

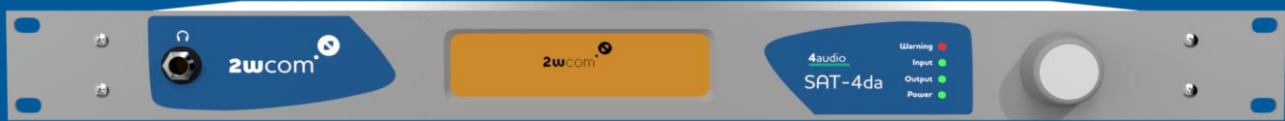
# SAT-4da DVB Audio Satellite Receiver

## Datasheet

### Highlights

- Professional DVB-S/S2/S2X audio receiver
- Multi-format 4-channel audio decoder
- Full analog and digital stereo support with 8 XLR outputs

# SAT-4da – DVB Audio Satellite Receiver



The SAT-4da is a multi-format 4-channel audio satellite receiver. It is perfect for high-density analog installations, coming with 8 XLR outputs to support up to 4 analog stereo channels. 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-4da 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
- Full 4-channel support for digital audio, L/R analog audio or mixed operation of analog and digital audio
- 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



## 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.



## 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



## 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 (2 <sup>nd</sup> 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 $\Omega$                                                                                                                                                                                                                                                                                                                           | -75 – -20 dBm, 75 $\Omega$                                                                                                                                                                                                                                                                 |
| LNB Control                      | 13 V vertical, 18 V horizontal, off 0 kHz<br>low band, 22 kHz high band                                                                                                                                                                                                                                                                              | 13 V vertical, 18 V horizontal, off 0 kHz<br>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<br>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)                                                                                                                                                                                                     |
| 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)            | 4x 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                                                                               |
| Harmonic distortion     | < 0.05 % / < -66 dB (40 Hz – 10 kHz)                                                     |
| 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 $\Omega$ BNC socket, 270 Mbit/s, MPEG2 TS<br>Note: Configurable to be either ASI input or 1 PPS SYNC input. |
| ASI output | 75 $\Omega$ BNC socket                                                                                         |

## Ethernet

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

## Synchronization

|                          |                                                               |
|--------------------------|---------------------------------------------------------------|
| 1PPS input               | Note: Configurable to be either 1PPS SYNC input or ASI input. |
| GPS (optional)           | 75 $\Omega$ BNC socket, from GPS module                       |
| 10 MHz output (optional) | 50 $\Omega$ SMA socket, from GPS module                       |
| 1PPS output (optional)   | 75 $\Omega$ BNC socket, from GPS module                       |

## Serial and GPIO

|      |                                                                           |
|------|---------------------------------------------------------------------------|
| DTE  | 15 pole D-Sub male connector for serial RS-232C data communication        |
| 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 $\Omega$ |
| 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                                                       |

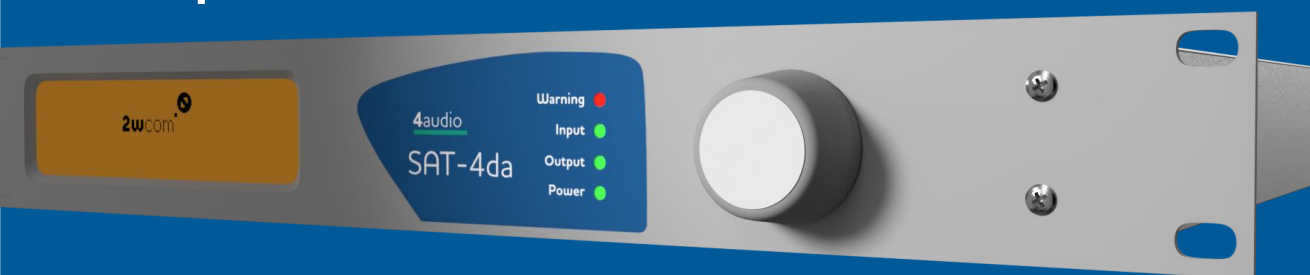


|                       |                                   |
|-----------------------|-----------------------------------|
| Material              | Steel plate, aluminum-zinc coated |
| Operating temp. range | 0 – +45 °C                        |
| Storage temp. range   | -40 – +70 °C                      |

## 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-4da 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                                                                                                                                                                                       |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VER63701    | Base unit SAT-4da with 1x internal AC power supply                                                                                                                                         |
| VER63702    | Base unit SAT-4da with 2x internal AC power supplies                                                                                                                                       |
| VER63703    | Base unit SAT-4da 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). |

## 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 <ul style="list-style-type: none"><li>QPSK, 8PSK, 16APSK, 32APSK</li><li>Supported symbol rates: 64 kSym/s – 45 MSym/s</li><li>GSE Support</li></ul> (*) 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.                                                                                                                                                                         |
| VER45851    | Hot-plug AC power supply            | Power supply with automatic switch over in case of failure. <ul style="list-style-type: none"><li>90 – 260 VAC (nominal 100 – 240 VAC),</li><li>47 – 63 Hz (nominal 50 – 60 Hz)</li></ul>                                                                         |
| VER45852    | Hot-plug DC power supply            | Power supply with automatic switch over in case of failure. <ul style="list-style-type: none"><li>40 – -60 VDC (nominal -48 VDC)</li></ul>                                                                                                                        |



## 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><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><br>Icecast/Shoutcast Client.<br><br>Price per unit.                                                                                                                    |
| VER63615    | Audio-Backup File payout               | File payout from internal memory as an additional backup solution.<br><br>Price per unit.                                                                                                                                             |
| VER63016    | SRT/RIST decoder                       | SRT functionality for decoder according to SRT standard of the SRT Alliance (including UDP).<br><br>RIST functionality for decoder according to IETF standard "RIST Simple Profile" and RFC 4585.<br><br>Price per activated channel. |
| VER63028    | HLS decoder                            | Adds HLS, HTTP Live Streaming Decoder function.<br><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><br>Price per activated channel.                                                                 |
| VER63012    | Livewire+                              | According to the standard of audio over IP interoperability Livewire+ (including AES67, LWRP, LWCP, Livewire Advertisement).<br><br>Price per activated channel.                                                                      |
| VER63024    | MPE                                    | MPE (Multiprotocol Encapsulation) encoding/decoding.<br><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><br>The SAT tuner is used as source.<br><br>Price per activated channel.                                                   |



| Article no. | Name                           | Description                                                                                                                                                                                                                                                                 |
|-------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VER63003    | SFN (single frequency network) | <p>Perfect timing and network synchronization suitable for FM-SFN networks.</p> <p>Timing sources:</p> <ul style="list-style-type: none"> <li>• 1PPS</li> <li>• PTP, PTPv2 (*)</li> </ul> <p>(*) Requires option Ravenna, AES67, PTP (VER63001).</p> <p>Price per unit.</p> |
| VER63617    | BISS Descrambling              | <p>Descrambling of BISS-1 and BISS-E according to EBU-Tech 3292 rev. 2.</p> <p>Price per unit.</p>                                                                                                                                                                          |
| VER63029    | Loudness measurement           | <p>Loudness measurement for the audio outputs according to EBU R128 and ITU-R BS.1770/BS.1771.</p> <p>Measures and displays momentary/short-term/integrated loudness, loudness range (LRA) and True Peak (dBTP).</p> <p>Price per activated channel.</p>                    |