

User Manual



CMR3000 DEMO KIT

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1 Introduction

CMR3000 demo demonstrates the CMR3000 component functionality and the component key properties. This document describes how to install the required software and how to use the CMR3000 demo board and Graphical User Interface (GUI) software.

CMR3000 demo consists of:

- CMR3000 sensor soldered on chip carrier PWB (see Figure 1 on next page)
- USB interface card (see Figure 1 on next page)
- USB cable
- GUI software running on PC

Evaluation boards (CMR3000 PWBs) are compatible with the CMA3000 DEMO KIT.

CMR3000 demo runs on Windows XP and 2000, it requires USB connection for data transfer. Demo is powered from USB port. The current GUI software does not support Windows Vista. The CMR3000 demo is based on the same USB hardware PCB as the CMA3000 DEMO KIT, also the same driver can be used with all demo kits provided by VTI Technologies.

2 Quick start for using the CMR3000 DEMO KIT

Please follow the steps below:

1. Insert CD-ROM
2. Setup the hardware
 - Connect the demo kit to PC's USB port
3. Install the USB driver, after the PC has found the device
 - When the PC detects the new USB device, do not let Windows to detect the driver, address the USB driver from folder:
"CD-ROM\CMR3000 demo - Virtual Com Port Drivers\"
 - NOTICE, if you have already installed some other demo kit provided by VTI Technologies, please check that the latency timer parameter is 5 ms. In case the latency timer value is greater than 5 ms, the CMR3000 DEMO KIT GUI will not work (more detailed instructions in section 9)
4. Install the GUI software
 - Install the GUI software by running the "setup.exe" from folder:
CD-ROM\CMR3000 DEMO KIT - ver 0.3 - Installer
 - Do not change the installation destination
5. Start the GUI software
 - From Start → Programs → CMR3000 → CMR3000.0.3

When using the CMR3000 DEMO KIT with GUI software:

- The DEMO KIT should be connected to PC before the GUI software is started
- Exit the GUI software before unplugging the DEMO KIT from PC
- After GUI software is stopped, the DEMO KIT can be unplugged from PC (DEMO KIT uses virtual serial port driver, so it can not be found as a USB device).

During software start up, the firewall may alert that the demo software wants a network access. The demo software can be operated without the network access (granting the network access won't change the software operation.)

3 Hardware

The CMR3000 DEMO KIT USB interface board (black PWB) and CMR3000 PWB (red PWB) are shown in Figure 1. The USB interface card converts the USB interface to SPI or I²C interface. CMR3000 sensor is soldered on PWB which is connected to interface board.

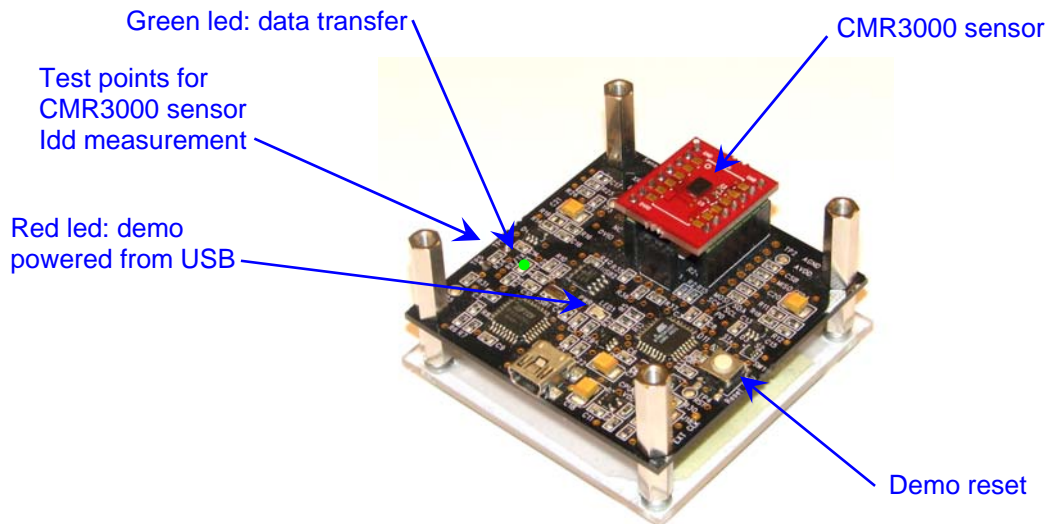


Figure 1. CMR3000 demo USB interface board and CMR3000 PWB.

4 GUI software

CMR3000 DEMO KIT is controlled via USB serial port by GUI software.

The GUI software has four different display modes. The CMR3000 sensor can be set to:

- normal measurement mode, slow/high speed sample rate
- mouse mode
- demo reset mode

The three different GUI displays and start up screens are presented below.

Screen capture of the GUI is presented in Figure 2.

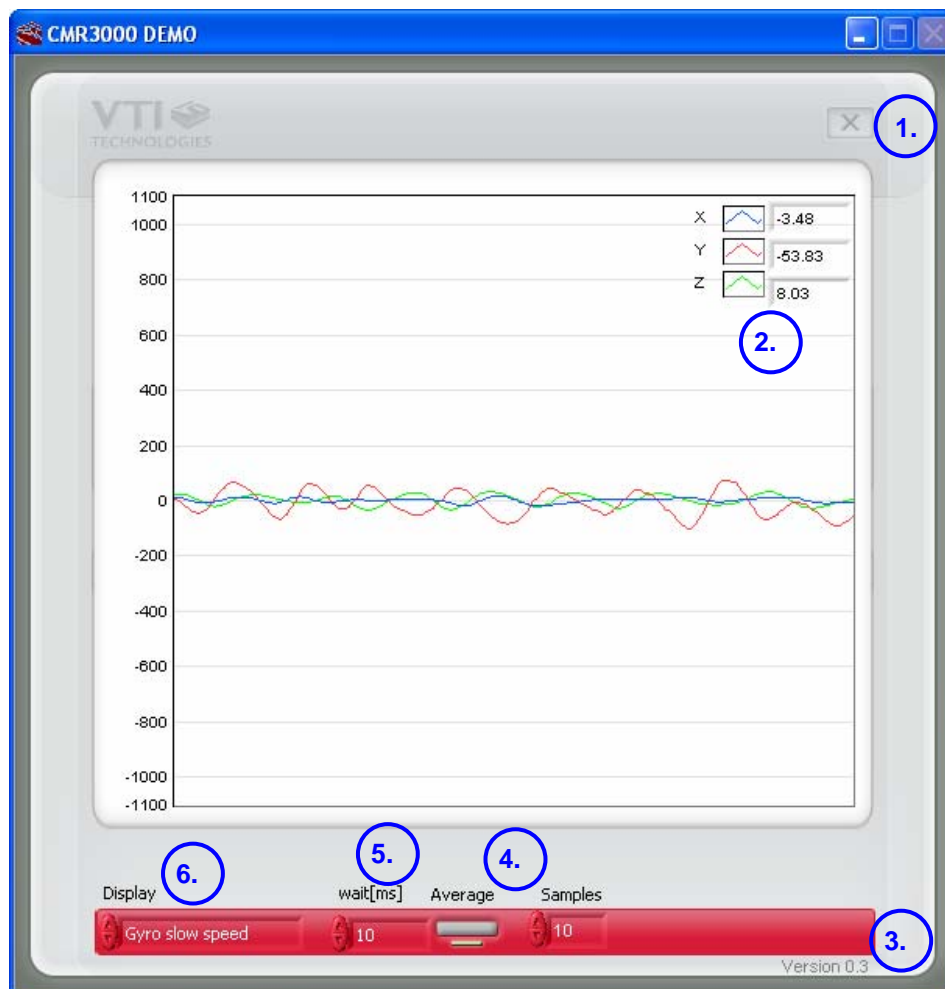


Figure 2. CMR3000 DEMO KIT Graphical User Interface

Table 1. The numbered items in Figure 2.

Item	Description
1	Exit software, [Esc]-button also.
2	Current acceleration output value decimal display
3	GUI software version
4	Averaging ON / OFF, number of samples for averaging.
5	Timing parameter defining how frequently serial port buffer is read
6	Pull down menu for GUI display mode.



MOUSE, CMR3000's Z-axis (yaw) is used to control cursor's x-movement and Y-axis (pitch) is used to control cursor's y-movement.

Gain X, Gain Y and Sensitivity are parameters with which X and Y direction movements can be controlled.

Figure 3. Mouse demo display.



RESET DEMO initialises the GUI software. The embedded MCU software version is presented also. SCROLL display opens after RESET by default.

Figure 4. Reset demo display.

4.1 Resetting GUI and μ C

CMR3000 DEMO KIT GUI software can be reinitialised by selecting the “Reset demo” display from pull down menu, see Figure 4.

MCU can be reset by exiting from the GUI and then pressing the reset button (Figure 1) on USB interface board for min 3s.




4.2 Uninstalling the GUI and USB driver

The GUI software and the USB driver (FTDI Serial Converter Driver) can be removed from Windows Control Panel Add/Remove Programs. Please notice that removing the FTDI Serial Converter Driver (USB driver) may affect on functionality of some other programs (such as other demo kits provided by VTI Technologies).

5 Advanced data logging

Data can be logged by using the Windows HyperTerminal software and macro language that is used to control the MCU of the CMR3000 DEMO KIT.

Please notice that GUI software and Windows HyperTerminal software can not be open at the same time. Follow the steps below to start the data logging:

1. Connect CMR3000 DEMO KIT with USB cable to PC
2. Use Windows Device Manager to find out the COM port number.
3. Close the GUI software.
4. Open Windows HyperTerminal software from CD-ROM:
 - “CMR3000_demo_HyperTerminal_connection.ht”, or
 - see detailed serial communication settings in Table 2.
5. Press demo reset button (see Figure 1). CMR3000 DEMO KIT sends an info text to HyperTerminal (see Figure 5). If the HyperTerminal software is unable to connect the CMR3000 DEMO KIT or the info text does not appear,
 - Press disconnect ,
 - change the COM port number to correct from port properties ,
 - press connect ,
 - press reset button on CMR3000 DEMO KIT.
 until info text appears to HyperTerminal screen (see Figure 5).
6. After the info text appears on HyperTerminal, send the wanted macro text file, such as “CMR3000 demo configuration - Meas mode 80Hz, INT disabled.txt” from CD-ROM (“Transfer” pull down menu → “Send Text File...” → browse for CMR3000 demo configuration - Meas mode 80Hz, INT disabled.txt)
7. The text file is a macro that runs in an endless loop. The macro sends 3-axis angular rate data in hex format to HyperTerminal (see Figure 6). Example of data format:
`0x3C,0x01,0x01,Z-Y-X`
 where “0x” indicates for hex format, and “Z-Y-X” the axis order. The Z-axis hex output is 3C, which is ‘0011 1100’ in binary format.
8. The data can be stored by capturing the data in to file:
 “Transfer” pull down menu → “Capture Text...” → save captured data into wanted file and folder.
9. Data capturing can be stopped from:
 “Transfer” pull down menu → “Capture Text...” → “Stop”

Macro language can be also used to configure the CMR3000 sensor. For more detailed information of macro language, please refer to “SCA3000 DEMO KIT macro language description 8259200”. More configuration and data read examples, that can be entered to CMR3000 by “Edit” pull down menu → “Paste to Host”, can be found in CMR3000 macro set 08-07-2010.txt available on the CD-ROM.

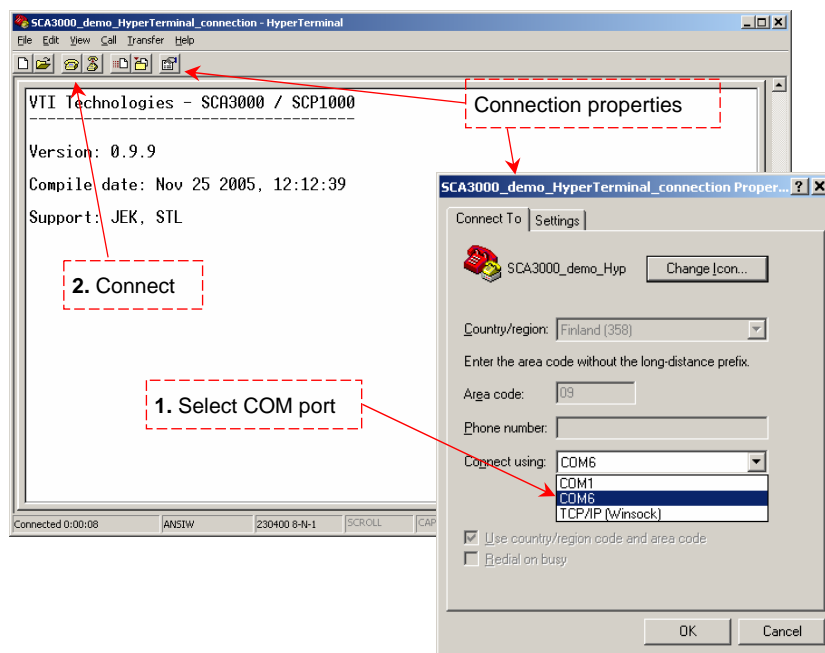


Figure 5. Windows HyperTerminal with CMR3000 demo info text.

If the pre-configured HyperTerminal connection is not available (the CD-ROM), the HyperTerminal connection can be opened also from:

→ Start → Programs → Accessories → Communications → HyperTerminal

The communication settings are presented in Table 2 below

Table 2. CMR3000 DEMO KIT serial communication settings.

Parameter	Value
Bits per second	230400
Data bits	8
Parity	None
Stop bits	1
Flow control	None

The correct COM port number depends on the PC and used USB port.

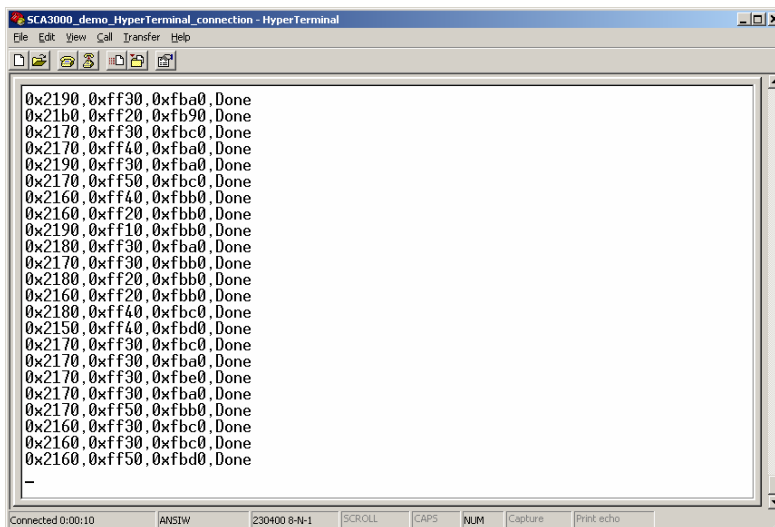


Figure 6. CMR3000 demo output during data logging.

6 CMR3000 current consumption measurement with DEMO KIT

The current consumption of the CMR3000 sensor can be calculated by measuring the voltage drop over the resistor R34 (100 Ω , 1% tolerance). Voltage drop can be measured from test points TP5 and TP6, see DEMO KIT USB interface board circuit diagram in Figure 9 (PCB design VTI 29393 rev B0).

The offset current consumption of the DEMO KIT hardware depends on used serial communication (SPI vs. I²C). The offset current consumption according to serial communication type is presented in Table 3 below. Current CMR3000 PWB supports SPI communication only, when used with the demo kit.

Table 3. Offset current consumption of the CMR3000 DEMO KIT HW.

Serial interface	Offset current consumption
SPI	~1.3 mA ($V_{offset} = 130$ mV)

The offset current consumption can also be measured by measuring the voltage drop over the resistor R34 (TP5 and TP6, see Figure 9) when CMR3000 PWB is not connected to USB interface board.

CMR3000 current consumption can be calculated

$$I_{dd} = \left(\frac{V_{drop} - V_{offset}}{100 \Omega} \right), \quad (1)$$

where V_{drop} is the measured voltage drop in [V] (from TP5 to TP6, see Figure 9), V_{offset} is the measured offset current consumption (from TP5 to TP6, see Figure 9), alternatively the values from Table 3 can be used. I_{dd} is the CMR3000 current consumption in [A].

The difference in offset current consumption is due the pull up resistor in SCK/SCL line (R2 in Figure 8). When using SPI-bus, the MCU software drives the SCK/SCL line low when there is no communication, which results in increase in DEMO KIT offset current consumption (current through resistor R2 in Figure 8 from DVDD to GND). When I²C is used, the MCU releases the SCK/SCL line when there is no communication.

7 USB interface board circuit diagram

CMR3000 demo USB interface board circuit diagram is presented in following pages.

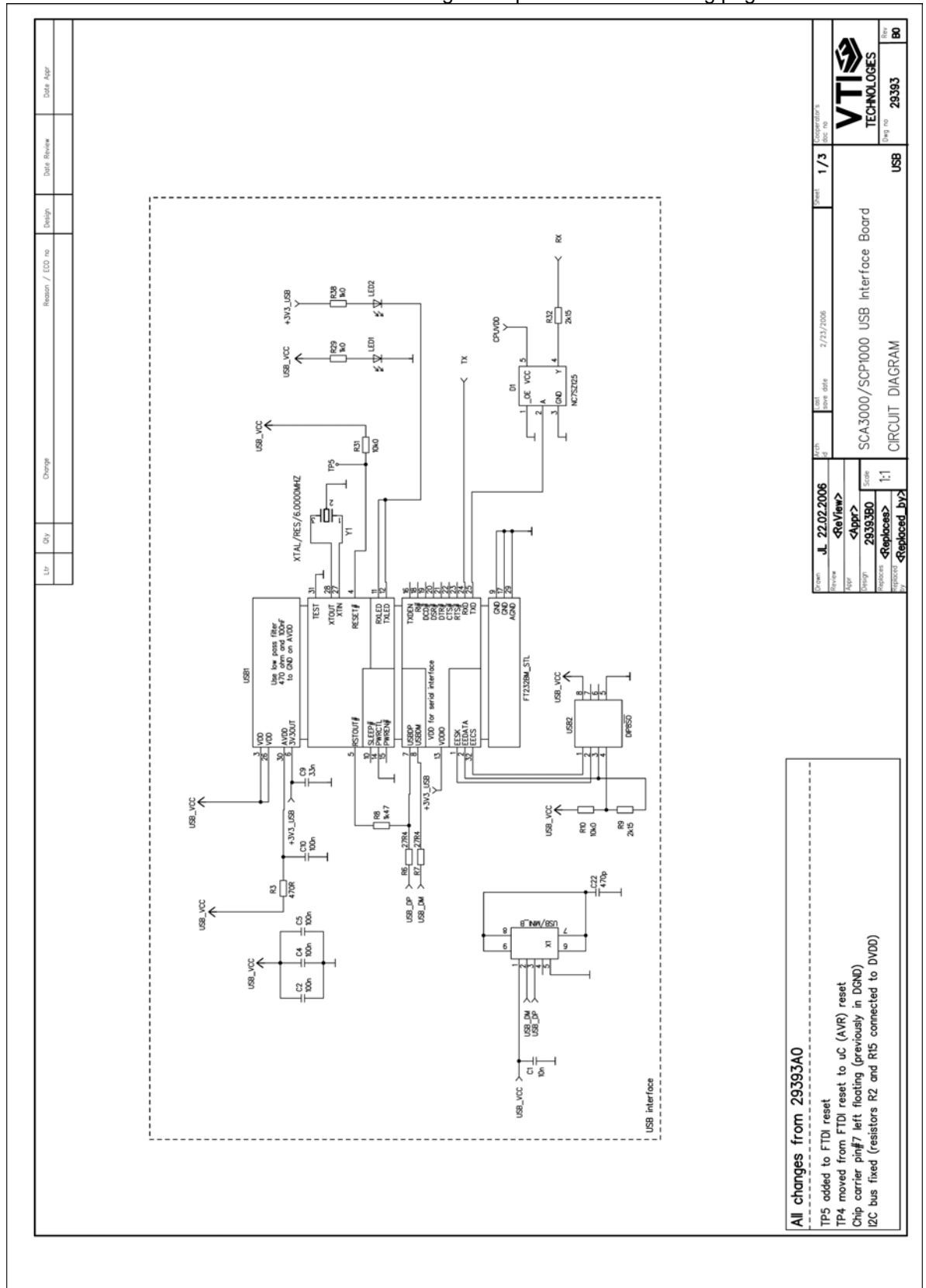


Figure 7. CMR3000 DEMO KIT USB interface board circuit diagram (sheet USB).

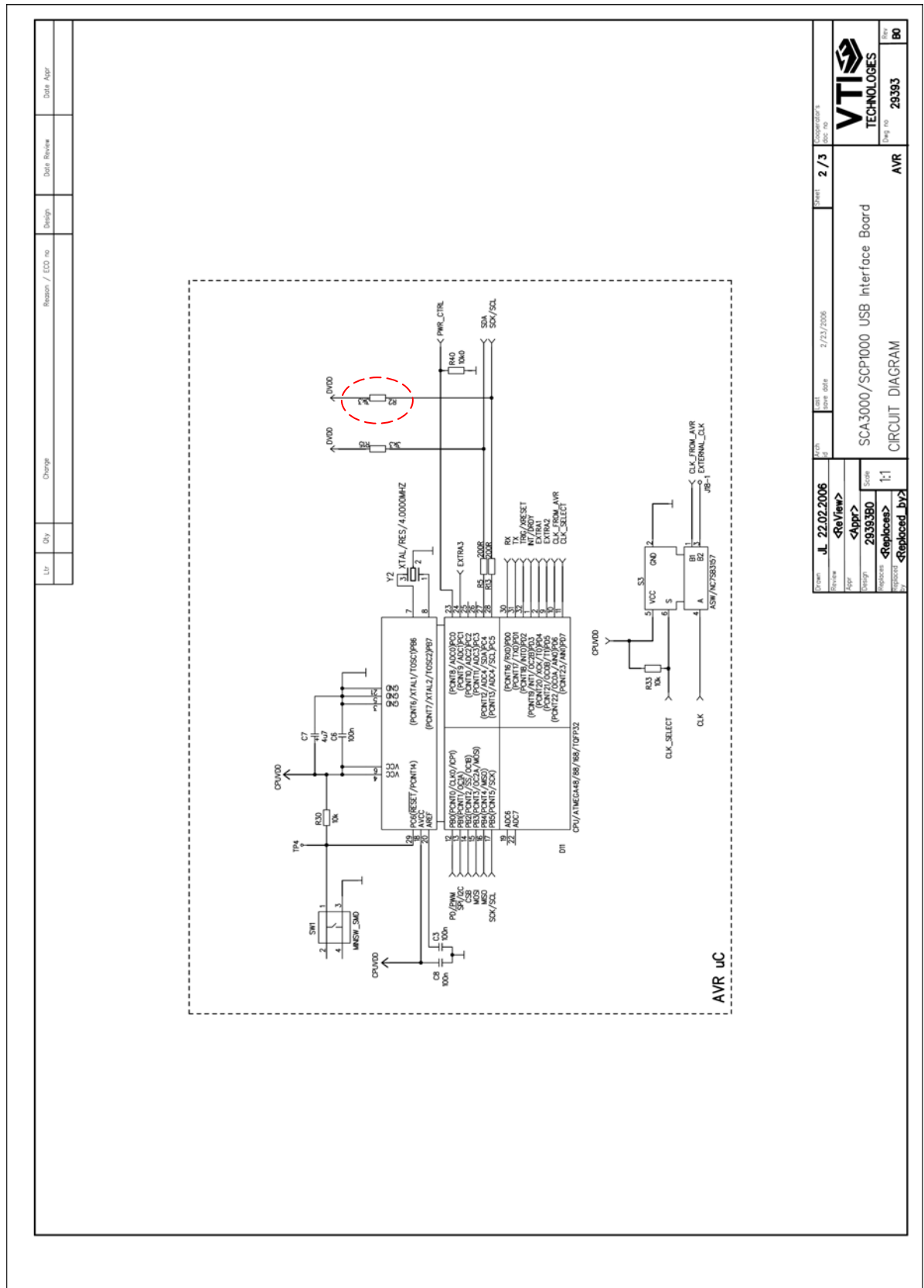


Figure 8. CMR3000 DEMO KIT USB interface board circuit diagram (sheet MCU).

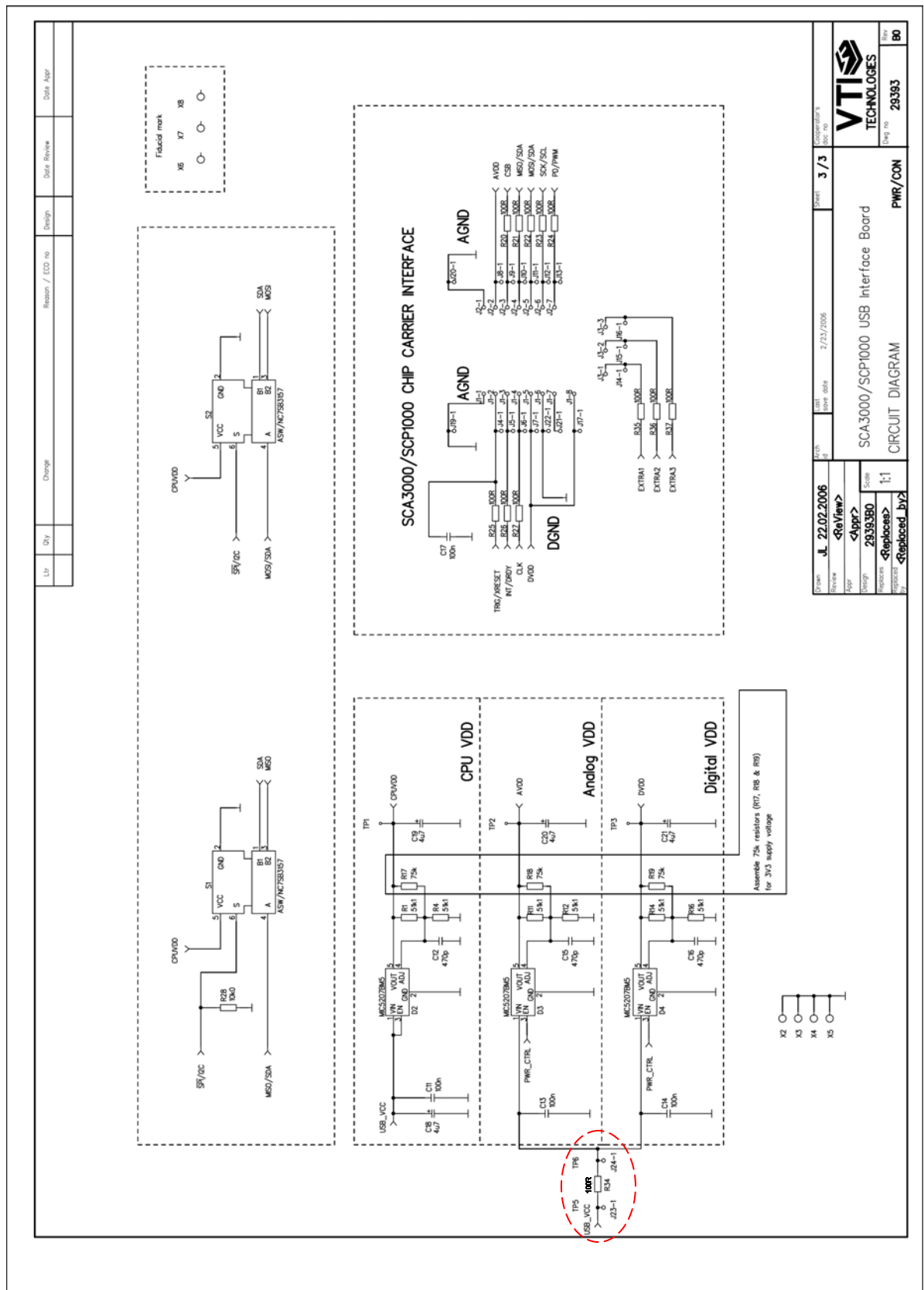


Figure 9. CMR3000 DEMO KIT USB interface board circuit diagram (sheet power).

8 USB interface board PWB layout

CMR3000 DEMO KIT USB interface board PWB layout and silkscreen is presented below.

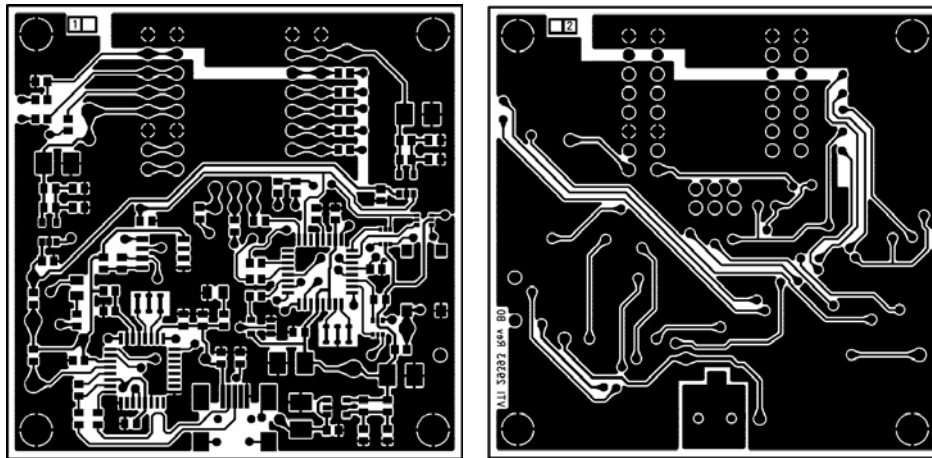


Figure 10. CMR3000 DEMO KIT USB interface board PWB layout.

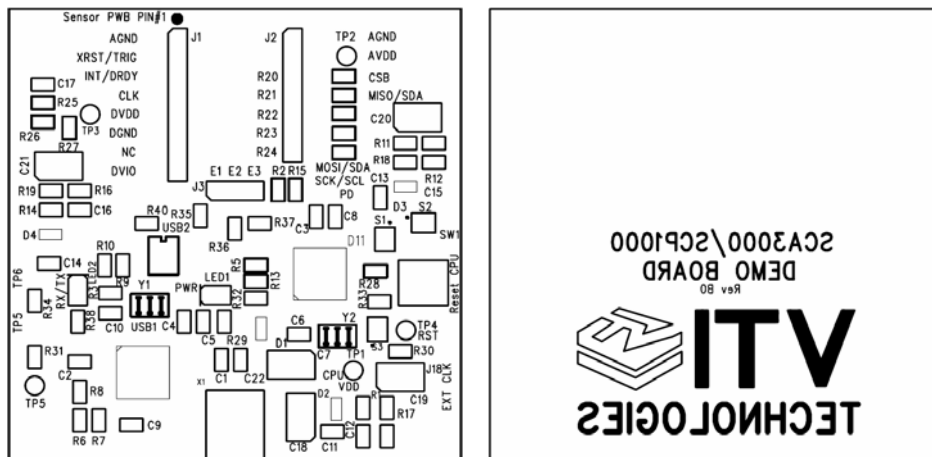


Figure 11. CMR3000 DEMO KIT USB interface board silkscreen.

9 Troubleshooting

Due to many PC environments, the interoperability can be limited. The CMR3000 DEMO KIT has been tested with DELL laptops (Latitude D600, D610, D410) and desktop PCs with Win2000 and WinXP operating system. If the CMR3000 DEMO KIT does not work properly or its operation is limited, the following items may help to sort the problems out:

1. Stop the GUI software, press the reset button program on demo USB interface board (see Figure 1), re-start the GUI again.
2. CMR3000 demo may not work properly if your PC has multiple USB serial port devices installed. Please remove all other USB serial port devices (including other VTI demos).
3. Close Windows HyperTerminal software, if you have used it.
4. If the GUI interface starts, but data is not scrolling in the window, check that USB driver LATENCY TIMER parameter is 5ms, please see details in section 9.1
5. Some times other LabView based software do not allow the demo kit GUI software execution, please try to install the CMR3000 demo kit to another PC or remove other LabView based software
6. If the PC is unable to find the demo kit serial port, try another USB port. Also, please check that there are not duplicate serial COM port numbers, more details in section 9.2.
7. The CMR3000 demo kit GUI does not support Windows Vista
8. Test the demo with another USB cable.
9. Please check that does the communication work between the demo kit and the PC:
 - Open HyperTerminal connection to the demo (see section 5)
 - Press demo reset button (see Figure 1)
 - see if the info text appears on the screen (see Figure 5)→ if the info text is transmitted, the communication between the demo kit and PC is ok

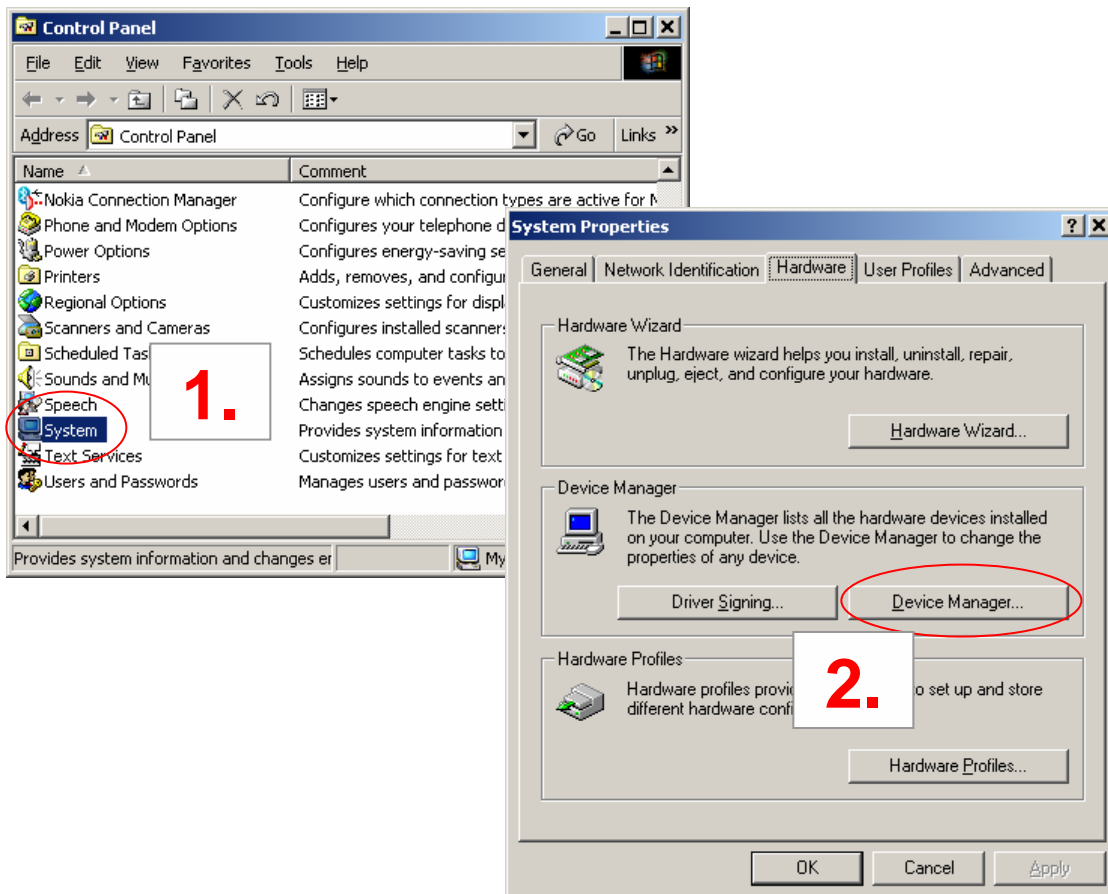
9.1 Checking and setting correct USB driver Latency timer value

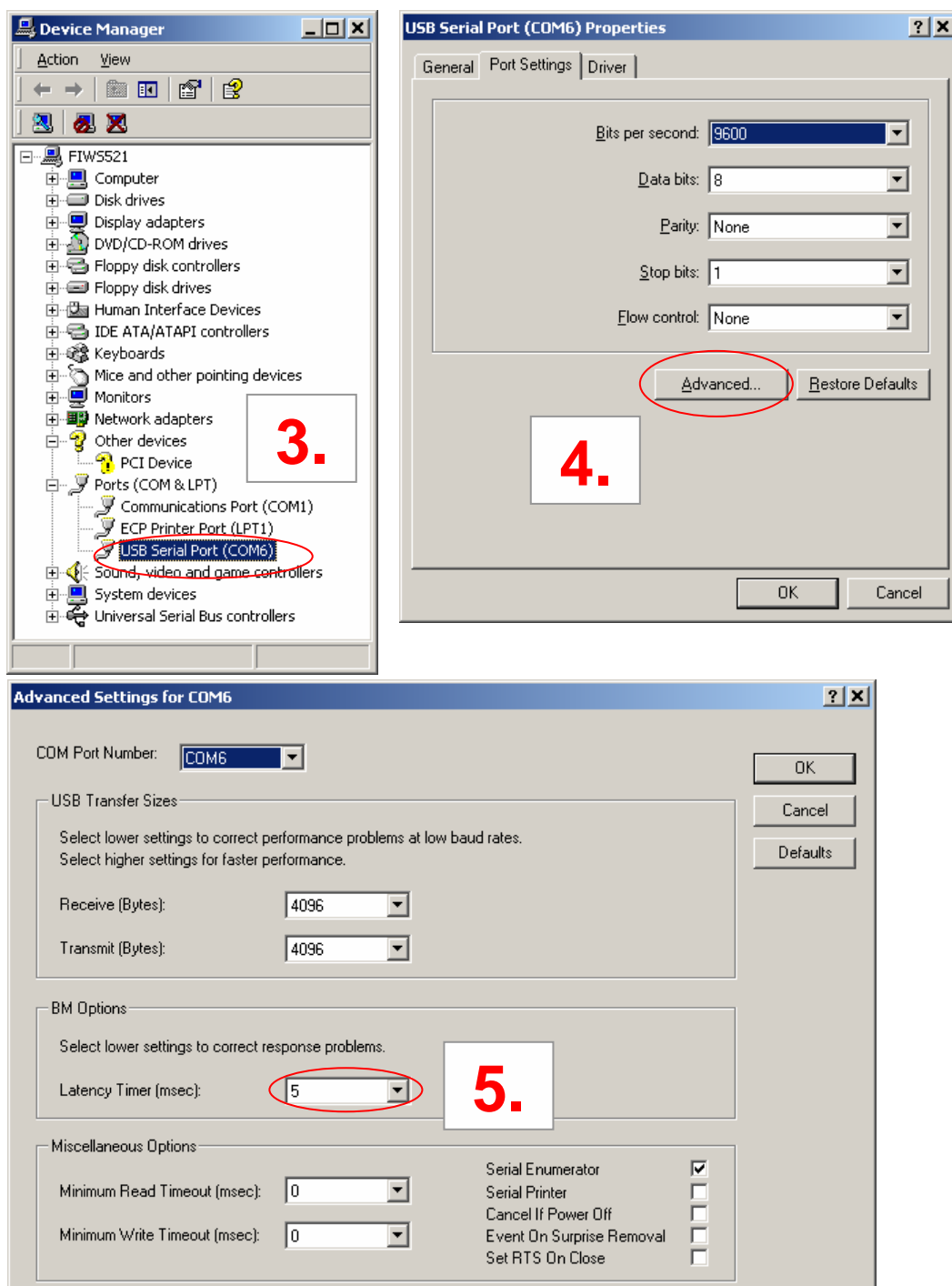
The FTDI USB Virtual Serial Com Port driver is delivered with the CMR3000 demo kit and the same driver version can be also downloaded from VTI's website. This driver is a slightly modified version of the original FTDI's driver: the driver used with VTI's demos must have a modified Latency timer setting. If the original FTDI's driver version is used, the demo may not work properly.

In order to modify the driver's Latency timer value, please plug the demo USB cable in to PC and follow the steps (and screen captures) below:

1. Open control panel and select "SYSTEM"
2. Select "DEVICE MANAGER" from "HARDWARE" tab
3. Select "USB SERIAL PORT" from the list, right mouse click and select "PROPERTIES"
4. Select "ADVANCED" from the USB Serial port Properties
5. Set the "LATENCY TIMER" to 5 ms (the 16ms default value is too slow for CMR3000 DEMO KIT).
6. Press "OK" to all windows.
7. Restart the GUI software.

Start → Settings → Control panel





9.2 Duplicate serial COM port numbers

Some PCs assign duplicate COM port numbers for virtual com port devices. If the PC assigns a com port number for demo kit that is already reserved by another device, the demo kit will not work properly (see **Figure 12**).

COM port numbers can be seen from Computer Management (Device Manager), see section 9.1 for instructions on opening the Device Manager.

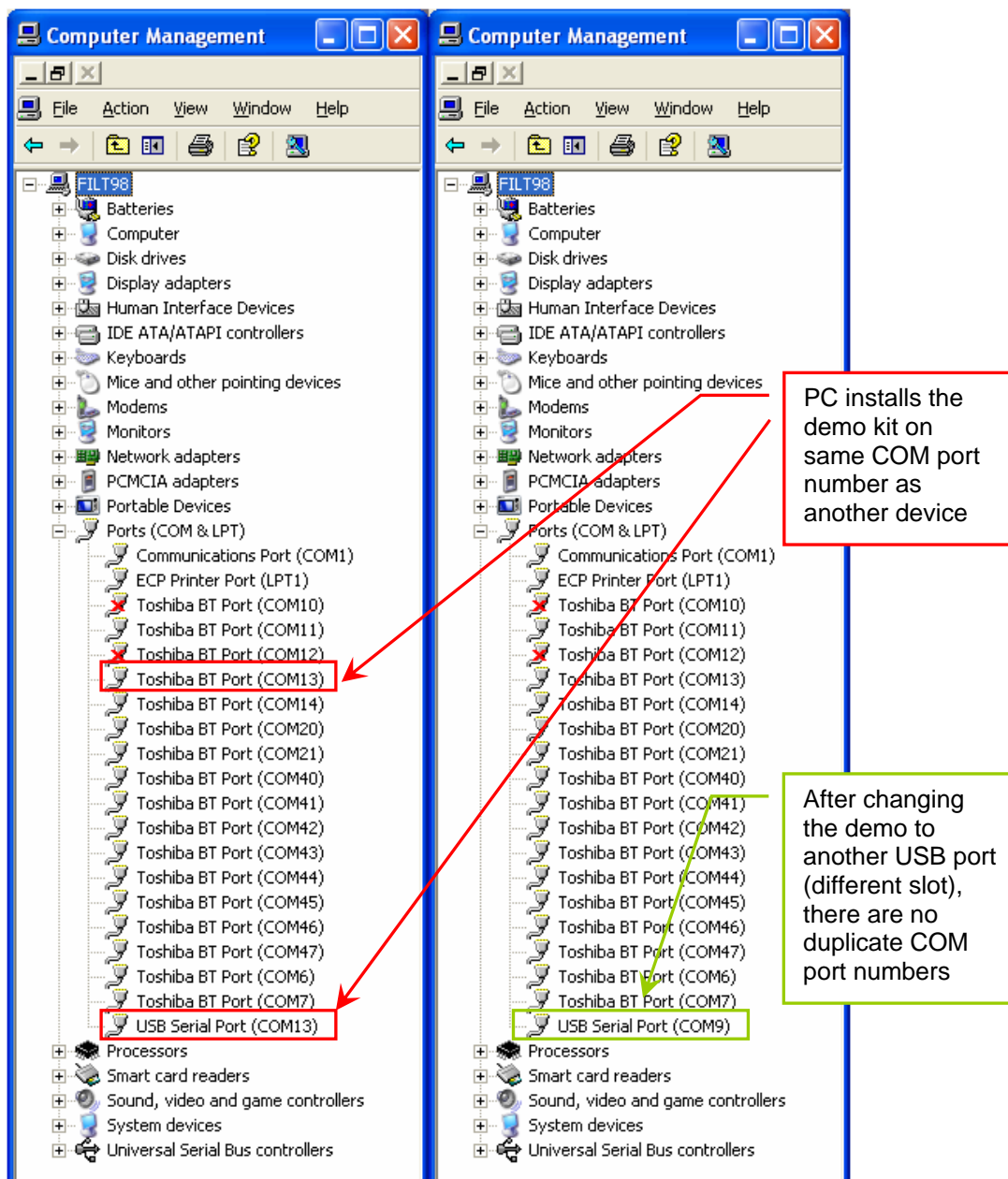


Figure 12. PC has assigned duplicate COM port numbers for two devices (LEFT), after changing the USB port there are no duplicate COM port numbers (RIGHT).

9.3 Known Issues

9.3.1 Changing the serial bus type

The MCU needs to be reset (by pressing the reset button, see Figure 1) when changing between the two available serial bus types (SPI & I²C). This thing can happen when user communicates with CMR3000 with macros that utilize different serial bus types.

10 Document Revision History

Version	Date	Change Description
0.1	22.06.2010	1 st version
0.2	09.07.2010	Typos corrected, section 4.1& 5 updated
0.3	21.08.2010	Typos corrected
0.4	03-Nov-2010	Release for product launch