Cortex HDR XXL - High Data rate Receiver

All-in-1-box solution
for Earth Observation Data Payload Demodulation and Recording

IN-SNEC®

Main Features

- 720 MHz and 1.2 GHz IF
- Dual 720 MHz IF baseline H/W (2 independent demodulation units)
- QPSK, 8PSK, 16APSK and 16QAM demodulator
- Up to 2 Gbps transmission rate
- Digital filtering and signal equalization
- Automatic real-time cross-polarization cancellation
- Convolutional and post-processing decoding
- Variable Coding & Modulation
- Telemetry data server
  - ◆ Very high speed recording
  - ◆ Real time output
  - ◆ Store and forward
- Built-in constellation viewer & spectrum analyser
- Test modulation capabilities
  - ◆ PRN generation
  - ◆ Recorded data playback

Main Benefits

- Field-proven truly multimission receiver : risk free solution and lowest implementation losses
- Powerful FPGA design allowing :
  - ◆ Variable Coding & Modulation (VCM) compliant with CCSDS standards like SCCC or VHR-E/O-DVB-S2
  - ◆ Advanced fixed CCSDS decoders such as LDPC or treillis
- Auto-adaptive Real time Digital Filtering for complete transmission path optimisation :
  - ◆ Onboard OMUX
  - ◆ Multipath transmission
  - ◆ Ground RF
  - ◆ Cross Polarization effects
- "1 box solution" for dual channel demodulation + FEP, drastically minimizing spare sets
- Cortex family product long term commitment: Back-compatible equipment with former versions, allowing swap-and-replace without any M&C or integration cost
- Easy on-site software upgrades to allow additional missions

The Cortex HDR XXL is the latest COTS very high rate receiver for wideband transmissions in X-band and Ka-band. This equipment is today acclaimed worldwide as the most powerful, versatile and reliable digital high rate demodulator, elected by all stakeholders of the Remote Sensing community from payload designers to ground station operators.

The powerful one-board-in-one-chassis architecture empowers the user with a long-term provision for supporting higher bit rates, multiple decoders, dual polarization transmissions and much more, just through simple user-made on-site software upgrades.

The Cortex HDR XXL is the reference equipment for all existing and forthcoming earth observation missions, with direct interface to modern image processing systems thanks to its built-in front-end-processing capabilities allowing Telemetry decoding, sorting, recording and forwarding.

ZODIAC DATA SYSTEMS

AEROSAFETY & TECHNOLOGY
Telemetry & Telecommunications

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Technical specifications

IF Input

Dual 720 MHz IF inputs
Input Frequency	2x 720 MHz ±200 MHz
	1x 1.2 GHz ±320 MHz
Carrier acquisition range	±10 kHz to ±1 MHz
External Frequency converter	(optional)
Low Group Delay Variation	<1ns over 400MHz

Filtering

Academic matched filters (I&D, RR, RRC, GMSK...)

60+ taps programmable matched filter

Auto-adaptive equalizer (DEAF)

Cross Polarization Cancellation (XDEAF)

Demodulation & Bitsync

Supported schemes	BPSK, QPSK, O/S QPSK.
	A/U QPSK, 8PSK, GMSK,
	16APSK,16QAM,32/64APSK
Bit rates	from 500 kbps to 2 Gbps
BER degradation	<1 dB @1Gbps and BER 10^{-6}

Built-in BER measurement tool

Fixed Decoding

Convolutional :
   4D-TCM (2/3, 2.25/3, 2.5/3 and 2.75/3)
   Viterbi (1/2 and punctured)
   Stacked Viterbi (SNUG)

Post-processing :
   CCSDS LDPC (7/8 or AR4JA)
   Reed Solomon (DVB, CCSDS 223, CCSDS 239)

Variable Coding and Modulation (VCM)

CCSDS Standards :
   Serial Concatenated Convolutional Code (SCCC)
   Very High Rate Earth-Observation DVB-S2 (VHR-E/O-DVB-S2)
Bit rates	up to 1.6 Gbps

Front End Processor (FEP)

Real time data recording at all supported rates
Internal recording capacity	1TB (Baseline)
External DAS recording capacity	3 to 12TB

Programmable framesync & derandomizer

Telemetry CADUs / VCDUs processing

CCSDS AOS paquets / CFDP

Real time data output on TCP-IP (up to 2x 1Gbps)

Differed time data output (store and forward) on TCP-IP

Recorded or external data playback to Data+Clock and test modulator

Test Modulator

IF carrier	720MHz and 1.2GHz
Built-in noise generator	
Supported schemes	equal to the demodulator
PCM simulation :	ASCII coded file on hard disk,
	recorded data playback or
	PRN generation
PRN patterns :	2^{10}, 2^{11}, 2^{15}, 2^{23}, 2^{31}

Miscellaneous

M&C through TCP-IP
Data+Clock as ECL (SMA) or LVDS (RJ45)
Power :	Autorange 90 to 265 VAC
	(47 to 63 Hz)
Consumption :	1.5A peak, 220V
Rackable chassis	H 4U x W 19" x D 550 mm

Cortex HDR XXL

FLEXIBLE SOLUTION
WITH 1 SINGLE H/W PLATFORM

Examples of configurations

▸ Multimission Meteorological ground station receiver

↣ 1x 150 Mbps with Viterbi and data recording (NPOESS, Feng Yung 3, Metop, Modis...)

▸ Sentinels and Pleiades class configurations :

↣ 2x 360 Mbps 4D-TCM-8PSK demodulators with direct interface to image processor

▸ Latest generation Remote Sensing missions

↣ 2x 800 Mbps 16QAM/16APSK demodulators with equalization, RS decoding and data store & forward on TCP-IP

↣ 1x 1 Gbps QPSK demodulation with Reed Solomon or LDPC decoding & data recording

▸ Ka-band very high rate data relay and applications

↣ 1x 1 Gbps QPSK demodulation with Single Viterbi & data recording.

↣ 1x 1.5 Gbps 8PSK with 4D-TCM decoding & data recording

↣ 1 x 2 Gbps 16APSK with LDPC decoding & data recording

▸ Advanced Variable Coding & Modulation solutions

↣ 1x 1.6 Gbps SCCC & data recording

↣ 1 x 1.6 Gbps VHR-E/O-DVB-S2 & data recording

Examples of Applications and Missions

Meteorological

NPP, NPOESS, MODIS (Terra Aqua, Aura), Feng Yung 3, GOES-R, ...

SAR

TerraSAR-X, TanDEM-X, Envisat, Cosmo Sky Med, Radarsat 1 & 2, Risat, SAR-Lupe, ...

Multi purpose

Sentinels, Spot Series, Cartosat / Ressourcesat series, Landsat 7, LDCM, C-BERS, ...

Science

Iris, LRO, SDO, GCOM, Gosat, SMOS, JWST, Icesat, ...

High resolution

Worldview, GeoEye, Pleiades HR, Eros-B, Quickbird, Ikonos, Kompsat series, ...

Relays

EDRS, TDRSS, DTRS, ...

www.zds-fr.com

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MASTERING THE ELEMENTS

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