

# Star 4

## OEM GPS Clock for Base Station integration

### Introduction

The Oscilloquartz Star 4 series offers superior time and frequency synchronization in a minimal space and at a ultra low cost.

Based on a state-of-the art GPS receiver, the Clock delivers 1PPS, 10 MHz and time-of-day outputs with the highest levels of accuracy and stability.

In addition to GPS, the Star 4 board has a 1PPS input to cascade time and frequency from a single GPS-antenna to several Star 4 boards, saving the cost of multiple GPS antenna installations.

Various levels of configurations are available to easily adapt to the requirements of your Base Stations, Broadcast Station systems, and sub-systems for a discrete and cost optimized synchronization solution.

When no valid input is available, the OSA OEM GPS Clock enters into holdover mode and is specially designed to hold its output frequencies to supply long hours of frequency and phase accuracies.

When enhanced with Oscilloquartz' advanced Aging and Temperature Drift Compensation (ATDC) system, the Star 4 is the most stable GPS quartz clock available in holdover mode. It has a very thin form factor and allows for large temperature variations and harsh environmental conditions.

Thanks to an exhaustive list of commands, Star 4 is easy to integrate into any base station management platform.



**Star 4 features a wide variety of Oscilloquartz crystal oscillators, adapting cost and holdover performance to the actual application: FDD/TDD, MFN/SFN, Indoor/Outdoor.**

### Highlights

- Inexpensive and easy-to-integrate GPS Clock
- High frequency stability and long term accuracy
- Various oscillators and holdover capabilities
- Ultra compact + reliable
- 1PPS, 10MHz and Time-of-day
- Phase alignment of all outputs within  $\pm 5\text{ns}$  with "0 crossing" 1PPS / 10MHz
- UTC-derived 1PPS and NMEA0183 timing information
- 1 Power supply input connection only
- ROHS compliant
- Firmware upgradeable

### Typical Applications

- Rack integration for Wireless Base stations
- WiMAX, WiBRO, 3G, 4G, LTE, CDMA, TD-SCDMA
- DAB, DVB-T/H/SH, T-DMB, MediaFLO, DRM
- E911 Location Systems
- Timing and Synchronization

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### Typical Characteristics

#### GPS System

- 50-channels, L1 frequency, C/A Code
- High immunity to jamming
- First acquisition and tracking after 1 minute
- 160dBm in fixed position and -144dBm in cold start
- Short circuit and TVS protection at 5kV

#### Alternative input to GPS receiver

- 1 PPS: 3.3 V LVCMOS @ 1 k $\Omega$  (optional)

#### Single input power supply

- 12 VDC

#### Management

- LVTTTL 3.3V or RS-232 (on choice)
- 4 alarm outputs and firmware upgrade by download

OEM GPS CLOCK variants	STAR 4 – 8725	STAR 4 – 8716	STAR 4+ – 8863	STAR 4+ – ATDC
<b>Oscillator</b>	Single-oven OSA 8725	Single-oven OSA 8716	Double-oven OSA 8863	Double-oven OSA 8863
<b>OUTPUTS</b>				
<b>1PPS</b>	TTL	TTL	TTL	TTL
<ul style="list-style-type: none"> <li>Holdover PPS 10 <math>\mu</math>s Duration (Temp range)</li> </ul>	8 hours (constant) 45 min (5°C)	16 hours (constant) 2 hours (5°C)	32 hours (constant) 24 hours (8°C)	40 hours (10°C) 24 hours (25°C)
<ul style="list-style-type: none"> <li>Phase stability when locked to GPS</li> </ul>	$\pm 30$ ns typical	$\pm 30$ ns typical	$\pm 30$ ns typical	$\pm 30$ ns typical
<ul style="list-style-type: none"> <li>Level</li> </ul>	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$
<ul style="list-style-type: none"> <li>Rising time / PPS Duration</li> </ul>	$\leq 10$ ns / 20 $\mu$ s	$\leq 10$ ns / 20 $\mu$ s	$\leq 10$ ns / 20 $\mu$ s	$\leq 10$ ns / 20 $\mu$ s
<b>10MHz</b>	Square & sine wave	Square & sine wave	Square & sine wave	Square & sine wave
<ul style="list-style-type: none"> <li>Phase alignment at ambient temp.</li> </ul>	$\pm 5$ ns	$\pm 5$ ns	$\pm 5$ ns	$\pm 5$ ns
<ul style="list-style-type: none"> <li>Phase Noise (10 MHz Sine)</li> </ul>		-110 dBc @ 10 Hz -135dBc @ 100Hz -140 dBc @ 1kHz	-125 dBc @ 10 Hz -140 dBc @ 100Hz -140 dBc @ 1kHz	-125 dBc @ 10 Hz -140 dBc @ 100Hz -140 dBc @ 1kHz
<ul style="list-style-type: none"> <li>Level of 10MHz Sine</li> </ul>	1 VRMS / 50 $\Omega$	1 VRMS / 50 $\Omega$	1 VRMS / 50 $\Omega$	1 VRMS / 50 $\Omega$
<ul style="list-style-type: none"> <li>Level of 10MHz Square</li> </ul>	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$	3.3 Vpp / 1 k $\Omega$ 1.5 Vpp / 50 $\Omega$
<b>Time-of-Day NMEA0183</b>	✓	✓	✓	✓
<b>TRACKING, FILTERING &amp; HOLDOVER</b>				
<ul style="list-style-type: none"> <li>OCXO performance ageing per day</li> </ul>	2E-9	5E-10	1E-10	5E-11
<ul style="list-style-type: none"> <li>OCXO performance thermal (full temp range)</li> </ul>	5E-8 peak to peak	2E-8 peak to peak	6E-10 peak to peak	2E-10 peak to peak
<ul style="list-style-type: none"> <li>Aging &amp; Temp. Drift Compensation</li> </ul>	✗	on request	on request	✓
<b>GENERAL</b>				
<ul style="list-style-type: none"> <li>Footprint (LxWxH)</li> </ul>	17.9 x 135 x 60 mm	20.4 x 135 x 60 mm	23.8 x 135 x 60 mm	23.8 x 135 x 60 mm
<ul style="list-style-type: none"> <li>Operating temperature</li> </ul>	-20 to 65°C	-20 to 65°C*	-20 to 65°C*	-20 to 65°C*

\*(-30 to 85°C on request)

### Compatible with TSAR Board

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

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