



GPS Evaluation Kit EVA1084-A

A Description of the Evaluation Board
for Maestro's GPS Receiver Modules A1084-A/-B

User's Manual

Version 1.1



Revision History

Rev.	Date	Description
0.1	12-15-08	Initial Draft
0.2	01-19-09	Second Draft
1.0	01-26-09	First release
1.1	02-09-11	New style; moved to Maestro
	mm-dd-yy	

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1 Introduction

1.1 Purpose

The GPS Evaluation Kit EVA1084 allows an easy evaluation of Maestro's GPS receiver module A1084-A/-B by offering quick access to the ports of the module.

The EVA1084-A serves three major purposes:

- As a demonstration package of the module's capabilities
Powering the A1084-A GPS receiver module via the USB connector and connecting the GPS antenna with sufficient view to the sky will result in an NMEA output with position information.
- As an example how to integrate the module into a system
The schematic in chapter "10 Board Schematics" is a basic example of how to integrate the GPS module into an application or system.
- To support an easy temporary design in
The signals provided on the Evaluation Kit allow direct integration into a surrounding system making it an ideal development tool.

The EVA1084-A can especially demonstrate that an active GPS antenna connected to the Auxiliary Antenna Input and a passive GPS antenna connected to the Primary Antenna Input will result in outstanding GPS performance. The user can switch between the two antenna connectors with the ANT_SW signal provided by the DIP switch.

A Supercap is used to continue RTC operation and to back-up SRAM during power off periods. The firmware provided on the A1084-A delivered with the EVA1084-A is identical to the standard firmware delivered on single A1084 GPS receiver modules.

1.2 Contents

The EVA1084 includes the following components:

- Demonstration board (labeled EVA1084-A) with one A1084-A GPS receiver
- Active GPS antenna
- Passive GPS antenna
- USB cable to connect to your PC
- CD with complete documentation and Maestro's GPS Cockpit software

Please check your package for completeness and connect the components properly.

1.3 Difference: A1084-A and A1084-B

Please note that there is no separate evaluation board for the A1084-B. The A1084-B is a subset of the A1084-A. It holds only one (primary) antenna input which allows the

connection of a passive or active antenna. Consequently, no antenna switch is implemented on the A1084-B. Otherwise both module variants are identical.

The following chapters of the manual will refer to the A1084-A!

2 Handling Precautions

The EVA1084-A contains components that are sensitive to electrostatic discharge (ESD). Please handle with appropriate care.

3 Quick Start (using USB connection)

- (1) Connect the EVA1084 with your PC using the included USB cable.
- (2) When the PC asks for drivers select the folder “[Tools\Drivers](#)” on the included CD ROM. Note that two drivers need to be installed, the [EVA1084 FTDI driver](#) and the [USB serial driver](#).

Note: During the driver installation process your Windows system will probably notify you, that the driver did not pass Windows logo testing with a warning:

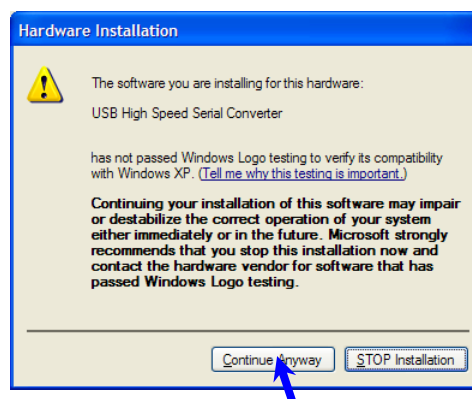


Figure 1: Windows driver installation warning

Note: After successful driver installation Windows might interpret the data coming over the serial interface as a serial ballpoint mouse! Your mouse pointer can start jumping around. To stop this, disable the according device using your device manager. Leave the EVA1084-A kit connected and press and keep pressing the reset button. You will find the device under “Mice and other pointing devices”. Use a right click to open the sub-menu and disable the device.

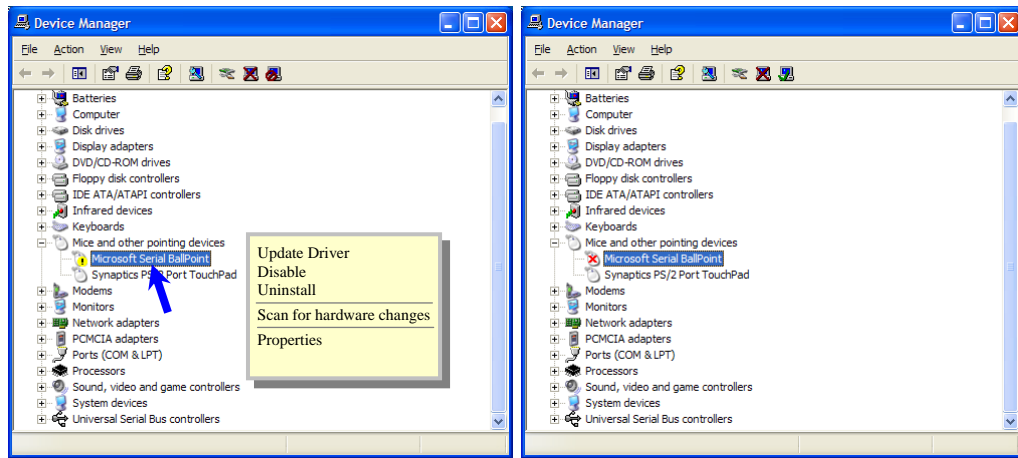


Figure 2: Disabling of Microsoft Serial BallPoint

- (3) Connect the included active GPS antenna to the Auxiliary Antenna Input of the EVA1084-A and make sure that the antenna has a good view to the sky! Make sure this input is activated by setting the ANT_SW DIP to the “ON” position.
- (4) To start the GPS Cockpit software which visualizes the NMEA output data coming from the GPS receiver, copy all files from the included CD ROM “Tools/GPS Cockpit” to a folder of your choice on your PC. Then double click the GPSC.exe file. The GPS cockpit software starts without additional software installation.
- (5) Now you need to activate the correct port within GPS Cockpit. You can do this by selecting “COM port connection”. A detailed description of the GPS Cockpit software is included on the CD ROM. In any case, the following window will appear:

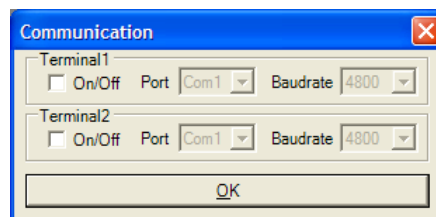


Figure 3: GPS Cockpit communication window - blank

Activate “Terminal 1”, choose the COM port to which the GPS receiver is connected (verify in your system settings - device manager, which communication port is used for this USB serial connection), in our example COM2 at 4800 baud (default setting for the EVA1084-A), and click on “OK”:

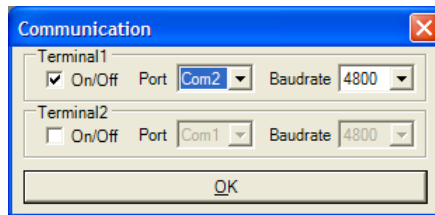


Figure 4: GPS Cockpit communication window – COM2

The connection is established now.

- (6) Open a terminal window to see NMEA sentences by using the “NMEA Terminal” window button. You should then see messages like this:

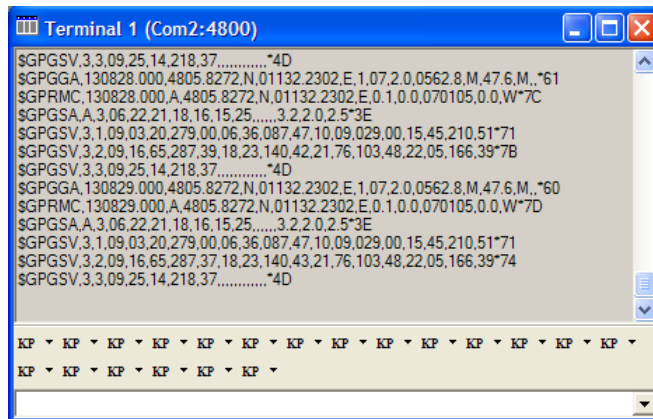


Figure 5: GPS Cockpit NMEA terminal with NMEA data

Now you can start using all the other windows and features of GPS Cockpit. Please refer also to the GPS Cockpit manual and the online help within GPS Cockpit.

4 On-Board Peripherals

4.1 RESET and ON_OFF Push-Button

The EVA1084-A holds two push-buttons:

- nRST (RESET)
- ON_OFF

The nRST button is used to get a full reset of the GPS module. All parameters are stored in non-volatile memory. After pushing this button the module starts again from the beginning.

The ON_OFF button puts the A1084-A GPS receiver into Hibernate state if it is on and wake up if it is in sleep state. During sleep state the receiver draws 20 μ A typically and maintains RTC and SRAM.

Hibernate mode is supported by Firmware version 3.2.5 and later.

4.2 Primary and Auxiliary Antenna Connector

The A1084 -A supports two antenna inputs:

- The antenna connector “Primary Antenna” leads to pin 12 of the A1084-A GPS receiver which supports passive (and active) GPS antennas.
- The antenna connector “Auxiliary Antenna” leads to pin 9 of the A1084-A GPS receiver which supports active GPS antennas.

It can be switched between the two antenna connectors by using the ANT_SW pin of the A1084-A connected to the DIP switch on board the EVA1084 evaluation kit.

Setting the DIP switch to “ON” means the Auxiliary Antenna input is activated.
Setting the DIP switch to “OFF” means the Primary Antenna input is activated.

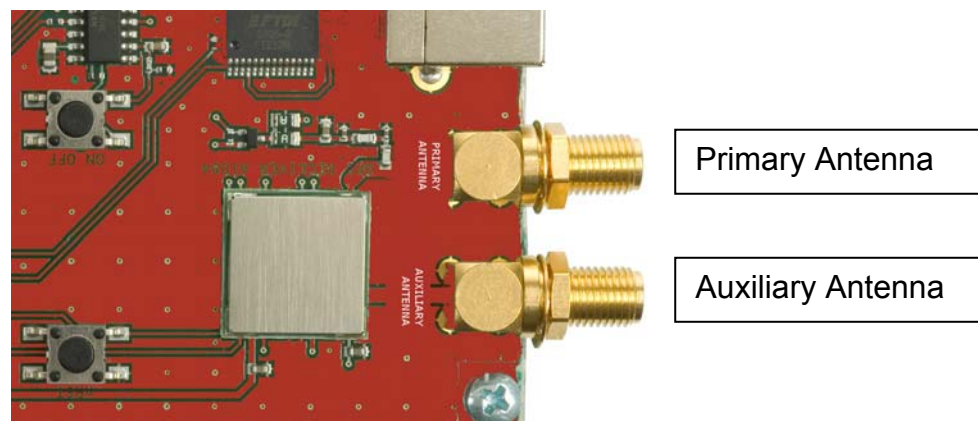


Figure 6: Primary and Auxiliary Antenna Connector

Further information is given in

- Chapter “6.2 DIP Switch Settings” and
- Maestro’s GPS Receiver A1084 Product Manual

4.2.1 Passive Antenna

A passive antenna must be connected to the Primary Antenna connector (passive antenna input). It should be placed as close as possible to the EVA1084-A board (short cable length). The signal power lost by the antenna cable can not be recovered by the LNA (Low Noise Amplifier) integrated on the A1084-A GPS receiver.

4.2.2 Active Antenna

4.2.2.1 On Auxiliary Antenna Connector (Active Antenna Input)

General GPS active antenna specification:

Limitations:

- Supply voltage (voltage fed into VANT pin) 5 V max.
- Supply current 50 mA max.

Recommendations:

- Gain ≥ 20 dB (should not exceed 26 dB + cable loss)
- Noise figure ≤ 1.5 dB

The recommendations apply to the majority of active antennas that can be found in the market. Anyhow, the quality of the GPS antenna chosen is of paramount importance to the overall sensitivity of the GPS system.

4.2.2.2 On Primary Antenna Connector (Passive Antenna Input)

An active antenna connected to the Primary Antenna connector must not exceed a gain of 10 dB + antenna cable loss according to SiRF recommendation. Exceeding this gain recommendation should be tested case by case.

The schematics in chapter “10 Board Schematics” show how an antenna supply voltage can be fed to an active antenna connected to the ANT_INT pin of the A1084-A GPS receiver and how the antenna supply voltage can be switched on and off by the RFPWUP signal.

4.2.3 Hints

Unused antenna inputs should be terminated with $50 \Omega \pm 20\%$. Do not feed antenna supply voltage into terminated antenna inputs.

5 LED's

There are 6 LED's on the EVA1084-A that indicate different signals from the GPS receiver (order of LED's on EVA1084-A from left to right):

LED	Name	Function	Description
LD2	RX1	Receive	Serial data traffic (into GPS receiver)
LD1	TX1	Transmit	Serial data traffic (from GPS receiver)
LD4	ON_OFF	Hibernate	Toggle hibernate mode / position request during PTF cycle (the LED visualizes the ON_OFF pulse)
LD5	1PPS	Timing	1PPS signal at rising edge (1 pulse per second, duration 500 ms typ.) Note: The original pulse width provided by the GPS receiver is 1 μ s typically. (see also AppNote 1PPS Pulse Width)
LD3	RFPWUP	RF/analog status	Status of analog section (LED on = ON, LED off = OFF) / controls power supply to the analog section of the A1084 GPS receiver.
LD6	Power / VCC	POWER	Power on LED

Table 1: LED's function and description

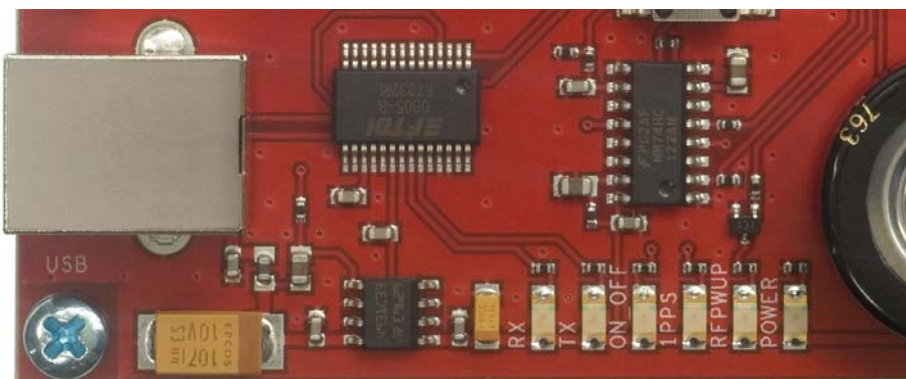


Figure 7: EVA1084-A LED's

6 Design-in Support

The EVA1084-A demo board offers the possibility to implement the A1084-A GPS receiver module temporarily into your design by using the terminal block with 9 connections. To operate the EVA1084-A via this terminal block, please check “Table 3: Switch settings”.

Please note:

- VCC power input is **not** protected against reversed polarity
- External supply has to be within the range of 3.3 to 3.6 VDC
- RTC backup: Supercap soldered to the board can be used (*1)

6.1 Terminal Block

The terminal block offers direct access to the A1084-A GPS receiver pins.

Pin	1	2	3	4	5	6	7	8	9
Port	nRST (reset)	RFPWUP (Status of analog section)	ON_OFF (hibernate mode / PTF mode)	RX0	TX0	1PPS (Pulse Per Second)	VBAK (backup supply)	VCC	GND

Table 2: Terminal block description

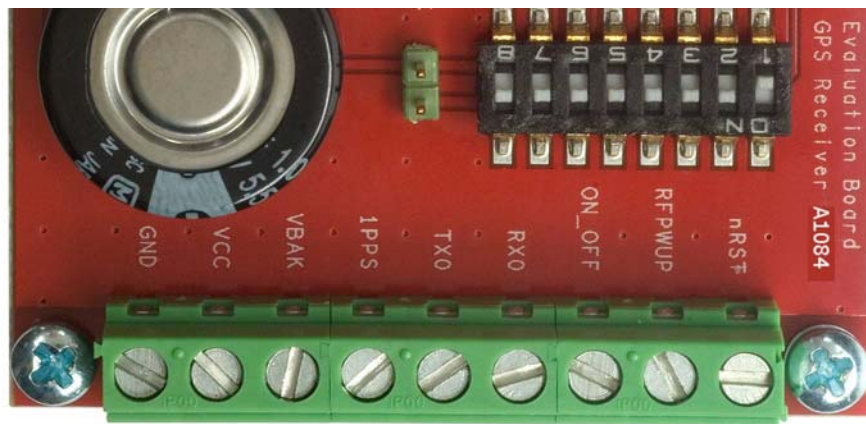


Figure 8: Terminal block (picture turned by 90°)

6.2 DIP Switch Settings

The following picture shows the DIP switches of the EVA1084-A.

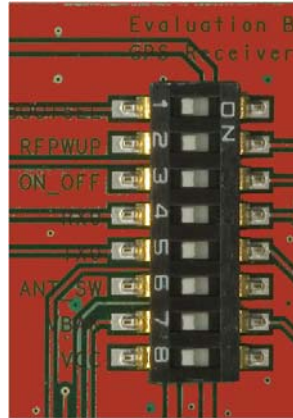


Figure 9: DIP switches

Switch	Function	Operation via USB connector (default settings)	Operation via terminal block
S1	BOOTSEL	OFF	OFF (*2)
S2	RFPWUP	ON	OFF
S3	ON_OFF	ON	OFF
S4	RX0	ON	OFF
S5	TX0	ON	OFF
S6	ANT_SW	ON = high (A1084-A pin 9, active antenna / auxiliary antenna) OFF = low (A1084-A pin 12, passive antenna / primary antenna)	not applicable
S7	VBAK	ON	OFF (*1)
S8	VCC	ON	OFF

Table 3: Switch settings

*1: S7 has to be OFF to use an external VBAK supply.
S7 has to be ON to use the onboard Supercap.

*2: The BOOT switch can be set to flash Firmware to the A1084-A GPS receiver. Switch the BOOTSEL switch to “ON”, press and release the nRST button. The A1084-A is now waiting to receive new firmware data via UART.

After upgrading the firmware switch the BOOTSEL switch to “OFF” and press and release the nRST button for restarting normal GPS receiver operation.

Related software tool and documentation: SIRF_Flash

6.3 ICC Jumper

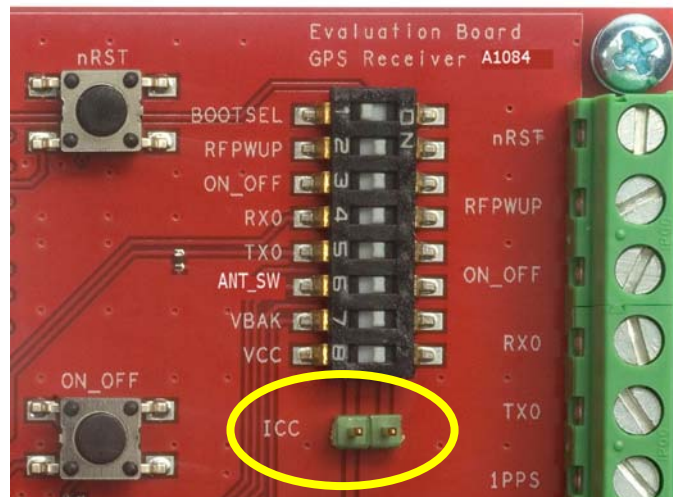


Figure 10: ICC jumper

As long as the VCC DIP switch is “ON” the ICC jumper is bridged. By switching off the VCC switch the current draw of the A1084-A GPS receiver can be measured directly by connecting a low resistance measurement device to the ICC jumper.

The low resistance measurement device should be connected before VCC is switched off!

7 NMEA Port

- Default setting: 4800 baud, 8 data bits, no parity, 1 stop bit, no flow control!
- Standard NMEA-0183 output on NMEA, baud rate selectable.
- Standard USB connectors

8 EVA1084-A Firmware and NMEA Sentences

See separate document **GPS Firmware** for a detailed description of the standard firmware loaded onto the modules delivered with the EVA1084.

9 Board Overview

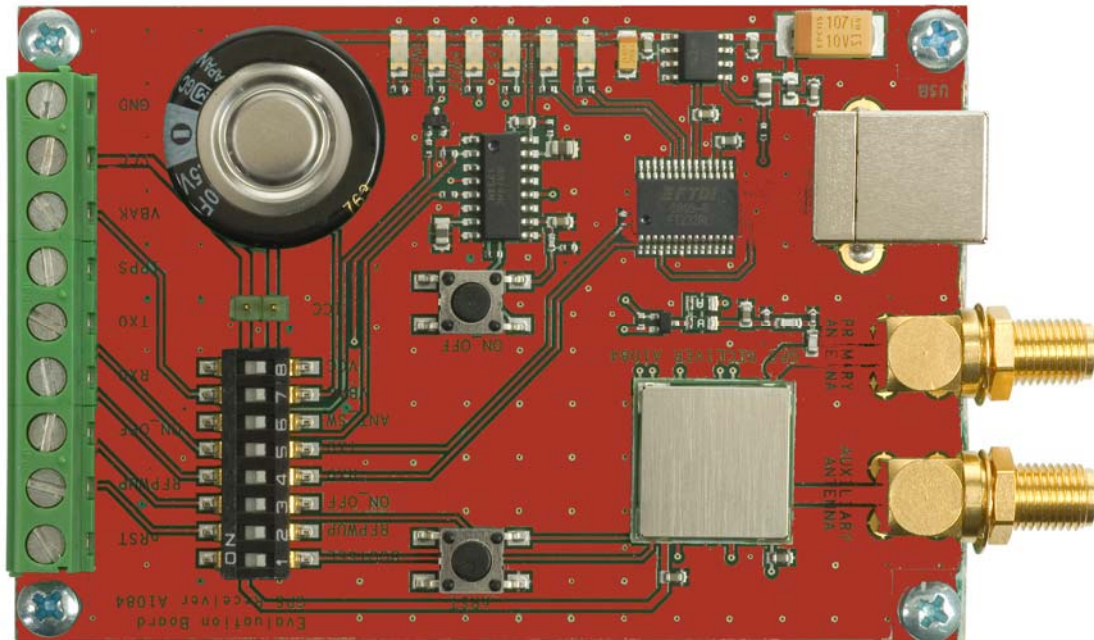


Figure 11: Board overview

10 Board Schematics

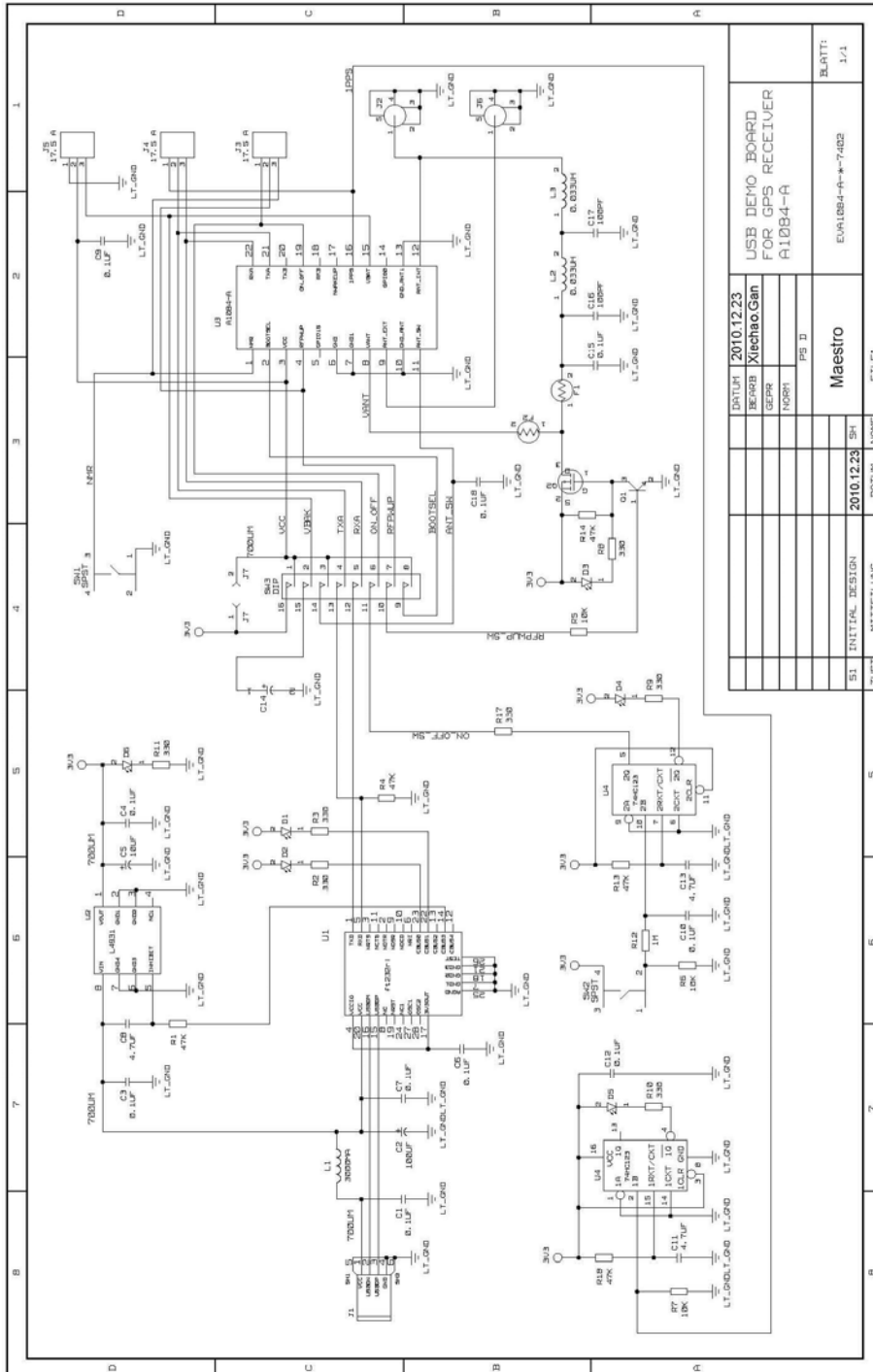


Figure 12: EVA1084-A board schematics

11 Related Information

11.1 Contact

This manual was created with due diligence. We hope that it will be helpful to the user to get the most out of the GPS module.

Inputs regarding errors or mistaken verbalizations and comments or proposals to Maestro, Hongkong, for further improvements are highly appreciated.

Maestro Wireless Solutions Limited

Add:Unit 3603-09,36/F.,
118 Connaught Road West, HK

Main Line: (852) 28690688

Fax: (852)25254701

support-gps@maestro-wireless.com

www.maestro-wireless.com

11.2 Related Documents

- GPS Receiver A1084 (Maestro)
- GPS Firmware A1080 (Maestro)
- GPS AppNote EDLC-Backup A1080 (Maestro)
- GPS AppNote Backup A1080 (Maestro)
- GPS AppNote GeoHelix Antenna A1080 (Maestro)
- GPS AppNote Firmware A1080 (Maestro)
- GPS AppNote nRST A1080 (Maestro)
- GPS AppNote 1PPS Pulse Width (Maestro)
- GPS AppNote ResetControl A1080 (Maestro)

11.3 Related Tools

- GPS Cockpit (Maestro)
- SiRF Demo
- SiRF Flash

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