AXTAL ADVANCED XTAL PRODUCTS

Specification	AXCS9500	Rev.: 1	Date: 2021-01-07

Oscillator type: **Ultra-High Stability Cesium Atomic Clock based on proven Magnetic Deflection Principle**

Features:

- **Ultra-High Stability Primary Reference Clock (PRC)**
- **Standard for Time Synchronisation, Calibration and Test Labs**
- **Full monitoring and control features with modern user interface**
- **Remote access & health monitoring**
- **Long service life – Continuous operating time >8 years**
- **No subject to U.S. export control (ITAR free)**
- **Compatible with popular Cesium Clocks**

The AXCS9500 is an Ultra-High-Stability Cesium Primary Reference Clock with supreme long-term stability below 1E-14. It is based on the proven magnetic deflection principle, which is used for Cesium clocks for decades. The guaranteed operating life time is min. 8 years for the "Standard Performance" and min. 5 years for the "High Performance" model. The AXCS9500 has multiple outputs for 5 MHz, 10 MHz and 1PPS with very low phase noise and very low jitter. System synchronization is possible via 1PPS input. It also offers a state-of-the-art control & monitor interface via touch-screen or via remote interfaces.

Frequency & 1PPS pulse distribution is possible with optional distribution amplifiers AXDA9000 & AXDA9100. For further phase noise improvement and/or frequency generation the AXPLO-series of ultra-low noise "clean-up" modules are available.

Electrical & Environmental Specification

Parameter	min.	typ.	max.	Unit	Condition
Nominal output frequency RF1		5.000		MHz	
Nominal output frequency RF2		10.000		MHz	
Nominal output frequency RF3		1PPS			
Frequency stability (Option 1)	**Standard Performance**		**High Performance**		
Frequency accuracy	$\pm1\cdot10^{-12}$		$\pm5\cdot10^{-13}$		
Short- and long-term stability	$1.2\cdot10^{-11}$ $8.5\cdot10^{-12}$ $2.7\cdot10^{-12}$ $8.5\cdot10^{-13}$ $2.7\cdot10^{-13}$ $8.5\cdot10^{-14}$ $5.0\cdot10^{-14}$		$5.0\cdot10^{-12}$ $3.5\cdot10^{-12}$ $8.5\cdot10^{-13}$ $2.7\cdot10^{-13}$ $8.5\cdot10^{-14}$ $2.7\cdot10^{-14}$ $1.0\cdot10^{-14}$		@ τ = 1 sec @ τ = 10 sec @ τ = 100 sec @ τ = 1,000 sec @ τ = 10,000 sec @ τ = 100,000 sec @ Floor (≥ 5 days)
Frequency reproducibility		$\pm5\cdot10^{-13}$			
RF output RF1					
Number of output ports		2			
Signal waveform		Sine wave			
Load R_L		50		Ω	±5%
Output level per port	+12	+13	+14	dBm	
Isolation between ports	80			dB	
Harmonics			-40	dBc	
Spurious			-80	dBc	
Phase noise @ 5 MHz			-105 -135 -145 -150 -154	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	@ 1 Hz @ 10 Hz @ 100 Hz @ 1 kHz @ ≥10 kHz
RF output RF2					
Number of output ports		2			
Signal waveform		Sine wave			
Load R_L		50		Ω	±5%
Output level per port	+12	+13	+14	dBm	
Isolation between ports	80			dB	
Harmonics			-40	dBc	
Spurious			-80	dBc	
Phase noise @ 10 MHz			-100 -130 -145 -150 -155	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	@ 1 Hz @ 10 Hz @ 100 Hz @ 1 kHz @ ≥10 kHz
RF output RF3					
Number of output ports		3			
Signal waveform		Square wave / TTL			
Load R_L		50		Ω	±5%
Output level	2.4			Vpp	
Rise & fall time			5	ns	
RMS Jitter			1	ns	
Pulse width		20		µs	
Synchronization accuracy			50	ns	

Parameter	min.	typ.	max.	Unit	Condition
External synchronisation input					
Input frequency		1PPS			
Signal waveform		Square wave / TTL			
Number of input ports		2			
Load R_L		50		Ω	
Input level	2		10	Vpp	
Rise & fall time			50	ns	
Pulse width	0.1		100	µs	
Frequency tuning					
Tuning range		$\pm1\cdot10^{-10}$			
Resolution		$1\cdot10^{-15}$			
Environmental sensitivity					
Temperature sensitivity		$\pm1\cdot10^{-13}$		1/°C	
Magnetic sensitivity		$\pm1\cdot10^{-13}$		1/Gauss	
Lock Time	30		60	min	@ +25°C
DC Supply voltage V_{S1} (Note 1, 2)	36	48	72	V	
AC Supply voltage V_{S2} (Note 1)	200	220	240	V	
AC Supply input frequency	50		60	Hz	
Power consumption (steady state)			80	W	
Power consumption (warm-up)			100	W	
Operating temperature range	-20		+50	°C	
Storage temperature range	-20		+70	°C	
Relative humidity	0		90	%	
Enclosure (see drawing) (LxDxH)		435x550x133		mm	19” rack 3 HU
RF Connectors (5 MHz/10 MHz Out)		N female, BNC/SMA optional			@ Rear plate
RF Connectors (1PPS In/Out)		BNC female			@ Rear plate
Weight		30		kg	
Service life	8 5			years years	Standard Performance High Performance

Notes:

1. If both supply inputs AC and DC are present, then AC power supply is automatically selected.
2. Internal battery with standby time >4 yours

Please consult factory for detailed information, operating manual or special technical requirements

Ordering Code

Model	Option 1	Revision	Frequency [MHz]
AXCS9500	“STD” – Standard Performance “HP” – High Performance	Rev.1	10.000

Example: AXCS9500-HP_Rev.1 – 10.000 MHz

Revision History

Rev.	Drawing	Date [dd.mm.yyyy]	Remarks	Author	Checked
1	D0	07.01.2021	First issue	HH	HH