



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# Quantum™ LN CSAC

## Low Noise Chip Scale Atomic Clock



Microsemi invented portable atomic timekeeping with QUANTUM™, the world's first family of miniature and chip scale atomic clocks.

Choose QUANTUM™ class for best-in-class stability, size, weight, and power consumption.



### Features

- Power consumption  $\leq 295$  mW
- Less than 46 cc volume, 2.0"  $\times$  2.0"  $\times$  0.70"
- 10 MHz sine wave output
- 1PPS output and 1PPS input for synchronization
- RS-232 interface for monitoring and control
- Short term stability (Allan deviation) of  $\leq 3 \times 10^{-11}$  at TAU = 1 sec
- Phase noise—sine wave
  - $\leq -85$  dBc/Hz at 1 Hz
  - $\leq -120$  dBc/Hz at 10 Hz
  - $\leq -140$  dBc/Hz at 100 Hz
  - $\leq -145$  dBc/Hz at 1 kHz
  - $\leq -150$  dBc/Hz at 10 kHz
  - $\leq -155$  dBc/Hz at  $\geq 100$  kHz

### Applications

- Underwater sensor systems
- GPS receivers
- Dismounted radios
- Dismounted IED jamming systems
- Autonomous sensor networks
- Unmanned vehicles

The Low Noise Chip Scale Atomic Clock (LN CSAC) combines the accuracy of an atomic clock with the spectral purity of an ovenized crystal oscillator (OCXO) in a compact size that requires low input power.

Microsemi, the original developer of the CSAC, has incorporated a low-power OCXO within the frequency control loop of the atomic clock, enabling exceptional performance for both Allan deviation and phase noise. This level of performance cannot be achieved using external phase locked loops.

The LN CSAC provides a 10 MHz sine wave output and 1PPS output, with short-term stability (Allan deviation) of  $\leq 3 \times 10^{-11}$  at TAU = 1 sec, long-term aging of  $\leq 9 \times 10^{-10}$ /month (typical), and a maximum frequency change of  $\pm 5 \times 10^{-10}$  over an operating temperature range of  $-10$  °C to  $70$  °C.

The LN CSAC accepts a 1PPS input that may be used to synchronize the unit's 1PPS output to an external reference clock with  $\pm 100$  ns accuracy. The LN CSAC can also use the 1PPS input to discipline its phase and frequency to within 1 ns and  $1.0 \times 10^{-12}$ , respectively.

The LN CSAC has a built-in standard RS-232 serial interface. This is used to control and calibrate the unit and also to provide a comprehensive set of status monitors. The interface is also used to set and read the LN CSAC's internal time-of-day clock.

The LN CSAC acts as a frequency and timing subsystem, while requiring limited size, weight, and power.

This device is not rated for space applications. Contact your Microsemi representative for more details.

# Quantum™ LN CSAC

## Low Noise Chip Scale Atomic Clock

### Specifications

All specifications are at 25 °C, V<sub>CC</sub> = 3.3 VDC, unless otherwise specified.

#### Electrical

- RF output
  - Frequency 10 MHz
  - Format Sine wave
  - Amplitude 6 dBm–9 dBm
  - Load impedance 50 Ω
  - Quantity 1
- 1PPS output
  - Rise/fall time (10%–90%) at load capacitance of 10 pF ≤10 ns
  - Pulse width 100 μs
  - Level 0 V to V<sub>CC</sub>
  - Logic high (V<sub>OH</sub>) minimum 2.80 V
  - Logic low (V<sub>OL</sub>) maximum 0.30 V
  - Load impedance 1 MΩ
  - Quantity 1
- 1PPS input
  - Format Rising edge
  - Low level ≤0.5 V
  - High level 2.5 V to V<sub>CC</sub>
  - Input impedance 1 MΩ
  - Quantity 1
- Serial communications
  - Protocol RS232
  - Format CMOS 0 V to V<sub>CC</sub>
  - Tx/Rx impedance 1 MΩ
  - Baud rate 57600
  - Number of data bits 8
  - Number of stop bits 1
  - Parity None
- Built-in test equipment (BITE) output
  - Format CMOS 0 V to V<sub>CC</sub>
  - Load impedance 1 MΩ
  - Logic 0 = Normal operation  
1 = Alarm

- Power input
  - Operating ≤295 mW
  - Warm-up ≤775 mW
  - Input voltage (V<sub>CC</sub>) 3.3 ± 0.1 VDC

#### Environmental

- Operating temperature –10 °C to 70 °C
- Maximum frequency change over operating temperature range (maximum rate of change 0.5 °C/minute) ±5 × 10<sup>-10</sup>
- Frequency change over allowable input voltage range ≤4 × 10<sup>-10</sup>
- Magnetic sensitivity (≤2.0 gauss) ≤9 × 10<sup>-11</sup>/gauss
- Humidity 0 to 95% RH per MIL-STD-810, Method 507.5
- Storage and transport (non-operating)
  - Temperature –40 °C to 85 °C
  - Shock MIL-STD-202, 30 g, half sine, 11 ms
  - Vibration MIL-STD-810, Method 514.6, Figure 514.6E-1, 7.7 grms (general minimum integrity exposure)

#### Physical

- Size 2.0" × 2.0" × 0.70"
- Weight 75 g

### Performance Parameters

#### Frequency Stability (Allan Deviation)

Time	Allan Deviation
TAU = 1 second	3 × 10 <sup>-11</sup>
TAU = 10 seconds	5 × 10 <sup>-11</sup>
TAU = 100 seconds	3 × 10 <sup>-11</sup>

#### RF Output Phase Noise (SSB)

Frequency	Phase Noise
1 Hz	≤–85 dBc/Hz
10 Hz	≤–120 dBc/Hz
100 Hz	≤–140 dBc/Hz
1000 Hz	≤–145 dBc/Hz
10000 Hz	≤–150 dBc/Hz
≥100000 Hz	≤–155 dBc/Hz



# Quantum™ LN CSAC

## Low Noise Chip Scale Atomic Clock

- Frequency accuracy
  - Maximum offset at shipment  $\pm 5 \times 10^{-11}$
  - Maximum retrace<sup>1</sup> (48 hrs off)  $\pm 5 \times 10^{-10}$
  - Aging<sup>2</sup> (monthly<sup>1</sup>)  $\leq 9 \times 10^{-10}$  (typical)
  - Aging<sup>2</sup> (yearly)  $\leq 1 \times 10^{-8}$  (typical)
  - 1PPS sync  $\pm 100$  ns
- Digital tuning
  - Range  $\pm 1 \times 10^{-6}$
  - Resolution  $1 \times 10^{-12}$
- Time to lock  $\leq 4$  minutes

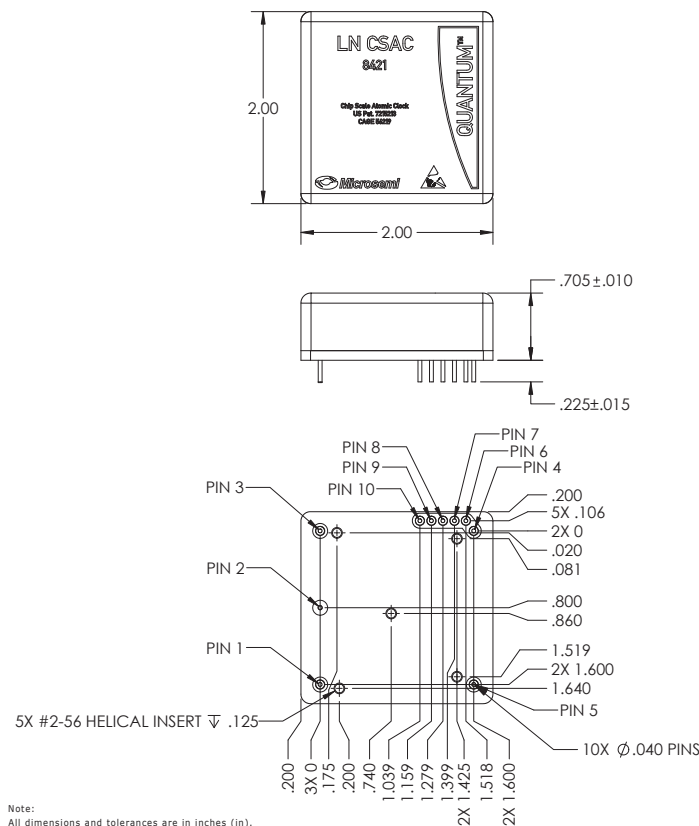
<sup>1</sup>After 30 days of continuous operation.

<sup>2</sup>All CSAC units are tested for aging per the datasheet and meet the specifications at the time of shipment. However, continuous operation of CSAC over extended period of time may yield unpredictable aging performance, resulting in failure to meet the specifications and may not be suitable for certain applications.

### Pinout Definition

Pin Number	Function
1	No Connection
2	GND
3	10 MHz SINE OUT
4	GND
5	+3.3 $\pm$ 0.1 VDC
6	BITE
7	TXD
8	RXD
9	1PPS IN
10	1PPS OUT

### Mechanical Specifications



### Ordering Information

- Part number 090-03054-000



**Microsemi Corporate Headquarters**  
 One Enterprise, Aliso Viejo, CA 92656 USA  
 Within the USA: +1 (800) 713-4113  
 Outside the USA: +1 (949) 380-6100  
 Fax: +1 (949) 215-4996  
 Email: sales.support@microsemi.com  
 www.microsemi.com

©2017 Microsemi Corporation. All rights reserved. Microsemi and the Microsemi logo are registered trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California and has approximately 4,800 employees globally. Learn more at [www.microsemi.com](http://www.microsemi.com).

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.