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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1 Overview	4
1.1 Scope.....	4
1.2 Features	4
1.3 Organization	5
1.4 Relevant Documents.....	5
2 Setting Up the TD1205 / 1205P EVK.....	6
2.1 Electrostatic Warning	6
2.2 Packing List	6
2.3 Requirements	6
2.4 Powering Up the Board	7
2.5 Getting Started	7
2.6 Upgrading the Firmware	10
2.7 SIGFOX™ Transmission Test	11
2.8 Cloud-on-Chip™ Transmission Test.....	11
3 TD1205 / 1205P EVK Overview	13
3.1 Layout.....	13
3.2 Block Diagram	13
3.3 Hardware Description	14
4 TDNx004 adapter board Schematics	15

1 Overview

This document provides a User's Guide for the Telecom Design TD1205 / 1205P Module Evaluation Kit (**TD1205 / 1205P EVK**). As an overview, this chapter gives the scope of this document and lists the board features. The document organization is then detailed. **This EVK is available for these following modules:**

Table 1. TDnext TD1205 / 1205P Modules compatible with TD1205 / 1205P EVK

Part Number	Description
TD1205	ISM SIGFOX™ gateway module with GPS (120mA@16dBm) 128K Flash/ 16K RAM / TCXO/ GPS / Integrated antennas / accelerometer
TD1205P	ISM SIGFOX™ gateway module with GPS (55mA@16dBm) 128K Flash/ 16K RAM / TCXO/ GPS / Integrated antennas / accelerometer / Hall effect sensor

1.1 Scope

The TD1205 / 1205P EVK provides a development and demonstration platform for the TDnext TD1205 / 1205P modules and software tools.

This guide focuses on the TD1205 / 1205P EVK as a development platform for the TDnext TD1205 / 1205P Modules.

1.2 Features

The board main features are:

- SIGFOX™ Gateway module in TD1205 / 1205P package
 - Power supply = 2.3 to 3.6 V
 - TD1205 / 1205P (38x30x10.5mm) with antennas
 - 2 pins for external battery
 - Up to 7 GPIOs pins (TD1205) or 13 GPIOs pins (TD1205P)
 - I²C bus interface (Only available with TD1205P)
 - 1xLVTTTL Low Power UART
 - 2xADC input pins (Only available with TD1205P)
 - 1x output trace ((Only available with TD1205P))
 - 1xStandard ARM™ SWD debug interface
- 1x TDNx004 adapter board

1.3 Organization

Each section in this document covers a separate topic, organized as follow:

- Section 1 is an overview of the board usage and features
- Section 2 provides a guide for quickly setting up the board
- Section 3 gives a hardware description of the TD1205 / 1205P EVK
- Section 4 contains the Telecom Design TD1205 / 1205P EVK schematic

1.4 Relevant Documents

This document provides a hardware overview for the TD1205 / 1205P EVK system. Additional information on the TDnext TD1205 / 1205P modules can be found in the following documents available on the Telecom Design Web site developer's area (<http://rfmodules.td-next.com/>):

2 Setting Up the TD1205 / 1205P EVK

This section helps you set up the TD1205 / 1205P for the first time.

Please consider first the electrostatic warning to avoid damaging the module, then discover the hardware and software required to operate the module. The procedure to power up the board is given, and a description of the default board behavior is detailed.

2.1 Electrostatic Warning

The TD1205 / 1205P EVK is shipped in a protective anti-static package.

The board should not be exposed to high electrostatic potentials. A grounding strap or similar protective device should be worn when handling the board. Avoid touching the component pins or any other metallic element.

2.2 Packing List

The TD1205 / 1205P EVK is delivered in a box containing:

- A TTL-232R-3V3 FTDI USB to TTL Serial Cable (3.3V)-1.8m
- The TD1205 / 1205P module
- The adapter board (TDNx004)

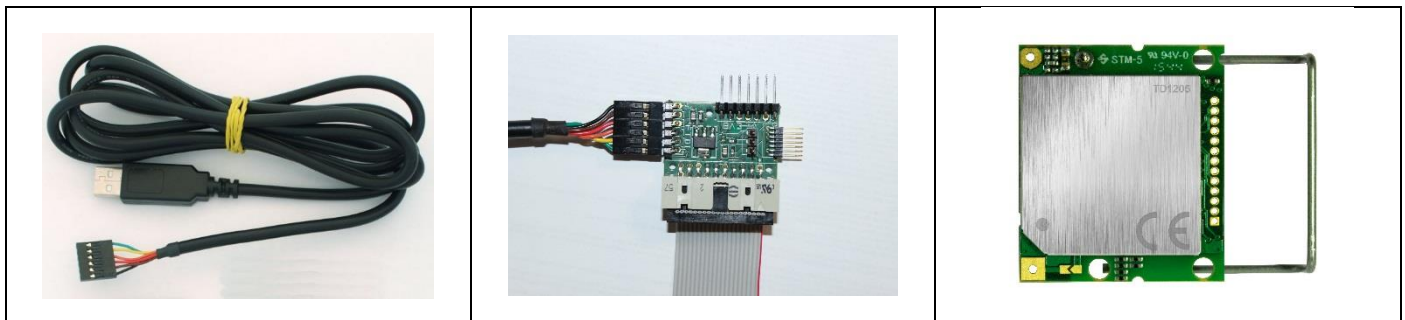


Figure 1. Packing List

2.3 Requirements

In order to set up the TD1205 / 1205P EVK, the following items are required:

- A PC running Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, 8, 10 or Windows Server 2008 R2 operating system (this is only required for being able to flash the device using the provided utility program, for a simple connection to the module, any operating system for which FTDI devices are supported should work)
- A Web browser running on the PC with access to the Internet
- A serial terminal emulation program running on the PC, such as:
 - PuTTY (<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>)
 - RealTerm (<http://realterm.sourceforge.net/>)
- The FTDI Virtual COM Port Driver (VCD) which is appropriate for your machine (<http://www.ftdichip.com/Drivers/VCP.htm>)
- The TDnext "TDLoader.exe" utility program in order to reflash the TDnext TD1205 / 1205P module firmware (<http://rfmodules.td-next.com/>)
- The TDNx004 interface board

2.4 Powering Up the Board

The TD1205 / 1205P EVK evaluation kit can be self-powered by the USB port, by using an external 5 V power supply attached to the corresponding pins on the FTDI onboard header, by the EFM32 Tiny Gecko Starter Kit connector (see schematic for details), or external battery (3.6V max).

Note that if an external battery is connected, be strongly careful to not add any other power supply.

2.5 Getting Started

The TDnext TD1205 / 1205P Modules on the TD1205 / 1205P EVK evaluation kit is pre-installed with a firmware allowing an easy set up.

This firmware contains a Hayes-compatible "AT" command interpreter that also understand the SIGFOX™ compatible commands, making it easy to type in control commands and getting the corresponding answers using a simple serial terminal emulator.

In order to verify that the device is functional, please:

- Connect the FTDI cable 0.1" Female Molex connector into the onboard R/A 6-pin header, so that the FTDI black wire is aligned with the label on the TDNx004 adapter board
- Connect the FTDI cable USB A plug into an available USB host port on the PC

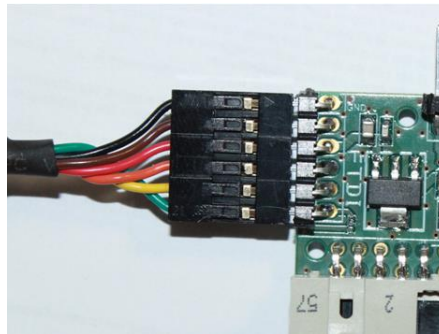


Figure 2. FTDI Cable Connection

The green LED of TD1205 / 1205P should flash briefly upon connection, indicating a Power-On Reset (POR) condition. If this is not the case, please try to unplug/replug the USB cable after controlling the connections described above.

Connector is present on TDNx004 board in order to choose the power supply. **Note that if an external battery is connected to the TD1205 / 1205P, the three pins of this connector must stay open.**

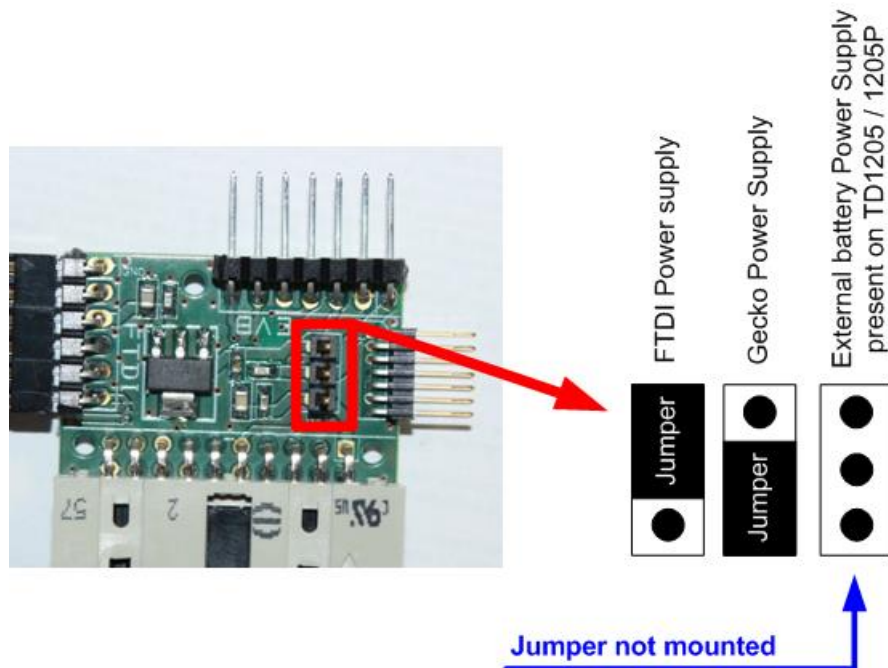


Figure 3. Power supply possibilities like J1

FTDI power supply and Gecko power supply can only be used if no Lithium battery is connected.

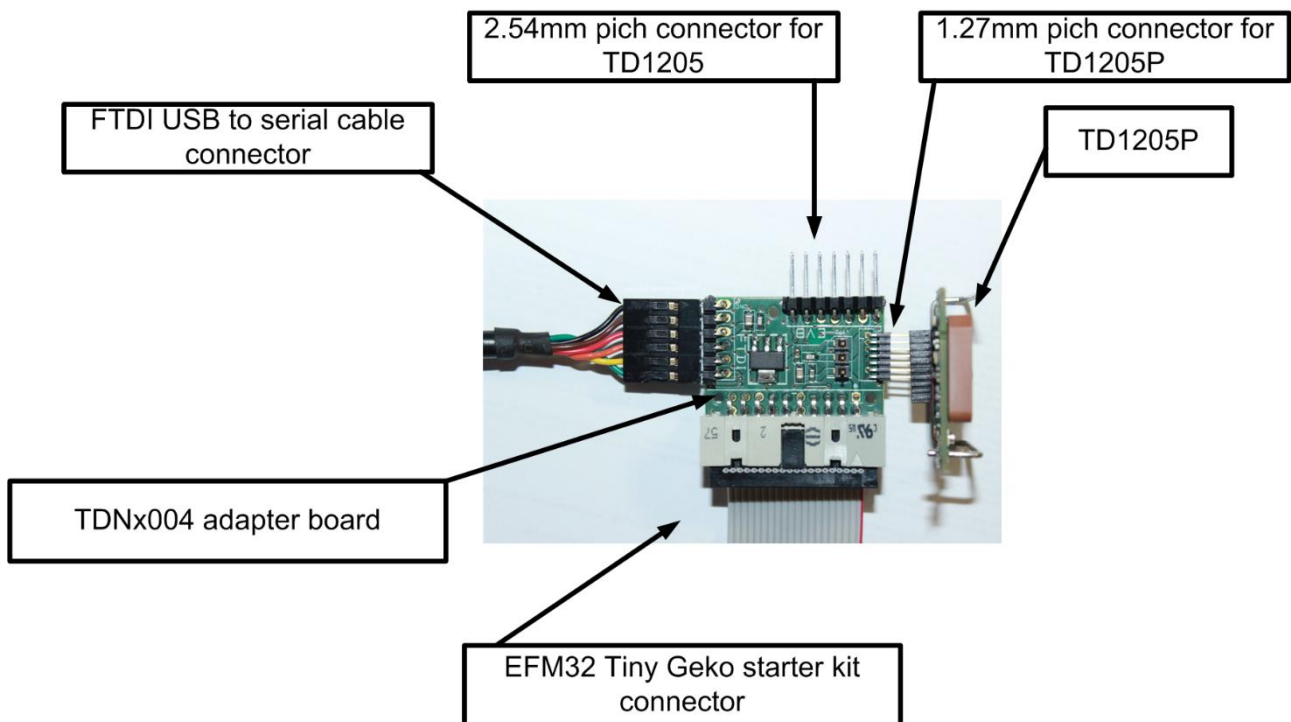


Figure 4. Getting Started

As the serial terminal emulation software will require the (virtual) port corresponding to the newly attached device, the best way to get it is to use Window's **"Device Manager"** from the Control Panel, by clicking on the **"System"** icon and selecting the **"Hardware"** tab and pressing the **"Device Manager..."** button. Please locate and unfold the **"Ports (COM & LPT)"** entry into the device tree list: you should see an **"USB Serial Port (COMx)"** entry corresponding to the newly

attached TD1205 / 1205P EVK device. If unsure, you can safely unplug/replug the USB cable to observe the changes into the “**Device Manager**” window. Please write down this “**COMx**” information, so you can provide it later to the serial terminal emulation software.

You can then close Windows’s “**Device Manager**” window and launch your selected serial terminal emulation software, with the following serial parameters:

- Port as obtained from Window’s “Device manager”
- LVTTTL electrical level
- 9600 bps
- 8 data bits
- No parity
- 1 stop bit
- No hardware/software flow control

You should then be able to type in the following command (note: there may be no character echo by default):

AT&V<CR>

Where “<CR>” represent a press on the “Carriage Return” key.
You should get a result similar to:

Telecom Design TDxxxx
Hardware Version: 0F
Software Version: SOFTxxxx
S/N: YYYYYYYY
ACTIVE PROFILE
E0 V1 Q1 X1 S300:24 S301:2 S302:14 S303:1

2.6 Upgrading the Firmware

2.6.1 With debug interface

Debug interface require EFM32 Tiny Gecko Starter Kit. To any more information, see '*Tiny Gecko Starter Kit Manual*' and '*TD1208 AN0004*'. Operation of debug interface depend of EFM32 Tiny Gecko Starter Kit hardware. To be functional, EFM32 Tiny Gecko board must be modified like depicted in '*TD1208 AN0004: Section 2*'. In this case, the jumper of TDNx004 adapter board must be place on Gecko power supply position (see **Figure 3**).

2.6.2 with embedded bootloader

Your TDnext TD1205 / 1205P module is always evolving and so is our Web portal. To be able to use your module please always perform a firmware upgrade using the latest available firmware.

The TDnext TD1205 / 1205P modules contain a built-in bootloader able to perform a full firmware upgrade locally while connected to a Windows PC computer over its UART/USB interface.

There is no need to have a full toolchain set up to upgrade at TDnext TD1205 / 1205P module, as only the TDnext provided "**TDLoader.exe**" utility is required.

This utility can be obtained from <http://rfmodules.td-next.com/>.

Launch the "TDLoader.exe" utility. This will open a dialog window similar to this:



Figure 5: TD Loader Dialog

2.6.3 Local Firmware Upgrade

In order to perform a local firmware upgrade, please:

- Make sure the FTDI cable is connected on the PC end
- Provide the COM port number, as obtained from the "**Device Manager**" in section 2.5 "Getting Started" above
- Paste the firmware file absolute file name or browse to it using the "**Browse...**" button
- Press the "**Acquire**" button to start the upgrade process
- If not already connected, please connect the TD1205 / 1205P EVK board to the FTDI USB cable, you should see:

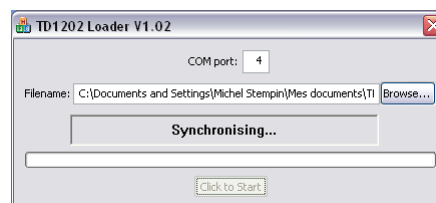


Figure 6: TD Loader Synchronizing

- If the Loader cannot get synchronized with the TD1205 / 1205P EVK, try to unplug/replug the board on the FTDI cable 2.54mm Female Molex connector side and retry. You should then get:



Figure 7: TD Loader Upgrading

- During the upgrade process, the TD1205 / 1205P EVK onboard blue LED should turn on and shortly turn off during Flash writes. It will eventually turn off and you should get:

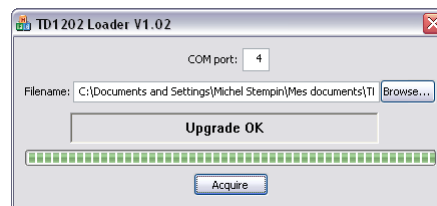


Figure 8: TD Loader Finished

2.6.4 Remote Firmware Update

Within a controlled RF manufacturing environment, the TDnext TD1205 / 1205P module firmware can also be upgraded remotely by radio.

Please contact TDnext to obtain more information on the required procedure.

2.7 SIGFOX™ Transmission Test

Beside the basic purpose of controlling that the board is operational, the default firmware is able to send RF messages to the SIGFOX™ network, which can be monitored using the SIGFOX™ backend Web portal in real-time.

In order to perform a SIGFOX™ transmission test, please point your Web browser to the address <http://backend.sigfox.com>. Use the login and password information supplied by SIGFOX™ to access the platform.

Then, turn on temporarily character echo (so you can see what you are actually typing), enable verbose answer display, and send a message containing the 2 hexadecimal byte values 0x54 and 0x44:

```
ATE1<CR>ATQ0<CR>
OK
AT$SS=54 44<CR>
OK
```

You should see a raw message containing the 2-byte value appearing promptly in the SIGFOX™ backend Web portal display.

2.8 Cloud-on-Chip™ Transmission Test

The default firmware is also able to send RF - Sensor formatted - messages through the SIGFOX™ network, which can be monitored on the SENSOR™ Web portal in real-time.

In order to access the SENSOR™ Web portal and to your module's dashboard, you will need first to register your SIGFOX™ gateway module on the SENSOR™ platform.

To do so, please turn on temporarily character echo (so you can see what you are actually typing), enable verbose answer display, and make sure your module is configured as a Transmitter.

```
ATE1<CR>ATQ0<CR>
OK
```

```
ATS500=2<CR>
```

```
OK
```

```
AT&W
```

```
OK
```

```
ATZ
```

```
OK
```

Please wait a few seconds for the module to reboot before sending a registration frame:

```
AT$REG<CR>
```

```
OK
```

You should now be able to access the SENSOR™ Web portal and your module's dashboard by pointing your Web browser to the address <https://developers.insgroup.fr/dashboards/device.html> and entering the registration information supplied on the TD1205 / 1205P EVK sticker.

You can try to send a raw message:

```
AT$RAW=54 44<CR>
```

```
OK
```

You should see a raw message containing the 2-byte value appearing promptly in your dashboard.

3 TD1205 / 1205P EVK Overview

The TD1205 / 1205P EVK provides access to the different TDnext TD1205 / 1205P module interfaces, USB connectivity using a standard FTDI LVTTTL RS232 ↔ USB cable, and development flashing/debugging facility using the standard ARM™ SWD debug interface, as well as an integrated regulated power supply.

The TD1205 / 1205P EVK can be powered from USB or from the dedicated power pins on the available headers, with the capability to measure the current consumption of the target TDnext TD1205 / 1205P module.

3.1 Layout

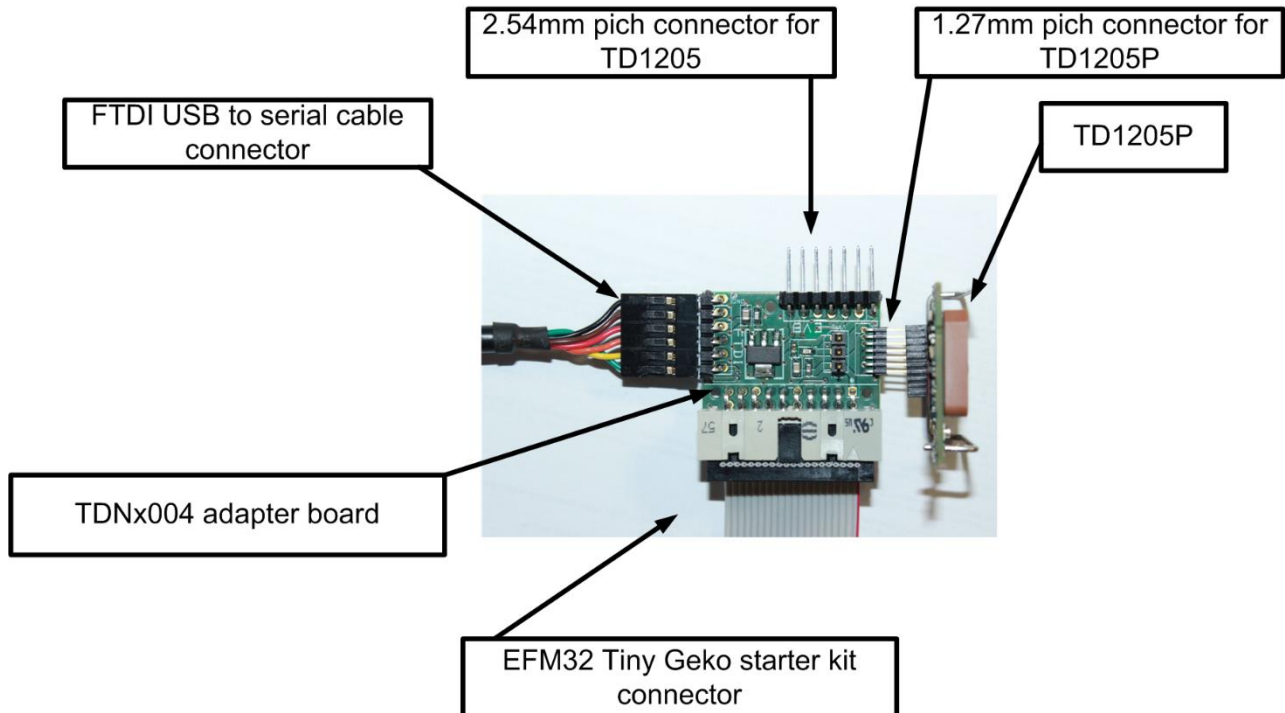


Figure 9: TD1205 / 1205P EVK Top View

3.2 Block Diagram

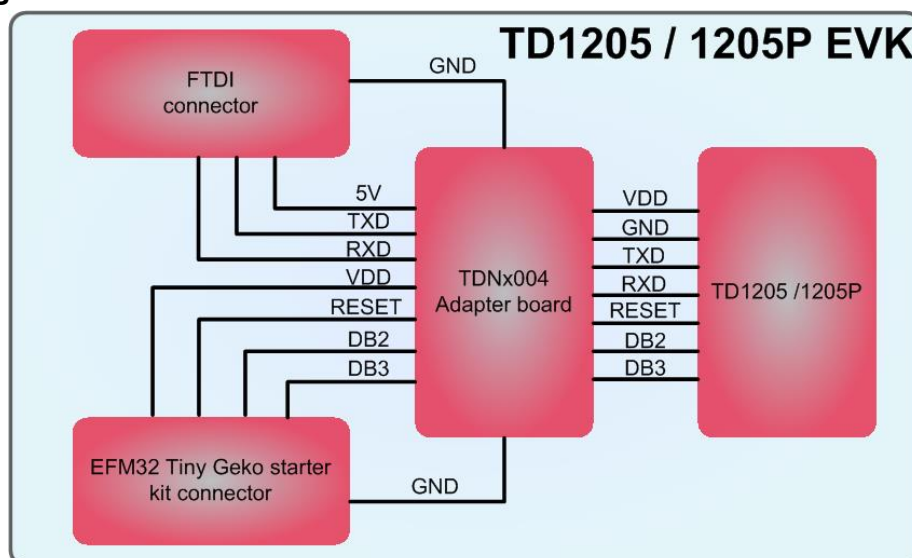


Figure 10: TD1205 1205P EVK Block Diagram

3.3 Hardware Description

3.3.1 FTDI USB to Serial Cable Connector

The TD1205 / 1205P EVK is equipped with a 1x6 2.54mm pitch R/A header compatible with FTDI's TTL-232R-3V3 TTL to USB Serial Converter cable. One such cable is included within the TD1205 / 1205P EVK.

The cable datasheet can be found on FTDI's support website at:

http://www.ftdichip.com/Support/Documents/DataSheets/Cables/DS_TTL-232R_CABLES.pdf

Note: This cable has no orientation key, so there is a chance that it can be plugged in the wrong way. The cable crimps should be visible on the upper side of the black Molex connector, see **Figure 2**.

3.3.2 EFM32 Tiny Gecko Starter Kit connector

The TD1205 / 1205P EVK is equipped with a 2x10 2.54mm pitch connector compatible with EFM32 Tiny Gecko Starter Kit.

3.3.3 ISP Header

The TD1205 / 1205P EVK contains a single-in-line 7x1 2.54mm pitch header for TD1205 and 7x1 1.27mm pitch header for TD1205P, as a convenient low pin count ISP (In Situ Programming/Debugging) interface, and consisting in:

- 3.3 V power supply and ground (only if external battery is not use)
- 2-wire UART RXD/TXD signals
- RESET input signal
- 2-wire ARM® SWD (Single Wire Debug) DB3 (SWDCLK) and DB2 (SWDIO) signals

The connector pinout is given in the following figure and table:

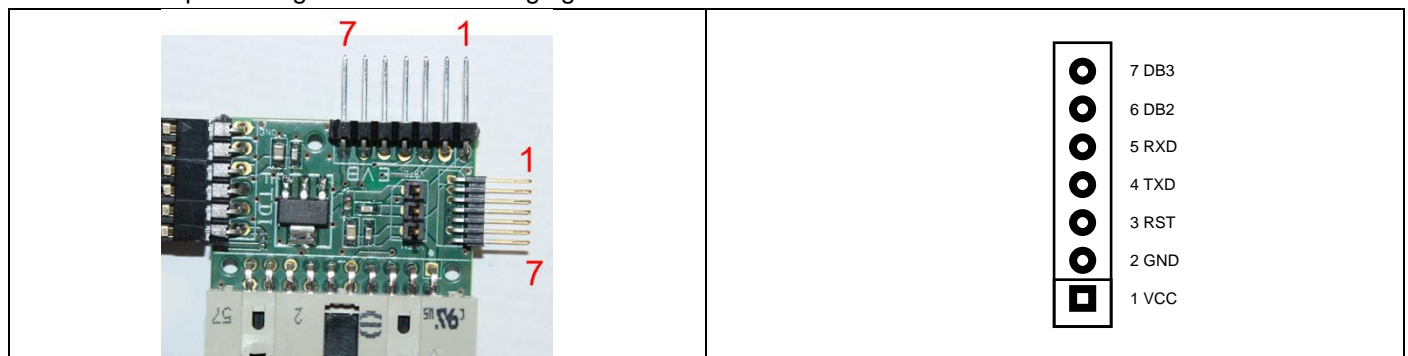


Figure 11 : ISP Header Pinout

Table 2: ISP Header Pinout

Pin	Pin Name	I/O	Description
1	VCC	VCC	+2.3 to +3.3 V Supply Voltage Input
2	GND	GND	Connect to PCB ground
3	RST	I	Active Low RESET input signal
4	TXD	O	Low-Power UART Data Transmit Signal
5	RXD	I	Low-Power UART Data Receive Signal This signal is internally pulled up by an integrated resistor.
6	DB2	I/O	SWDIO (SWD Data I/O) Signal
7	DB3	I	SWDCLK (SWD Clock) Signal

4 TDNx004 adapter board Schematics

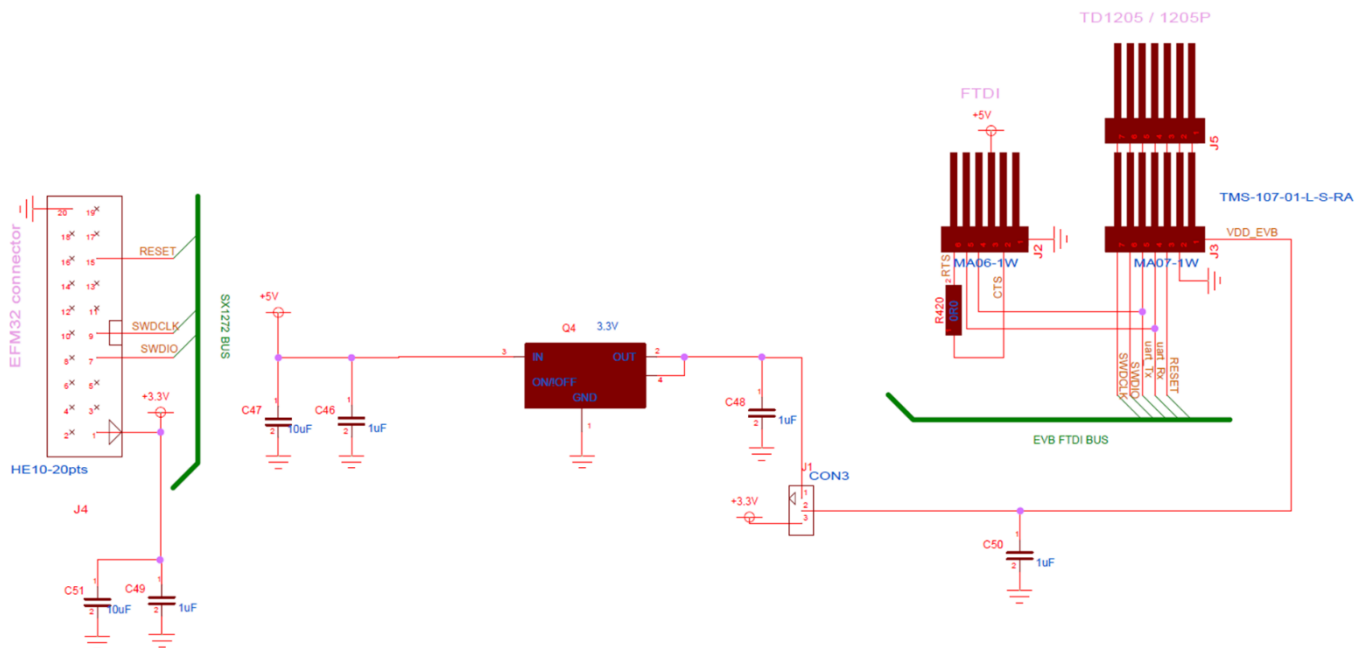


Figure 12: TDNx004 adapter board Schematics

DOCUMENT CHANGE LIST

Revision 1.0

- TD12xx/TD15xx/TD16xx EVK User's Guide

Revision 1.1

- 2.6.1 section added

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