MODEL HW-02409

OMNISAT LIGHT

DEMODULATOR AND MODULATOR ADVANCED DATA ACQUISITION SYSTEM FOR EARTH OBSERVATION AND SCIENCE MISSIONS

CelestiAntwerp
Celestia Technologies Group Company

OMNISAT LT/LT+ DEMODULATOR

It performs data demodulation and data acquisition in a cost-efficient single 1.5 U unit. Up to 200 Msymb/s (325 Msymb/s for LT+ version).

TECHNICAL SPECIFICATION

- Data Ingest & front-end processors (CCSDS and DVB-S)
- Data storage 1 SSD with 120 GB Capacity.
  - Other capacity optional (max 4 TB)
- Real Time data distribution over Ethernet
- One Channel
- Numerous missions pre-stored with all parameters in XML files
- Operational reliability:
  - Hight MTBF
  - Functionality is in software and/or on reprogrammable digital hardware.
  - No tuning required
  - Redundant power supply
- Bit rates
  - LT version:
    - BPSK, GMSK: 1 to 200 Mbit/s (200 Msymb/s)
    - (S/O/U/A) QPSK: 2 to 400 Mbit/s (200 Msymb/s)
    - 8PSK: 3 to 600 Mbit/s (200 Msymb/s)
  - LT+ version:
    - BPSK, GMSK: 1 to 325 Mbit/s (325 Msymb/s)
    - (S/O/U/A) QPSK: 2 to 650 Mbit/s (325 Msymb/s)
    - 8 PSK: 3 to 975 Mbit/s (325 Msymb/s)
- Decoding:
  - Differential decoding
    - QPSK: modulo-4 Gray decoding, 8 different codes possible
    - BPSK, SQPSK: modulo-2 decoding, i.e. NRZ-M or NRZ-S to NRZ-L conversion
    - 8 PSK: 8 different codes possible
  - Convolutional decoding (K = 7), rates 1/2, 2/3, 3/4, 5/6, 7/8.
  - CCSDS compatible 4D TCM (Trellis Coded Modulation)
  - Reed-Solomon decoding (255,223), (255,239), (254,238) and shortened codes
  - LDPC decoding 7/8 (LT+ version)
- IF:
  - IF input frequency
    - Standard: 720 ± 190 MHz and 1200 ± 350 MHz (so contiguous IF Frequency from 530 to 1550 MHz)
    - Optional: 375 MHz (others on request). Limitations on bitrates may apply
  - Frequency search range programmable, up to 1500 kHz (step 1 kHz)
  - Input frequency change rate (Doppler rate) up to 35 kHz/s
  - Input signal level range (AGC): 40 dB (-50 to -10 dBm)
  - Max. bit clock frequency offset 10^{-4} x bit clock frequency
  - Power unbalance I/Q up to 10 dB (UQPSK)
  - BER degradation (QPSK): < 0,6 dB at 600 Mbps at BER = 1.10^{-6}
  - Digital SRRC filter (roll-off 0.1 – 1), RC filter
  - Acquisition time: typically 250 ms
  - Acquisition threshold
    - BPSK Es/No = 1 dB
    - QPSK Es/No = 4 dB

- Adaptive equalizer to mitigate the effects of satellite transmitter imperfections and reception issues, in terms of compression, amplitude & phase slope and multipath effects
- BER counter
  - PN code 2^{31}-1, 2^{23}-1, 2^{15}-1, 2^{11}-1, 2^{10}-1, 2^{7}-1
- Outputs
  - Digital data outputs (ECL) or LVDS and corresponding clock outputs directly accessible from the back panel of the equipment
  - Real Time Data Distribution over Ethernet
  - Storage to file and retrieval via SCP
  - Other outputs on request
- Front-End Processing (FEP) functionality:
  - Automatic ambiguity and data polarity resolving
  - Real time ingest of data
  - Frame synchronization, descrambling and CRC in real time for all supported bitrates
  - Real time Reed-Solomon processing
  - Saving of ingested data to disk in real time before or after frame synchronization
  - Data distribution over the network using onboard LAN on standard file transfer protocols
  - Measurements of data/reception quality

OVERALL SYSTEM FUNCTIONS

- Monitoring and control done remotely over Ethernet via a TCP/IP interface
- Continuous logging of all receiving parameters
- Internal spectrum analyzer and constellation diagram.

ENVIRONMENTAL & POWER

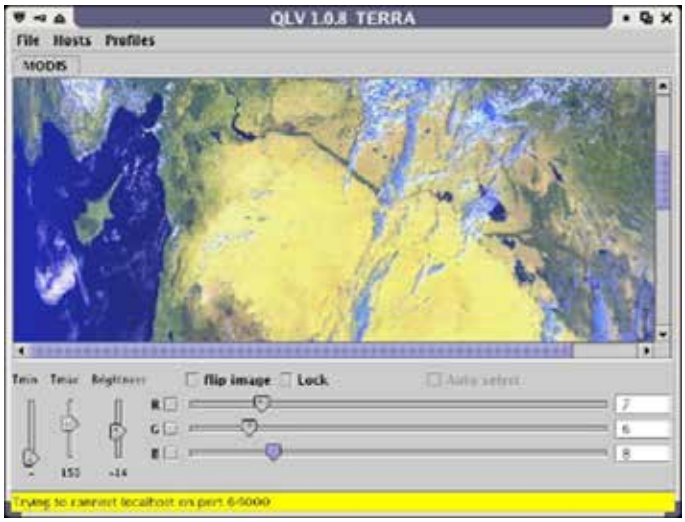
- Operating temperature: + 10 °C to + 40 °C
- Storage temperature: - 20 °C to + 60 °C
- Relative humidity: 10 % to 90 % non condensing
- The equipment is CE compliant and CB scheme tested
- Redundant power supply : 90 V - 265 V, 47 - 63 Hz

PHYSICAL DIMENSIONS

- The Omnisat LT/LT+ is a 1,5 U high, 19" rack-mount industrial PC with possibility to connect an external screen, keyboard and mouse.
- Dimensions (W x H x D): 44 x 7 x 50 cm
- Weight: 15 kg max

MODELS

- Omnisat-G3 LT: up to 200 Msym/s
- Omnisat-G3 LT+: up to 325 Msym/s



OMNISAT LT/LT+ MODULATOR

It performs data modulation and data formatting in a cost-efficient single 1.5 U unit. Up to 200 Msymb/s (325 Msymb/s for LT+ version)

TECHNICAL SPECIFICATION

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  - Other capacity optional (max 4 TB)
- One Channel
- Numerous missions pre-stored with all parameters in XML files
- Operational reliability:
  - Functionality is in software and/or on reprogrammable digital hardware.
  - No tuning required
  - Redundant power supply
- Bit rates
  - LT version:
    - BPSK, GMSK: 1 to 200 Mbit/s (200 Msymb/s)
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- Coding:
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  - Convolutional coding (K = 7), rates 1/2, 2/3, 3/4, 5/6, 7/8.
  - CCSDS compatible 4D TCM (Trellis Coded Modulation)
  - Reed-Solomon coding (255, 223), (255, 239), (254, 238) and shortened codes
  - LDPC coding 7/8 (LT+ Mod version)
- IF:
  - IF output frequency
    - Standard: 720 ± 190 MHz or 1200 ± 350 MHz
    - Optional: 375 MHz (others on request). Limitations on bitrates may apply
  - Power unbalance I/Q up to 10 dB (UQPSK)
  - Digital SRRC filter (roll-off 0.1 – 1)
- Inputs
  - Digital data inputs (ECL) and corresponding clock inputs directly accessible from the back panel of the equipment
  - Replay of files
  - PRBS generation: 2^{31}-1, 2^{23}-1, 2^{15}-1, 2^{11}-1, 2^{10}-1, 2^{7}-1
- Front-End Processing (FEP) functionality:
  - Realtime creation of CADUs by prefixing ASM, apply randomization and Reed/Solomon or LDPC calculation
  - Can take any of 3 inputs: file, ECL or PRBS
  - All functions bypassable
- Satellite simulation:
  - Noise source: - 132 dBm/Hz to - 93 dBm/Hz (white noise)
  - Doppler simulator: configurable frequency sweep ramp applied to the carrier.

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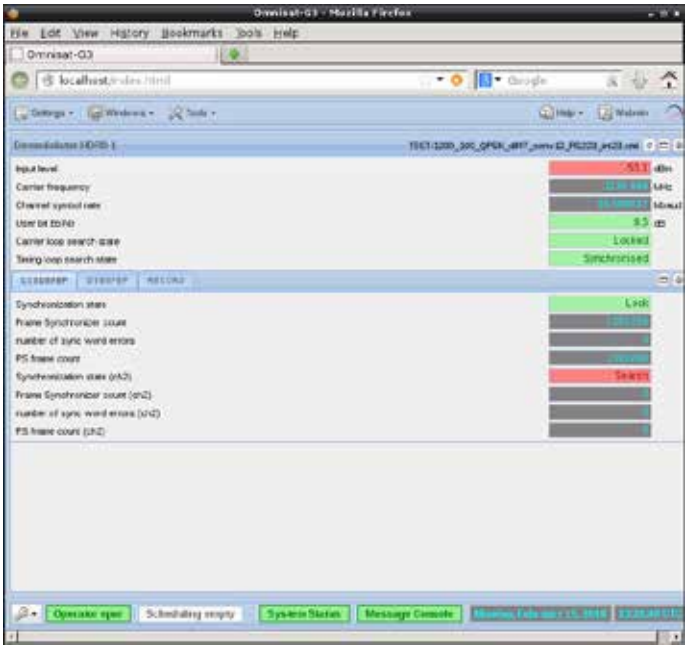

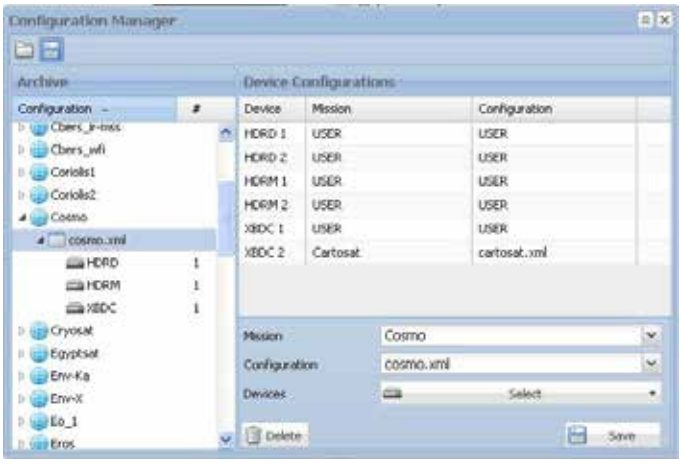

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