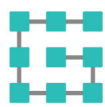


## gridconnect GRID45 Evaluation Board User Guide

[Home](#) » [gridconnect](#) » gridconnect GRID45 Evaluation Board User Guide 



gridconnect®

GRID45 Evaluation Kit  
User Guide

### Contents

- [1 GRID45 Evaluation Board](#)
- [2 OVERVIEW](#)
- [3 Evaluation Kit](#)
- [4 Operation of the Evaluation Board](#)
- [5 Use Cases for the GRID45 Evaluation board](#)
- [6 Example Application Configurations](#)
- [7 Evaluation board schematic](#)
- [8 Documents / Resources](#)

## GRID45 Evaluation Board

### Copyright and Trademark

Copyright © 2023, Grid Connect, Inc. All rights reserved.

No part of this manual may be reproduced or transmitted in any form for any purpose other than the purchaser's personal use, without the express written permission of Grid Connect, Inc. Grid Connect, Inc. has made every effort to provide complete details about the product in this manual, but makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose. In no event shall Grid Connect, Inc. be liable for any incidental, special, indirect, or consequential damages whatsoever included but not limited to lost profits arising out of errors or omissions in this manual or the information contained herein.

Grid Connect, Inc. products are not designed, intended, authorized or warranted for use as components in systems intended for surgical implant into the body, or in other applications intended to support or sustain life, or in any other application in which the failure of a Grid Connect, Inc. product could create a situation where personal injury, death, or severe property or environmental damage may occur. Grid Connect, Inc. reserves the right to discontinue or make changes to its products at any time without notice.

Grid Connect and the Grid Connect logo, and combinations thereof are registered trademarks of Grid Connect,

Inc. All other product names, company names, logos or other designations mentioned herein are trademarks of their respective owners.

GRID45™ and gridconnect© are trademarks of Grid Connect, Inc.

#### **Grid Connect Inc.**

1630 W. Diehl Rd.

Naperville, IL 60563, USA

Phone: 630.245.1445

#### **Technical Support**

Phone: 630.245.1445

Fax: 630.245.1717

On-line: [www.gridconnect.com](http://www.gridconnect.com)

#### **Disclaimer**

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

**Attention:** This product has been designed to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause harmful interference to radio communications. Changes or modifications to this device not explicitly approved by Grid Connect will void the user's authority to operate this device.

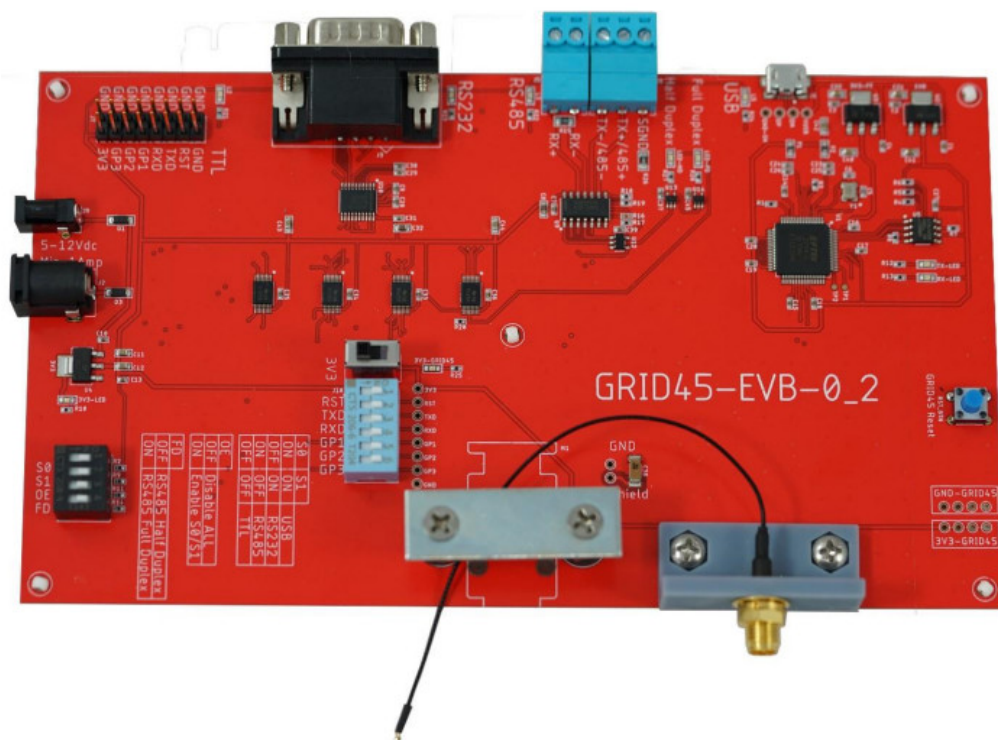
The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.

## **OVERVIEW**

### **Introduction**

This user guide provides the information needed to use the GRID45 Evaluation Kit. The intended audience is any Product, Software or Design engineer that is responsible for qualifying, testing or integrating the GRID45 into their product.

The GRID45 OEM module is a powerful, Wi-Fi + Ethernet co-processor module that can be used in a wide variety of IIoT applications. It is designed to be a simple, easy to integrate add-on module to an OEM's host processor that provides many of the popular IIoT communication protocols. The GRID45 is a fully integrated network solution in a small form factor module.



The GRID45 Evaluation Board provides a flexible test and qualification platform for all variations of the GRID45

module. The evaluation board uses a multiplexor circuit to provide four optional, external serial connection options to the single serial interface on the GRID45 module. This allows OEMs to test the GRID45 in any one of the following modes:

- RS232 serial connection
- RS485/RS422 serial connection
- USB serial for a connection to a PC
- TTL Serial connection (all eight signals) to the OEMs host controller UART interface through the Multiplexor circuit. (If a direct serial connection is needed, see the section “Direct connection Option to the GRID45 module”)

The Evaluation board is easily powered using the provided +5V wall adaptor and provides pin sockets for a GRID45 module to be easily plugged into the evaluation board. The pin sockets also allow the module to be swapped in or out.

#### **Additional Documentation**

The following additional user guides and documents are available for download on the internet.

<b>Title</b>	<b>Description and Location</b>
<b>GRID45 Modbus User Guide</b>	Document providing Quick Start instructions and describing the Modbus firmware configuration and operation. <a href="http://www.gridconnect.com">www.gridconnect.com</a>
<b>GRID45 Evaluation Board Quick Start Guide</b>	Document providing Quick Start instructions for using the GRID45 Evaluation board <a href="http://www.gridconnect.com">www.gridconnect.com</a>
<b>GRID45 Module Data Sheet</b>	Documentation for the GRID45 module hardware. <a href="http://www.gridconnect.com">www.gridconnect.com</a>
<b>GRID45 Modbus Product Brief</b>	Overview of the GRID45 Modbus module <a href="http://www.gridconnect.com">www.gridconnect.com</a>

#### **Quick Start Documentation**

For the quick start documentation on the GRID45 module and the evaluation kit, please see the applicable GRID45 software User Guide. For example, if you are interested in evaluating the GRID45 Modbus module, please refer the GRID45 Modbus User Guide.

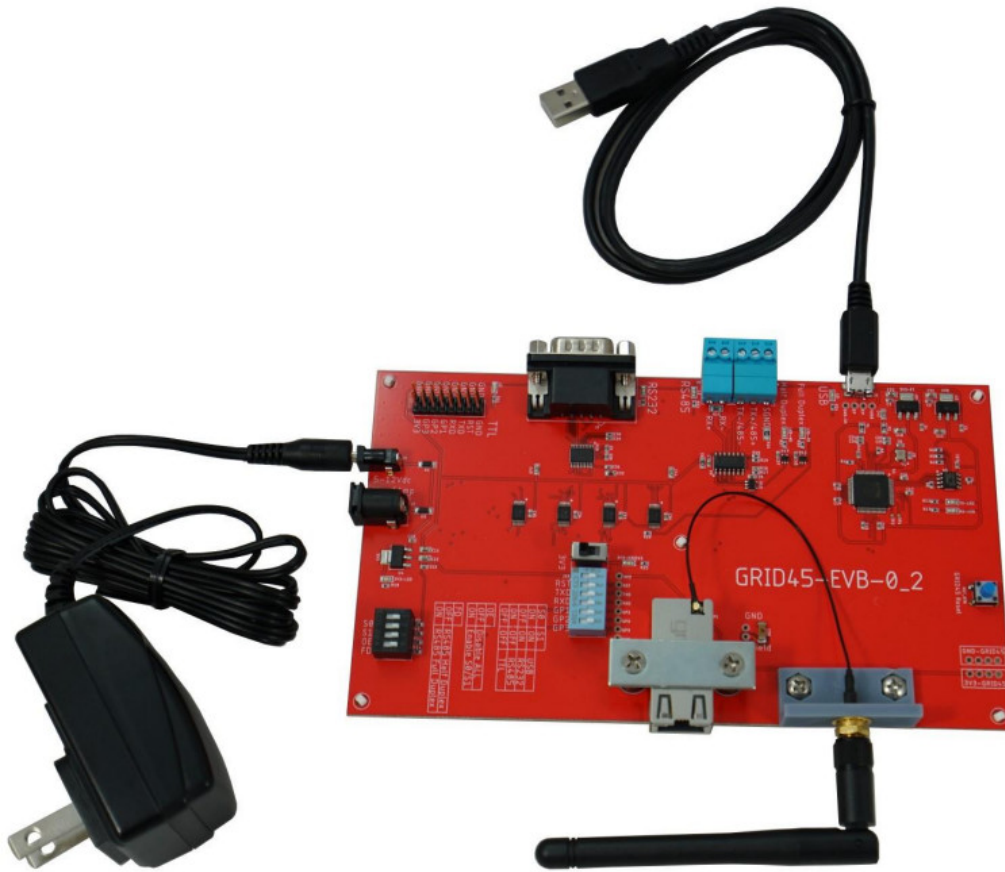
#### **Evaluation Kit**

##### **Contents of the GRID45 Evaluation kit**

The GRID45 Evaluation Kit contains the following items:

- GRID45 Evaluation Board
- 5V wall adaptor
- USB Cable Type A to Micro connector
- Insulated w.fl antenna cable to reverse SMA connector
- Dipole antenna

**Note:** You must buy a GRID45 module separately for use with this Evaluation Kit. The GRID45 Evaluation board supports multiple versions of the GRID45 module. Each GRID45 module can run different Industrial Automation protocols.



#### Part Numbers for the GRID45 Evaluation Kit

Part Number	Description
GRID45-EVAL-BD-110	GRID45 Evaluation Kit for 110 Vac US
GRID45-EVAL-BD-U	GRID45 Evaluation Kit for 110/220 Vac International Plugs

#### Operation of the Evaluation Board

##### Powering the Evaluation Board

The evaluation board is supplied with a +5-volt power supply that plugs into a wall outlet. The power supply plugs into the J9 barrel connector on the board. The power jack at J2 is redundant and adds flexibility to accept other power supply adapters. The Evaluation board will accept power from +5 volts to +12 volts with a minimum power requirement of 5 Watts (must supply a min of 1 amp at +5 volts).

The Evaluation Board can NOT be solely powered through the USB connector. The power requirements of the board exceed what a typical USB interface can source. Only the USB interface circuits are powered through the USB connector.

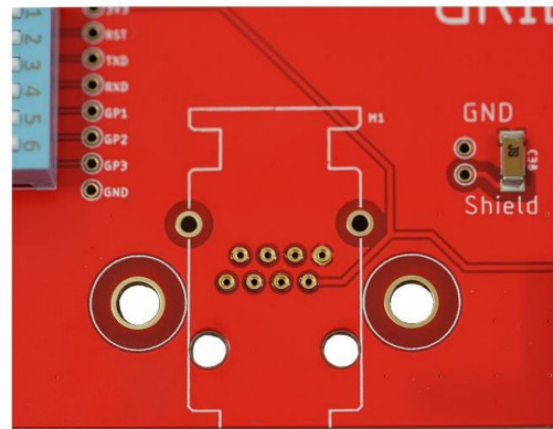
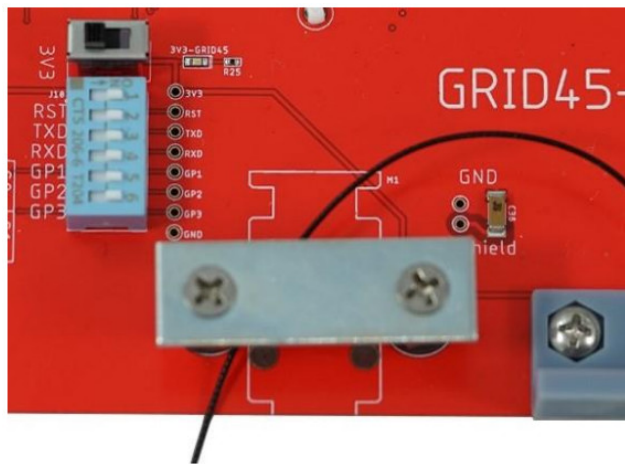
##### Note:

There are 2 options for ordering the Evaluation board. 110-volt with a US plug and a 110/220-volt universal power supply that can be used in international applications.

##### GRID45 Socket

The evaluation board has pin sockets for the GRID45 module that makes it easy to plug in the GRID45 module on the board. The pin sockets allow the module to be interchanged or swapped out as the testing or qualification requires.

There is a simple hold down bar across the GRID45 module to keep a tight connection between the GRID45 module and the Evaluation board circuitry.



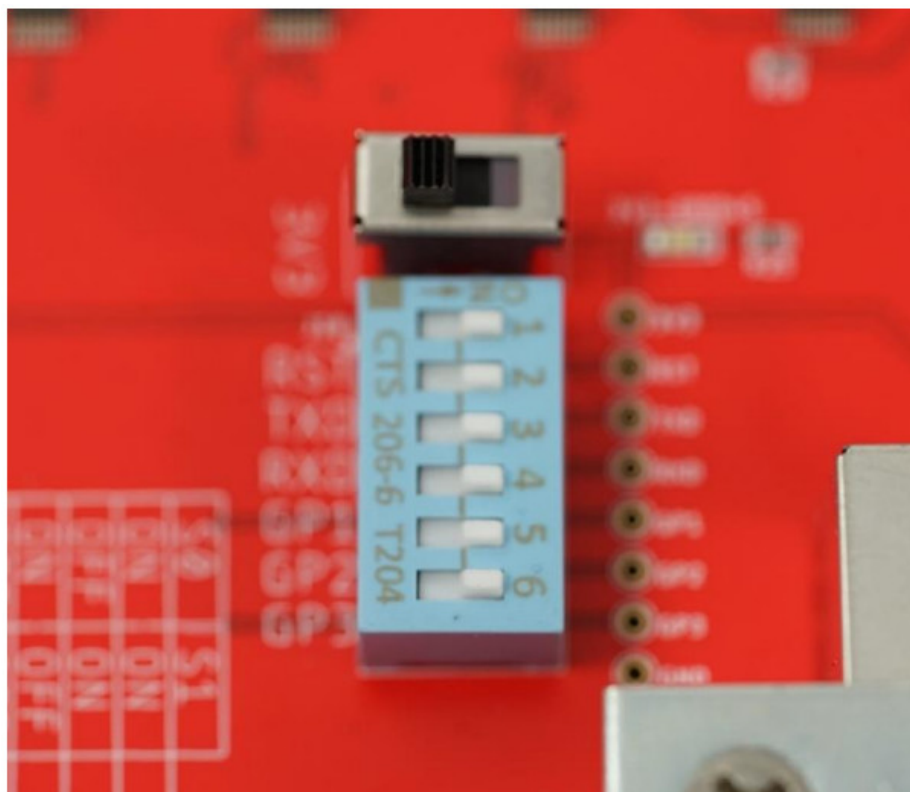
### Install the GRID45 Module

To install a GRID45 module into the board follow these steps:

1. Make sure power is off to the Evaluation board
2. Remove the Hold down bar by un-screwing the 2 screws.
3. Carefully line up and install the GRID45 module
4. Re-install the hold down bar by screwing in the 2 screws.

### Powering the GRID45 module

There is a power switch on the evaluation board labeled 3V3.

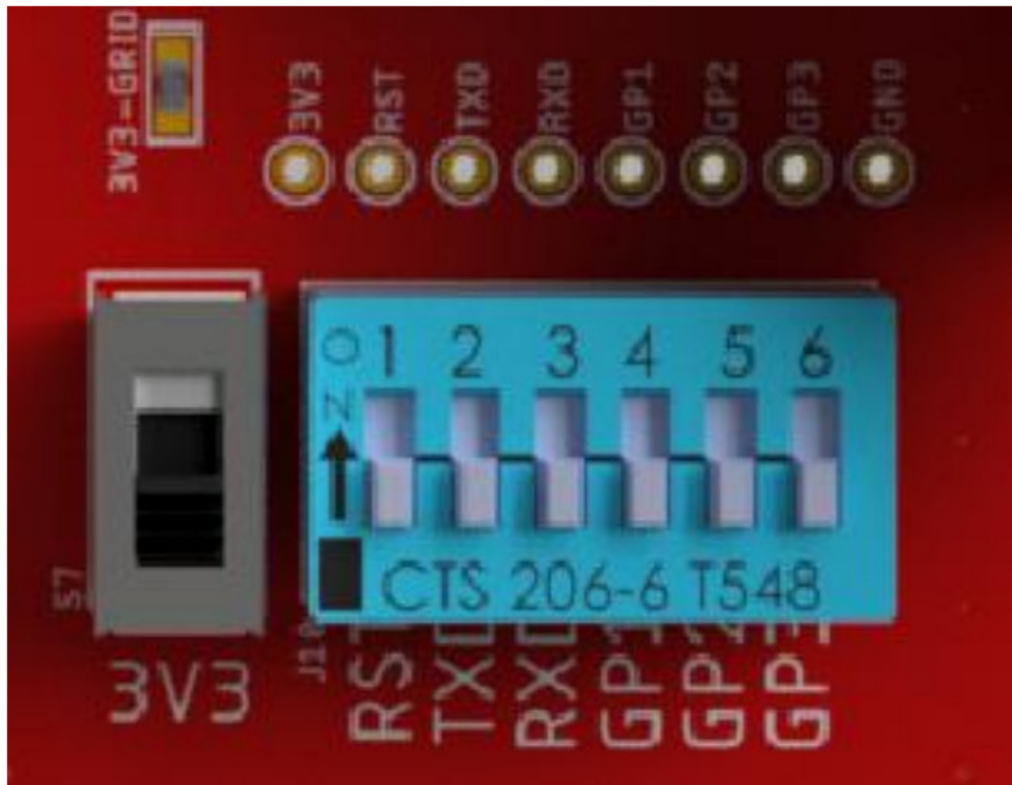


This switch controls the +3.3-volt power source to the GRID45 module to powered On or Off. When installing or removing a GRID45 module from the board, power off this switch. Setting the 3V3 switch (S7) to OFF will isolate power to the GRID45 from the rest of the evaluation board circuit. This is useful when a Direct I/O connection option to the GRID45 module is required. See the section “Direct Connection Option to the GRID45 module” for additional details.

### GRID45 Connect DIP Switch J10



The 6 position DIP labeled J10 allows some or all of the GRID45 signals to be connected or disconnected from the Evaluation board circuitry.



- Set the signals to ON to connect the GRID45 signal to the Evaluation board circuit.
- Set the signals to OFF to disconnect it from the multiplexor circuit of the Evaluation board.

Setting all of the DIP switches (J10) to OFF will isolate the RST, TX, RX and GPIO signals from the rest of the evaluation board circuit. This is useful when a Direct I/O connection option to the GRID45 module is required. See the section “Direct Connection Option to the GRID45 module” for additional details.

#### **Reset button**

There is a reset push button that can be used to reset the GRID45. It is labeled GRID45 Reset. Hold the button for 1 sec to reset the GRID45



## Use Cases for the GRID45 Evaluation board

The GRID45 Evaluation board is designed to allow 4 application use cases by providing an option for 4 different connection modes to your host device. The following connection modes are supported:

### TTL Serial

- The TTL option allows a TTL serial connection to the UART of an OEM's host processor. The evaluation board supports a UART connection (thru jumper pins and wires) to the OEM's CPU board. The evaluation board supports jumpers for all 8 signals through a 16-pin header labeled TTL (J7) on the PCB. The 16-pin header was designed to allow a ribbon cable connection.

### RS232.

- The evaluation board supports a serial connection to a legacy device thru RS232. The evaluation board has an on-board RS232 transceiver that allow this connection. The RS232 connection is a DB9 with Male pins.

### RS485.

- The evaluation board supports a serial connection to a legacy device thru RS485/RS422. The evaluation board has an on-board RS485 transceiver that allow this connection. The RS485/422 connection is a 5 position de-pluggable terminal strip. It supports a 2-wire or a 4wire serial connection; half or full duplex.

### USB Serial

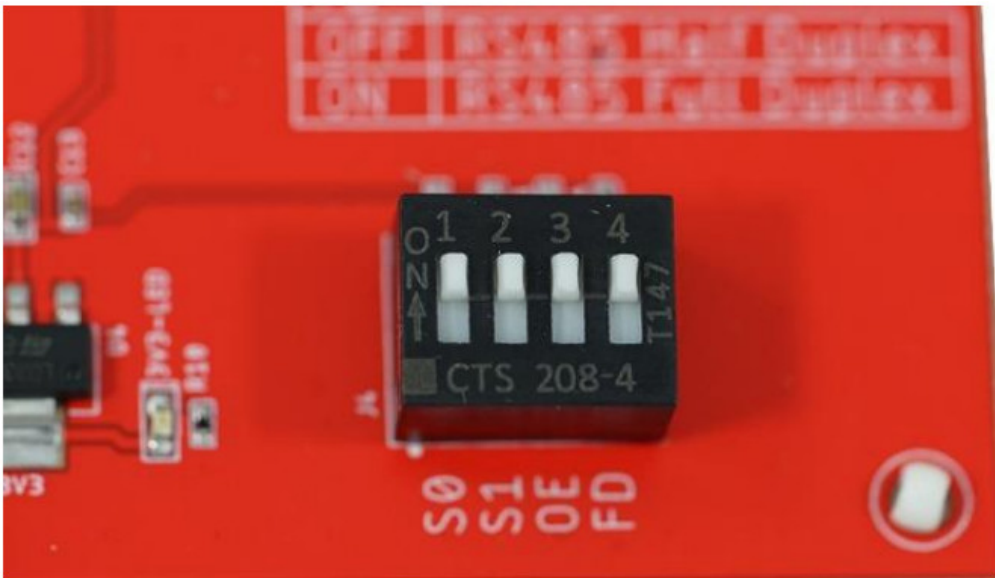
- For applications where the user will simply want to test the GRID45, update firmware or modify configuration,

the evaluation board supports a serial connection to a PC thru a USB interface. The Evaluation board provides a USB Micro connector for this connection.

- You will need to connect the USB-to-serial interface to your PC. The FTDI drivers for the USB should load automatically and make 2 serial COM ports available. Connect to the higher of the COM ports created (ie if COM5 and COM6, try COM6 first).

### Selecting the Connection mode

The connection modes are selected by the J4 four position dip switch. There is an LED by each connector that provides visual indication of the mode selected.



Mode	Switch position S0	Switch position S1
USB	ON	ON
RS232	OFF	ON
RS485	ON	OFF
TTL Connection	OFF	OFF

These switch settings are also printed on the Evaluation board PCB silk screen by the J4 DIP switch.  
**NOTE:** For RS485 mode, there is an option to select to Full or Half duplex. See DIP switch position 4 setting below.  
 There are 2 other switch settings allowed with the J4 DIP switch.

1. DIP switch position 3 controls enabling or disabling all external serial connections to the GRID45. The setting is as follows:

Mode	Switch pos 3 Labeled 0E
Disable all serial connections	OFF
Enable serial connections through S 0/S1	ON **

\*\* – This must be ON to enable the Evaluation Boards Multiplexor for any Serial I/O connections to send or receive data



2. DIP switch position 4 controls enabling either RS485 half-duplex or RS485 full-duplex serial connections to the GRID45. This setting only works when RS485 mode is enabled through S0 and S1 settings. The setting is as follows:

Mode	Switch pos 4 Labeled FD
RS485 Half-duplex	OFF
RS485 Full-duplex	ON

#### Direct connection Option to the GRID45 module

The Evaluation board does support a TTL connection option from the UART of an OEM's host controller to the GRID45 module through the J7 header pins. However, these I/O connections are through the multiplexor circuitry which may affect voltage levels and timing. If a direct connection between the UART of an OEM's host controller to the pins of the GRID45 module are desired then the GRID45 evaluation board can be modified to support this. To do this the following steps are required:

1. Solder an 8-pin header into the holes adjacent to the J10 DIP switch.
2. Set all 6 DIP switches on J10 to OFF.
3. Set the 3V3 GRID45 power switch to OFF (remove power)
4. Jumper the signals from the UART of the OEM's host processor to the new 8-pin header which includes bringing 3.3-volt power to the GRID45 module

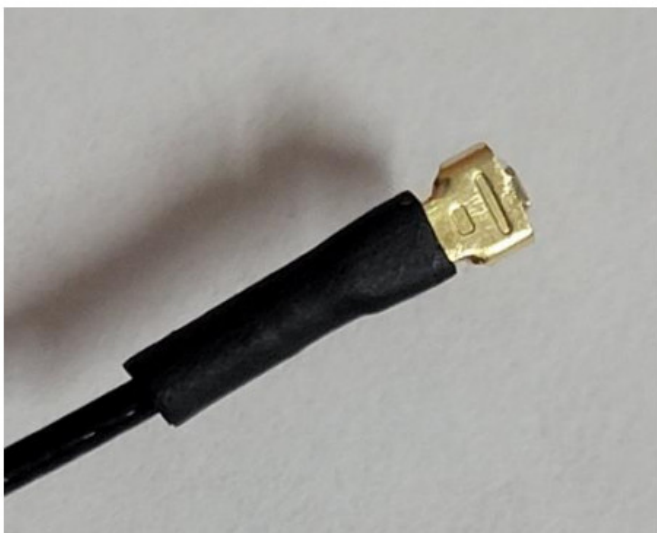
#### WLAN Antenna Connection

The Evaluation board provides a mechanical antenna mount for a reverse SMA antenna connector. The Evaluation kit comes with an antenna cable that has an insulated w.fl connector on one end and a reverse SMA connector the other. The reverse SMA connector that can be mounted to this bracket.

The insulated w.fl connector on the antenna cable can be connected to the w.fl connector on the GRID45 module.

#### Important Note:

On the mating w.fl antenna cable, the w.fl connector must be insulated (recommend heat shrink tubing) to prevent the w.fl connector from shorting to the shield of the GRID45.



#### Example Application Configurations

The following examples provide the correct configuration settings of the GRID45 Evaluation board for a couple of the most common use cases

##### Host UART Connection to GRID45 through Multiplexor

Use this example if you want to connect the UART of the host processor to the GRID45 through the multiplexer circuitry.

DIP Switch J10 (6 position DIP switch)

1. Set all 6 positions to ON

DIP Switch J4 (4 position DIP switch)

2. Set S0 position (position 1) to OFF
3. Set S1 position (position 2) to OFF
4. Set OE position (position 3) to OFF
5. Set FD position (position 4) to:
  - a. Don't Care – unused in this mode

#### **RS485 external Connection to GRID45**

Use this example if you want to connect the GRID45 to an RS485/422 interface.

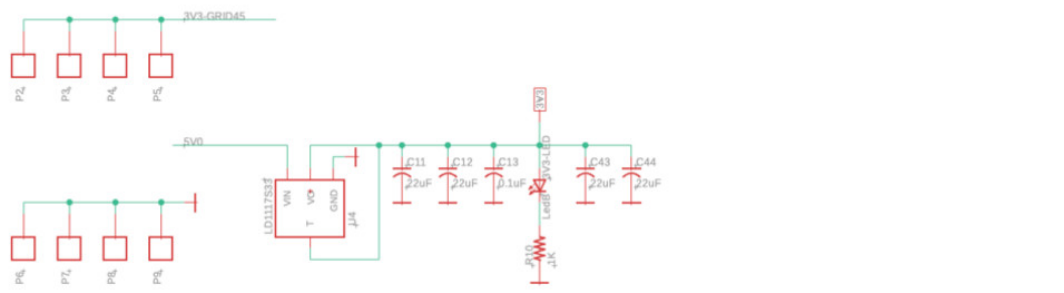
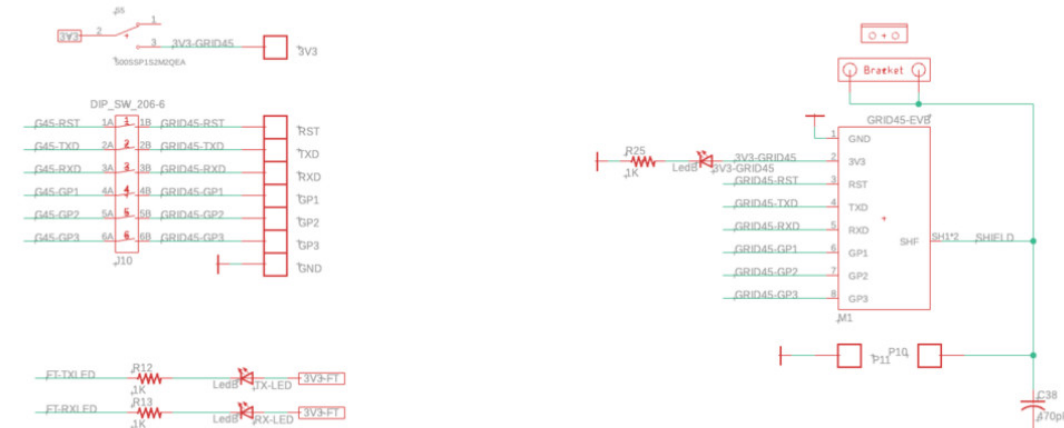
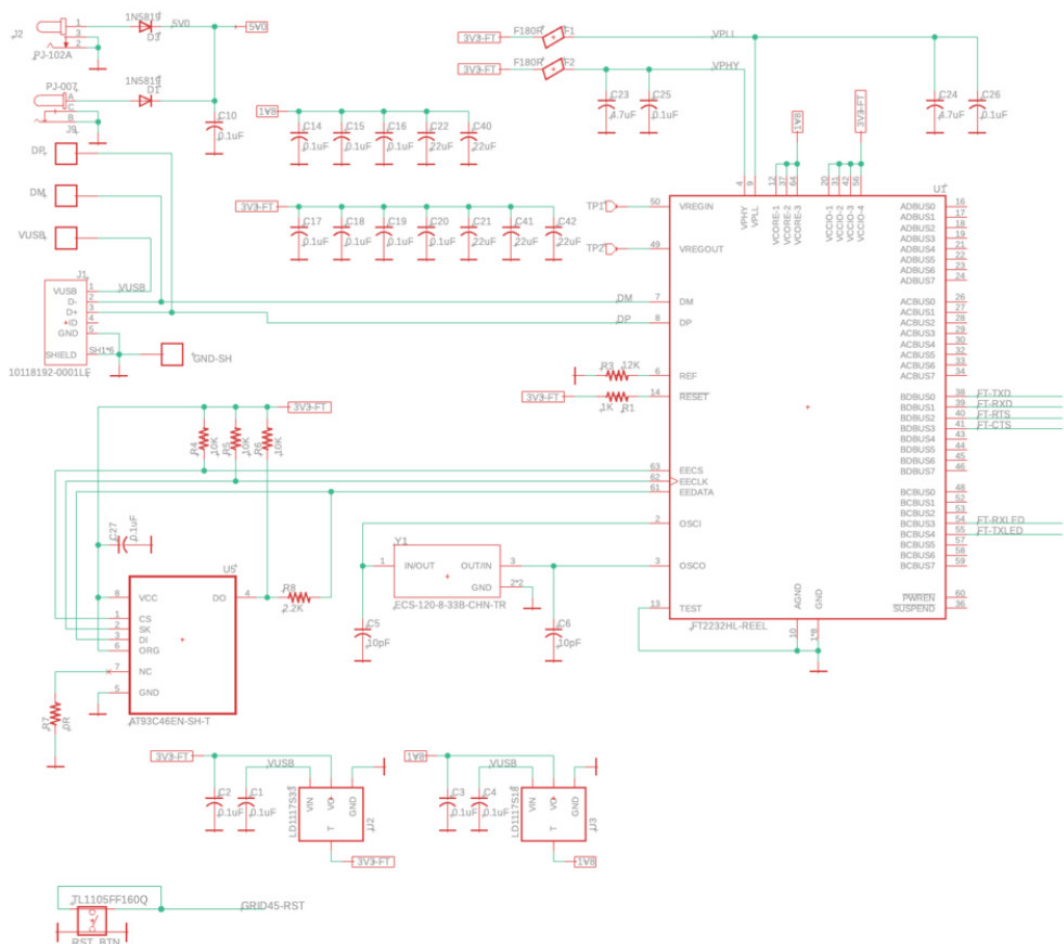
DIP Switch J10 (6 position DIP switch)

6. Set all 6 positions to ON

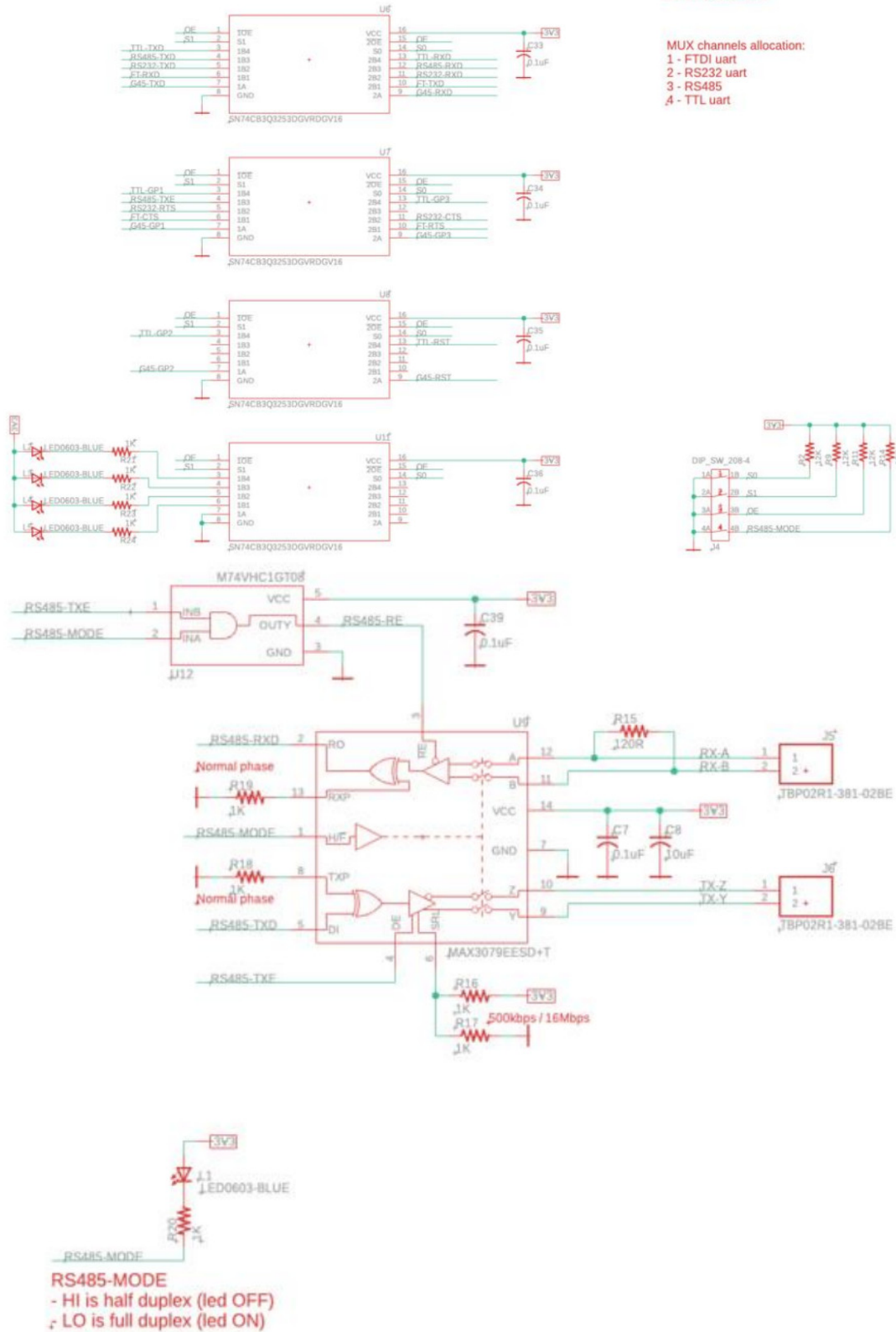
DIP Switch J4 (4 position DIP switch)

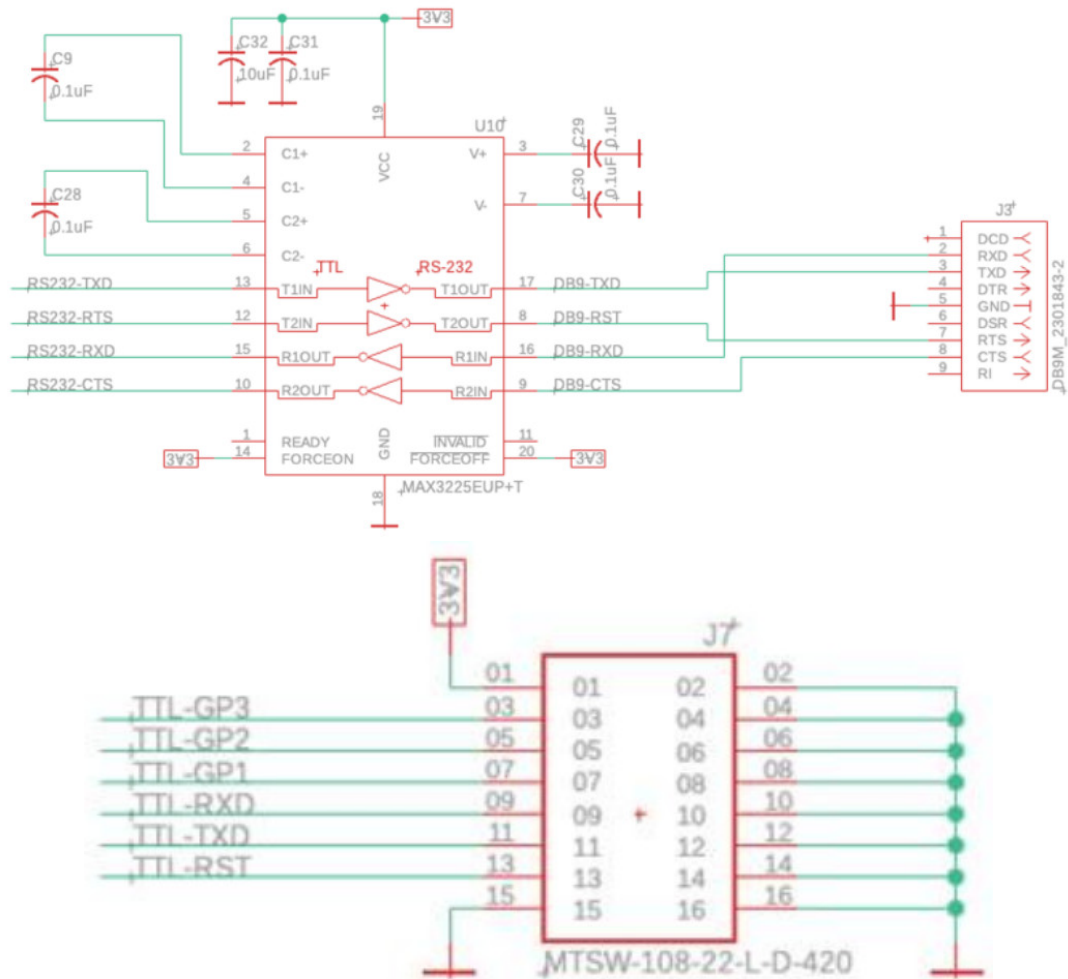
7. Set S0 position (position 1) to ON
8. Set S1 position (position 2) to OFF
9. Set FD position (position 4) to:
  - a. OFF for RS485 Half Duplex
    - i. Wire RS485 signal pair to terminals marked 485+ and 485-.
  - b. ON for RS485 Full Duplex
    - i. Wire outgoing RS485/422 signal pair to terminals marked TX+ and TX-
    - ii. Wire incoming RS485/422 signal pair to terminals marked RX+ and RX-
10. External RS485 termination may need to be added to each pair depending on cable length
11. A signal ground (SGND) connection may be needed depending on cable length and ground differential

#### **Evaluation board schematic**





MUX channels allocation:  
1 - FTDI uart  
2 - RS232 uart  
3 - RS485  
4 - TTL uart





## GRID45™ Evaluation kit

### Documents / Resources

  Evaluation Kit User Guide	<a href="#">gridconnect GRID45 Evaluation Board [pdf] User Guide</a> GRID45, GRID45 Evaluation Board, Evaluation Board, Board
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------