

# ORG1410 Evaluation Kit

## Datasheet



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## 1. Introduction

### 1.1 About the ORG1410

OriginGPS GPS modules with built-in antenna have been designed to address markets where stand-alone operation, high level of integration, power consumption and flexibility are very important.

The ORG1410 module is a miniature multi-channel receiver that continuously tracks all GPS satellites in view and provides accurate positioning data in industry's standard NMEA format.

The ORG1410 module is further miniaturization of the OriginGPS popular ORG14XX series.

Featuring OriginGPS Noise-Free Zone System™ technology the ORG1410 module offers the ultimate of satellite navigation in smallest size.

The ORG1410 module is a complete SiP (System-in-Package) featuring advanced miniature packaging technology and an ultra-small footprint designed to commit unique integration features for high volume cost sensitive applications.

The ORG1410 module integrates OriginGPS proprietary patch antenna element, LNA, SAW filter, TCXO, RTC crystal, RF shield and Power Management Unit with SiRFStarIV™ GPS processor, thereby optimized for how people really use their location-aware products: often indoors with periods of unobstructed sky view when moving from place to place.

This new architecture can detect changes in context, temperature, and satellite signals to achieve a state of near continuous availability by maintaining and opportunistically updating its internal fine time, frequency, and ephemeris data while consuming mere microwatts of battery power.

Internal ARM microprocessor and sophisticated firmware keeps positioning payload off the host allowing integration in embedded solutions even with low computing resources.

### 1.2 About OriginGPS

OriginGPS is a world leading designer, manufacturer and supplier of miniature positioning modules, antenna modules and antenna solutions.

OriginGPS modules introduce unparalleled sensitivity and noise immunity by incorporating Noise Free Zone system proprietary technology for faster position fix and navigation stability even under challenging satellite signal conditions.

Founded in 2006, OriginGPS is specializing in development of unique technologies that miniaturize RF modules, thereby addressing the market need for smaller wireless solutions.

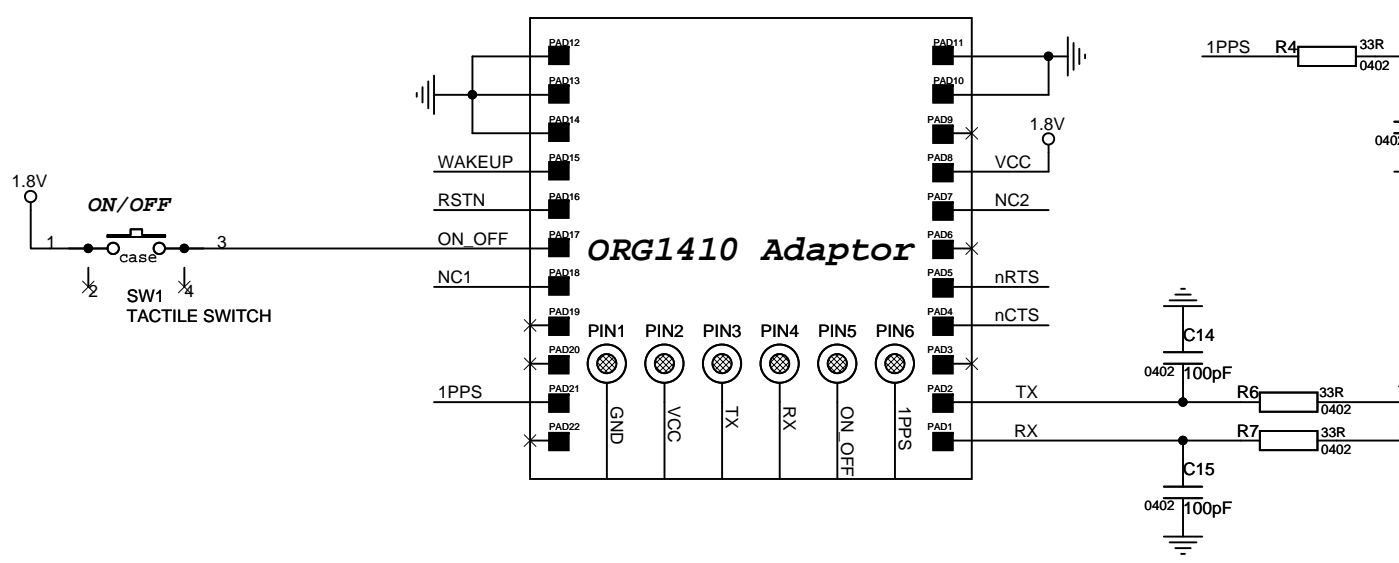
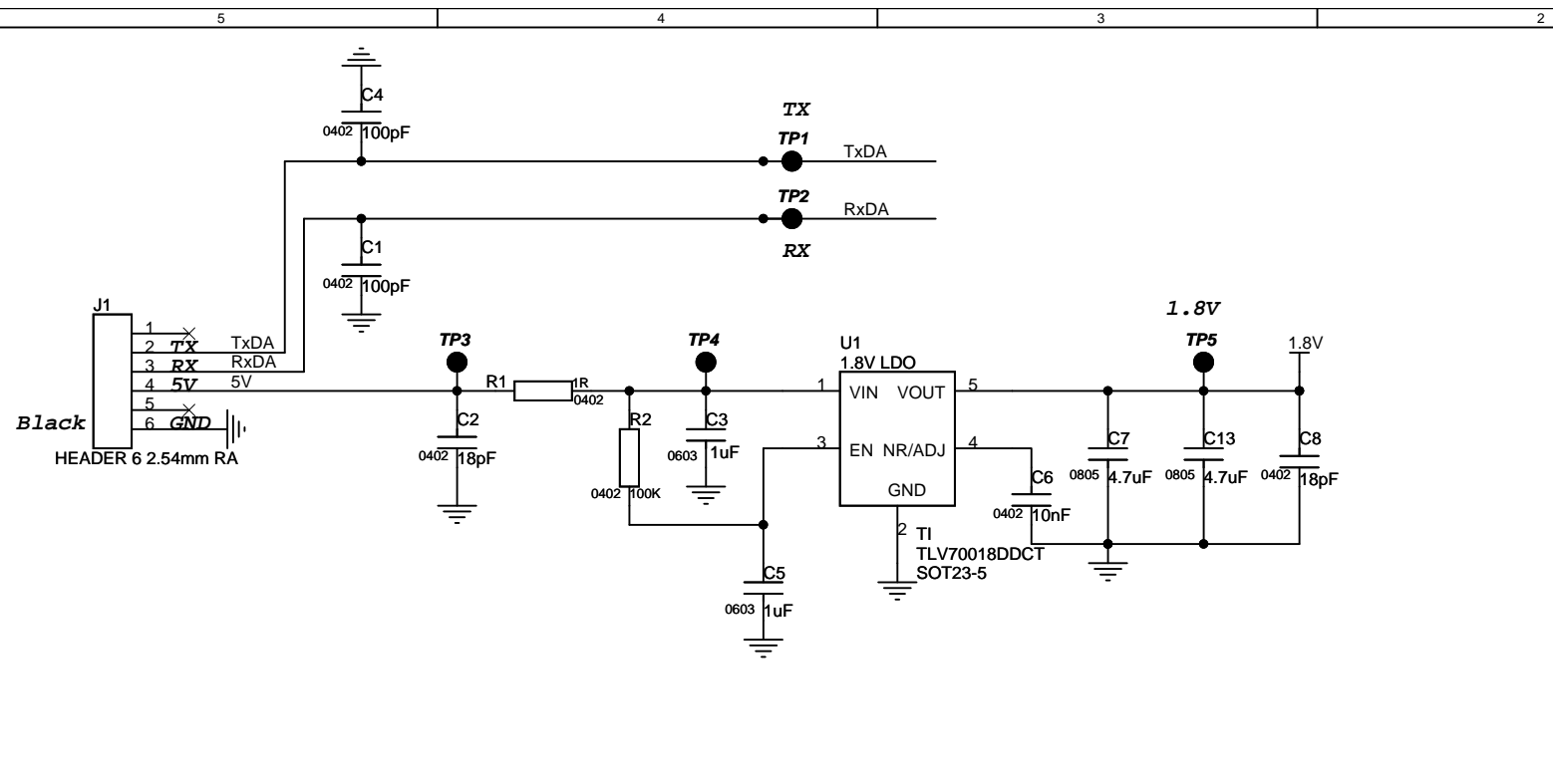
## 2. Description

Evaluation Kit of the ORG1410 GPS Antenna Module comprises the Demo Board, USB to UART cable and CD with GPS simulator software for PC and documentation.

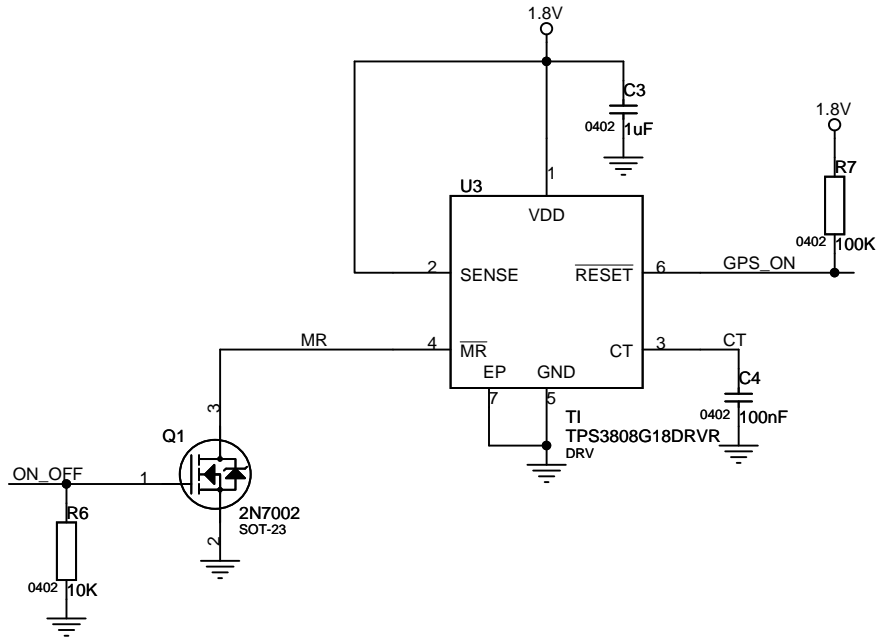
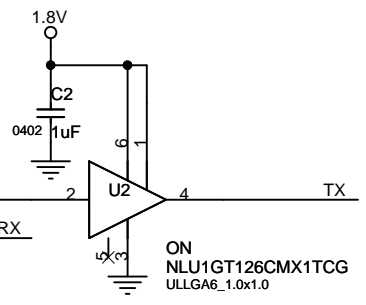
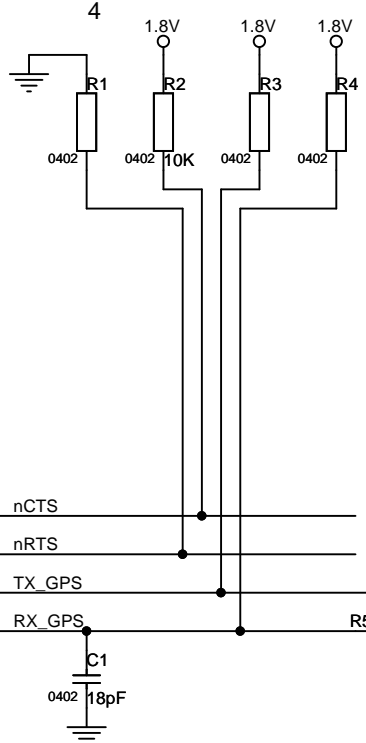
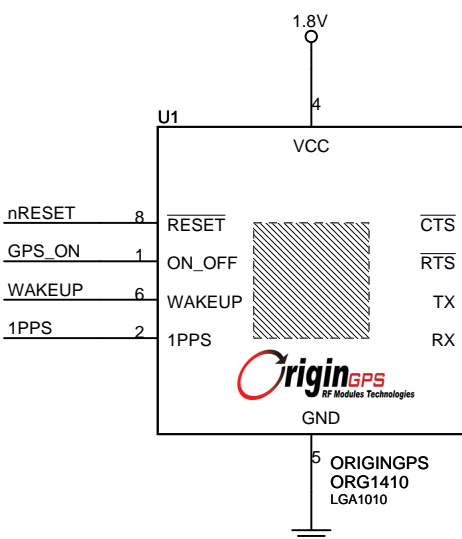
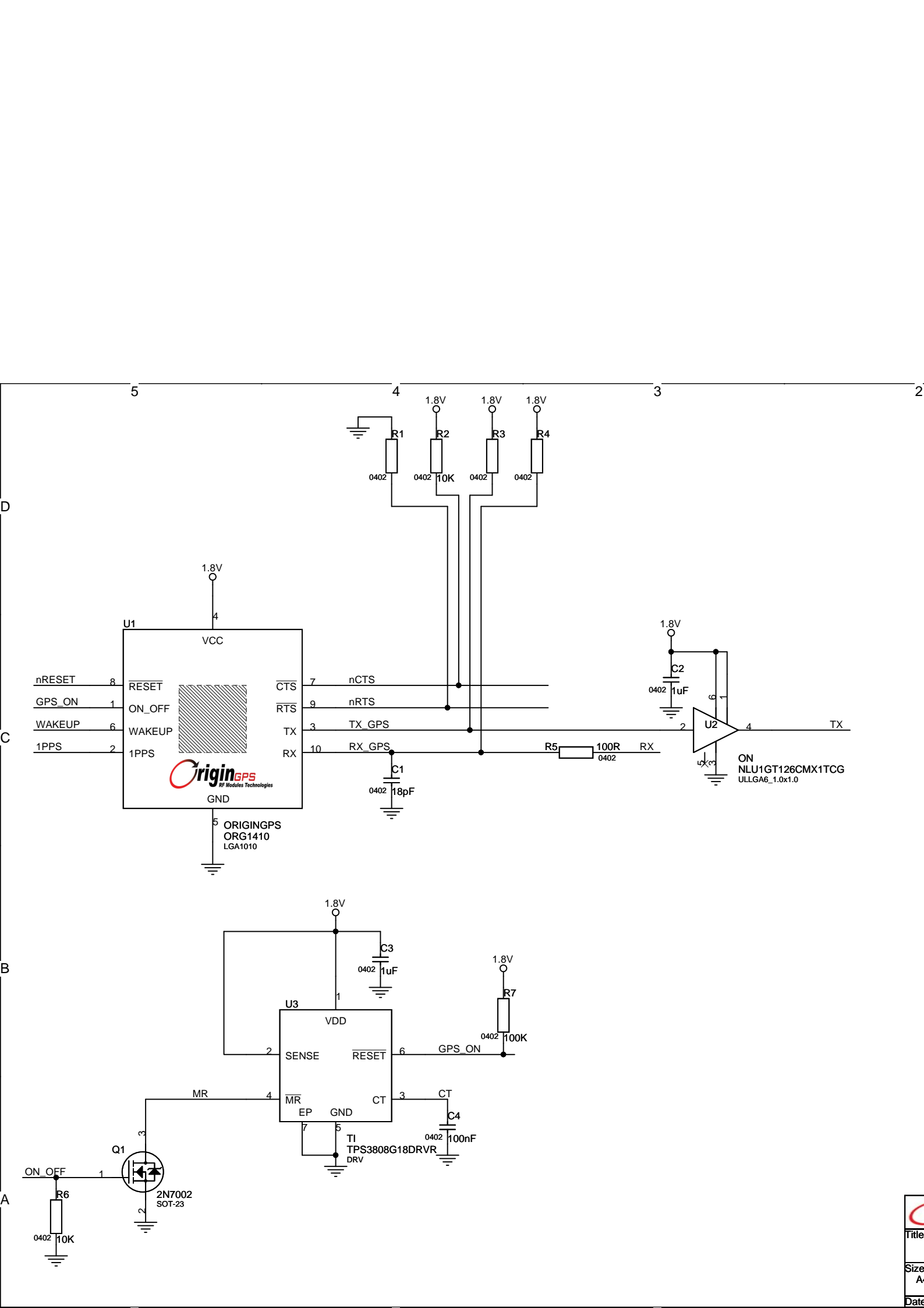
The Demo Board is built of Main Board, incorporating 1.8V LDO regulator, UART connector, push-button tactile switch for Push-To-Fix™ interrupt and various test points.

The ORG1410 GPS Antenna Module is soldered onto the Main Board through the Interface Adaptor.

The Interface Adaptor includes a single-bit buffer for voltage level translation of TX line, and a voltage supervisor for autonomous power-on pulse generation.



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## 4. Bill Of Materials

### 4.1 Main Board Bill Of Materials

| Reference                           | Value | Description                     | P/N                | MFG     |
|-------------------------------------|-------|---------------------------------|--------------------|---------|
| C2, C8                              | 18pF  | CAP SMT 0402 18pF ±5% 50V COG   | GRM1555C1H180JZ01D | MURATA  |
| C1, C4, C9, C10, C11, C12, C14, C15 | 100pF | CAP SMT 0402 100pF ±5% 50V COG  | GRM1555C1H101JA01D | MURATA  |
| C6                                  | 10nF  | CAP SMT 0402 10nF ±10% 25V X7R  | GRM155R71E103KA01D | MURATA  |
| C3, C5                              | 1μF   | CAP SMT 0603 1μF ±10% 10V X5R   | GRM188R60J105KA01J | MURATA  |
| C7, C13                             | 4.7μF | CAP SMT 0805 4.7μF ±10% 16V X5R | GRM21BR61C475KA88L | MURATA  |
| R1                                  | 1Ω    | RES SMT 0402 1Ω ±1%             | RM04FTN0010        | TA-I    |
| R3, R4, R5, R6, R7                  | 33Ω   | RES SMT 0402 33Ω ±1%            | RM04FTN0330        | TA-I    |
| R2                                  | 100KΩ | RES SMT 0402 100KΩ ±1%          | RM04FTN1003        | TA-I    |
| J1                                  | HDR   | HEADER 6 POS. "0.1 RIGHT ANGLE  | 2211S-06G-F1       | NELTRON |
| SW1                                 | TSW   | TACT SWITCH SMT                 | KSC222JLFS         | C&K     |
| U1                                  | LDO   | LDO REG. SMT SOT23-5 1.8V 200mA | TLV70018DDCT       | TI      |

Table 4-1: Main Board Bill Of Materials

## 4.2 Interface Adaptor Bill Of Materials

| Reference | Value     | Description                       | P/N                | MFG       |
|-----------|-----------|-----------------------------------|--------------------|-----------|
| C1        | 18pF      | CAP SMT 0402 18pF ±5% 50V COG     | GRM1555C1H180JZ01D | MURATA    |
| C4        | 100nF     | CAP SMT 0402 100nF ±10% 16V X7R   | GRM155R71C104KA88D | MURATA    |
| C2,C3     | 1µF       | CAP SMT 0402 1µF ±10% 10V X5R     | GRM155R61A105KE15D | MURATA    |
| R5        | 100Ω      | RES SMT 0402 100Ω ±1%             | RM04FTN1000        | TA-I      |
| R2,R6     | 10KΩ      | RES SMT 0402 10KΩ ±1%             | RM04FTN1002        | TA-I      |
| R7        | 100KΩ     | RES SMT 0402 100KΩ ±1%            | RM04FTN1003        | TA-I      |
| Q1        | 2N7002    | N-CH MOSFET SOT-23                | 2N7002KT1G         | ON        |
| U1        | MODULE    | GPS ANTENNA MODULE SMT LGA        | ORG1410            | ORIGINGPS |
| U2        | NLU1GT126 | SINGLE BUFFER 3-STATE             | NLU1GT126CMX1TCG   | ON        |
| U3        | TPS3808   | LOW IQ POR SUPERVISOR W. MAN. RST | TPS3808G18DRVR     | TI        |

Table 4-2: Interface Adaptor Bill Of Materials

## 5.Assembly and layout

### 5.1 Main Board PCB

Main Board for the ORG1410 GPS Antenna Module is 2 layers 1.6mm thickness FR4 PCB.

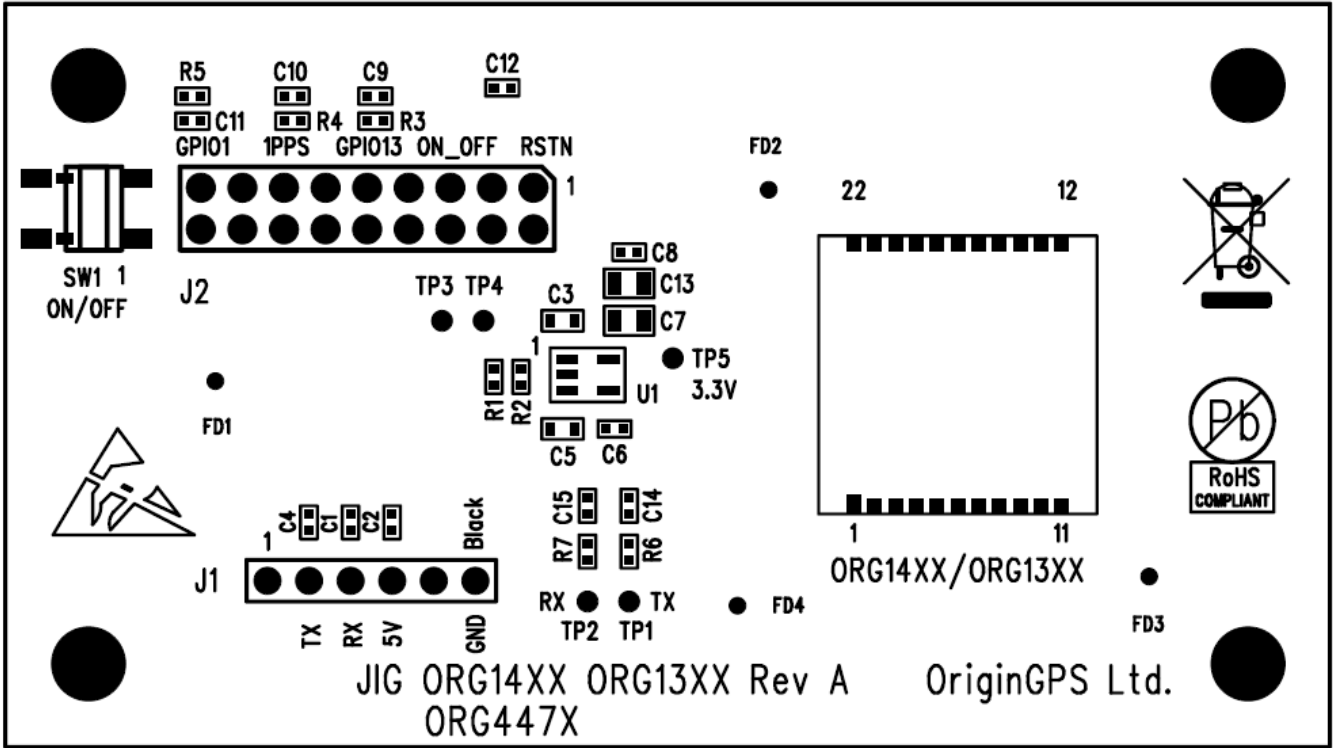


Figure 5-1: Main Board Components Placement

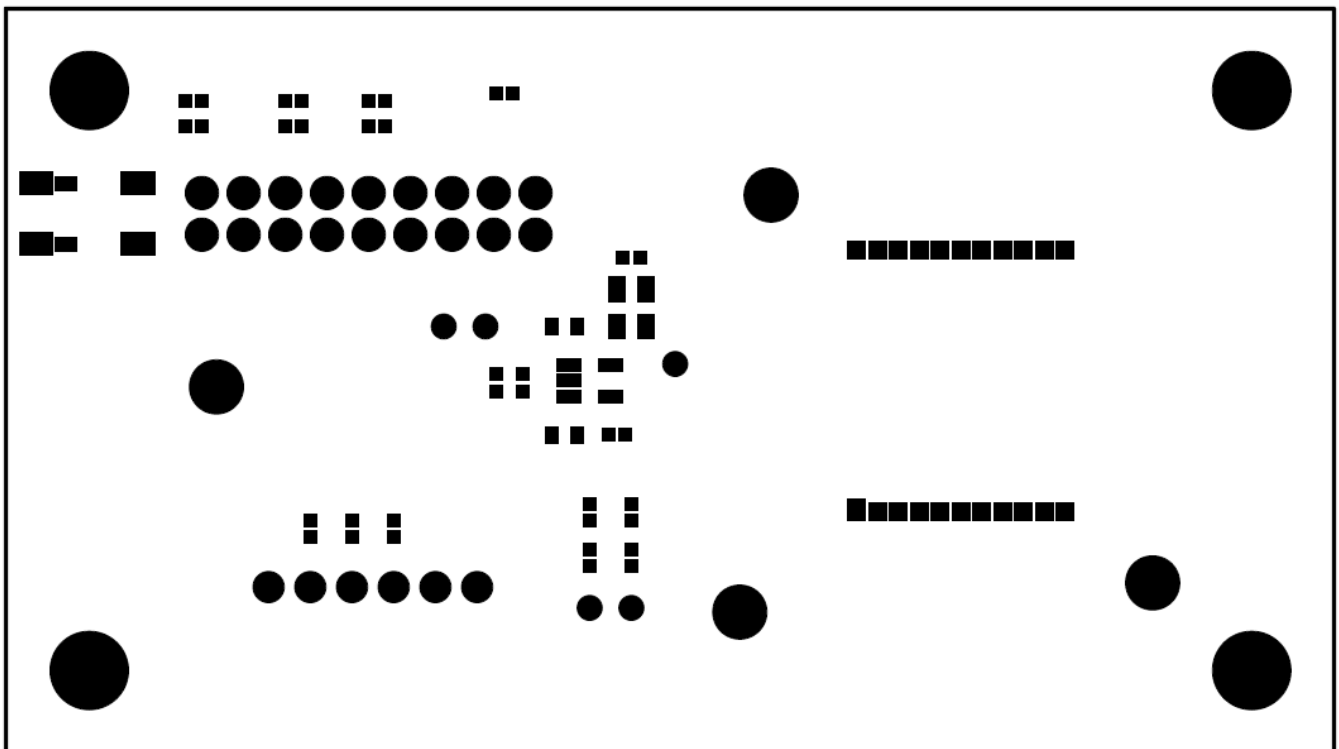


Figure 5-2: Main Board Solder Mask



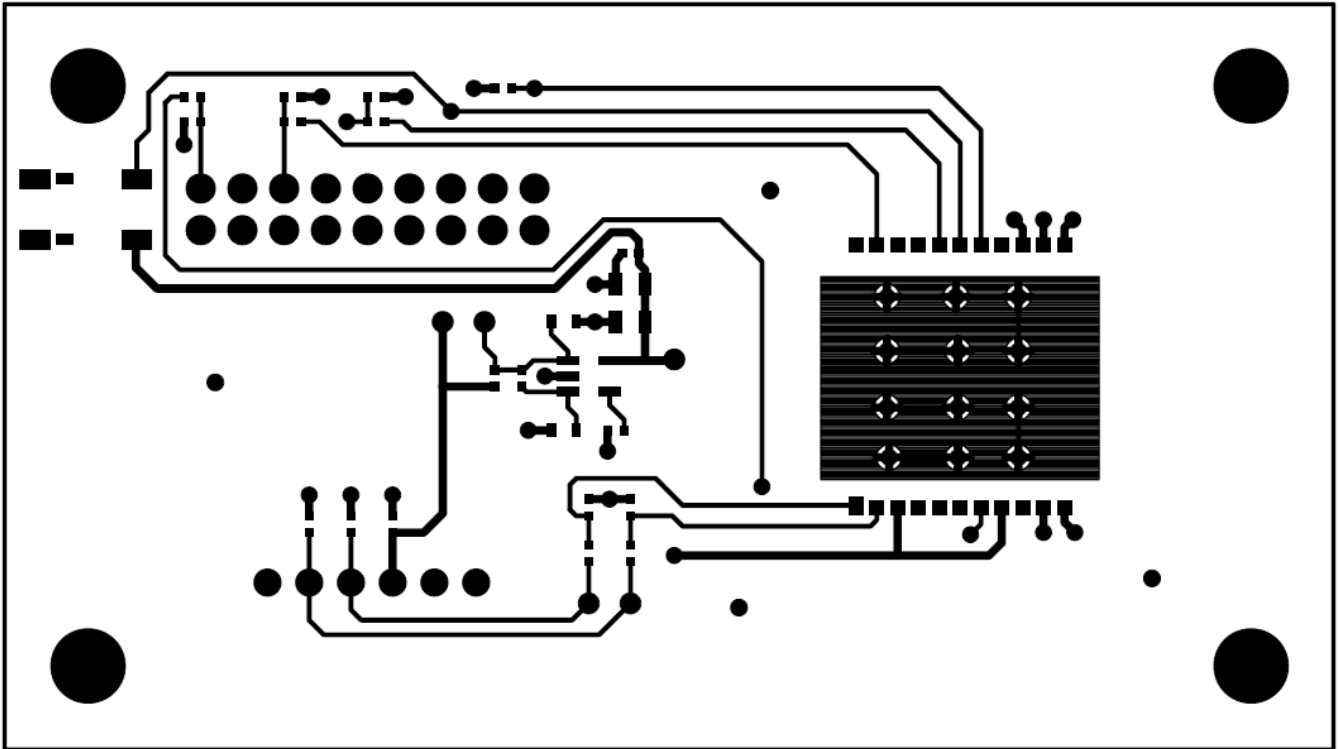


Figure 5-3: Top Layer Routing

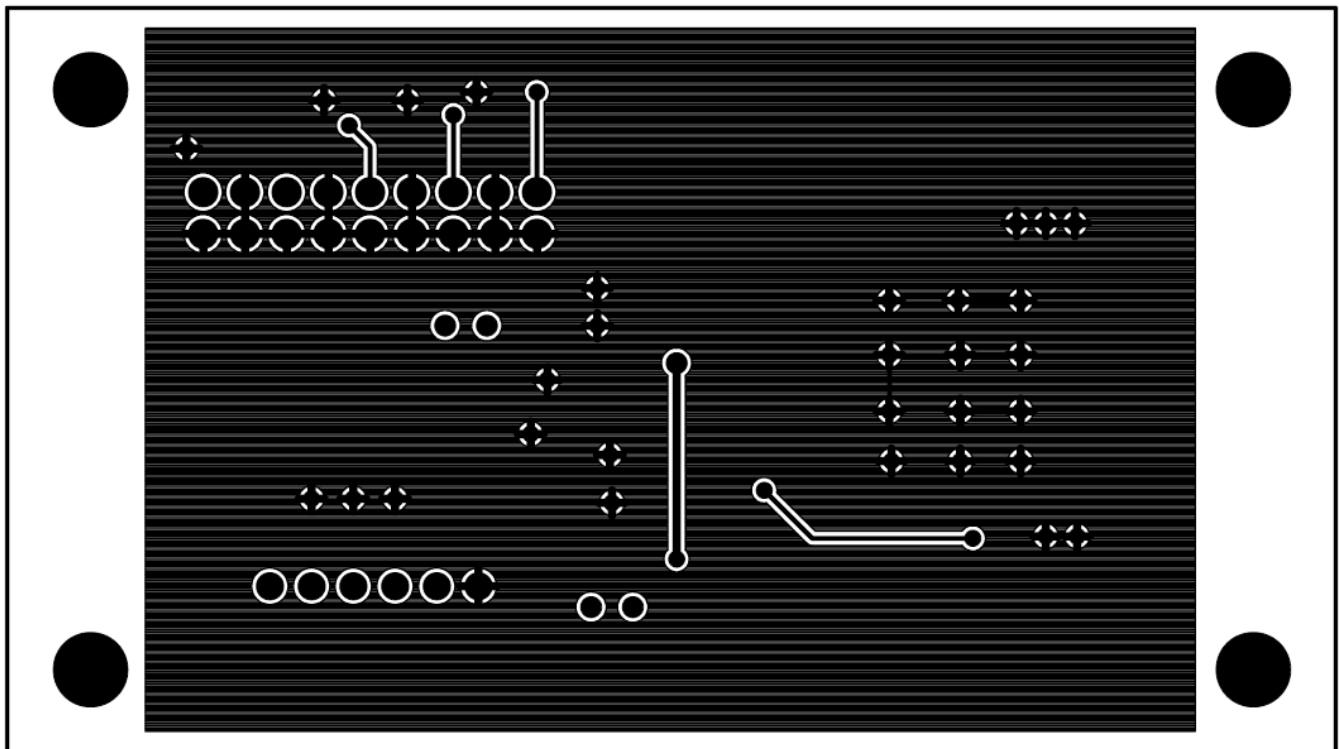


Figure 5-4: Bottom Layer Routing

## 5.2 Interface Adaptor PCB

Interface Adaptor Board for the ORG1410 GPS Antenna Module is 17mm x 17mm 22 pads 4 layers 0.6mm thickness FR4 PCB.

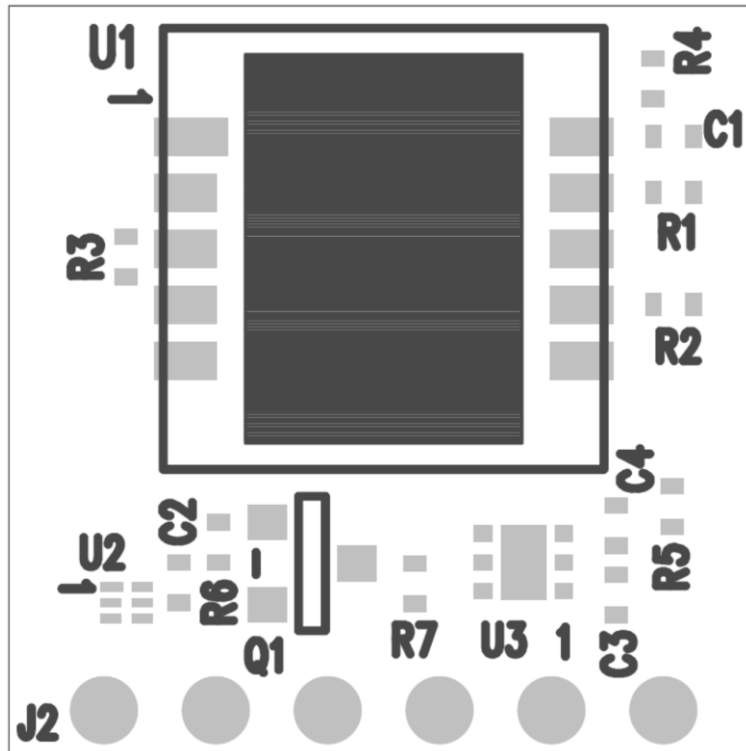


Figure 5-5: Interface Adaptor Board Components Placement

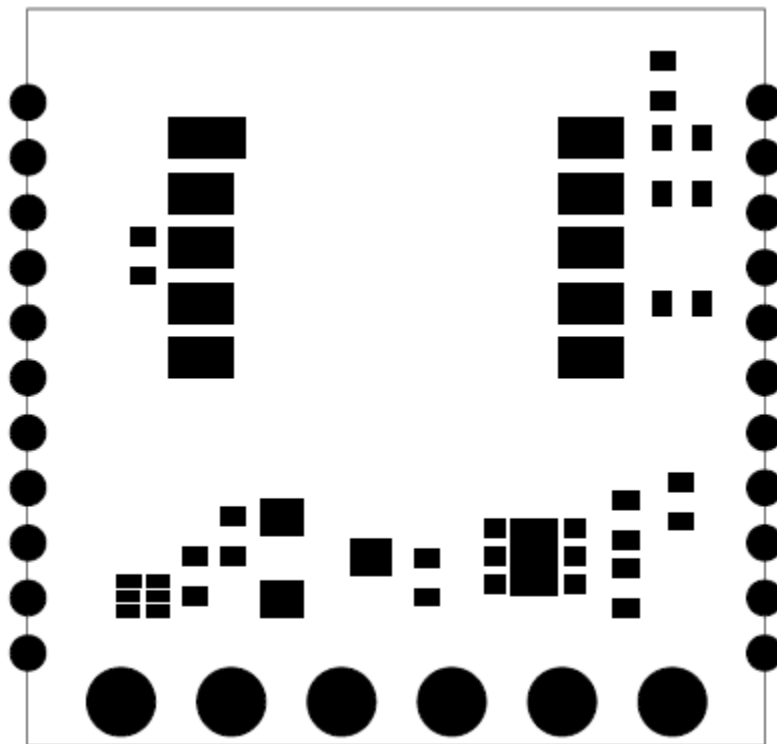


Figure 5-6: Interface Adaptor Board Solder Mask

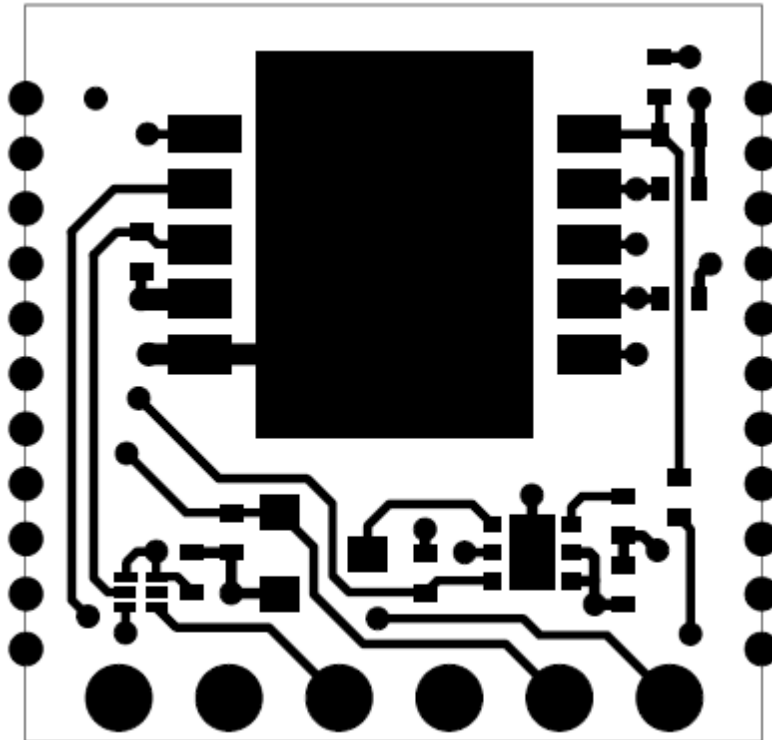


Figure 5-7: Interface Adaptor Board Top Layer Routing

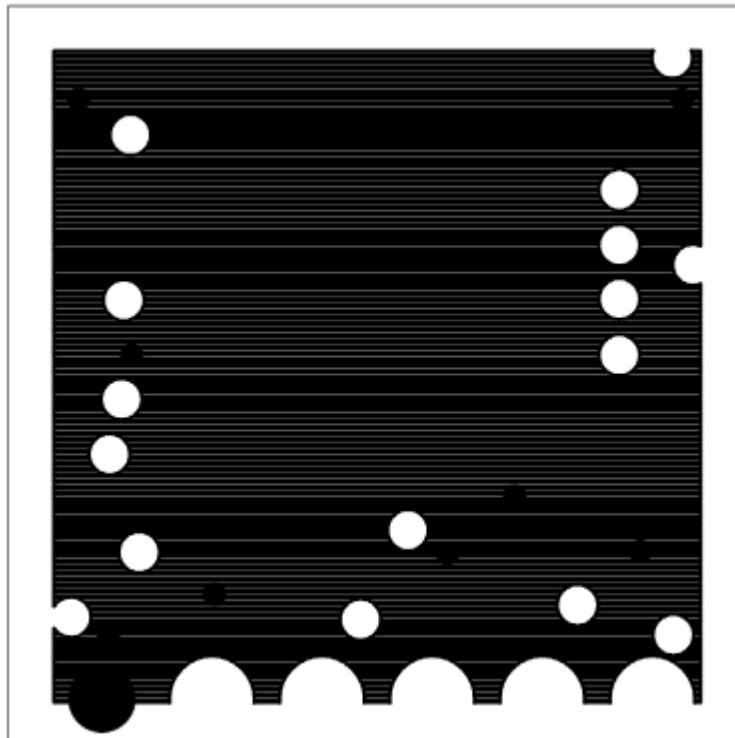


Figure 5-8: Interface Adaptor Inner Layer 1 Routing

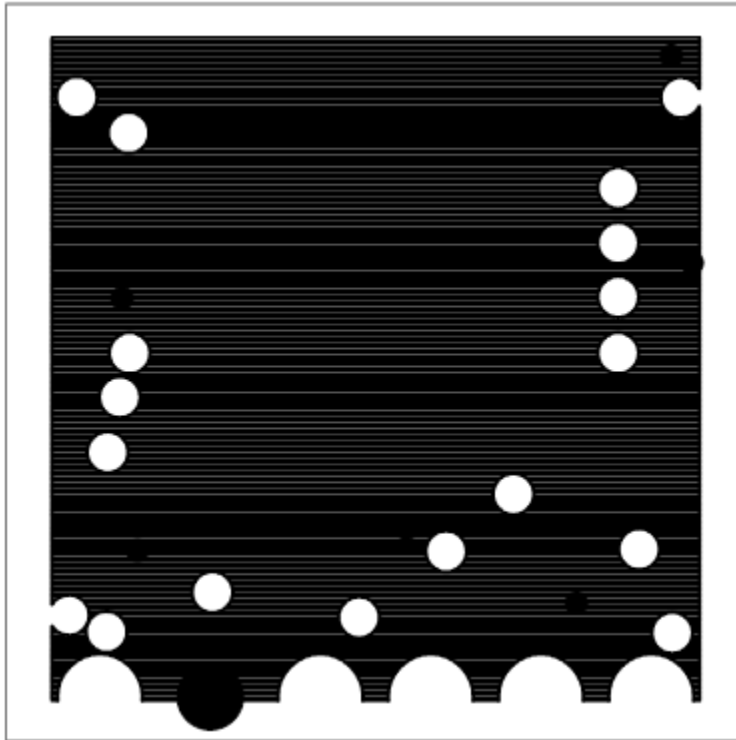


Figure 5-9: Interface Adaptor Inner Layer 2 Routing

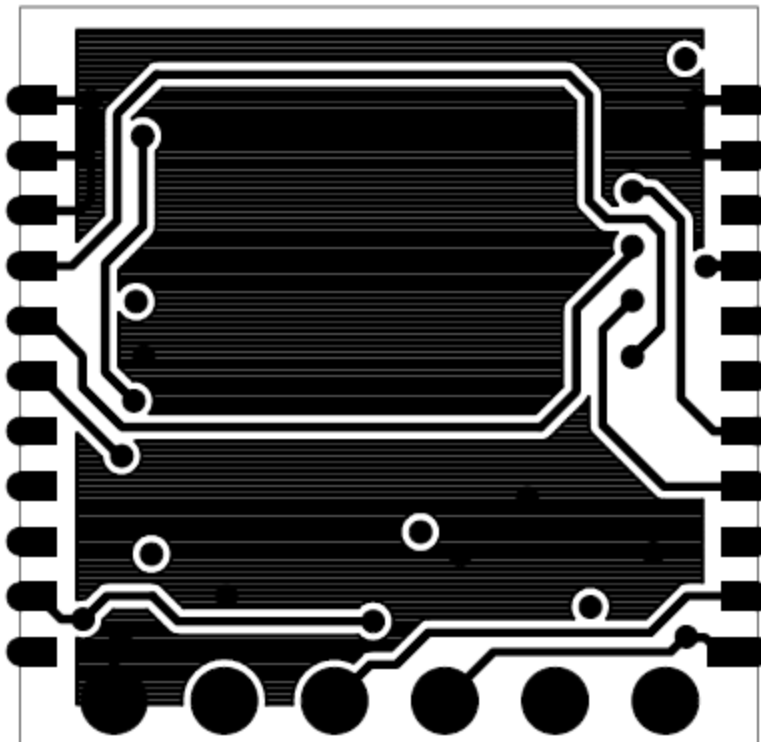


Figure 5-10: Interface Adaptor Bottom Layer Routing

## 6.TTL-232R-3V3 USB-Serial Converter

The TTL-232R-3V3 is a USB to Serial converter cable that provides a simple way to connect devices with UART interface to PC.

The TTL-232R-3V3 uses an FTDI FT232RQ IC which is housed inside the USB Type 'A' connector and is terminated at the end of a 1.8 meter cable (6 ft.) with a 2.54mm ("0.1) pitch header socket which provides an access to UART standard Transmit Data (TxD) and Receive Data (RxD).

These lines are operating at 3.3V LVTTTL levels.

Also brought out on the header are +5V and GND.

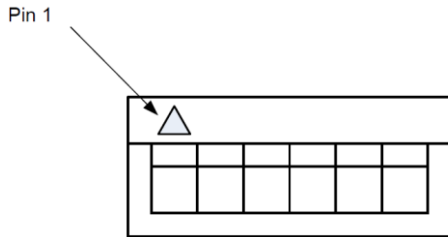


Figure 6-1: Pin Header Socket Bottom view



| Pin Number | Name                           | Type   | Colour | Description                          |
|------------|--------------------------------|--------|--------|--------------------------------------|
| 1          | GND                            | Power  | Black  | Ground supply pin                    |
| 2          | $\overline{\text{CS}}\text{T}$ | Input  | Brown  | Clear To Send input – not in use     |
| 3          | VCC                            | Power  | Red    | +5V power source, USB specified      |
| 4          | TXD                            | Output | Orange | Asynchronous Data output – GPS input |
| 5          | RXD                            | Input  | Yellow | Asynchronous Data input – GPS output |
| 6          | $\overline{\text{RT}}\text{S}$ | Output | Green  | Request To Send output – not in use  |

Table 6-1: USB-Serial Converter Cable header pin-out

| Parameter                                | Symbol            | Test Conditions                 | Min  | Typ | Max  | Units              |
|--|-------------------|---------------------------------|------|-----|------|--------------------|
| Power Supply Voltage                     | $V_{\text{CC}}$   | Defined by USB $V_{\text{BUS}}$ | 4.25 | 5.0 | 5.25 | V                  |
| Power Supply Current                     | $I_{\text{O}}$    |                                 | -    | -   | 75   | mA                 |
| Output Voltage Low State                 | $V_{\text{OL}}$   | $I_{\text{OL}} = 8\text{mA}$    | 0.3  | 0.4 | 0.6  | V                  |
| Output Voltage High State                | $V_{\text{OH}}$   | $I_{\text{OH}} = -3\text{mA}$   | 2.2  | 2.8 | 3.2  | V                  |
| Input Voltage State Switching Threshold  | $V_{\text{IN}}$   | Low $\rightarrow$ High          | 1.0  | 1.2 | 1.5  | V                  |
| Input Voltage State Switching Hysteresis | $V_{\text{HYST}}$ | High $\rightarrow$ Low          | 20   | 25  | 30   | mV                 |
| Operating Temperature                    | $T_{\text{AMB}}$  |                                 | -40  | +25 | +85  | $^{\circ}\text{C}$ |

Table 6-2: USB-Serial Converter Cable operating parameters

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