

Product Features

- *Multi-Standard (DVB-T or DTMB) SFN Adapter option*
- *CMMB Multiplexer option*
- *DTx Adapter option*
- *ATSC-M/H Multiplexer option*
- *DVB-ASI to IP Bridge option*
- *Front Panel, Web GUI, CLI, Telnet and SNMP interfaces provided for local or remote control and software upgrades*



Description and Application

Overview

Based on Advanced UBS Technology, the new Universal Network Adapter can be configured as a Multi-Standard SFN Adapter, CMMB Multiplexer, DTx Adapter, ATSC-M/H Multiplexer or DVB-ASI to IP Bridge.

The new Advanced design allows UBS to manufacture the Universal Network Adapter in less time and with even greater reliability and serviceability. None of the features known to the individual products will be sacrificed.

This open architecture design enables users to take advantage of a state of the art design, while planning networks to meet current and future broadcast needs.

Web Interface

This feature allows local and/or remote control of the UNA 7000 via an Ethernet interface and is based on an internal Web server.

The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for monitoring the status and modifying the UNA 7000 parameters. The Web pages are customized for each individual product option.

The Web Interface concept is popular as remote control only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

SNMP Client

This feature allows remote control of the UNA 7000 in accordance with SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

Universal Network Adapter

Model: UNA 7000

Multi-Standard SFN Adapter



Features

- *DVB-T or DTMB waveform support*
- *DVB-T waveform supports MIP insertions and hierarchical mode*
- *DTMB waveform supports SIP insertion*
- *SFN time and frequency synchronization*
- *Selectable ASI inputs and outputs*
- *Bit rates adjusted with transmission mode*
- *GbE transport stream input/output (optional)*
- *Dual channel operation (optional)*
- *Internal GPS (optional)*

Description and Application

Overview

For the operation of digital terrestrial TV networks (DVB-T or DTMB), where several transmitters broadcast the same programs on the same RF channel frequencies (Single Frequency Networks), the transmitters require precise frequency and time synchronization. The frequency (10 MHz) and time (1PPS) reference signals can be obtained from a GPS receiver at each transmission site.

The SFN Adapter fulfils the task of inserting “synchronization marks” (MIP or SIP packets) in a MPEG transport stream in full accordance with DVB-T and DTMB standards.

The basic functions performed by the SFN Adapter are:

- Insert a megafame or second frame initialization packet (MIP or SIP) into an MPEG transport stream
- Adjust the bitrate of the transport stream to be synchronous with an external reference, and in accordance with the chosen transmission mode
- Provides signaling/mode data for the control of individual transmitters or modulators

Compliant with ETSI standards: EN 300 744 and TS 101 191

Compliant with Chinese standards: GB20600-2006, GY/T 229.1-2008

MIP Insertion (DVB-T Mode)

MIP insertion occurs once per megafame, with a time interval dependent on the selected guard interval.

The MIP indicates when the first packet in a mega-frame (Synchronization Time Stamp, STS) begins transmitting.

The time reference is an external 1 pulse per second signal, obtained from a GPS receiver.

SIP Insertion (DTMB mode)

SIP insertion occurs once per second and is synchronized with the 1PPS signal from a GPS receiver. The SIP contains the transmission parameters for the modulator and the SFN maximum delay.

Bitrate Adaptation

The SFN Adapter is provided with two serial (ASI) inputs that accept an MPEG transport stream according to DVB recommendations (188 or 204 byte packets). The output may be configured as either 188 or 204 byte packets for DVB-T/H mode. In DTMB mode, only 188 byte packets are supported.

Note: the maximum bitrate has to include the inserted MIP or SIP, which means the input net bitrate must be slightly lower than the output bitrate.

The SFN Adapter removes null packets from the input signal and inserts MIP or SIP packets. New null packets are then added to produce a precise output bitrate, which is required for the selected transmission mode (dependent on code rate, constellation and guard band). The maximum allowable net bitrate is governed by the selected transmission mode. As the transport rate is modified, the SFN adaptor performs PCR re-stamping.

GbE Transport Stream Input/Output (optional)

The IP-ASI/ASI-IP Bridge option allows the UNA 7000 to accept a GbE transport stream on either of its Ethernet ports and/or provide a GbE transport stream output (with MIPs) on either of its Ethernet ports according to Pro-MPEG Forum CoP #3 / SMPTE 2022.

Dual Channel Operation (optional)

Dual Channel operation allows the UNA 7000 to process two transport streams, on separate logical channels (CH_A and CH_B), at the same time.



Universal Network Adapter

Model: UNA 7000

CMMB Multiplexer

Features

- *The CMMB Multiplexer provides frame generation that is compliant with Mobile Multimedia Broadcasting specifications*
- *One or two frequencies, user configured - Upgradable to up to 6 frequencies*
- *Up to 160 services*
- *IPv4 and IPv6 support*
- *Control Information Table generation: NIT, CMCT, CSCT, SMCT, SSCT, ESG Basic Description Table, Urgent Broadcast Table and Conditional Access Table*
- *8 MHz Bandwidth*
- *Three modes of interleaving*
- *½ and ¾ LDPC Code Rates*
- *Internal GPS (optional)*
- *Hot Swapping between main and backup multiplexers (optional)*

Description and Application

Multiplexing is used to encapsulate multiple Audio, Video, and Data services and Control information in Multiplex Frames (MMB Part 1, 2).

The main functions of the multiplexer are to receive the incoming data, prepare control and service information tables, encapsulate the data in frames depending on the data type and classification criteria, schedule time slots maintaining appropriate FIFO levels and distribute the multiplexed service and control tables as MPEG-2 TS packets to modulators through ASI interfaces.

The multiplexer can be used in two possible scenarios: at the Head-End as a central multiplexer of global services, simultaneously multiplexing one or two networks (1), or locally as a multiplexer of local content (2). The multiplexer is designed to satisfy the requirements in both scenarios and operate in either of them with minimal configuration.

Standards Compliance

- *Mobile Multimedia Broadcasting Part 1: Framing Structure, Channel Coding and Modulation for Broadcasting Channel, CMMB*
- *Mobile Multimedia Broadcasting Part 2: Multiplexing, CMMB Technical Working Group*
- *Mobile Multimedia Broadcasting Part 3: ESG Guide*
- *Mobile Multimedia Broadcasting Part 4: Urgent Broadcast*
- *Mobile Multimedia Broadcasting Part 5: Data Broadcast*
- *Mobile Multimedia Broadcasting Part 6: Conditional Access*
- *Mobile Multimedia Broadcasting System Multiplexer Technical Requirement V2.10*
- *Mobile Multimedia Broadcasting System: Encryption & Authorization Multiplexing V2.01*
- *H.264 Final Draft, ISO/IEC 14496-10 AVC*
- *Internet Protocol, RFC 0760*
- *Internet Protocol, Version 6 (IPv6), RFC 2460*
- *User Datagram Protocol, IEN-88*
- *RTP: A Transport Protocol for Real-Time Applications, RFC 3550*
- *SDP Session Description Protocol, RFC 2327*
- *RTP Payload Format for H.264 Video, RFC 3984*
- *RTP Payload Format for AC-3 Audio, RFC 4184*
- *RTP Profile for Audio and Video Conferences with Minimal Control, RFC 1890*
- *ISO/IEC 13818-1*

Universal Network Adapter

Model: UNA 7000

DTx Adapter



Features

- *Fully compliant with ATSC standard A/110:2011*
- *ASI and SMPTE 310M (optional) inputs and outputs*
- *Integrated GPS Receiver provides 10 MHz and 1 PPS reference signals*
- *Optional SMPTE 310M inputs and outputs allow for ASI to SMPTE 310M conversion or SMPTE 310M to ASI conversion*
- *Web, SNMP and Command Line Interfaces are provided for local and remote control and software upgrades*

Description and Application

The UNA 7000 design is based on the UBS Advanced Universal Modulator board, customized to operate as an ATSC Distributed Transmission (DTx) Adapter, according to ATSC standard A/110:2011.

The basic function of the DTx Adapter is to insert Cadence Sync Points (CSP), Transmitter Control Packets (TCP) and optionally Dummy Data Bytes Channel and the Field-Rate Side Channel into an MPEG-2 transport stream. The result is an MPEG-2 transport stream output that can be used to synchronize multiple transmitters operating in a single frequency network (SFN).

The DTx Adapter also includes an internal GPS receiver that provides 10 MHz and 1PPS reference signals needed for transport stream generation.

Optional SMPTE 310M inputs and outputs allow the user to configure the DTx Adapter as an ASI to SMPTE 310M or SMPTE 310M to ASI converter.



Universal Network Adapter

Model: UNA 7000

ATSC-M/H Multiplexer

Features

- Fully compliant with ATSC-M/H Standard A/153
- Carries DTV services for mobile/pedestrian/handheld receiving devices
- ATSC M/H is backward-compatible with existing digital TV receivers
- Carries ATSC legacy DTV services
- Input M/H data is delivered over the IP datagrams
- Input M/H traffic support for IPv4, IPv6
- Supports constant and variable IP sources
- Packet filtering based on IP Address and port
- Reed-Solomon and SCCC Encoding – user specified
- Easy integration into an SFN network
- Loss free handover using SFN
- Provides “burst mode” for M/H data transmission (i.e. enables the receiver to save energy by cycling power)
- Provides signaling data for M/H receivers
- Transport stream recording and playback

Description and Application

The ATSC-M/H Multiplexer provides DTV services to mobile/pedestrian/handheld receivers. It is a fully ATSC-M/H Standard compliant device that supports all ATSC-M/H modes.

The multiplexer processes both the IP traffic (carrying M/H services for mobile, pedestrian and handheld M/H receivers) and the existing legacy ATSC services into one combined ATSC-M/H compliant MPEG-2 ASI output transport stream.

The multiplexer provides mobile/pedestrian/handheld broadcasting DTV services using a portion of the ~19.39 Mbps ATSC 8-VSB payload, while the remainder is available for HD and/or multiple SD television services.

The ATSC-M/H Multiplexer consists of two sections:

- 1. ATSC M/H Pre-Processor**
- 2. ATSC M/H Exciter (post-processing and transmission)**

The ATSC M/H Pre-Processor represents the first stage of the M/H data processing and receives two different types of input streams:

- The legacy service (main) MPEG-2 transport stream packets are delivered to the multiplexer through the ASI input interface.
- The M/H video and audio IP datagrams are delivered to the multiplexer through the Ethernet interface.

The ATSC M/H Pre-Processor combines both of these streams and forms an MPEG-2 ASI transport stream, which is subject further processing and modulation by the ATSC-M/H Exciter.

The M/H data delivered to the ATSC M/H Pre-Processor is partitioned into Ensembles, each of which contains one or more services. Each Ensemble uses an independent RS Frame, and furthermore, each Ensemble may be coded to a different level of error protection using Reed Solomon and SCCC coding.

M/H encoding includes FEC at both the packet and trellis levels, plus the insertion of the long and regularly spaced training sequences into the M/H data. Robust and reliable control data is also inserted into the output stream by the Pre-Processor for use by the mobile/pedestrian/handheld M/H receivers.

The ATSC M/H Pre-Processor supports the “burst mode” of M/H data transmission, which allows the M/H receivers to save energy by power cycling their tuners and demodulators.

Universal Network Adapter

Model: UNA 7000

DVB-ASI to IP Bridge



Features

- *DVB-ASI-to-IP and IP-to-DVB-ASI modes of operation*
- *Forward Error Correction support according to Pro-MPEG Forum CoP #3 / SMPTE 2022*
- *SFN Network preservation (SFN over IP)*
- *Internal or external 10 MHz reference clock and drift correction*
- *Low induced PCR jitter*
- *Low processing latency*
- *Protection against IP network jitter*
- *Configurable input buffer size for IP packets*

Characteristics

- 6x DVB-ASI inputs
- 8x DVB-ASI outputs
- 2x Gigabit Ethernet ports (Control and/or Data)
- Software selectable configurations
- Throughput limited by the maximum DVB-ASI bandwidth of 216 Mbps
- Each Ethernet port can support the combined bandwidth of 8 DVB-ASI ports
- Automatic input MPEG TS packet size detection (188/204 bytes)
- 1 to 7 MPEG TS packets per IP packet
- IP Packet loss and re-ordering recovery with Forward Error Correction according to Pro-MPEG Forum CoP #3 / SMPTE 2022
- High protection against Jitter and Delay
- Regulation for SFN networks
- Unicast or multicast support
- RTP / UDP support
- Full SNMP v2 support
- Embedded HTTP server
- Real-time monitoring
- Optional 10 MHz external reference

Description and Application

In today's broadcast environment, IP networks have become a very important part in the distribution of digital video streams.

The DVB-ASI-to-IP Bridge is designed to achieve the highest performance, while satisfying all requirements of MPEG transport stream distribution in SFN networks. It provides DVB-ASI-to-IP or IP-to-DVB-ASI conversion and can be used to transfer a MPEG transport stream through an IP network.

The unit supports full DVB-ASI bandwidth operation (up to 216 Mbps) on both Ethernet ports and simultaneous operation in both directions.

Different combinations of four DVB-ASI ports and two Gigabit Ethernet ports are possible. Data and Control IP streams can be applied to either Ethernet port.



An OEM version of the DVB-ASI to IP Bridge is also available (UBS P/N 54849-02) with 2 DVB-ASI inputs and 2 DVB-ASI outputs



Universal Network Adapter

Model: UNA 7000



Front Panel

Multi-Standard SFN Adapter Mode Specifications

DVB-T Signal Processing

| | |
|----------------------------|--|
| Input monitoring | <ul style="list-style-type: none"> • Transport stream presence • Input Data overflow • Sync 188 byte presence • Sync 204 byte presence |
| FFT Modes | 2K, 8K |
| Guard Intervals | 1/4, 1/8, 1/16, 1/32 |
| Code Rates | 1/2, 2/3, 3/4, 5/6, 7/8 |
| Constellations | QPSK, 16-QAM, 64-QAM |
| Channel Bandwidth | 8 MHz, 7 MHz, 6 MHz, 5 MHz |
| Hierarchical Mode | Alpha - 1, 2 and 4 for 16-QAM and 64-QAM |
| Max Delay (data) | 0 - 1.0 sec, resolution 100 ns |
| Signal Substitution | Output transport stream is replaced with null packets and MIP in case of input data loss |

DTMB Signal Processing

| | |
|----------------------------|--|
| Input monitoring | <ul style="list-style-type: none"> • Transport stream presence • Input Data overflow • Sync 188 byte presence |
| FFT Modes | 3780, Single Carrier |
| Guard Intervals | 945, 595, 420 symbols |
| Code Rates | 0.4, 0.6, 0.8 |
| Constellations | QPSK, 4-QAM-NR, 16-QAM, 32-QAM, 64-QAM |
| Time Interleaver | 240, 720 symbols |
| Channel Bandwidth | 8 MHz, 7 MHz, 6 MHz |
| Frame Duration | 500 us, 571.43 us, 666.67 us |
| Sub-Carrier Spacing | 2 kHz, 1.75 kHz, 1.5 kHz |
| Max Delay (data) | 0 - 1.0 sec, resolution 100 ns |
| Signal Substitution | Output transport stream is replaced with null packets and SIP in case of input data loss |

Note 1: The "10MHz" and "1pps" are inputs, except when the UNA 7000 is equipped with an internal GPS receivers, where they become Monitoring Outputs (high impedance).

Control Interfaces

| | |
|-------------------------------------|---|
| Front Panel | LCD display and cursor/ execute keys |
| Ethernet Interface | 2 Connector: RJ45 Speed: 10/100/1000 Base-T |
| USB Interface | Connector: USB Type B |
| RS232 Interface | Connector: 9-pin SUB-D Male |
| RS485 Interface | Connector: 9-pin SUB-D Female |
| CLI (Command Line Interface) | Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet) |
| Web GUI | Internet Explorer, Firefox, etc. Connector: Ethernet |
| SNMP Control Interface | Connector: Ethernet Note: MIBs are provided |
| Alarm Relays | Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm. |

Signal Inputs

| | |
|--|--|
| MPEG Transport Stream | 2 ASI inputs: BNC (F), 75 Ω |
| GbE Transport Stream (Optional) | 2 Connector: RJ45 Protocol: Pro-MPEG CoP #3 |
| 10 MHz (Note 1) | Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm |
| 1 PPS (Note 1) | Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition |

Signal Outputs

| | |
|--|--|
| MPEG Transport Stream | 2 ASI outputs: BNC (F), 75 Ω |
| GbE Transport Stream (Optional) | 2 Connector: RJ45 Protocol: Pro-MPEG CoP #3 |
| Clock Reference - 10 MHz (Note 1) | Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave |
| Time Reference - 1 PPS (Note 1) | Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition |

Universal Network Adapter

Model: UNA 7000



CMMB Multiplexer Mode Specifications

Signal Inputs

| | |
|--------------------------|--|
| IP Services Input | Services Ethernet Interface (SVC) Connector: RJ45 |
| GPS Antenna | Connector: F-type (F), 75 Ω |

Signal Outputs

| | |
|---|--|
| CMMB Multiplexed Transport Stream ASI Output | 2 Connectors: BNC (F), 75 Ω Optional 4 output configuration for Hot Swapping between main and backup multiplexers. |
| Clock Reference - 10 MHz | Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, \pm 2.5 dB sinewave |
| Time Reference - 1 PPS | Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition |

Control Interfaces

| | |
|-------------------------------------|--|
| Front Panel | LCD display and cursor/ execute keys |
| SVC Ethernet Interface | Connector: RJ45 Speed: 10/100/1000 Base-T |
| USB Interface | Connector: USB Type B |
| RS232 Interface | Connector: 9-pin SUB-D Male |
| CLI (Command Line Interface) | Connector: USB (HyperTerminal) or SVC Ethernet (HyperTerminal or Telnet) |
| Web GUI | Internet Explorer, Firefox, etc. Connectors: Ethernet (SVC) |
| SNMP Control Interface | Connectors: Ethernet (SVC) MIBs are provided |
| Remote Control (optional) | Connector: DB9 (F) Used for optional Hot Swapping between main and backup units. Normal Open, used for remote shutdown. |

DTx Adapter Mode Specifications

Signal Inputs

| | |
|--------------------------------------|--|
| DVB-ASI (IN A, IN B) | 2x Connectors: BNC (F) Impedance: 75 Ω |
| SMPTE 310M (optional) (AUX D) | 1x Connector: BNC (F) Impedance: 75 Ω |

Signal Outputs

| | |
|--------------------------------------|--|
| DVB-ASI (OUT A, OUT B) | 2x Connectors: BNC (F) Impedance: 75 Ω |
| SMPTE 310M (optional) (AUX C) | 1x Connector: BNC (F) Impedance: 75 Ω |

Control Interfaces

| | |
|-------------------------------------|---|
| Front Panel | LCD display and cursor/ execute keys |
| Ethernet Interface | 2 Connector: RJ45 Speed: 10/100/1000 Base-T |
| USB Interface | Connector: USB Type B |
| RS232 Interface | Connector: 9-pin SUB-D Male |
| RS485 Interface | Connector: 9-pin SUB-D Female |
| CLI (Command Line Interface) | Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet) |
| Web GUI | Internet Explorer, Firefox, etc. Connector: Ethernet |
| SNMP Control Interface | Connector: Ethernet Note: MIBs are provided |
| Alarm Relays | Connector: RS232 and RS485 2 Dry Contact Alarm relays, triggered by any major alarm. |



Universal Network Adapter

Model: UNA 7000

ATSC-M/H Multiplexer Mode Specifications

Signal Inputs

| | |
|---|---|
| ATSC- M/H IP Input | Service Ethernet Interface Connector: RJ45 |
| ATSC Legacy Transport Stream ASI Input | 2 Connectors: BNC (F), 75 Ω |
| Clock Reference - 10 MHz (Note 1) | Connector: BNC (F), 50 Ω Frequency: 10 MHz Level: 0 dBm to 15 dBm |
| Time Reference - 1 PPS (Note X1) | Connector: BNC (F), 50 Ω Frequency: 1 PPS Level: TTL Trigger: Positive transition |
| GPS Antenna | Connector: F-type (F), 75 Ω |

Signal Outputs

| | |
|---|--|
| ATSC-M/H Transport Stream ASI Output | 2 Connectors: BNC (F), 75 Ω Bit Rate: 19.39 Mbps |
| Clock Reference - 10 MHz (Note 1) | Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, \pm 2.5 dB sinewave |
| Time Reference - 1 PPS (Note 1) | Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition |

Control Interfaces

| | |
|-------------------------------------|---|
| Front Panel | LCD display and cursor/ execute keys |
| MGMT Ethernet Interface | Connector: RJ45 Speed: 10/100/1000 Base-T |
| USB Interface | Connector: USB Type B |
| RS232 Interface | Connector: 9-pin SUB-D Male |
| RS485 Interface | Connector: 9-pin SUB-D Female |
| CLI (Command Line Interface) | Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet) |
| Web GUI | Internet Explorer, Firefox, etc. Connector: Ethernet |
| SNMP Control Interface | Connector: Ethernet Note: MIBs are provided |

DVB-ASI to IP Bridge Mode Specifications

Video Interface

| | |
|-----------------------|---|
| DVB-ASI Input | 6 Connectors: BNC (F) Impedance: 75 Ω |
| DVB-ASI Output | 8 Connectors: BNC (F) Impedance: 75 Ω |

Network Interface

| | |
|-----------------|---|
| Ethernet | 2 Connectors: RJ45 (data and control interchangeable) Speed: 10/100/1000 Base-T Protocol: Pro-MPEG CoP #3 / SMPTE 2022 |
|-----------------|---|

Reference Input

| | |
|---------------------------------|---|
| Clock Reference - 10 MHz | Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω |
|---------------------------------|---|

Control Interfaces

| | |
|-------------------------------------|---|
| Front Panel | LCD display and cursor/ execute keys |
| Ethernet Interface | 2 Connector: RJ45 Speed: 10/100/1000 Base-T |
| USB Interface | Connector: USB Type B |
| RS232 Interface | Connector: 9-pin SUB-D Male |
| RS485 Interface | Connector: 9-pin SUB-D Female |
| CLI (Command Line Interface) | Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet) |
| Web GUI | Internet Explorer, Firefox, etc. Connector: Ethernet |
| SNMP Control Interface | Connector: Ethernet Note: MIBs are provided |

Note 1: The "10MHz" and "1pps" are inputs, except when the unit is equipped with an internal GPS receivers, where they become monitoring outputs (high impedance).



Universal Network Adapter

Model: UNA 7000

Common Product Specifications

Power Supply

| | |
|----------------------------|---------------|
| Voltage | 100 - 240 VAC |
| Frequency | 50 - 60 Hz |
| Power Consumption | max. 45 VA |
| Harmonic Correction | EN61000-3-2 |

Environmental

| | |
|--|--|
| Operating Temperature | 0°C to +50°C (+32°F to +122°F) |
| Storage Temperature | -30°C to +70°C (-22°F to +158°F) |
| Relative Humidity (operating/storage) | max. 95% |
| Cooling | Internal fans to assist natural convection |

Mechanical

| | |
|------------------------------|---|
| Size | 1 U of 19" wide cabinet |
| Dimension (W x H x D) | 48.3cm x 4.39cm x 42.7cm (19" x 1.73" x 16.8") |
| Weight | 4.5 kg (10 lbs) |
| Transport and Storage | Vibration acc. to IEC Publ.68 |

ETSI Compliance

| Essential Requirement R&TTE Directive 1995/5/EC | Standard / Specification |
|--|---|
| Safety | EN 60950-1: 2001, A11: 2004 First Edition |
| Health | Not applicable. No antenna. |
| EMC | EN 301 489-1 V1.8.1 |

CE Compliance

This equipment is CE Compliant.



GPS Receiver

| | |
|---|--|
| Input Connector | F-type (F), 75 Ω 5 Vdc biased |
| Recommended Antenna | Bullet III GPS antenna - Trimble model no. 57860-10 or equivalent |
| Receiver Architecture | L1 1575.42 MHz |
| 12 Parallel Channels | C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking) |
| Tracking Capability | 12 simultaneous satellite vehicles |
| Acquisition Time (Time To First Fix, TTFF) | < 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information) |
| Positioning Accuracy | < 5 m, 1 - sigma < 10 m, 2 - sigma |
| Timing Accuracy | < 2 ns, 1 - sigma < 6 ns, 6 - sigma |
| Holdover Time | ±1 usec during 2 hours |
| 10 MHz Output Signal | Level: 10 dBm ±2.5 dBm, sine wave Harmonic Level: -40 dBc max. Phase Noise: 1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz |
| 1PPS Output Signal | Level: TTL |