Callisto

Ultra-Low Noise Systems

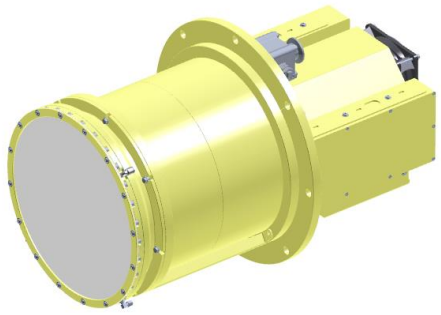
Data Sheet

QRFH Compact Wideband Cryogenic Receiver

Zero Maintenance Cryo-LNA including QRFH feed

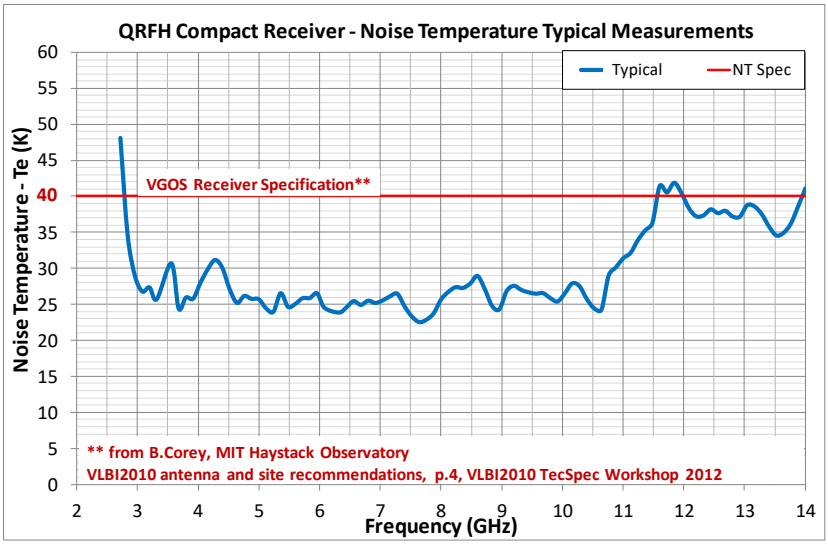
- **Maintenance Free** (for cryocooler)
- **Plug and Play** (no gas line, no vacuum lines to connect for cooldown)
- **Very Low Power Consumption** (vs standard cryogenic systems)
- **Wideband**
  - From 2.3 to 14GHz[(1)] in one single receiver
  - 2 RF Polarizations/Channels
  - Feed included (CalTech's QRFH design)
- **Compact System** (L.62xØ38cm – <30Kg, Including: receiver, cryocooler, compressor, heat exchanger)

QRFH Compact Wideband Cryogenic Receiver



Main Specifications (Full specification available on next page)

Parameter	Specifications
Frequency Bands	S, C, X & Ku (2.3—14GHz)[(1)]
Noise Temperature	<40K
Gain	>55dB
Cryo Operation	Continuous, No maintenance on cooler



Main Benefits

- **Wideband and Low Noise**
  - One receiver covering 12GHz of bandwidth
  - Noise temperature <40K over full band
  - The frequency band can be adapted to customer's needs
- **Zero Maintenance on cryocooler**
  - Reduce maintenance logistics and costs
  - Ideal for operation in remote locations
- **Very Low Power Consumption**
  - Reduce energy consumption cost
  - Reduce environmental impact
  - Ideal for operation in remote locations
- **Robust to operational constraints**
  - No need for vacuum pump for cooldown, even after power cut and warmup!
- **Antenna compatibility**
  - Receiver can be equipped with QRFH feed model 45 or 60, making it compatible with most VLBI telescopes such as Intertronic Solutions, MT Mechatronics and Vertex Antennentechnik.

Cryogenic Cooler – Zero Maintenance Proven Technology

Callisto employs world leading cryogenic technology and the Compact QRFH Receiver uses a light-weight, highly efficient and long-life cryogenic cooler. The cooler has been developed to serve various applications including mobile telephone base station filter cooling. It has been produced in very high volumes and for which extremely long MTTF performance has been proven: the manufacturer announces 200,000 hours MTTF. This Stirling-cycle cryocooler operates at below 100K, and combines the cold finger and compressor into one compact unit that can work in any orientation. Integrated in the Callisto Receiver, it is expected having a continuous operation life of >5 years (with a target of 10 years in nominal operating conditions).

Detailed Specifications*

Parameter	Specifications	Comments
Frequency Band	2 – 14GHz(1)	(1) The frequency band can be adapted to customer's needs
Noise Temperature	< 40K	At Dewar window excluding external noise contributions (Tsky, Tground, Tant)
Gain	>55dB	
Gain flatness	10dBpp	
Output Return loss	10dB minimum	14dB typical
Pout 1dB	+20dBm	
Cooldown Time to reach RF Specification	5hrs	Typical value at 20°C environmental temperature
Input	Free space radiation	QRFH Feed Model 45° or 60° available
RF output connectors	SMA	Localized opposite to input. One output for each polarisation.
10MHz Phase Cal input	SMA	+10dBm minimum Power level. (Phase Cal. unit is optional)
Dimension	L-618.15 x Ø-380mm	Ø at base plate. RF input window is smaller at Ø311mm. All included: receiver, cryocooler, compressor, heat exchanger.
Weight	27Kg	
Mounting	Any orientation on movable antenna structure.	
Operating temperature	-10°C to +40°C	+25°C average monthly recommended in order to increase the cooler lifetime
Storage temperature	-40°C to +60°C	
Relative Humidity	To 90% non condensing	Condensation on vacuum window can occur on high humidity unless embedded radome is used with dry air.
Ventilation Requirement	Forced air cooling	Air supply ≤25°C recommended
Max Power Consumption	400W	340W typical during nominal operation. 20 times less than conventional cryogenic receivers.
Input Voltage	90--264VAC / 47--63Hz	Voltage range must be selected by the customer
Distance between receiver and DAQ-PSU Drawer	≤ 6m	
Distance between DAQ-PSU Drawer and PC unit	≤ 20m	Up to 100m as an option
Local M&C function	Panel PC (touchscreen)	All functions available locally via touchscreen. Limited M&C functions available via remote monitoring (TCP/IP)
Cryo Cooler MTTF	200 000Hrs	Cooler operating at nominal values

*Interface Control Document available on request

ISO 9001:2015 BUREAU VERITAS Certification

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