SL871 & SL869 V2 Families Evaluation Kit User Guide

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Making machines talk.

APPLICABILITY TABLE

PRODUCT
SL869 V2 EVK
SL869 V2 S EVK
SL871 EVK
SL871-S EVK

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Contents

Figures

Tables

1. Introduction

1.1. Scope

This document provides information on using the SL869 V2 Family and the SL871 Family Evaluation Kits.

1.2. 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-AMERICAS@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

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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.

1.3. Text Conventions

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

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.

1.4. Related Documents

- SL871 Data Sheet
- SL871 Family Product User Guide
- SL871 & SL869 V2 Families Software User Guide
- SL869 V2 Data Sheet
- SL869 V2 Family Product User Guide
- TelitView User Guide

1.5. Product Usage Notes

- To prevent ESD and EOS damage, a properly grounded ESD wrist strap should be worn when the EVK case is opened
- Do not alter jumpers while power is applied
- Do not short the RF signal to ground if antenna supply voltage is connected. Damage to the EVK or module may occur.

Always follow ESD safety precautions when utilizing the evaluation kit. For additional information, contact your local sales representative.

This module shall be supplied by a limited power source complying with clause 2.5 of EN 60950-1 and mounted on a V1 flammability class material or better.

2. Evaluation Kit Requirements

To use the SL871 or SL869 V2 Evaluation Kit (EVK), you will need the following items:

1. An Evaluation Kit with a programmed/flashed module
   - Current Firmware (FW) build for the installed module (if necessary)
2. FTDI USB Drivers (included on the USB flash drive)
3. Current version of TelitView (included on the USB flash drive)
4. A PC with a USB port and:
   - Windows XP or later
   - .NET Framework 2.0

3. Evaluation Kit Description

3.1. Evaluation Kit Contents

Figure 3-1 SL871 or SL869 V2 Evaluation Kit Contents

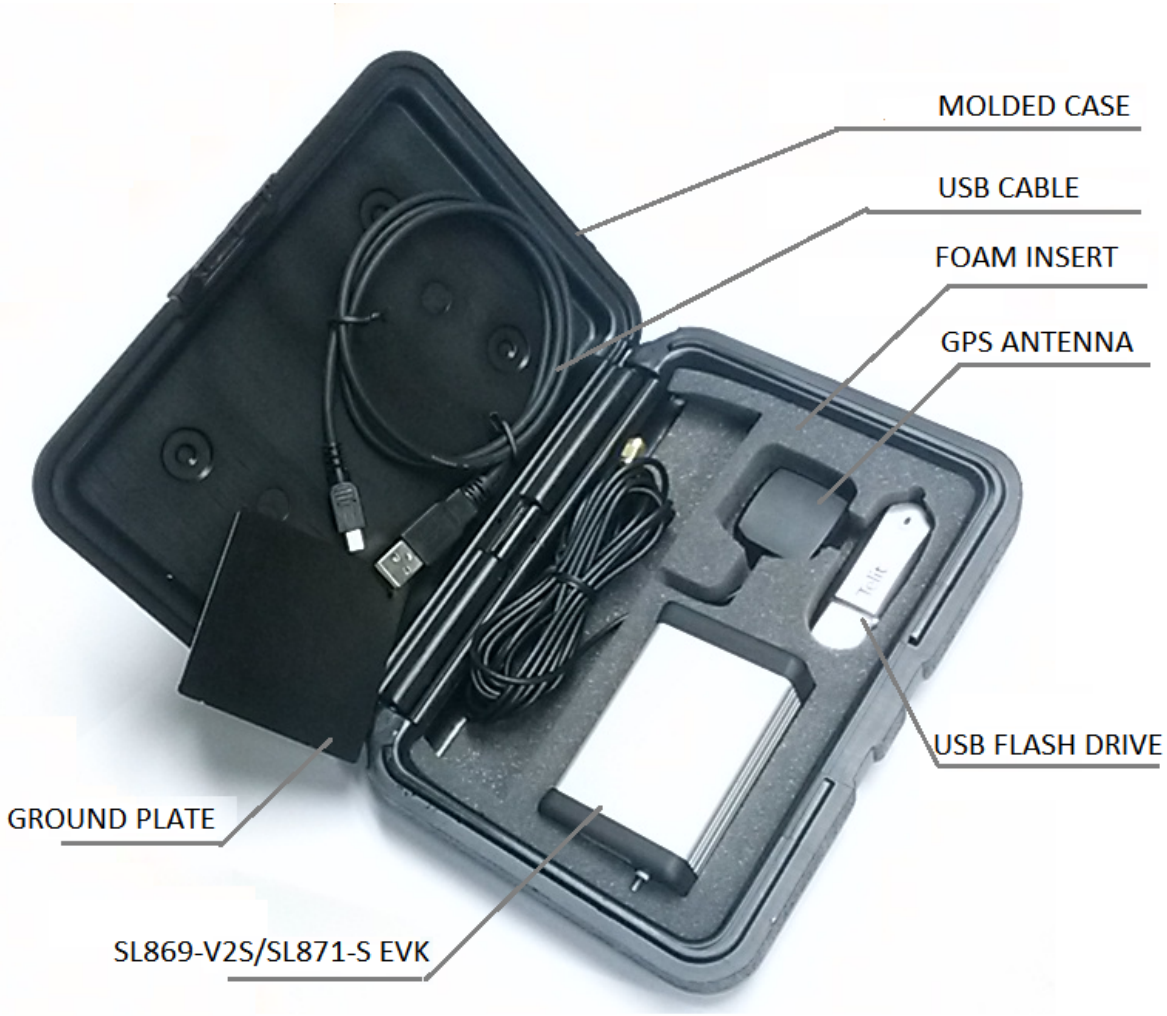

Figure 3-2 SL871-S or SL869-V2S Evaluation Kit Contents

3.2. Evaluation Kit Board Layout

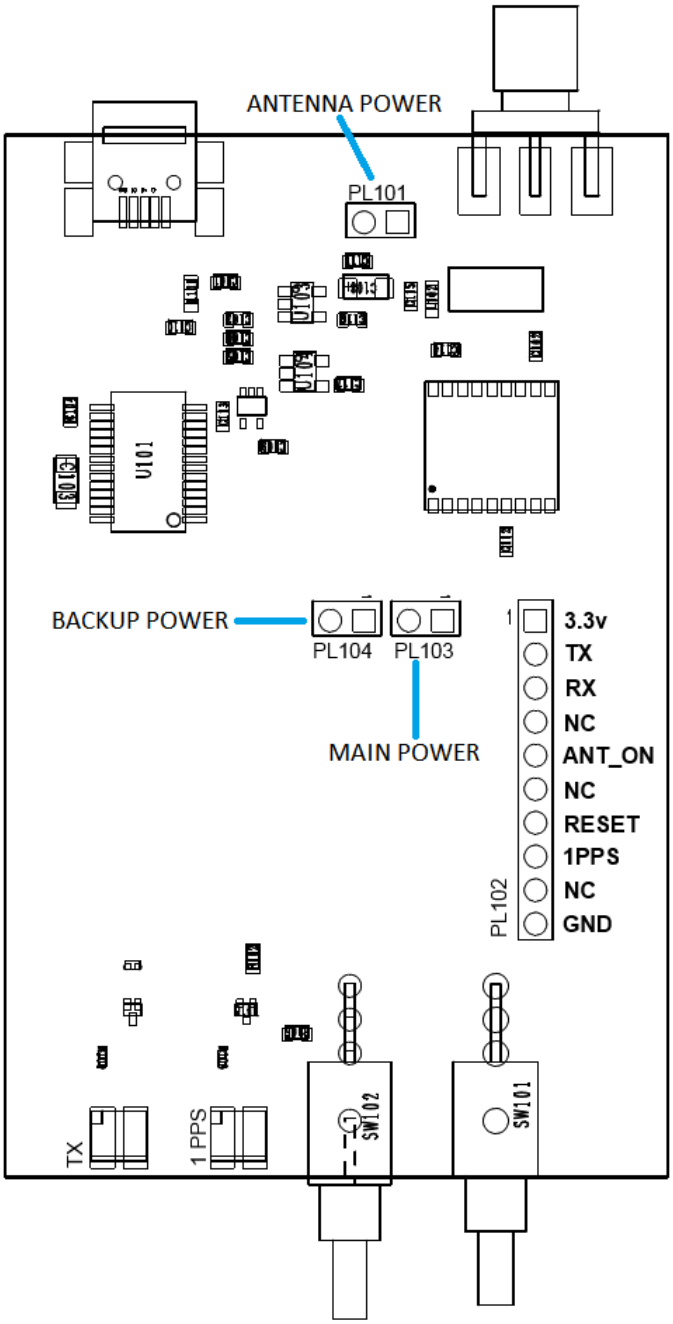

Figure 3-3 SL871 and SL871-S Evaluation Kit Board Layout

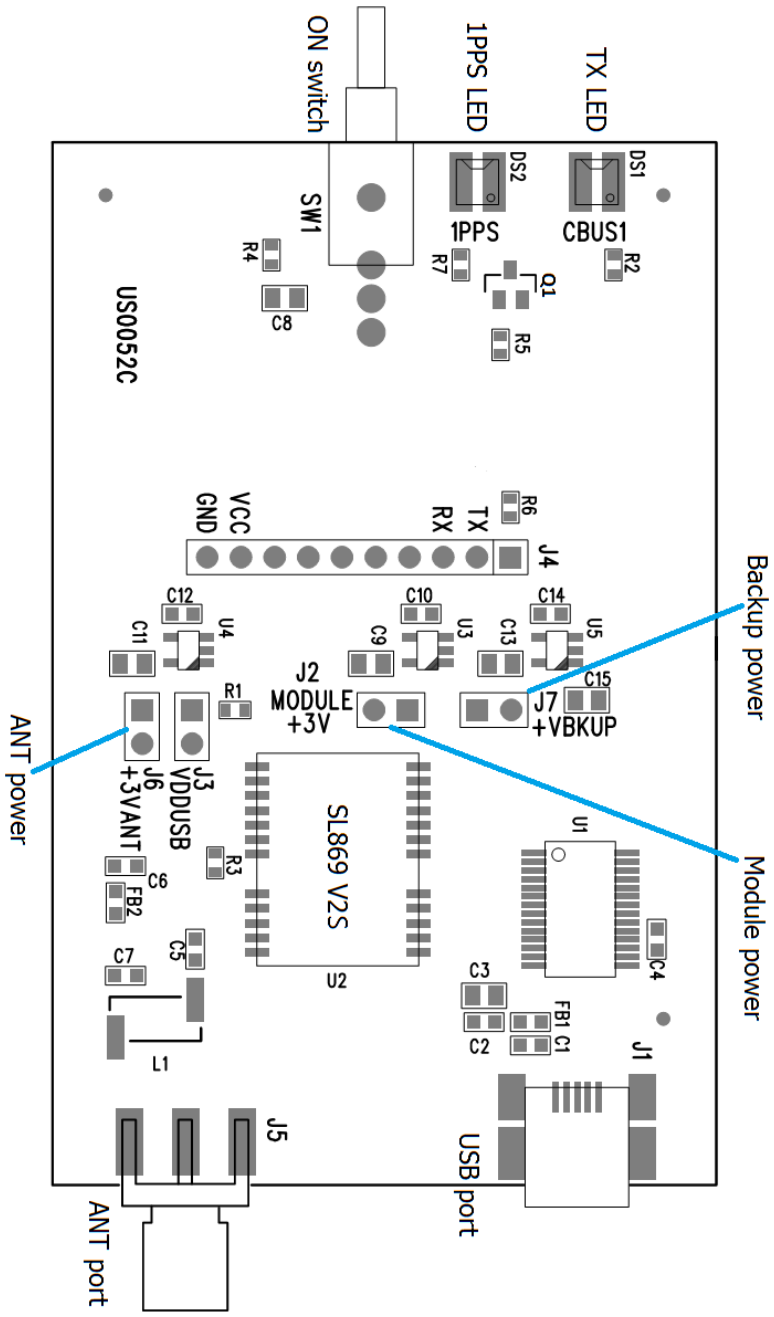

Figure 3-4 SL869 V2 and SL869-V2S Evaluation Kit Board Layout

3.3. Evaluation Kit Schematic Design

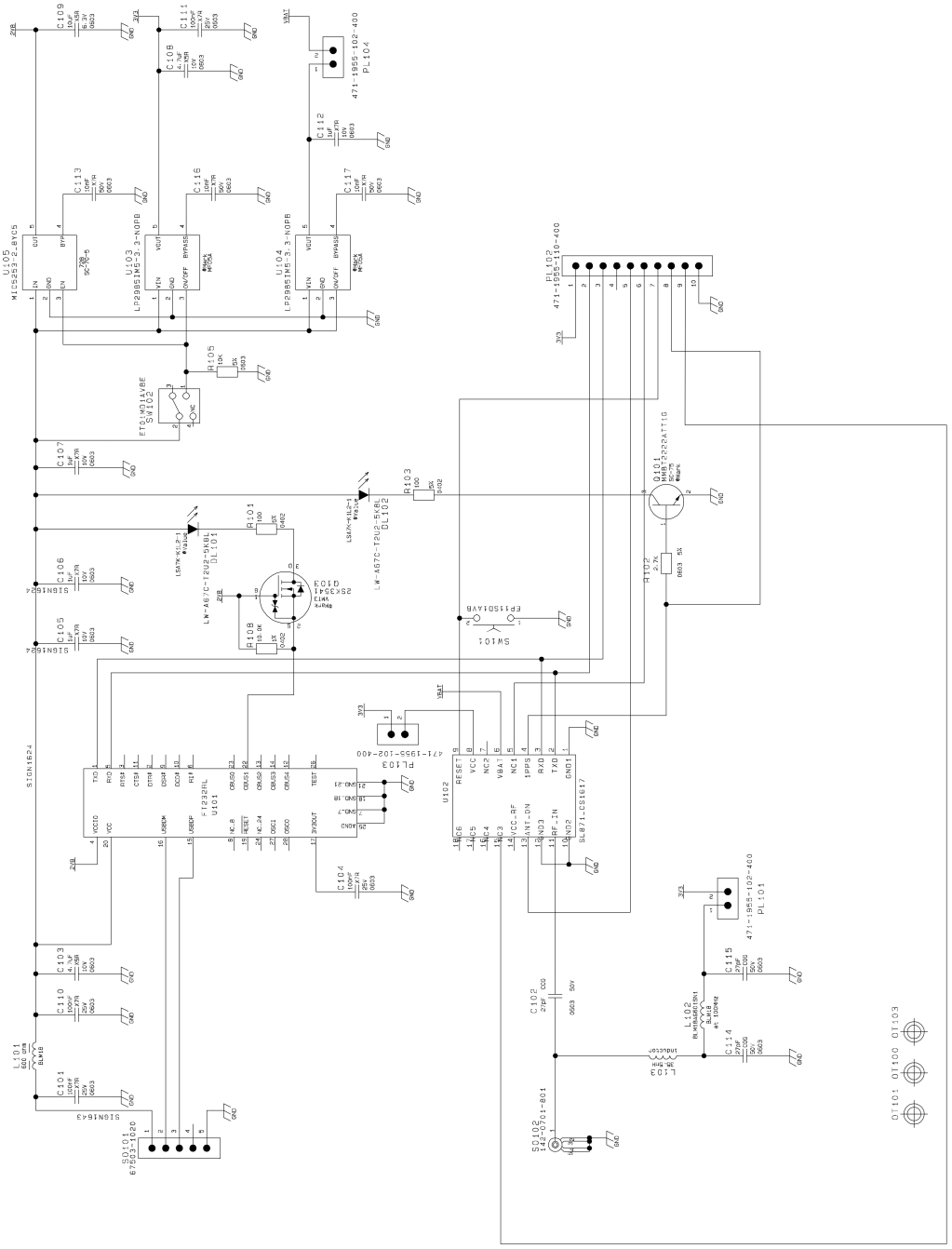

Figure 3-5 SL871 and SL871-S Evaluation Kit Schematic Diagram

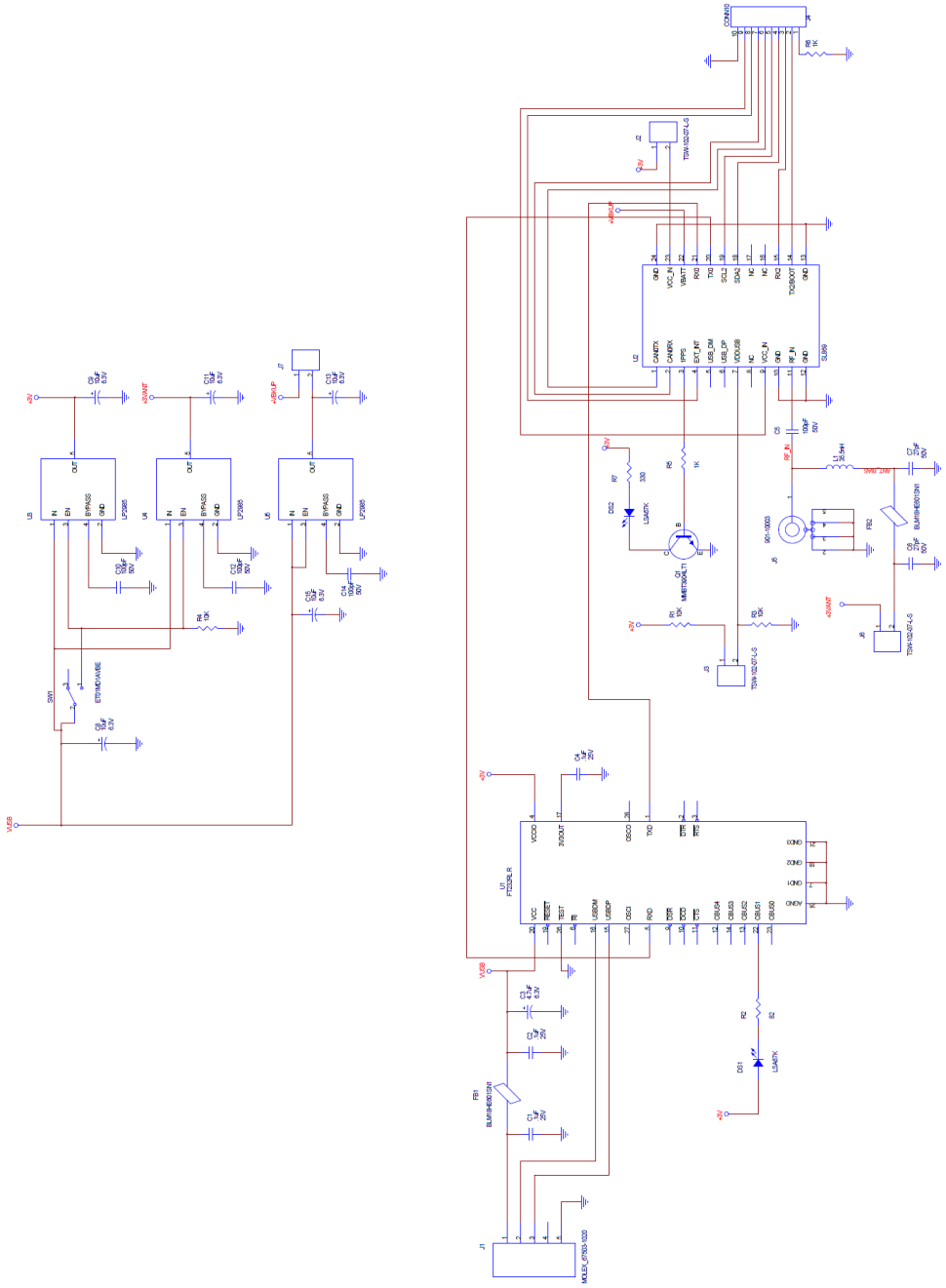

Figure 3-6 SL869 V2 and SL869-V2S Evaluation Kit Schematic Diagram

3.4. Evaluation Kit Component Identification

Item SL871 / SL869 V2	Description
TX DATA LED	Displays the status of the USB-to-UART bridge TX line. This LED blinks when data is transmitted by the module.
1PPS LED	Displays the 1PPS output of the module.
POWER Switch 102 / SW 1	Applies power to the EVK
RESET Switch 101	Turn on the receiver module. Not applicable for the SL869 V2.
Backup Power PL104 / J7	Install a jumper to apply 3.3V to Battery Backup pin.
Module Power PL103 / J2	Install a jumper to apply 3.3V power to the Main pin. This jumper must be installed for normal operation.
Antenna Power PL101 / J6	Install a jumper to apply 3.3V power to an external active antenna.

Table 3-1 EVK Component Identification

4. Evaluation Kit Setup

4.1. Installing the USB Drivers

1. Before connecting the evaluation kit, ensure that the FTDI USB drivers are installed.

   If needed, install the drivers from the USB flash drive by double-clicking the USB driver executable and following the onscreen directions.

2. Verify that the proper jumpers have been installed.
3. Connect the provided Active Antenna to the SMA connector.
4. Connect the evaluation kit to the PC. It will automatically be detected and the USB driver will be installed. If the system does not automatically find the driver, the user may provide the path to the USB drive.
5. Select "Continue Anyway" to proceed

Figure 4-1 USB Installation message

6. After the device driver has been installed, the user should check the “Device Manager” in Windows for the evaluation board COM port number to be present. This port number is required by TelitView or other software to communicate with the EVK.
7. Turn power on to EVK. (SW1-SL869-V2 S or SW102 SL871-S).
8. Refer to Chapter 5 for using the EVK with TelitView software.

NOTE:

After installation of the USB FTDI driver, Windows may install a "Microsoft Serial BallPoint mouse" if the EVK is powered on when connecting the USB cable.

If this happens, it will show up on the "Device Manager" under "Mice and other pointing devices". If this is displayed, power the EVK off, disconnect it from the USB port, and uninstall the "Microsoft Serial Ball Point mouse". Then, reconnect the EVK while powered off, and verify that it is now displayed as a USB serial com port under "Ports (COM & LPT)".

5. Using TelitView

Please refer to the TelitView User Guide for detailed information.

5.1. TelitView Setup

1. Install the TelitView program by double-clicking on the installation file supplied on the USB flash drive.
2. After TelitView has been installed, launch the program by double-clicking the desktop icon (if set up) or from the PC's "Start" menu, by clicking

   All Programs -> TelitView -> TelitView.
3. Once the program is launched, the main screen should appear as shown below:

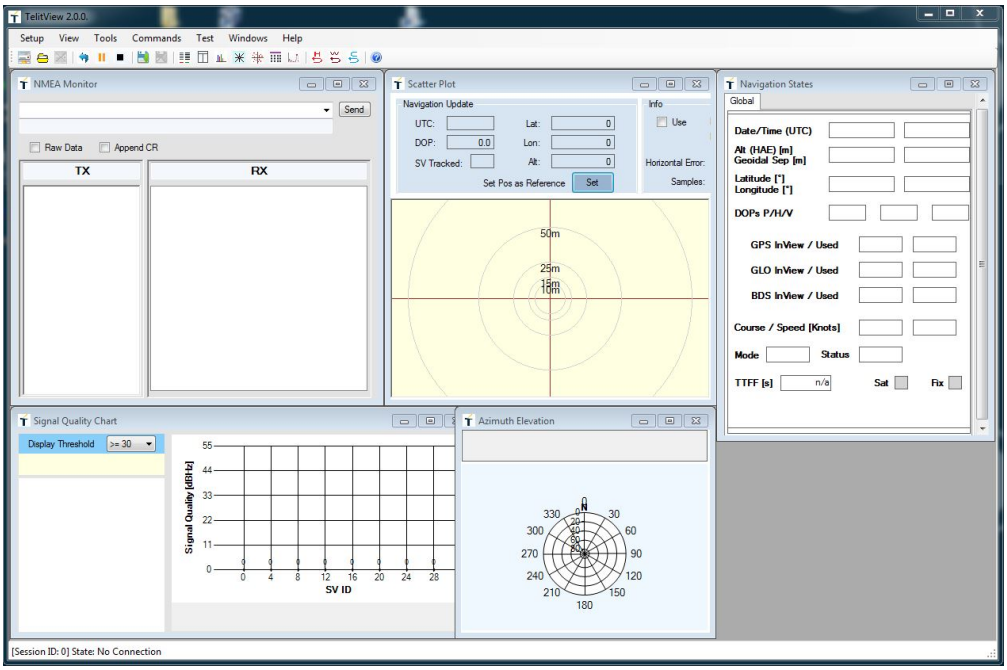

Figure 5-1 Initial TelitView Screen

5.2. Connecting to the EVK

5.2.1. Selecting the baud rate

1. Connect the EVK to a USB port while it is powered OFF.
2. On the Main Menu, click Setup.

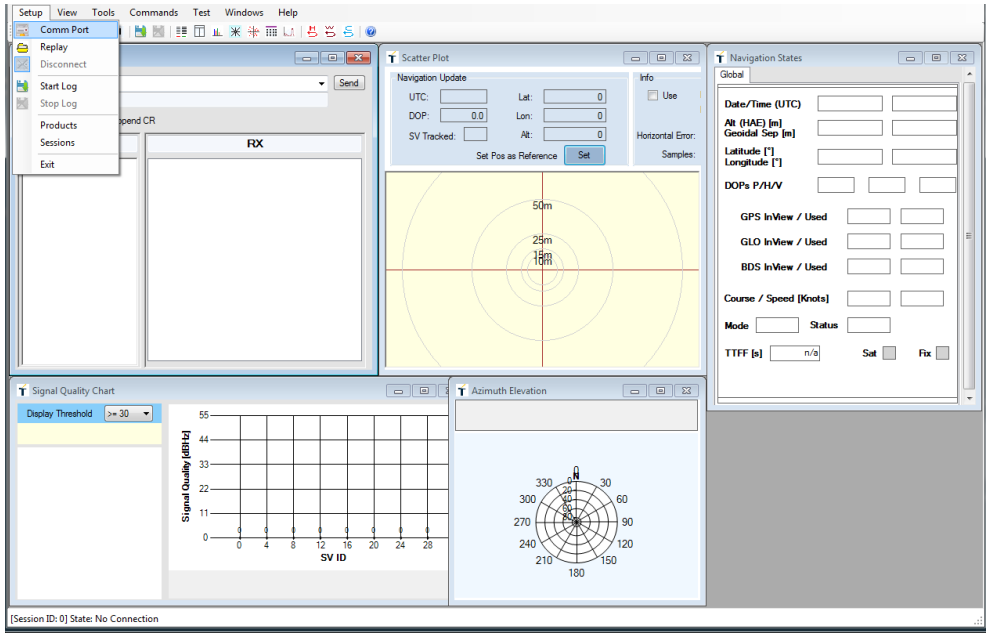

Figure 5-2 TelitView Main Menu - Setup

3. Click “Comm Port”, select the proper serial port, select the baud rate, then click OK.

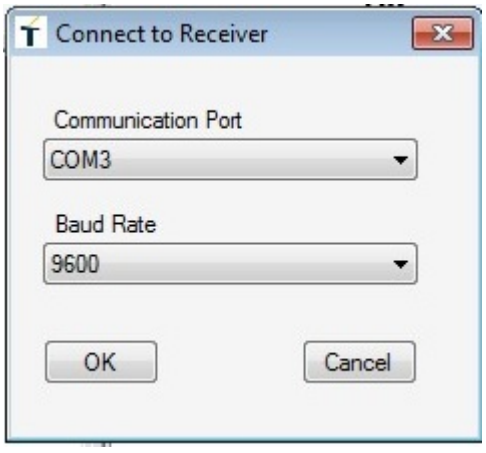

Figure 5-3 TelitView Com port selection

4. Power up the EVK and if connected properly, the NMEA Monitor window should display output messages every second as shown below (outlined in red).

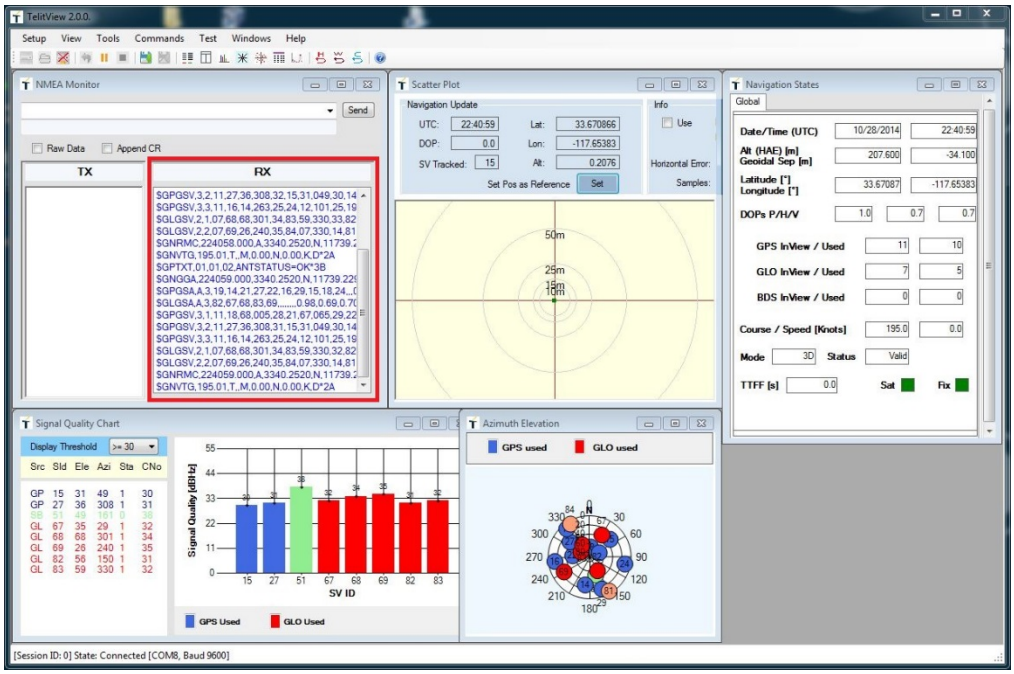

Figure 5-4 TelitView Main Session

5.3. TelitView Functions

NOTE: If "Session configuration" prompts to save Setup, click YES.
For detailed illustrated instructions on TelitView operation, click on the "Help" option in the main Tool Bar, and select User's Manual.

5.3.1. Setup Menu

The setup menu allows the user to specify setup parameters as follows:

- Comm Port – Allows the user to set up the appropriate Com port and baud rate.
- Replay – Allows the user to replay a previously recorded data file.
- Disconnect – Allows the user to disconnect the Com Port
- Start Log – Allows the user to start recording a log file
- Stop Log – Allows the user to stop recording a log file
- Products – Allows the user to select which Telit module is under test.
  Note: Be sure to select SL871/SL869 V2 when connecting to the SL871 or SL869 V2 module.

- Sessions – Allows the user to configure or save a session (specifying Comm port, Baud Rate, etc.)
- Exit – Allows the user to terminate the program.

5.3.2. View Menu

The main View Screens should be active as shown above in Figure 5-4. They are described as follows:

- Navigation States – Date, Time and Navigation data
- NMEA Monitor –Receiver NMEA input commands and output messages.
- Signal Quality –Tracked satellite's signal strengths
- Azimuth Elevation –Visible satellites' position (azimuth and elevation). The center of the plot represents the antenna position.
- Scatter Plot – Plot of the horizontal position and tracks. Also displays the position update and horizontal error.

Additional View Screens are accessible by clicking the "View" Tab:

- Data Overview – The navigation data in a tabular form.
- Data Charts – Time-sequenced navigation data. Parameters listed are Latitude, Longitude, Altitude, Speed, HDOP, SVs in View, and SVs in Use.
- DR States - DR Data (not applicable to the SL871 EVK).
- Custom Messages Window –Allows the user to select and display custom messages.

5.3.3. Tools Menu

- Allows the user to replay previously recorded data files (play, pause, and stop).
- Allows the user to manage the user-defined commands.

5.3.4. Commands Menu

The Commands menu provides the user with options to enter a choice of either Basic or user Defined Commands.

- Basic Commands: These are built-in Commands provided by TelitView, e.g. to select the satellite constellation of choice (GPS only, GPS + GLO, or GPS + BDS).
- User Commands: These Commands are created and maintained by the user (under the Tools menu). They can be customized for customer specific applications.

5.3.5. Test Menu

- Allows the user to enter a Reference Position for comparison to actual test results
- LoopIt test is an automatic repeated test (for TTFF).

5.3.6. Windows Menu

The Windows option is for screen management. Any changes by the user in the placement of the set of windows will be arranged as described in the drop-down menu. For the default configuration, restart TelitView.

5.3.7. Help Menu

- Displays the version of TelitView in use
- Displays the built-in User's Manual (which includes a list of the Tool Bar Icons and their functionalities).

6. Updating Firmware with TPFlash

6.1. Flashing Requirements

The Folder is on the USB Flash Drive included with the EVK

- TPFlash.exe software from TELIT
- Set of three files (in folders DA, SCAT, and ROM)
  Some of these folders may become visible when TPFlash is started.
- brom.dll

6.2. Flashing Instructions

1. Copy the “TPFlash for SL871” folder onto the host PC from the USB flash drive.
2. Connect the Evaluation Kit.
3. Turn on the power switch (SW102-SL871/S or SW1-SL869-V2 or V2S).
4. Launch TPFlash by double clicking the TPFlash.exe icon located in the above mentioned folder. A COM port will be selected. If the port is not the same as the one displayed in the Device Manager (for the correct USB Serial Port), please select the correct COM port.

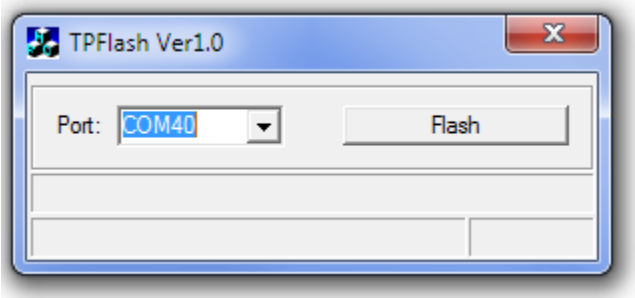

Figure 6-1 TPFlash Com Port

5. Click on the “Flash” button and the FW upgrade will start after about 5 seconds.
6. You may see a “S/N Read Error” message. If so, disregard it.

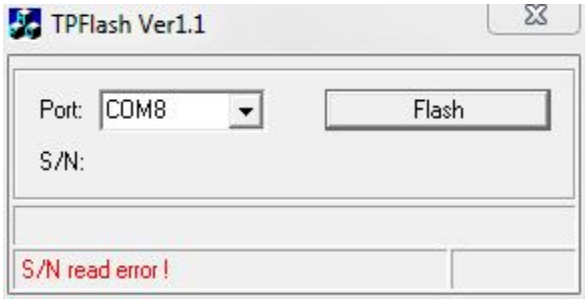

Figure 6-2 S/N read error message

7. When the first Open dialog window pops up, look at the “Files of type” box at the bottom of the window to determine what file type should be selected.

   The first one will be the “Download Agent File”.

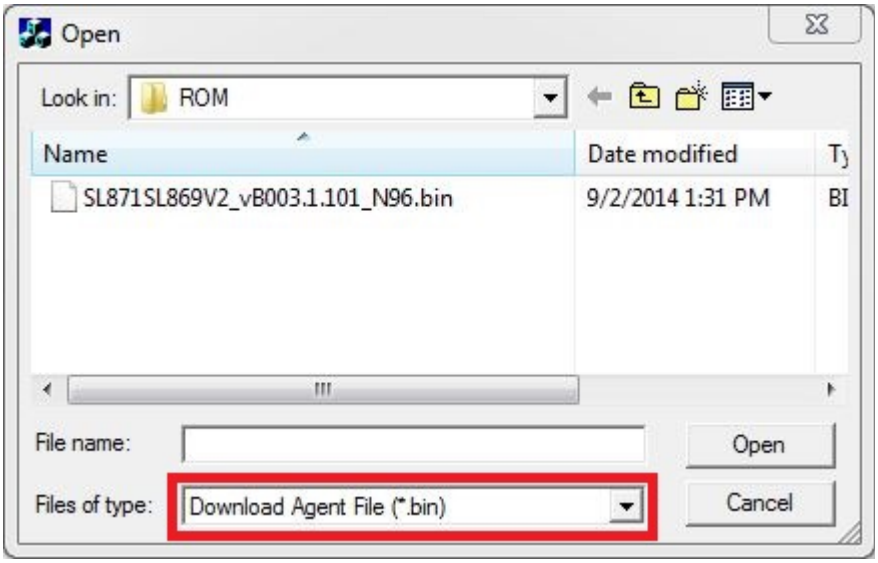

Figure 6-3 Download Agent request

8. At this point, you must change the “Look in” folder from “ROM” to “DA” so it matches the “File of type”. Do this by clicking on the down triangle at the right of the “Look In” box, and selecting the parent folder “TPFLASH for SL871”.

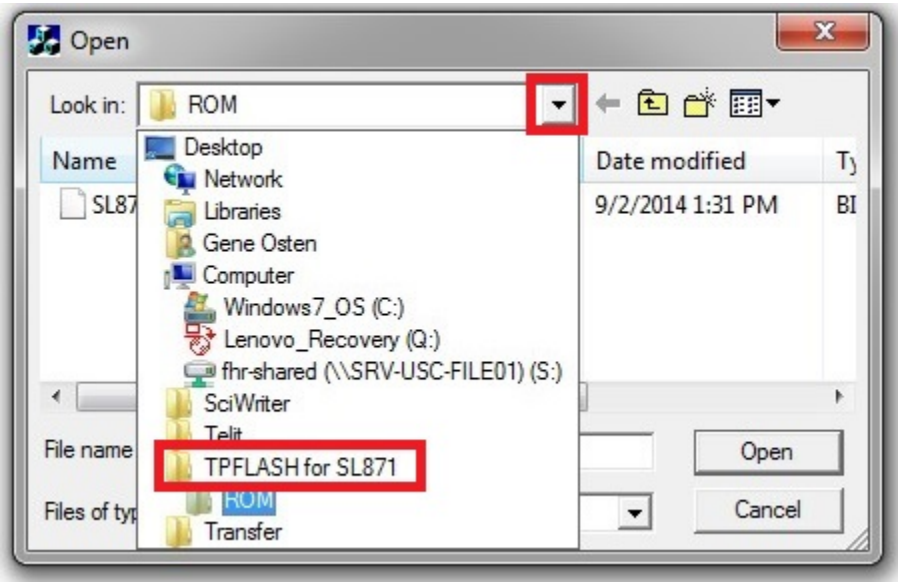

Figure 6-4 Parent directory TPFlash

9. Three folders will now appear (DA, ROM, and SCAT).

   Select the DA (Download Agent) folder by clicking on it, then click “Open”.

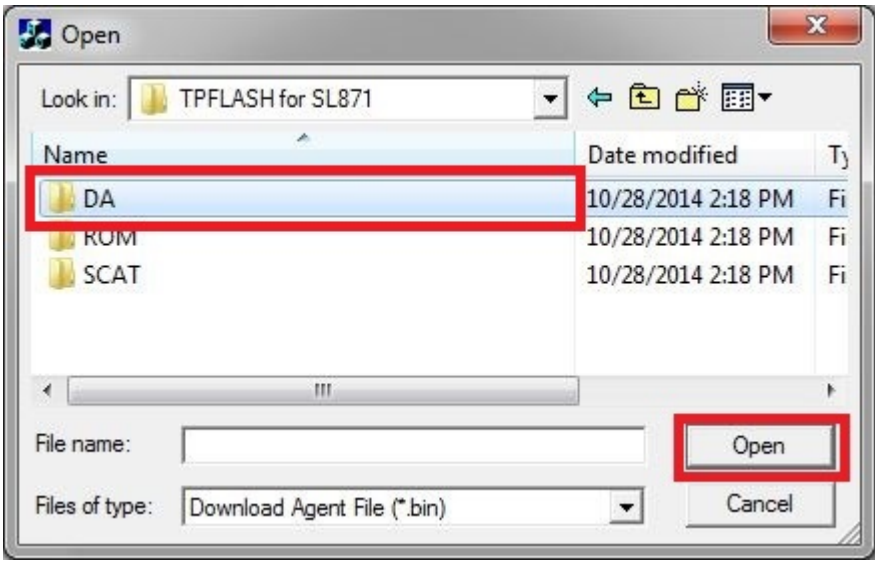

Figure 6-5 Download Agent folder

10. Verify that the displayed filename includes “DA”, then select the DA (Download Agent) file by clicking on it, then click “Open”.

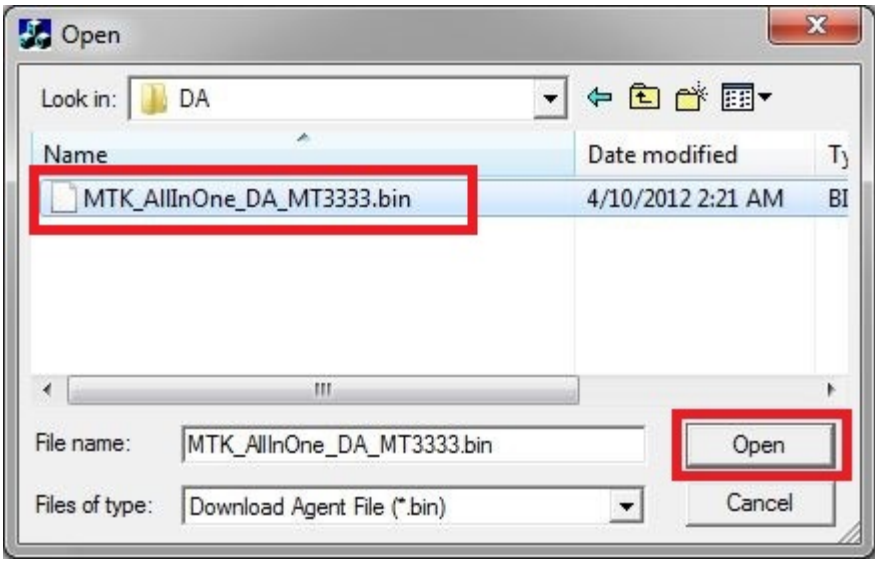

Figure 6-6 Download Agent File

11. The “Files of type” box will now display “SCAT File”.

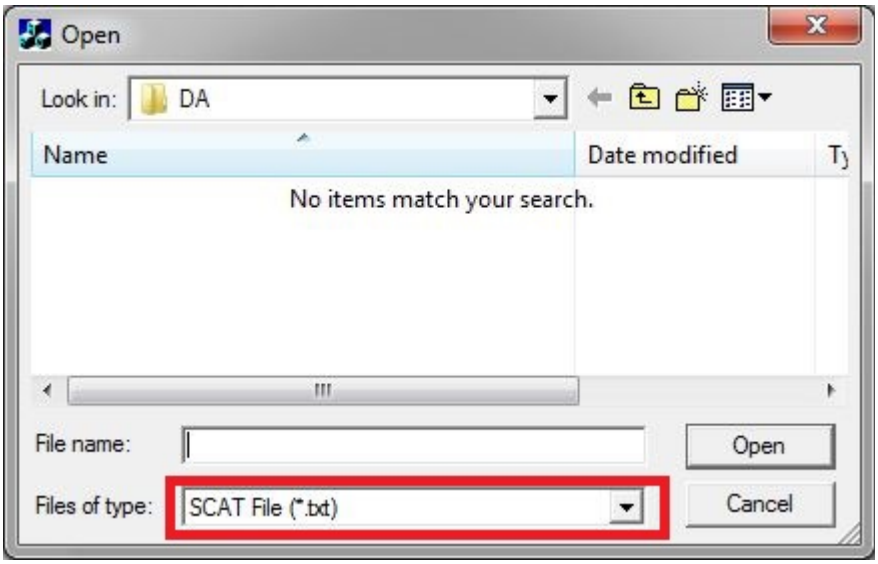

Figure 6-7 Scatter file

12. Again, click the downward triangle at the right of the “Look in”, then select the parent “TPFlash for the SL871” folder by clicking on it.

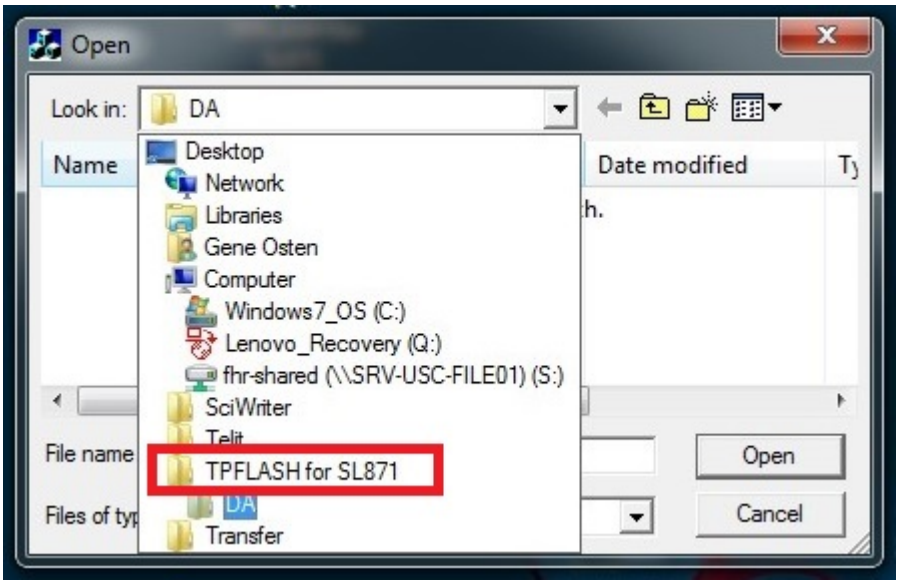

Figure 6-8 Parent directory TPFlash

13. The three folders will be again displayed.

    Click on “SCAT” (to match the “Files of type”), then click on “Open”.

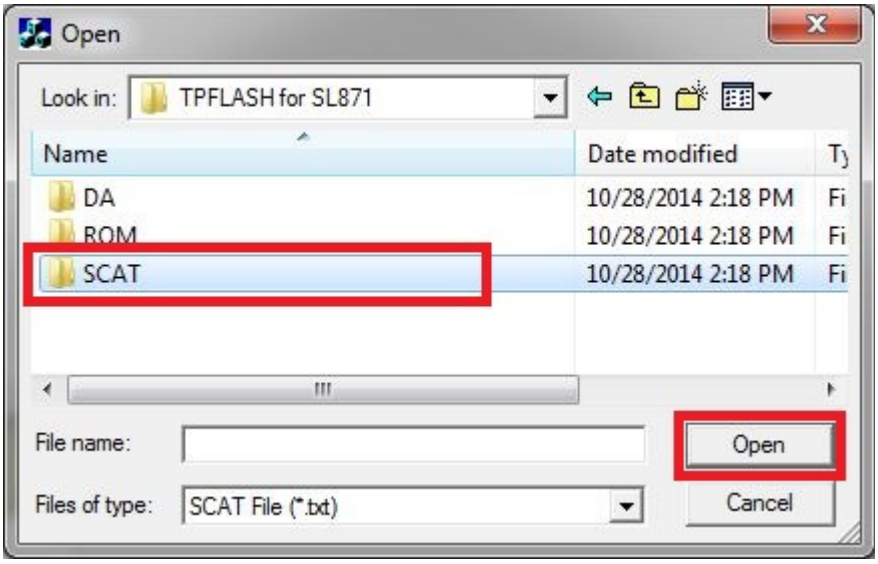

Figure 6-9 Scatter folder

14. The SCAT file will be displayed. Click on it, then click on “Open”.

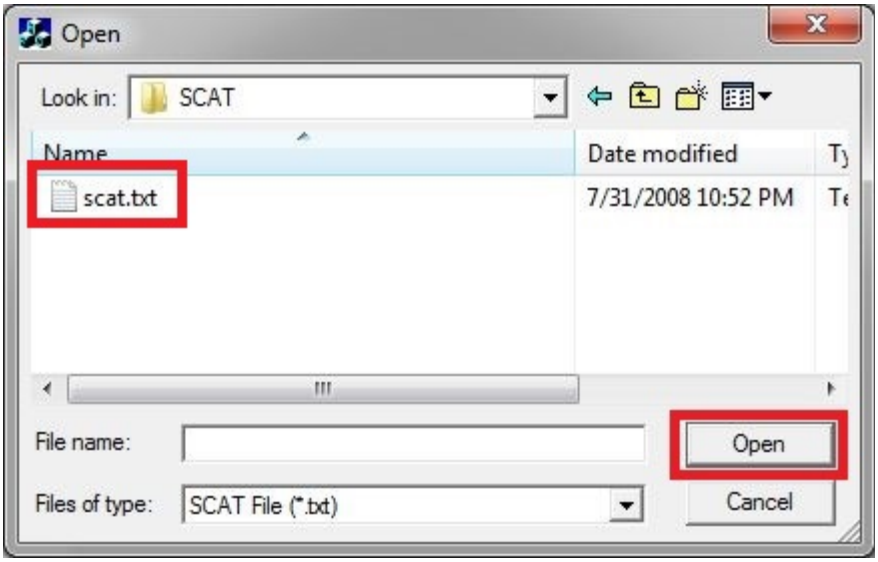

Figure 6-10 Scatter file

15. Finally, the ROM file will be requested.

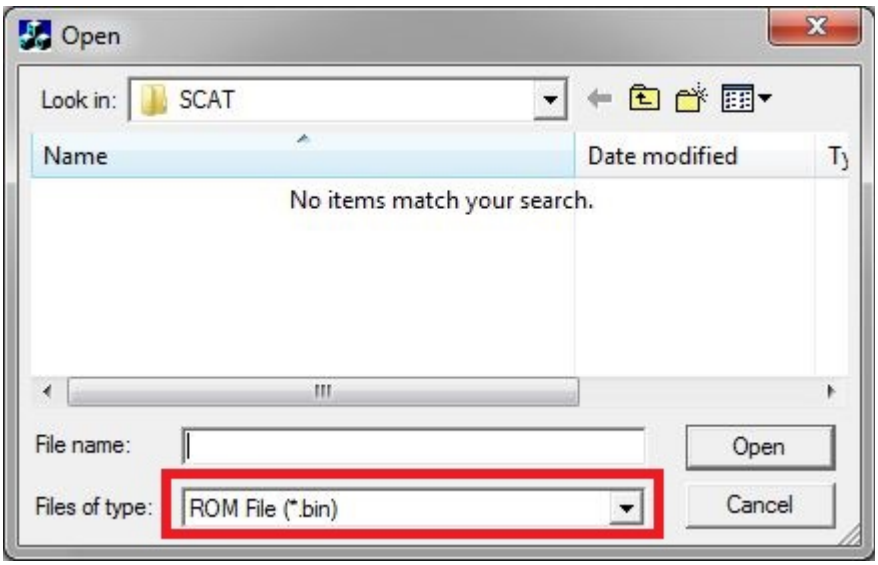

Figure 6-11 ROM file

16. Again, click on the downward triangle at the right of the “Look in” box and click on the parent “TPflash for SL871” folder.

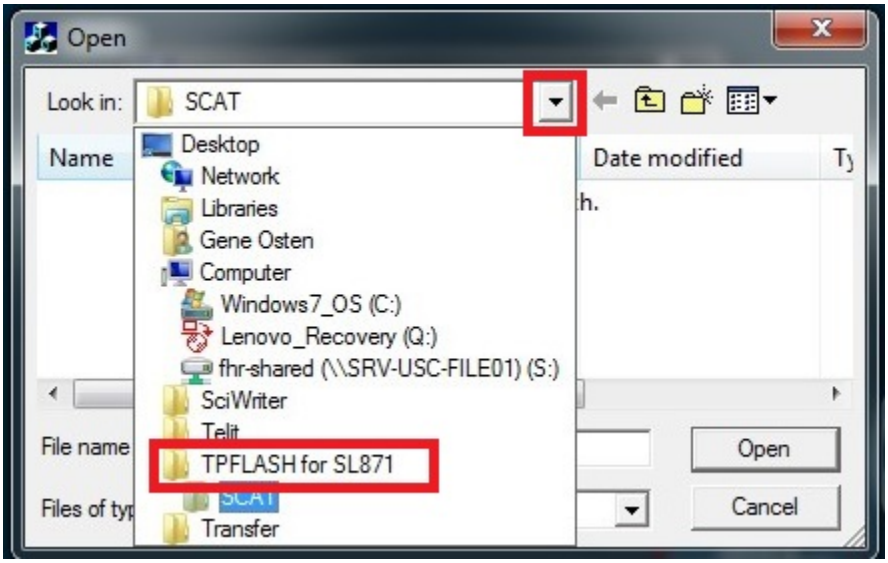

Figure 6-12 Parent directory TPFlash

17. The three folders will be displayed. Click on the “ROM” folder, and click on “Open”.

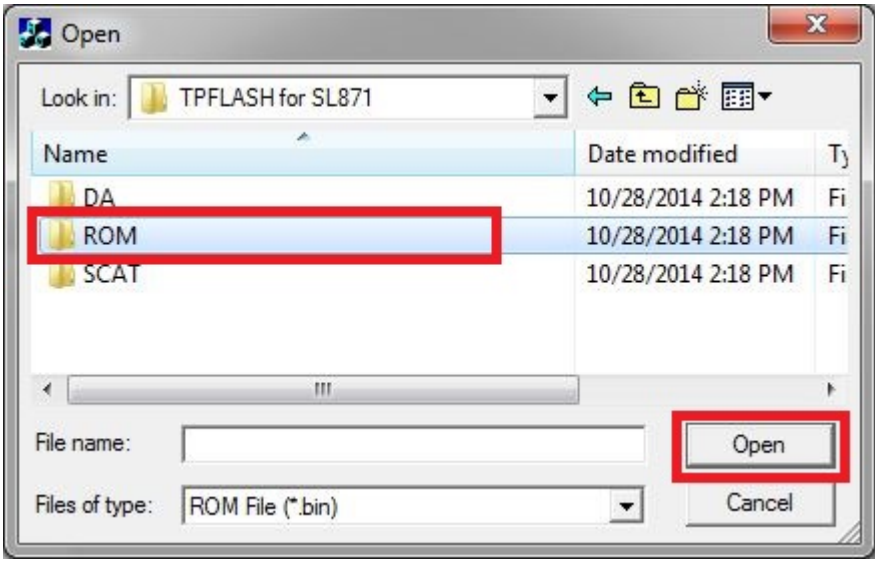

Figure 6-13 ROM folder

18. The ROM file will be displayed. Click on it, then click on “Open”.

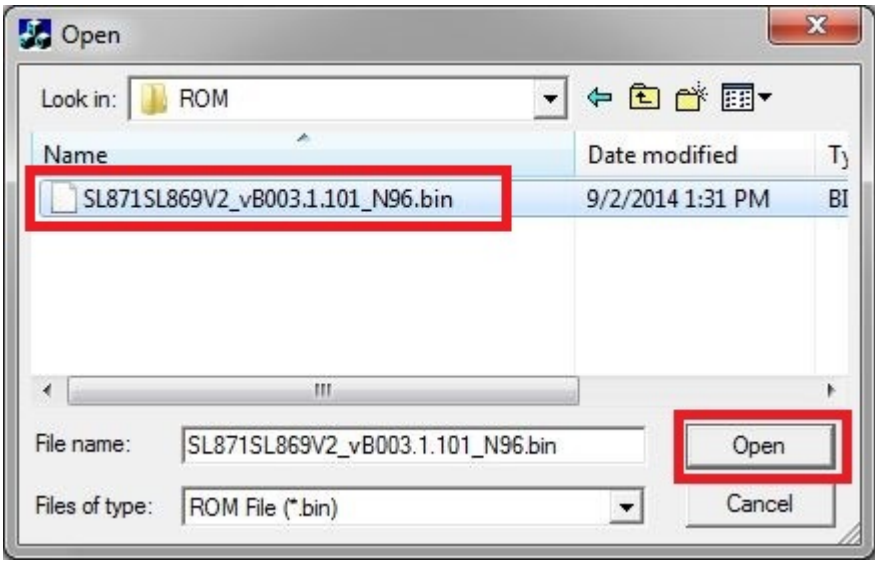

Figure 6-14 ROM file

19. If you see a “Download Fail” message, it is most likely that you do not have the correct COM port specified. Check the Device Manager – Ports (COM & LPT) for the correct USB Serial Port.
20. The Download Agent will now transfer (about 20 seconds).
21. The ROM file will now transfer (about 1.5 minutes).
22. You may see a “S/N Write Error” message. Disregard it and click “OK”..

Figure 6-15 S/N write error

23. The final message will be displayed. Click the red “X” to close the window.

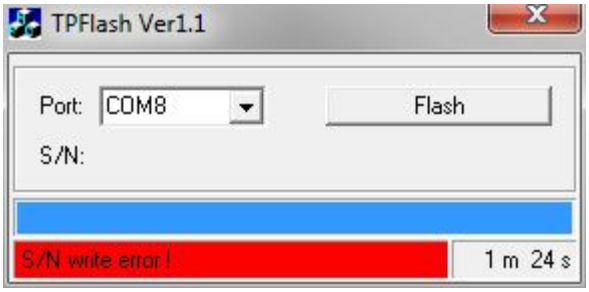

Figure 6-16 TPFlash Download completed

24. Connect an antenna to the EVK and verify its operation.

7. NMEA-0183 Messages and Commands

7.1. COM Port (serial)

The user interface with the EVK is serial data connected through a serial-to-USB converter. The default port settings are:

- 9600 Baud
- 8 Data Bit
- No Parity Bit
- 1 Stop Bit

Data can be sent and received through the use of a PC terminal emulator program or an application program like TelitView.

7.2. NMEA Output Messages

NMEA-0183 v4.10 is the default protocol.

In the current Firmware release, some sentences may exceed the NMEA length limitation of 80 characters.

By default, GPS and QZSS constellations are enabled.
For the SL869 V2, GLONASS is also enabled by default.

The default fix rate is 1 Hz.

These messages are output once per second by default.
Multiple GSA and GSV messages may be output on each cycle.

- **Standard Messages**

Message ID	Description
RMC	GNSS Recommended minimum navigation data
GGA	GNSS position fix data
VTG	Course Over Ground & Ground Speed
GSA	GNSS Dilution of Precision (DOP) and active satellites
GSV	GNSS satellites in view.
$PMTK010	System messages (e.g. to report startup, etc.)

Table 7-1 Default NMEA output messages

The following messages can be enabled by command:

Message ID	Description
GLL	Geographic Position – Latitude & Longitude
ZDA	Time & Date

Table 7-2 Available Messages

Talker ID	Constellation
BD	BeiDou
GA	Galileo
GL	GLONASS
GP	GPS

Table 7-3 NMEA Talker IDs

- **Proprietary Messages**

The SL869 V2 and V2 S support several proprietary NMEA periodic output messages which report additional receiver data and status information.

7.3. NMEA Input Commands

The SL869 V2 and SL871 use NMEA proprietary messages for commands and command responses. This interface provides configuration and control over selected firmware features and operational properties of the module.

The format of a command is:

```
$<command-ID>[,<parameters>]*<cr><lf>
```

Commands are NMEA proprietary format and begin with “$PMTK”.
Parameters, if present, are comma-delimited as specified in the NMEA protocol.

Unless otherwise noted in the Software User Guide, commands are echoed back to the user after the command is executed.

NOTE: Multi-constellation commands are not supported by the SL869 V2 S module.

7.4. Commands Description

Command ID	Description
$PMTK000	Test. This command will be echoed back to the sender (for testing the communications link).
$PMTK101	Perform a HOT start
$PMTK102	Perform a WARM start
$PMTK103	Perform a COLD start
$PMTK104	Perform a system reset (erasing any stored almanac data) and then a COLD start
$PMTK120	Erase aiding data stored in flash memory
$PMTK127	Erase EPO data stored in flash memory
$PMTK161,0	Standby - Stop mode
$PMTK161,1	Standby - Sleep mode
$PMTK251,Baudrate	Set NMEA Baudrate
$PMTK313,0	Disable SBAS feature
$PMTK313,1	Enable SBAS feature
$PMTK353,1,0,0,0,0	Enable GPS only mode
$PMTK353,0,1,0,0,0	Enable GLO only mode
$PMTK353,0,0,0,0,1	Enable BDS only mode
$PMTK353,1,1,0,0,0	Enable GPS and GLO mode
$PMTK353,1,0,0,0,1	Enable GPS and BDS mode

Table 7-4 NMEA input commands

8. Document History

Revision	Date	Changes
0	2014-11-10	First issue
1	2015-06-29	Updated figure 3-5 with a better quality schematic