EPSILON BOARD

MODEL EBO3

USER'S MANUAL

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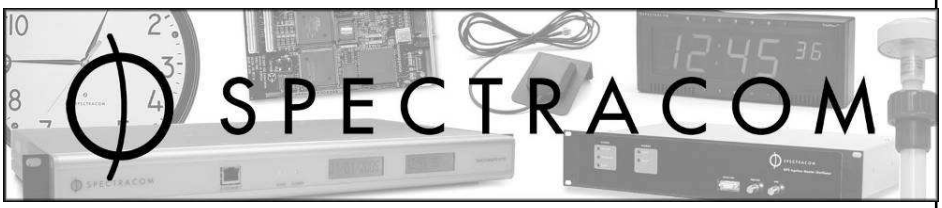

www.spectracomcorp.com

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SPECTRACOM LIMITED WARRANTY

LIMITED WARRANTY

Spectracom warrants each new product manufactured and sold by it to be free from defects in software, material, workmanship, and construction, except for batteries, fuses, or other material normally consumed in operation that may be contained therein AND AS NOTED BELOW, for five years after shipment to the original purchaser (which period is referred to as the "warranty period"). This warranty shall not apply if the product is used contrary to the instructions in its manual or is otherwise subjected to misuse, abnormal operations, accident, lightning or transient surge, repairs or modifications not performed by Spectracom.

The GPS receiver is warranted for one year from date of shipment and subject to the exceptions listed above. The power adapter, if supplied, is warranted for one year from date of shipment and subject to the exceptions listed above.

THE TIMEVIEW ANALOG CLOCKS ARE WARRANTED FOR ONE YEAR FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

THE TIMECODE READER/GENERATORS ARE WARRANTED FOR ONE YEAR FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

THE WIRELESS CLOCK SYSTEM TRANSMITTERS AND/OR TRANSCEIVERS AND CLOCKS ARE WARRANTED FOR TWO YEARS FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

THE EPSILON CLOCKS, BOARDS, AND SYNCHRONIZATION UNITS ARE WARRANTED FOR TWO YEARS FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

The Rubidium oscillator, if supplied, is warranted for two years from date of shipment and subject to the exceptions listed above.

All other items and pieces of equipment not specified above, including the antenna unit, antenna surge suppressor and antenna pre-amplifier are warranted for 5 years, subject to the exceptions listed above.

WARRANTY CLAIMS

Spectracom's obligation under this warranty is limited to in-factory service and repair, at Spectracom's option, of the product or the component thereof, which is found to be defective. If in Spectracom's judgment the defective condition in a Spectracom product is for a cause listed above for which Spectracom is not responsible, Spectracom will make the repairs or replacement of components and charge its then current price, which buyer agrees to pay.

Spectracom shall not have any warranty obligations if the procedure for warranty claims is not followed. Users must notify Spectracom of the claim with full information as to the claimed defect. Spectracom products shall not be returned unless a return authorization number is issued by Spectracom.

Spectracom products must be returned with the description of the claimed defect and identification of the individual to be contacted if additional information is needed. Spectracom products must be returned properly packed with transportation charges prepaid.

Shipping expense: Expenses incurred for shipping Spectracom products to and from Spectracom (including international customs fees) shall be paid for by the customer, with the following exception. For customers located within the United States, any product repaired by Spectracom under a "warranty repair" will be shipped back to the customer at Spectracom's expense unless special/faster delivery is requested by customer.

Spectracom highly recommends that prior to returning equipment for service work, our technical support department be contacted to provide trouble shooting assistance while the equipment is still installed. If equipment is returned without first contacting the support department and "no problems are found" during the repair work, an evaluation fee may be charged.

EXCEPT FOR THE LIMITED WARRANTY STATED ABOVE, SPECTRACOM DISCLAIMS ALL WARRANTIES OF ANY KIND WITH REGARD TO SPECTRACOM PRODUCTS OR OTHER MATERIALS PROVIDED BY SPECTRACOM, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Spectracom shall have no liability or responsibility to the original customer or any other party with respect to any liability, loss, or damage caused directly or indirectly by any Spectracom product, material, or software sold or provided by Spectracom, replacement parts or units, or services provided, including but not limited to any interruption of service, excess charges resulting from malfunctions of hardware or software, loss of business or anticipatory profits resulting from the use or operation of the Spectracom product or software, whatsoever or howsoever caused. In no event shall Spectracom be liable for any direct, indirect, special or consequential damages whether the claims are grounded in contract, tort (including negligence), or strict liability.

EXTENDED WARRANTY COVERAGE

Extended warranties can be purchased for additional periods beyond the standard five-year warranty for those products covered under five-year warranty. Contact Spectracom no later than the last year of the standard five-year warranty for extended coverage.

Table of Contents

1 Introduction

The EPSILON BOARD MODEL EBO3 generates and distributes a highly accurate and stable frequency source disciplined using different synchronization inputs, such as:

- GPS satellites signals
- External_1pps_10MHz. This synchronization source is either an External 1PPS linked or not with standard NMEA message or a 10MHz frequency. In the case that both sources are connecting on the EPSILON BOARD MODEL EBO3, the external 1PPS is automatically chosen as the synchronization source.
- Optional inputs such as 2.048 Mbit/s (E1) or IEEE1588 available using a “piggy-back” board.

The choice of the synchronization input is performing automatically according to the presence and /or the availability of the input and by a priority’s level affected at the source. This priority’s level affected at each synchronization source should be 0, 1, 2, 3:

0 Disable the source input (in this case the source input is not supervised);
1 is the highest priority.
2 is the intermediate level priority.
3 is the lowest priority level.

The status and the ownership of the priority level are only set with the 10/100BT interface through embedded SNMP protocol and/or web server. The standard factory settings are: GPS priority 1, external 1pps_10MHz and Optional inputs priority 0 (not supervised).

The time reference thus obtained is processed by efficient algorithms that control the built-in oscillator, which generates inner frequency and time signals. The board continues to deliver time and frequency signals even if the reference input signal is lost. Furthermore, learning from its behavior in different situations (effects attributed to aging and to temperature variations) while the reference signal is present, the smart Epsiltime© algorithm driving the embedded frequency reference improves the accuracy of time and frequency delivered when the reference signal is lost.

The majority of the EPSILON BOARD MODEL EBO3’s functions are software controlled. At start-up, the board carries out a series of automatic tests (including hardware tests and verification of the built-in oscillator's stability) before making an initial coarse adjustment to the distributed frequency. The board has a serial remote control interface for all the queries and commands described in this manual.

THE EPSILON BOARD MODEL EBO3 IS FACTORY CONFIGURED TO ASSUME AUTOMATIC START-UP AND NORMAL OPERATION WITHOUT USING THE REMOTE CONTROL INTERFACE.

The EPSILON BOARD MODEL EBO3 is used to generate, maintain, and provide the following:

- A synchronized $UTC_{(GPS)}$ time reference. This time reference is fed from the GPS board when the EPSILON BOARD MODEL EBO3 is locked on GPS or is issued from the NMEA message input when the EPSILON BOARD MODEL EBO3 is locked on the

external 1PPS and the NMEA message is connected and valid. The board also distributes a 1pps signal, a Time Of Day message or standard NMEA message (TOD interface), and a time-coded message (remote control interface).

- A frequency reference (one sine-wave 10 MHz).

The board is powered by two DC power supplies: +5V and +12V. A remote control interface provides board status and allows the user to send initialization and configuration commands.

An Ethernet 10/100BaseT interface also gives the user access to the setup, status, and alarms through embedded SNMP protocol and/or web server.

The board has four TTL status outputs:

- GPS lock: When on, the GPS reception is correct and the GPS receiver board distributes a 1PPS locked on UTC.
- EXTERNAL REFERENCE OK: When on, External_1pps_10MHz input or optional input is connected and detected.
- SFN mode: When on, the 10MHz frequency is cycle locked to the 1pps, meaning that there are always 10,000,000 cycles between consecutive 1PPS occurrences.
- EBO OK: When on, indicates the continuous auto tests' success on the board.

The EPSILON BOARD MODEL EBO3 is fully automatic. It requires no maintenance for a period of 10 years.

The EPSILON BOARD MODEL EBO3 exists in four versions depending the accuracy need and the type of integration:

- EBO3B-BG : high accuracy and connectivity on the bottom of the carte
- EBO3B-WG : medium accuracy and connectivity on the bottom of the carte
- EBO3T-BG : high accuracy and connectivity on the top of the carte
- EBO3T-WG : medium accuracy and connectivity on the top of the carte

1.1 Inventory

Before installing your Spectracom product, please verify that all material ordered has been received. If there is a discrepancy, please contact Spectracom Customer Service. Customer service is available by telephone at +33 (0) 1.64.53.39.80 (France), or +1.585.321.5800 (United States). Updated contacts information are available on web site, see “Support” page.

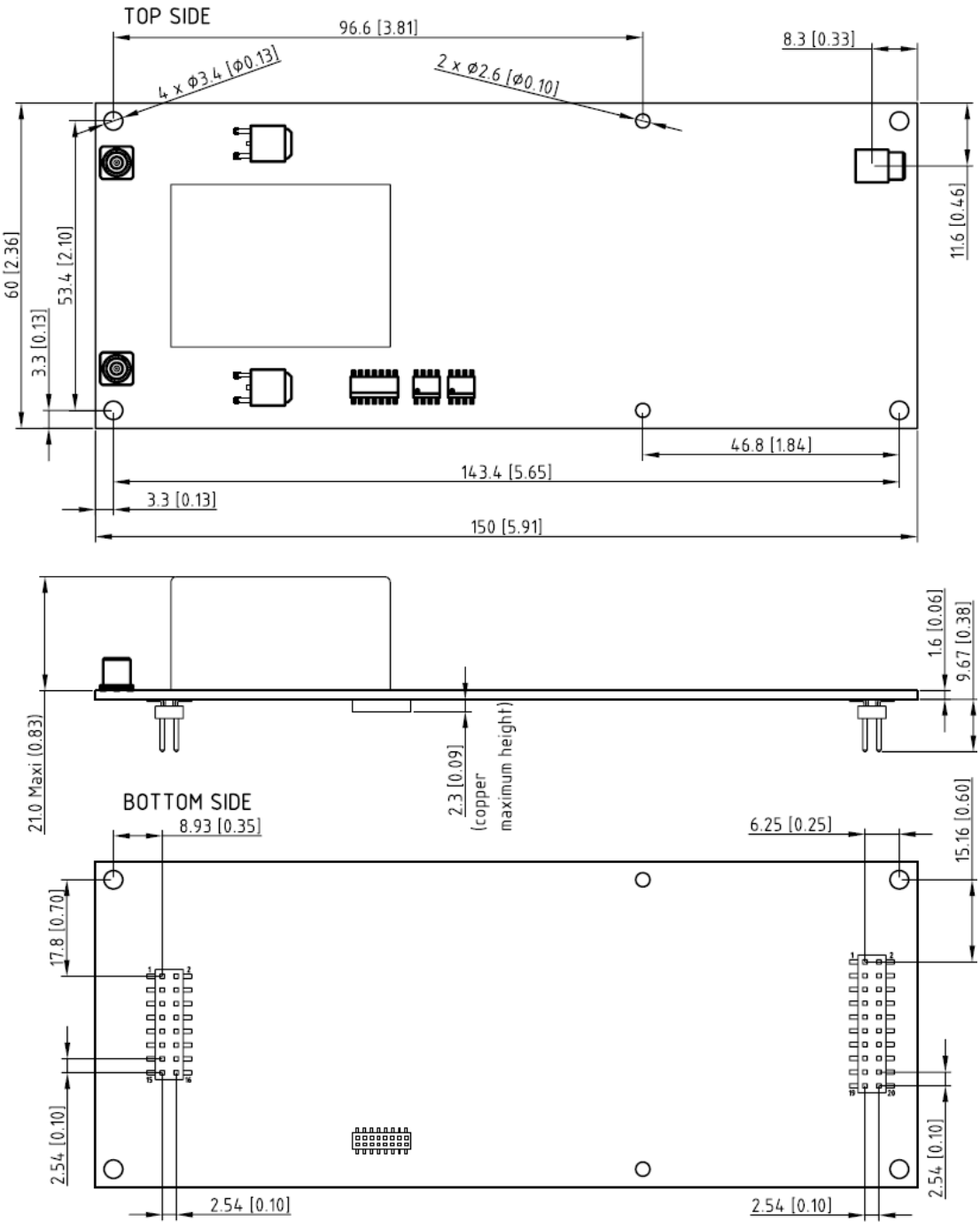
CAUTION:  *Electronic equipment is sensitive to Electrostatic Discharge (ESD). Observe all applicable ESD precautions and safeguards when handling the Spectracom equipment.*

NOTE: If equipment is returned to Spectracom, it must be shipped in its original packing material. Save all packaging material for this purpose.

1.2 Inspection

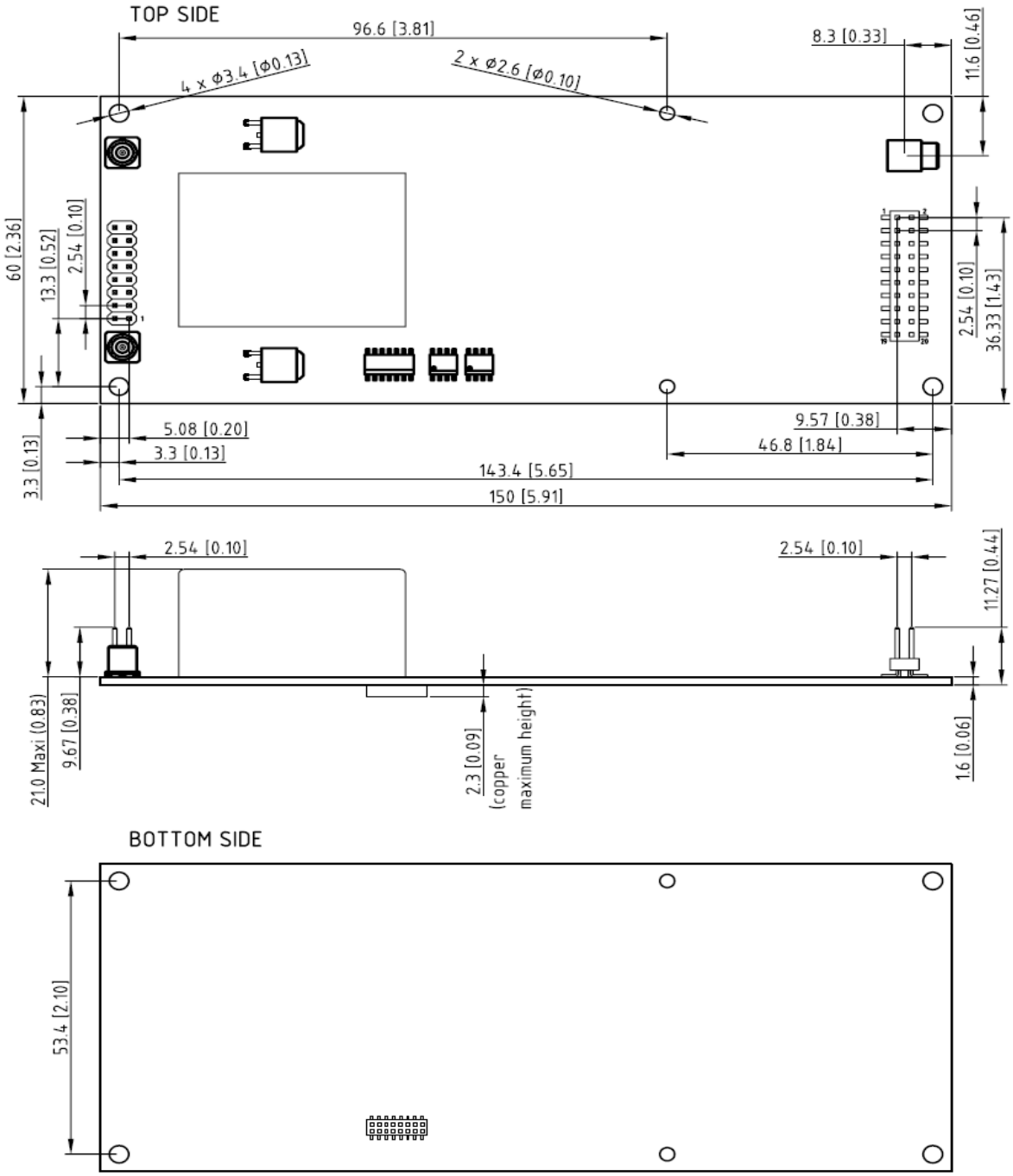
Unpack the equipment and inspect it for damage. If any equipment has been damaged in transit, please contact Spectracom Customer Service. Customer service is available by telephone at +33 (0) 1.64.53.39.80 (France), or +1.585.321.5800 (United States). Updated contacts information are available on web site, see “Support” page.

1.3 EBO3B-BG mechanical Characteristics (Dimensions in mm)



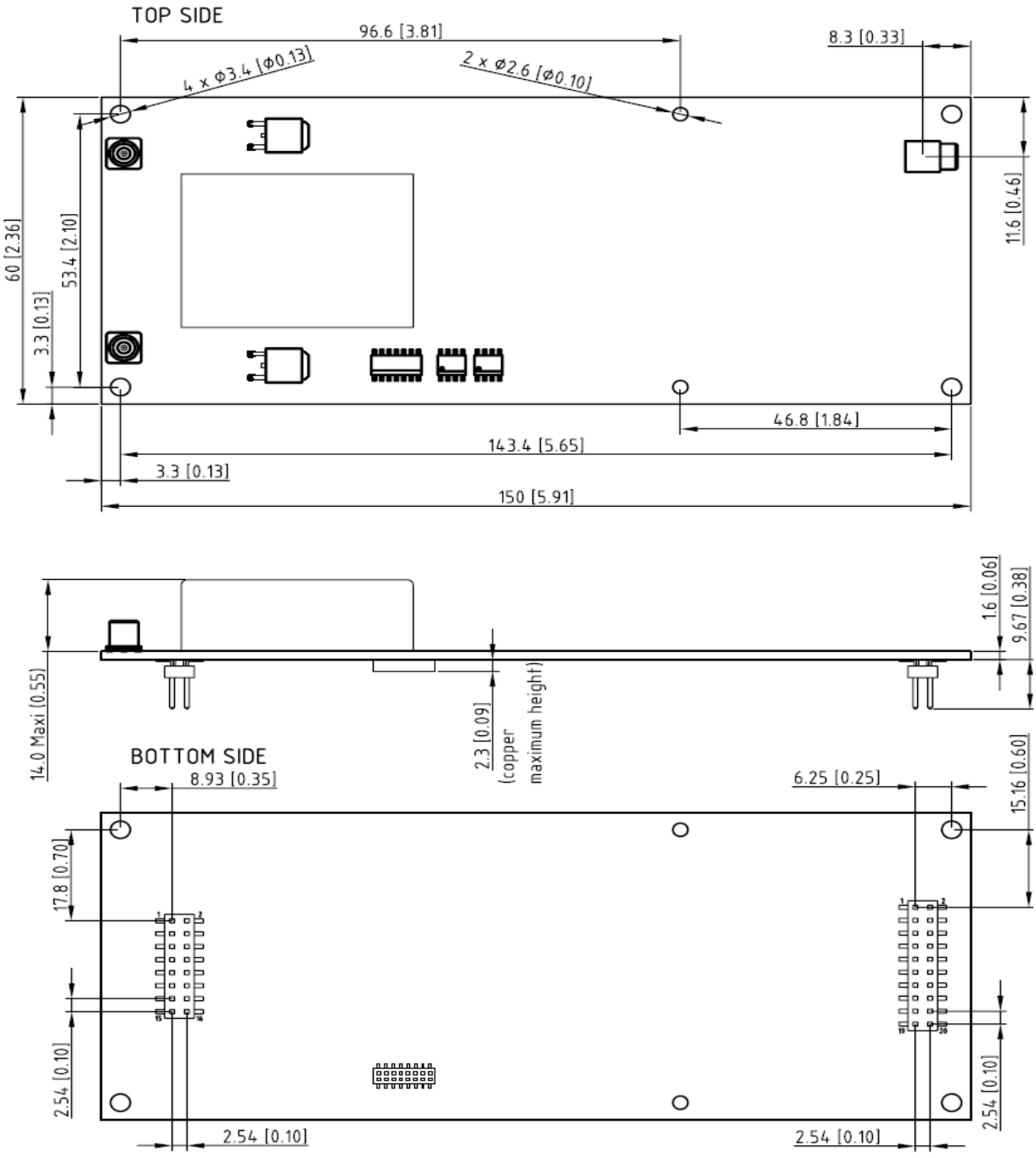
All dimensions in mm (in inche). Weight < 150g

1.4 EBO3T-BG mechanical Characteristics (Dimensions in mm)



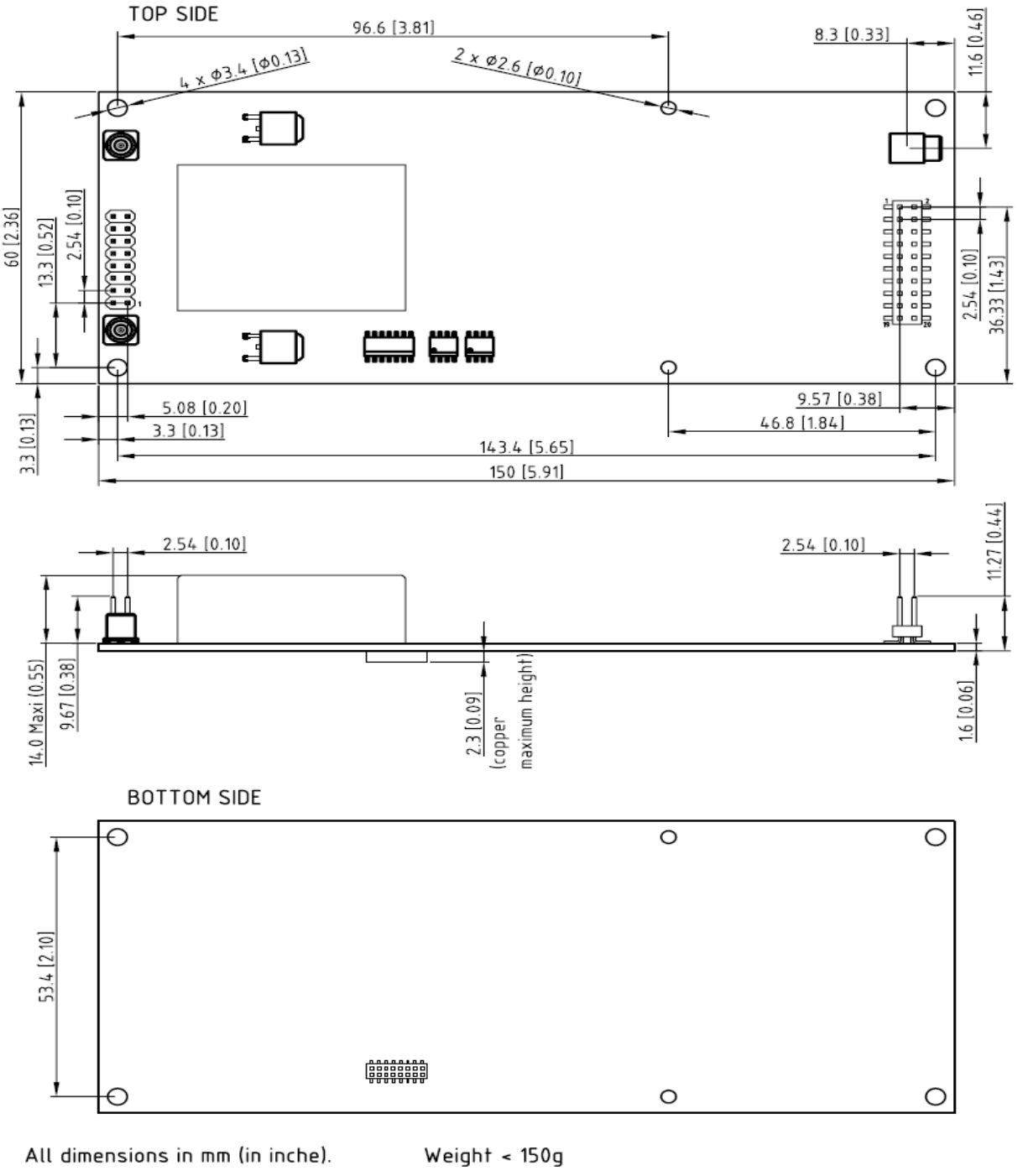
All dimensions in mm (in inche). Weight < 150g

1.5 EBO3B-WG mechanical Characteristics (Dimensions in mm)



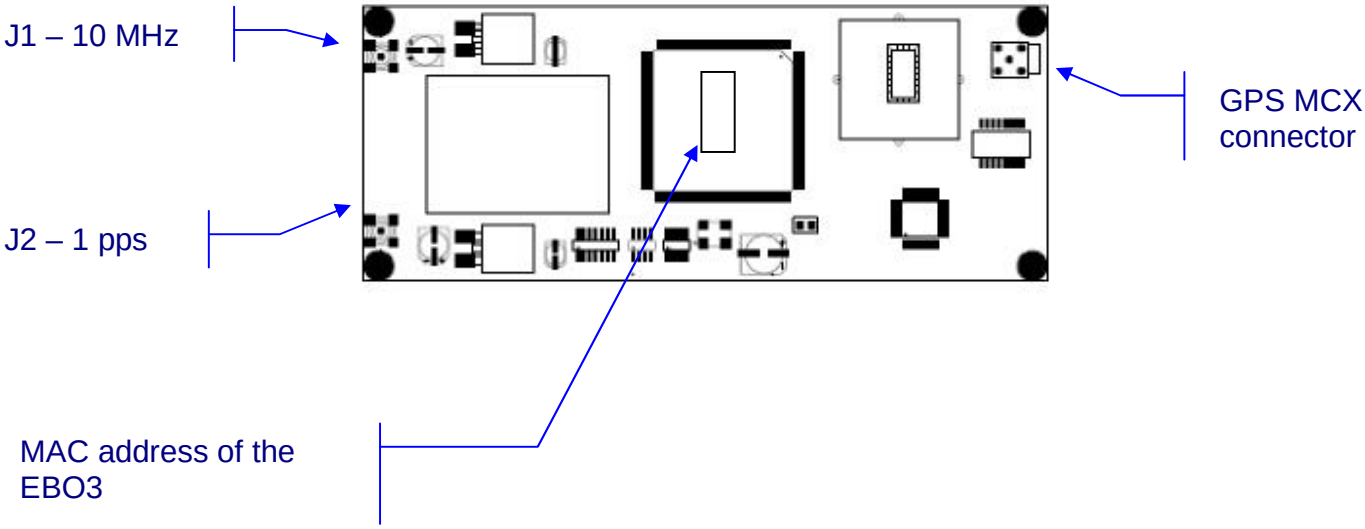
All dimensions in mm (in inche). Weight < 150g

1.6 EBO3T-WG mechanical Characteristics (Dimensions in mm)



All dimensions in mm (in inche). Weight < 150g

1.7 Board View



1.8 Terminology

DHCP	Dynamic Host Configuration Protocol
GPS	Global Positioning System
OCXO	Oven Controlled XTAL (Crystal) Oscillator
Rb	Rubidium oscillator
S/A	Selective Availability
SFN	Single Frequency Network
TRAIM	Time Receiver Autonomous Integrity Monitoring
UTC	Universal Time Coordinated
1PPS	One Pulse Per Second
1 PPS driver	Pulse signal obtained through division of the frequency driver
Holdover	If the reference input signal is lost, the EPSILON CLOCK® maintains the generation of information and of time and frequency signals.
Reliability	Concerns the positioning mode of the antenna. In automatic mode, the EPSILON CLOCK® calculates the position of the antenna and, after testing the result, imposes the reliable position on the internal GPS receiver. The receiver therefore functions in GPS 0D reception mode. The EPSILON CLOCK® is synchronized by following at least one satellite.
Frequency driver	Frequency signal generated by the built-in oscillator.
Reference input	Time and frequency source used by the EPSILON CLOCK®.
IERS	International Earth Rotation Service.
MAC	Medium Access Control
MIB	Management Information Base
NMEA	National Marine Electronics Association
RCI	Remote control interface
TCI	Terminal control interface

2 Installation

2.1 Preliminary Connections

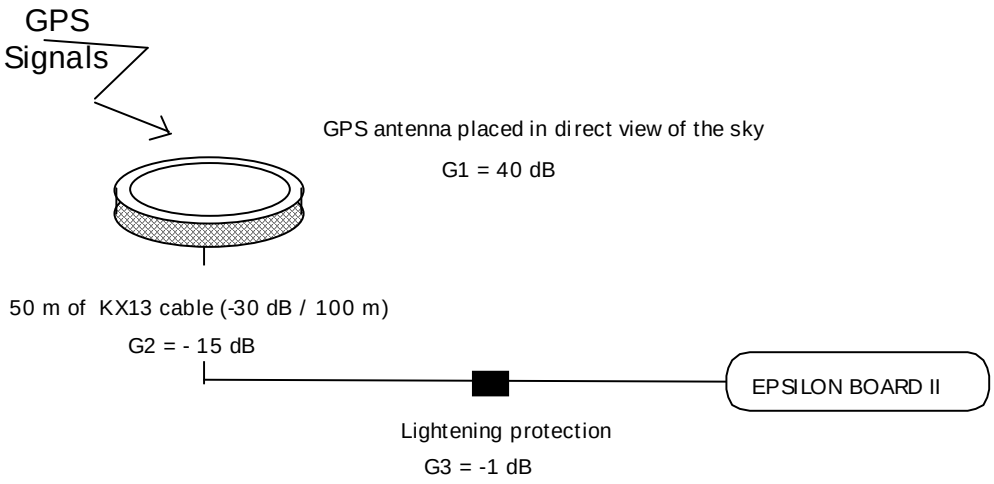
Before starting the EPSILON BOARD MODEL EBO3, perform the following tasks:

- Locate the board to obtain natural air cooling.
- Locate the GPS antenna outside in a place from which it is in direct view of the sky over 360 degrees (on top of a mast, for example).

CAUTION:  *The EPSILON BOARD MODEL EBO3 is designed to be used with the supplied GPS antenna ONLY. Using another antenna may cause significant damage to the unit and will void your Spectracom warranty.*

- Connect the antenna cable to the MCX GPS connector of the GPS receiver. To ensure the correct reception of the GPS signal, the overall system of antenna/cable/protection requires accurate gain matching.

Example:



$G1 + G2 + G3 = 40\ dB - 15\ dB - 1\ dB = 24\ dB$

Thus: $X_{min}\ dB < G1 + G2 + G3 = 24\ dB < X_{max}\ dB$

X_{min} and X_{max} are defined in last updated revision of application note TF2.

2.2 Connector J2 HE1302 Pin-Out (only for EBO3B-BG an EBO3B-WG)

The main characteristics of the HE1302 connector of the EPSILON BOARD MODEL EBO3 are:

- 16 contacts (2 rows, eight pins per row).
- Vertical headers 2.54 x 2.54 mm (0.100 x 0.100 in.)
- Mating length 6.1 mm (0.240 in.)

NOTE: The J2 connector is fully compatible with the P2 connector of the EPSILON BOARD MODEL EBO2.

The pin-out of the connector is described in the following table:

1	PWR_5VDC	**2**	PWR_5VDC
3	GND	**4**	GND
5	TC_RX	**6**	TC_TX
7	TOD_TX	**8**	EXT_10MHz
9	GPS_LOCK	**10**	EBO_OK
11	Reserved	**12**	RESET
13	GND	**14**	GND
15	PWR_12VDC	**16**	PWR_12VDC

The inputs/outputs of the HE1302 connector are defined in the following table:

GND	Ground
TC_TX	Transmit line output of the remote control interface. TTL compatible level
TC_RX	Receive line input of the remote control interface. TTL compatible level
PWR_12VDC	12V DC power input
GPS_LOCK	Binary status output relative to GPS reception: - "1" logical level indicates that the GPS reception is correct. - "0" logical level: - non permanent: *at start-up*, indicates that the minimum time to first fix sufficient GPS satellites is not reached. *in normal operation*, indicates a momentarily loss of GPS reception. - permanent: indicates a GPS reception failure. TTL compatible level.
EBO_OK	Binary status output relative to board working order. "1" logical level indicates the good working order of the board. "0" logical level indicates a board failure or a phase or a frequency alarm. TTL compatible level.
PWR_5VDC	5V DC power input
TOD_TX	Transmit line of the Time Of Day message interface. TTL compatible level.
RESET	External reset input of the board. External command must be provided by a switch (connected to the board ground) or an open collector transistor (powered on the board 5V DC supply).
EXT_10MHz	External frequency 10MHz, used for the External_1pps_10MHz input.

2.3 Connector J7 HE1302 Pin-Out (only for EBO3B-BG an EBO3B-WG)

The main characteristics of the HE1302 connector of the EPSILON BOARD MODEL EBO3 are:

- 20 contacts (2 rows, eight pins per row).
- Vertical headers 2.54 x 2.54 mm (0.100 x 0.100 in.)
- Mating length 6.1 mm (0.240 in.)

The pin-out of the connector is described in the following table:

1	SFN_OK	**2**	EXT_REF_OK
3	GND	**4**	EXT_OPT_E1+
5	EXT_OPT_E1-	**6**	GND
7	EXT_1PPS_INPUT	**8**	GND
9	EXT_NMEA_INPUT	**10**	GND
11	LED_ETH_TX	**12**	LED_ETH_LINK
13	ETH_TX+	**14**	ETH_TX-
15	ETH_SHIELD_TX+	**16**	ETH_RX+
17	ETH_SHIELD_TX-	**18**	ETH_RX-
19	ETH_SHIELD_RX+	**20**	ETH_SHIELD_RX-

The inputs/outputs of the HE1302 connector are defined in the following table:

GND	Ground
SFN_OK	Binary status output relative to SFN mode availability - "1" logical level indicates that the 10MHz frequency is cycle locked to the 1pps, meaning that there are always 10 000 000 cycles between consecutive 1pps occurrences. - "0" logical level: no available for the SFN mode. TTL compatible level (3.3V max).
EXT_REF_OK	Binary status output relative to the presence of External_1pps_10MHz or optional inputs. - "1" logical level indicates that the External_1pps_10MHz and /or optional inputs are connected. - "0" logical level: External_1pps_10MHz and optional inputs are not connected. TTL compatible level (3.3V max).
EXT_OPT_E1+ **EXT_OPT_E1-**	External 2.048 Mbit/s / E1 Synchronization frames at 2048 Kbit/s in accordance with G.704.-§13 Only available with a specific piggy-back board
EXT_1PPS_INPUT	External 1PPS used as an external synchronization reference TTL (0-5V) / 50 Ω
EXT_NMEA_INPUT	Receive line of the NMEA message interface input Time reference of the EPSILON BOARD MODEL EBO3 when the clock is locked on the external 1PPS and the MNEA message is connected and valid
LED_ETH_TX	Led pin indicate a transmission on the 10/100 Base T interface.
LED_ETH_LINK	Led pin indicate a connection on the 10/100 Base T interface.
ETH_SHIELD_xx	Shield of the 10/100 Base T interface
ETH_TX+ **ETH_TX-**	Transmit line of the 10/100 Base T interface
ETH_RX+ **ETH_RX-**	Receive line of the 10/100 Base T interface

2.4 Connector J8 HE1302 Pin-Out (only for EBO3T-BG an EBO3T-WG)

The main characteristics of the HE1302 connector of the EPSILON BOARD MODEL EBO3 are:

- 16 contacts (2 rows, eight pins per row).
- Vertical headers 2.54 x 2.54 mm (0.100 x 0.100 in.)
- Mating length 6.1 mm (0.240 in.)

The pin-out of the connector is described in the following table:

1	PWR_5VDC	**2**	PWR_5VDC
3	GND	**4**	GND
5	TC_RX	**6**	TC_TX
7	TOD_TX	**8**	EXT_10MHz
9	GPS_LOCK	**10**	EBO_OK
11	Reserved	**12**	RESET
13	GND	**14**	GND
15	PWR_12VDC	**16**	PWR_12VDC

The inputs/outputs of the HE1302 connector are defined in the following table:

GND	Ground
TC_TX	Transmit line output of the remote control interface. TTL compatible level
TC_RX	Receive line input of the remote control interface. TTL compatible level
PWR_12VDC	12V DC power input
GPS_LOCK	Binary status output relative to GPS reception: - "1" logical level indicates that the GPS reception is correct. - "0" logical level: - non permanent: *at start-up*, indicates that the minimum time to first fix sufficient GPS satellites is not reached. *in normal operation*, indicates a momentarily loss of GPS reception. - permanent: indicates a GPS reception failure. TTL compatible level.
EBO_OK	Binary status output relative to board working order. "1" logical level indicates the good working order of the board. "0" logical level indicates a board failure or a phase or a frequency alarm. TTL compatible level.
PWR_5VDC	5V DC power input
TOD_TX	Transmit line of the Time Of Day message interface. TTL compatible level.
RESET	External reset input of the board. External command must be provided by a switch (connected to the board ground) or an open collector transistor (powered on the board 5V DC supply).
EXT_10MHz	External frequency 10MHz, used for the External_1pps_10MHz input.

2.5 Connector J17 HE1302 Pin-Out (only for EBO3T-BG an EBO3T-WG)

The main characteristics of the HE1302 connector of the EPSILON BOARD MODEL EBO3 are:

- 20 contacts (2 rows, eight pins per row).
- Vertical headers 2.54 x 2.54 mm (0.100 x 0.100 in.)
- Mating length 6.1 mm (0.240 in.)

The pin-out of the connector is described in the following table:

1	EXT_REF_OK	**2**	SFN_OK
3	EXT_OPT_E1+	**4**	GND
5	GND	**6**	EXT_OPT_E1-
7	GND	**8**	EXT_1PPS_INPUT
9	GND	**10**	EXT_NMEA_INPUT
11	LED_ETH_LINK	**12**	LED_ETH_TX
13	ETH_TX-	**14**	ETH_TX+
15	ETH_RX+	**16**	ETH_SHIELD_TX+
17	ETH_RX-	**18**	ETH_SHIELD_TX-
19	ETH_SHIELD_RX-	**20**	ETH_SHIELD_RX+

The inputs/outputs of the HE1302 connector are defined in the following table:

GND	Ground
SFN_OK	Binary status output relative to SFN mode availability - "1" logical level indicates that the 10MHz frequency is cycle locked to the 1pps, meaning that there are always 10 000 000 cycles between consecutive 1pps occurrences. - "0" logical level: no available for the SFN mode. TTL compatible level (3.3V max).
EXT_REF_OK	Binary status output relative to the presence of External_1pps_10MHz or optional inputs. - "1" logical level indicates that the External_1pps_10MHz and /or optional inputs are connected. - "0" logical level: External_1pps_10MHz and optional inputs are not connected. TTL compatible level (3.3V max).
EXT_OPT_E1+ **EXT_OPT_E1-**	External 2.048 Mbit/s / E1 Synchronization frames at 2048 Kbit/s in accordance with G.704.-§13 Only available with a specific piggy-back board
EXT_1PPS_INPUT	External 1PPS used as an external synchronization reference TTL (0-5V) / 50 Ω
EXT_NMEA_INPUT	Receive line of the NMEA message interface input Time reference of the EPSILON BOARD MODEL EBO3 when the clock is locked on the external 1PPS and the MNEA message is connected and valid
LED_ETH_TX	Led pin indicate a transmission on the 10/100 Base T interface.
LED_ETH_LINK	Led pin indicate a connection on the 10/100 Base T interface.
ETH_SHIELD_xx	Shield of the 10/100 Base T interface
ETH_TX+ **ETH_TX-**	Transmit line of the 10/100 Base T interface
ETH_RX+ **ETH_RX-**	Receive line of the 10/100 Base T interface

Connections Quality

Great care must be taken in setting up the GPS Antenna and its connections. Remember that your GPS antenna must have an unobstructed view of the sky.

The type of cable connecting the antenna to the clock and the length of the cable influence greatly the quality of the signal reception. Cable type and length must conform to the rules described herein.

Connections to the antenna, the accessories (surge protection, in-line amplifier) and the cable must be weatherproofed.

An improper installation could result in problems ranging from random, intermittent loss of signal to complete loss of GPS reference. The most common outcome is the inability to discipline the GPS reference correctly.

2.6 Starting the Board

Verify that the preliminary connections have been made.

CAUTION:

The "EBO_OK" control output is at the logic level "0" during the OCXO warm-up time (about 5 minutes).

For 60 seconds after board start-up, the TOD and the Remote Control cannot be used.

The status outputs are used to report the status of the board. During start-up procedures, the output level of the status is interpreted as follows:

	GPS_LOCK	**EBO_OK**	**Notes**
Standard hardware automatic test	"0"	"0"	Checks the basic features of the board
Daughter board hardware test	"1"	"0"	Checks GPS features

In case of hardware failure (or software failure if the corresponding factory setting is active) the "EBO_OK" status output is not activated ("0" logical level).

The conditions for activating this output are as follows:

- Faulty GPS receiver,
- Faulty frequency driver,
- Faulty frequency divider loop,
- Faulty distribution of frequency or synchronization signals,
- Faulty frequency or synchronization performances*.

**This functionality is a parameter that can be selected via the remote control interface.*

If the failure occurs after the start-up sequence, both status outputs are set to "0" logic level. In this state, the Time Of Day message is not distributed and the board will not be synchronized to the GPS source. In this event you should contact Spectracom.

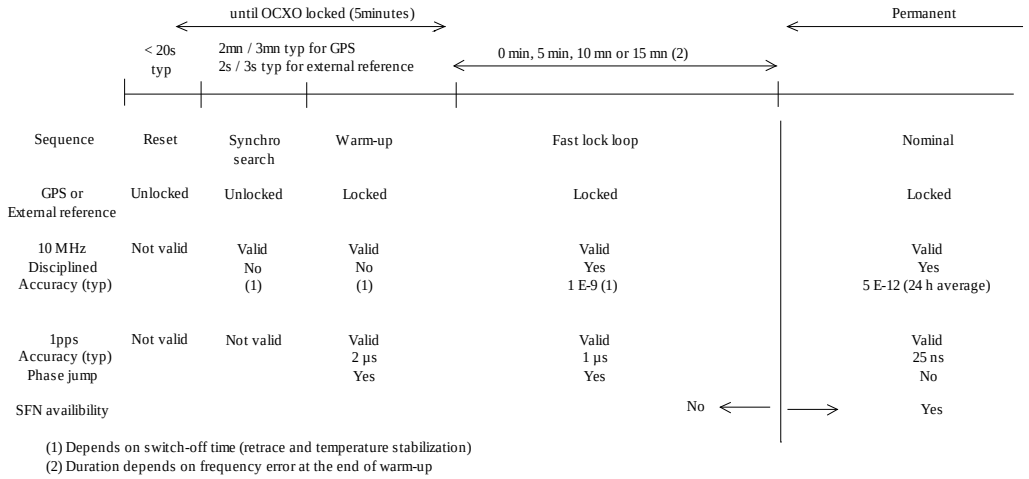
Under normal operating conditions, the EPSILON BOARD II is synchronized to $UTC_{(GPS)}$ about 5 minutes after switching it on. When it is synchronized, both status outputs are set to the "1" logic level.

In this state the EPSILON BOARD II continuously provides, with $UTC_{(GPS)}$ reference, the following outputs:

- The 1pps outputs (J2) and the associated Time Of Day message output (HE1302)
- The frequency output (J1)

The graph below shows a typical warm-up sequence when the GPS is selected as the primary synchronization reference source.

EPSILTIME SEQUENCES



(1) Depends on switch-off time (retrace and temperature stabilization)
(2) Duration depends on frequency error at the end of warm-up

2.7 Switching Off the Board

To switch off the EPSILON BOARD MODEL EBO3, remove the +5V and +12V power input.

3 Specifications

3.1 Frequency Output

Connectors: J9 MCX Female

Pin Settings

Core: Sine-wave signal
Ground: Electrical ground of the GND pins

Refer to data sheet for signal characteristics.

3.2 1PPS Output

Connector J13: MCX Female

Pin Settings

Core: Periodic pulse
Ground: Electrical ground of the GND pins

Refer to data sheet for signal characteristics.

3.3 EXT_10MHZ Input

Connector: J2 or J8 Connector HE1302

Pin Settings for J2 or J8

- 8: Sine-wave signal
- 3, 4, 13, 14: Electrical ground of the “GND” pins

Minimum Signal characteristic required:

Type: Sine wave
Level: 0 to 30 dBm / 50 Ω
Frequency range: 10MHz ± 0.001 Hz

3.4 EXT_1PPS Input

Connector: J7 or J17 connector HE1302

Pin Settings for J7

7: Periodic pulse

3, 6, 8, 10: Electrical ground of the “GND” pins

Pin Settings for J17

8: Periodic pulse

4, 5, 7, 9: Electrical ground of the “GND” pins

Minimum Signal characteristic required:

- TTL level (0 – 5V) / 50 Ω
- Active rise edge (high level duration 100µs minimum)
- Accuracy to UTC: ±50ns (1σ)

CAUTION: 

If the EXT_10MHZ_INPUT or EXT_1PPS_INPUT do not have the required minimum characteristics, the global performance of the EPSILON BOARD MODEL EBO3 will decrease dramatically.

3.5 NMEA Message Input

Connector: J7 or J17 connector HE1302

Pin Settings for J7

9: Periodic pulse

3, 6, 8, 10: Electrical ground of the “GND” pins

Pin Settings for J17

10: Periodic pulse

4, 5, 7, 9: Electrical ground of the “GND” pins

Input signal characteristic required:

Data and port parameters: ASCII, 4800 bps, 8 bits, 1 stop bit, no parity.

Protocol: <Message> <CR> <LF>

Format: $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh

- RMC = Recommended Minimum Specific GPS/TRANSIT Data
- hhmmss.ss = UTC of emitter position fix. Must be date the last EXT_1PPS
- A = status of the emitter (A = OK, V=warning).
- llll.ll = Latitude of emitter , not used by the EPSILON BOARD MODEL EBO3
- a = N or S (North or South) of emitter, not used by the EPSILON BOARD MODEL EBO3
- yyyyy.yy = Longitude of emitter, not used by the EPSILON BOARD MODEL EBO3
- a = E or W (East or West) of emitter, not used by the EPSILON BOARD MODEL EBO3
- x.x = not used by the EPSILON BOARD MODEL EBO3
- x.x = not used by the EPSILON BOARD MODEL EBO3
- ddmmyy = UTC date
- x.x = not used by the EPSILON BOARD MODEL EBO3
- a = not used by the EPSILON BOARD MODEL EBO3
- *hh = Checksum

NOTE: When the status sent is V and /or the checksum sent is incorrect, the NMEA message is not used by the EPSILON BOARD MODEL EBO3.

3.6 Remote Control Interface (TTL)

CAUTION:  *The remote control interface is TTL compatible ONLY. It should not be connected to an RS-232 interface.*

Serial port parameters:	9600 bps, 8 bits, 1 stop bit, odd parity
Protocol / syntax / format of messages:	Refer to *Remote Control Interface*
Data:	Binary (two's complement)
Order of bytes emitted:	Most significant bytes first

Connector: J2 or J8 Connector HE1302

Pin Settings for J2 or J8

6	Transmit remote signal
5	Receive remote signal
3	Electrical and mechanical ground
4	Electrical and mechanical ground
13	Electrical and mechanical ground
14	Electrical and mechanical ground

3.7 TOD Output (TTL)

CAUTION:  *The TOD interface is TTL compatible ONLY. It should not be connected to an RS-232 interface.*

Connector: J2 or J8 Connector HE1302

Pin Settings for J2 or J8

7	TOD message output
3	Electrical and mechanical ground
4	Electrical and mechanical ground
13	Electrical and mechanical ground
14	Electrical and mechanical ground

The TOD should be either the Time of Day message output or a standard NMEA message type RMC. The choice of the type of message delivered should be set with the 10/100BT interface through embedded SNMP protocol and/or web server.

NOTE: The NMEA message can be sent only when the reference of the UTC time scale is selected.

Time Of Day message output:

Output: ASCII, 9600 bps, 8 bits, 1 stop bit, odd parity.
Protocol: <Message> CR LF
Format*: Day/Month/Year Hour: Minute: Second Source
e.g.: 20/03/1996_21:02:05U

Format*: Month/Day/Year Hour: Minute: Second Source
e.g.: 11/12/1996_18:14:38L

Format*: Day of Year/Year Hour: Minute: Second Source
e.g.: 317/1996_18:16:20 L

The "Source" byte holds one ASCII character which codes the reference of the time chosen:

N No reference (when the board is not yet locked on GPS or NMEA message)
U UTC reference
G GPS reference
L Local time
M Manual (only authorized in “force holdover” mode or when the board is not locked)
- Maximum output period*: 1 message per second
- Output synchronization: Sent at 300 ms ±100 ms after the 1PPS signal.

* Programmable through the remote control interface.

3.8 NMEA 0183 Message Output

Data and port parameters: ASCII, 4800 bps, 8 bits, 1 stop bit, no parity.

Protocol: <Message> <CR> <LF>

Format: $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh

- RMC = Recommended Minimum Specific GPS/TRANSIT Data
- hhmmss.ss = UTC of position fix
- A = status of the EPSILON BOARD MODEL EBO3 (A = OK, V=warning)
- llll.ll = Latitude of fix
- a = N or S (North or South)
- yyyyy.yy = Longitude of fix
- a = E or W (East or West)
- x.x = not used, set to 0
- x.x = not used, set to 0
- ddmmyy = UTC date
- x.x = not used, Set to 0
- a = Set to E
- *hh = Checksum

3.9 Status Outputs

Connector: J2 or J8 Connector HE1302

Pin Settings for J2 or J8

9	“GPS_LOCK” output
10	“EBO_OK” output
3	Electrical and mechanical ground
4	Electrical and mechanical ground
13	Electrical and mechanical ground
14	Electrical and mechanical ground

Connector: J7 or J17 connector HE1302

Pin Settings for J7

1	“SFN_OK” output
2	“REF_EXT_OK” output
3	Electrical and mechanical ground
6	Electrical and mechanical ground
8	Electrical and mechanical ground
10	Electrical and mechanical ground

Pin Settings for J17

2	"SFN_OK" output
1	"REF_EXT_OK" output
4	Electrical and mechanical ground
5	Electrical and mechanical ground
7	Electrical and mechanical ground
9	Electrical and mechanical ground

Signal Level: TTL compatible (3.3V max.)

3.10 10/100 Base T interface

Connector: J7 or J17 connector HE1302

Pin Settings for J7

11: LED_ETH_TX

12: LED_ETH_LINK

13: ETH_TX+

14: ETH_TX-

15: ETH_SHIELD_TX+

16: ETH_RX+

17: ETH_SHIELD_TX -

18: ETH_RX-

19: ETH_SHIELD_RX +

20: ETH_SHIELD_RX –

Pin Settings for J17

12: LED_ETH_TX

11: LED_ETH_LINK

14: ETH_TX+

13: ETH_TX-

16: ETH_SHIELD_TX+

15: ETH_RX+

18: ETH_SHIELD_TX -

17: ETH_RX-

20: ETH_SHIELD_RX +

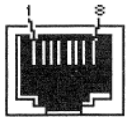
19: ETH_SHIELD_RX –

Characteristics

- Interface: 10 BASE T / 100 BASE T, IEEE-802.3 compliant
- Full featured auto negotiation function

Typical interconnection with a standard RJ45 female connector (without include transformers):

- Preliminary, ensure that the connections between the RJ45 female connector and J7 should be shorten as possible, or use printed circuit line with 100Ω of impedance.
- Pin out of the female RJ45 (front of view)



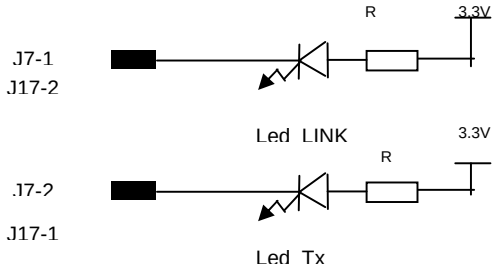
Connection

	Connector J7 EBO3B-BG EBO3B-WG	RJ45 Female
ETH_TX+	13	1
ETH_TX-	14	2
ETH_RX+	16	3
ETH_RX-	18	6
ETH_SHIELD_TX+	15	4
ETH_SHIELD_TX -	17	5
ETH_SHIELD_RX +	19	7
ETH_SHIELD_RX –	20	8

	Connector J17 EBO3T-BG EBO3T-WG	RJ45 Female
ETH_TX+	14	1
ETH_TX-	13	2
ETH_RX+	15	3
ETH_RX-	17	6
ETH_SHIELD_TX+	16	4
ETH_SHIELD_TX -	18	5
ETH_SHIELD_RX +	20	7
ETH_SHIELD_RX –	19	8

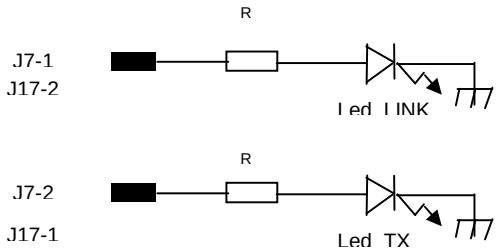
The two pins (LED_ETH_LINK and LED_ETH_TX) allow connecting two LEDs to see easily the good functioning of the interface with a Switch/Hub or server.

If in your printed circuit, you have a 3.3V power supply, then connect each LED with a resistor in series (220 Ω minimum) as follow:



In this case, the led LINK light on for a link up and the led TX light on for a data transmission .

If you don't have any 3.3V supply on your printed board, then connect each led with a resistor in series (220 Ω minimum) as follow:



In this case, the led LINK light on for a link down or no link and the led TX light off for a data transmission .

3.11 Power Supply

+5V DC Power

Typical consumption: 500 mA.

Connectors: HE1302 (P2)

Pin Settings for J2 or J8
- 1, 2: +5V ± 10%.
- 3, 4, 13, 14: Electrical ground of the "GND" pins

+12V DC Power

Typical consumption: 300 mA (500 mA at warm-up) for EPSILON BORD III

Connectors: HE1302 (P2)

Pin Settings for J2 or J8
- 15, 16: +12V ± 1V for EPSILON BORD III
- 3, 4, 13, 14: Electrical ground of the "GND" pins

3.12 GPS Antenna Input/Output

Connector: J6 (MCX female)

Pin Settings:

Core: GPS Signal Input (L1)
Output power supply of the active antenna

Voltage: 5V

Current: 70 mA max

Ground: Electrical ground of the "GND" pins

3.13 Operating Environment

Operating temperature:	-5 to +60℃
Storage temperature:	- 40℃ to 85℃
Relative humidity:	95 % without condensation, at + 40℃

4 Network Interface

4.1 Network Connection

At power-up, the EPSILON BOARD OEM III is waiting for a DHCP server connection so that its own IP address is set according to its own MAC address.

The MAC address of the EBO3 is available on the front of the EBO3.

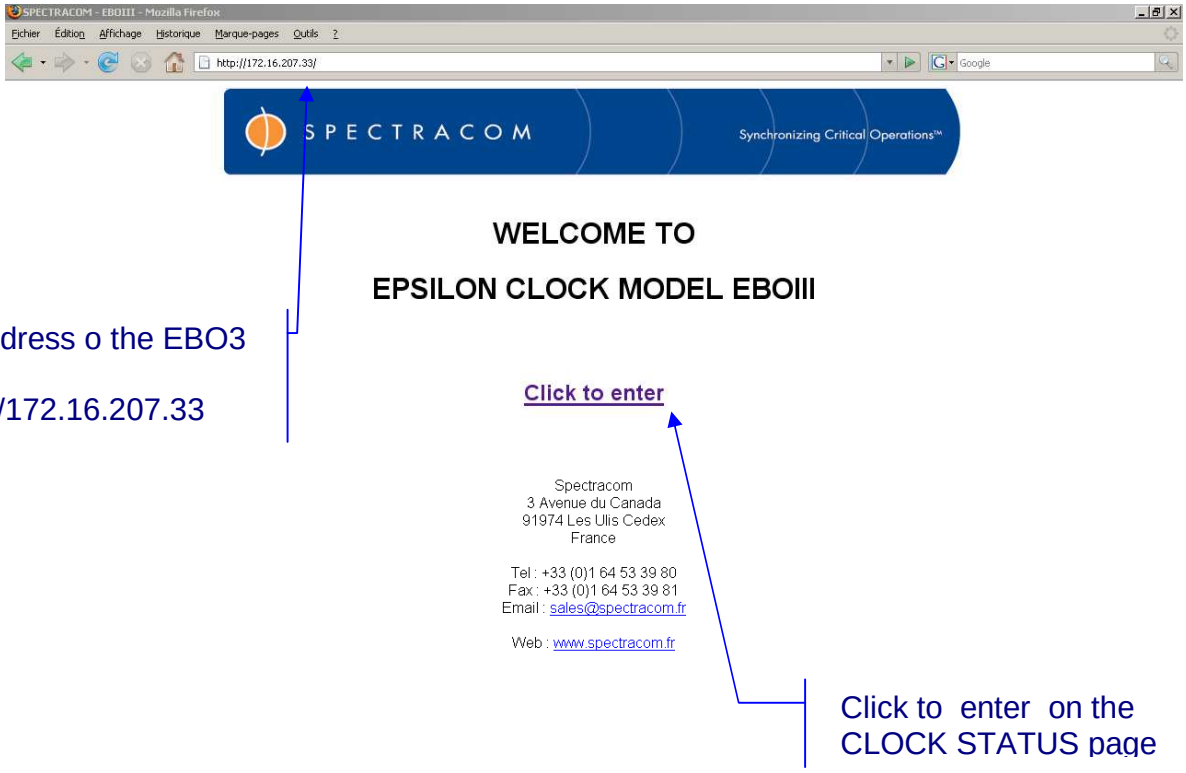
A networking tool can give the address allocated to the EBO3.

Then it is possible for any PC with a web browser to access the EPSILON BOARD Model EBO3 web pages.

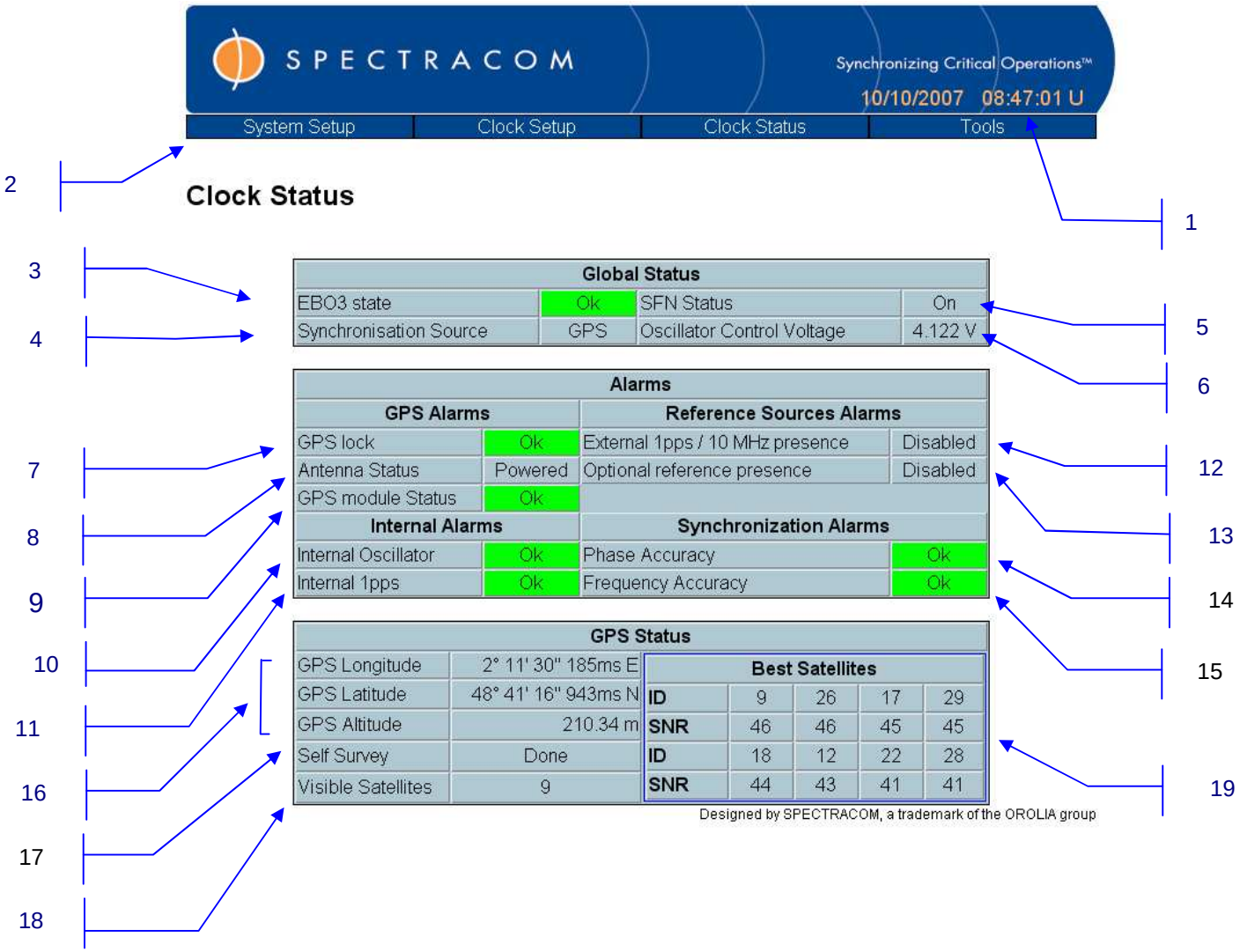
4.2 Web Interface

When connecting to the EPSILON BOARD Model EBO3, IP address with a web browser (HTTP protocol), the user can check the clock status and modify configuration parameters.

4.2.1 Introduction Page


SPECTRACOM - EBOIII - Mozilla Firefox
Fichier Édition Affichage Historique Marque-pages Outils ?
http://172.16.207.33/
SPECTRACOM
Synchronizing Critical Operations™
WELCOME TO
EPSILON CLOCK MODEL EBOIII
Click to enter
Spectracom
3 Avenue du Canada
91974 Les Ulis Cedex
France
Tel : +33 (0)1 64 53 39 80
Fax : +33 (0)1 64 53 39 81
Email : sales@spectracom.fr
Web : www.spectracom.fr
IP address o the EBO3 like: http://172.16.207.33
Click to enter on the CLOCK STATUS page

4.2.2 Clock Status page



This page is automatically refreshed every 5 seconds.

1) Date, time, and time reference of the EBO3.

2) Menu board: Click on the specific menu to accede at the following menu:

   a. System Setup:

      i. Network setup: Configure the network (protected by password)

      ii. Traps setup: Configure the traps emission (protected by password)

      iii. Logout: Logout all the pages.

b. Clock setup
    i. Time and reference setup: Configure the time and the synchronization reference of the EBO3, protected by a password.
    ii. GPS setup: Configure the GPS, protected by a password
c. Clock Status: This Page
d. Tool
    i. Software version: Currently software revision
    ii. Software upgrade: Upgrade the software
    iii. Reboot: Restart the board

Global status board

3) EBO3 state:
    a. OK (Green): Indicates the good working order of the board.
    b. WARM UP (yellow): Indicates the warm up time of the oscillator
    c. Alarm (RED): Indicates a board failure or a loss of all references sources or a phase or a frequency alarm.

4) Synchronization source (gray): Indicates on which source the EBO3 is locked on:
    a. NONE (none synchronization source selected)
    b. GPS
    c. External 1pps/10MHz
    d. Optional reference

5) SNF status (Gray):
    a. On: Indicates that the 10MHz frequency is cycle locked to the 1pps, meaning that there are always 10 000 000 cycles between consecutive 1pps occurrence.
    b. Off: Not available for the SFN mode

6) Oscillator voltage (Gray):
    a. Value of the control voltage oscillator in volt
    b. Range 0V to 8V
    c. Generates an Internal Oscillator alarm when the value reaches 0V or 8V, meaning that the EBO3 is not able to discipline correctly the internal Oscillator.

Alarms board

7) GPS lock:
   a. Disable (Gray): The GPS source is disabled and not supervised
   b. OK (Green): Indicates that the reference source GPS is correct and that the EBO3 should use this source as the reference of synchronization.
   c. ALARM (Red): Indicates that the reference source GPS isn't correct and that the EBO3 shouldn't use this source as the reference of synchronization.

8) Antenna Status (Gray):
   a. Disable (Gray): The GPS source is disable and not supervised
   b. Unpowered: The GPS antenna is not connected or uncorrected powered
   c. Powered: The GPS antenna is connected and correctly powered
   d. Shortcut: The GPS antenna is in short-cut

9) GPS module status:
   a. Disable (Gray): The GPS source is disable and not supervised
   b. Ok (Green): Indicates the good working order of the gps receiver
   c. ALARM (Red): Indicate a failure of the GPS receiver

10) Internal Oscillator
   a. OK (Green): Frequency driver operational
   b. ALARM (Red): Frequency driver failure

11) Internal 1PPS
   a. OK (Green): 1pps driver operational
   b. ALARM (Red): 1pps driver failure

12) External 1pps/ 10MHz presence:
   a. DISABLE (Gray): The source input is disable and not supervised
   b. ALARM (Red): The source input is supervised (priority 1 to 3 is affected) but not available as a synchronization source.
   c. OK (Green): The source input is supervised (priority 1 to 3 is affected) and available as a synchronization source.

13) Optional reference presence

a. DISABLE (Gray): The source input is disable and not supervised

b. ALARM (Red): The source input is supervised (priority 1 to 3 is affected) but not available as a synchronization source.

c. OK (Green): The source input is supervised (priority 1 to 3 is affected) and available as a synchronization source.

14) Phase accuracy

a. OK (Green): Phase limit not exceeded

b. ALARM (Red): Loss of synchronization and phase limit exceeded.

15) Frequency accuracy

a. OK (Green): Frequency limit not exceeded

b. ALARM (Red): Loss of synchronization and frequency limit exceeded

GPS status board

16) Geographic position of the GPS antenna (Gray).

17) Self survey (Gray): When the GPS is in the automatic mode, the self survey allows the GPS receiver to continuously calculate the geographic position of the GPS antenna for a period of one hour:

a. Pending: Waiting to calculate the geographic position, of GPS antenna or the calculation is not necessary (the gps receiver is in manual mode)

b. In Progress: The calculation is in progress.

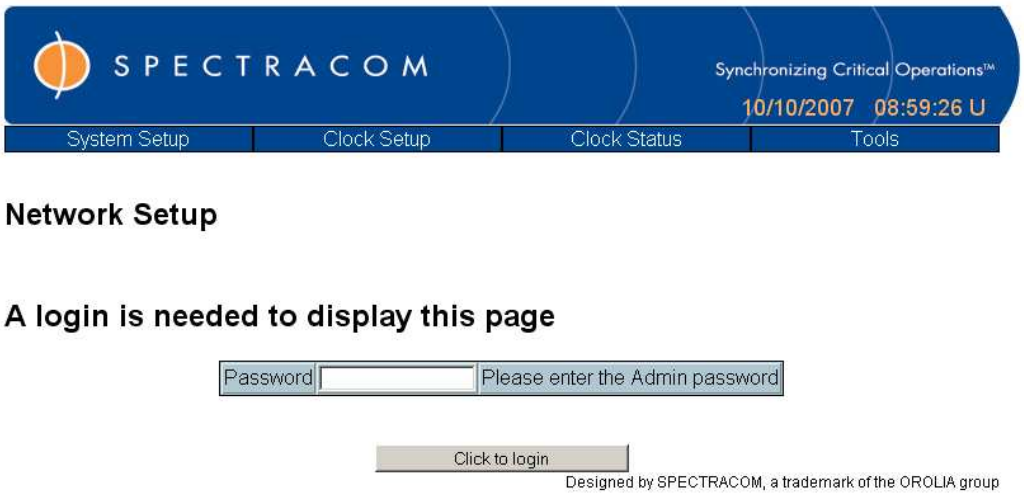
c. Done: The calculation is done.

18) Number of satellites followed (12 maximum).

19) Satellite ID and the SNR of the 8 best satellites followed by the GPS receiver.

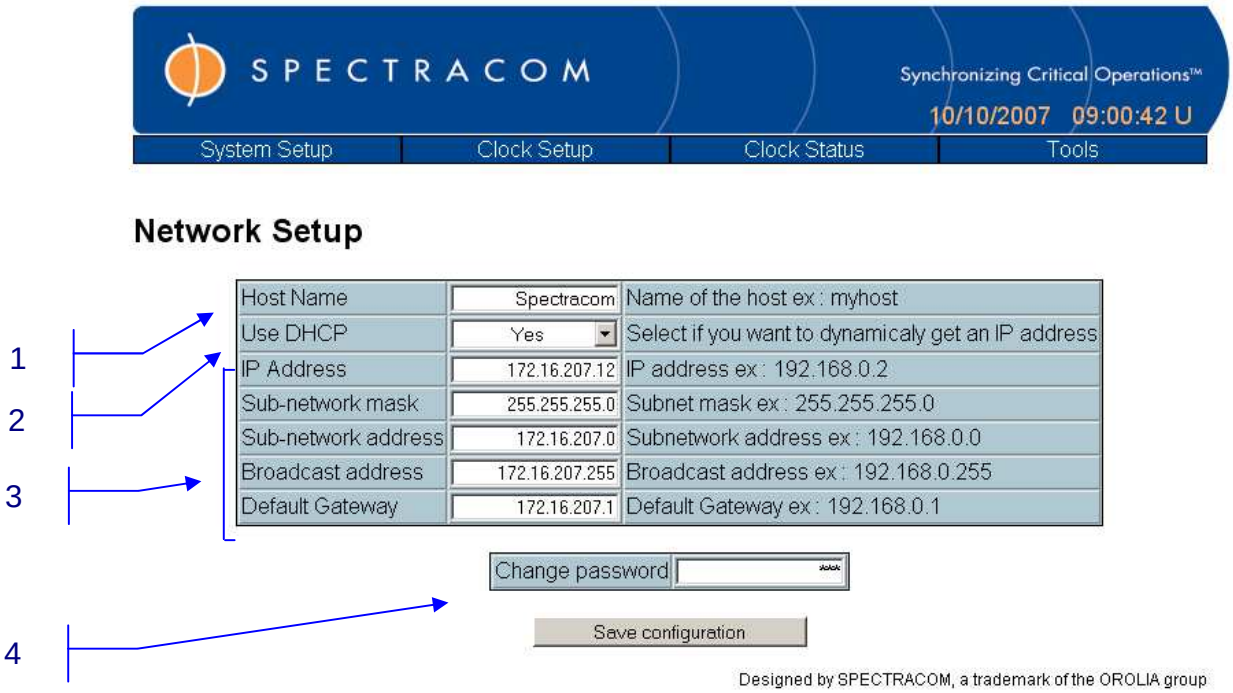
4.2.3 Admin password page

A password is necessary to access to the configuration pages. The default password is “pwd”. It can be changed in the network setup page.



4.2.4 Network setup

This page allows the user to modify the Network configuration.



1) Host name: Unique name by which the network identifies the EBO3. This functionality depends of the type of DNS server used.

2) DHCP: Dynamic Host Configuration Protocol

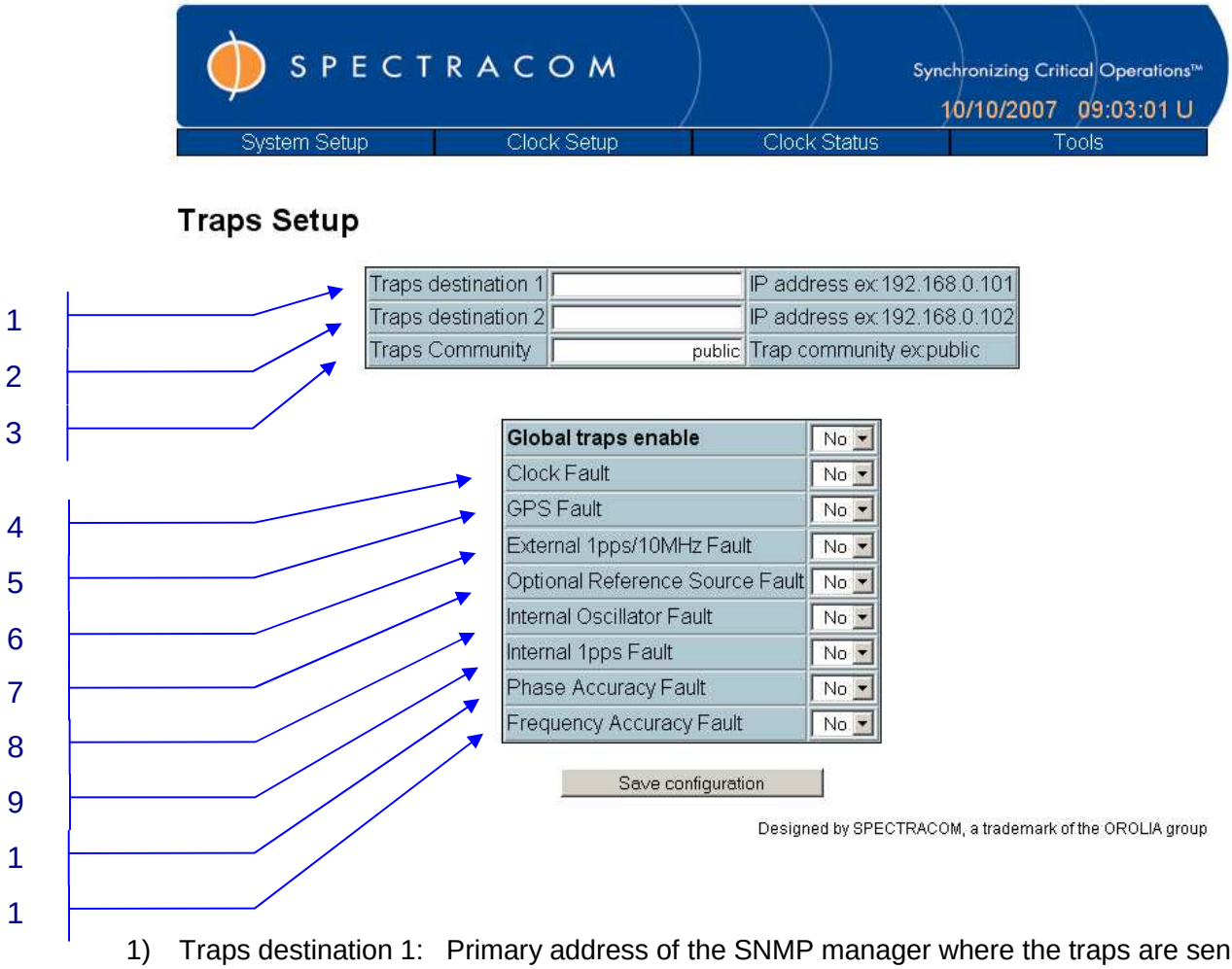
a. Yes: The Dynamic Host Configuration Protocol is available. In this case, the IP address of the EBO3 is automatically fixed by the server according to the EBO3 MAC address. Fields labeled “3” are not used.

b. No: The Dynamic Host Configuration Protocol isn’t available. In this case, the operator must fill in the fields labeled “3” according the topology of the network:IP address, Sub-network mask, Sub-network address, broadcast address, and default gateway.

3) Fields to allow configuring the network access when the DHCP is set to No
4) Field to allow changing the password to access the configuration pages

4.2.5 Trap setup

This page allows the user to configure the Trap configuration. The trap is used to report an alert or another event relevant to the EBO3.



1) Traps destination 1: Primary address of the SNMP manager where the traps are sending.
2) Traps destination 2: Secondary address of the SNMP manager where the traps are sending.
3) Traps community : SNMP string that allows the unit to filter the traps: public by default

Global trap enable

4) Clock Fault:
   a. Yes: Generates a trap when the EBO3 goes on default (EBO_OK set to 0)
   b. No: No trap generated.

5) GPS fault:
    a. Yes: Generates a trap when the GPS receiver goes on default or goes unlocked (gps_lock goes to 0).
    b. No: No trap generated.

6) External 1pps/10Mhz Fault:
    a. Yes: Generates a trap when the External 1PPS /10MHz is lost and this reference is supervised.
    b. No: No trap generated.

7) Optional Reference source Fault:
    a. Yes: Generates a trap when the Optional reference source is lost and this reference is supervised.
    b. No: No trap generated.

8) Internal oscillator Fault:
    a. Yes: Generates a trap when the frequency driver goes on alarm (generally the OCXO goes on default).
    b. No: No trap generated.

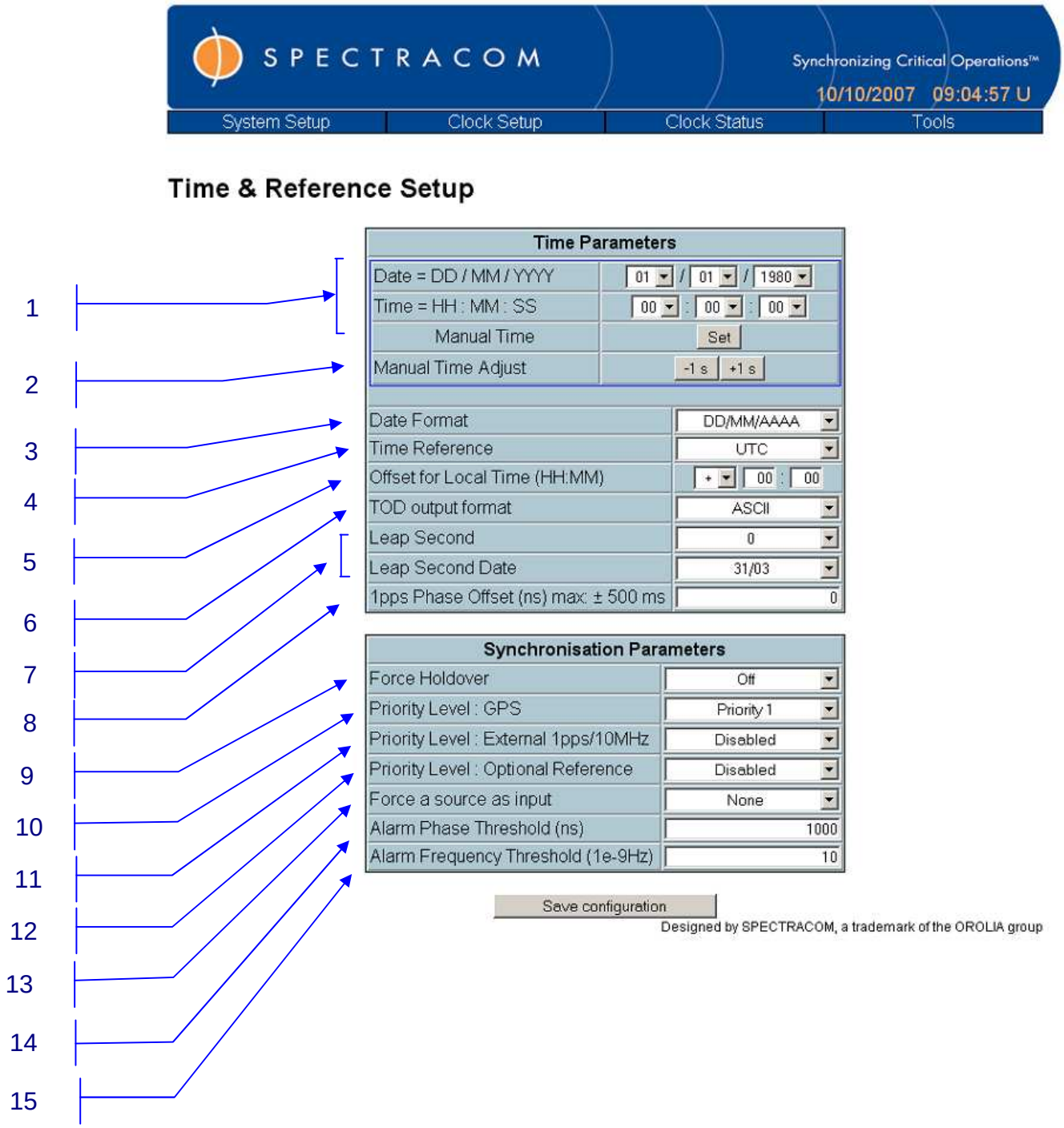
9) Internal 1PPS Fault:
    a. Yes: Generates a trap when the 1PPS driver goes on alarm.
    b. No: No trap generated.

10) Phase Accuracy Fault:
    a. Yes: Generates a trap when the synchronization is loss and the phase limit is exceeded.
    b. No: No trap generated.

11) Frequency Accuracy Fault:
    a. Yes: Generates a trap when the synchronization is lost and the frequency limit is exceeded.
    b. No: No trap generated

4.2.6 Time & reference setup

This page allows the user to modify the time and choice of the synchronization sources.



1) Manual time: Allows the operator to set date and time when the EBO3 is in force holdover mode or when the EBO3 is not yet synchronized to a reference source.

2) Manual time adjust: Adjusts the time by 1 second when the EBO3 is in force holdover mode or when the EBO II is not yet synchronized to a reference source.

3) Date format: choice of the Time Of Day message output type:
   a. DD/MM/AAAA: day / month / year
   b. MM/DD/AAAA: month / day / year
   c. DD/AAAA: day of the year / year

4) Time reference: choice of the reference of the selected time scale
   a. UTC
   b. GPS
   c. Local

5) Offset local time: Allows the user to shift the hour transmitted by the GPS receiver in UTC time.

6) TOD output format: Choice of the Time of day output message:
   a. NMEA: NMEA 0183 message output type GPRMC
   b. ASCII: Time of Day in accordance of the Date format

7) Leap second: Programs in advance the leap second correction, hence ensuring it will be applied even in case of loss GPS signal input
   a. Leap second: Sense of the application
      i. 0: non leap second pending
      ii. –1: positive leap second pending
      iii. +1: negative leap second pending
   b. leap second date: date of application
      i. : 31/03
      ii. : 30/06
      iii. : 30/09
      iv. : 31/12

8) 1pps phase offset: Phase correction of the 1PPS output from –500ms to +500ms in nanosecond.

9) Force holdover: Disciplines (or not) the OCXO even if a synchronization reference is available:
   a. On: Not allowing
   b. Off: Allowing

10) Priority level GPS: Programs the priority of the GPS reference source.
   a. Priority 1: highest priority
   b. Priority 2: medium priority
   c. Priority 1: lowest priority
   d. Disable: disable the source, this source is not supervised

11) Priority External 10 MHz/1PPS: Programs the priority of the External 10Mhz/1PPS reference source.
   a. Priority 1: highest priority
   b. Priority 2: medium priority
   c. Priority 1: lowest priority
   d. Disable: disable the source, this source is not supervised

12) Priority optional reference: programs the priority of the External optional reference source.
   a. Priority 1: highest priority
   b. Priority 2: medium priority
   c. Priority 1: lowest priority
   d. Disable : disable the source, this source is not supervised

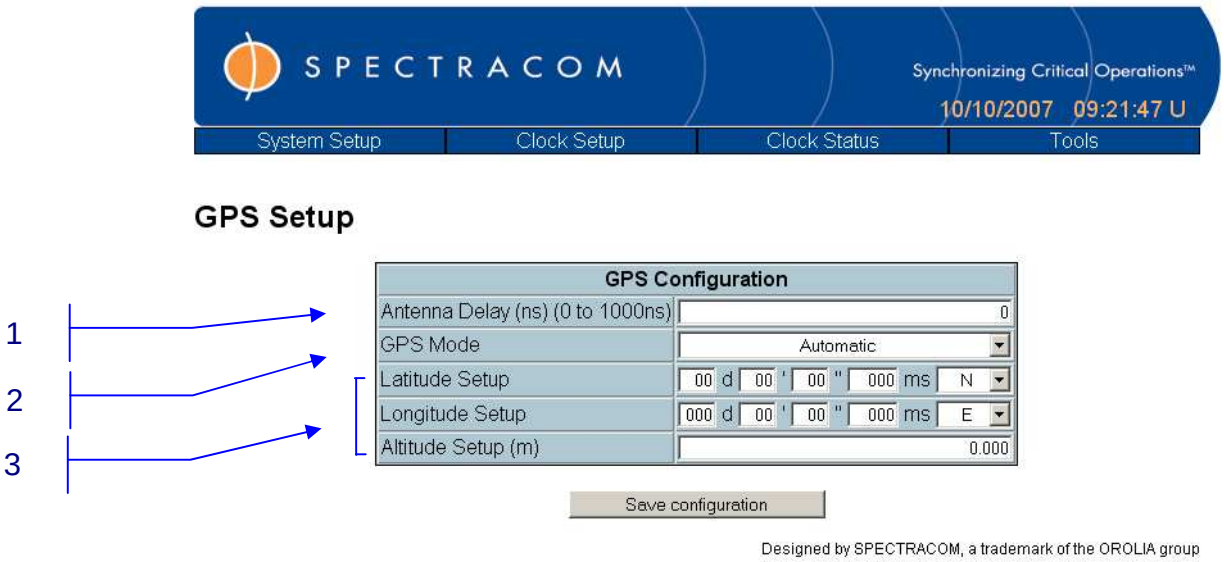
13) Force a source as input: Force the EBO3 to be synchronized on a reference source even if other sources with a higher priority are available:
   a. GPS
   b. External 10Mhz/1PPS
   c. optional reference

14) Alarm phase threshold: Programs the limit value in nanoseconds of the accuracy after which the 1PPS signal output is deemed invalid.

15) Alarm phase threshold: Programs the limit value in hertz of the accuracy after which the 10MHz signal output is deemed invalid.

4.2.7 GPS setup

This page allows the user to program the GPS receiver.



1) Antenna delay: Time shift to be compensated for the propagation delay of the GPS signal due to the cable (in nanoseconds)

2) GPS Mode: Defines the board functioning mode with regard to the GPS signals received:

   a. Automatic: The board averages during 1 hour the antenna position supplied by the receiver in order to make it reliable. After this period, and providing that a minimum of 4 satellites were received at all times, the position is fixed. This 1 hour reliability procedure of the position is initialized every time the board is switched on and is maintained as long as a minimum of 4 satellites is not received continuously.

   b. Manual: Allows the user to force the GPS receiver to function instantaneously with 3 satellites. The user is required to enter the precise geographic position of the antenna. Uses fields numbered 4.

   c. Mobile: Allows function of the GPS receiver when the board is moved.

3) Latitude, longitude, Altitude: Define the Geographic position of the GPS antenna applied in Manual mode.

4.2.8 Software version

This page displays the version number of key elements of EBO3 software and firmware.

Epsilon Board Version

Archive Version	
Actual Version	01.05b
Date	21/09/2007 16:25:04

Software Version	
Principale	01.09b
Gps	01.08b
Asservissement	01.08b
Telecommande	01.06b
PpsExt	01.04b
Traps	01.04b
Agent SNMP	01.04b
Web	01.04b

System Version	
Actual Version	01.06a
Date	14/09/2007 14:52:55

Hardware Version	
Carte	3

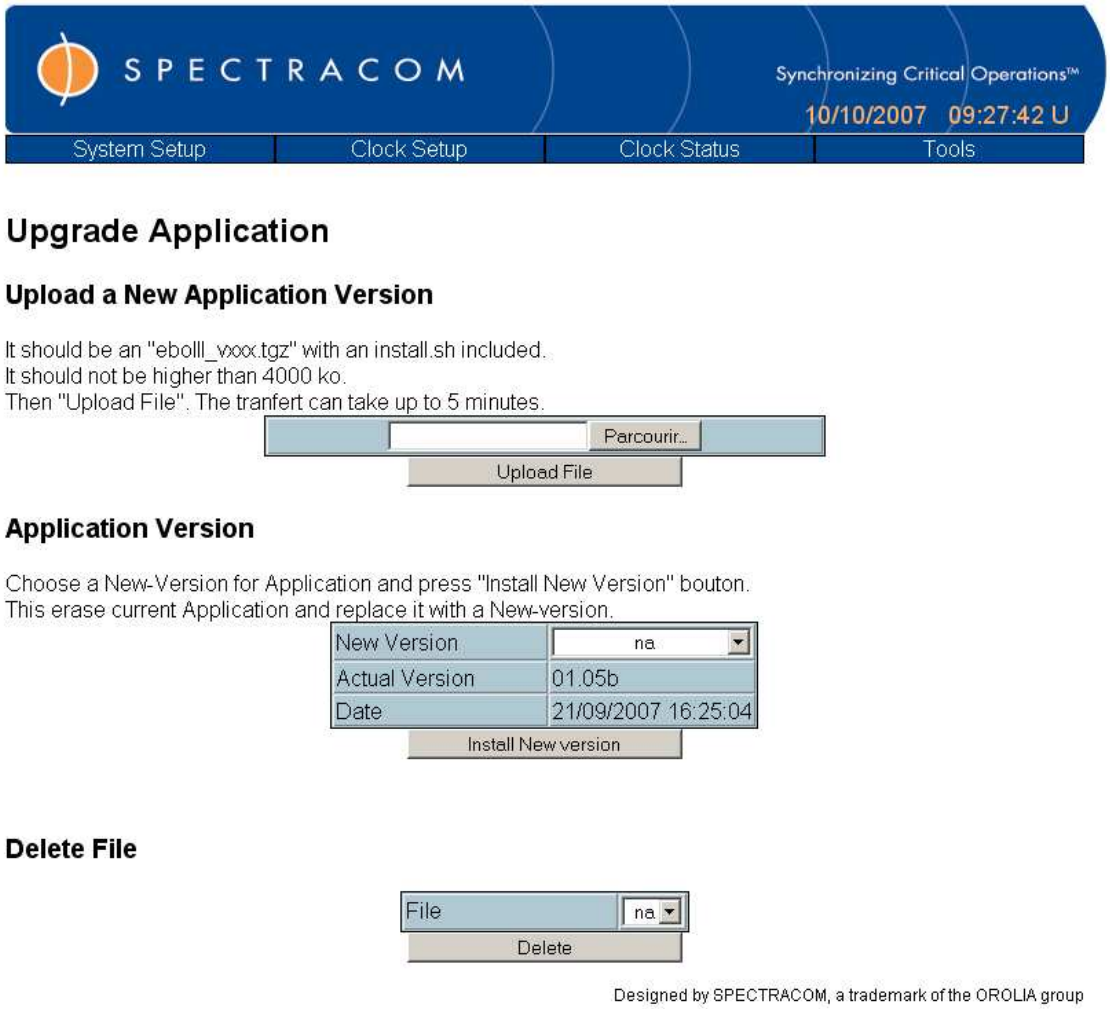
Designed by SPECTRACOM, a trademark of the OROLIA group

4.2.9 Software upgrade

Software upgrade is performed with this "Upgrade Application" page.

Two steps are necessary: First download a new release, and then activate the new release.

Before starting the upload of new version, select the file to be uploaded (usually a .tgz file provided by the manufacturer). Click the "Upload File" button to proceed.



Uploaded release is shown in the Application Version field.

Actual version is the running version.

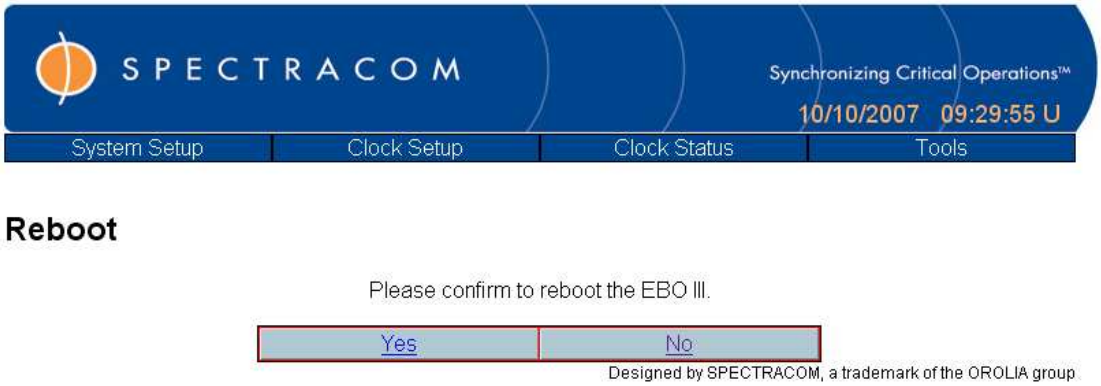
When clicking on the "Install New version" button, upgrading of the EPSILON BOARD MODEL EBO3 is automatically restarted.

The “Delete File“ field is not used.

4.2.10 Reboot

This page allows the user to stop and restart the board (warm-reboot).

Click on Yes to confirm the reboot.



4.3 SNMP interface

The Simple Network Management Protocol (SNMP) is an application layer protocol that facilitates the exchange of management information among network devices. It is a part of the Transmission Control Internet Protocol/ Internet Protocol (TCIP/IP) protocol suite. SNMP enables a network administrator or manager to manage the EPSILON BOARD MODEL EBO3.

The EPSILON BOARD MODEL EBO3 is monitored and controlled using 3 basic SNMP commands:

1. READ: Used by the manager to monitor the EBO3. The manager examines the different variables stored in the Management Information Base (MIB).

2. WRITE: Used by the administrator to control the EBO3. The manager changes the values of variables stored in the MIB.

3. TRAP: Used by the EBO3 to report asynchronously events to the administrator.

4.4 MIB EBO3

```
EBO3-MIB DEFINITIONS ::= BEGIN

IMPORTS
        MODULE-IDENTITY,OBJECT-IDENTITY,
        OBJECT-TYPE,NOTIFICATION-TYPE,Integer32,
        enterprises FROM SNMPv2-SMI;

ebo3Description MODULE-IDENTITY
    LAST-UPDATED "200805130000Z"
    ORGANIZATION "Spectracom"
    CONTACT-INFO
        "Spectracom
        Primary Author: Spectracom
        postal:         3 avenue du Canada
                        91953 Les Ulis
                        FRANCE
        phone:          01.69.82.21.90
    email:              synchro@spectracom.fr"
    DESCRIPTION         "EBO III Board MIB."
    REVISION            "200805130000Z"
    DESCRIPTION         "EBO III Board MIB."
    ::= {ebo3 0}

spectracom  OBJECT IDENTIFIER  ::= { enterprises 25121}
ebo3        OBJECT IDENTIFIER  ::= { spectracom 1 }
system      OBJECT IDENTIFIER  ::= { ebo3 1 }
status      OBJECT IDENTIFIER  ::= { ebo3 2 }
command     OBJECT IDENTIFIER  ::= { ebo3 3 }
traps        OBJECT IDENTIFIER        ::= { ebo3 99 }

-- Define the sections of the mib them selves:

--
--

trapData                        OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..18))
        MAX-ACCESS              not-accessible
        STATUS                  current
        DESCRIPTION             "Trap data.
                                 Usually :
                                 0:Ok
                                 1:Alarm"
        ::= { ebo3 4 }

-------------------------------------------------------------------------
-- OIDs SYSTEM
ebo3SysSwVersion              OBJECT-TYPE
        SYNTAX                OCTET STRING (SIZE(0..5))
        MAX-ACCESS            read-only
        STATUS          current
        DESCRIPTION           "Software version"
        ::= { system 1 }
```

```
ebo3SysDate                     OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..18))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Date and clock.
                                  DD/MM/YYYY HH:MM:SS or
                                  MM/DD/YYYY HH:MM:SS or
                                  Day of Year/YYYY HH:MM:SS"
        ::= { system 2 }

-------------------------------------------------------------------------

-------------------------------------------------------------------------
-- OIDs STATUS
ebo3StaGpsLocked                OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Indicate if GPS and satellite SNR are locked
or not.
                                 0 : No  - Not locked
                                 1 : Yes - Locked"
        ::= { status 1 }

ebo3StaSynchroSource    OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Synchronization Source.
                                 1 : GPS
                                 2 : External 1pps/10MHz reference
                                 3 : Optional reference"
        ::= { status 2 }

ebo3StaSFNMode          OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Indicate if the mode Signal Frequency Network
is enable or disable.
                                 0 : Off
                                 1 : On"
        ::= { status 3 }

ebo3StaStatus           OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Indicate the state of EBO III.
                                 0 : Alarm
                                 1 : OK"
        ::= { status 4 }

ebo3StaLatitude         OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
```

```
        STATUS          current
        DESCRIPTION             "Latitude of the antenna"
        ::= { status 5 }

ebo3StaLongitude        OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Longitude of the antenna"
        ::= { status 6 }

ebo3StaAltitude         OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Altitude of the antenna"
        ::= { status 7 }

ebo3StaTracking         OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Tracking Status :
                                 Warming up
                  Tracking Search
                  Locked
                  Holdover"
        ::= { status 8 }

ebo3StaFreqAlarm        OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Frequency limit reached
                                0 : Alarm
                     1 : OK"
        ::= { status 9 }

ebo3StaPhaseAlarm       OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Phase limit reached
                                0 : Alarm
                     1 : OK"
        ::= { status 10 }

ebo3StaInternalFreq     OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "Internal Frequency Status
                                0 : Alarm
                     1 : OK"
        ::= { status 11 }

ebo3StaPpsOut   OBJECT-TYPE
```

```
        SYNTAX                  OCTET STRING (SIZE(0..255))
        MAX-ACCESS              read-only
        STATUS          current
        DESCRIPTION             "PPS Output Status
                                0 : Alarm
                    1 : OK"
        ::= { status 12 }
-------------------------------------------------------------------------

-------------------------------------------------------------------------
-- OIDs COMMANDE
ebo3CmdDateFormat               OBJECT-TYPE
        SYNTAX                  Integer32
        MAX-ACCESS              read-write
        STATUS          current
        DESCRIPTION             "Date Format.
                                 1 : DD/MM/YYYY
                                 2 : MM/DD/YYYY
                                 3 : Day of Year/YYYY"
        ::= { command 1 }

ebo3CmdDateReference    OBJECT-TYPE
        SYNTAX                  Integer32
        MAX-ACCESS              read-write
        STATUS          current
        DESCRIPTION             "Time Reference Setup
                                 85 : U - UTC
                                 71 : G - GPS
                                 76 : L - Local"
        ::= { command 2 }

ebo3CmdClockType                OBJECT-TYPE
        SYNTAX                  Integer32
        MAX-ACCESS              read-write
        STATUS          current
        DESCRIPTION             "Type of EBO3 Clock.
                                 0 : EBO3-Wimax
                                 1 : EBO3-Broadcast"
        ::= { command 3 }

ebo3CmdutputType        OBJECT-TYPE
        SYNTAX                  Integer32
        MAX-ACCESS              read-write
        STATUS          current
        DESCRIPTION             "Type of Time Of Day Output
                                 1 : ASCII output
                                 2 : NMEA output"
        ::= { command 4 }

ebo3CmdGpsMode          OBJECT-TYPE
        SYNTAX                  Integer32
        MAX-ACCESS              read-write
        STATUS          current
        DESCRIPTION             "GPS Mode
                                 1 : Automatic
                                 2 : Manual
                                 3 : Mobile"
```

```
        ::= { command 5 }

ebo3CmdPhaseThreshold          OBJECT-TYPE
        SYNTAX                 Integer32
        MAX-ACCESS             read-write
        STATUS         current
        DESCRIPTION            "Phase alarm threshold (ns)"
        ::= { command 6 }

ebo3CmdFreqThreshold   OBJECT-TYPE
        SYNTAX                 Integer32
        MAX-ACCESS             read-write
        STATUS         current
        DESCRIPTION            "Frequency alarm threshold (1e-9Hz)"
        ::= { command 7 }

ebo3CmdAntennaDelay    OBJECT-TYPE
        SYNTAX                 Integer32
        MAX-ACCESS             read-write
        STATUS         current
        DESCRIPTION            "Antenna cable delay (ns)"
        ::= { command 8 }

ebo3CmdHoldoverForced  OBJECT-TYPE
        SYNTAX                 Integer32
        MAX-ACCESS             read-write
        STATUS         current
        DESCRIPTION            "Enable or disable the functioning mode :
holdover forced.
                                0 : Off
                                1 : On"
        ::= { command 9 }

ebo3CmdForcedSource            OBJECT-TYPE
        SYNTAX                 Integer32
        MAX-ACCESS             read-write
        STATUS         current
        DESCRIPTION            "Forced source of Synchronisation.
                               0 : None
                    1 : GPS
                    2 : External 1pps/10MHz reference
                    3 : Optional Reference"
        ::= { command 10 }

ebo3CmdPrioritySyncGps         OBJECT-TYPE
        SYNTAX                 Integer32
        MAX-ACCESS             read-write
        STATUS         current
        DESCRIPTION            "Priority of the reference of GPS
synchronization.
                                0 : Disable
                                1 : Priority 1
                                2 : Priority 2
                                3 : Priority 3"
        ::= { command 11 }

ebo3CmdPrioritySyncPPSExtern   OBJECT-TYPE
```

```
        SYNTAX                Integer32
        MAX-ACCESS            read-write
        STATUS          current
        DESCRIPTION           "Priority of the reference of PPS extern
synchronization.
                               0 : Disable
                               1 : Priority 1
                               2 : Priority 2
                               3 : Priority 3"
        ::= { command 12 }

ebo3CmdPrioritySyncMezzanine  OBJECT-TYPE
        SYNTAX                Integer32
        MAX-ACCESS            read-write
        STATUS          current
        DESCRIPTION           "Priority of the reference of Mezzanine
synchronization.
                               0 : Disable
                               1 : Priority 1
                               2 : Priority 2
                               3 : Priority 3"
        ::= { command 13 }
-------------------------------------------------------------------------

-------------------------------------------------------------------------
-- OIDs Traps
ebo3ClockFault NOTIFICATION-TYPE
        OBJECTS                { trapData }
        STATUS          current
        DESCRIPTION           "Clock Fault
                               1 : Alarm
                               0 : Ok"
        ::= { traps 1 }


ebo3GpsFault NOTIFICATION-TYPE
        OBJECTS                { trapData }
        STATUS          current
        DESCRIPTION           "GPS Fault
                               1 : Alarm
                               0 : Ok"
        ::= { traps 2 }

ebo3ExternalRefFault NOTIFICATION-TYPE
        OBJECTS                { trapData }
        STATUS          current
        DESCRIPTION           "External 1pps/10Mhz Reference Fault
                               1 : Alarm
                               0 : Ok"
        ::= { traps 3 }

ebo3OptionalRefFault NOTIFICATION-TYPE
        OBJECTS                { trapData }
        STATUS          current
        DESCRIPTION           "Optional Reference Fault
                               1 : Alarm
                               0 : Ok"
```

```
        ::= { traps 4 }

ebo3InternalOscFault NOTIFICATION-TYPE
        OBJECTS                 { trapData }
        STATUS          current
        DESCRIPTION             "Internal Oscillator Fault
                                 1 : Alarm
                                 0 : Ok"
        ::= { traps 5 }

ebo3InternalppsFault NOTIFICATION-TYPE
        OBJECTS                 { trapData }
        STATUS          current
        DESCRIPTION             "Internal 1pps Fault
                                 1 : Alarm
                                 0 : Ok"
        ::= { traps 6 }

ebo3PhaseAccuracyFault NOTIFICATION-TYPE
        OBJECTS                 { trapData }
        STATUS          current
        DESCRIPTION             "Phase Accuracy Fault
                                 1 : Alarm
                                 0 : Ok"
        ::= { traps 7 }

ebo3FreqAccuracyFault NOTIFICATION-TYPE
        OBJECTS                 { trapData }
        STATUS          current
        DESCRIPTION             "Frequency Accuracy Fault
                                 1 : Alarm
                                 0 : Ok"
        ::= { traps 8 }

END
```

5 Remote Control Interface

5.1 General

The remote control interface allows remote configuration and remote status reporting of the board (RCI) or allows configure the network configuration of the board via a serial console (TCI).

The choice is done by the solder trap PS1. When PS1 is open, the RCI is active and when PS1 is close, TCI is active instead of RCI. The choice between RCI and TCI is made only at the startup of the board and it is not possible to swap during the board functioning.

The TTL connection operates at 9600 bps and is set to 8 bits, 1 stop bit, and odd parity (both for RCI or TCI).

5.2 TCI

To launch TCI, close PS1 during the startup of the board.

Connect a serial software (like Hyperterminal) to the TC, configure serial parameter : 9600-O-8-1.

Press Enter to show Menu :

```
        Spectracom - Terminal Control Interface

   Value to modify                  | Current value
   _________________________________|_____________
                                    |
   1 - Use of a DHCP                | Yes
   2 - Static IP address            | 192.168.0.100
   3 - Sub-network mask             | 255.255.255.0
   4 - Sub-network address          | 192.168.0.0
   5 - Broadcast address            | 192.168.0.255
   6 - Default gateway address      | 192.168.0.1
   7 - Trap destination address (1) | 172.16.207.1
   8 - Trap destination address (2) | INVALID
   9 - Default network setup        |
   0 - Reboot system                |

   Current IP address  :  172.16.207.122
->
```

5.2.1 Network with DHCP

If your network uses DHCP, you can use the current IP address of product with your Web-browser.

5.2.2 Network without DHCP

If your network doesn't use DHCP, or you want specify an IP address manually, enter '1' on command line.

Enter 'no' to disable DHCP configuration Mode.

Enter '2' to '8' on command line to configure the the network

Enter '0' on command line to Reboot system and apply modification.

5.3 RCI Protocol

The protocol used is Master (Host) / Slave (EPSILON BOARD MODEL EBO3) with a systematic reply to all messages. The following exceptions apply (for which no reply is expected):

- The time code message sent periodically
- The reset board command

All messages start with the "STX" character and end with the "ETX" character.
e.g.: <STX> <Message> <ETX>

The characters " STX ", " ETX " or " DLE " to be sent within a message should be escaped (prefixed) by the "DLE" character.

Each message contains four distinct sections:

- The message "ID" (this identifies the type of message being sent):
- The count of the number of data bytes in the message (CNT),
- The data bytes (DATA(*)) of the message,
- The checksum: calculated by performing an exclusive OR on all the consecutive characters in the message (ID + CNT + DATA)

e.g.:	<Message> =	<ID>	<CNT >	<DATA(*)>	<CS>
	Number of bytes	1	1	N	1

(*): The encoding format of the DATA is based on "MOTOROLA big Endian" type (integer, long, float, and double data must be sent or received with the MSB first).

NOTE: The maximum length of the <DATA> section is 255 bytes.

Messages belong to one of three categories:

- Queries (requests for information from the EPSILON BOARD MODEL EBO3)
- Commands (functions that initialize or configure the EPSILON BOARD MODEL EBO3)
- Error Messages (returned by the board if errors are detected in the Queries or Commands sent by the user)

When a user sends a message to the EPSILON BOARD MODEL EBO3, it replies within the current second. This reply, or acknowledgement, is formatted as follows:

- The format of the message is identical to the message sent by the user
- The contents of sections <ID> and <CNT> are identical to those sent by the user
- The content of the <DATA > section:
  - Is identical to that sent by the user if the message was a Command
  - Contains the information supplied by the board, if the message was a Query

The acknowledgement to a Command is an exact copy of the message sent.

The reply to a Query is the copy of the Query message with the <DATA> section completed by the EPSILON BOARD MODEL EBO3. In a query, the <DATA> field is not taken into account by the EPSILON BOARD MODEL EBO3 command interpreter.

An Error message is generated by the board if one of the following errors occurs:

- The message contains an unknown ID
- The number of bytes in the <DATA> section does not correspond to the <CNT> value
- An overflow is detected in a parameter within the <DATA> section

NOTE: If the board detects a checksum error, it does not take into account the message and it does not transmit any error message.

5.4 Commands Description

5.4.1 TOD output setup

This command allows the user to modify the contents of the periodical messages transmitted by the board on the TOD output. In standard mode, the default message transmitted contains the current date and hour according to the codes provided herein. In diagnostic mode, the message transmitted contains information regarding the disciplining of the frequency driver to the GPS reference. This mode is used by the manufacturer during the “good” working verification phases.

5.4.2 TOD output transmission period

This command defines the transmission period to the TOD message on the corresponding special link. This period is quantified in seconds; the value 0 inhibits permanently the transmission of the message.

5.4.3 Board reset

This command generates the re-initialization of the board.

5.4.4 Date setup

This command initializes the date of the board's GPS receiver. This associated with the initialization of the position, when possible, accelerates the tracking procedure of the GPS satellites

5.4.5 GPS setup

This command defines the board functioning mode with regards to the GPS signals received. Three modes are available: Automatic, Manual, or Mobile.

The Automatic mode is the default mode during the board initialization. In this mode, the board averages during 1 hour the antenna position supplied by the receiver in order to make it reliable. After this period and providing that a minimum of 4 satellites were received at all times, the position is fixed and the board requires only one satellite for time transfer. This 1 hour reliability procedure of the position is initialized every time the board is switched on and is maintained as long as a minimum of 4 satellites are not received continuously.

The manual mode allows the user to instantaneously force the GPS receiver to function in one satellite mode. The user is required to enter the date and the geographic position of the antenna.

The Mobile mode is useful when the board is moved while functioning. This command prevents the GPS receiver from switching to the 1 satellite mode. It is therefore necessary in this case to receive a minimum of 4 satellites continuously to ensure a good disciplining of the frequency source.

5.4.6 GPS Position

This command allows the initialization of the antenna position. This is necessary in Manual mode. This command also allows the user to define which time reference is used. The two possibilities are as follows:

- The Universal Time Coordinated,
- The GPS Atomic Time.

The difference between these two time references is equal to a whole number of seconds, which changes with every leap second insertion in the UTC reference.

The GPS Atomic Time reference is recommended when the user's application requires a perfectly continuous time reference. In effect, the GPS Atomic Time is not subject to leap second insertion.

5.4.7 Local hour

Using this command, the user may shift the hour transmitted by the GPS clock. This shift corresponds to a whole number of hours and minutes (such as a correction for DST).

5.4.8 Antenna delay correction

The cable between the antenna and the board generates a propagation delay of the GPS signal. This delay corresponds to a time shift of the synchronizing signal. This time shift can be compensated for using this command. The correction is entered in nanoseconds, and the value corresponding to the delay is linked to the type of cable and its length. As a general rule of thumb, the value for the delay of a coaxial cable is 5 nanoseconds per meter.

5.4.9 Leap second

The UTC time reference, maintained by the GPS clock, is subject to leap second corrections, the purpose of which is to maintain the difference between the atomic time represented by UTC and the astronomic time. These corrections decided by the IERS are published in Bulletin C and D.

If the time reference used by the board is UTC, these corrections are automatically made in real time provided the GPS signal is received correctly. This command allows the board to maintain a reliable time reference by programming in advance the leap second correction, ensuring it will be applied even in the case of loss of GPS signal input.

This command does not apply to the other time references.

5.4.10 Display

This command defines the format of the hour transmitted by the TOD message and displayed on the front panel display screen if this option was chosen.

The tree formats available are as follows:

- Day / Month / Year Hour: Minute: Second
- Month / Day / Year Hour: Minute: Second
- Day of year / Year Hour: Minute: Second

With this command, the user defines whether the output of the hour is issued from the UTC or GPS time reference, or from the local hour with the programmed shift.

5.4.11 Alarms

If the GPS input signal is lost, the board's internal oscillator is no longer disciplined. The frequency accuracy and the distributed synchronization start to degrade slowly according to the ageing of the oscillator.

Using the alarms limits commands; the user may define the accuracy limits outside of which the output signals are deemed invalid. These limit values are in the form of a time difference for the 1 pps and in the form of a relative frequency difference for the frequency outputs.

When these limit values are reached, a fault is generated and status output “EBO_OK” is fixed to a “0” logic level.

5.5 Time distribution on the remote control interface

The time message is transmitted to the remote control interface. The format and the output TOD are selected by the "display" function. The transmission is synchronous with the 1pps.

Format 1: ID: 193
CNT: 8
DATA: day/month/year/hour/min/sec/source

Format 2: ID: 194
CNT: 8
DATA: day/month/year/hour/min/sec/source

Format 3: ID: 195
CNT: 8
DATA: Day of Year/year/hour/min/sec/source

Format 4: ID: 196
CNT: 9
DATA: MJD/source

Format 5: ID: 197
CNT: 8
DATA: MJD integer part/hour/min/sec/source

The "Source" byte holds an ASCII character, which codes the time reference:

N No reference
U UTC reference
G GPS reference
L Local time
M Manual

Encoding Type:

Day : char
Month : char
Year : integer (2 bytes)
Min : char
Sec : char
Source : char

5.6 Command or Query Lists

Designation	Command ID	query ID	Number of bytes	Command validity conditions
Serial Line Configuration	1	65	1	(1)
Status	---	80	37	(1)
Emission period of the time message on the TOD interface and on the remote control interface	2	66	4	
Reset	16	---	0	(1)
GPS Date init	4	68	7	(1)
Local Time	7	71	2	(1) et (2)
Phase Correction	8	72	4	(1) et (2)
Leap Second	9	73	6	(1) et (3)
GPS Positioning	10	74	19	(1) et (2)
Display	13	77	2	(1)
Alarm limits	14	78	10	(1)
Version	---	67	10	(1)
Forced holdover mode	15	79	1	(1)
Manual time setting	17	81	7	(1) et (4)
Manual correction ±1s	21	85	1	(1) et (4)

(1): Command authorized if the clock is in remote control mode.
(2): Command always authorized.
(3): Command authorized if the clock is not in forced holdover mode.
(4): Command authorized if the current time reference is UTC.
(5): Command authorized if the clock is in forced holdover mode.

The tables that follow contain the format of the commands and the requests.

Name	Identifier		Bytes	Byte No.	Encode Type	Settings	Description
	Query	Command					
Status	80	-	37	0 to 3	1 long	$b_0 = 1$ $b_0 = 0$	Board is synchronized to the reference input (GPS) Board is not synchronized (the board is in hold over mode after the loss of the reference input signal).
						b_1 to b_7	Reserved bits.
						$b_8 = 1$ $b_8 = 0$	GPS 1pps failure. GPS 1pps operational.
						$b_9 = 1$ $b_9 = 0$	Frequency driver failure. Frequency driver operational.
						$b_{10} = 1$ $b_{10} = 0$	1pps driver failure. 1pps driver operational.
						b_{11} 0	Reserved bit.
						$b_{12} = 1$ $b_{12} = 0$	1pps output failure. 1pps output operational.
						$b_{13} = 1$ $b_{13} = 0$	Phase limit alarm: loss of synchronization, programmed phase-limit exceeded. Phase limit not exceeded.
						$b_{14} = 1$ $b_{14} = 0$	Frequency or limit alarm: loss of synchronization (if the programmed limit is set to 0) or loss of synchronization and limit exceeded or synchronization period too short to provide the programmed frequency limit. Programmed frequency or limit not exceeded: the board is synchronized during a period of time sufficient enough to provide the frequency inside the programmed limit or the loss of synchronization is not sufficiently long to exceed the programmed limit.
						b_{15}	Reserved bit
						b16 = 1 b16 = 0	EPSILON BOARD hardware failure. EPSILON BOARD hardware operational.
						b17	Reserved
						b18 = 1 b18 = 0	Antenna not connected. Antenna connected.
						b19 = 1 b19 = 0	Antenna short circuit alarm. No antenna short circuit.
						b20 to b31	Reserved
				4	1 char	Char value: 1 or 5	GPS reception, mode 0D: Mode set to manual positioning of the GPS antenna or after reliability testing of the GPS antenna's coordinates in automatic positioning mode.
						Char value: 2 or 6	GPS reception mode 2D: The EPSILON BOARD is synchronized using 3 satellites. This mode can only operate if the antenna positioning mode is set to mobile, or automatic (before reliability testing and only if 3 satellites are tracked).
						Char value: 3 or 7	GPS reception mode 3D: The EPSILON BOARD is synchronized using 4 to 8 satellites and the antenna positioning mode is set to mobile, or automatic (before reliability testing).

Name	Identifier		Bytes	Byte No.	Encode Type	Settings	Description
	Query	Command					
				5 to 20	8 integers	Odd bytes (5 to 19)	For each byte, the number of the satellite being tracked is set on bits b_0 to b_6. The locking to satellite indicator is given by bit b_7 (b_7=0 ; locked).
						Even bytes (6 to 20)	SNR (0 to 255) of the followed satellites. The even byte O_i gives the SNR of the satellite indicated by the byte O_{i-1} e.g.: O_3 = 140 (80 HEX + 12 decimal) O_4 = 120 Satellite 12 is locked and its SNR is 120.
				21 to 22	1 integer	---	Reserved
				23 to 26	1 long	-324,000,000 ... 324,000,000 (-90°S ... +90°N)	Latitude of the GPS antenna (ms).
				27 to 30	1 long	-648,000,000 ... 648,000,000 (-180°W .. +180°E)	Longitude of the GPS antenna (ms).
				31 to 34	1 long	-100,000 ... 1,800,000 (-1,000 m to 18,000 m)	Altitude of the GPS antenna (cm).
				35	1 char	1 0	GPS receiver failure GPS receiver operational.
				36	1 char	---	Reserved
Serial line configuration	65	1	1	0	1 char	1 0	Board diagnostic output. TOD message output.
Time message period of emission	66	2	4	0 to 3	1 long	0 ... 100,000 (0 ... 100,000 sec)	Period of the emission of the time message on the TOD interface and on the remote control interface.
Reset of the board	---	16	0		---	---	Stops and restarts the board (warm-reboot).
GPS date init	68	4	7	0	1 char	1 ... 31 (Days)	Sets the GPS receiver date and time. (no affect in the EBO3)
				1	1 char	1 to 12 (Months)	
				2 to 3	1 integer	1992 ... 2016 (Years)	
				4	1 char	0 ...23 (hours)	
				5	1 char	0 ... 59 (minutes)	
				6	1 char	0 ... 59 (seconds)	
Set GPS	74	10	19	0	1 char	1 2 3	Antenna positioning mode: Automatic Antenna positioning mode: Manual Antenna positioning mode: Mobile
				1 to 4	1 long	-324,000,000 ... 324,000,000 (-90°S ... +90°N)	Latitude (ms).
				5 to 8	1 long	-648,000,000 ... 648,000,000 (-180°W .. +180°E)	Longitude (ms).
				9 to 12	1 long	-100,000 ... 1,800,000 (-1,000 m to 18,000 m)	Altitude (cm).

Name	Identifier		Bytes	Byte No.	Encode Type	Settings	Description
	Query	Command					
				13 to 17	5 char	---	Reserved
				18	1 char	1 0	UTC time reference. GPS time reference.
Local time	71	7	2	0	1 char	-23 ... +23 (hours)	Difference, in hours and minutes, between local time and the board's reference time.
				1	1 char	-59 ... +59 (minutes)	
Phase correction	72	8	4	0 to 3	1 long	0 ... 1,000 ns	Programmed difference between the distributed 1pps signal and the built-in reference (to correct antenna cable delay).
Leap second	73	9	6	0	1 char	1 0	No leap second. Use leap second.
				1	1 char	1 2	Leap second addition. Leap second subtraction.
				2 to 3	1 integer	1 ... 366 Days	Day of the year to be used.
				4 to 5	1 integer	1992 ... 2127	Year to be used
Display	77	13	2	0	1 char	0	Day / Month / Year format
						1	Month / Day / Year format
						2	Day of year / Year format
						3	MJD format
						4	MJD format integer part /hh/mn/sec
				1	1 char	---	Reserved
Alarm limits	78	14	10	0 to 3	1 long	0 ... 1,000 µs	Phase alarm limit 0 = no phase alarm.
				4 to 7	1 long	0 ... 1,000 10^{-9}	Frequency alarm limit 0 = alarm immediate if synchronization is lost.
				8 to 9	1 integer	---	Reserved
Version	67		10	0 to 3	1 long	---	Reserved
				4	1 char	0 ... 255	Software version.
				5	1 char	0 ... 255	Update version number.
				6 to 9	1 integer	---	Reserved
				8	1 char		EPLD version number
				9	1 char	---	Reserved

Name	Identifier		Bytes	Byte No.	Encode Type	Settings	Description
	Query	Command					
Error (ID = 64)			2	0	1 char	X	Invalid message ID
				1	1 char	0	Incorrect number of useful bytes
						1	Unknown message ID
						2	Unauthorized parameter in <DATA> section.
						3	Command not valid
						4	Remote command not authorized
Forced holdover mode	79	15	1	0	1 char	1 0	Functioning mode: disciplining authorized Functioning mode: holdover forced
Manual time setting	81	17	7	0	1 char	1 ... 31 (days)	Manual setting of the board (authorized only in forced keeping mode).
				1	1 char	1 ... 12 (months)	
				2 to 3	1 integer	1992 ... 2127 (years)	
				4	1 char	0 ...23 (hours)	
				5	1 char	0 ... 59 (minutes)	
				6	1 char	0 ... 59 (seconds)	
Manual correction ±1s	85	21	1	0	1 char	1: - 1 second 0: + 1 second	Manual second correction (authorized only in forced keeping mode).

6 EPSILON BOARD MODEL EBO3 Evaluation Kit

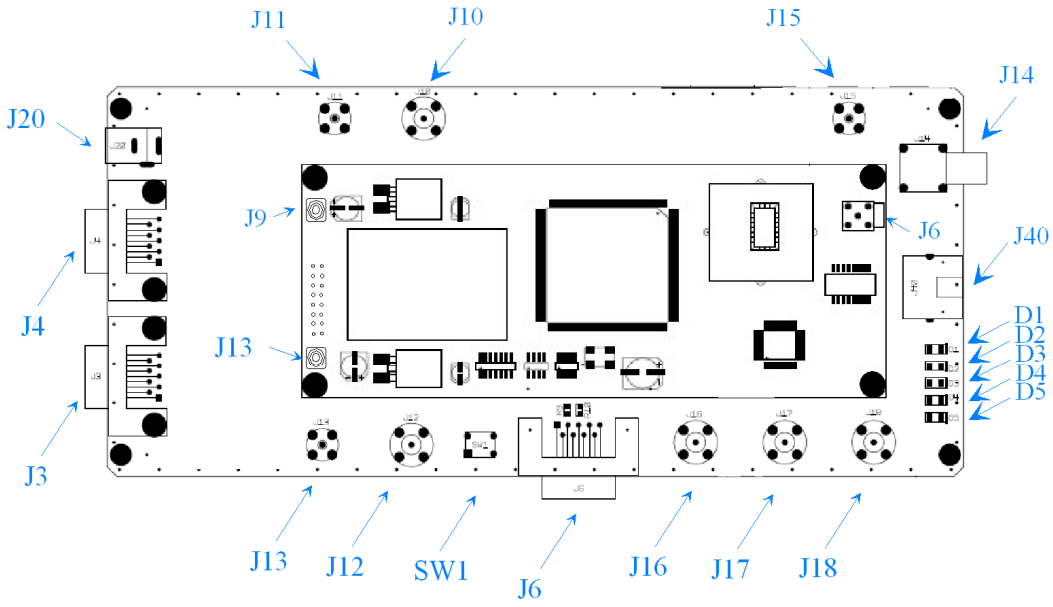
The EPSILON BOARD MODEL EBO3 Evaluation Kit is a package used to facilitate the development task for the system in which the Epsilon Board is to be integrated. The kit allows easy access to all functionalities of the EPSILON BOARD MODEL EBO3, including full remote status and control through EpsilWin 32 software or IP interface.

The EPSILON BOARD MODEL EBO3 Development Kit includes:

- 1 adaptation Board that provides the following standard interfaces:
  - BNC connector for 10MHz output and 1PPS output
  - TNC connector for GPS antenna input
  - 1 RS232C interface for Remote Control (RC) input/output
  - 1 RS232C interface for Time of Day (or NMEA) message output
  - 1 RS232C interface for NMEA message input
  - 1 RJ45 interface for IP interface
  - BNC connector for External 10MHZ and external 1PPS inputs
- 1 AC/DC power desktop 12V 24W
- 1 EPSILON EBO3 user's manual

The EPSILON BOARD MODEL EBO3 Starter Kit has five LEDs and a reset button, providing the following features:

- The EBO_OK, GPS_LOK, SFN_OK, EXT_REF_OK LEDs are connected to the corresponding signals of the EPSILON BOARD MODEL EBO3 to visualize its main status:
  - The Power LED indicates that the Adaptation Board is correctly powered on.
  - The Reset button is connected to the corresponding signal of the EPSILON BOARD MODEL EBO3 to perform the reset function.

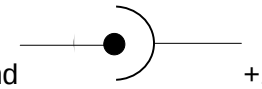


I/O Description

Connector: J20

Power supply (VDC): 12VDC ±1V
Consumption: 24W max.
Reverse polarity protection
Connector: Power jack 0.10 [2,5mm] pin

Pin setting:



Using with the AC/DC power desktop provided:

Input voltage: 98V – 264 VAC / 47 to 63 Hz
Output voltage: 12VDC / 2A

Connector: J3

Remote control of EBO3
Electrical Format: RS232C instead of TTL
Connector: SubD 9 points female
Pin setting:

- 2: transmit signal of the remote control interface
- 3: receive signal of the remote control interface
- 5: electrical ground of the “GND” pins.

To use Epsilwin32 software, connect this port to a PC RS232C port with a straight RS232C cable 9 point (not provided).

Connector: J4

ToD/NMEA output of EBO3

Electrical Format: RS232C instead of TTL
Connector: SubD 9 points female

Pin setting:

- 2: transmit signal of the ToD/NMEA
- 5: electrical ground of the “GND” pins.

Using with a straight RS232C cable 9 point (not provided) to connect directly to a PC RS232C port.

Connector: J10

10MHz output of EBO3
Connector: BNC female

Pin setting:

- core : 10MHz output of EBO3
- ground: electrical ground of the EBO3.

Available when the right angle MCX cable J11 is connecting to J9 of the EBO3

Connector: J14

GPS Signal Input (L1) of the EBO3

Connector: TNC female
Pin settings:

- Core: GPS Signal Input (L1) of EBO3
- Ground: electrical ground of the “GND” pins.

Available when the right angle MCX cable J15 is connecting to J9 of the EBO3

Connector: J40

10/100 Base T interface of EBO3

Connector: RJ45

Pin settings:
- 1: ETH_TX+
- 2: ETH_TX-
- 3: ETH_RX+
- 6: ETH_RX-
- 4: ETH_SHIELD_TX+
- 5: ETH_SHIELD_TX -
- 7: ETH_SHIELD_RX +
- 8: ETH_SHIELD_RX –

Using with a straight Ethernet cable (not provided) to connect to a switch/hub port or using with a cross Ethernet cable (not provided) to connect directly to a PC Ethernet port.

The RJ45 has two integrated LED:
- Yellow led: on for a link
- Green led: on for a data transmission

Connector: J18

EXT_OPT_E1 (External 2.048 Mbit/s / E1) input of EBO3
Only available with a specific piggy-back board
Connector: BNC female
Pin settings:

- Core: EXT_OPT_E1+ directly connected to J7-4
- Ground: EXT_OPT_E1 - directly connected to J7-5

Connector: J17

EXT_10MHz input of EBO3
Connector: BNC female
Pin settings:
- Core: EXT_10MHz input of EBO3
- Ground: Electrical ground of the “GND” pins.

Connector: J16

EXT_1PPS input of EBO3
Connector: BNC female

Pin settings:
- Core: EXT_1PPS input of EBO3
- Ground: Electrical ground of the “GND” pins.

Connector: J6

NMEA message input of EBO3
Electrical Format: RS232C instead of TTL
Connector: SubD 9 points male

Pin setting:
- 2: Receive signal of NMEA message
- 5: electrical ground of the “GND” pins.

Connector: J12

1PPS output of EBO3
Connector: BNC female

Pin setting:
- core : 1PPS output of EBO3
- ground: electrical ground of the EBO3.

Available when the right angle MCX cable J13 is connecting to J13 of the EBO3

Switch: sw1

External reset input of the board
Connected directly to J2-12 of EBO3

LED:

D1: Power led	On indicates the Adaptation Board is correctly powered on
D2: EBO_OK led	On indicates the good working order of the board
D3: GPS_OK led	On indicates that the GPS reception is correct
	D4: SFN_OK led On indicates that the 10MHz frequency is cycle locked to the 1pps, meaning that there are always 10 000 000 cycles between consecutive 1pps occurrences.
	D5: EXT_REF_OK led On indicates that the External_1pps_10MHz and /or optional inputs are connected

REVISION HISTORY

Revision Level	***ECN Number***	***Description***
A	13/02/07	
B	16/07/07	Update Mechanical Characteristics Update Network interface
C	10/10/07	Web template update; add on annex 2 evaluation kit.
D	12/06/08	First iteration of this Spectracom documentation, converted from Temex Sync documentation.
E0	15/07/08	Mechanical drawing update, include TCI

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