for monitoring digital transmitter systems performance. The receiver can be integrated into a transmitter system for remote monitoring applications or used as a stand-alone unit during design verification, production tests and system calibration.

In the context where broadcasters are more and more concerned about reducing their network OPEX costs and at the same time limiting impact on the environment, it becomes important for the transmitter systems and repeater networks to be designed as reliable as possible in terms of the QoS provided to the service subscribers. The receiver allows not only monitoring signal parameters but it also can be used for estimation and characterization of the transmitter system performance - distortions introduced by the amplification and filtering chains. The unique functionality allows the receiver to be also used for estimation of critical RF parameters of high power amplifier performance using real broadcasting signals. The ActiveCore® monitoring receiver is available as a stand-alone unit (1U) or OEM module.
**AVQ1020 ActiveCore®**
RF Layer Monitoring Receiver and Signal Analyzer

**Main signal input: “RF in”:**
- **Connector:** 50Ω, SMA(OEM)/N-type(1U)
- **Input level:** 0...-50 dBm; -20 dBm optimum
- **Frequency range:** 50...1000 MHz / 950...3000 MHz
- **Frequency tuning step:** 10 Hz
- **Analyzed bandwidth:** ≥ 50 MHz

**Reference frequency:**
- 1 PPS: LVTTL, SMA(OEM)/BNC(1U)
- 10 MHz: 50Ω, 1Vp-p, sine, SMA(OEM)/BNC(1U)

**Control and monitor ports:**
- **Ethernet:** 10/100/1000 Fast Ethernet, RJ45
- **Serial:** RS232, Molex(OEM)/DB9M(1U)
- **Relay control (x2):** Dry contacts, Molex(OEM)/DB9F(1U)

**Power supply:**
- 2A@12V DC (OEM)
- 110-250V, 50/60Hz AC (1U)

**Operating temperature:**
- 0...50 °C

**Form factor:**
- OEM module: 37cm x 14cm x 4.3cm (14.5” x 5.5” x 1.7”)
- 1U stand-alone unit: 48.3cm x 33cm x 4.3cm (19” x 13” x 1.7”)

---

**Technical specification:**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector</strong></td>
<td>50Ω, SMA(OEM)/N-type(1U)</td>
</tr>
<tr>
<td><strong>Input level</strong></td>
<td>0...-50 dBm; -20 dBm optimum</td>
</tr>
<tr>
<td><strong>Frequency range</strong></td>
<td>50...1000 MHz / 950...3000 MHz</td>
</tr>
<tr>
<td><strong>Frequency tuning step</strong></td>
<td>10 Hz</td>
</tr>
<tr>
<td><strong>Analyzed bandwidth</strong></td>
<td>≥ 50 MHz</td>
</tr>
<tr>
<td><strong>Control and monitor ports</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ethernet</strong></td>
<td>10/100/1000 Fast Ethernet, RJ45</td>
</tr>
<tr>
<td><strong>Serial</strong></td>
<td>RS232, Molex(OEM)/DB9M(1U)</td>
</tr>
<tr>
<td><strong>Relay control (x2)</strong></td>
<td>Dry contacts, Molex(OEM)/DB9F(1U)</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>2A@12V DC (OEM)</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>0...50 °C</td>
</tr>
<tr>
<td><strong>Form factor</strong></td>
<td></td>
</tr>
<tr>
<td><strong>OEM module</strong></td>
<td>37cm x 14cm x 4.3cm (14.5” x 5.5” x 1.7”)</td>
</tr>
<tr>
<td><strong>1U stand-alone unit</strong></td>
<td>48.3cm x 33cm x 4.3cm (19” x 13” x 1.7”)</td>
</tr>
</tbody>
</table>

---

**Monitored Parameters:**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Signal</strong></td>
<td>PAR, RMS</td>
</tr>
<tr>
<td><strong>Spectral</strong></td>
<td>Bandwidth, frequency shift, Peak-to-Average Power, Shoulder Attenuation</td>
</tr>
<tr>
<td><strong>Modulation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Distortions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Non-linear</strong></td>
<td>AM-AM, AM-PM curves; Output complex LUT array is available for DAP</td>
</tr>
<tr>
<td><strong>Linear</strong></td>
<td>Amplitude and Phase response; Output complex FR coefficients are available for DAP</td>
</tr>
<tr>
<td><strong>Default set of alarms</strong></td>
<td>Spectrum shoulder levels/mask; Signal MER/SNR/EVM; Frequency shift.</td>
</tr>
<tr>
<td><strong>Application-specific alarm events</strong></td>
<td>Use-defined set of parameters and their thresholds</td>
</tr>
<tr>
<td><strong>Parameter update rate</strong></td>
<td>≤ 60 sec</td>
</tr>
<tr>
<td><strong>Available plots and log data</strong></td>
<td>Spectrum; Constellation; AM-AM, AM-PM; Channel Amplitude and Phase responses; CCDF; SINR; Output complex FR coefficients; SNR; MER/SNR; EVM variation history; Shoulder attenuation history; Event and Alarm log.</td>
</tr>
</tbody>
</table>

**Applications:**

- Digital transmitter/repeater performance 24/7 monitor;
- Remote monitoring for broadcasting repeater system network;
- Test and design verification equipment;
- Signal analyzer for a wide variety of applications;
- R & D;
- In-field and production testing.

---

**Signal Spectral and Statistical Analysis:**

- **Spectral Analysis** (Web GUI):
  - PAR, RMS
  - Bandwidth, frequency shift, Peak-to-Average Power, Shoulder Attenuation
  - AM-AM, AM-PM curves;
  - Output complex LUT array is available for DAP
  - Amplitude and Phase response;
  - Output complex FR coefficients are available for DAP
  - Spectrum shoulder levels/mask;
  - Signal MER/SNR/EVM;
  - Frequency shift.

- **Parameter update rate:** ≤ 60 sec
- **Available plots and log data:**
  - Spectrum;
  - Constellation;
  - AM-AM, AM-PM;
  - Channel Amplitude and Phase responses;
  - CCDF;
  - SINR; Output complex FR coefficients;
  - SNR; MER/SNR; EVM variation history;
  - Shoulder attenuation history;
  - Event and Alarm log.

- **Software interfaces:**
  - WEB GUI;
  - Host based GUI (PC GUI);
  - SNMP agent;
  - Email.

**AVQ1020 Versions:**

- **AVQ1020 1U:**
- **AVQ1020 OEM:**

**AVQ1020 1U Front Panel:**

**AVQ1020 1U Rear Panel:**

---

**ActiveCore®** is a registered trademark of Avateq Corp. 2014 © Avateq Corp. All rights reserved. AVQ1020 v.20140901