Getting Started with the ATR2820 RF Demo Board plus USB RF Interface Board

Evaluation Board for ATR2820

Application Note

1. Required Items

- **ATR2820 RF Demo Board**
- **USB RF Interface Board**
- **PC with USB Port Cables and ATR2820 Software Installed Power Supply (9V/500 mA)**
- **Spectrum Analyzer (up to 6 GHz)**
- **Signal Generator (up to 6 GHz)**
- **Oscilloscope (100 MHz Bandwidth Recommended)**

2. Set-up

Step 1: Install the USB driver software to operate the USB RF interface board on your USB port. This is described in detail in Appendix B (Driver Installation).

Step 2 Install the ATR2820 control software by starting 'setup.exe' from the CD-ROM. This is described in detail in Appendix C (Software Installation).

Step 3 Connect the USB RF interface board with the RF demo board to a DC power supply (V_{CC} = 9V/500 mA) and the USB port.

Step 4 Adjust the jumper setting of the USB RF interface board for TX or RX mode testing according to the manual. Default is TX jumper setting.

Step 5 Connect a spectrum analyzer to the TX output of the RF demo board.

Step 6 Start the ATR2820 control software and press the 'Send Data' button. Default program set-up is TX mode.

Step 7 Measure the TX carrier.

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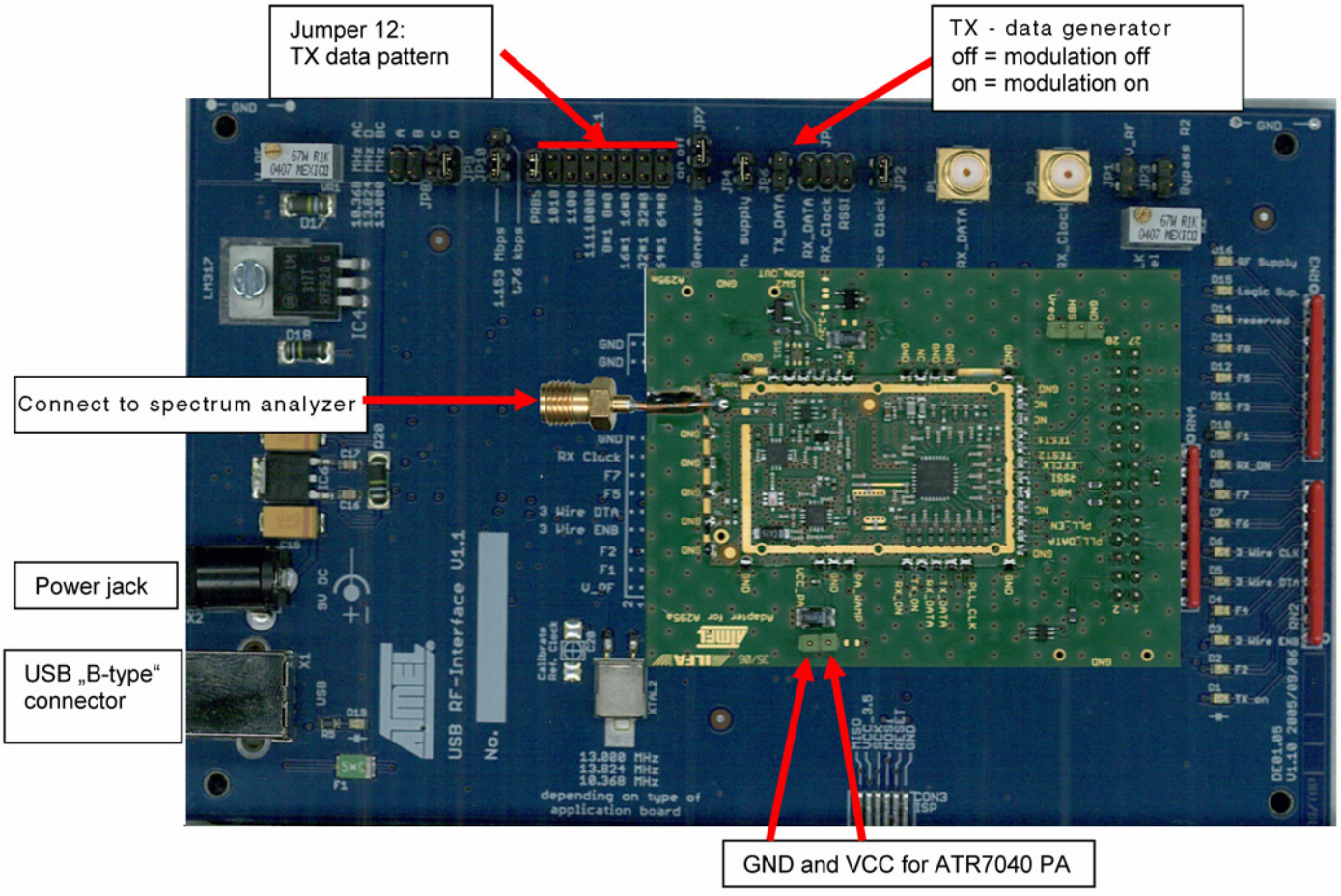
3. TX Mode - USB RF Interface Board Jumper Setting

Figure 3-1. TX Mode - USB RF Interface Board Jumper Setting



Using jumper 12 enables to select several TX data pattern '1-0' sequences and a PRBS pattern.

Since the ATR2820 is in closed loop mode, low frequency '1-0' patterns will be canceled by the PLL. These patterns are no problem for the open loop mode, which is used during normal burst mode operation.

4. RX Mode - USB RF Interface Board Jumper Setting

Figure 4-1. RX Mode - USB RF Interface Board Jumper Setting

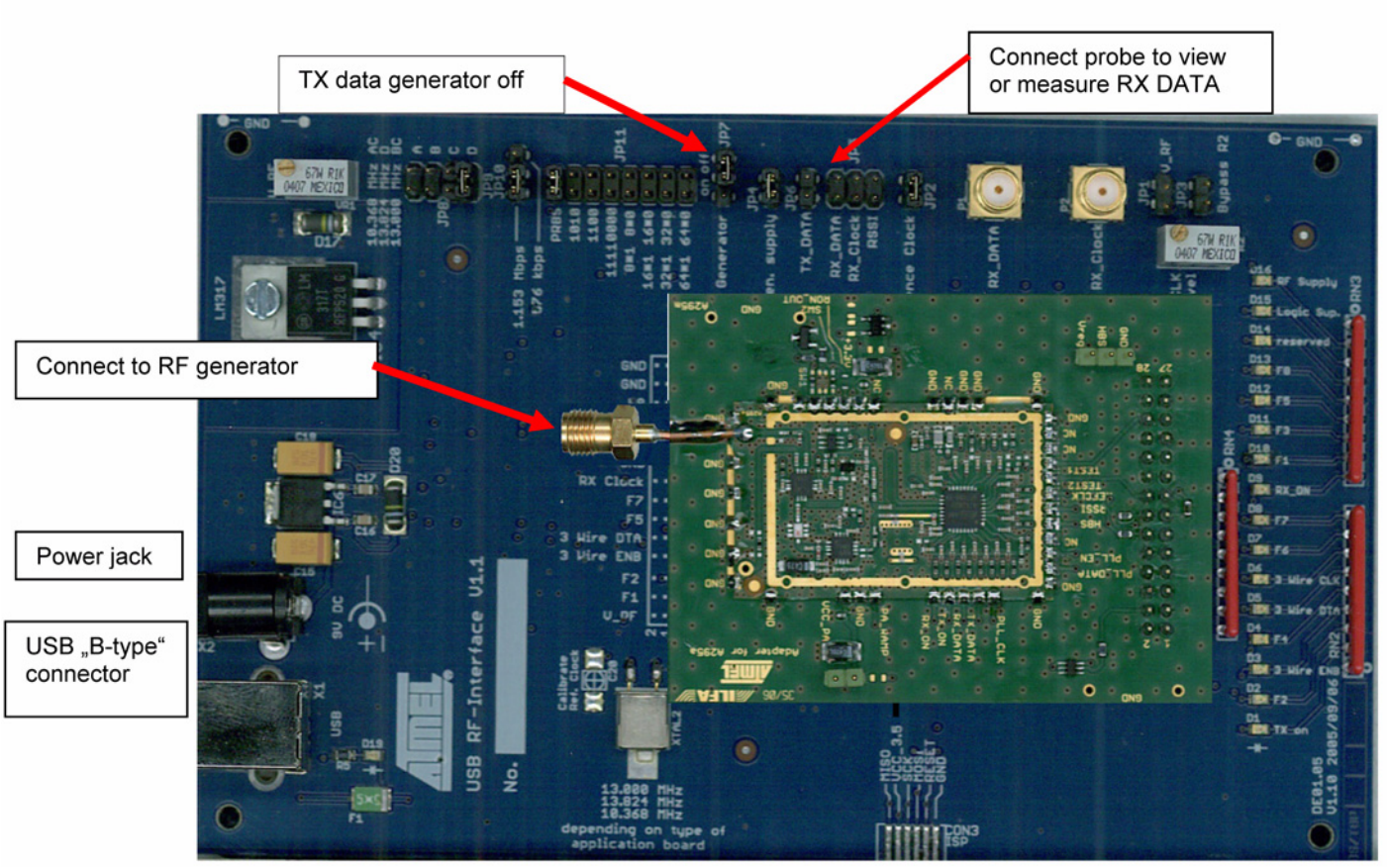
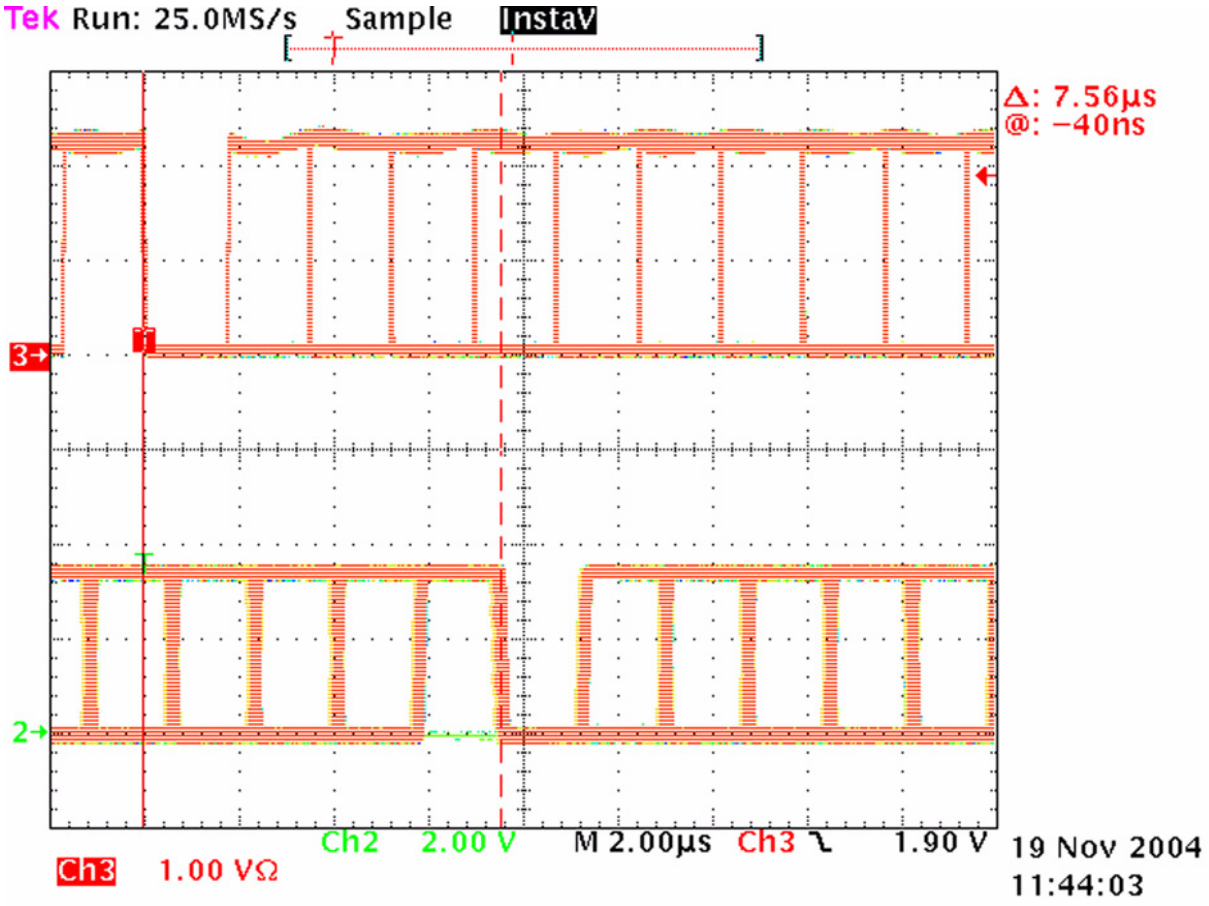


Figure 4-2. Example of RX Data Output Signal with PRBS Modulation



5. Appendix A: Interface Board Functions

The interface board includes the following functionality:

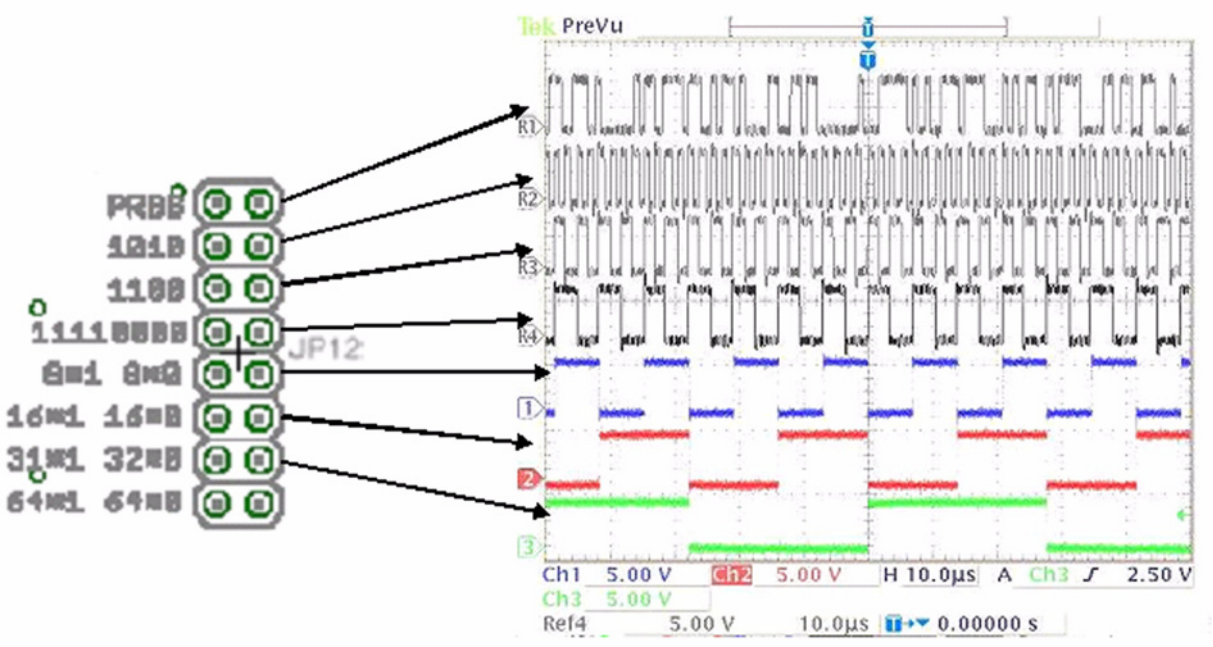
- 5V fixed voltage regulator
- 3.2V variable voltage regulator as transceiver supply voltage
- Reference clock generator and pseudo random TX data generator
- Crystal-stabilized reference clock generator (13.824 MHz) used as reference clock for the transceiver and the pattern generator
- 3-wire bus interface, power and mode control for the transceiver via USB port
- 11 bit pseudo random pattern generator and bit sequence generator for TX data

Default jumper settings are “Reference Clock”, “PRBS Gen. on”, “V_RF”, and “PRBS”, “PRBS Gen. Supply”.

Functionality of the jumpers on the interface board:

“1.152 MB/s - 576 kB/s”	Select TX data rate
“PRBS”	Pseudo random pattern for feeding TX data
“1010”	Bit patterns sequence for feeding TX data
“1100”	
“11110000”	
“8x1, 8x0”	
“16x1, 16x0”	
“32x1, 32x0”	
“64x1, 64x0”	

Figure 5-1. Data Generator Output



5.1 Functionality of the Jumpers on the Interface Board (cont'd):

"V_RF"	Supplies the power to the T280X demo board (the regulated output voltage and current can be measured at the jumper. The voltage is normally at 3.6V and can be adjusted with the variable resistor R25.)
"RXData"	Monitoring pin for RX data of the transceiver
"RSSI"	Monitoring pin for RSSI of the transceiver
"TXData"	Monitoring pin for TX data pattern of the transceiver
"PRBS Gen. Off"	If the jumper is removed the data generator is disabled. No data will be sent to the transceiver.
"Ref CLK"	Supplies the 13.824 MHz reference clock to the demo board pin 25

5.2 Connectors

JP1	Supply voltage for RF module. The pin close to the outer PCB edge is connected to pins 1 and 2 of CON1, the other pin is connected to with the regulated voltage of the PCB (LM317)
JP2	Not used
JP3	Reference clock feed to CON1. This jumper must be set to have the reference clock on CON1. [Rectangular Signal 0V to V_RF]
JP4	Short potentiometer R4 (RF_CLK_Level)
JP5	PRBS generator supply. Jumper must be set, otherwise, the generator does not work
JP6	Measurement points for RX Data, RX Clock and RSSI. The pin close to the outer PCB edge is connected to the signal, the others to GND.
JP7	Measurement point for TX Data. The pin close to the outer PCB edge is connected to the signal, the other to GND.
JP8	Jumper for switching on/off the PRBS generator
JP9, JP10	Reference crystal selection
JP11	Select data rate (1.152 Mbps / 576 kbps)
JP12	Output of the data generator. One jumper selects the data sent to CON1. The pins close to the outer PCB edge are connected and fed to CON1.

5.3 Reference Clock Generation

The output of the reference oscillator produces a rectangular signal with a level between 0V and V_RF. The signal level can be adjusted with a potentiometer R4 (10 kΩ). As an alternative the potentiometer can be shorted with JP4.

6. Appendix B: USB Driver Installation

6.1 Hardware Installation:

Your computer must be running Microsoft® Windows® 98, Windows ME, Windows 2000 or Windows XP.

6.1.1 Installation Steps under Windows 98

Your computer must be switched on and running Microsoft® Windows.

Connect the **AVR309:USB to UART** device to the USB port on your computer.

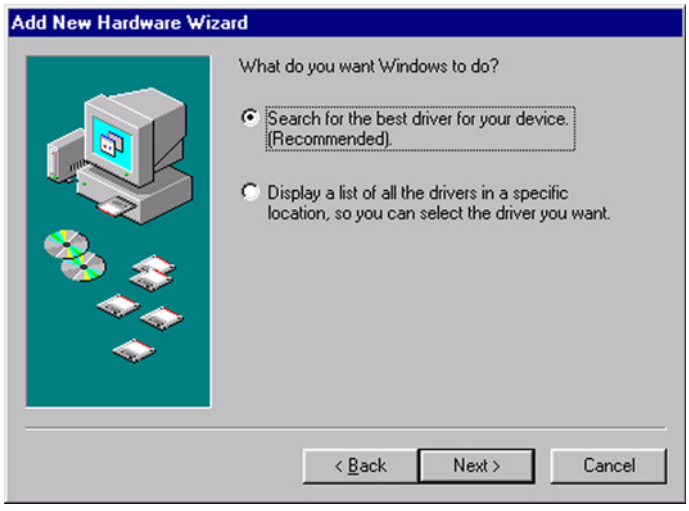
A window indicating “New hardware found” appears (with “AVR309:USB to UART ...” name).

Next, a new window stating *“Add New Hardware Wizard”* opens up. Click “Next”.

Figure 6-1. Window “Add New Hardware Wizard”

Choose *“Search for the best driver for your device (Recommended)”* and click “Next”.

Figure 6-2. Window “Add New Hardware Wizard” 2



Check *"Specify location" and "browse"* to the folder where the driver files are stored (CD or download folder). Then click *"Next"*.

Figure 6-3. Window "Add New Hardware Wizard" 3

In the next window (*AVR309:USB to UART protocol converter ...*) click *"Next"*.

Figure 6-4. Window "Add New Hardware Wizard" 4

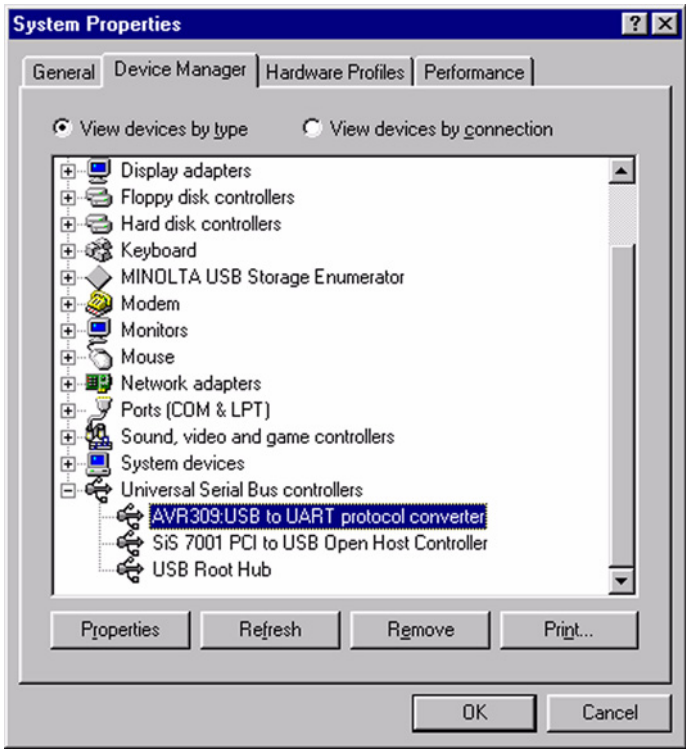
Windows will then install the necessary driver files and will perform system changes. Rebuilding of Windows driver database may happen.

The installation is now complete. Click *"Finish"* in the last window.

Figure 6-5. Window "Add New Hardware Wizard" 5

Verify the device ***"AVR309:USB to UART protocol converter ..."*** is present in *"Start - Settings -Control Panel - System - Device Manager - Universal Serial Bus controllers"*.

Figure 6-6. Window "System Properties"



The device has been successfully installed.

6.1.2 Installation Steps under Windows XP

Your computer must be switched on and running Microsoft® Windows.

Connect the ***AVR309:USB to UART ...*** device to the USB port on your computer and wait.

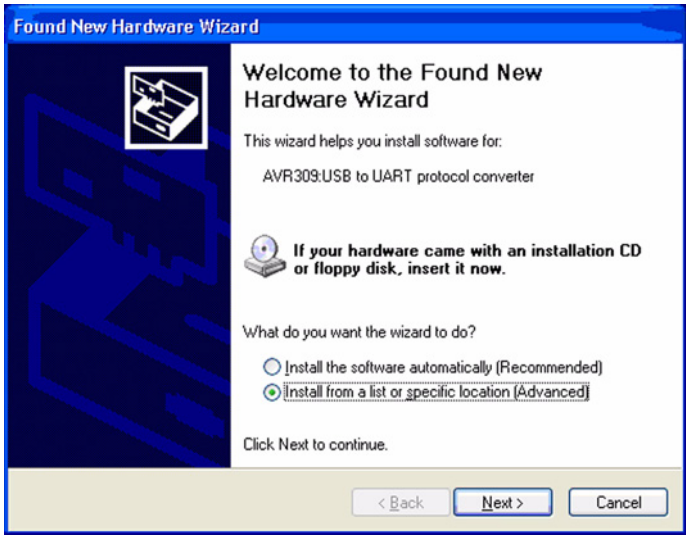
"Found new hardware" window appears (with ***"AVR309:USB to UART ..."*** name).

Figure 6-7. Window "Found New Hardware"

A window indicating *"Found New Hardware Wizard"* opens up.

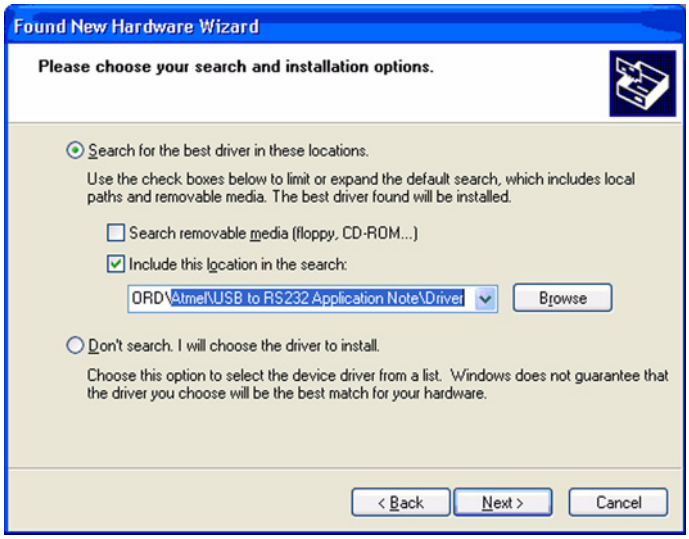
Choose *"'Install from a list or specify location (Advanced)"* and click *"Next"*.

Figure 6-8. Window "Found New Hardware Wizard"



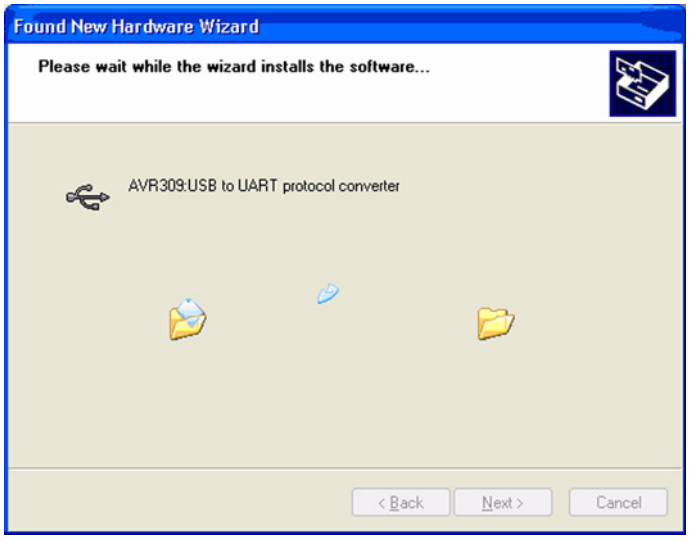
Check *"Include this location in the search"* and *"browse"* to the folder where the driver files are stored (CD or download folder). Then click *"Next"*.

Figure 6-9. Window "Please choose your search and installation options."



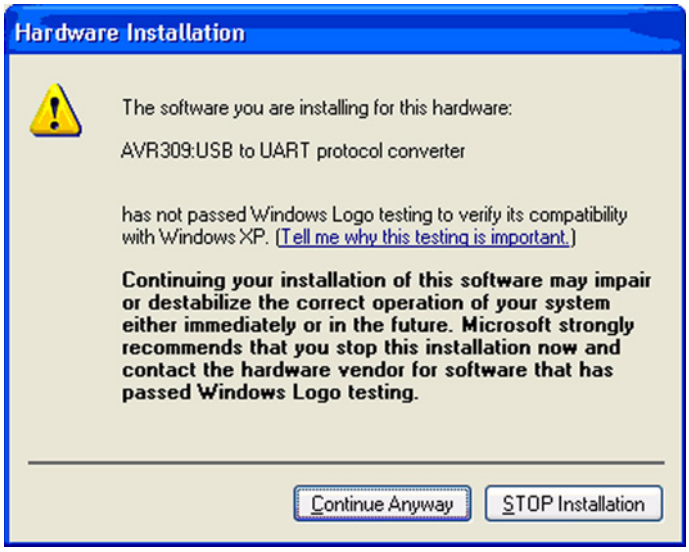
A new window indicating *AVR309:USB to UART protocol converter ...*) appears.

Figure 6-10. Window "AVR309:USB to UART protocol converter"



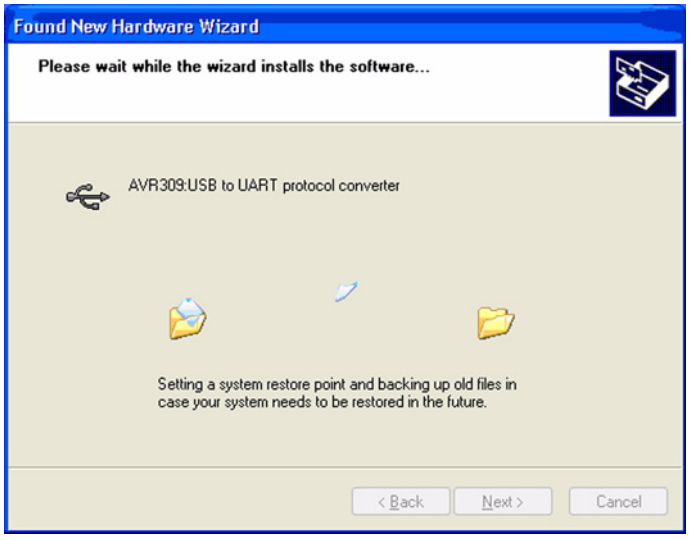
If a window with the warning message *"Hardware Installation"* appears, choose *"Continue Anyway"*.

Figure 6-11. Window "Hardware Installation"



Windows will then install the necessary driver files and performs system changes.

Figure 6-12. Window "Please wait while the wizard installs the software"

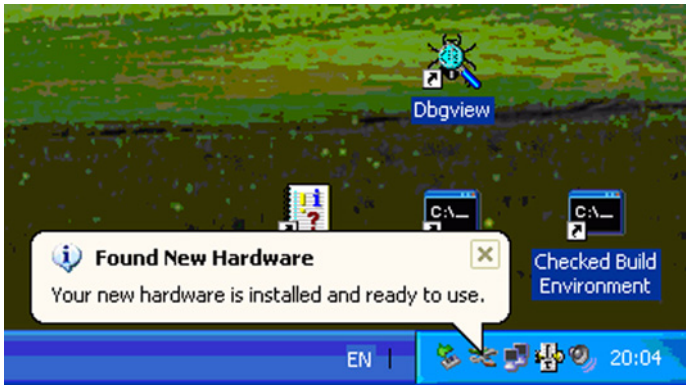


The installation is now complete. Click *"Finish"*.

Figure 6-13. Window "Completing the Found New Hardware Wizard"

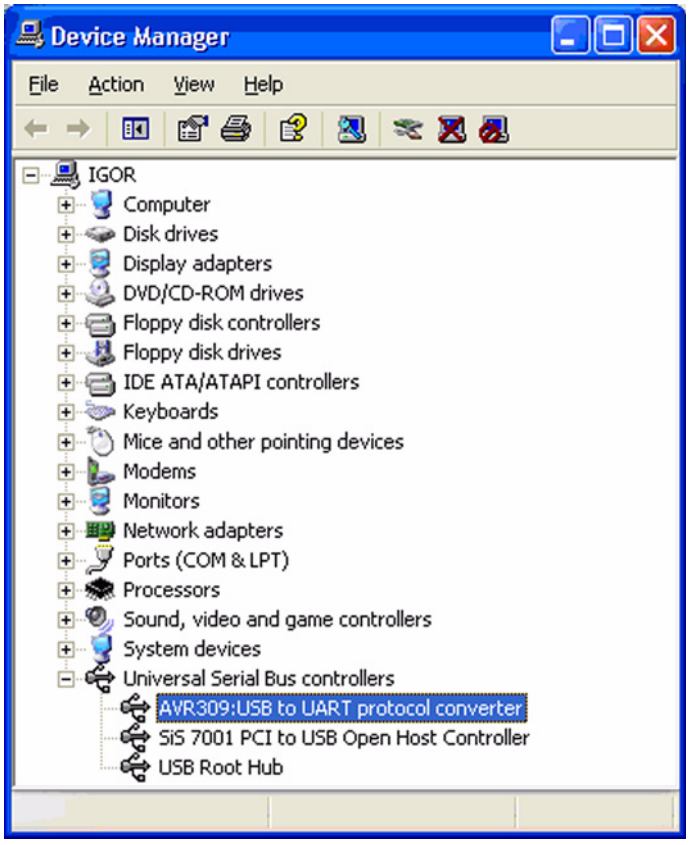
After successful installation, a small window with an installation confirmation appears.

Figure 6-14. Window "Confirmation of Installation"



Verify if the device ***"AVR309:USB to UART protocol converter ..."*** is present in *"Start - Settings - Control Panel - System - Device Manager - Universal Serial Bus controllers"*.

Figure 6-15. Window "Device Manager"



The device has been successfully installed.

7. Appendix C: ATR2820 Control Software Installation

The ATR2820 control software supports Microsoft® Windows 98, Windows ME, Windows 2000 and Windows XP.

Your computer must be switched on and running Microsoft® Windows.

Start the setup.exe file from the CD.

Figure 7-1. Window “Start the setup.exe File”

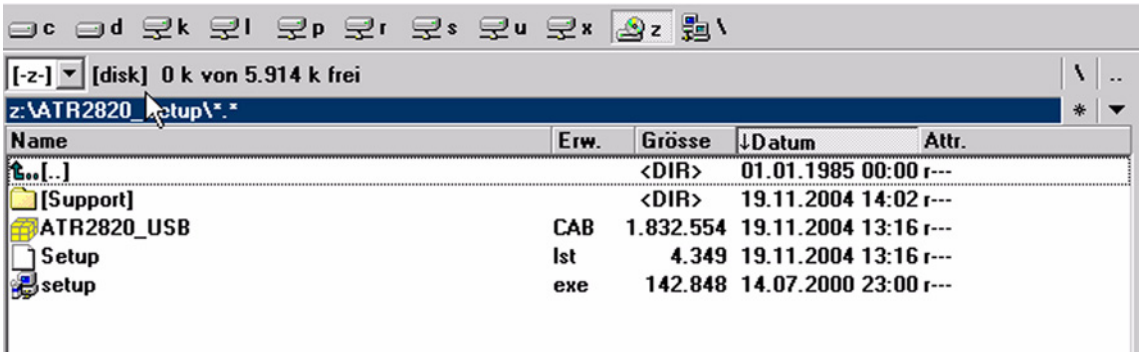


Figure 7-2. Window “ATR2820_USB-Setup”

Confirm this dialog box by clicking OK.

Start the installation by clicking on the installation symbol.

Figure 7-3. Window “ATR2820_USB-Setup” 2

Figure 7-4. Window “ATR2820_USB-Setup” 3

Allow to set up a new program group by clicking “weiter”.

The Installation has been successfully completed. Click on *"OK"*.

Figure 7-5. Window "ATR2820_USB-Setup" 4

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