AXTAL ADVANCED XTAL PRODUCTS

Specification	AXCS9000STD	Rev.: 2	Date: 2022-06-22

Oscillator type: Optically-pumped Cesium Atomic Clock
Standard Performance Model

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 via Ethernet & RS-232
- Long Cesium tube life time – 10 years warranty
- No subject to U.S. export control (ITAR free)
- Compatible with popular Cesium Clocks
- Applications: 4G/5G networks, DTV, DAB, CMDA and Tetra, IPTV etc.
- Equivalent to ELECSPN TA1000 “Standard Performance”

The AXCS9000STD is a Cesium Primary Reference Clock with supreme long-term stability below 5E-14. It is the first commercially available Optically-Pumped Cesium Clock. This principle has several advantages, compared to the common magnetic deflection method, like higher reliability, higher stability and lesser influence of physical factors. The guaranteed operating life time of the tube is min. 10 years. The AXCS9000STD 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 remotely via LAN or RS-232 connection.

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					
Frequency accuracy			$5 \cdot 10^{-13}$		
Short- and long-term stability			$8.0 \cdot 10^{-12}$ $3.5 \cdot 10^{-12}$ $1.5 \cdot 10^{-12}$ $5.0 \cdot 10^{-13}$ $1.5 \cdot 10^{-13}$ $5.0 \cdot 10^{-14}$ $5.0 \cdot 10^{-14}$		@ 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			$5 \cdot 10^{-13}$		
RF output RF1					
Number of output ports		2			
Signal waveform		Sine wave			
Load R_L		50		Ω	±5%
Output level per port	+7	+10	+13	dBm	
Isolation between ports	100			dB	
Harmonics			-40	dBc	
Spurious			-80	dBc	
Phase noise @ 5 MHz			-105 -135 -145 -156 -158	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	+7	+10	+13	dBm	
Isolation between ports	100			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			20	ns	

Parameter	min.	typ.	max.	Unit	Condition
External synchronisation input					
Input frequency		1PPS			
Signal waveform		Square wave / TTL			
Number of input ports		1			
Load R_L		50		Ω	
Frequency tuning					
Tuning range		≥ $\pm 1 \cdot 10^{-9}$			
Resolution		≤ $6.5 \cdot 10^{-15}$			
Lock Time			60	min	@ +25°C
DC Supply voltage V_{S1} (Note 1, 2)	22		75	V	
AC Supply voltage V_{S2} (Note 1)	200		240	V	
AC Supply input frequency	50		60	Hz	
Power consumption (steady state)			120	W	
Power consumption (warm-up)			200	W	
Operating temperature range (Note 3)	+18	+23	+28	°C	
Storage temperature range	0		+50	°C	
Relative humidity (Note 3)	0		40	%	
Enclosure (see drawing) (LxDxH)		456x553x177		mm	19" rack 4 HU
Weight			40	kg	
MTBF		≥100,000		hrs	
Cesium tube warranty		10		years	designed for 12 years
System factory warranty		2		years	

Notes:

1. If both supply inputs AC and DC are present, then AC power supply is automatically selected.
2. The clock does not have an internal battery. It is recommended to use an UPS unit to ensure continuous power.
3. Please see operation manual for details.

Operation & Test Documents

Title
Operation Manual
Health Monitoring Manual
Safety Mechanisms Description
Factory Acceptance Plan/Report
Site Acceptance Plan/Report

Please consult AXTAL

Reference Documents

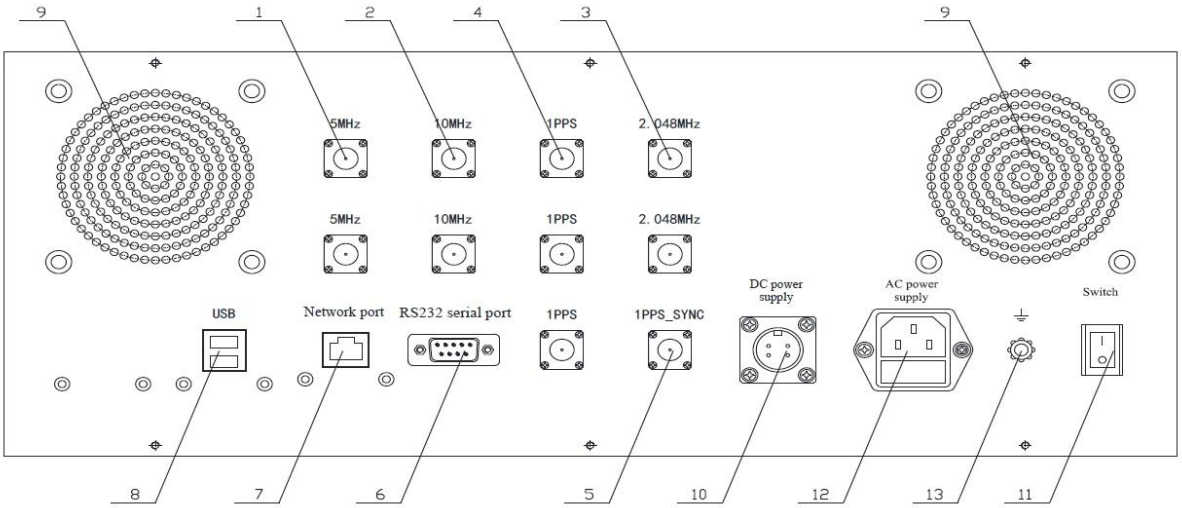
Title
Test Report National Institute of Metrology (NIM), China
Test Report National Time Service Center (NTSC), China

Please consult AXTAL

Ordering Code

Model	Revision	Frequency [MHz]
AXCS9000STD	Rev.2	10.000

Backplane / Connections



#	Description	#	Description
1	5 MHz Outputs (x2)	**8**	USB Interface
2	10 MHz Outputs (x2)	**9**	Fan vents
3	*TA1000-M1 model only*	**10**	DC Power Supply Input
4	1PPS Outputs (x3)	**11**	AC Power Switch
5	1PPS Synchronization Input	**12**	AC Power Supply Input
6	RS-232 Interface	**13**	Ground connection
7	LAN Interface		

Revision History

Rev.	Drawing	Date [dd.mm.yyyy]	Remarks	Author	Checked
1	D0	30.07.2019	First issue – Improved Standard Model	HH	HH
1	D1	13.11.2019	Editorial changes	HH	HH
2	D0	08.01.2021	Major update – Various parameters added/updated	HH	HH
2	D1	22.01.2021	Warranty information added/updated	HH	HH
2	D2	22.06.2022	Max. humidity and operating temperature range corrected, editorial changes	HH	HH