KSZ8795-POE-EVAL Board (KSZ8795CLX+KSZ9031RNX) Demo Evaluation Board User's Guide

KSZ8795 Family Integrated 5-port Managed Switch with 4 10/100 Copper Ports and Port 5 Gigabit port

Rev 1.0 January 2015

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Revision History

Revision	Date	Change
1.0	01/28/15	Initial release

1.0 Introduction

The KSZ8795 family is Micrel Operations new generation integrated 5-port switch with Gigabit up-link. The KSZ8795CLX is one of KSZ8795 family. KSZ8795CLX contains four MAC/PHYs for four copper ports and one GMAC5 interface with configurable GMII/RGMII/MII/RMII interfaces. The device had been designed with cost sensitive systems in mind but still offers a multitude of new features such as port based security ACL filtering, 802.1az EEE, LinkMD and so on. Also support port and tag based VLAN; QoS priority; SPI and MDC/MDIO interfaces for the registers access. The KSZ8795 family is an excellent choice in broadband gateway applications, integrated broadband router applications, industrial automatic, automotive, etc. fields and as a standalone switch. The KSZ8795-POE-EVAL board is designed to allow the user to experience Gigabit up-link with KSZ9031 Gigabit PHY to Gigabit port of any processor board directly, and can provide PoE PSE power to other four ports. Other rich feature set can be evaluated on this board. The evaluation board is highly configurable and easy to use.

2.0 Features

- Micrel KSZ8795 Integrated 5-port 10/100 Managed Ethernet Switch
- 4 RJ-45 Jacks for 10/100Base-T/TX Ethernet LAN with Corresponding Isolation Magnetics.
- Auto MDI/MDIX on All Ports.
- Port 5 SW5-RGMII hook-up with a KSZ9031RNX GPHY and provide a Gigabit port.
- Easily set to different VDDIO of 3.3V, 2.5V and 1.8V by jumpers.
- 1 USB Port Interface Configurable to Emulate an SPI Interface for all registers access by using Window GUI and DOS based software tools.
- 2 LEDs per Port with 5 LED sets to indicate the Status and Activity for 4 fast Ethernet ports and 1 Gigabit port.
- The board powered can be used by a 12V DC power supply.

3.0 Evaluation Kit Contents

The KSZ8795-POE-EVAL Evaluation kit includes the following:

- KSZ8795-POE-EVAL Evaluation Board Rev. 1.x
- KSZ8795-POE-EVAL Evaluation Board User's Guide Rev 1.x
- Micrel SPI Configuration Software tools
- KSZ8795-POE-EVAL Evaluation Board Schematics and BOM
- KSZ8795-POE-EVAL PCB file, Gerber file and IBIS model
- The software, reference schematics and other design information will be found in the Design Kit (Design Package) of the KSZ8795 Ethernet switch products on Micrel website. (Contact your Micrel FAE for the latest schematic).
- One 12V DC power supply.
- The USB cable is not included.

4.0 Hardware Description

The KSZ8795-POE-EVAL evaluation board is in a compact form factor and can sit on a bench near a computer with USB connector. There are two options for configuration: strap in mode; SPI mode and Strap-in mode that is easily done with on board jumper options. SPI mode is accomplished through a built in USB port interface. You can configure the KSZ8795 device on board by the USB port. Using Micrel SPI software and your PC, you can access the KSZ8795's full feature set registers by the USB to SPI interface. The board also features RGMII to hook up a KSZ9031RNX as a Gigabit uplink for Gigabit port 5.

The KSZ8795-POE-EVAL evaluation board is easy to use. There are programmable LED indicators for link and activity on all ports and a power LED. A manual reset button allows the user to reset the board without removing the power plug. A standard 12VDC power supply can be used by the power jack so that the user can supply power from any 110-240 Volt AC wall or bench socket.

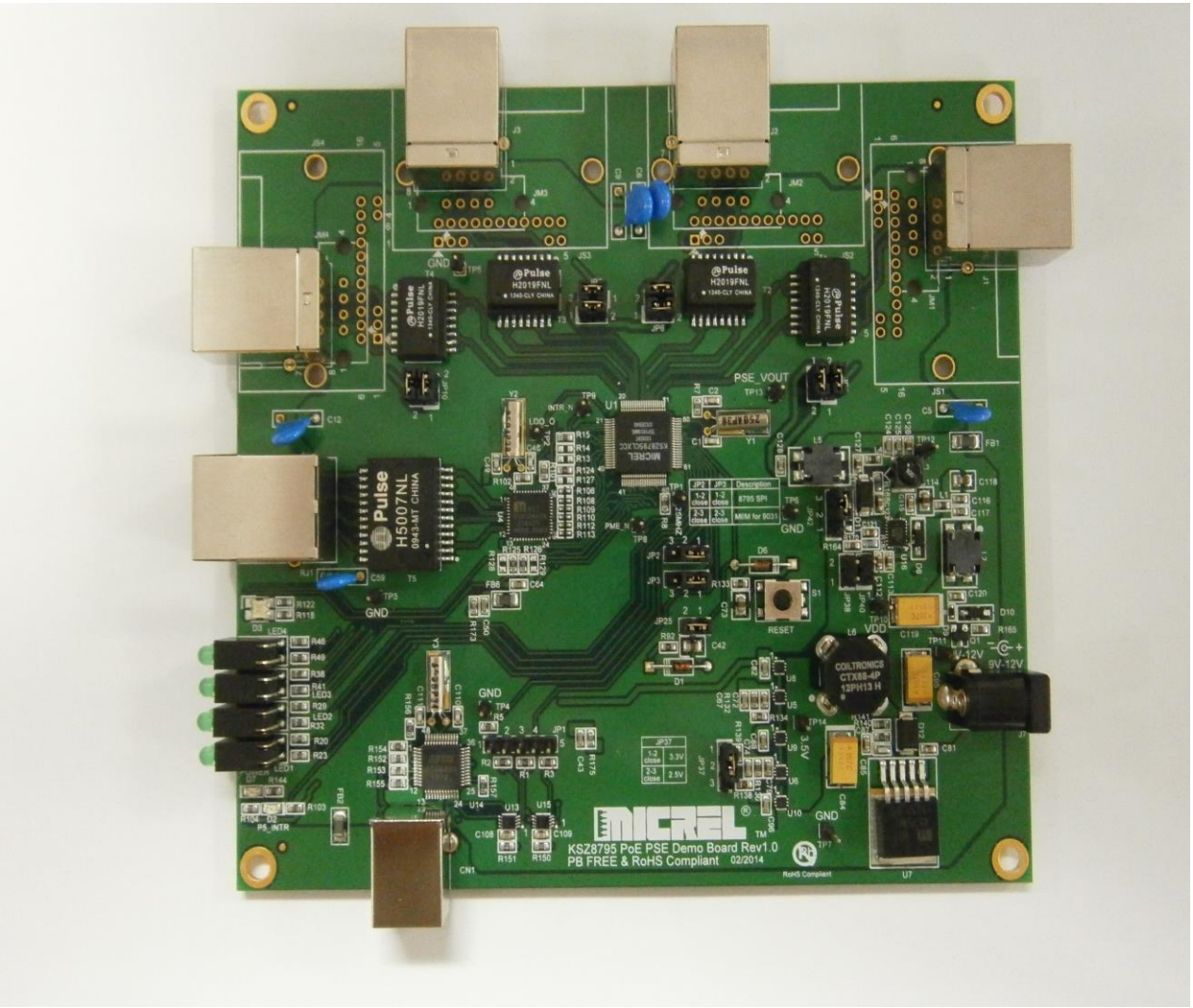


Figure 1 KSZ8795-POE-EVAL Board

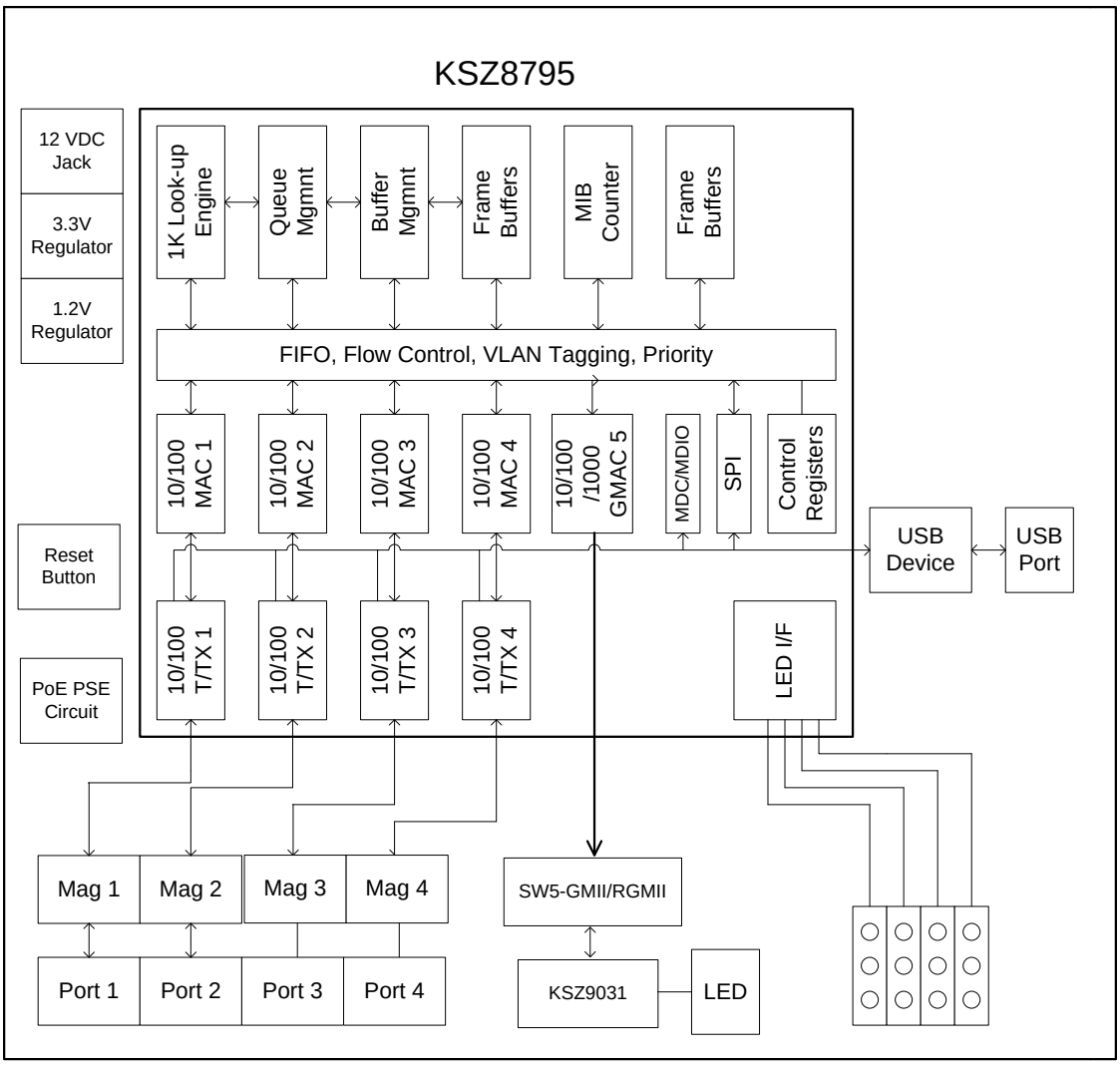


Figure 2 KSZ8795-POE-EVAL Board Block Diagram

4.1 Strap in Mode

Strap in configuration mode is the quickest and easiest way to get started. In the default mode, the KSZ8795 acts as a stand-alone 4 port switch and one RGMII up-link. The user has to simply set the board's configuration jumpers to the desired settings and apply power to the board. The user can also change jumper settings while power is applied to the board and press the convenient manual reset button for the new settings to take effect. Note that even if there is no external strap in values are set, internal pull up and pull down resistors will set the KSZ8795 default configuration. Section 4.1.1 covers each jumper on the board and describes its function.

The KSZ8795 will start automatically after power up or reset.

4.2 Feature Setting Jumpers

The evaluation board provides jumpers to allow the user to easily set strap in configurations for the KSZ8795. Tables below describe the jumpers and their functions in the open or closed state.

Table 1 General Setting Jumpers

Jumper	KSZ8795 Signal	Description Closed or Open	Description Closed or Open
JP1 5-pin	SPI signals	Open for SPI signals	N/A
JP2 3-pin	SCL_MDC	1-2 for KSZ8795 SPI or	2-3 for KSZ9031 GPHY MDC
JP3 3-pin	SDA_MDIO	1-2 for KSZ8795 SPI or	2-3 for KSZ9031 GPHY MDIO
JP4/JP5	Port 1 POE PSE	Open: Don't provide POE PSE power for port 1	Closed: Provide POE PSE power for port 1
JP6/JP7	Port 2 POE PSE	Open: Don't provide POE PSE power for port 2	Closed: Provide POE PSE power for port 2
JP8/JP9	Port 3 POE PSE	Open: Don't provide POE PSE power for port 3	Closed: Provide POE PSE power for port 3
JP10/JP11	Port 4 POE PSE	Open: Don't provide POE PSE power for port 4	Closed: Provide POE PSE power for port 4
JP38	PGOOD Status	Open: Default	N/A
JP40	Enable POE PSE power regulator	Open: Enabled as default	Closed: Disabled
JP42	Select POE PSE output voltage	1-2: About 3.3V (it is not recommended)	2-3: About 7V (default)
JP25	Push button reset with KSZ9031 GPHY	Open: Doesn't reset KSZ9031 GPHY	Closed: Push button reset including KSZ9031 GPHY

Table 2 Power Setting Jumpers

Jumper	Description	Description Closed or Open	Description Closed or Open
JP37 3-pin	VDDIO voltage selection	1-2 Closed: 3.3V VDDIO (default)	2-3 Closed: 2.5V VDDIO

4.3 SPI Mode

From SPI interface to the KSZ8795, use a USB to SPI converter that allows accessing all of the KSZ8795 features and registers. The user can easily access the SPI interface using a computer connected to the evaluation board's USB port interface. Micrel provides a Windows GUI based program for the user to evaluate the KSZ8795's full feature set. KSZ8795's SPI interface will be able to access all static MAC table, the VLAN table, dynamic MAC address table, the MIB counters and all enhanced features.

To prepare the KSZ8795CLXD-EVAL board for SPI mode configuration follow these steps:

1. Copy the Micrel provided SPI interface software on your computer.
2. KSZ8795-POE-EVAL board is fixed at SPI slave mode.
3. Connect the computer's USB port to the KSZ8795CLXD-EVAL board with a USB port cable.
4. Connect the 12V DC power supply to J7 of the KSZ8795-POE-EVAL board.
5. Open the Windows and navigate to the directory where the Window SPI file is stored. Click its icon to invoke the software.
6. Program the desired settings using the Micrel SPI interface software. See the software operation description section for details.

4.4 10/100 Ethernet Ports

There are five 10/100 Ethernet ports on the KSZ8795-POE-EVAL board. The ports J1, J2, J3 and J4 are the standard RJ45 connectors and using CAT-5 cables. Each port can be used as either an uplink or downlink. All ports support Auto-MDI/MDIX, so there is no need for cross over cables.

J1 = RJ45 connector for port 1
J2 = RJ45 connector for port 2
J3 = RJ45 connector for port 3
J4 = RJ45 connector for port 4

JM1, JM2, JM3, JM4 and JS1, JS2, JS3, JS4 special connectors for Automotive used only.

4.4 10/100/1000 Gigabit Ports

There is one KSZ9031RNX with 10/100/1000 Ethernet ports on the KSZ8795-POE-EVAL board. The ports RJ1 is the standard RJ45 connectors for port 5 and can connect to one Gigabit port of a processor platform by using CAT-5 cables. The port supports Auto-MDI/MDIX, so there is no need for the cross over cables.

RJ1 = RJ45 connector for port 5

4.5 LED indicators

Ethernet Port LEDs

There are four columns of LED indicators on the board, one column for each of the four ports. The LED indicators are programmable to two different modes. You can program the LED mode through Register 11 bits [5:4]. The mode definitions are shown in Table below. There are two LEDs per port. The naming convention is "LEDx_y", where "x" is the port number, and "y" is the number of the LED for that port.

Table 3 LED Modes

Register 11 bits [5:4]	00	01	10	11
LEDx_1	Speed	ACT	Duplex	Duplex
LEDx_0	Link/ACT	Link	Link/ACT	Link

LED1_y are assigned to port 1
LED2_y are assigned to port 2
LED3_y are assigned to port 3
LED4_y are assigned to port 4

Gigabit Port LED

The board also has a Gigabit port LED D3 to indicate the link-up speed for port 5.
Green Color: 1G Link
Red Color: 100M Link
Orange Color: 10M Link

Power LED

The board also has a power LED D7 for the 3.3V power supply. D7 LED indicates Power on and off.

5.0 Software Tools Description

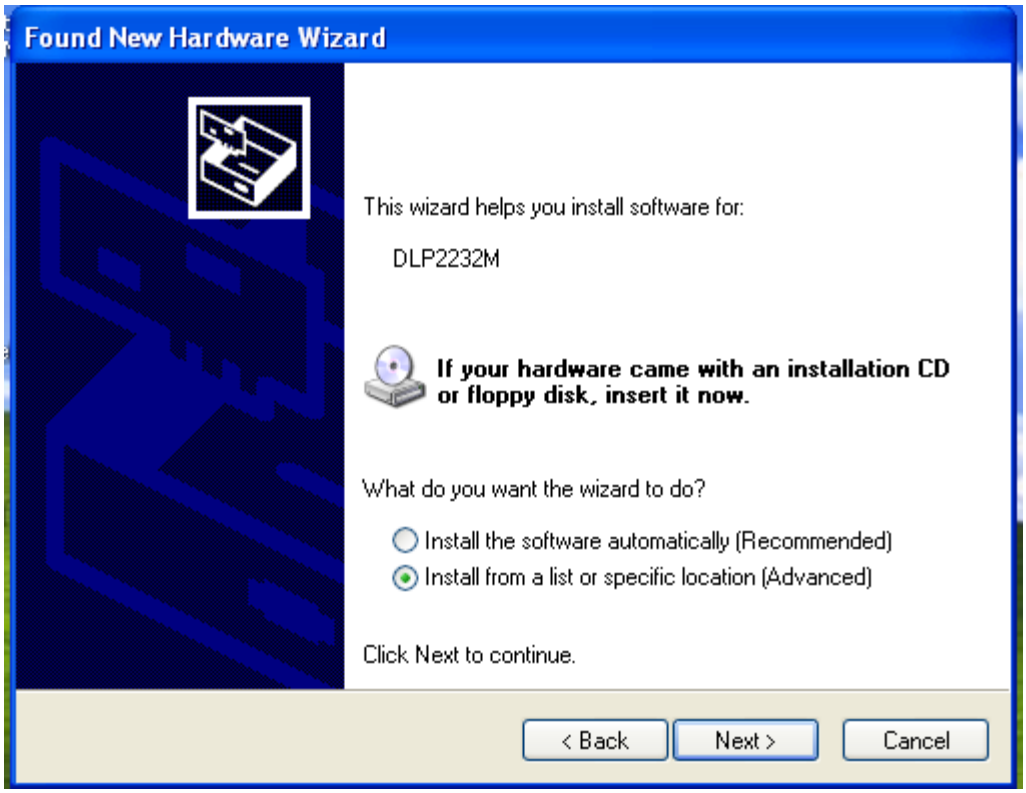
5.1 Introducing Application Software Tools

The Design Kit provides some software tools to support SPI access for all registers and MDC/MDIO access for MIIM registers. The installation file is located folders in the software tool directory within subdirectory of Window SPI_MDIO_Tools, this file name is MicrelSwitchPhyTool_x.xx.msi.

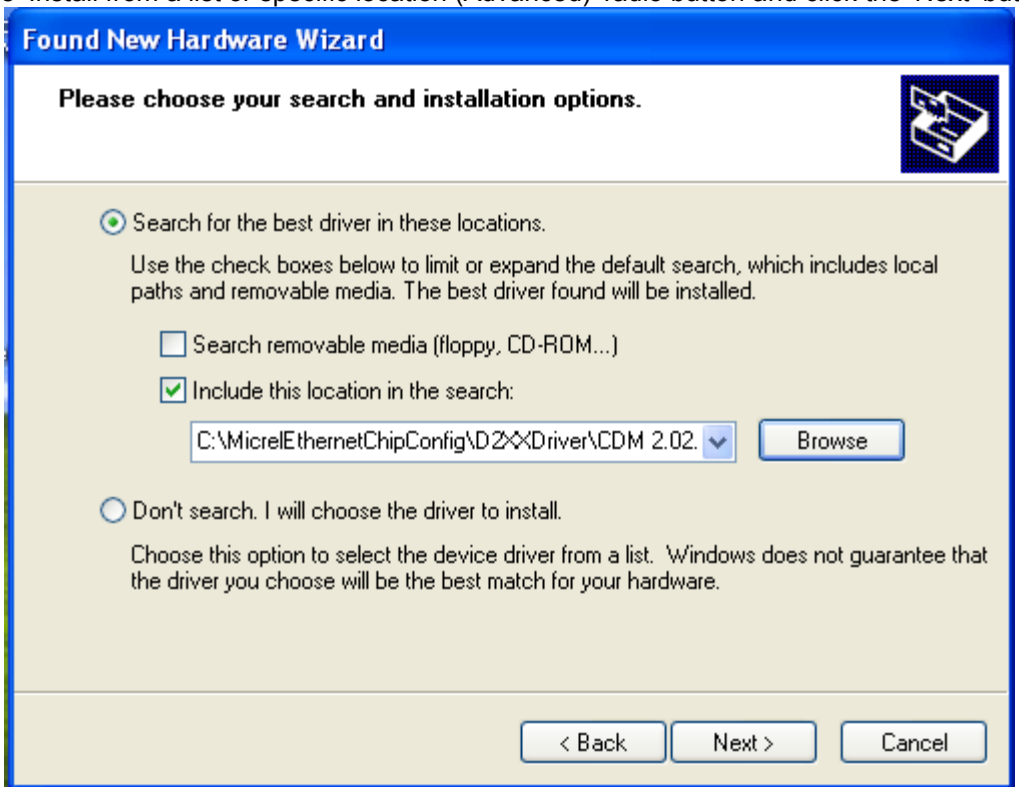
5.2 Window Driver Installation First

Before use the Window based application software tool, the support drivers need to be installed to PC/Laptop first and this installation is just one times only. When connect one standard USB cable with type A and type B connectors between the evaluation board and PC computer first time, the Found New Hardware Wizard window will pop-up and then follow the instructions step by step as below.

. Choose 'No, not this time' radio button and click the 'Next' button.

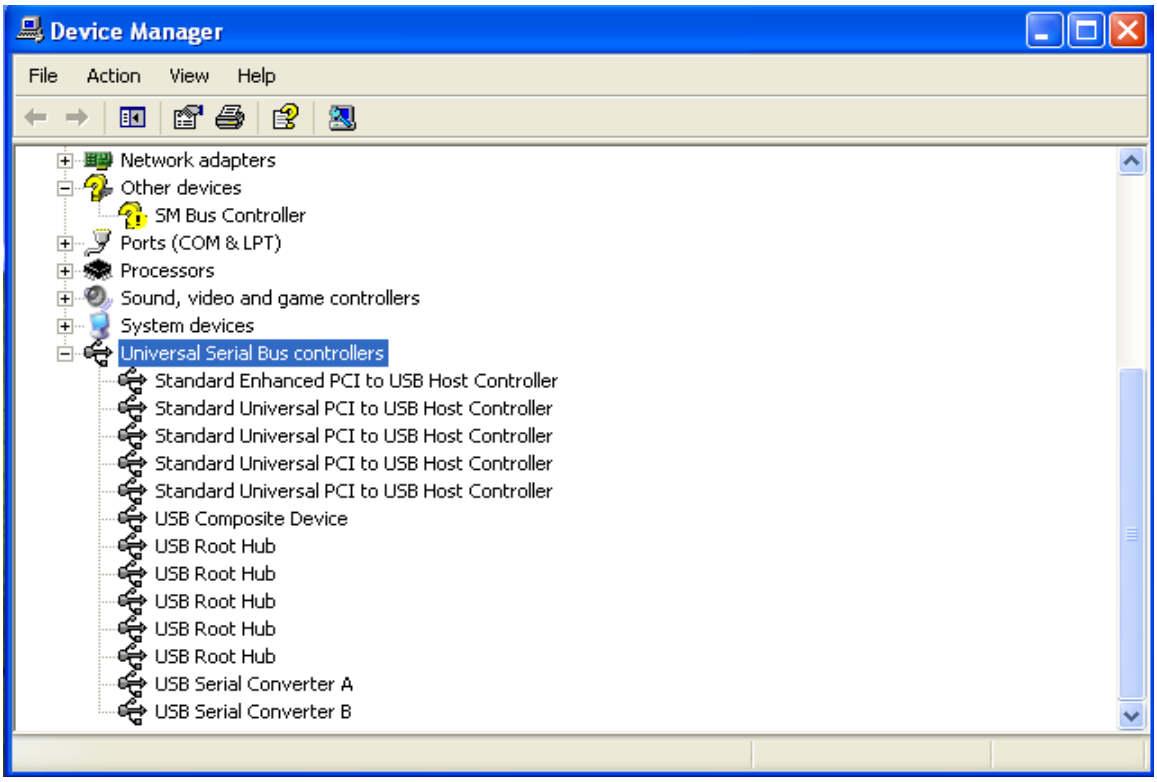


Choose the 'Install from a list or specific location (Advanced)' radio button and click the 'Next' button.



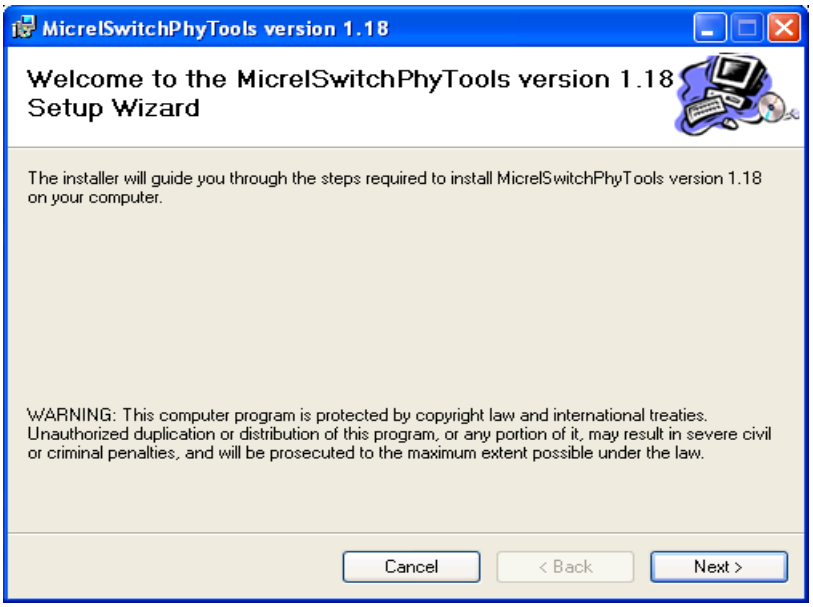
Click the 'Include this location in the search' check box, and use 'Browse' button to select the 'C:\MicrelEthernetChipConfig\D2XXDriver\CDM 2.02.04 WHQL Certified' directory and click the 'Next' button. The window will install the drivers from this location.

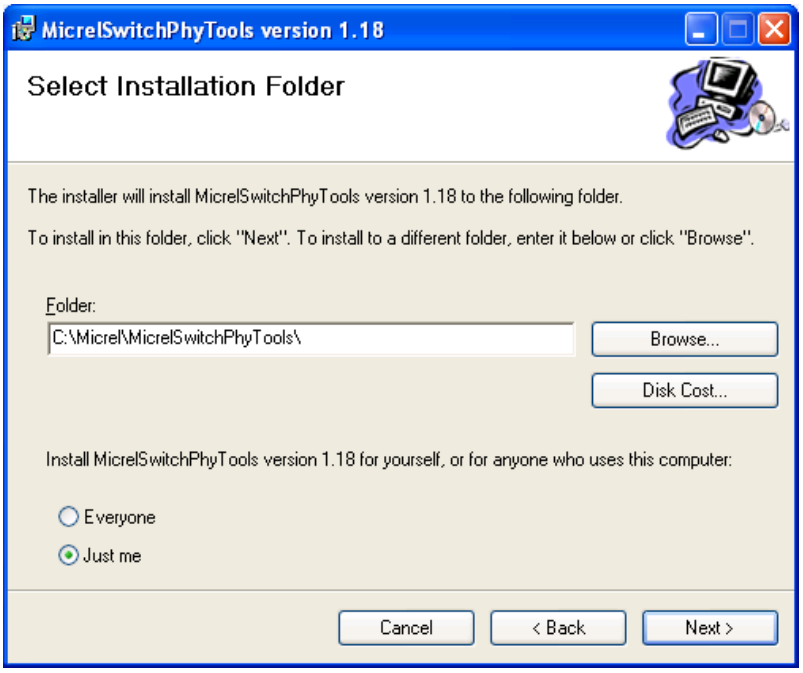
Click 'Finish' button. The Window will install another driver called 'USB Serial Converter B'. After the drivers installed, Window Device Manager will show 'USB Serial Converter A' and 'USB Serial Converter B' as below figure. That means the installation successful.



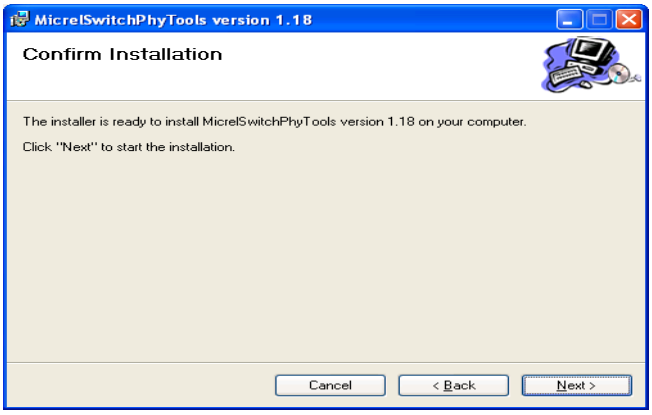
5.3 Installation Application Software Tools

In the Design Kit, the installation file is located folders in the software tool directory within subdirectory of Window SPI_MDIO_Tools, this file name is MicrelSwitchPhyTool_x.xx.msi. Double click this file name, an installation Window will pop-up and then follow the instructions step by step as below.

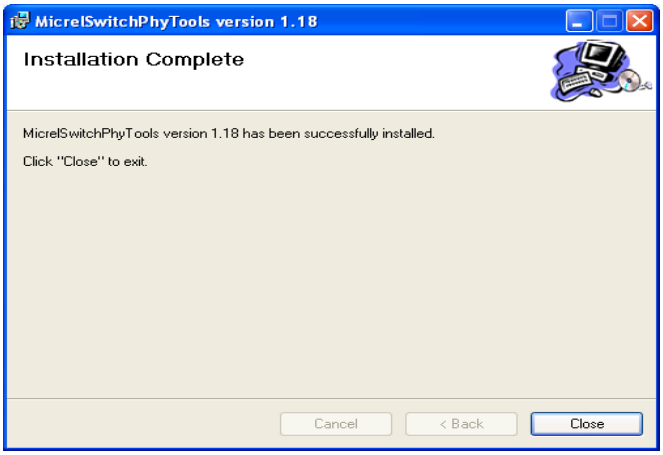




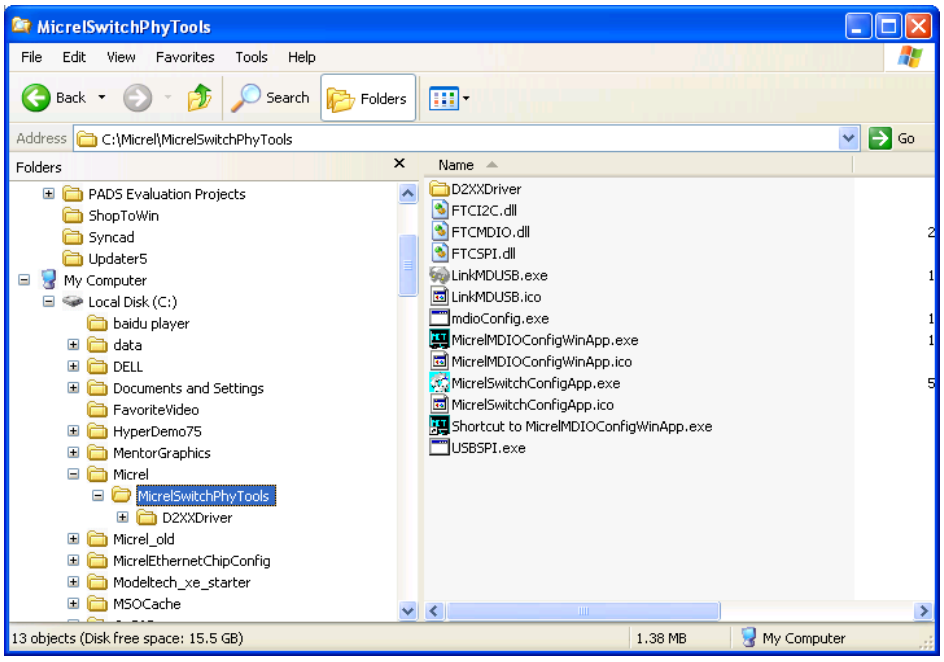
In this pop-up Window, this application software tools can be assigned to default Micrel directory in above window shown or is assigned to a specified folder what you want. Click 'Next' button, next Window will pop-up as below.



Click 'Next' button to start the installation.

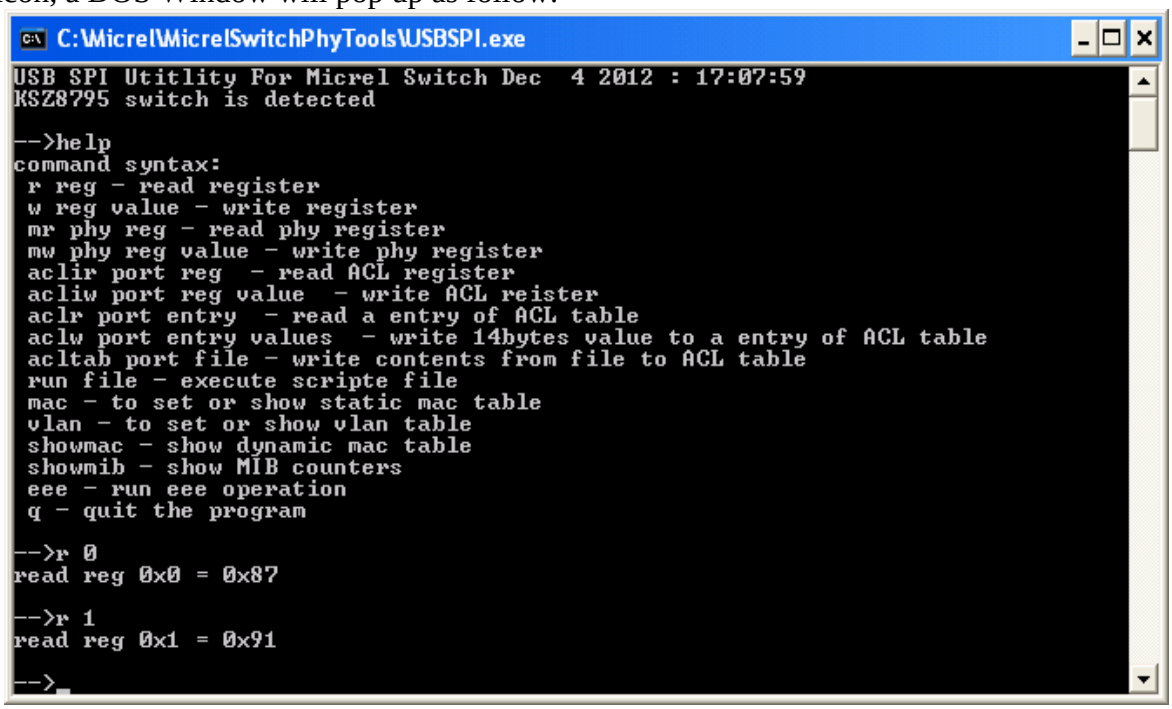


Click 'Close' button to finish the installation. All application software tools are installed into the default Micrel directory or assigned directory in installation as below.



5.4 DOS SPI Tool

This is a simple and powerful tool to access all register. The tool located in the default or assigned folder in the installation. There is an USBSPI.exe file which can be executed directly by clicking its icon. Before run the software tool, the SPI jumper setting should follows Table 5 in 4.3 SPI mode section and USB cable is plugged in both KSZ8795-POE-EVAL board and PC/Laptop. After click its icon, a DOS Window will pop up as follow:

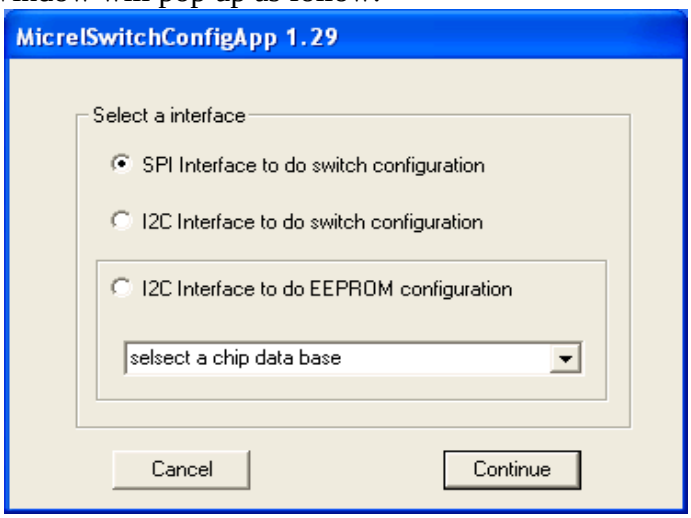


Type a 'help' and press Enter, all commands will display as follows,
For Read or Write registers, reg is the offset address of the register, value is Hex number.
The 'run file' command can execute multiple commands by a script file, the script file is a .txt file which can be created by any edit tools.
→ run xxxx.txt //will run the .txt script file.

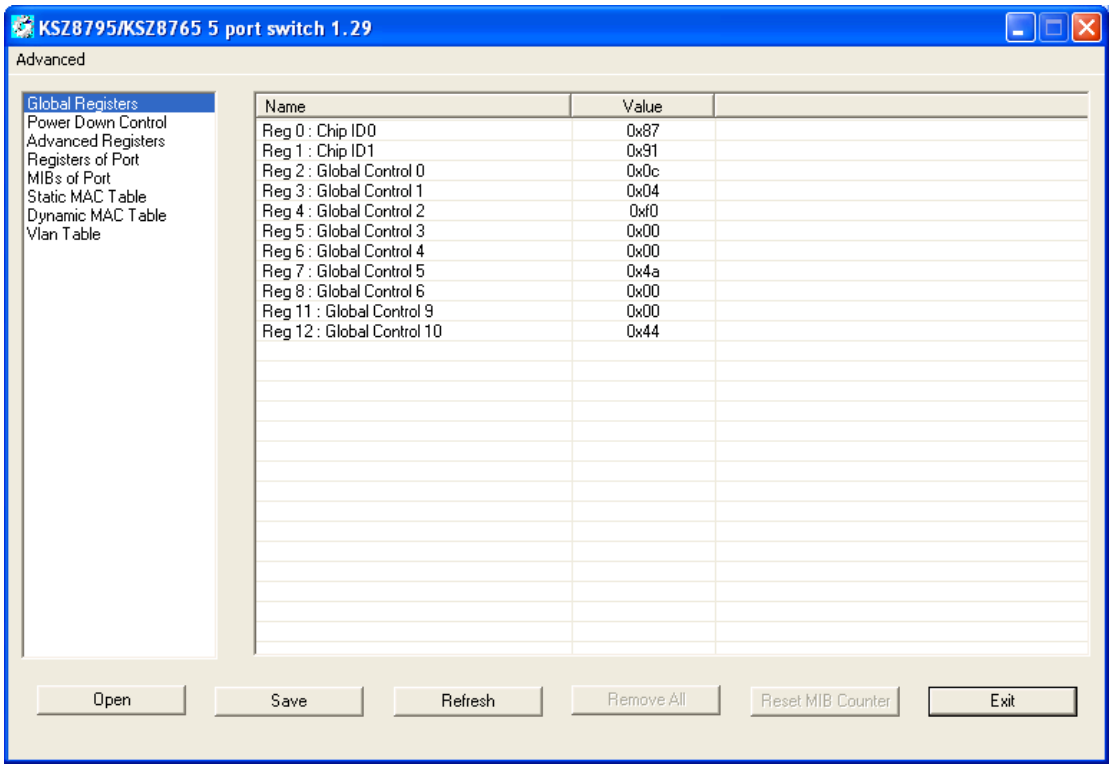
5.5 Window SPI Software Tool

This is a powerful tool to access all register. The tool located in the default or assigned folder in the installation. There is a MicrelSwitchConfigApp.exe file which can be executed directly by clicking its icon.

Before run the software tool, the SPI jumper setting should follows Table 5 in 4.3 SPI mode section and USB cable should be plugged in both KSZ8795CLXD-EVAL board and PC/Laptop. After click its icon, a GUI Window will pop up as follow:



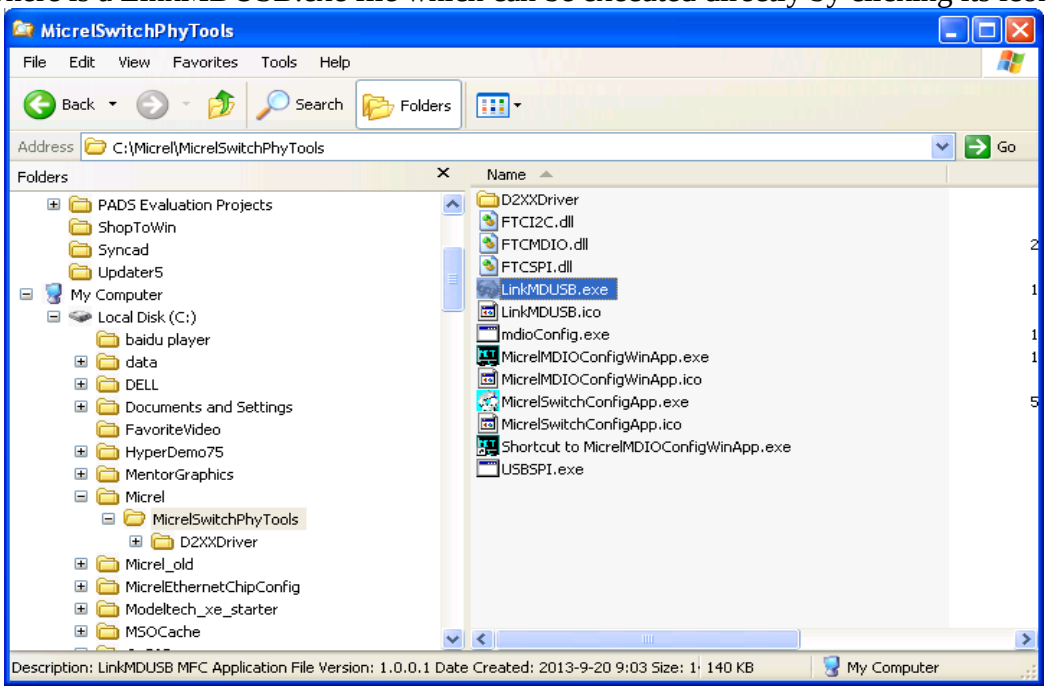
The default is SPI interface to do switch configuration. From the device selection window to select any devices then press 'Continue' button or click 'Continue' button directly, the software tool can detect devices automatically. A control Window will be pop up as follow.



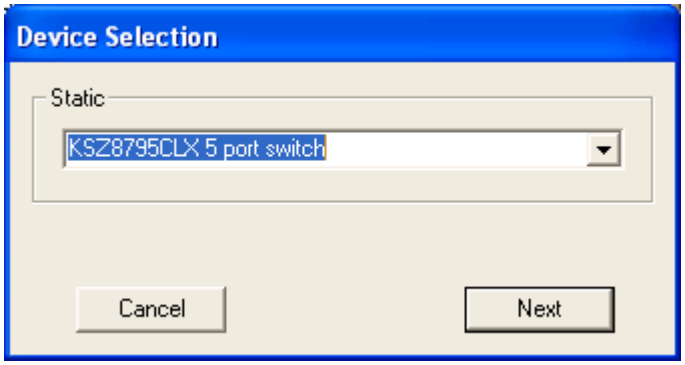
All register can be read/ written in the window.
The control Window includes all application registers, static MAC table, VLAN table, dynamic table and MIB counters that are supported by SPI. The software can save and open the configuration file as a back-up.

5.6 LinkMD Software Tool

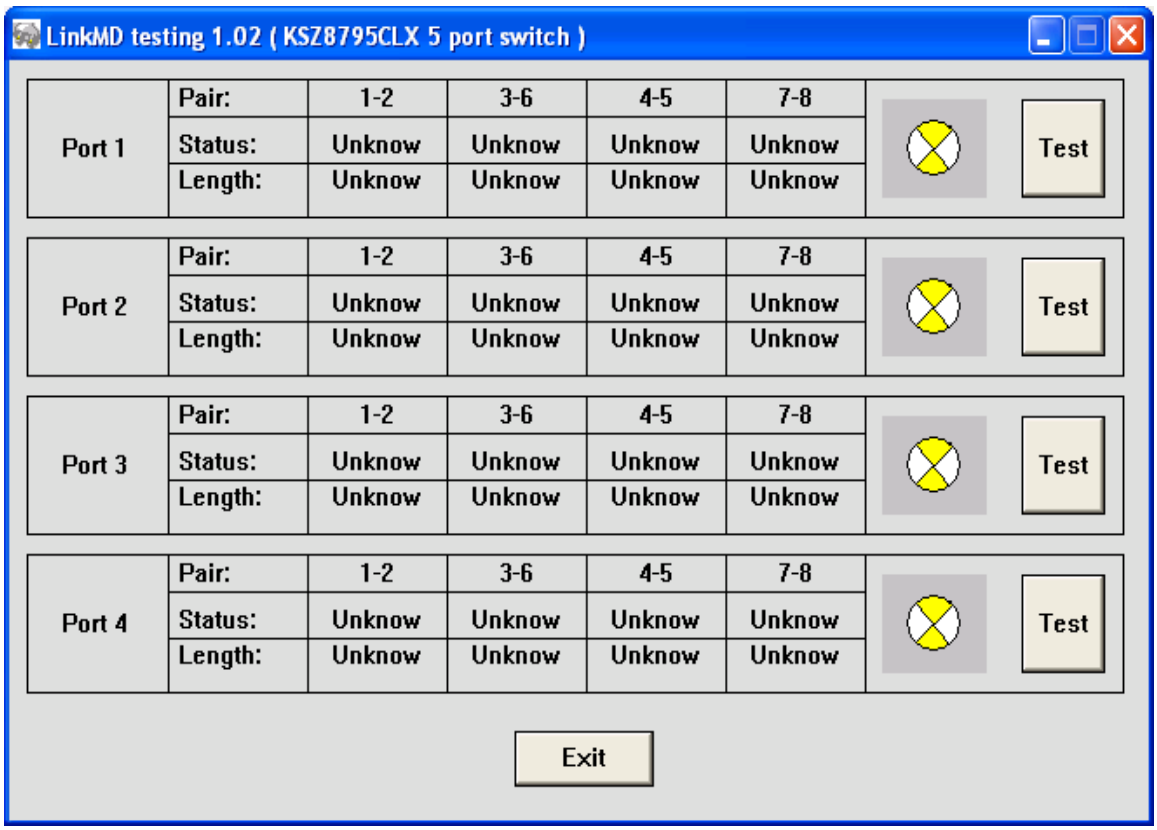
This is a simple and powerful tool to test Micrel LinkMD feature. The tool is in the installation folder. There is a LinkMDUSB.exe file which can be executed directly by clicking its icon.



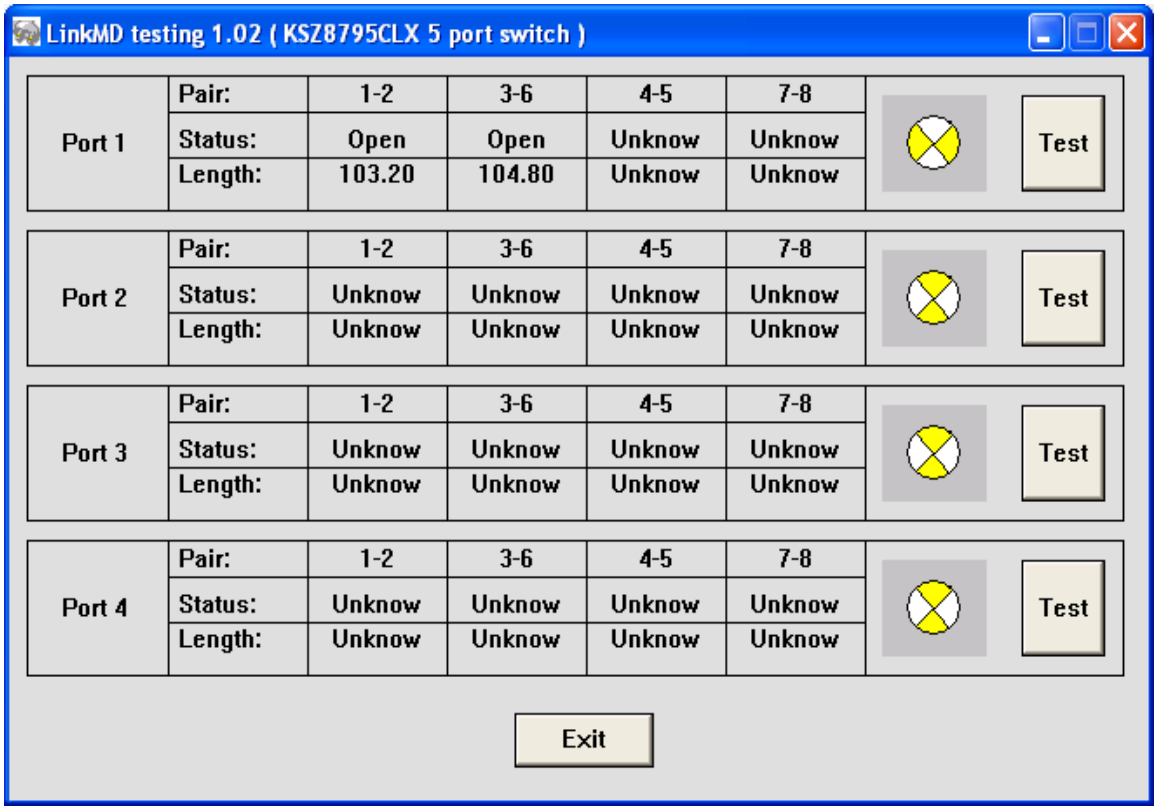
After click the icon of this executed file, a GUI Window will pop up as follow:



Select one part and clik 'Next' button, using SPI interface and clik 'Next' button again, pop up a test windown as below:



An example for CAT-5 cable diagnostic with open on port 1, just click 'TEST' button, a test result shows as below.



The test result shows both MDIX mode for pair 3-6 and MDI mode for 1-2 pair. The detail LinkMD diagnostic testing configuration is described in the datasheet.

6.0 Reference Documents

KSZ8795CLX Data Sheets (Contact Micrel for Latest Datasheet), KSZ8795 Design Package includes all design information as a Design kit. The Design Kit will be found on Micrel website (Contact Micrel for the updates).

7.0 Bill of Material

Please see the detail BOMs in the BOM folder of the hardware design package for the KSZ8795-POE-EVAL Boards.

8.0 Schematics

Please see the schematics of the evaluation board and reference design in the schematics folder of the hardware design package (Design kit) for the KSZ8795-POE-EVAL Board.

Magnetics Vendors:

See the datasheets for the recommendation.

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