



Jupiter-F²

User's Manual

Preliminary



Note

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

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Table of Contents

CONTENTS

PREPARING FOR THE JUPITER-F²	4
WHAT IS NECESSARY	4
INSTALLING THE USB DRIVERS	4
INSTALLING SIRFLIVE	5
JUPITER-F² EVALUATION KIT	6
WHAT'S IN THE BOX	6
JUPITER EVALUATION BOARD.....	7
<i>Item Function</i>	7
<i>Jumper Configuration</i>	8
STEP-BY-STEP: FIRST TIME RUNNING THE JUPITER-F² EVALUATION BOARD	9
STEP-BY-STEP: FIRST TIME CONNECTION	9
JUPITER-F² ON SIRFLIVE	11
MAIN INTERFACE	11
CONNECTING TO THE JUPITER-F ²	11
SIRFLIVE WINDOWS.....	13
RECEIVER COMMANDS	17
BATTERY FUNCTION ON J-F²	23
APPENDIX	23
FLASHING THE JUPITER-F ²	24
GOING INTO BOOT MODE AND HIBERNATE MODE	25
INTERNAL LNA AND ANTENNA.....	26
TESTING INSTANTFIX 1	27
<i>General Description</i>	27
<i>Step-by-Step Instructions</i>	27



Always follow ESD safety precautions when utilizing the Jupiter-F² evaluation kit. For additional information on the Jupiter-F², ask your sales representative for additional manuals, datasheets, support, etc.

What is Necessary

To use the Jupiter-F² 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:
 - Windows XP
 - .NET Framework 2.0
 - This will be automatically installed by the SiRFLive package if necessary (internet connection is required).
- A programmed/flashed Jupiter-F² evaluation device.
 - SiRFlash_402 and above if needed to flash the Jupiter-F² device.
 - GSD4e v4.0.2-P1 firmware to be flashed on the Jupiter-F² device if needed.

Installing the USB Drivers

Before connecting the Jupiter-F² Evaluation Kit, install the necessary USB drivers.



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

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

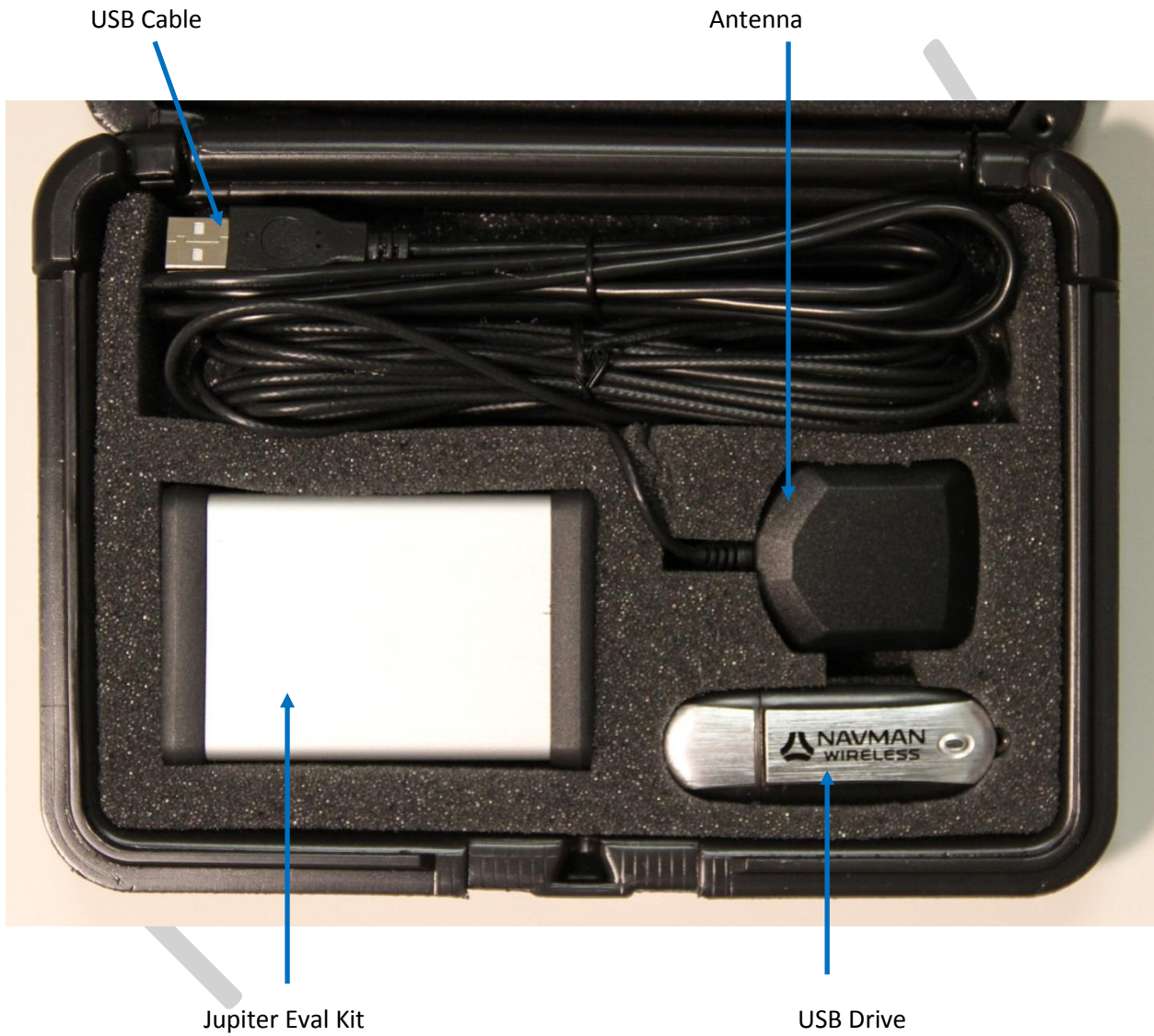


Ensure that all previous installation versions of SiRFLive have been uninstalled before installing any newer versions!

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.

Jupiter-F² Evaluation Kit

What's in the Box



Jupiter Evaluation Board

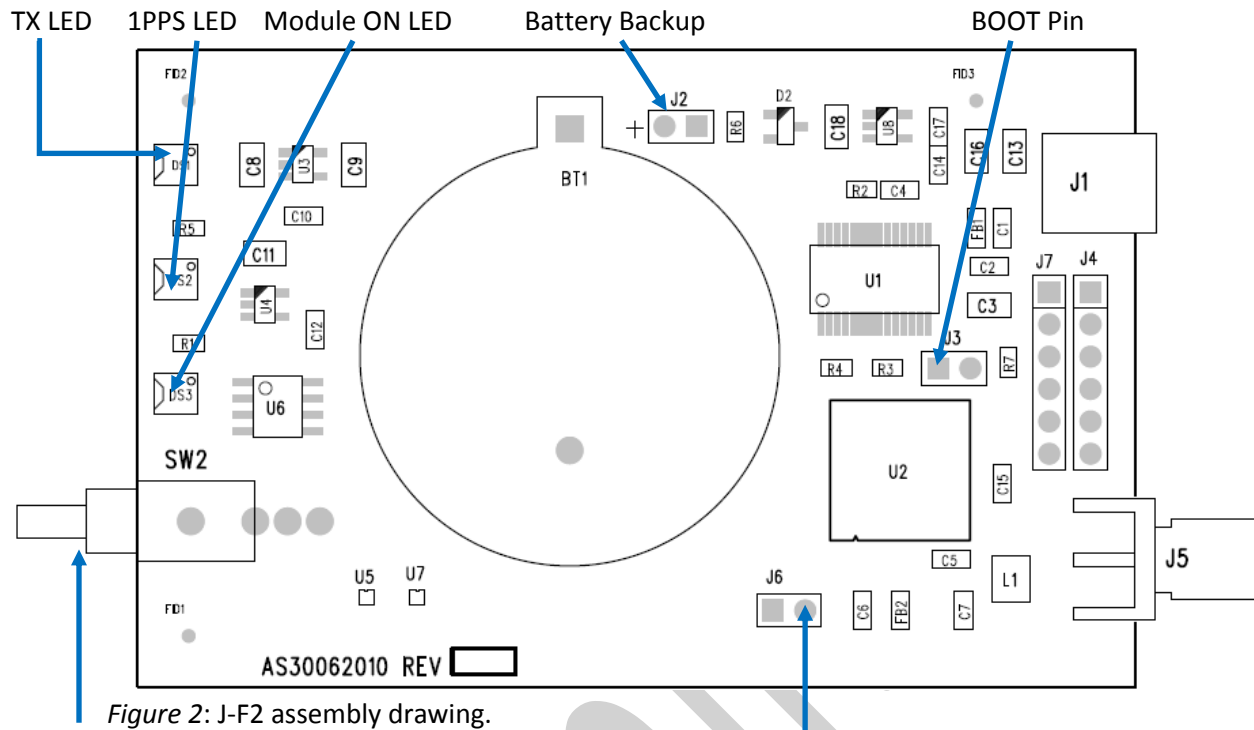


Figure 2: J-F2 assembly drawing.

ON_OFF Pulse

3.3V Antenna Supply

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 $\frac{1}{4}$ a second and OFF at $\frac{3}{4}$ a second, indicating a fix with the receiver.
Module ON LED	LED indicating that the module is on. Led is tied to the SYSTEM_ON pin out of the Jupiter-F ² .
ON_OFF Pulse	Pushbutton that sends a 1.8V voltage pulse to the ON_OFF input of the Jupiter-F ² module.
3.3V Antenna Supply	A jumper on J6 provides a 3.3V output to an active antenna (remove jumper if connecting a passive antenna).
BOOT Pin	A jumper on J3 will pull the BOOT_0 high, putting the module into internal BOOT mode for firmware flashing
Battery Backup Pin	A jumper on J2 will utilize a 3V lithium battery installed on BT1. Refer to Section 5 on how to properly utilize a battery with the J-F ² .

Jumper Configuration

	J2	J3	J6
Normal GPS	(Battery)	(BOOT)	(Active Ant)
w/ provided Active Antenna no Battery	NO	NO	YES
w/ Passive Antenna no Battery	NO	NO	NO
w/ Active Antenna and Battery	YES	NO	YES
w/ Passive Antenna and Battery	YES	NO	NO
Flashing the GPS			
	N/A	YES	N/A

Step-by-Step: First Time Running the Jupiter-F² Evaluation Board

The Jupiter-F² evaluation board defaults to *hibernate mode* as soon as the USB is connected. It is important to understand the different power states in order to be in the correct mode for the desired operation.

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.

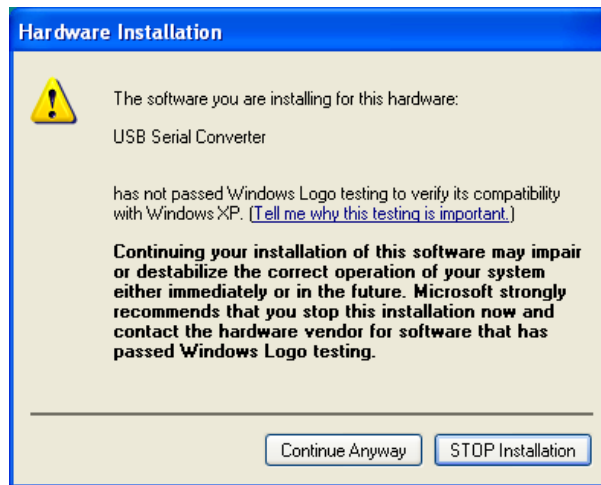


Figure 3: USB installation, select “Continue Anyway” to proceed.

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.

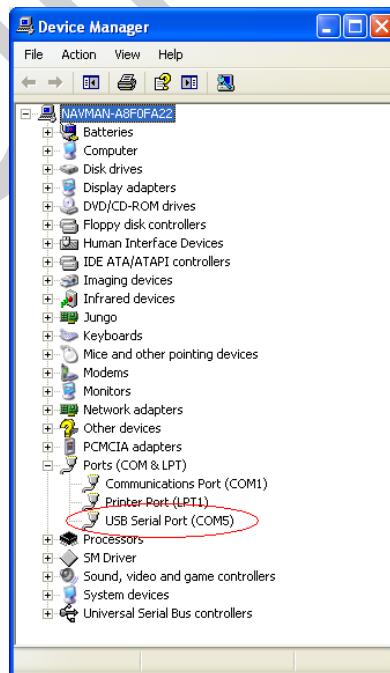


Figure 4: In this case, the COM port is assigned as COM5

4. At first application of power (connecting of USB), the evaluation board should default to *hibernate mode*. The **Module ON LED** should be unlit.
5. Remove any jumper installed on J3 (**BOOT Pin**).
6. Press the **ON/OFF** pulse button to bring the unit into *Full Power Mode*.
7. The *Full Power Mode* will be indicated by the **Module ON LED**.
8. Connect the provided GPS Active Antenna. NOTE: The evaluation kit is outputting 3.3V to the antenna. For a passive antenna, the jumper on J6 needs to be removed.
9. Place the GPS Active Antenna to where it has a clear view of open sky.
10. The evaluation board can now be manipulated with the provided GPS tools (SiRFLive or SiRFDemo).
11. Refer to [Chapter 4: Jupiter-F² on SiRFLive](#) for using the J-F² on SiRFLive.

Preliminary

Jupiter-F² on SiRFLive

Launch the SiRFLive application.



Main Interface

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



Figure 5: Main Menu Bar



Figure 6: Main Tool Bar

Connecting To the Jupiter-F²

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

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.

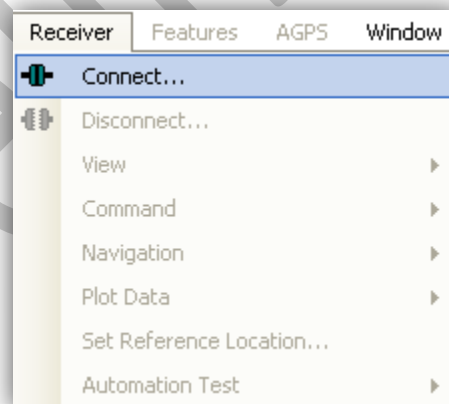


Figure 7: Connect to Receiver

Main Tool Bar



Select the “Receiver Settings” button



Or the “Connect” button



Rx Port Settings

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

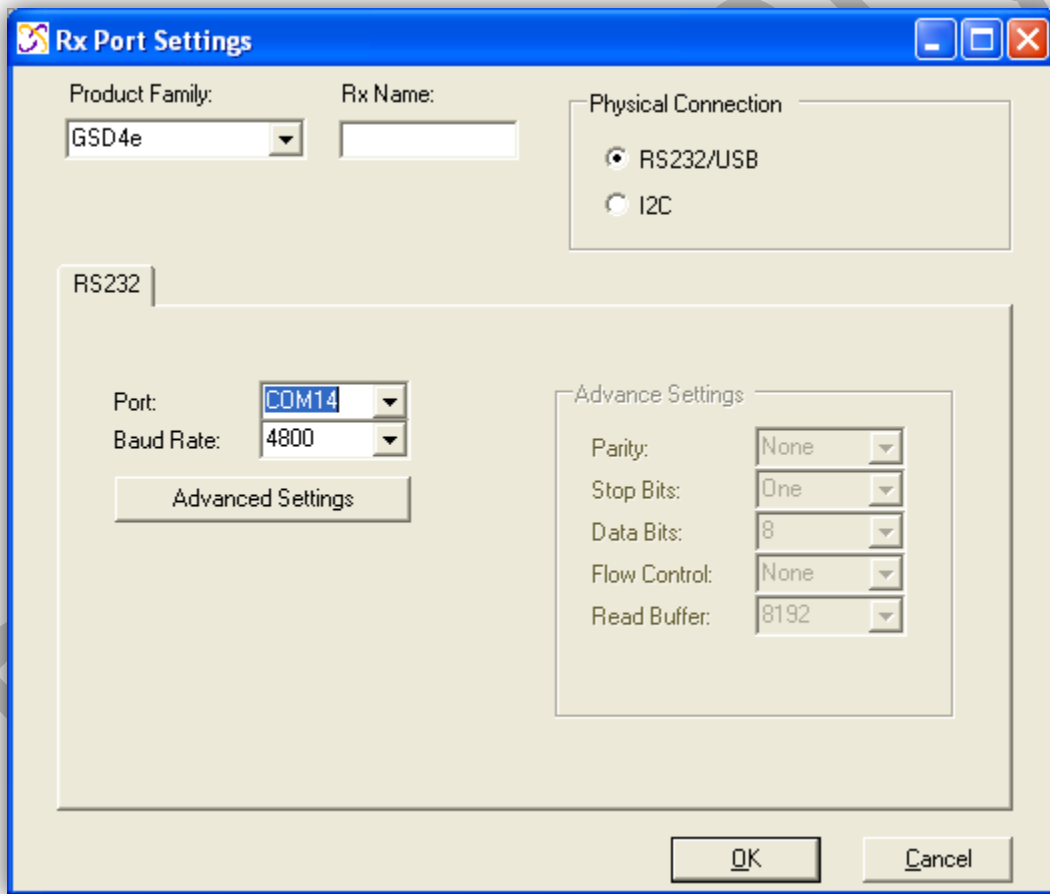


Figure 8: The Rx Port Connection Window



Default Baud rate for NMEA is 4800, and 115200 for OSP. SiRFLive uses AUTODETECT to synchronize the protocol and baud rate.

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.”

Signal View



(main tool bar icon)

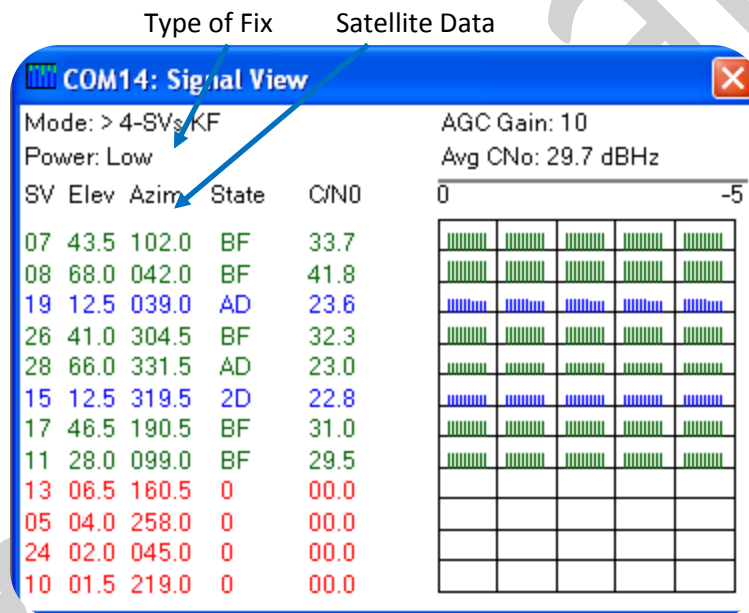


Figure 9 Shows the satellite signal levels.

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.

Debug View



(main tool bar icon)

Shows the communication messages with the receiver.

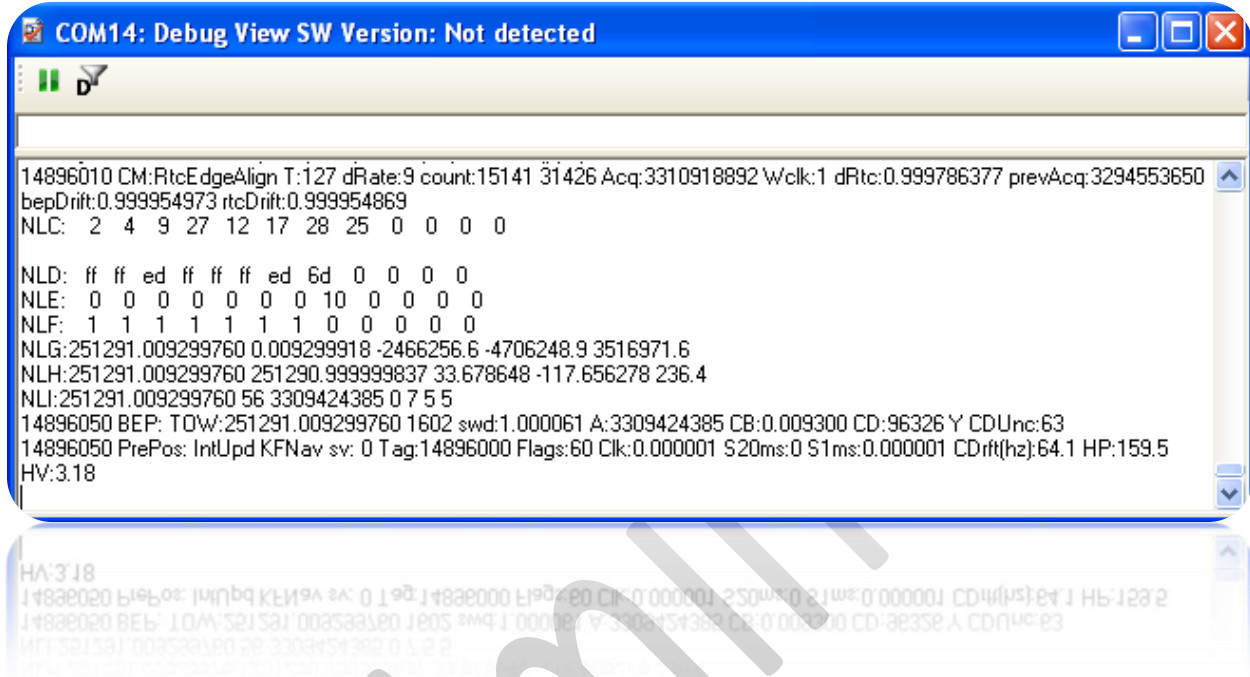


Figure 11: Debug view with One Socket Protocol messages.

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

Position Information		
Receiver Time(UTC): 21:51:46	TOW: 251521.00	Ext. Week: 1602
Latitude: 33.678691	Longitude: -117.656278	Altitude: 240.48 m
HDOP: 1.00	Speed: 0.00 m/s	Heading: 213.42°
	Mode: > 4-SVs KF	
Number of SVs used in Fix: 8	(2 4 9 10 12 17 27 28)	

Lat:33.678704, Lng:-117.656252

R = 5.00m

Auto Center

Figure 12: Location view



Map position button requires Internet access to work.

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.

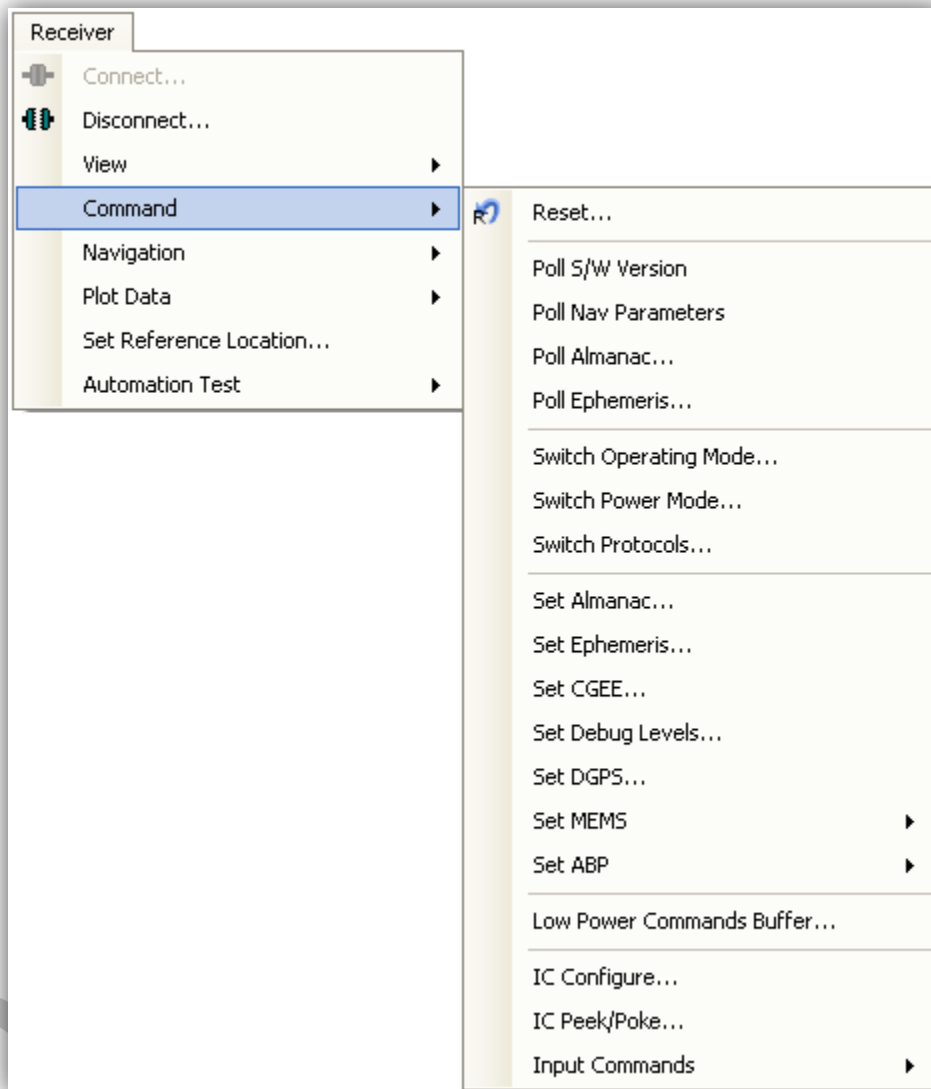


Figure 13: All the commands for the receiver.



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

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.

COM14: Reset

Reference Location

Office Latitude: 33.6786428 Fix P

Check Position Accuracy? Longitude: -117.656331

Set as Default Altitude: 240.26

Config AutoReply

Warm Init Params

Update with current fixed data

Position: Use Current PC Time

X(m): -2686727 Ext Week #: 1311

Y(m): -4304282 TOW: 86400

Z(m): 3851642 Channels: 12

Clock Drift(Hz): 75000

Reset Mode

Hot Start

Warm Start (No Init)

Warm Start (Init)

Cold Start

Factory Reset

Factory (Clear XD learning)

Factory (Keep Flash/Eeprom data)

Messages

Enable Navlib Data

Enable Development Data

Send Cancel

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.

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. . .”

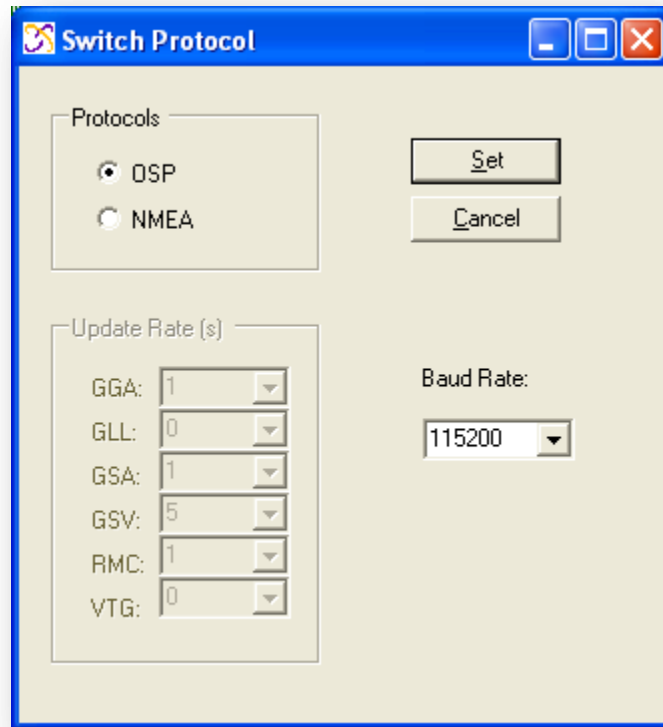


Figure 15: Switching to OSP protocol with its default 115200 baud rate

2. Click “Set” to apply settings.

Switching to NMEA should be similar.

Setting the IC Configuration

The Jupiter-F² 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.

3. Click “Yes” to proceed.
4. 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 14* displays the IC Configuration window.

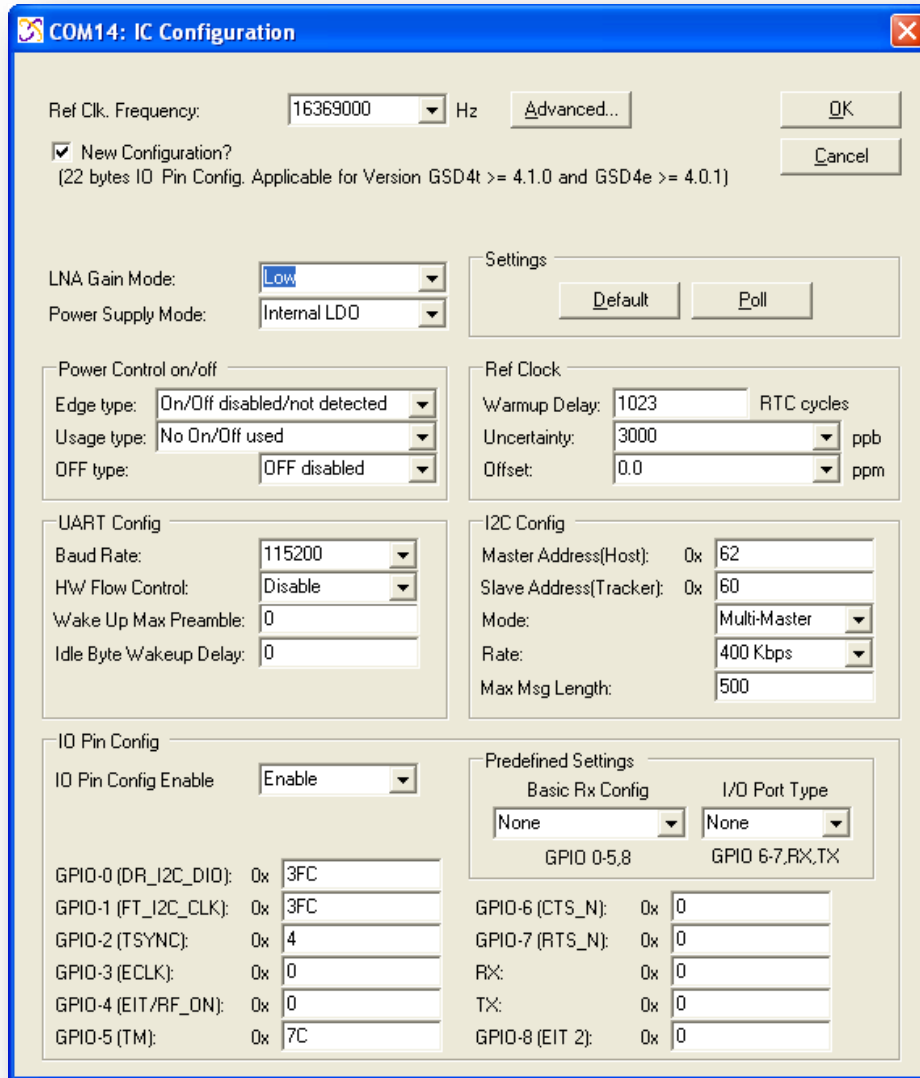


Figure 16: Configuring the IC parameters.

5. Click “OK” after all necessary changes.

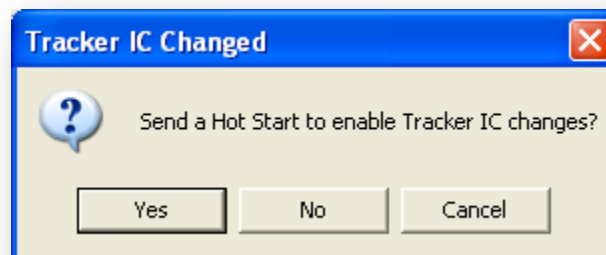


Figure 17: Click “Yes” in order for new changes to be applied.

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.

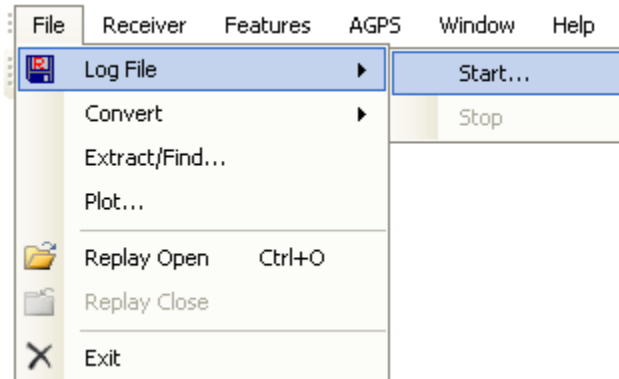


Fig 18: Main Menu Bar access to the Log File command.

2. 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.

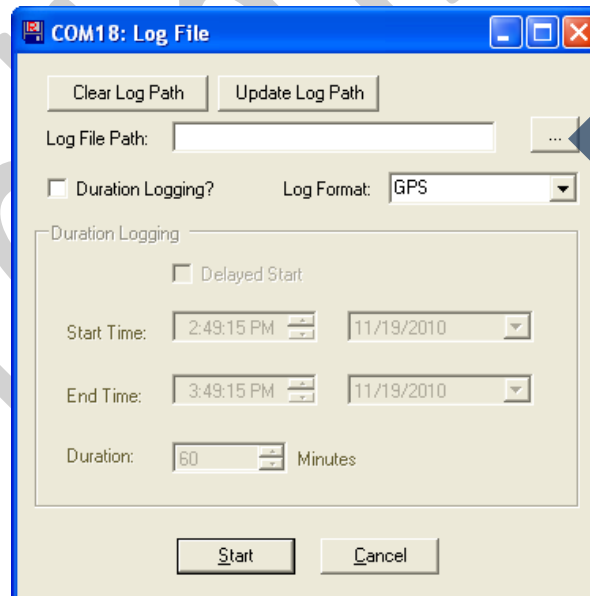


Fig 19: Clicking on the “. . .” button will give the user the control of the output folder and output name

3. 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.
4. Select the desired Log Format, and click “Start” in order to start logging.

Battery Function on J-F²

The J-F² evaluation kit supports the use of battery backup. If the 3V lithium coin cell is installed, and the jumper on the Battery Backup pin (J2) is installed then the evaluation kit will support battery backup. However, the procedure must adhere to the instructions below

To safely enter battery backup:

1. While the evaluation kit is running, press the **ON_OFF Pulse** pushbutton. The **Module ON LED** should turn off.
2. Once the **Module ON LED** turns off, the USB cable can be removed. The J-F² will retain RTC time and battery backed memory.

If this procedure is not followed, the current limiting resistor on the backup battery will cause the supply voltage to sag enough that RTC time and battery backed RAM is lost.



Note that if the battery is not installed, the evaluation kit will still support hibernate mode with preserved battery backed RAM and RTC. The connected USB cable will be providing the *hibernate* voltage in this case.

To safely exit battery backup:

1. While the evaluation kit is in *hibernate* mode, connect the USB cable to the computer. Wait until the computer enumerates the USB port and applies power.
2. Press the **ON_OFF Pulse** button.

APPENDIX A: Flashing The Jupiter-F²

Flashing the Jupiter-F²

It is usually not necessary for users to keep re-flashing the evaluation kit. New firmware will only be provided if necessary.



- 1 From *Hibernate Mode*, (**Module ON LED** unlit), place a jumper across J3 and apply the **ON_OFF pulse** in order to go into Internal Boot mode. Fig. 2.
- 2 Double click the SiRFlash.exe icon to open the program.
- 3 Select Program, Internal Boot mode, Erase whole chip, and browse for the device firmware.
- 4 Select Execute.
- 5 Once in *Boot Mode*, the module will no longer respond to the **ON_OFF pulse**. Power needs to be removed in order to leave *Boot Mode*. This can be done by removing the USB cable and the **Battery Backup**.
- 6 Re-apply power and remove the jumper across J3. Press the **ON_OFF pulse** and the unit will be in *Full-Power Mode* ready to communicate.



The evaluation Jupiter-F² device needs to be in *BOOT mode* in order to flash. A jumper across J3 needs to be placed. Refer to Figure 2 for placement location.

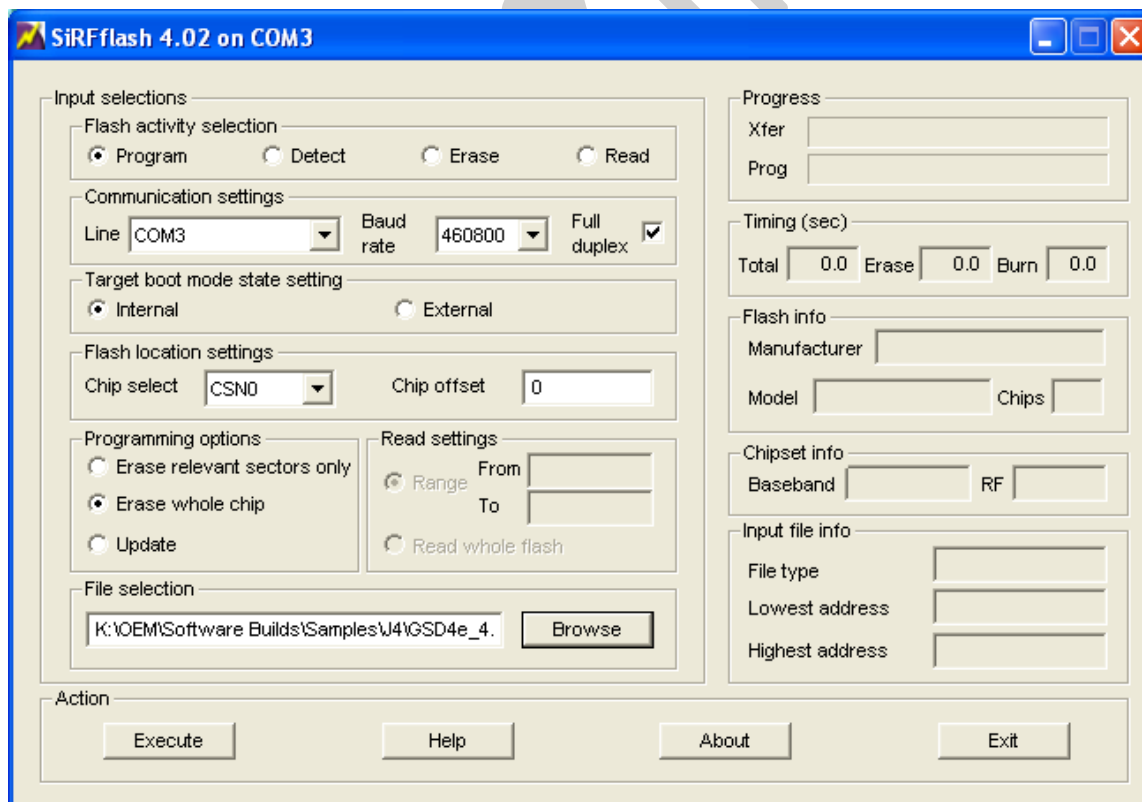


Figure 20: SiRFlash tool setting.

APPENDIX **B**: Going into Boot Mode and Hibernate Mode

Going into Boot Mode and Hibernate Mode

The Jupiter-F² Evaluation Board's main power comes from its USB port. Upon connection to a USB port, the evaluation kit defaults to its *hibernate mode*.



Hibernate mode is an ultra low power state that has both the RF and baseband turned off, leaving only the RTC and battery-backed RAM powered.

Going into Boot Mode

1. From hibernate mode (**Module ON LED** off), place a jumper on the **BOOT Pin J3**.
2. Wake up the Jupiter-F² module by pressing the **ON_OFF Pulse** pushbutton once.
3. Wait for the **Module ON LED** to turn on, indicating that the module has left *hibernate mode*.
4. It is now in Boot mode and ready to be flashed with firmware.

Going into Full Power Mode

1. From hibernate mode (Module ON LED off), ensure that there is no jumper on the **BOOT Pin J3**.
2. Wake up the Jupiter-F² module by pressing the **ON_OFF Pulse** pushbutton once.
3. Wait for the **Module ON LED** to turn on, indicating that the module has left *hibernate mode*.
4. It is now ready to communicate with software GPS tools.

APPENDIX C: Antenna and Internal LNA

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 Jupiter-F² evaluation is bundled with an Active Antenna, providing an amplifier gain of 16dB typical.

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 adding a jumper on J6. The active antenna should be low gain variety.



For passive antenna connection, ensure that jumper J6 is not installed in order to prevent damage.

Passive Antenna

Open the box and ensure that there are no jumpers installed on J6.

APPENDIX D: Testing InstantFix 1

Testing InstantFix 1

General Description

InstantFix technology eliminates the start-up wait time that extends Time-To-First-Fix (TTFF). InstantFix employs an Extended Ephemeris file that is acquired through a network connection, which eliminates the need to download satellite broadcast ephemeris.

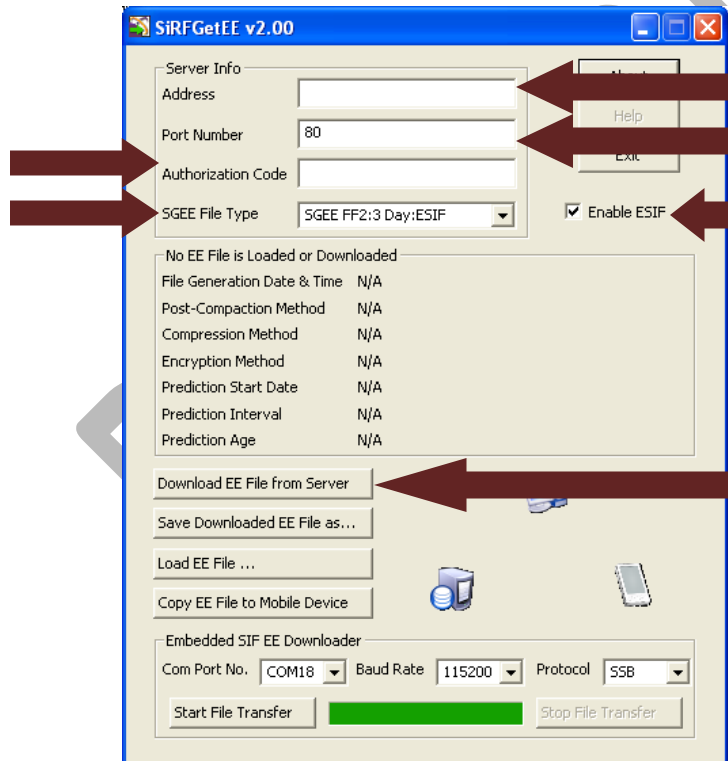
Step-by-Step Instructions

You will need:



- SiRGetEE v2.00 or above
- Access to Test Server

1. Use SiRFLive to find out the current baudrate and protocol that the EVK is in.
2. Open the SiRGetEE v2.00 or above application. Ensure that the ceutil.dll and rapi.dll files are in the same folder as the application

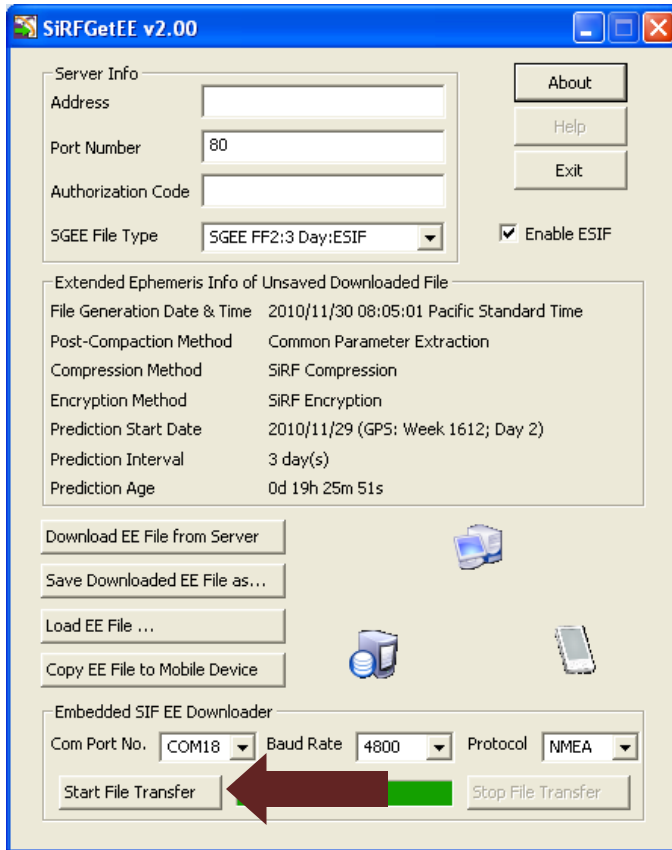


3. Enter in the Server Info (Address, Port Number, Authorization Code, and SGEE File Type). Ensure that the SGEE File Type is ESIF and that the “Enable ESIF” checkbox is selected.

4. Select “Download EE File from Server” in order for the application to fetch the EE file from the Server.

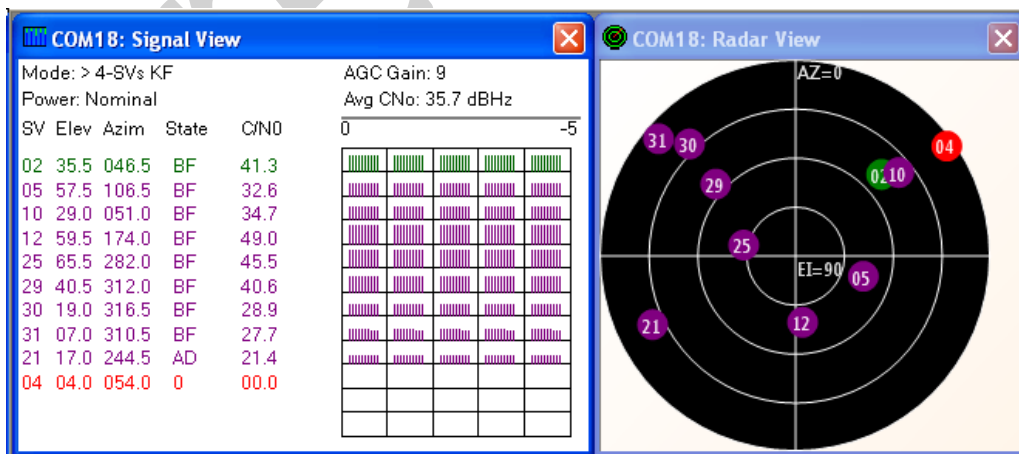



Ask your sales representative for Server Info for testing InstantFix with the EVK.

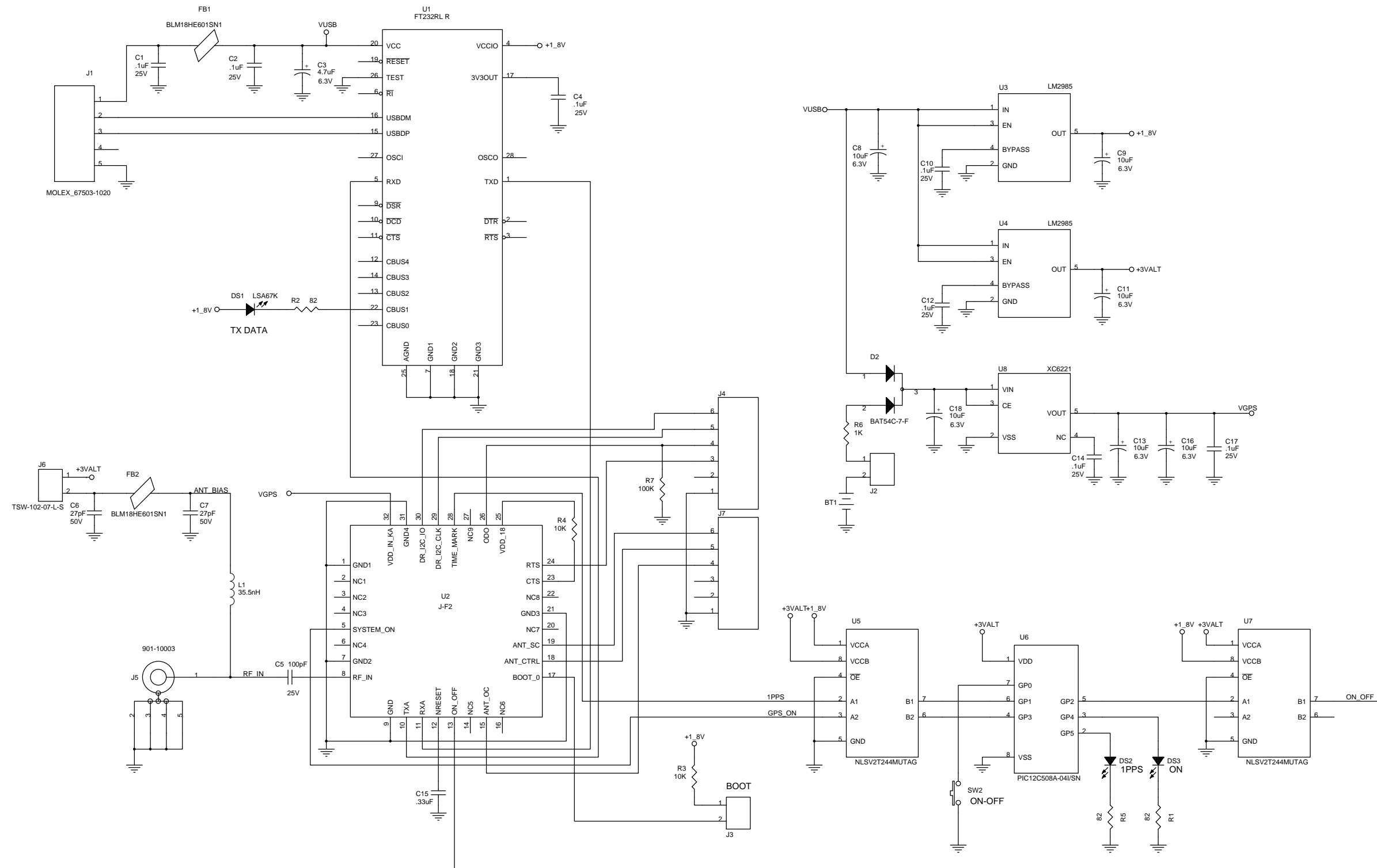


5. Once the Extended Ephemeris has been fetched, select the correct Com Port No., Baud Rate, and Protocol of the EVK.
6. A window will verify if the download of the EE file to the EVK was successful.
7. Close SiRFGetEE and Open SiRFLive

8. Connect to the EVK. Make sure that the EVK is in OSP protocol in order to visually see if the unit is using the Extended Ephemeris file. A Purple Satellite indicates that Extended Ephemeris is being used.
9. Send a Warm Start to the unit to see it use extended ephemeris.



 Note: Fast TTFF fixes through InstantFix requires the internal clock to be calibrated.



NOTES: UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE 1/10 WATT 5%.

NAVMAN WIRELESS			
Title			
SCHEMATIC DIAGRAM, J-F2			
Size	Document Number	Rev	
C	SCH30062010	A	
Date:	Thursday, May 27, 2010	Sheet	1 of 1