

# LN CSAC

## Low-Noise Chip-Scale Atomic Clock

### Summary

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 in a compact size requiring low input power.

Microchip, the 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 1 PPS output, with short-term stability (Allan deviation) of  $3 \times 10^{-11}$  @ TAU = 1 second, long-term aging of  $\leq 9 \times 10^{-10}$ /month, and maximum frequency change of  $\pm 5 \times 10^{-10}$  over an operating temperature range of  $-10^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

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

A standard RS-232 serial interface is built in to the LN CSAC. 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 Microchip representative for more details.



### Features

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

### Applications

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

## Specifications

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

### Electrical Specifications

RF Output	
Frequency	10 MHz
Format	Sine wave
Amplitude	6–9 dBm
Load impedance	50Ω
Quantity	1
1 PPS Output	
Rise/fall time (10%–90%) at load capacitance 10 pF	≤10 ns
Pulse width	100 μs
Level	0V to V <sub>CC</sub>
Logic high (V <sup>OH</sup> ) minimum	2.80V
Logic low (V <sup>OL</sup> ) maximum	0.30V
Load impedance	1 MΩ
Quantity	1
1 PPS Input	
Format	Rising edge
Low level	≤0.5V
High level	2.5V to V <sub>CC</sub>
Input impedance	1 MΩ
Quantity	1
Serial Communications	
Protocol	RS232
Format	CMOS 0V 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 0V to V <sub>CC</sub>
Load impedance	1 MΩ
Logic	0 = Normal operation 1 = Alarm
Power Input	
Operating	≤295 mW
Warmup	≤775 mW
Input voltage (V <sub>CC</sub> )	3.3 ± 0.1 VDC

Environmental Specifications	
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, 30g, half sine, 11 ms
Vibration	MIL-STD-810, Method 514.6, Figure 514.6E-1, 7.7 grms (General Minimum Integrity Exposure)



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[090-03054-000](#)