

## LORADD UTC eLoran Timing receiver



reelektronika's eLoran timing receiver LORADD UTC provides accurate timing and frequency signals throughout the Loran coverage area. The UTC receiver is derived from reelektronika's successful LORADD series equipment.

### Timing

The LORADD UTC receiver provides stable frequency outputs and a Loran derived 1 PPS output synchronised to Coordinated Universal Time (UTC). To provide the best possible timing stability, the LORADD UTC is equipped with an ovenised crystal, which allows longer integration times. The long-term stability of the frequency outputs is determined by the stability of the eLoran signals. The eLoran carrier wave is exactly 100 kHz and phase synchronised to UTC. The timing of each eLoran station is controlled by multiple Caesium clocks independently from GNSS, and related to national UTC time sources. The receiver provides a number of internationally standardised telecommunication frequencies, for operation in a variety of applications, in Europe, the US and Asia. The LORADD UTC has proven to meet the Stratum-1 ( $1 \times 10^{-11}$ ) frequency standard.

### Time of day

Next to differential eLoran corrections for maritime applications, the eLoran data channel also carries UTC synchronization messages, which give the exact relation between the transmitted eLoran pulses and UTC. This allows the LORADD UTC to determine absolute time to within 50 ns from UTC and let the LORADD UTC meet the ITU requirements in G.811 for primary reference clocks. eLoran UTC services are expanding and already available in the US, Europe and China.

For reference, calibration and synchronization in areas without the eLoran UTC message broadcast, the LORADD UTC also houses a GPS timing receiver.

### Key features

- Integrated eLoran/GPS timing receiver
- Primary Reference Clock capabilities
- Industry standard frequency outputs
- eLoran and GPS 1 PPS outputs
- UTC time of day display
- eLoran data channel capabilities
- Firmware upgradeable

### Performance characteristics

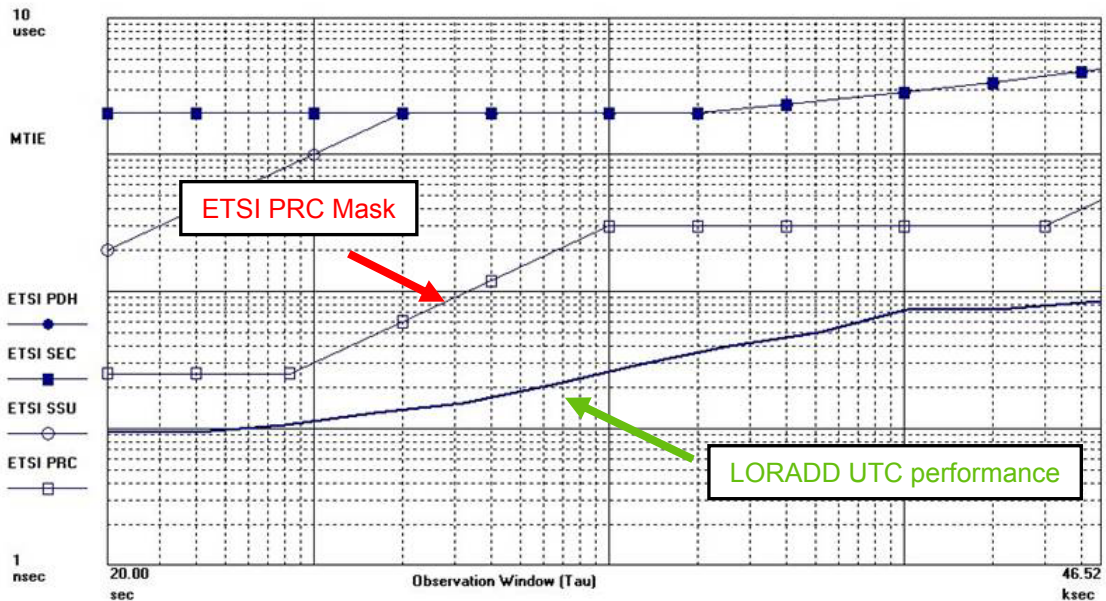
Frequency	90-110 kHz
Signal strength	30-120 dB $\mu$ V/m
Dynamic range	90 dB
Loran datachannel	Eurofix decoding 9 <sup>th</sup> pulse prepared
Interference suppression	30 dual-channel notch filters
Measurement output	TOA, TD, eLoran position, SNR, ECD and Loran data channel output
Frequency output	1.544 MHz 2.048 MHz 10 MHz
1 PPS output	1 eLoran derived 1 GPS derived

### Physical characteristics

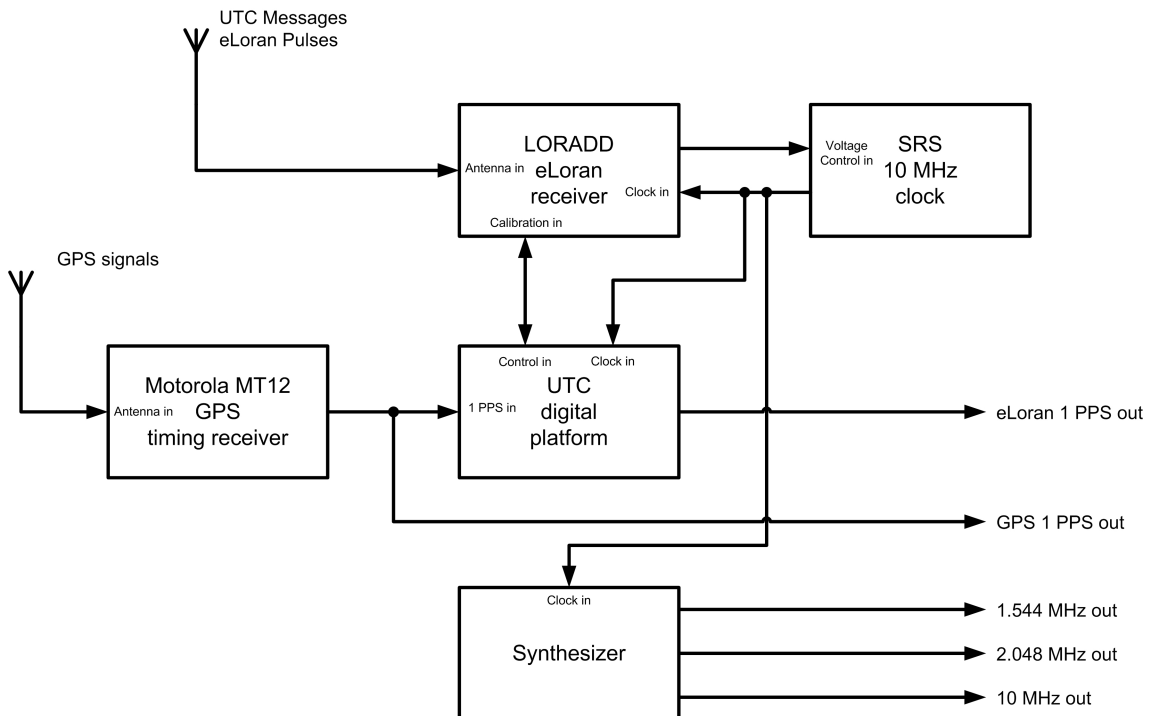
<b>LORADD UTC Case</b>	
Size	48x9x35 cm
Voltage	100-240 V AC 50/60 Hz
Operating temperature	0° to +50° C
Humidity	90% (non-condensing)
<b>Hardware configuration</b>	
eLoran receiver	LORADD series
Clock	Stanford Research Systems 10 MHz Oscillator SC10 Motorola MT12+
<b>GPS receiver</b>	
Antenna	Active dual-loop eLoran H-field antenna with GPS patch antenna and antenna calibration input, 19 x 19 x 8 cm
eLoran H-field	Up to 50 meters
<b>Cable length</b>	
Interfacing	
Serial ports	COM1, COM2, COM3
BNC input/output	12
Status LEDs	Power, Status, 1 PPS eLoran, 1PPS GPS
LCD display	eLoran derived UTC time & status

Specifications are subject to change without prior notice

Symmetricom TimeMonitor Analyzer  
 MTIE on zoomed area: 2.329 hours to 15.24 hours; Fo=1.000 Hz; Fs=50.00 mHz; \*28/06/06 06:03:23 PM\*; \*29/06/06 09:19:42 AM\*;  
 Fluke PM6680B; Test: 612; LORADD; 1PPS; TS3100; Samples: 2748; Gate: 1 s; Glitch: 40.00 nsec; Ref ch1; TI/Time Data Only; TI 1->2;



Above: LORADD UTC Maximum Time Interval Error performance vs. European Telecommunications Standards Institute (ETSI) requirements for Primary Reference Clocks



Above: Functional diagram of the LORADD UTC eLoran timing receiver