SE880 EVK User Manual

1vv0301048 Rev. 1 – 2013-01-16

APPLICABILITY TABLE

PRODUCT
SE880

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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Contents

1. Introduction

1.1. Scope

Scope of this document is to give an overview of the Evaluation kit of the GPS standalone module SE880.

1.2. Audience

This document is intended for customers who are evaluating one or more products in the applicability table.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4.　　Text Conventions

STOP

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.5.　　Related Documents

- SE880 HW User Guide
- SE880 Product Descritption

NOTE:

- To prevent ESD and EOS damage, a properly grounded ESD wrist strap should be worn when working inside the EVK.
- Do not alter switch positions while USB power is applied.
- Do not short the RF signal to ground if the antenna voltage is installed. Damage to the EVK may result.

NOTE:

Always follow ESD safety precautions when utilizing the SE880 evaluation kit. For additional information on the SE880, ask your sales representative for additional manuals, datasheets, support, etc.

2.   Preparing for the SE880

What is Necessary

To use the SE880 Evaluation kit, you will need:
- FTDI USB Drivers
- SiRFLive2.0 and above or
- SiRFDemo
- A PC with a USB port that fulfills the minimum software requirements:
    o Windows XP
    o .NET Framework 2.0
        - This will be automatically installed by the SiRFLive package if necessary (internet connection is required).

2.1.   Installing the USB Drivers

Before connecting the SE880 Evaluation Kit, install the necessary USB drivers.

1   Double-click the USB driver executable and follow the directions to install the USB drivers.

2.2.   Installing SiRFLive

NOTE SiRFLive does not work on 64-bit OS machine at this time!
Minimum PC requirements:
- Pentium CPU 2 GHz
- 1 GB of RAM
- 100 MB hard drive

Recommended
- 2 GB of RAM
- 1280 x 1024 screen resolution

Ensure that all previous installation versions of SiRFLive have been uninstalled before installing any newer versions!

Install the current SiRFLive with the attached installer. Follow the installer directions until finished. Users should allow SiRFLive to install to the default location – C:\Program Files\SiRF\SiRFLive, but it can be changed if necessary.

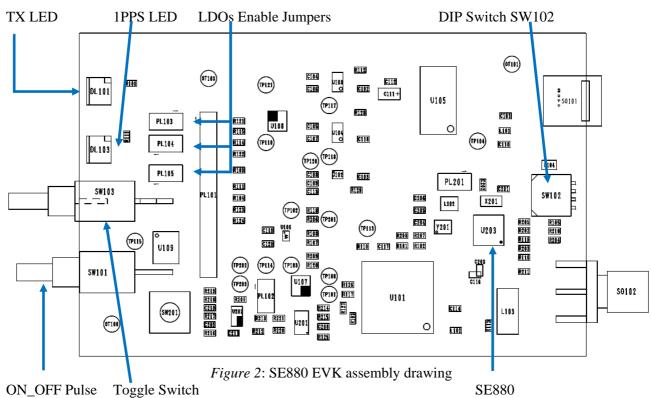# 3.   SE880 Evaluation Kit

3.1.   What's in the Box

Antenna

SE880 Eval Kit   USB Drive

3.2. Jupiter Evaluation Board

TX LED   1PPS LED   LDOs Enable Jumpers   DIP Switch SW102

Figure 2: SE880 EVK assembly drawing

ON_OFF Pulse   Toggle Switch   SE880

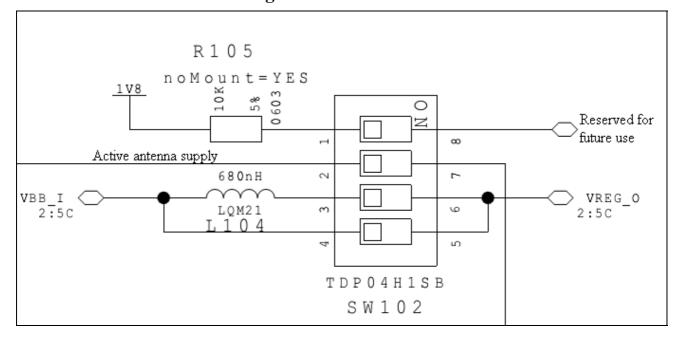| Item	Function
TX LED	LED that is tied to the USB to UART bridge TX line. The LED blinks whenever there is activity on the TX line.
1PPS LED	LED that pulses ON at ¼ a second and OFF at ¾ a second, indicating a fix with the receiver.
Toggle Switch	Switch that acts on the enable signals of the 3V and SE880 VDD; it permits to turn on and off these two voltages while living the SE880 VKA on, thus allowing to simulate a battery backed-up configuration.
ON_OFF Pulse	Pushbutton that sends a 1.8V voltage pulse to the ON_OFF input of the SE880 module.
DIP Switch	Externally accessible DIP switch for power supply, active antenna and boot mode configuration (please refer to paragraph 3.2.1 for details)
LDO Enable Jumpers	These jumpers allow the connection/disconnection of the enable signals of the 3 LDOs available on the board.

3.2.1.　　Switch Configuration

Switch position	Function in ON state
1	Reserved fo future use
2	Active antenna supply connection
3	L104 connection for SE880 switching mode power supply
4	L104 bypass for SE880 LDO mode power supply

Notes:

- Each switch is in ON state when in low position.

- Switches in position 3 and 4 must be active alternatively, since they are acting on the same signal.

3.2.2.   LDOs enable configuration

The SE880 EVK presents 3 jumpers (PL103, PL104 and PL105) connected to the enable signals of the on board LDOs generating the following voltages:

- SE880 VKA (1.8V): this voltage (also available on TP117) acts as the backup voltage of the SE880 and is supposed to be always present when the USB 5V voltage is present. PL103, when populated, connects the SE880 VKA enable signal (active high) to the USB voltage.

- SE880 VDD (1.8V): it's the main supply of the SE880 (also available on TP120) and it's enabled or disabled using the toggle switch. PL105, when populated, connects its enable signal to the toggle switch output.

- 3.3V (available on TP118): used for active antenna and additional on-board circuitry, it's enabled or disabled using the toggle switch. PL104, when populated, connects its enable signal to the toggle switch output.

4. Step-by-Step: Installing and running the SE880 EVK

4.1. Step-by-Step: First Time Connection

1. Before connecting the evaluation board, ensure that the USB drivers have been installed.
2. As soon as the evaluation board is connected to the PC, it will be detected and installed.

Figure 3: USB installation, select "Continue Anyway" to proceed.

3. After the evaluation board has been installed, check the "Device Manager" window for the evaluation board COM port number. This information is needed for use with the GPS tools.

Figure 4: In this case, the COM port is assigned as COM5

4.2.   Powering on the EVK

1. At first application of power (connecting of USB) only the SE880 VKA voltage is applied.
2. Put in low position switch 4 of SW102 to have the SE880 internal regulator working in linear mode or put in low position switch 3 of SW102 to have the SE880 internal regulator working in switching mode (to set the SE880 power supply in switching mode you'll be also required to send a proper command on UART interface).
3. Turn on the toggle switch (it's on when in high position). At this point the SE880 will be in *hibernate mode*.
4. Press the **ON/OFF** pulse button to bring the unit into *Full Power Mode*.
5. If using the provided active antenna please put in low position switch 2 of SW102; the board provides 3.3V to the active antenna whit the SE880 in *Full Power Mode*. If using a passive antenna or connecting the board to an instrument please disable the active antenna supply putting switch 2 in high position. To correctly exploit the chosen antenna please verify the internal LNA status as reported in paragraph 5.4.3.
6. Place the GPS Active Antenna to where it has a clear view of open sky.
7. The evaluation board can now be manipulated with the provided GPS tools (SiRFLive or SiRFDemo).
8. Refer to Chapter 15: SE880 on SiRFLive for using the SE880 on SiRFLive.

5.   SE880 on SiRFLive

Launch the SiRFLive application.

5.1.   Main Interface

After launching SiRFLive, first notice the application's main interface.

Figure 5: Main Menu Bar

Figure 6: Main Tool Bar

5.2.   Connecting To the SE880

The user can utilize either the *Main Menu Bar* or the *Main Tool Bar*.

5.2.1.   Main Menu Bar

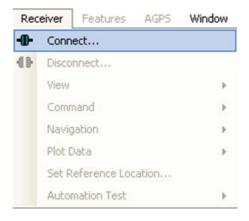Under the option "Receiver" on the *Main Menu Bar*, there is a selection "Connect. . ." This
will open the Receiver settings for connection.

Figure 7: Connect to Receiver

5.2.2. Main Tool Bar

Select the "Receiver Settings" button

Or the "Connect" button

5.2.3. Rx Port Settings

Select the GSD4e Product Family, RS232/USB, and the Correct COM Port.

Figure 8: The Rx Port Connection Window

Default Baud rate for NMEA is 4800, and 115200 for OSP.

5.3.   SiRFLive Windows

After a successful connection with the receiver is established, the default SiRFLive windows should be arranged and become filled with data.

> If not all the default windows are arranged or opened, under the *Main Menu Bar*, go to "Window" > "Restore Layout" > "Default."

5.3.1.   Signal View

(main tool bar icon)

Type of Fix   Satellite Data

Figure 9 Shows the satellite signal levels.

5.3.2. Radar View

(main tool bar icon)

Red satellites – 0 C/N0

Blue satellites – nonzero C/N0 but not being used in the navigation solution

Green satellites – nonzero C/N0 and are being used in the navigation solution

Skyblue satellites – SBAS satellites

Orange satellites – ABP is being used to acquire satellites

Magenta satellites – Extended Ephemeris is being used to acquire satellites.

Figure 10: Displays the satellites by azimuth and elevation.

5.3.3.   Debug View

(main tool bar icon)
Shows the communication messages with the receiver.

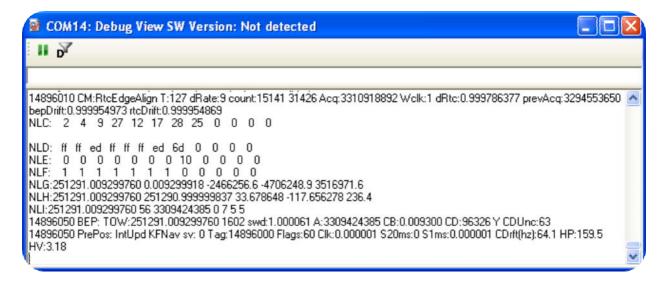*Figure 11*: Debug view with One Socket Protocol messages.

5.3.4. Location View

(main tool bar icon)

Displays more detailed information regarding the UTC, TOW, Latitude, Longitude, Altitude, etc.

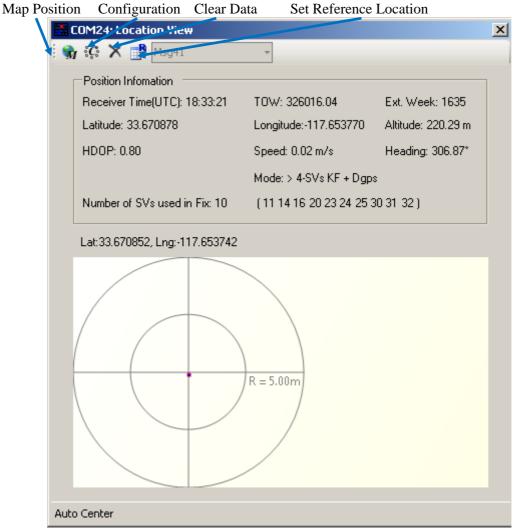Map Position   Configuration   Clear Data   Set Reference Location

Figure 12: Location view

⚠️   Map position button requires Internet access to work.

5.4.   Receiver Commands

Most of the Receiver Commands can be accessed through the *Main Menu Bar* under "Receiver" > "Command." There are also shortcuts on the *Main Tool Bar* which will be covered in this section.
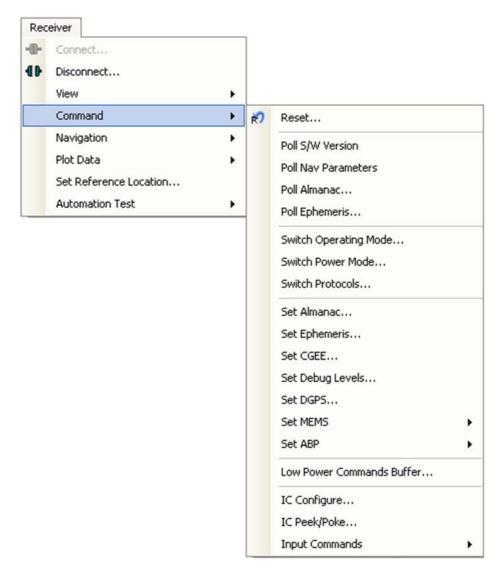
Figure 13: All the commands for the receiver.

All of the *Receiver Commands* become available in One Socket Protocol (OSP) only.

5.4.1.   Sending Resets

(main tool bar icon)

1. Select "Reset. . ." under the *Main Menu Bar* "Receiver" > "Command" > "Reset. . ."

   Or

   Select the Reset icon on the *Main Tool Bar*.

The "Reset" window should open.

Reference Location allows the user to change the position used as the reference. This helps determine position accuracy in conjunction with Time-To-First-Fix values.
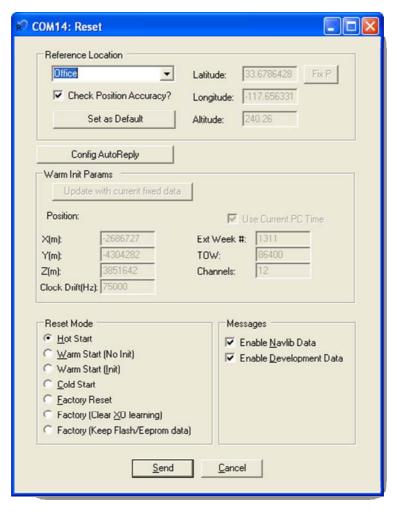

Figure 14: Reset window.

Resets are used to measure the TTFF of the receiver. The TTFF/Nav Accuracy window conveniently displays the TTFF in seconds and Navigation accuracy based on the Reference Location.

5.4.

Switch Protocol

The number of available commands in NMEA is limited compared to OSP. Switching to OSP for testing is recommended.

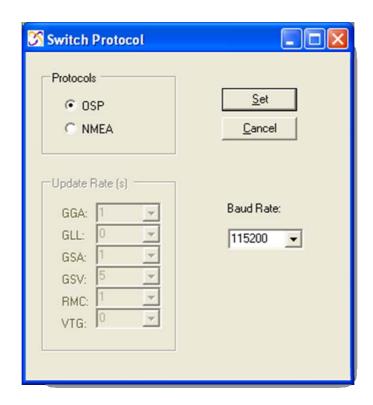1. On the *Main Menu Bar*, select "Receiver" > "Command" > "Switch Protocols. . ."

Figure 15: Switching to OSP protocol with its default 115200 baud rate

2. Click "Set" to apply settings.

Switching to NMEA should be similar.

5.4.3.   Setting the IC Configuration

The SE880 module has two LNA modes, a high gain mode, and a low gain mode. The high gain mode is ideal for passive antenna applications, while the low gain mode is ideal for active antenna applications.

LNA Gain Setting	Gain (dB)	Noise Figure (dB)	Recommended External Gain Range
Low	6.0–10.0	8.5–9.5	16–30
High	16.0–20.0	1.2–2.0	8–18

Table 1: LNA information and antenna gain requirements

The development kit hardware is set up to use an active antenna. The antenna feed is outputting 3.3V for the antenna. To ensure that no cross-correlation occurs, ensure that the correct LNA gain setting is selected for the chosen GPS antenna for use. In this case, the provided GPS antenna, the M820B-S, has 16dB typical gain.

1. On the *Main Menu Bar*, select "Receiver" > "Command" > "IC Configure. . ."

2. Click on "Advanced. . ." to open the IC Configuration fields.

> ⚠ A message will pop up warning about incorrectly configuring the IC parameters. Ensure that you are aware of the correct parameter changes so as not to render your receiver non-operational.

i. Click "Yes" to proceed.
ii. Under the selection "LNA Gain Mode:" choose "Low" from the drop down menu. Choosing Low will configure the internal LNA to its low gain mode. This will make the Evaluation Kit better fitted to work with an active antenna. *Figure 16* displays the IC Configuration window.
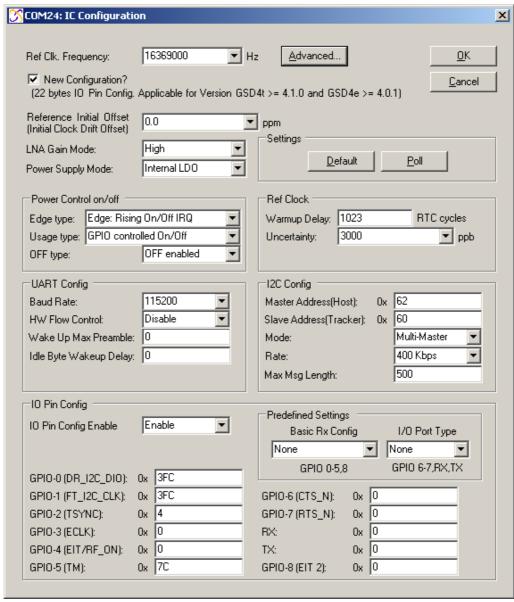
Figure 16: Configuring the IC parameters.

1. Click "OK" after all necessary changes.

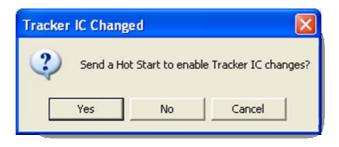*Figure 17*: Click "Yes" in order for new changes to be applied.

5.4.4.   Logging Data

(main tool bar icon)

SiRFLive is capable of collecting either the OSP message stream or the NMEA message stream into a log file.

1. While the receiver is outputting messages to SiRFLive, click on the *Log File* icon on the *Main Tool Bar* or go through the *Main Menu Bar* under "Log File" then "Start. . ." shown in Fig 18.
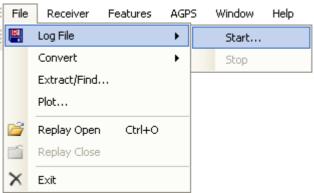

Fig 18: *Main Menu Bar* access to the Log File command.

i. The *Log File* window should open, which is shown in Fig 19. Click on the ". . ." button, as indicated by the arrow in Fig 19, to open a window where the user can specify the output folder and the output file name.
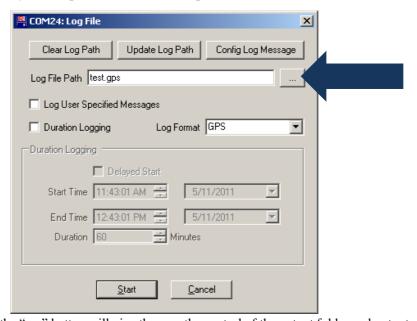

Fig 19: Clicking on the ". . ." button will give the user the control of the output folder and output name

ii. After specifying the output folder and output name, close the "Specify log file name:" window by clicking *Open* and the "Log File Path:" bar should be filled with the file path. Select the desired Log Format, and click "<u>S</u>tart" in order to start logging.

6. APPENDIX

6.1. Internal LNA and Antenna

The Internal LNA has two modes, each are specific to the amount of gain that a connected antenna will have.

Usually, in high gain internal LNA mode, the antenna connected will be a passive antenna, while the low gain internal LNA mode will require an active antenna or an external LNA.

It is recommended for the AGC to be in mid-range(between 1 and 62). If the total system gain is too high, the AGC will be high, therefore it will not be able to compensate as well if the receiver is in a noisy environment.

The SE880 evaluation is bundled with an Active Antenna, providing an amplifier gain of 16dB typical.

6.1.1. Active Antenna

The bundled M820B antenna requires a DC voltage between 2.7V to 6.0V. The Evaluation Kit can provide 3.3V to the active antenna by pressing switch 2 of SW102. The active antenna should be low gain variety.

For passive antenna connection, ensure that position 2 of SW1 is depressed in order to prevent damage.

6.1.2. Passive Antenna

Ensure that switch 2 of SW102 is in high position.

7. Document History

Revision	Date	Changes
0	2013-01-16	First draft