AMWZ5168-AL

User manual

DOCUMENT HISTORY

The next table gives an overview of the changes to the document

DATE	VERSION	STATUS	AUTHOR	CHANGE
23. Jan. 2014	0.1	Draft	David Lu	Initial release
21. Feb. 2014	0.2	Proposal	David Lu	Modify FCC information

TABLE OF CONTENTS

FCC INFORMATION

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference in witch case the user will be required to correct the interference at his own expense.

Federal Communication Commission Interference Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the 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 the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:
● Reorient or relocate the receiving antenna.
● Increase the separation between the equipment and receiver.
● Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
● Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated. Additional testing and certification may be necessary when multiple are used. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: XPQAMWZ5168AL ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

1 GENERAL INFORMATION

The AMWZ5168-AL module is a range of ultra low power, high performance surface mount modules targeted at IEEE 802.15.4, JenNet-IP, ZigBee Light Link, ZigBee Smart Energy and RF4CE networking applications, enabling users to realise products with minimum time to market and at the lowest cost. They remove the need for expensive and lengthy development of custom RF board designs and test suites. The modules use NXP's JN5168 wireless microcontroller to provide a comprehensive solution with large memory, high CPU and radio performance and all RF components included. All that is required to develop and manufacture wireless control or sensing products is to connect a power supply and peripherals such as switches, actuators and sensors, considerably simplifying product development.

2 FEATURES

2.1 GENERAL
- ❑ Low-cost RF SOC module
- ❑ Few external component count
- ❑ Compact size and low power consumption
- ❑ High reliability
- ❑ Custom-made
- ❑ 2.0V ~ 3.6V power supply
- ❑ Industrial temp (-40℃ to +85℃)
- ❑ Lead-free and RoHS compliant

2.2 RF / ANALOG
- ❑ ISM band 2.405~2.475 GHz operation
- ❑ IEEE 802.15.4 specification compliance
- ❑ Tx output power +2.77dBm
- ❑ Differential Antenna input/output
- ❑ Low current consumption: 17.5 mA in RX and 15 mA in TX mode
- ❑ High receiver and RSSI dynamic range
- ❑ Offset QPSK modulation (DSSS baseband)

2.3 MICROCONTROLLER
- ❑ 32-bit RISC CPU, up to 32MIPs with low power
- ❑ Data EEPROM with guaranteed 100k write operations
- ❑ RF4CE, JenNet-IP, Zigbee Smart Energy stacks
- ❑ JTAG debug interface
- ❑ 4-input 10-bit ADC, 1 comparator
- ❑ 5 x PWM (4 x timer, 1 x timer/counter)
- ❑ 2 UARTs
- ❑ SPI Master & Slave port with 3 selects
- ❑ 2-wire serial interface
- ❑ Battery and Temperature Sensor
- ❑ Watchdog timer and BOR
- ❑ Up to 20 DIO

3   ELECTRICAL SPECIFICATION

Table 2. Electrical Specification of AMWZ5168-AL module   VDD = 3.0V @+25℃

Typical DC Characteristics		Notes
Deep Sleep Current	100nA	
Sleep Current	0.70uA	With active sleep timer
Radio Transmit Current	15mA	CPU is doze, radio transmitting
Radio Receive Current	17.5mA	CPU is doze, radio receiving
Centre Frequency accuracy	+/-25ppm	Additional +/-15ppm allowance for temperature and ageing
Typical RF Characteristics		**Notes**
Transmit Power	+2.77dBm	Normal
Maximum Input signal	+10dBm	For 1% PER, measured as sensitivity
RSSI range	-95 to -10 dBm	
RF Port Impedance –uFL connector	50 ohm	2.4 – 2.5GHz
Rx Spurious Emissions	-61dBm	Measured conducted into 50 ohms
Tx Spurious Emissions	-40dBm	Measured conducted into 50 ohms
VSWR (max)	2:1	2.4 – 2.5GHz
Peripherals		**Notes**
Master SPI Port	3 selects	250kHz – 16MHz
Slave SPI Port	Yes	250kHz – 8MHz
UART	2	16550 compatible
Two-wire serial I/F (compatible with SMbus & I2C)	Yes	Up to 400KHz
5 x PWM (4 x timer, 1 x timer/counter)	yes	16MHz clock
Programmable Sleep Timers	2	32kHz clock
Digital IO lines (multiplexed with UARTs, timers and SPI selects)	20	
Analogue-to-Digital converter	4 Channels	10-bit, up to 100ks/s
Programmable analogue comparators	Yes	Ultra low power mode for sleep
Internal Temperature Sensor and Battery Monitor	Yes	

3.1   MAXIMUM RATINGS

Parameter	Min	Max
Device Supply Voltage VDD	-0.3V	3.6V
All Pins	-0.3V	VDD + 0.3V
Storage Temperature	-40℃	+150℃

3.2   OPERATING CONDITIONS

Supply	Min	Max
VDD	2.0V	3.6V
Ambient temperature range	-40℃	+85℃

4   INSTALLING CDM DRIVERS

This user manual provides guidance on installing and setting up the tool on PC. CDM driver provides access to both virtual COM port (VCP) and FTDI's proprietary "direct" (D2XX) interfaces, it should install before connect a PC to main board using a USB-to-serial cable. Hyper terminal access the new connection between PC and AMWZ5168 module and is used for selecting appropriate operation mode for AMWZ5168 module on PC screen.

4.1   INSTALLING VIA THE FOUND NEW HARDWARE WIZARD

To install CDM drivers for an FTDI device under Windows XP, please follow the instructions below:

➢ If a device of the same type has been installed on your machine before and the drivers that are about to be installed are different from those installed already, the original drivers need to be uninstalled. Please refer to the Uninstalling CDM Drivers section of this document for further details of this procedure.

➢ Download the latest available CDM drivers from the FTDI web site and unzip them to a location on your PC.

➢ If you are running Windows XP or Windows XP SP 1, temporarily disconnect your PC from the Internet. This can be done by either removing the network cable from your PC or by disabling your network card by going to the "Control Panel\Network and Dial-Up Connections", right-clicking on the appropriate connection and selecting "Disable" from the menu. The connection can be re-enabled after the installation is complete. This is not necessary under Windows XP SP 2 if configured to ask before connecting to Windows Update. Windows XP SP 2 can have the settings for Windows Update changed through "Control Panel\System" then select the "Hardware" tab and click "Windows Update".

➢ Connect the device to a spare USB port on your PC. If the device is based on the FT2232, the Microsoft composite device driver is automatically loaded in the background. Once the composite driver has been installed Windows Found New Hardware Wizard will launch. If there is no available Internet connection or Windows XP SP 2 is configured to ask before connecting to Windows Update, the screen shown in Figure 2.1 is displayed. Select "No, not this time" from the options available and then click "Next" to proceed with the installation. If there is an available Internet connection, Windows XP will silently connect to the Windows Update website and install any suitable driver it finds for the device in preference to the driver manually selected.
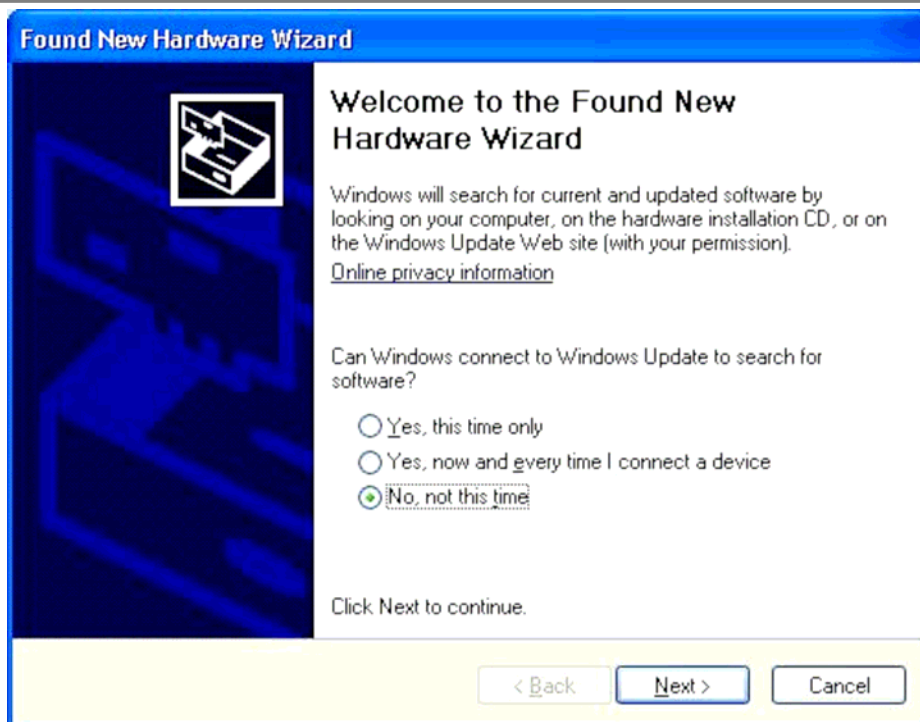
Figure 2.1

➢ Select "Install from a list or specific location (Advanced)" as shown in Figure 2.2 below and then click "Next".
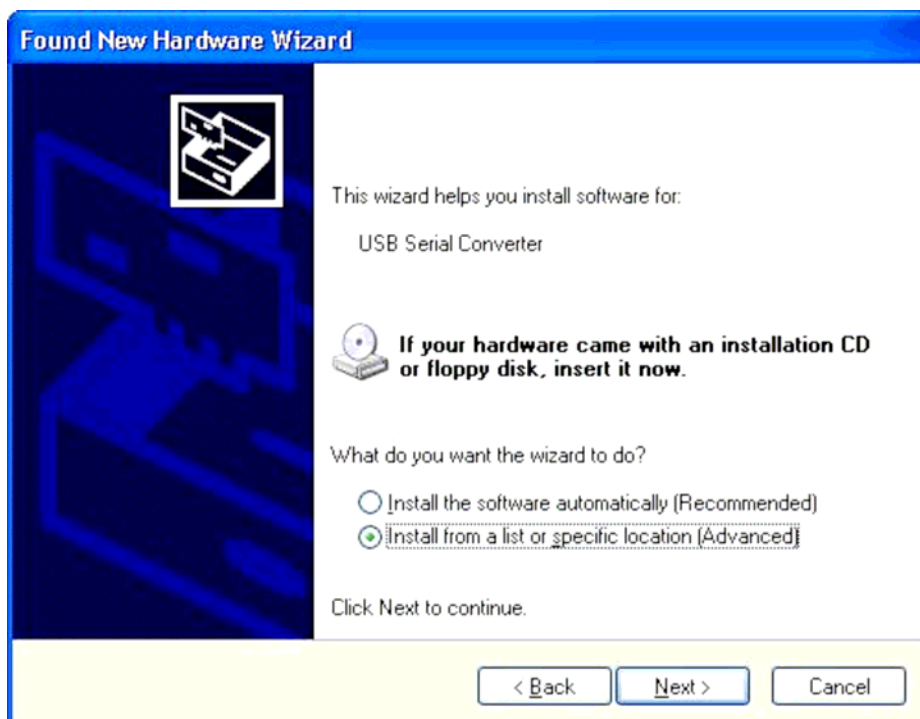

Figure 2.2

➢ Select "Search for the best driver in these locations" and enter the file path in the combo-box ("C:\CDM 2.02.04" in Figure 2.3 below) or browse to it by clicking the browse button. Once the file path has been entered in the box, click next to proceed.
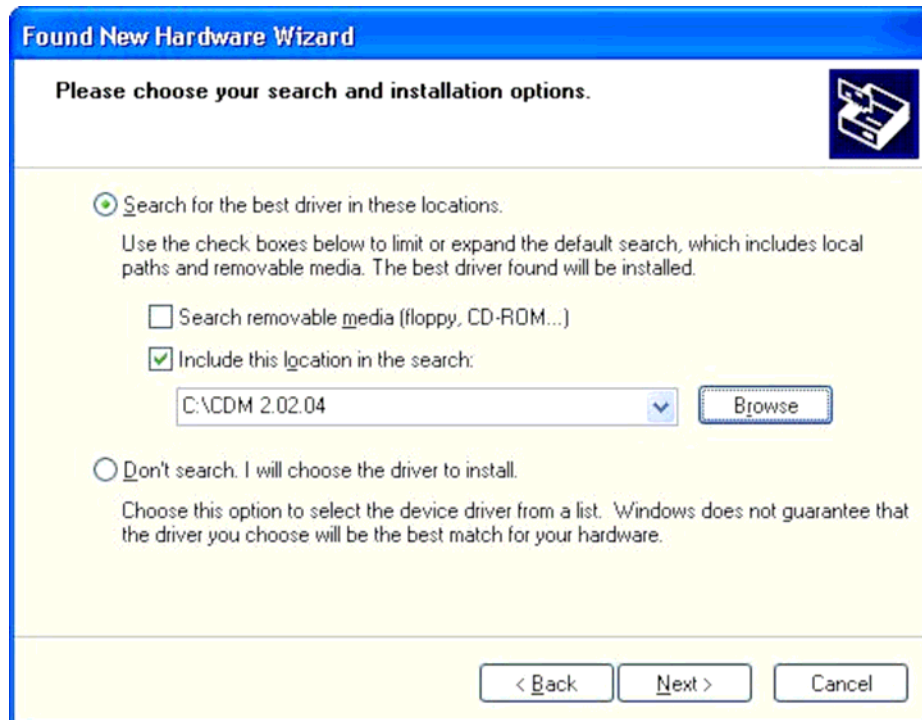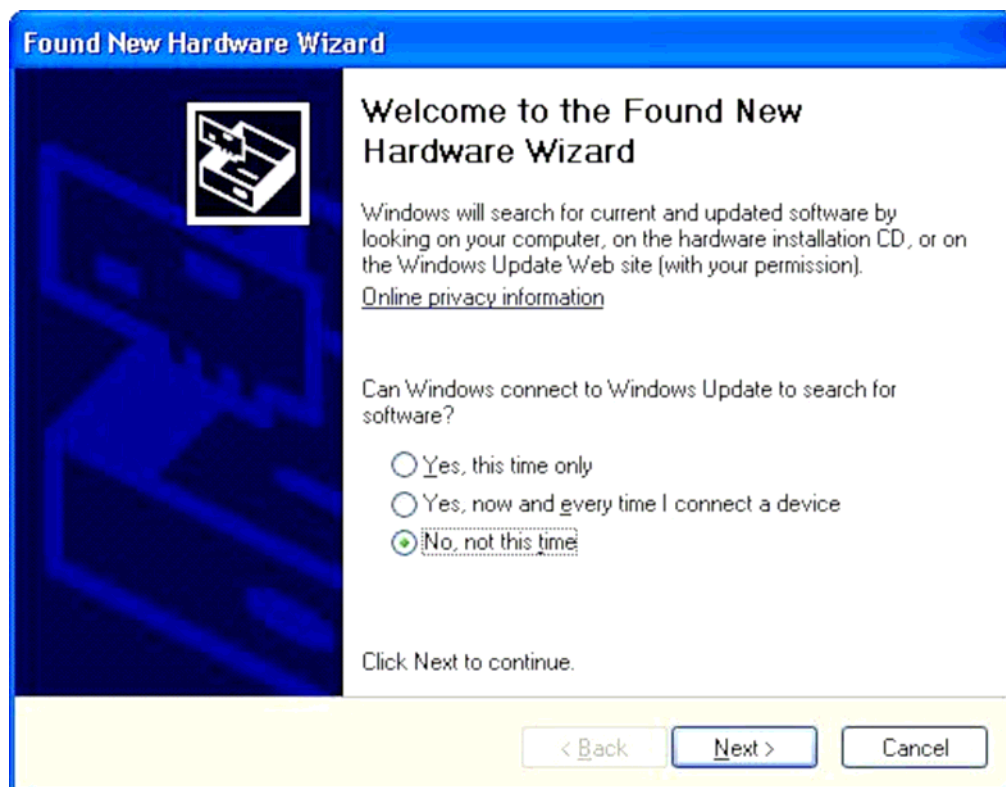

Figure 2.3

➢ If Windows XP is configured to warn when unsigned (non-WHQL certified) drivers are about to be installed, the message dialogue shown in Figure 2.4 will be displayed unless installing a Microsoft WHQL certified driver. Click on "Continue Anyway" to continue with the installation. If Windows XP is configured to ignore file signature warnings, no message will appear.

Figure 2.4

> The screen shown in Figure 2.5 will be displayed as Windows XP copies the required driver files. Windows should then display a message indicating that the installation was successful. Click "Finish" to complete the installation for the first port of the device.
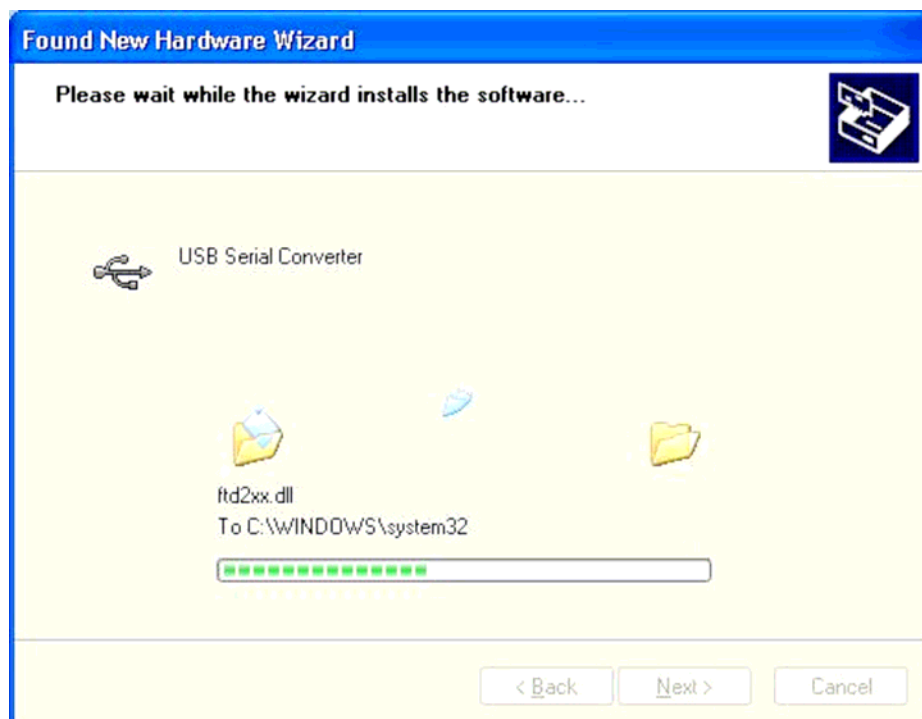
Figure 2.5

➢ If the device is based on the FT2232, the Found New Hardware Wizard will continue by installing the USB Serial Converter driver for the second port of the FT2232 device. The procedure for installing the second port is identical to that for installing the first port from the first screen of the Found New Hardware Wizard. This is done automatically if the driver is Microsoft WHQL certified. If the device is not based on the FT2232, the COM port emulation driver is loaded as indicated in the following steps.

➢ The Found New Hardware Wizard will launch automatically to install the COM port emulation drivers. As above, select "No, not this time" From the options and click "Next" to proceed with the installation (Figure 2.6).

Figure 2.6

➢ Select "Install from a list or specific location (Advanced)" as shown in Figure 2.7 below and then click "Next".
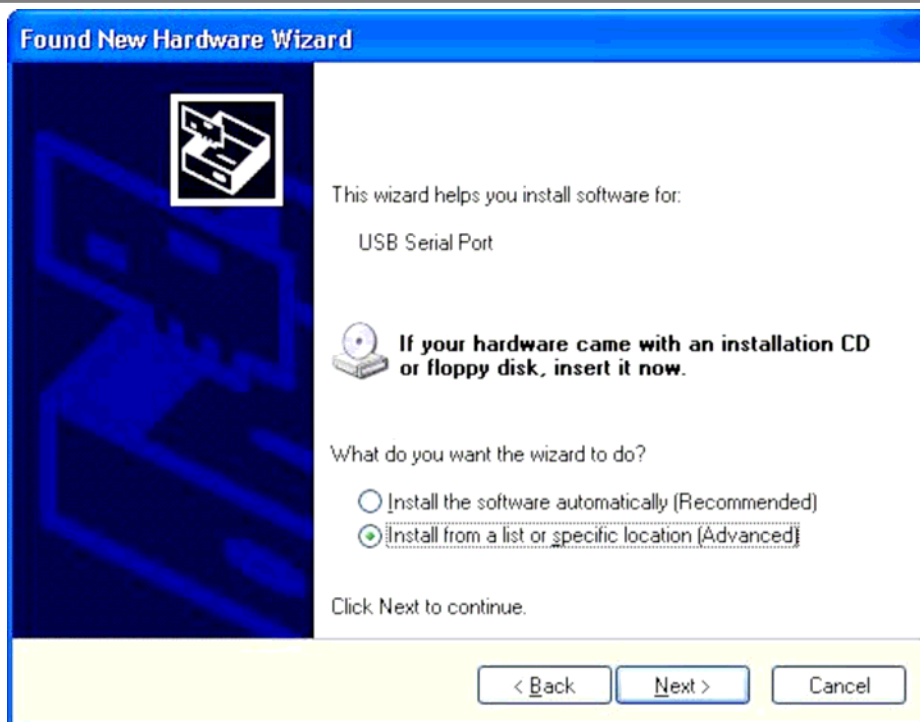
Figure 2.7

➢ Select "Search for the best driver in these locations" and enter the file path in the combo-box ("C:\CDM 2.02.04" in figure 2.8 below) or browse to it by clicking the browse button. Once the file path has been entered in the box, click next to proceed.
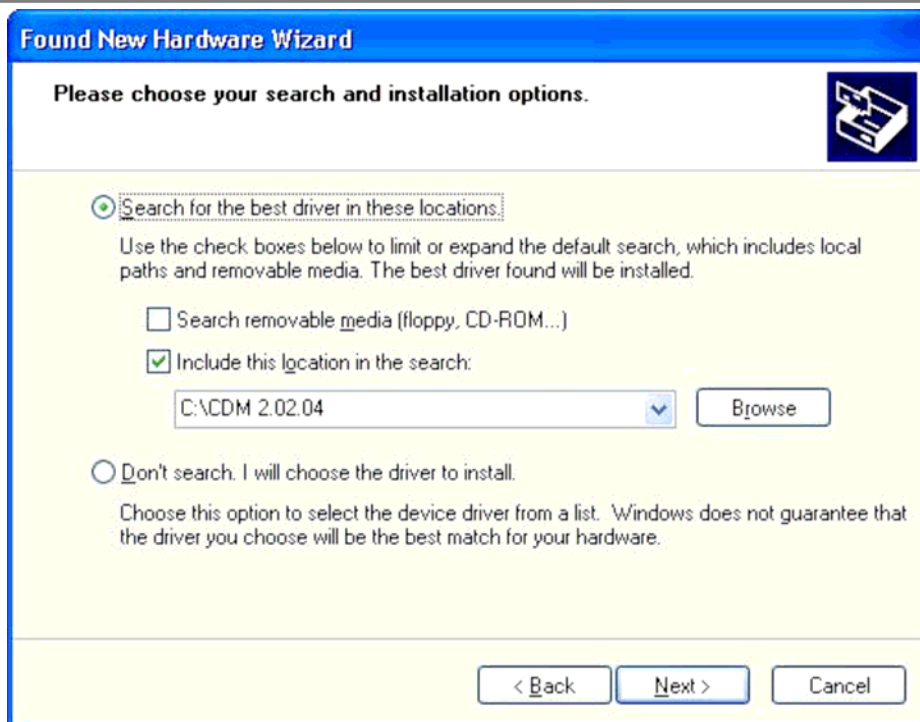
Figure 2.8

- ➢ If Windows XP is configured to warn when unsigned (non-WHQL certified) drivers are about to be installed, the message dialogue shown in Figure 2.9 will be displayed unless installing a Microsoft WHQL certified driver. Click on "Continue Anyway" to continue with the installation. If Windows XP is configured to ignore file signature warnings, no message will appear. The screen will be displayed as Windows XP copies the required driver files. Windows should then display a message indicating that the installation was successful. Click "Finish" to complete the installation for the first port of the device.

Figure 2.9

➢ If the device is based on the FT2232, the second port must also be installed. The procedure for installing the second port is identical to that for installing the first port from the first screen of the Found New Hardware Wizard for the USB Serial Port device. If the driver is Microsoft WHQL certified, this is done automatically.

➢ Open the Device Manager (located in "Control Panel\System" then select the "Hardware" tab and click "Device Manger") and select "View > Devices by Connection", the device appears as a "USB Serial Converter" with an additional COM port with the label "USB Serial Port" (Figure 2.10). If the device is based on the FT2232, two ports will be available from a composite USB device.
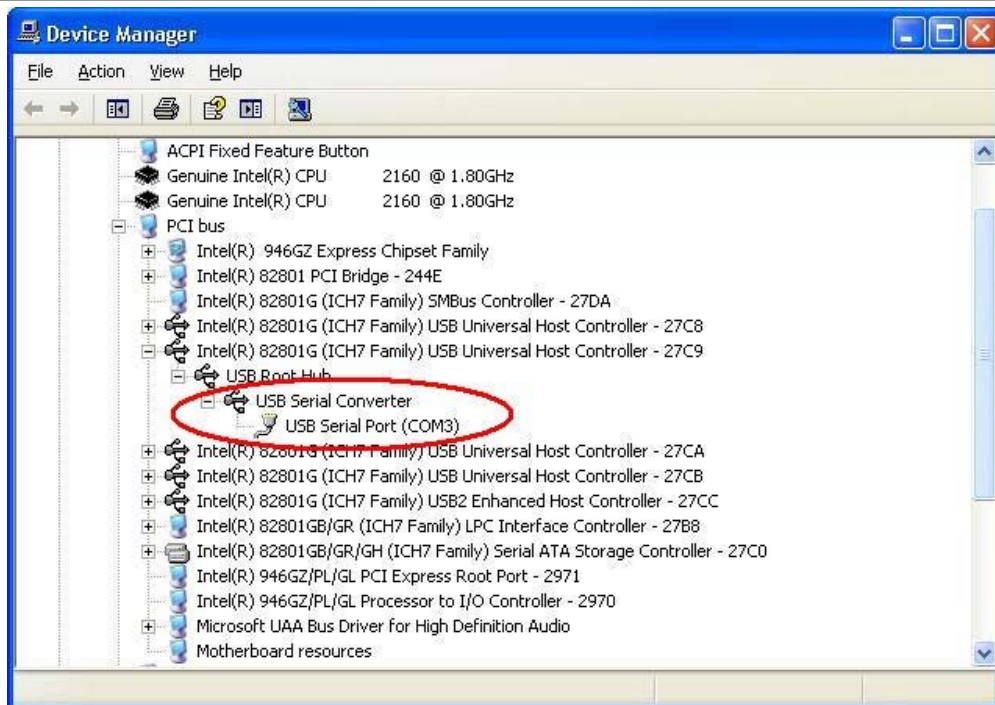
Figure 2.10

➢ In the case of the FT2232, port A of the FT2232 will be installed as COMX and port B will be installed as COMX+1 where COMX is the first available COM port number.
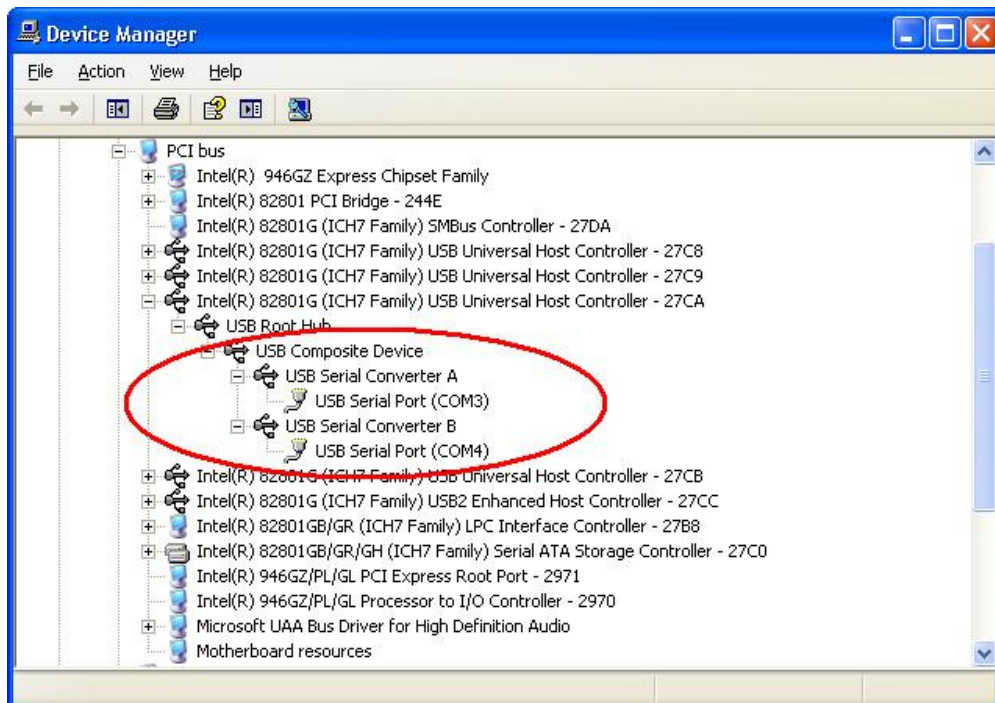

Figure 2.11

5   APPLICATION

5.1   SETTING UP AND RUNNING THE TOOL

This section describes how to use the tool running on the AMWZ5168 module from a PC. Operational instructions are provided below for those using Microsoft Hyper Terminal to interface with the tool.

➢   Open HyperTerminal: Accessories > Communications > HyperTerminal.

➢   Access the New Connection dialogue box: File > New Connection. Type a name for the connection, then click OK.
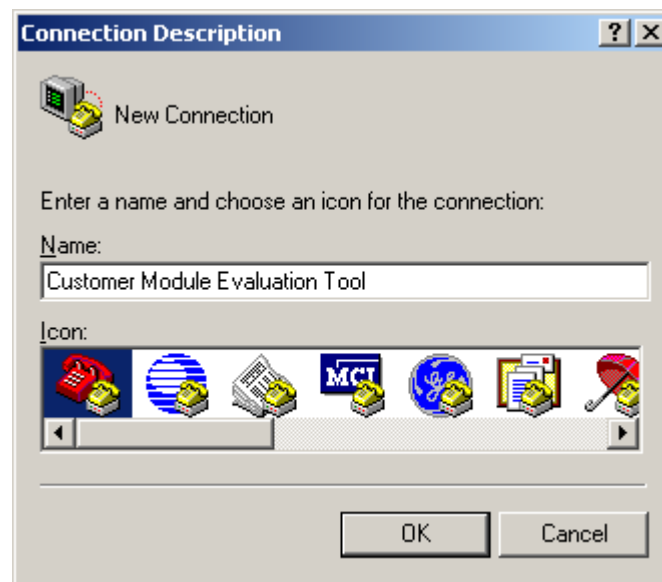
Figure 3.1

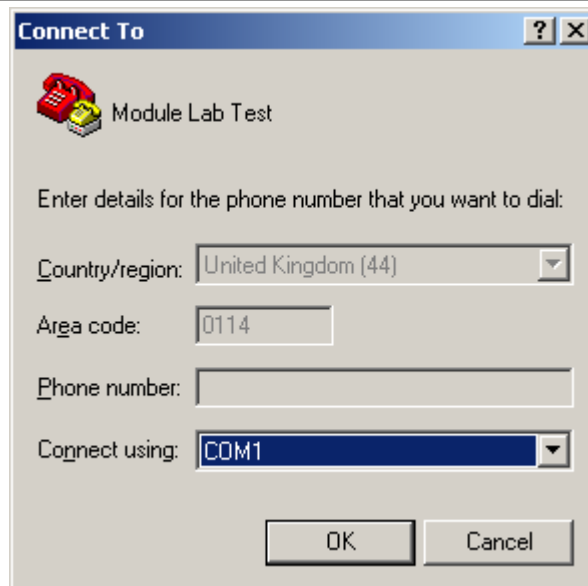➢   Choose the serial communications port that the board is connected to and then click OK.

Figure 3.2

> ➢ Set the port settings to 38400 bits per second, 8 data bits, no parity, 1 stop bit and no flow control, then click OK.
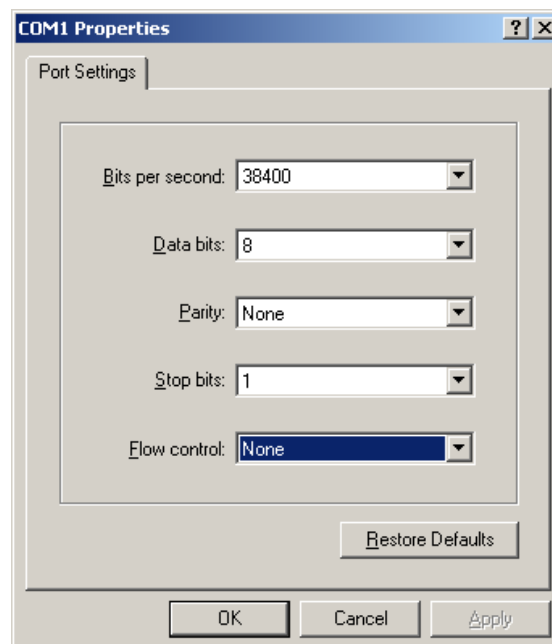

Figure 3.3

> ➢ Access the Properties dialogue box: File > Properties. Click on the Settings tab (shown below), ensure the box label Emulation is set to "Auto detect" and then click OK.
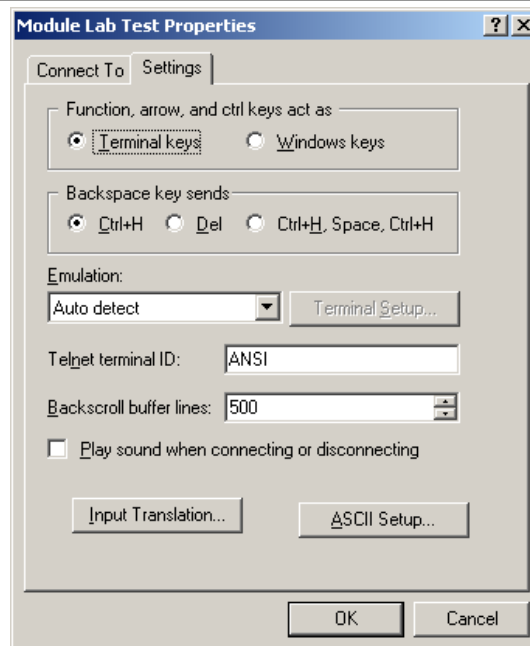
Figure 3.4

➢   Press any key, and the screen shown below will be generated by the board.
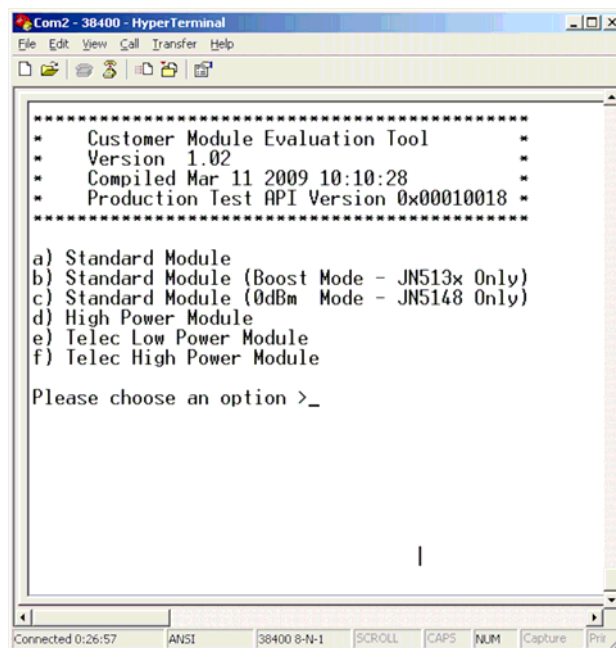

Figure 3.5