

# SAT-4d DVB Audio Satellite Receiver

## Highlights

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



## SAT-4d– DVB Audio Satellite Receiver (1/3)

### DVB transport stream input

DVB-S/S2 (single and multiple channels per carrier) Double satellite tuner supporting QPSK, 8PSK, 16APSK and 32APSK

- ▶ Symbol rate of standard tuner: 1 – 45 MSym/s.  
Optional low symbol rate tuner: 0.64 – 45 MSym/s\*.
- ▶ ASI input and output
- ▶ Gigabit IP
- ▶ BISS-1, E descrambling (SAT / ASI input)\*

### Audio decoding

High-quality multi-format audio decoding for up to 4 stereo channels

- ▶ MPEG-1/2 Layer 2, 3
- ▶ G.711, G.722, Linear PCM
- ▶ Opus, Ogg Vorbis
- ▶ AAC-LC, HE-AAC v1 & v2, AAC-LD, AAC-ELD, AAC-ELDv2, xHE-AAC
- ▶ Enhanced aptX (E-aptX)
- ▶ Dolby Digital Pro\*

### Audio output

Combined XLR connectors for digital or analog output

- ▶ Up to 4 balanced digital AES/EBU
- ▶ Up to 2 balanced analog
- ▶ Analog/digital output can be configured per XLR pair

### Redundancy

- ▶ Icecast, Shoutcast, HLS input\*
- ▶ Enhanced integrated memory as additional back-up solution\*

### Data output

- ▶ 4x DTE (ancillary data & auxiliary (PID) data)
- ▶ 8x DTE, per UDP up to 16\*

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\* This function is optional. Please find the complete list of options at the end of the document.



## SAT-4d– DVB Audio Satellite Receiver (2/3)

### Transport stream output

- ▶ ASI input and output
- ▶ Gigabit IP (TS forwarding)

### IP input

Rock solid network connection even in stress conditions according to standards RFC 3550, RFC 3551, RFC 3640, RFC 2250

- ▶ Professional audio IP reception using UDP, RTP
- ▶ PRO MPEG FEC, Dual streaming input
- ▶ SRT (Secure Reliable Transport) & RIST (Reliable Internet Stream Transport) \*
- ▶ TS RTP, UDP and SRT streaming input\*
- ▶ Livewire / Ravenna (SAP, AES67, PTPv2) \*

### Backup / advanced redundancy management

- ▶ Flexible automatic switch over concept with free definition of alternative input sources as redundancy solution in case of failures
- ▶ Playing files from internal storage or using alternative streams (Icecast, Shoutcast, HLS) \*
- ▶ Dual IP ports for data + 1 IP port for control interface
- ▶ Redundant power supply 90 - 260 VAC or 48 VDC\*

### Special

- ▶ Energy efficient 24/7 broadcast quality
- ▶ RDS decoding (built in RDS / UECP decoder)
- ▶ Embedded auxiliary data (RBDS / RDS or PAD) and GPIO forwarding
- ▶ Synchronized FM transmission within FM SFN networks\*

### Monitoring and control

- ▶ Remote control with various possibilities: HTTP/S, FTP, NMS, SNMP
- ▶ Revised configuration via web user interface for easier setup
- ▶ SNMP v2c & V3, relays, inputs
- ▶ REST-API
- ▶ Ember+
- ▶ Remote control via satellite (on request)

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\* This function is optional. Please find the complete list of options at the end of the document.



## SAT-4d – DVB Audio Satellite Receiver (3/3)

### Advanced control functionalities

- ▶ HTTP / HTTPS: via web interface
- ▶ Adjustable silence detection
- ▶ IP buffer and jitter check
- ▶ PLL control
- ▶ SNMP, alarm, source switch & logging for control via centralized NMS (Network Management System)

### Perfect audio & latency management

- ▶ GPS based 2wcom latency control solution usage in SFN FM networks\*
- ▶ ACIP compliant high audio quality and PTPv2 network synchronization\*

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\* This function is optional. Please find the complete list of options at the end of the document.



## Technical details (1/4)

### Input/output

#### SAT

|                                     | Dual Tuner (default)                                                                                                 | Advanced Single Tuner (optional)                                                                                     |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Connector RF1</b>                | F connector female (input)                                                                                           | F connector female (input)                                                                                           |
| <b>Connector RF2</b>                | F connector female (2 <sup>nd</sup> input)                                                                           | F connector female (loop-through)                                                                                    |
|                                     | 950 – 2.150 MHz, step 1 kHz<br>All LNB oscillator frequencies possible                                               | 950 – 2.150 MHz, step 1 kHz<br>All LNB oscillator frequencies possible                                               |
| <b>Input level, impedance</b>       | -75 – -20 dBm, 75 $\Omega$                                                                                           | -75 – -20 dBm, 75 $\Omega$                                                                                           |
| <b>LNB Control</b>                  | 13 V vertical, 18 V horizontal, off<br>0 kHz low band, 22kHz high band                                               | 13 V vertical, 18 V horizontal, off<br>0 kHz low band, 22kHz high band                                               |
| <b>Noise figure</b>                 | Typical 6dB, max. 12 dB                                                                                              | Typical 6dB, max. 12 dB                                                                                              |
| <b>DVB-S Demodulation/Decoding</b>  | QPSK<br>CCM<br>VITERBI and Reed-Solomon decoder 1/2, 2/3, 3/4, 5/6, 6/7, 7/8                                         | QPSK<br>CCM<br>VITERBI and Reed-Solomon decoder 1/2, 2/3, 3/4, 5/6, 6/7, 7/8                                         |
| <b>DVB-S2 Demodulation/Decoding</b> | QPSK, 8PSK, 16APSK and 32APSK<br>CCM, VCM and ACM<br>LDPC and BCH decoder<br>1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 | QPSK, 8PSK, 16APSK and 32APSK<br>CCM, VCM and ACM<br>LDPC and BCH decoder<br>1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| <b>Symbol rates</b>                 | 1 – 45 MSym/s                                                                                                        | QPSK, 8PSK, 16APSK:<br>0.64 – 45 MSym/s<br>32APSK: 0.64 – 38 MSym/s                                                  |
| <b>Data processing</b>              | single and multiple MPEG TS                                                                                          | single and multiple MPEG TS<br>single and multiple GSE                                                               |
| <b>PL scrambling</b>                | ID 0 – 262144                                                                                                        | ID 0 – 262144                                                                                                        |
| <b>IF Filter bandwidth</b>          | Automatic selection                                                                                                  | Automatic selection                                                                                                  |
| <b>MPEG decoding</b>                | according to ETSI TR 101 154                                                                                         | according to ETSI TR 101 154                                                                                         |

#### ASI

|                  |                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Connector</b> | 1x BNC 75 $\Omega$ output<br>1x BNC 75 $\Omega$ configurable to be either ASI input or 1PPS SYNC input (option) |
| <b>Data</b>      | MPEG2 TS- 270 Mbps                                                                                              |



## Technical details (2/4)

### Ethernet

|           |                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------|
| Connector | 3x RJ45 (Control, 2x Data)                                                                         |
| Type      | Auto switching 10/100/1000 BASE-T, Unicast, Multicast                                              |
| Data      | Audio, serial data and GPIO transmission, controlling and setup functions<br>MPEG TS or MPE output |

### Redundancy Input

|      |                               |
|------|-------------------------------|
| Data | Icecast, Shoutcast (optional) |
|------|-------------------------------|

### Audio decoder

|                       |                                                                                                                                                                                                                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards             | Linear PCM, 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)<br>Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3), Dolby E on request. (optional) |
| Sample rates          | 16, 22.05, 24, 32, 44.1, 48 kHz (on request: up to 192 kHz)                                                                                                                                                                                                                         |
| Sample rate converter | 8:1 (with bypass modes)                                                                                                                                                                                                                                                             |

### Interfaces

#### Audio

|                         |                                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------------------|
| Digital out             | 4x AES/EBU, 110 $\Omega$ balanced, integrated XLR male<br>shared with analog out (configurable) |
| Analog out              | 2x L/R, < 20 $\Omega$ balanced, integrated XLR male<br>shared with digital out (configurable)   |
| Headphone (out)         | L/R, < 10 $\Omega$ , 6,3 mm                                                                     |
| Analog reference level  | +9 dBu                                                                                          |
| Adjustable gain         | 20 – +6 dB                                                                                      |
| Harmonic distortion     | < 0.05 % / < -66 dB (40 Hz – 10 kHz)                                                            |
| Frequency response      | Depends on sample rate – e.g. 48 kHz: 0,1 dB; 20 Hz – 22,5 kHz                                  |
| Digital reference level | 9 dBFS                                                                                          |
| Adjustable gain         | 20 – +6 dB                                                                                      |
| Dynamic range           | 16 Bit: > 89 dB; 24 Bit, > 130 dB                                                               |



## Technical details (3/4)

### Serial

|           |                                                                 |
|-----------|-----------------------------------------------------------------|
| Connector | 4x RS-232C (rear)<br>Optional: 8x RS232c via Sub D-15           |
| Data      | Private data, MPEG ancillary data, UECF/RDS (acc.to TR 101 154) |

### USB

|           |                                                           |
|-----------|-----------------------------------------------------------|
| Connector | USB 2.0                                                   |
| Data      | interface for service, configuration and firmware updates |

### Contact-closure

|           |                                                                                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------------|
| Connector | 26 pole sub-D male                                                                                                  |
| Inputs    | 8 inputs                                                                                                            |
| Outputs   | 7+1 floating relays, 7 relays SPST (from A), 1 relay SPDT (from C)<br>Optional: 16 relays, DC: max. 30 V, 1 A, 10 W |

### Internal storage (optional)

|      |                         |
|------|-------------------------|
| Data | internal audio files    |
| Size | 7 GB (optional 1000 GB) |
| Type | eMMC (optional SSD)     |

### Time synchronization

|             |                                                     |
|-------------|-----------------------------------------------------|
| PTP v2      | Network synchronization according to IEEE 1588-2008 |
| SYNC / AUX1 | BNC – 75 $\Omega$ – 1PPS                            |

## Control and monitor

### GUI and interfaces

|                |                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------|
| User interface | Integrated Web GUI, LCD display                                                                                                    |
| Protocols      | 2wcom NMS, HTTPS, SNMP, UDP, RTCP, SRT Secure Reliable Transport, SFTP IGMP, ICMP, NTP, DHCP, SNMP, SSH, PTPv2, TCP (Icecast, HLS) |

### Front panel

|              |                                           |
|--------------|-------------------------------------------|
| Display: LCD | Graphical, 264x64 pixel                   |
| Jog wheel    | Impulse, enter button                     |
| LED          | 4 Duo LEDs: Power, input, output, warning |



## Technical details (4/4)

### General data

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

### Power supply

|                                 |                                                                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Standard AC</b>              | 1 internal IEC power connector<br>voltage range 90 – 260 VAC (nominal 100 – 240 VAC)<br>frequency range 47 – 63 Hz (nominal 50 – 60 Hz)                                                                              |
| <b>Standard DC (optional)</b>   | 1 internal (Neutrik powerCON)<br>voltage range -40 – -60 VDC (nominal -48 VDC)                                                                                                                                       |
| <b>Dual internal (optional)</b> | Two internal 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)      |
| <b>Dual hot-plug (optional)</b> | Two 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 (1/2)

### SAT-4d base unit variations

Each base unit includes one channel. You can choose between 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 supply<br>▶ 2x hot-plug power supplies AC / DC not included.<br>▶ Please order 2 hot-plug power supplies AC (VER45851) or DC (VER45852). |
| VER63604    | Base unit SAT-4d with 1x AC / 1x DC (DC leading) internal power supplies                                                                                                                  |
| VER63605    | Base unit SAT-4d with 1x DC internal power supply                                                                                                                                         |

### SAT-4d 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 8x ancillary data (e.g. UECP RDS data) via RS232 cable                                                                                                                                 |

### SAT-4d 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.                                                                      |
| VER63001    | Ravenna, AES67, PTP                    | According to the standard Ravenna of audio over IP interoperability (including AES67, SAP, RTSP, PTP).<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. |



## Options (2/2)

| Article no. | Name                            | Description                                                                                                                                                                                                                            |
|-------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VER63614    | Audio-Backup IP-Input - Icecast | IP-Audio streaming input as an additional backup solution<br>▶ Icecast, Shoutcast<br>Price per unit.                                                                                                                                   |
| VER63615    | Audio-Backup File playout       | File playout from internal memory as an additional back-up solution<br>Price per unit.                                                                                                                                                 |
| VER63013    | Live listening                  | Audio monitoring via web interface or any web stream client.<br>Price per activated channel.                                                                                                                                           |
| VER63003    | SFN (single frequency network)  | Perfect timing and network synchronization for SFN applications.<br>Price per unit.<br>On request.                                                                                                                                     |
| 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.          |
| VER63617    | BISS Descrambling               | Descrambling of BISS-1 and BISS-E according to EBU-Tech 3292 rev. 2<br>Price per unit.                                                                                                                                                 |
| VER63024    | MPE                             | MPE (Multiprotocol Encapsulation) decoding.<br>Price per unit.                                                                                                                                                                         |
| VER63025    | TS forwarding over IP           | TS Forwarding enables the forwarding of a complete TS or together with the MPE Option (VER63024) MPE-forwarding. The SAT tuner is used as source.<br>Price per unit.                                                                   |
| VER63019    | Dolby Digital Pro Decoder       | Supports Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3) Support of Dolby E on request.<br>Price per activated channel.                                                                                                              |
| VER63029    | Loudness measurement            | Loudness measurement for the audio outputs according to EBU R128 and ITU-R BS.1770/BS.1771. Measures and displays momentary/short-term/integrated loudness, loudness range (LRA) and True Peak (dBTP).<br>Price per activated channel. |