TUSB3410UARTPDK User's Guide

Connectivity Solutions

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1 Overview

The TUSB3410UARTPDK is a product design kit (PDK) intended to showcase the TUSB3410 as a compact USB to serial interface bridge. Together with TI's Virtual COM Port (VCP) software, it produces a turnkey, configurable USB/serial bridge solution.

TI provides all components necessary to complete the solution:

- the integrated circuit devices
- firmware to run on the device
- drivers (Windows, Mac OS, Linux)
- utilities and instructions necessary for the designer to implement the solution in the end design.

The information in this kit is subject to change, and software updates are ongoing. For the latest information pertaining to this kit, please visit http://www.ti.com/rd/tusb3410uart. For the latest version of the software, please visit www.ti.com/rd/tusbwinvcp.

1.1 What's Included

This kit contains the following:

- "Getting Started" document (SLLU048B)
- TUSB3410UART EVM
- USB cable (certified by the USB-IF)
- Serial cable
- An application note, "Application of TI's VCP Software Solution" (SLLA170) which walks the designer through the process of implementing the VCP solution.

The driver/firmware software package must be downloaded from TI's website (www.ti.com). TI distributes this software via the web so that you are sure to get the latest build. Please see the "Getting Started" document for specific instructions in obtaining the software.

1.2 Hardware/Software Requirements for the TUSB3410UARTPDK

The TUSB3410UART EVM is designed for use with a personal computer running a USB–enabled operating system. The PC should be compliant with the USB 1.1 or 2.0 specifications. This implies that the BIOS, chipsets, and operating system are all USB specification compliant.

The TUSB3410UARTPDK is primarily intended for evaluation with the Windows version of the VCP driver. All descriptions provided in this user's guide assume that Windows is the software environment. While the Linux and Mac OS versions could be used as well, they may require additional configuration. Contact TI if you're interested in these alternate versions of the driver.

1.3 TUSB3410UART EVM Board Overview

The TUSB3410UART evaluation module (EVM) provided in this kit is specifically designed to showcase the TUSB3410 as a compact USB to serial interface bridge. TUSB3410 interfaces full-speed (12Mbps) USB to a high-speed UART. The EVM adds an RS232 driver to interface to standard serial port devices.

Included in the TUSB3410 EVM design are an I2C serial EEPROM, a 12MHz crystal, and a 5V-to-.3V low-dropout voltage regulator. The EEPROM contains code to boot the TUSB3410's internal 8052 micro controller and other configuration parameters while the 12MHz crystal provides the clock source for the device. The 5V-to-3.3V voltage regulator converts the 5V USB bus power to 3.3V, which is required by the TUSB3410.

The EVM operates from 5V USB bus power. A TUSB3410 solution may be either self-powered or bus powered.

The EVM is 3cm by 6cm. See Fig. 1.

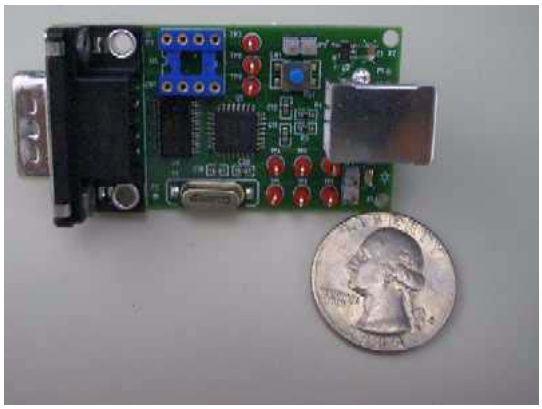


Figure 1. TUSB3410UART Evaluation Module

2 System Setup and Procedure

Download the software per the instructions in the "Getting Started" document accompanying this kit. Install the driver according to the instructions.

Please run the installer included in the driver package rather than allowing Windows to conduct the installation. While it is possible to do a proper install by first attaching the EVM and allowing Windows to complete the installation, running the installer is more automated. The installer seeks out and resolves any conflicts that could prevent the driver from working properly.

Be sure to run the appropriate version of the installer depending on your version of Windows (Windows 98/ME or Windows 2000/XP). The installer places both the driver and a firmware file that will be downloaded to the EVM when it is attached.

Fig. 2 shows the typical system setup.

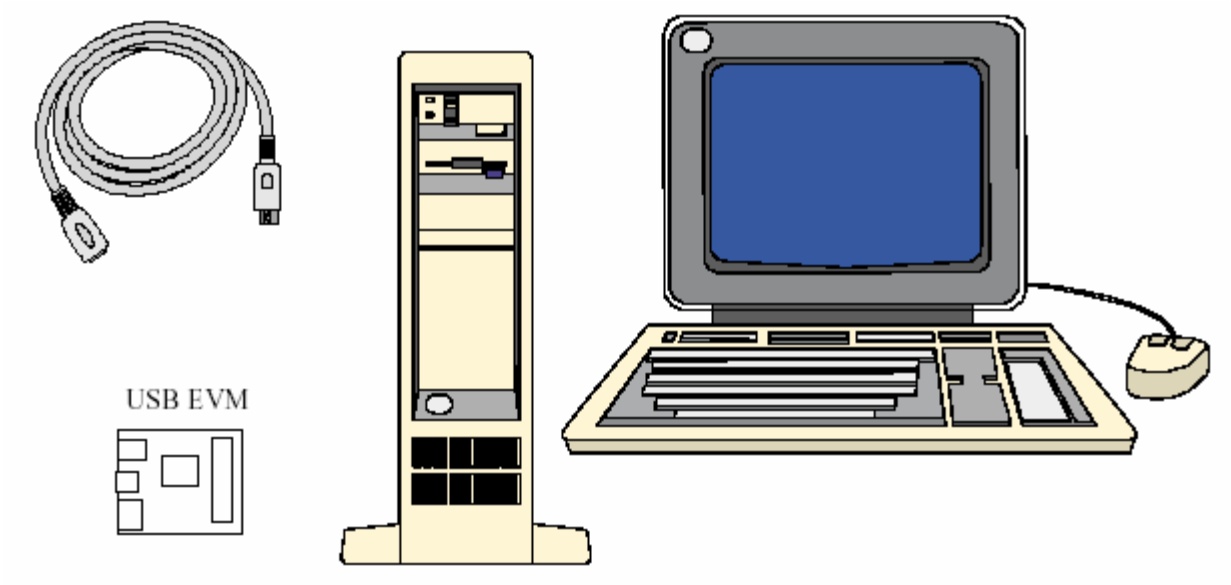


Figure 2. Typical System Setup

Attach a serial device to the TUSB3410UART EVM using the serial cable and attach the EVM to the PC using the USB cable. The first time you attach the EVM to the host PC, Windows displays “bubble” information in the lower right corner, showing text that originates in the EEPROM device located on the board. This is information you can customize for your product.

Also located in the EEPROM is a device descriptor containing a Vendor ID (VID) and Product ID (PID). For the TUSB3410UART EVM, these values are 0x0451 (the VID assigned to TI by the USB Implementers Forum) and 0x341A (the PID TI has assigned to this EVM), respectively. The operating system uses the VID/PID combination to identify the type of device that has been attached, and therefore what driver it needs to load. The VCP driver is configured to respond to the 0451/341A VID/PID pair.

Furthermore, the EEPROM includes a string descriptor containing a serial number for this EVM. The operating system uses the combination of the VID, PID, and serial number to distinguish this particular EVM from other instances off this EVM. For example, COM port settings will be associated with that particular combination of VID, PID, and serial number. Windows presents the “Found New Hardware” dialog whenever it sees a new combination of these three values.

If the VCP installer setup was run before attaching the EVM, the installation will occur automatically. If the installer was not run first, guide Windows to the correct INF files within the installer directory.

Note that Windows may state that the driver is not certified by Microsoft. TI has verified that the driver passes Microsoft's HCT test setup, but to date has not submitted the driver for certification. Any certification TI acquires will have to be performed again by target companies prior to their specific product release due to regulations by Microsoft and the USB IF. Nevertheless, TI is pursuing certification in the first quarter of 2005.

Because the VCP driver architecture contains two modules, one for the USB functionality and one for the COM port functionality, Windows will present the "Found New Hardware" dialog twice. For the same reason, you should be able to see the solution enumerate in two places in the Windows Device Manager when installation is complete. For the Windows 9x driver, it enumerates as a "VCP device" and also as a new COM port, as shown in Fig. 3.

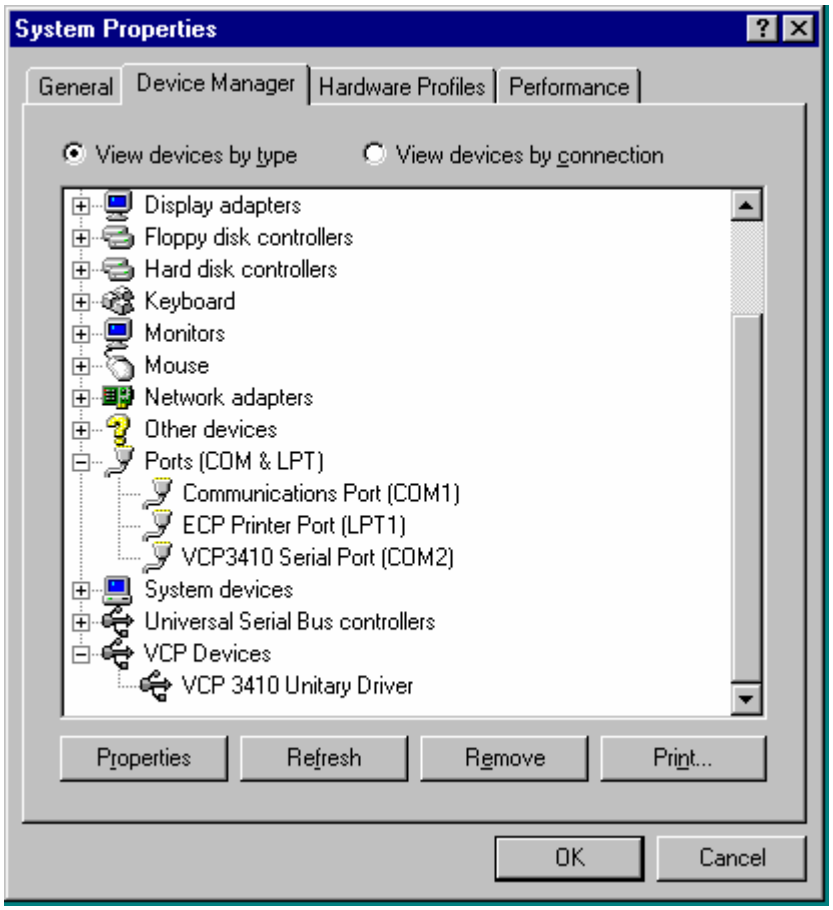


Figure 3. Enumeration on Windows 98

For the Windows 2000/XP driver, it enumerates as a "multiport serial adapter", and also as a new COM port, as shown in Fig. 4.

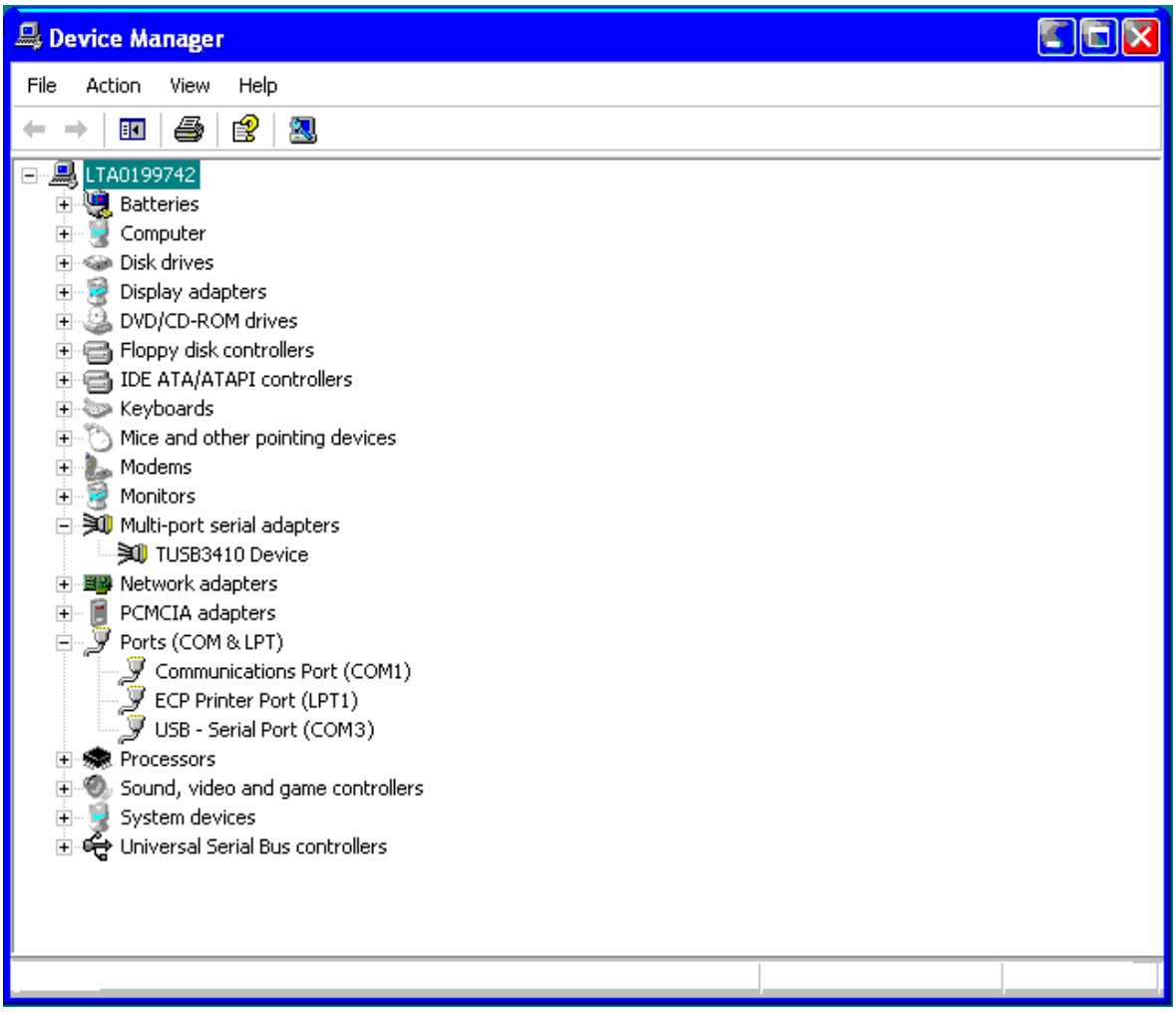


Figure 4. Enumeration on Windows 2000/XP

The serial device should now be accessible.

2.1 A Note on PIDs for TUSB3410UART EVM

Prior to March 2005, the EVM shipped without an EEPROM device in socket U5. As a result, the TUSB3410 reported its default VID, PID, and serial number to the host, and the INF files for the VCP driver were configured to associate with these values. TI provides another driver (AppLoader) that associates with this same VID/PID pair and has found that many users have run into conflicts due to having both drivers installed on the same host machine. In addition, TI is planning to release a new utility in 2Q05 that also uses the default VID/PID.

In order to resolve these common conflicts, as well as enable the use of both the VCP software and the new utility on the same machine, TI has changed the PID reported by the EVM to “341A”. An EEPROM is now included on each TUSB3410UART EVM to implement this change.

NOTE: *Starting with v104 of the driver, TI is removing PID "3410" from the VCP driver INF files.* Prior versions of the VCP driver are able to recognize either "3410" or "341A"; v104 and later versions only recognize "341A". (See Sec. 2.2 for instructions on determining which version is installed.)

2.2 Identifying Version of VCP Driver

The firmware and Windows driver are characterized by the same versioning nomenclature. Although there are no known conflicts when the driver/firmware versions do not match, it is recommended to use matching versions when possible. For example, the v103 driver should be used with the v103 firmware. If firmware is not included in the EEPROM – as is the case with the TUSB3410UART EVM – then firmware is downloaded from the host, and this ensures that the driver and firmware are of the same version.

To determine the version of the Windows 2000/XP driver, locate the "Multi-port serial" device in the Device Manager, double-click, and click on the "Driver" tab. Look at the last subfield in the value of the "Driver Version" field (the number after the last decimal).

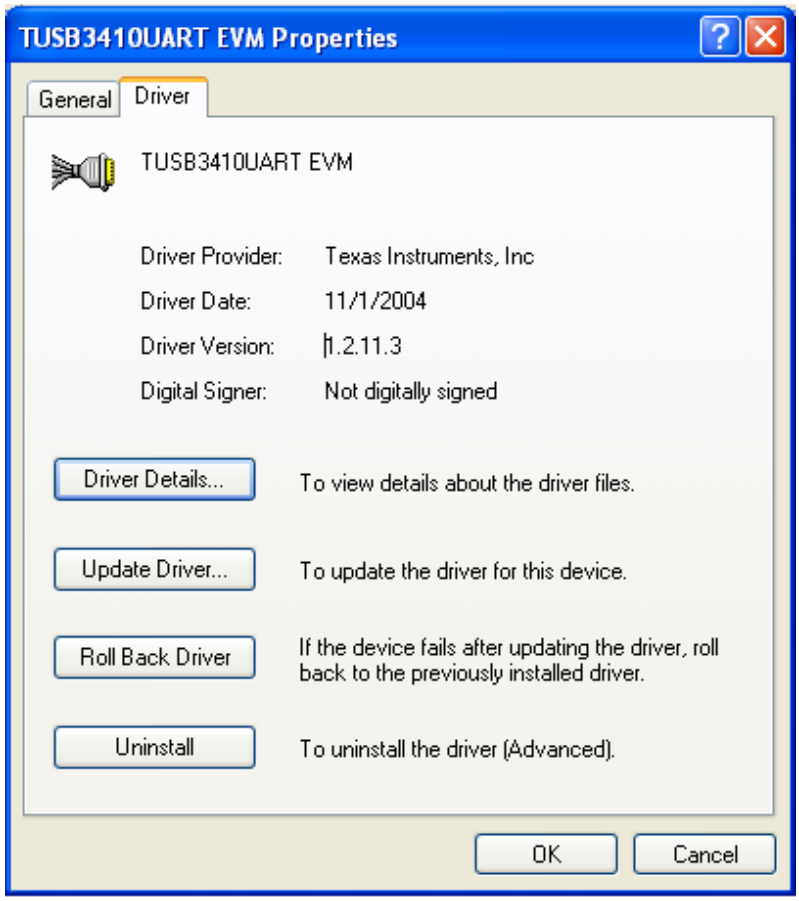


Figure 5. Windows Driver Properties

In Fig. 5, this value is “3”. This indicates version v103 of the driver. A “4” would indicate v104, and so forth.

Prior to v100, there were two digits in this subfield. For example, a “96” indicated v096 of the driver. (Only two digits are allowed in the field, and the leading 0 is dropped. As a result, this number rolled to 0 with v100 of the driver.)

Text files within the driver installer also document the version of the driver.

3 EVM Materials

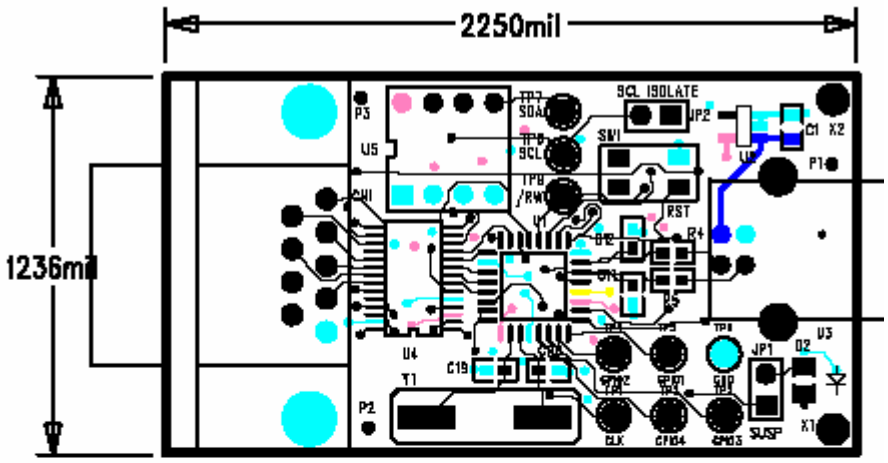
3.1 BOM

Item	Reference Designator	Part	Part Number	
1	CN1	Connector-DB9		DB9-HM
8	C1, C13, C14, C15, C16, C17, C18, C21	1 μF	C2012X7R1C105M	SMT_0805
1	C2	4.7 μF	C3216X7R1C475M	SMT_0805
4	C3, C6, C8, C10	0.1 μF	C1608X7R1H104K	SMT_0603
2	C4, C5	0.01 μF	C1608X7R1H103K	SMT_0603
2	C9, C7	0.001 μF	C1608X7R1H102K	SMT_0603
2	C11, C12	22 pF	C1608C0G1H220J	SMT_0603
2	C20 ,C19	33 pF	C1608C0G1H330J	SMT_0603
1	D1	sot-23-Diode	BAS21ZXCT-ND	SOT23-DIODE
1	D2	LED	160-1421-1-ND	SMT_0805
1	F2	TDK MPZ2012S331A	MPZ2012S331A	MPZ2012
2	JP1, JP2	Jumper		HDR1X2
1	R1	90.9 kΩ	P100KCCT-ND	SMT_0603
1	R2	100 kΩ	P100KCCT-ND	SMT_0603
1	R3	1.5 kΩ	P1.50KCCT-ND	SMT_0603
2	R4, R5	RES 33.2 OHM 1/10W 1%	P33.2HTR-ND	0603 SMD
3	R9, R10, R15	1 kΩ	P1.00KCCT-ND	SMT_0603
1	R11	RES 32.4K OHM 1/10W 1%	P32.4KHTR-ND	0603 SMD
1	R12	10 kΩ	P10.0KCCT-ND	SMT_0603
1	R13	15 kΩ	P15.0KCCT-ND	SMT_0603
1	R20	10 kΩ	P1.50KCCT-ND	SMT_0603
1	SW1	Switch	7914G-1-000E	MOM-SW
7	TP1, TP2, TP3, TP4, TP5, TP6, TP9	T point R	HDR1X1	TP52
2	TP7, TP8	Test point small		TP52
1	U1	TUSB3410	TUSB3410	LQFP-32
1	U2	TPS76933	TPS76933DBVT	SOT-5P
1	U3	Type B USB–shield	AE1085-ND	4P-B-RECEP
1	U4	SN75LV4737A	SN75LV473A	SN75LV4737ADB
1	U5	8–pin socket for 24LCxx	A400-ND	DIP8_SKT

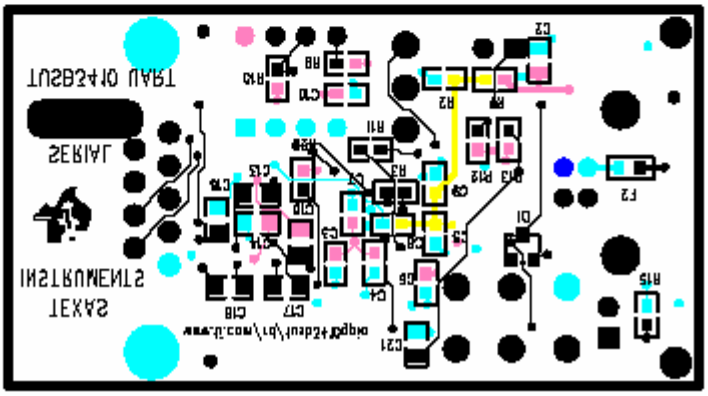
1	Y1	12–MHz crystal HC49SMD	P-16695	CRYSTEK

3.2 Layout

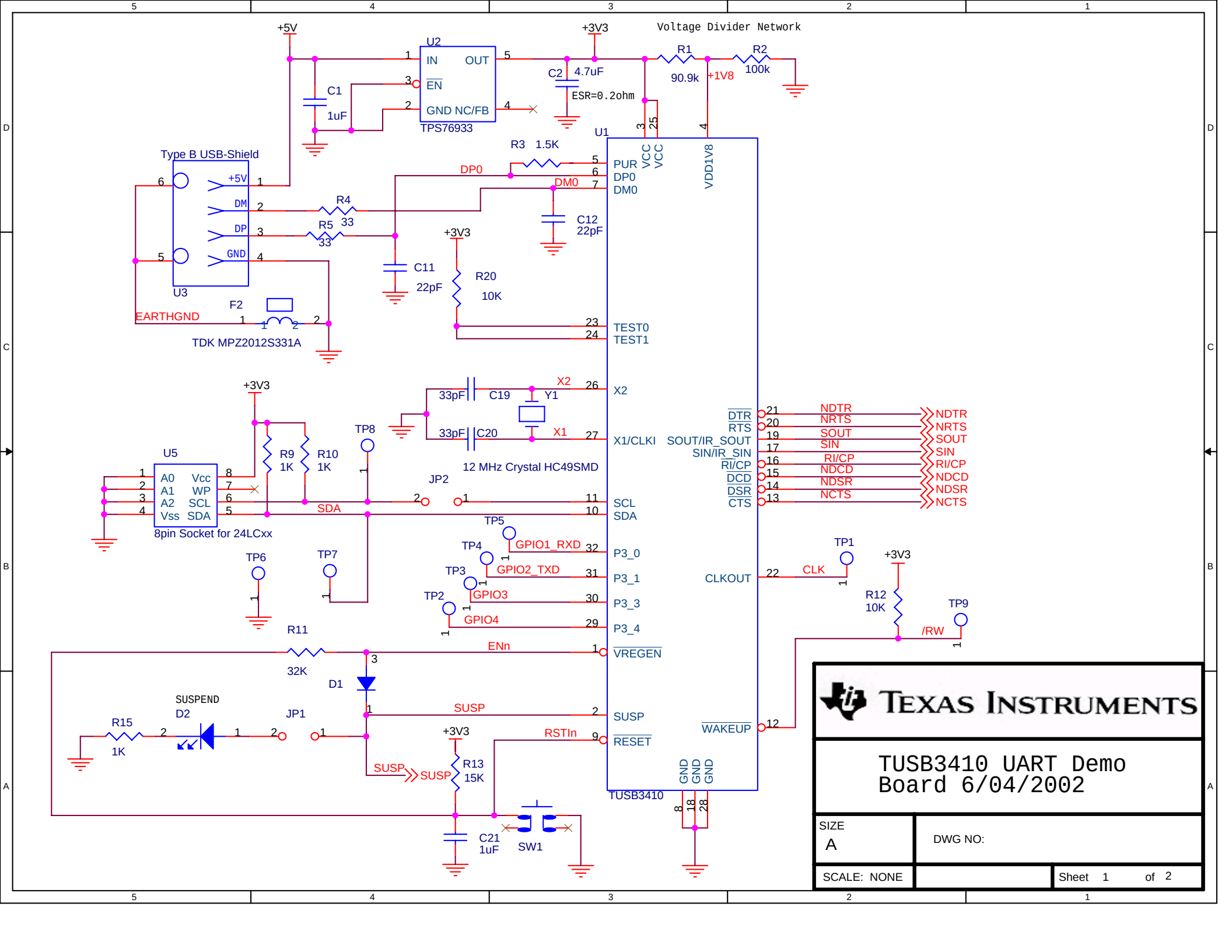
Top View

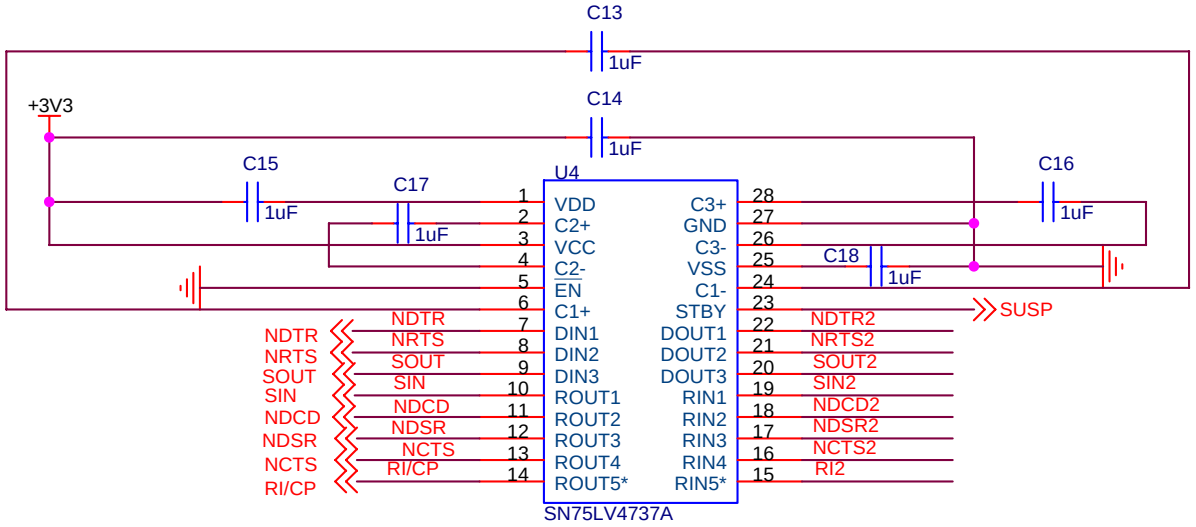


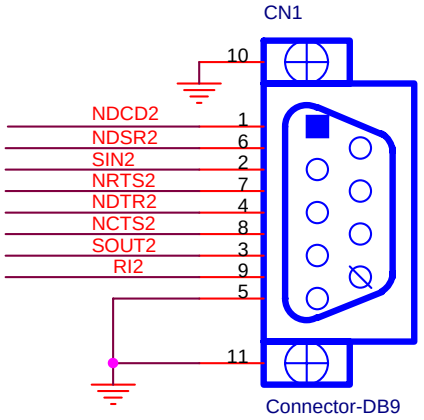
Bottom View



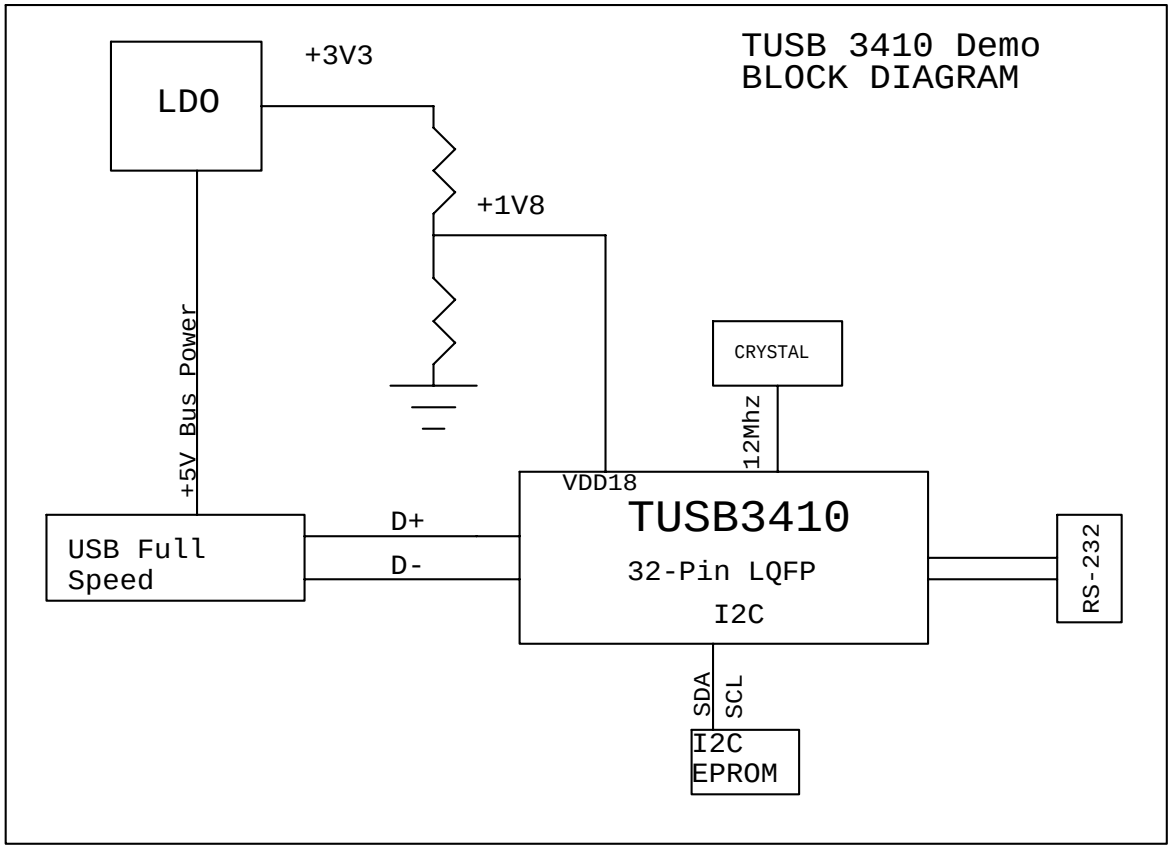
3.3 Schematic

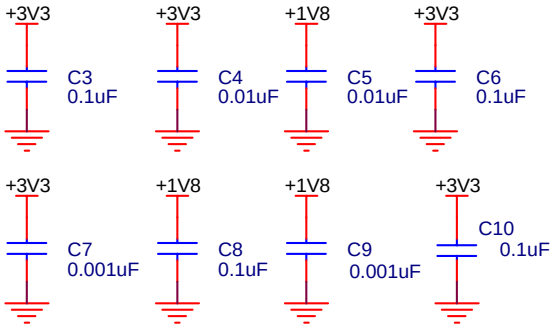

Voltage Divider Network
+5V
+3V3
U2
IN
OUT
EN
GND NC/FB
TPS76933
C1
1uF
C2
4.7uF
ESR=0.2ohm
R1
90.9k
R2
100k
+1V8
U1
R3 1.5K
PUR
DP0
DM0
VCC
VDD1V8
Type B USB-Shield
+5V
DM
DP
GND
U3
R4
R5 33
33
C12
22pF
C11
22pF
R20
10K
F2
EARTHGND
TDK MPZ2012S331A
TEST0
TEST1
X2
X1/CLKI
33pF
C19
Y1
33pF
C20
12 MHz Crystal HC49SMD
TP8
JP2
U5
A0
A1
A2
Vss
Vcc
WP
SCL
SDA
8pin Socket for 24LCxx
R9
1K
R10
1K
SDA
SCL
DTR
RTS
SOUT/IR_SOUT
SIN/IR_SIN
RI/CP
DCD
DSR
CTS
NDTR
NRTS
SOUT
SIN
RI/CP
NDCD
NDSR
NCTS
TP5
TP4
TP3
TP2
TP6
TP7
GPIO1_RXD
GPIO2_TXD
GPIO3
GPIO4
P3_0
P3_1
P3_3
P3_4
CLKOUT
CLK
TP1
R12
10K
TP9
/RW
R11
32K
ENn
VREGEN
D1
SUSPEND
D2
R15
1K
JP1
SUSP
SUSP
SUSP
R13
15K
RSTIn
RESET
WAKEUP
GND
TUSB3410
C21
1uF
SW1
TEXAS INSTRUMENTS
TUSB3410 UART Demo
Board 6/04/2002
SIZE
A
DWG NO:
SCALE: NONE
Sheet 1 of 2





RS-232
Male
CONNECTION





Title	TUSB3410 UART Demo Board 6/04/2002	
Size A	Document Number	Rev
Date:	Sheet 2 of 2	

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