



# Cs4000

## Cesium Frequency Standard

### STANDARD FEATURES

- Multiple RF Outputs
- CsIII Technology
- AC & DC Inputs
- Internal Battery Back-up
- Color Front Panel User Interface
- 10b/100T Remote Interface
- 30 Minute Warm-Up to Full Specifications

### OPTIONAL FEATURES

- T1/E1 Outputs
- No Front Panel Option
- No Battery Option
- 24VDC Input
- Custom Outputs Available

The Symmetricom Cs4000 is a new cesium frequency standard platform that provides exceptional performance in a configurable 3U rack mount chassis. The Cs4000 is designed for high precision timing and frequency applications requiring high stability, low noise RF and 1PPS reference signals. Symmetricom's advanced Cesium III digital technology is the engine that drives this exceptional performance.

The Cs4000 includes a new color front panel Graphical User Interface (GUI) that provides easy to use monitoring and control of the instrument. All functional control of the cesium and optional output cards are managed via the front panel GUI. The GUI is a touch panel LCD screen that provides easy at a glance access to cesium health, control and configuration data. Remotely, you now have two methods of interfacing with the Cs4000. A new Ethernet interface provides monitoring capability via an embedded web page server. Both static IP

and DHCP are supported. The Cs4000 also provides an RS-232 port that allows the user comprehensive monitor and control access via ASCII commands or via Symmetricom's Monitor 3 windows based utility program.

The Cs4000 is designed to provide standard and custom output signal formats. The standard outputs include, 100kHz, 1, 5, 10MHz and 1PPS. Optional outputs include T1 and E1 both of which support multiple signaling and alarming formats. Realizing that custom signaling is part of many system designs, the Cs4000 has a custom output area that can support most signaling requirement. Because of this, the standard output signals are not affected and can be utilized along with whatever custom format is required.

The Cs4000 meets the challenges of laboratory standards, satcom terminals, mobile communications systems and a wide variety of test and measurement applications.



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## Cs4000 Specifications

### ELECTRICAL SPECIFICATIONS

#### • Frequency outputs

|                 |                         |
|-----------------|-------------------------|
| Frequency:      | 1 ea 100kHz & 1MHz Sine |
| Amplitude:      | 1Vrms                   |
| Harmonic:       | <-40dBc                 |
| Non harmonic:   | <-80dBc                 |
| Connector:      | BNC                     |
| Load impedance: | 50 $\Omega$             |
| Location:       | rear panel              |

|                 |                      |
|-----------------|----------------------|
| Frequency:      | 2 ea 5 & 10 MHz Sine |
| Amplitude:      | 1Vrms                |
| Harmonic:       | <-40dBc              |
| Non harmonic:   | <-80dBc              |
| Connector:      | Type N               |
| Load impedance: | 50 $\Omega$          |
| Location:       | rear panel           |

#### • Timing outputs

|                 |                                   |
|-----------------|-----------------------------------|
| Format:         | Three 1PPS                        |
| Amplitude:      | >3.0V into 50 $\Omega$            |
| Pulse width:    | 20 $\mu$ s positive pulse         |
| Rise time:      | <5ns                              |
| Jitter:         | <1ns rms                          |
| Connector:      | BNC                               |
| Load impedance: | 50 $\Omega$                       |
| Location:       | rear panel (2)<br>front panel (1) |

#### • Timing inputs

|                 |                                   |
|-----------------|-----------------------------------|
| Sync input:     | Two 1PPS                          |
| Connector:      | BNC                               |
| Load impedance: | 50 $\Omega$                       |
| Location:       | rear panel (1)<br>front panel (1) |

#### • Remote system interface and control

RS-232-C (DTE Configuration)  
Complete remote control and interrogation of  
all instrument functions and parameters

##### Connector

|           |  |
|-----------|--|
| RS-232-C: | (2)9-pin male rectangular D<br>subminiature type |
| Location: | rear panel (1)                                   |

##### Network interface

|                 |                             |
|-----------------|-----------------------------|
| Physical Layer: | 10 base 100 TX (IEEE 802.3) |
| Connector:      | RJ45                        |
| Location:       | rear panel (1)              |
| Transport:      | TCP/IP                      |
| Protocol:       | HTTP                        |

##### Alarm (TTL):

|           |            |
|-----------|------------|
| Location: | rear panel |
|-----------|------------|

##### Output TTL:

|              |
|--------------|
| high, normal |
|--------------|

TTL low, fault

Circuit is TTL open collector with internal pullup resistor

Circuit can sync up to 10mA

### PERFORMANCE SPECIFICATIONS

#### • Performance

|                            |               |
|----------------------------|---------------|
| Accuracy:                  | $\pm 1.0E-12$ |
| Warm-up time:<br>(typical) | 30 Min        |
| Reproducibility:           | $\pm 2.0E-13$ |
| Stability                  |               |
| Range:                     | $\pm 1.0E-9$  |
| Resolution:                | 1.0E-15       |

#### • Stability

| AvgTime (s) | Allan Deviation |
|-------------|-----------------|
| 1           | $\leq 1.2E-11$  |
| 10          | $\leq 8.5E-12$  |
| 100         | $\leq 2.7E-12$  |
| 1,000       | $\leq 8.5E-13$  |
| 10,000      | $\leq 2.7E-13$  |
| 100,000     | $\leq 8.5E-14$  |
| Floor       | $\leq 5.0E-14$  |

#### • SSB Phase noise

| Offset (Hz) | 5MHz Output    |
|-------------|----------------|
| 1           | $\leq -95dBc$  |
| 10          | $\leq -130dBc$ |
| 100         | $\leq -145dBc$ |
| 1,000       | $\leq -155dBc$ |
| 10,000      | $\leq -155dBc$ |
| 100,000     | $\leq -160dBc$ |

### ENVIRONMENTAL & PHYSICAL SPECIFICATIONS

#### • General environment

|                           |                                 |
|---------------------------|---------------------------------|
| Operating                 |                                 |
| Temperature:              | 0°C to 50°C                     |
| Humidity:                 | 95% up to 50°C (non-condensing) |
| Non-operating (transport) |                                 |
| Temperature               |                                 |
| [storage]:                | -30°C to 70°C                   |
| Temperature               |                                 |
| [short term]:             | -40°C to 75°C                   |
| Magnetic field:           | 0 to 2 gauss                    |
| Shock:                    | 30g/11ms, 3 axis                |
| Vibration:                | MIL-T-28800E, Type III, Class 5 |
| Altitude (operating):     | 0 to 50,000'                    |

#### • AC Power requirements

|                       |
|-----------------------|
| 85 to 264 VAC         |
| 47 to 63 Hz           |
| 70VA, 64W (Operating) |
| 90VA, 80W (Warm Up)   |

#### • DC Power requirements

|                 |
|-----------------|
| 36 - 75VDC*     |
| 60W (Operating) |
| 70W (Warm Up)   |

\* 24VDC (22 - 36VDC) Power supply option available

|               |   |
|---------------|---|
| • Dimensions: | 17.22" W x 5.22" H x 20.63" D<br>(43.73 cm x 13.25 cm x 52.40 cm) |
|---------------|---|

#### • Internal standby battery

|                |   |
|----------------|---|
| Capacity:      | 45 minutes @ 25°C from full charge<br>(without front panel display)<br>20 minutes @ 25°C from full charge<br>(with front panel display)<br>16 hours maximum from fully discharged state |
| Charge time:   | 16 hours maximum from fully discharged state  |
| Charge source: | AC or DC  |

|           |                   |
|-----------|-------------------|
| • Weight: | 45 lbs. (20.4 Kg) |
|-----------|-------------------|

|         |               |
|---------|---------------|
| • MTBF: | >105,000 hrs. |
|---------|---------------|

### ORDERING INFORMATION

|   | Part No.  |
|---|-----------|
| • 48VDC, Display, Battery, Ethernet     | 14645-111 |
| • 48VDC, Display, Battery, T1, Ethernet | 14645-123 |
| • 48VDC, Display, Battery, E1, Ethernet | 14645-115 |
| • 48VDC, No Display, No Battery         | 14645-101 |



Rear view of Cs4000



**SYMMETRICOM, INC.**  
2300 Orchard Parkway  
San Jose, California  
95131-1017  
tel: 408.433.0910  
fax: 408.428.7896  
info@symmetricom.com  
www.symmetricom.com