

PRELIMINARY



CSAC GPS Disciplined Oscillator

Featuring the QUANTUM™ SA.45s Chip Scale Atomic Clock (CSAC)

KEY FEATURES / BENEFITS

- Unparalleled holdover: +/-1 μ sec (typ 24hr period @25°C)
- Ultra low power consumption: \leq 1.4W @25°C (12V Vdd)
- Fast warm-up time: <110 seconds (@25°C)
- Industry leading 1PPS accuracy: +/-15ns to UTC RMS (1-sigma)
- Slim profile: 0.7" (H) x 2.5" (W) x 3.0" (L)
- QUANTUM™ Series SA.45s Chip Scale Atomic Clock (CSAC) for holdover
- Ultra low-g static sensitivity (typ 0.1ppb/axis) - ideal for man-packs
- Maintains GPS lock with only one satellite in view

PART (ORDERING) NUMBER

090-00925-000 - 10MHz Standard Temp (-10 °C to +70 °C)

090-00926-000 - 10MHz Extended Temp (-40 °C to +85 °C)

APPLICATION

The QUANTUM™ SA.45s Chip Scale Atomic Clock (CSAC) GPS Disciplined Oscillator (GPSDO) is the preeminent solution for demanding mobile GPS applications. These include military man-pack radios that require very low-g static sensitivity, MILSATCOM terminals, avionics payloads for Unmanned Autonomous Systems (UAS) and high acceleration applications such as jet fighters. All of these applications are increasingly expected to deliver mission critical performance even in GPS-denied environments. Other applications include network timing in stationary applications such as base-stations.

PRODUCT DESCRIPTION

The Symmetricom® CSAC GPSDO is an ultra low power, slim profile, unit with an industry-leading 1PPS accuracy. The standard product offering includes Symmetricom's QUANTUM™ series SA.45s Chip Scale Atomic Clock, as its frequency reference, which enables unparalleled holdover capability, an ultra low-g static sensitivity, and a very fast warm up time of <110 s. The built-in GPS receiver is able to operate in a base station position-hold

mode using an auto survey feature, which allows operation with just a single satellite in view, and hence improves timing stability. The unit can also be set to operate in highly-dynamic mobile environments with only a minimum loss in timing stability versus the position-hold mode.

Standard outputs, via a low-noise distribution amplifier, include four 10 MHz sine wave outputs, one 5 MHz CMOS output, and one 1 PPS output. Other standard features include; a 16x2 character LCD driver (display not included), and a phase noise filter. The QUANTUM™ SA.45s Chip Scale Atomic Clock (CSAC) GPSDO can be powered from standard aircraft or vehicle power with an 8V to 36V operating range, and includes reverse polarity protection. Alternatively the unit can be powered through a 5 volt mini-USB power supply.

Optional features include an extended operating temperature range (-40 °C to +85 °C), a 10MHz CMOS output, and the ability to delete the phase noise filter.



CSAC GPS Disciplined Oscillator

ELECTRICAL SPECIFICATIONS

[All specifications shown are for the standard -10°C to +70°C version, and are valid at 25°C only, unless otherwise specified]

MODULE SPECIFICATIONS:

- **1 PPS Output**

Rise Time:	< 5 ns
Pulse Width:	200ms
Level:	5 V CMOS
Load Impedance:	1 M Ohm
Qty:	Qty 1
- **1 PPS Accuracy (GPS Locked)** +/-15ns to UTC RMS (1-sigma)
- **Distribution Amplifier Isolation**

2MHz	>98dB
10MHz	>85dB
- **Serial Control**

Full SCPI-99:	RS232 & USB
Baud Rate	9.6K – 115.2K
- **Serial NMEA Output** NMEA 0183 rev 2.3, GGA, RMC, ZDA, PASHR.
- **TTL Alarm Outputs** GPS Unlock and HW failure indicator
- **Accelerometer/Gyro Output** 20 samples/s <+/-0.1g accuracy, +/-3g range, degrees and g-load output
- **GPS receiver Motion Adaptive Filter Settings** Auto switchover (optimized settings for Stationary, pedestrian, car, 3 airborne Modes), depending on velocity.
- **GPS Frequency, Antenna**

L1, C/A 1574MHz:	Passive or Active Antenna (5V) with MMCX Connector.
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- **GPS Receiver**

50 ch, Mobile or Stationary Mode SBAS:	WAAS, EGNOS, MSAS supported
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- **GPS TTFB** < 45sec (cold), 1 sec (warm), 1 sec (hot)
- **Sensitivity** Acquisition -144dBm, Tracking -160dBm
- **Power Input**

Total Power: Sine wave (STD)	< 1.4W @25°C
CMOS (option)	< 1.0W @25°C
Input Voltage:	8V-36VDC (or 5V mini-USB)
- **LCD Support (Standard)** 16x2 character LCD driver/support

ENVIRONMENTAL SPECIFICATIONS

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|---|---|
| Standard Operating Temperature: | -10°C to +70°C |
| Extended Temperature Range (Option) | -40°C to +85°C |
| Frequency stability over operating temperature range: | Corrected by GPS lock |
| (CSAC only): | $\pm 0.5 \times 10^{-9}$ (standard version) |
| Non-Operating (Storage) Temperature: | -55°C to +90°C |
- **Optional Features:**

Options: Extended temperature range, delete phase noise filter, 10MHz CMOS output, and 3-axis electronic compensation.

OSCILLATOR SPECIFICATIONS:

- **RF Output**

Frequency:	5MHz	10 MHz
Format:	CMOS	Sine
Amplitude:	5V	+13 +/--3dBm
Load Impedance:	1M	50 Ohms
Qty:	Qty 1	Qty 4
- **Typical Stability (Allan Deviation) (GPS Locked)**

Avg. Time	ADEV
1	1×10^{-10}
10	2.5×10^{-11}
100	3.5×10^{-11}
1000	2×10^{-11}
10000	2×10^{-12}
- **RF Output Typical Phase Noise (SSB) (GPS Locked)**

10Hz	-90 dBc/Hz
100Hz	-125 dBc/Hz
1KHz	-145 dBc/Hz
10KHz	-152 dBc/Hz
100KHz	-153 dBc/Hz
1MHz	-153 dBc/Hz
2MHz	-158 dBc/Hz
- **Frequency Accuracy**

Accuracy > 3min operating with GPS lock:	+/- 2x10-10
Retrace (24 hrs off)	+/- 5x10-11 (CSAC only)
Aging:	Corrected by GPS lock
(CSAC only):	<3x10-10/month (in holdover model)
1PPS Sync (typ):	<100ps (resolution)
	<500ps (accuracy, ref to ext 1PPS)
- **Stability**

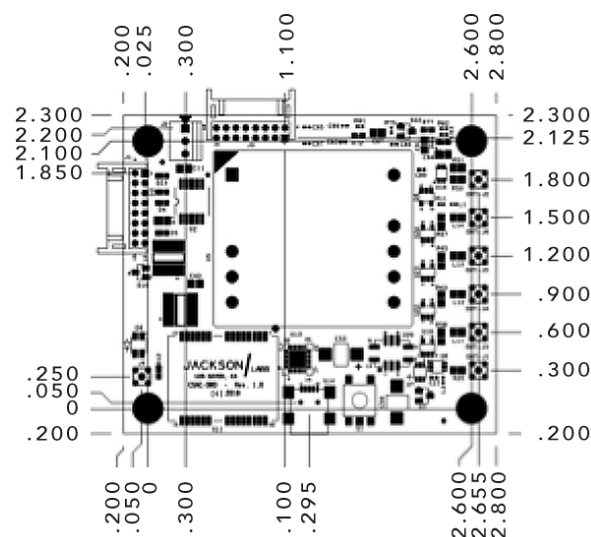
(24hr period @25°C w/20 min warm up & GPS lock):	+/- 1us (typical)
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- **Warm-up Time**

(@25°C)	<110 s
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PHYSICAL SPECIFICATIONS

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|-------------|--------------------------------|
| Dimensions: | 0.7" (H) x 2.5" (W) x 3.0" (L) |
| Weight: | <64 g |
| MTBF: | >100,000 hours |

MECHANICAL OUTLINE DRAWING (Dim: inches)



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