OSA 458x OEM Series

OEM OCXO driven GPS receivers by Oscilloquartz

458x GPS-OCXO based solution by Oscilloquartz is the number one set OEM products and provide the highest capabilities for high performance reference when state of the art stability, accuracy and redundancy are needed at a minimum price.

OSA OEM 458x offers numerous variants to be used in a single channel / dual channel redundant configuration. The product family is highly versatile and adapts to customer integration requirements: dimension of the board, number/type/frequency of output signals, custom back-plane connectors and front panel, custom management protocol.

The operating and monitoring parameters of the instrument are accessible for read and write operations through the internal interface RS-485 and through the local RS-232C.

Main applications

➢ Frequency & phase reference for UMTS 3G base station such as TD-SCDMA
➢ Transmitters in SFN broadcasting networks such as DVB-T and DAB
➢ Reference for test equipment and measuring quality of GPS driven oscillators

TD-SCDMA (*Time Division Synchronous Code Division Multiple Access*), among other UMTS 3rd Generation such as W-CDMA, requires highly stable frequency & phase references to synchronise (phase) and syntonise (frequency) each Node B/BTS of the mobile network. Meeting such stringent specifications requires the implementation of a GPS driven frequency & phase reference that generates signals with frequency accuracy better than 1×10^{-11} and phase-time accuracy better than 100 ns.

In macro BTS, dedicated to high density areas, "phase-jump-less" redundancy is a must to achieve high efficiency.

Moreover, frequency and time references must exhibit high holdover performance, typically # 7 μs over three days of free running BTS/B node.

Highlights:

➢ Extremely stable GPS-based frequency & phase reference
➢ High time stability allowed by the use of high performances OCXOs with high loop time constant
➢ Very low phase jump during channel switchover in redundant configuration (lower than 5 ns)
➢ 10 MHz and PP2S standard outputs
➢ Numerous customer specific outputs available
➢ Low phase noise 10 MHz output
➢ Better than 100 ns phase-time accuracy (locked)
➢ Better than 7 μs / 24 hrs holdover phase-time accuracy
➢ Better than 1×10^{-10} / 24 hrs holdover frequency accuracy
➢ RS-232C local management
➢ RS-485 user board management
➢ Low power consumption
➢ Expected life time greater than 15 years
➢ Minimal integration effort with highly flexible / adaptable solution
➢ By far cheaper than Rubidium based solution

OSA 458x
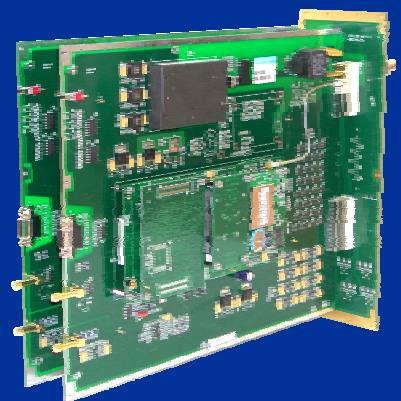
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Technical specification OSA OEM 458x

Principle of operation

GPS driven frequency and time receiver's principle of operation is based on quartz oscillator frequency locked to references signals provided by a constellation of satellites. Combining the information of position and onboard time of 8 satellites among twelve simultaneously observable, provide high accuracy positioning and timing at receiver level.
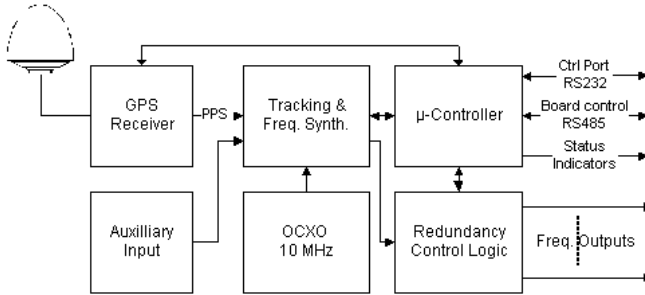
A key for time and frequency stability is the phase lock loop to drive the quartz oscillator frequency by an "averaged" error signal extracted from GPS. The better the oscillator, the higher the time loop constant, the better the stability.

Thanks to the very high performance of 8663 oscillator, OSA-OEM 458x receivers provide very high frequency stability ($ADEV(\tau) < 1x0^{-11}$ from τ = 1s to τ = 1000 s) and highly stable timing signal (typ less than +/- 25 ns) .

By design, the **OSA OEM 458x** board is built as a 1+1 fully redundant, self calibrating, hot swappable unit. Oscilloquartz expertise in the design of synchronization equipments for transport networks (SONET, SDH) where redundancy is a must ensures that OSA-OEM 458x boards provide channel switch-over phase jumps of less than 5 ns.

A passive back plane is available to provide the 1+1 redundancy / hot swappable capability where each GPS board acts as a plug and play unit.

The **OSA OEM 458x** board provides a set of timing signals on various outputs (PP2S, TOD on RS 485, 10MHz …) phase aligned within less than 5 ns, providing time accurate reference signals better than 100ns from UTC. Other timing signal (12.5 Hz, specific frequency aligned on PP2S) are available.

In case of failure of incoming GPS signal (bad weather conditions, destruction of GPS antenna..), the high performance oscillator ensures that the OEM unit is able to provide frequency and timing holdover references better than 7 μs over 24 hours.

Typical Characteristics

Reference: ➢ Type: GPS-OCXO receiver ➢ TOD message is phase aligned with PP2S **Performance when locked to GPS:** ➢ Frequency accuracy $\pm1x10^{-12}$ (after 12 hours operation) ➢ Time accuracy on time signals (PPS, PP2S, and others) < 100 ns after 24 hrs locked < 200 ns after 15 mn warm-up ➢ Short term stability: $ADEV < 1 \times 10^{-11}$, τ = 1s to 1000 s **Performance in Holdover:** ➢ Frequency drift $< 1x10^{-10}$ / 24 hrs ➢ Phase-time drift <10μs / 24hrs, 7μs / 24hrs after 72 hours locked to GPS ➢ Frequency change with temperature $< 1 \times 10^{-10}$ over 0-50°C range	**Standard Output signals:** ➢ PP2S : rate 0.5Hz, negative pulse, LVTTL into 50 ohm, pulse width on request from 40 ns to 100 ms, rise and fall time 5 ns ➢ 10MHz , sinusoidal, 5 dBm amplitude, 50 ohm, aligned on PP2S **Low Phase noise at 10 MHz output (dB/Hz):** ➢ -75@1Hz, -90@10Hz, -120@100Hz, -135@1kHz, -140@10kHz **Specific outputs available on request** ➢ Various frequencies, (8 kHz, 12.5 Hz, any frequency from 5 to 40 MHz, multiple of 8 kHz), on various output signal shapes ➢ TTL, square positive pulse, 2.5 Vpp, 50 ohm, rise and fall time : 2ns<t<5ns duty cycle 50%+/-5% ➢ LVDS user output, LVTTL test level output ➢ Sine, LVDS or LVTTL specific frequency output aligned on PP2S **Control Monitoring and Warm up:** ➢ Digital control and monitoring of all operating parameters ➢ RS-232C for local interface ➢ RS-485 for user board interface towards Main Control Module ➢ Cold start less than 12 minutes
Environment : ➢ Operational Temp : -5°C to +55°C / -20°C to 70°C ➢ Storage Temp: -20°C to +80°C ➢ Humidity: <80% (max 35°C) ➢ Expected lifetime: > 15 years	**Electrical / Mechanical:** ➢ DC Voltage: -48VDC ±10V, other DC on request ➢ Power consumption: max 8 W during warm up less than 3 W steady state ➢ Dimensions OEM board / customer defined

Oscilloquartz SA reserves the right to change all specifications contained herein at any time without prior notice.

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