

## Proximity Modem SPACE FLIGHT COMMUNICATIONS MODEM

### MULTI-SCENARIO COMMUNICATIONS MODEM

#### DESCRIPTION

The Proximity Modem is a highly flexible design communications modem, which can be accommodated to multiple mission scenarios, including inter-satellite and Earth-satellite link slant range up-to 100.000 Km.

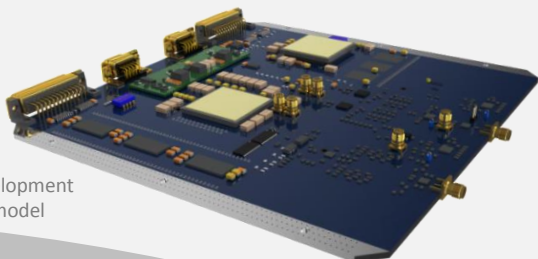
As it is able to work under CCSDS Proximity-1 protocol, it allows the user to customize its parameters in-orbit, (e.g. duplex mode, datarate, codification rate, frequency channel, and QoS type, among others) and to adapt itself to the needs of any environment.

Due to its intermediate frequency output, the module can be connected to either UHF/S or X-Band interface radio (IR), including the IR provided by the ground stations.

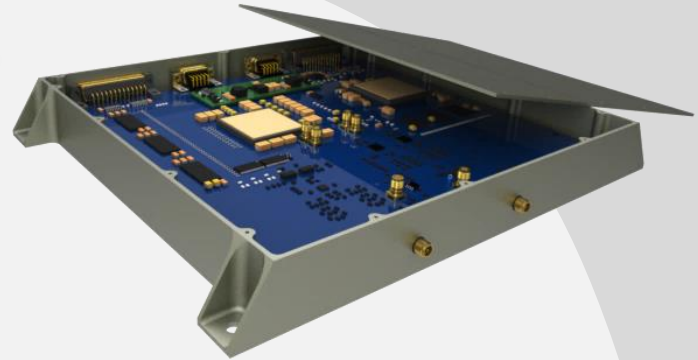
Designed for hostile radiation environments, such as LEO orbits.

#### FEATURES

- Able to work under CCSDS Proximity-1 protocol.
- Hailing process for automatic negotiation of the communication parameters.
- Doppler Supported: Frequency Shift up to 500 KHz @ 10 KHz/s – 100ppm @ 0.5 ppm/s.



Development  
model

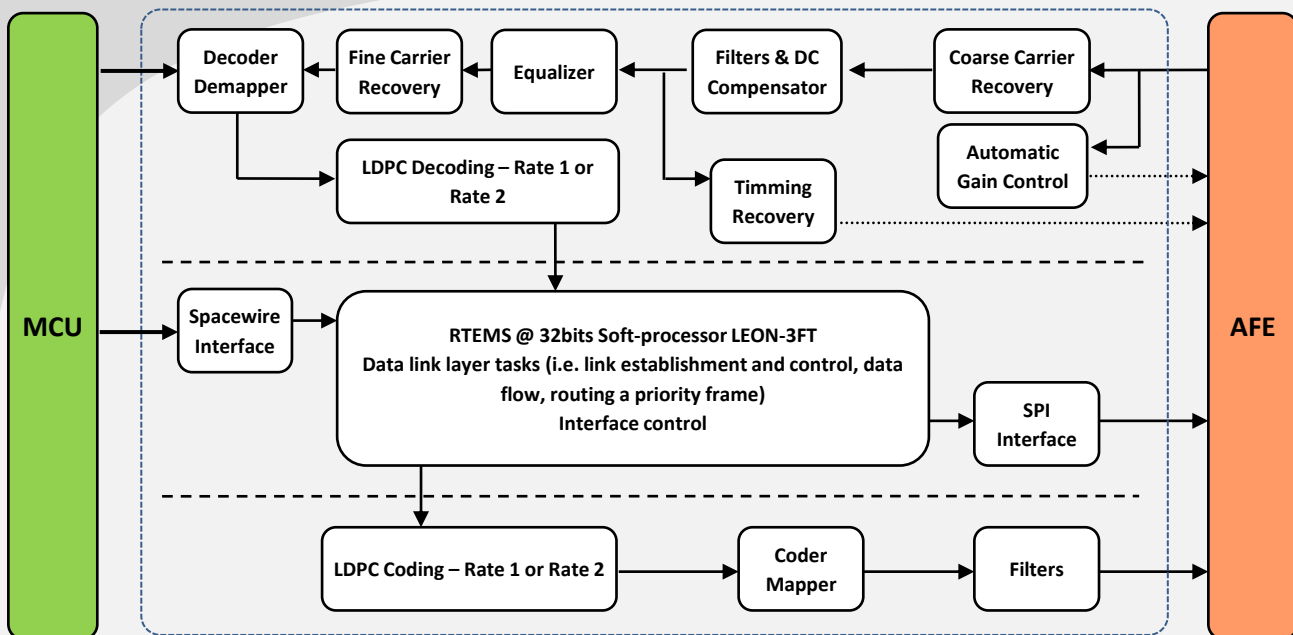


- Coding: LDPC R = 1/2, 4/5 (up to 8.5 dB gain).
- Modulation: DBPSK, DQPSK.
- Datarate: 128 Kbps, up to 8 Mbps.
- Tx/Rx Ch frequency output adjustable from 70 to 200 MHz (7.5 Mhz steps).
- Duplex modes supported: Full-Duplex, Half-Duplex, Simplex-Tx and Simplex-RX.
- QoS: Expedited, sequence controlled.
- Ranging service: Echo and synchronization dependent.
- Process Unit:
  - LEON3-FT fault-tolerant processor, 32-bits SPARC V8 Instruction set.
  - Modular design, FPGA-based core, easily adaptable to new requirements/interfaces.
  - BSP and drivers for RTEMS real-time operating system.
  - Memory: SDRAM and NOR flash with triple modular redundancy (TMR).
- Interfaces:
  - 1 x SpaceWire (nominal + redundant links).
  - 1 x SPI Master + 6 x SPI slaves.
  - 8 x GPIO, software configurable input or output.
  - 1 x PPS inputs with detection and distribution core.
  - 1 x JTAG debug interface.
  - 1 x UART / RS232 debug interface.
- Power output: 0 dBm +/- 0.5 dBm
- Receiver sensitivity: -10 dBm +/- 0.5 dBm
- Maximum power consumption: 20 W.
- Board outline: 6U.

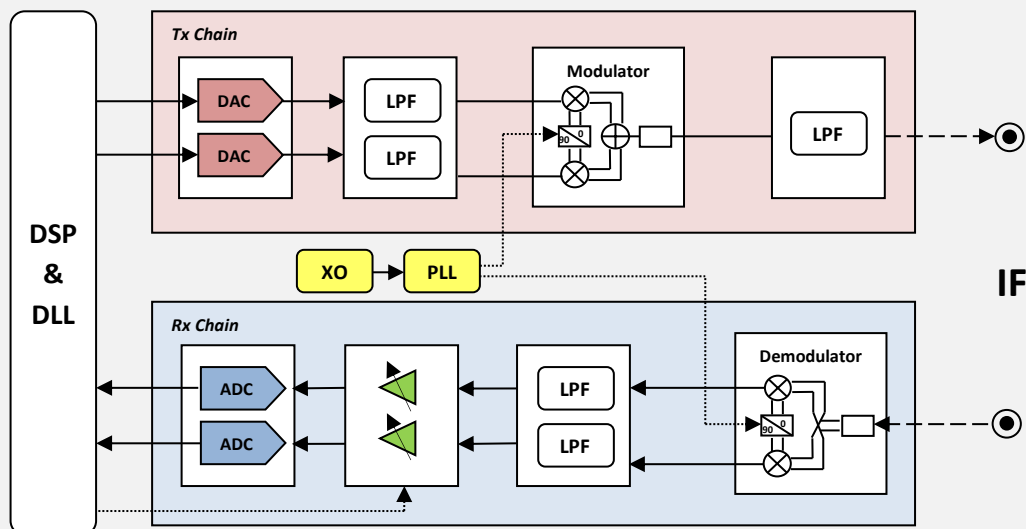
#### APPLICATIONS

- Command, telemetry and data transmission for scientific and Earth observation satellites.
- Data relay for inter-satellite links.

## DSP & DLL BLOCK DIAGRAM



## AFE – BLOCK DIAGRAM



## MECHANICAL OUTLINE

