# SAT-4d
# DVB Audio Satellite Receiver

## Datasheet

### Highlights

- Professional DVB-S/S2/S2X audio receiver
- Multi-format 4-channel audio decoder
- Designed for audio over satellite distribution links

Your audio. Our solution.

2wcom

# SAT-4d – DVB Audio Satellite Receiver




The SAT-4d is a multi-format 4-channel audio satellite receiver. It offers reliable reception of up to 4 audio programs from satellite and supports analog and digital audio. You can choose between two different satellite tuners. The advanced single tuner supports DVB-S/S2 and the dual tuner supports DVB-S/S2/S2X. The SAT-4d is ideal for radio studios and transmitter sites and includes 3 backup sources to ensure an uninterrupted audio distribution.

## Flexible in Application – Pay as You Grow

- Optimized for broadcast distribution over satellite
- Expandable to up to 4 channels, allowing you to pay only for as many as needed
- Supports up to 4 digital channels, up to 2 analog channels, and a mixed operation of up to 2 channels
- Upgradeable with hardware and software options according to your needs

## Multi-Standard Satellite Reception and Processing

- Choice between the default dual tuner and the optional advanced tuner: both support DVB-S/S2
- Additional support of DVB-S2X with the default dual tuner
- Optional support of low symbol rates starting at 64 kSym/s with the advanced tuner
- Support of multiple demodulation standards like 8PSK, 16APSK and 32APSK
- Transfer of SAT data over IP via MPE-Forwarding (optional for both tuners) and GSE (advanced tuner only)
- ASI output and input to process transport streams

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# SAT-4d – DVB Audio Satellite Receiver

## Versatile Compatibility – Complete Audio Decoder Support

- Comprehensive codec support for unmatched interoperability (see Specifications)
- Optimized studio-to-transmitter links (STL) with efficient coding formats like MPEG-Layer 2 and AAC-LC; ensure highest fidelity and minimal latency with bit-transparent transmission of digital audio
- Flexibility for IP based backup feeds with codecs like Opus, Enhanced aptX (E-aptX) and xHE-AAC
- Professional audio streaming: Decoding of web streams supporting mp3, OGG, Opus and the complete AAC family

## Smooth Integration – Compatible with various Audio over IP Formats

- 2wcom provides robust network connections by combining multiple proven technologies to deliver your audio even in stressful conditions.
- Unicast, multiple unicast, and multicast for maximum network control
- Proven multimedia transport protocols such as UDP, RTP and RTSP
- De-multiplex and decode from MPEG-TS over IP
- Well-established audio protocols such as AES67, SMPTE ST 2110, Livewire and RAVENNA*
- Receive audio from HLS, MPEG DASH, Icecast Source Client und Icecast Server

## Advanced Streaming Robustness – Unmatched Broadcast Resilience

- PRO MPEG Forward Error Correction (FEC) and dual streaming for resilient, redundant streams
- Secure and reliable streaming over unpredictable networks with Secure Reliable Transport (SRT)* and Reliable Internet Stream Transport (RIST)
- Manage packet size, buffering, and Quality of Service (QoS) for a robust streaming performance
- Multiple redundancy options and source switching for uninterrupted streaming including Dual Streaming and Stream4Sure

## Audio Latency Management – Ensuring Precise Synchronization

- SPN (Synchronous Playout Network): Uses NTP (Network Time Protocol) to synchronize audio input and output across devices, preventing timing drifts (for example, at transmitter sites) with a precision of < 20 ms
- SFN (Single Frequency Network)*: Uses 1PPS for a precision of < 10 µs, enabling SFN operation for FM broadcasting

## Reliable and Uninterrupted Operation

- Flexible backup concept with automatic switching between 1 main source and 3 backup sources. Backups can be any kind of input source, including internal storage, physical interfaces, and web stream.
- 2 dedicated IP interfaces for data transmission, along with an extra IP interface for control, allow a dependable IP streaming experience.
- All 3 IP interfaces can be flexibly configured for either data transmission or control.
- Redundant power supplies (90 – 260 VAC or 48 VDC) provide a fail-safe system, ensuring continuous operation even during a power supply failure.

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# SAT-4d – DVB Audio Satellite Receiver

## User-Friendly and Streamlined Access

- Modern and easy-to-use web interface
- Uniform operating concept across all 2wcom devices for maximum usability
- LCD menu for direct on-site access
- Audio monitoring via web interface or any web stream client with Live Listening

## Smart Management and Seamless Integration

- Well-established APIs and physical control seamlessly integrate into your current infrastructure: Rest API, Ember+, SNMP, NMOS, and GPI
- Stay informed: Flexibly configurable alarm events and notifications over SNMP, GPO, and front panel LED

## Verified IP Security

- High-level security within open IP infrastructures
- Thoroughly examined by independent audit authorities through whitelist/blacklist penetration tests

# Specifications

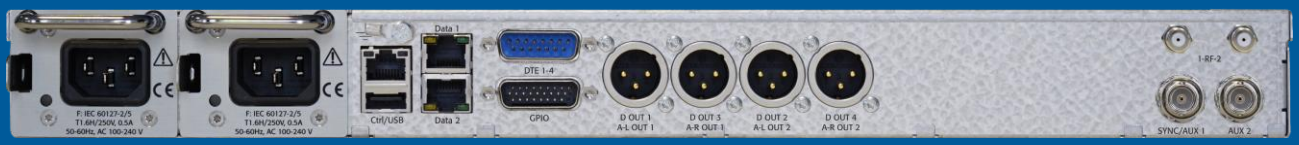


## Reception

### Satellite Tuner

| | Dual DVB-S/S2/S2X Tuner (default) | Advanced DVB-S/S2 Single Tuner (optional) |
|---|---|---|
| Connector RF1 | F connector female (input) | F connector female (input) |
| Connector RF2 | F connector female (2nd input) | F connector female (loop-through) |
| Frequency range | 950 – 2.150 MHz, in 1 kHz steps<br>All LNB oscillator frequencies possible | 950 – 2.150 MHz, in 1 kHz steps<br>All LNB oscillator frequencies possible |
| Input level, impedance | -75 – -20 dBm, 75 Ω | -75 – -20 dBm, 75 Ω |
| LNB Control | 13 V vertical, 18 V horizontal, off 0 kHz low band, 22 kHz high band | 13 V vertical, 18 V horizontal, off 0 kHz low band, 22 kHz high band |
| Noise figure | Typically 6 dB, max. 12 dB | Typically 6 dB, max. 12 dB |
| DVB-S Demodulation/ Decoding | QPSK: 1/2, 2/3, 3/4, 4/5, 5/6, 7/8<br>CCM<br>VITERBI and Reed-Solomon decoder<br>DIRECTV™ (DSS) compliant | QPSK: 1/2, 2/3, 3/4, 4/5, 5/6, 7/8<br>CCM<br>VITERBI and Reed-Solomon decoder<br>DIRECTV™ (DSS) compliant |
| DVB-S2/S2X Demodulation/ Decoding | QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 8/10<br>8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10<br>16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10<br>32APSK: 3/4, 4/5, 5/6, 8/9, 9/10<br><br>Roll-off 0.05 – 0.35<br>Normal frames only (no short frames)<br>CCM / VCM / ACM<br>LDPC and BCH decoder<br><br>S2 Professional Profile/S2X Broadcast Profile | QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 8/10<br>8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10<br>16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10<br>32APSK: 3/4, 4/5, 5/6, 8/9, 9/10<br><br>Roll-off 0.20 / 0.35<br><br>CCM / VCM / ACM<br>LDPC and BCH decoder<br><br>S2 Professional Profile |
| Symbol rates | QPSK, 8PSK, 16APSK:<br>1 – 45 MSym/s<br>32APSK: 1 – 40 MSym/s | QPSK, 8PSK, 16APSK:<br>0.64 – 45 MSym/s<br>32APSK: 0.64 – 38 MSym/s |

# Specifications



| | | |
|---|---|---|
| Data processing | single and multiple MPEG TS<br>GSE-HEM (S2X only) – on request | single and multiple MPEG TS<br>single and multiple GSE |
| PL scrambling | ID 0 - 262144 | ID 0 - 262144 |
| IF Filter bandwidth | Automatic selection | Automatic selection |
| MPEG decoding | according to ETSI TR 101 154 | according to ETSI TR 101 154 |

## Formats and Protocols

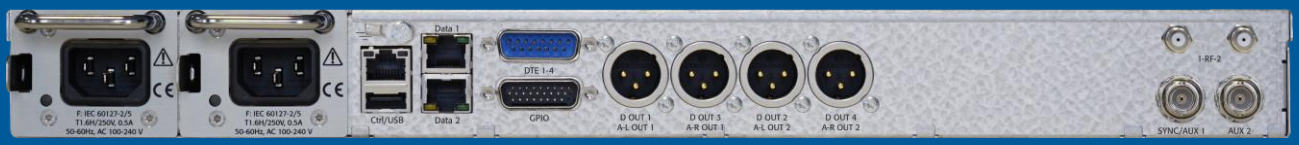
### Audio

| | |
|---|---|
| Codecs (included) | Linear PCM, SMPTE 302M, AM824<br>G.711, G.722<br>Opus, Ogg Vorbis<br>MPEG 1/2 Layer 2, 3<br>MPEG-2/MPEG-4 AAC-LC, MPEG-4 HE-AAC v1 & v2, MPEG-4/MPEG-D xHE-AAC<br>MPEG-4 AAC-LD/ELD/ELDv2<br>Enhanced aptX (E-aptX) |
| Bit depth | 16, 20, 24 bit |
| Sample rates | 16, 22.05, 24, 32, 44.1, 48 kHz<br>(On request: up to 192 kHz) |

### Streaming

| | |
|---|---|
| IP protocols | TCP, UDP<br>unicast, multiple unicast & multicast |
| Audio over IP formats | RTP (RFC 3550, RFC 3551, RFC 3640, RFC 2250)<br>SIP/SAP according to EBU Tech 3326<br>SMPTE ST 2110 (optional)<br>AES67 based on RAVENNA, Livewire, or Dante (optional)<br>Livewire / RAVENNA (SAP/SDP, RTSP, AES67, PTP, PTPv2) (optional)<br>MPEG-TS |
| Web streaming | Icecast/Shoutcast Client<br>HLS decoder (optional) |

# Specifications



| | |
|---|---|
| Transmission robustness | SRT, RIST<br>Pro-MPEG FEC #3 release 2<br>Dual Streaming<br>2wcom Stream4Sure<br>µMPX FEC<br>Adaptive bitrate switching, source switching concept, management of packet size, buffers, QoS |

## Synchronization

| | |
|---|---|
| Internal | free-running |
| External | 1PPS, PTP, PTPv2, NTP, digital reference input |
| Decoder synchronization between different devices | < 20 ms using SPN via NTP (optional)<br>< 1 µs using SFN via 1PPS or PTP, PTPv2 (optional) |
| Sample rate converter | Asynchronous, any ratio |

# Interfaces

## Audio

| | |
|---|---|
| Digital (out) | 4x AES/EBU, 110 Ω balanced<br>integrated XLR male, shared with analog out (configurable) |
| Analog (out) | 2x L/R, < 20 Ω balanced<br>integrated XLR male shared with digital out (configurable) |
| Analog reference level | +9 dBu |
| Digital reference level | -9 dBFS |
| Adjustable gain | 20 – +6 dB |
| Dynamic range | 16 Bit: > 89 dB; 24 Bit: > 130 dB |
| Frequency response | Depends on sample rate. For example: 48 kHz: 0.1 dB; 20 Hz – 22.5 kHz |

## Interface Extensions

| | |
|---|---|
| ASI input | 75 Ω BNC socket, 270 Mbit/s, MPEG2 TS<br>Note: Configurable to be either ASI input or 1PPS SYNC input. |
| ASI output | 75 Ω BNC socket |

# Specifications

## Ethernet

| | |
|---|---|
| Connector | 3x RJ45 (1x Control, 2x Data) |
| Type | Auto-switching 10/100/1000 BASE-T<br>Unicast, Multicast |

## Synchronization

| | |
|---|---|
| 1PPS input | 75 Ω BNC socket<br>Note: Configurable to be either 1PPS SYNC input or ASI input. |

## Serial and GPIO

| | |
|---|---|
| USB | USB 2.0 interface for service, configuration, and firmware updates |
| GPIO | 26 pole D-Sub male; combined connector for inputs (GPI) and outputs (GPO) |

## Internal Storage

| | |
|---|---|
| Size | 7 GB (optional 128 GB) |
| Type | eMMC (optional SSD) |

## Front Panel

| | |
|---|---|
| Headphone | 6.3 mm / 1/4” socket, < 10 Ω |
| LEDs | Power, Input, Output, Warning |
| Operation | Display and Jog Wheel |
| Display | LCD, graphical, 264x64 pixel |

# General Data

## Integrated Web GUI

| | |
|---|---|
| Languages | English |
| Web technologies | HTML5, Java Script |

## Device

| | |
|---|---|
| Power consumption | < 20 W |
| Case dimensions | 19”, 1 RU, depth: 310 mm, width: 424 mm, front panel: 484 mm |
| Weight | < 5 kg |
| Material | Steel plate, aluminum-zinc coated |
| Operating temp. range | 0 – +45 °C |
| Storage temp. range | -40 – +70 °C |

# Specifications

## Power Supply

| | |
|---|---|
| Standard AC | 1x internal IEC power connector<br>voltage range 90 – 260 VAC (nominal 100 – 240 VAC)<br>frequency range 47 – 63 Hz (nominal 50 – 60 Hz) |
| Standard DC (optional) | 1x internal (Neutrik powerCON)<br>voltage range -40 – -60 VDC (nominal -48 VDC) |
| Dual internal (optional) | 2x internal redundant power supplies (AC or DC) automatic switchover and prioritization<br>AC: 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz)<br>DC: -40 – -60 VDC (nominal -48 VDC) |
| Dual hot-plug (optional) | 2x hot-swappable redundant power supplies (AC or DC)<br>automatic switchover and prioritization<br>AC: 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz)<br>DC: -40 – -60 VDC (nominal -48 VDC) |

# Options




## SAT-4d Base Unit Variations

To customize your device, start by selecting a base unit variation, then choose from our range of hardware and software options to fit your needs. Each unit includes one audio channel and the Dual DVB-S/S2/S2X Tuner by default. You can choose from the following base unit variations:

| Article no. | Name |
|---|---|
| VER63601 | Base unit SAT-4d with 1x internal AC power supply |
| VER63602 | Base unit SAT-4d with 2x internal AC power supplies |
| VER63603 | Base unit SAT-4d with slot for 2x hot-plug power supplies<br>Note: 2x hot-plug power supplies AC/DC not included. Please order 2x hot-plug power supplies AC (VER45851) or DC (VER45852). |
| VER63604 | Base unit SAT-4d with 1x AC and 1x DC (DC leading) internal power supplies |
| VER63605 | Base unit SAT-4d with 1x DC internal power supply |

## Hardware Options

Please note that hardware options are installed at the factory in Flensburg, Germany, and can only be retrofitted independently in individual cases.

| Article no. | Name | Description |
|---|---|---|
| VER63613 | Advanced single satellite tuner (*) | DVB-S/S2 low symbol rate single tuner module with additional loop-through output<br>• QPSK, 8PSK, 16APSK, 32APSK<br>• Supported symbol rates: 64 kSym/s – 45 MSym/s<br>• GSE Support<br>(*) Replaces default tuner. |
| VER65120 | Internal SSD storage | 128 GB internal SSD storage |
| VER63009 | Breakout cable RS232 8-times | Cable for in- and output of 8 ancillary data (for example UECP RDS data) via RS232 cable. |

# Options

## Software Options

Please note that software options can be retrofitted remotely.

| Article no. | Name | Description |
|---|---|---|
| VER63610 | Activation of additional audio channel | Activation of additional audio channel of the base unit incl. all ordered audio codecs.<br>The third and fourth channels are only available as digital channels. |
| VER63614 | Audio-Backup IP-input - Icecast | IP-Audio streaming input as an additional backup solution.<br>Icecast/Shoutcast Client.<br>Price per unit. |
| VER63615 | Audio-Backup File playout | File playout from internal memory as an additional backup solution.<br>Price per unit. |
| VER63016 | SRT/RIST decoder | SRT functionality for decoder according to SRT standard of the SRT Alliance (including UDP).<br>RIST functionality for decoder according to IETF standard "RIST Simple Profile" and RFC 4585.<br>Price per activated channel. |
| VER63028 | HLS decoder | Adds HLS, HTTP Live Streaming Decoder function.<br>Price per activated stereo channel. |
| VER63001 | RAVENNA, AES67, PTP | Audio output according to the RAVENNA technology for audio over IP interoperability (including AES67, SAP/SDP, RTSP, PTP, PTPv2).<br>Price per activated channel. |
| VER63012 | Livewire+ | According to the standard of audio over IP interoperability Livewire+ (including AES67, LWRP, LWCP, Livewire Advertisement).<br>Price per activated channel. |
| VER63024 | MPE | MPE (Multiprotocol Encapsulation) encoding/decoding.<br>Price per unit. |
| VER63025 | TS forwarding over IP | TS Forwarding enables the forwarding of a complete TS or MPE-forwarding (requires option MPE VER63024).<br>The SAT tuner is used as source.<br>Price per activated channel. |

# Options

| Article no. | Name | Description |
|---|---|---|
| VER63003 | SFN (single frequency network) | Perfect timing and network synchronization suitable for FM-SFN networks.<br>Timing sources:<br>• 1PPS<br>• PTP, PTPv2 (*)<br>(*) Requires option Ravenna, AES67, PTP (VER63001).<br>Price per unit. |
| VER63617 | BISS Descrambling | Descrambling of BISS-1 and BISS-E according to EBU-Tech 3292 rev. 2.<br>Price per unit. |
| VER63029 | Loudness measurement | Loudness measurement for the audio outputs according to EBU R128 and ITU-R BS.1770/BS.1771.<br>Measures and displays momentary/short-term/integrated loudness, loudness range (LRA) and True Peak (dBTP).<br>Price per activated channel. |