



KSZ8873MML

Evaluation Board User's Guide

KSZ8873MML Integrated 3-Port 10/100 Managed Switch with PHYs

Revision 1.1 January 2011

© Micrel, Inc. 2011
All rights reserved

Micrel is a registered trademark of Micrel and its subsidiaries in the United States and certain other countries. All other trademarks are the property of their respective owners.

The information furnished by Micrel in this datasheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer. Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

Micrel, Inc. ♦ 1849 Fortune Drive ♦ San Jose, CA 95131 ♦ U.S.A.
408-955-0800 (voice) ♦ 408-955-1577 (fax)
<http://www.Micrel.com>

Revision History

Revision	Date	Summary of Changes
1.0	04/30/09	Initial Release
1.1	01/11/11	Update description

Table of Contents

1.0	Introduction	4
2.0	Board Features.....	4
3.0	Evaluation Kit Contents.....	4
4.0	Hardware Description	4
4.1	Strap In Mode	5
	4.1.1 Feature Setting Jumpers.....	6
4.2	I2C Master (EEPROM) Mode	7
4.3	SPI Slave Mode	8
4.4	10/100 Ethernet PHY Ports.....	9
4.5	LED Indicators.....	9
4.6	MII Port Configuration	9
5.0	Reference Documents	10

List of Tables

Table 1:	Feature Setting Jumpers	6
Table 2:	Reserved Jumpers	7
Table 3:	LED Modes	9
Table 4:	MII Mode Settings.....	9

List of Figures

Figure 1:	KSZ8873MML Evaluation Board Block Diagram	5
-----------	---	---

1.0 Introduction

The KSZ8873MML is Micrel's third generation fully integrated 3-port switch. The PHY units support 10BASE-T and 100BASE-TX. The device has been designed for cost sensitive systems, however, still offers a multitude of features, such as switch management, port and tag based VLAN, QoS priority, Two MII interfaces and CPU control and data interfaces.

The KSZ8873MML is an excellent choice for VoIP Phone, Set-top/Game Box, SOHO Residential Gateway, industrial Ethernet systems and as a standalone 3-port switch.

The KSZ8873MML Evaluation Board provides a convenient means to evaluate the KSZ8873MML's rich feature set. Easy access is provided to all of the KSZ8873MML pins, with jumpers and interface connectors allowing quick configuration and re-configuration of the board. MIIM, EEPROM programming, SPI emulation software are also provided to access the more extensive features of the KSZ8873MML, via a PC USB port.

2.0 Board Features

- Micrel's KSZ8873MML Integrated 3-Port 10/100 Managed Ethernet Switch
- One RJ-45 Jacks for Ethernet LAN Interfaces with corresponding Isolation Magnetics
- Auto MDI/MDI-X on the PHY port
- PHY Mode and MAC Mode MII Connector for the Switch MII Interface
- 1 USB port to emulate an MIIM, EEPROM, SPI Interface
- On board EEPROM
- 2 LEDs to Indicate the Status and Activity of the RJ45 port
- 1 power jack for 5VDC Universal Power Supply

3.0 Evaluation Kit Contents

The KSZ8873MML Evaluation kit includes the following:

- KSZ8873MML Evaluation Board Revision 1.0
- KSZ8873MML Evaluation Board User's Guide
- Micrel USB Configuration Software Version 1.05
- KSZ8873MML Evaluation Board Schematic Revision 1.0
(Contact your Micrel FAE for the latest schematic)

Note: USB cable and 5V DC Wall Power Supply is not included in the design kit (the dimension of the output plug of 5V DC wall power supply is 2.5x5.5x9.5mm or 0.1x0.218x0.375inch)

4.0 Hardware Description

The KSZ8873MML Evaluation Board is in a compact form factor and can sit on a bench near a computer. There are three options for configuration: strap in mode, EEPROM mode, and SPI mode. Strap in mode configuration is easily done with on board jumper options. EEPROM mode and SPI mode are accomplished through a built in USB port interface. With the Micrel software and your PC, you can use the USB port to reprogram the EEPROM on board, or use the SPI interface to access the KSZ8873MML's full feature set. The board also features two MII connectors for the Switch MII interface. These are to facilitate connections from the switch to either the external CPUs or the external PHYs.

The KSZ8873MML evaluation board is easy to use. There are programmable LED indicators for link and activity on port 2 and a power LED. A manual reset button allows the user to reset the board without removing the power plug. A standard 5VDC power supply is included so that the

user can supply power from any 110-240 Volt AC wall or bench socket, and the power also can be provided by USB port when close pin 2-3 of the JP44 jumper.

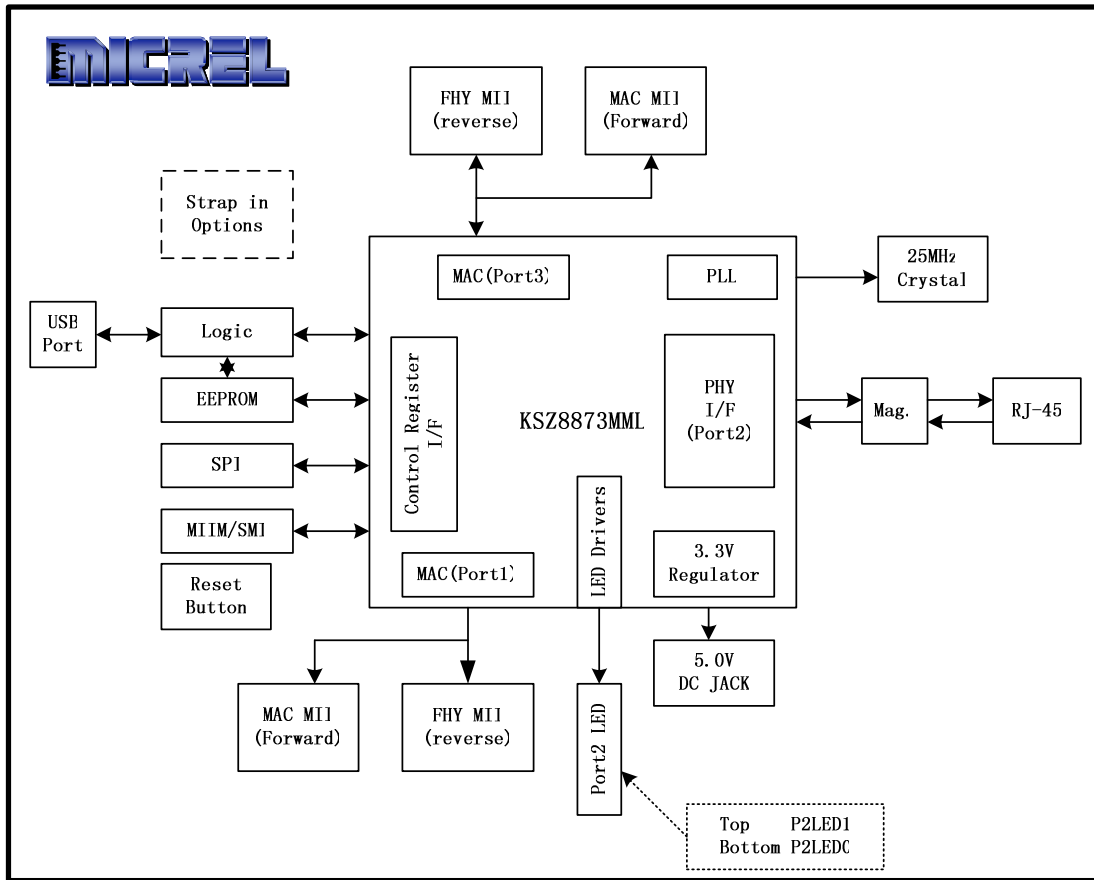


Figure 1: KSZ8873MML Evaluation Board Block Diagram

The KSZ8873MML evaluation board is easy to use. There are programmable LED indicators for link and activity on the PHY port and a power LED. A manual reset button allows the user to reset the board without removing the power plug. The 5V power on the board can be supplied by a standard 5VDC power supply or by the USB cable (close pin 2-3 of JP44 jumper) which is used to access the registers in SPI mode. The JP44 is used to select the power supply. A standard 5VDC power supply is included so that the user can supply power from any 110 Volt AC wall or bench socket. Before to start to use the evaluation board, make sure the power connectors JP103, JP104, JP105 and JP107 are connected, and close pin 1-2 of J14.

4.1 Strap In Mode

Strap in configuration mode is the quickest and easiest way to get started. In this mode, the KSZ8873MML acts as a standalone 3-port switch. Simply set the board's configuration jumpers to the desired settings and apply power to the board. The configuration can be changed while power is applied to the board by changing the jumper settings and pressing the convenient manual reset button for the new settings to take effect. Note that even if no external strap in values are set, internal pull up and pull down resistors will set the KSZ8873MML default configuration. Section 4.1.1 covers each jumper on the board and describes its function. To

start in strap in configuration mode, make sure that the USB cable is unplug, JP34 and JP35 , JP3 and JP9 are connected, JP21, JP25 have jumpers fitted between pins 2 to 3.

4.1.1 Feature Setting Jumpers

The evaluation board provides jumpers to allow easy setting of strap in configurations for the KSZ8873MML. Table 1 describes the jumpers and their functionalities.

Table 1: Feature Setting Jumpers

JUMPER	KSZ8873MML SIGNAL	OPEN	CLOSED
JP3	SPIQ	SPI	EEPROM
JP25	P2LED0	EEPROM/SPI Setting. See Section 4.2 and 4.3	
JP21	P2LED1	EEPROM/SPI Setting. See Section 4.2 and 4.3	
JP26	SMRXDV3	P3 MII Setting. Pull Up: PHY mode, Pull Down: MAC mode	
JP27	SMRXD13	P1 MII Setting. Pull Up: PHY mode, Pull Down: MAC mode	
JP78	FXSD1	Pins 1-2 closed : Force port 1 FX mode Pins 5-6 closed : Force port 1 TX mode For KSZ8873MML, close 5-6 since this device doesn't support FX mode.	
JP2	PWRDN	Normal Operation	KSZ8873MML Chip Power Down
JP30	P1FFC	Pull Down = Disable Pull Up(default) = Enable	
JP46	P1DPX	Pull Down = Half Duplex Pull Up(default) = Full Duplex	
JP31	P1SPD	Pull Down = 10BT Pull Up(default) = 100BT	
JP32	P2FFC	Pull Down = Disable Pull Up(default) = Enable	
JP47	P2DPX	Pull Down = Half Duplex Pull Up(default) = Full Duplex	
JP33	P2SPD	Pull Down = 10BT Pull Up(default) = 100BT	
JP33	P2ANEN	Pull Down = Disable Pull Up(default) = Enable	
JP37	P3FFC	Pull Down = Disable Pull Up(default) = Enable	
JP48	P3DPX	Pull Down = Full Duplex Pull Up(default) = Half Duplex	
JP38	P3SPD	Pull Down = 100BT Pull Up(default) = 10BT	
JP33	XCLK	Pull Down = 50MHz Pull Up(default) = 25MHz	

Note: JP33, JP47 and JP32 are only valid if Auto-Negotiation is disabled.

The following table shows the recommended settings for the evaluation board reserved jumpers.

Table 2: Reserved Jumpers

JUMPER	Description	Recommended Setting
JP79	MDC_PHY,MDIO_PHY	Open
JP40	P3 MII configuration (For test only)	Open
JP41	P1 MII configuration (For test only)	Open
JP106	3.3V Biased of transformer Center (For test only)	Open
JP11	Power for Fiber Module. (KSZ8873MML doesn't support Fiber mode)	Open
JP29	REFCLKO1 enable. (Only for RMII interface. (KSZ8873MML doesn't support RMII interface)	Open
JP28	REFCLKO3 enable. (Only for RMII interface. (KSZ8873MML doesn't support RMII interface)	Open

4.2 I2C Master (EEPROM) Mode

The evaluation board has an EEPROM to allow the user to explore more extensive capabilities of the KSZ8873MML. The user can conveniently program the EEPROM on board using the USB port from any computer with a WIN 2000/XP environment and the Micrel provided software. This makes it easy for the user to evaluate features like “broadcast storm protection” and “rate control”.

To prepare the KSZ8873MML evaluation board for EEPROM configuration follow these steps:

1. Copy the Micrel provided EEPROM software to your computer.
2. Set JP3, JP9, JP21, JP25, JP34 and JP35 as specified in Table 3 for EEPROM mode configuration. Make sure that the EEPROM is installed on the board.
3. Connect the computer's USB port to the KSZ8873MML board with a USB port cable.
4. There are two way to power up the evaluation board:
 - a). Connect the 5 VDC power supply to the KSZ8873MML when JP44 pin1-2 is closed.
 - b). 5 VDC power source from the USB port when JP44 pin 2-3 is closed.
5. The KSZ8873MML will power up in its default configuration if there is no information in the EEPROM.
6. Program the desired settings into the EEPROM using the Micrel software. See the [USB_SPI Software User's Guide](#) for details.

7. Press the manual reset button. The KSZ8873MML will reset and read the new configuration in the EEPROM. After reset, the KSZ8873MML is ready for normal operation.

Table 3: EEPROM Mode Settings

Jumper	Description	Setting
JP9	SPIQ	Closed
JP3	SCL_MDC_SW	Closed
JP34	SCL_MDC	Closed
JP35	SDA_MDIO	Closed
JP25	Serial Bus Config. (P2LED0)	Pins 2-3 closed
JP21	Serial Bus Config. (P2LED1)	Pins 2-3 closed

4.3 SPI Slave Mode

From SPI interface to the KSZ8873MML, use a USB to SPI converter that allows accessing all of the KSZ8873MML 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 2000/XP based program for the user to evaluate the KSZ8873MML's full feature set. In addition to all the registers available via EEPROM programming, a host CPU connected to the KSZ8873MML's SPI interface will be able to access all static MAC entries, the VLAN table, dynamic MAC address table and the MIB counters.

To prepare the KSZ8873MML evaluation board for SPI mode configuration follow these steps:

1. Copy the Micrel provided SPI interface software on your computer.
2. Set JP3, JP9, JP21, JP25, JP34 and JP35 as specified in Table 4 for SPI mode configuration.

Table 4: SPI Slave Mode Settings

Jumper	Description	Setting
JP9	SPIQ	Open
JP3	SCL_MDC_SW	Open
JP34	SCL_MDC	Closed
JP35	SDA_MDIO	Closed
JP25	Serial Bus Config. (P2LED0)	Pins 2-3 closed
JP21	Serial Bus Config. (P2LED1)	Pins 1-2 closed

3. Connect the computer's USB port to the KSZ8873MML board with a USB port cable.
4. Remove the EEPROM from the evaluation board. (Optional)
5. There are two way to power up the evaluation board:
 - a). Connect the 5 VDC power supply to the KSZ8873MML when JP44 pin1-2 is

closed.

- b). 5 VDC power source from the USB port when JP44 pin 2-3 is closed.
6. The KSZ8873MML will power up in its default configuration
7. Open the Windows and navigate to the directory where the “**USB_SPI Software**” file is stored. Click its icon to invoke the software.
8. Program the desired settings using the Micrel SPI interface software. See the **USB_SPI Software User's Guide** for details.

4.4 10/100 Ethernet PHY Ports

There are one 10/100 Ethernet PHY ports on the KSZ8873MML evaluation board. The ports can be connected to an Ethernet traffic generator or analyzer via standard RJ-45 connectors using CAT-5 cables. Each port can be used as either an uplink or downlink. Both ports support auto MDI/MDI-X, eliminating the need for cross over cables.

4.5 LED Indicators

There is one column of LED indicator for one column for port 2. The LED indicators are programmable to three different modes. LED mode is selected through register 195 bit [5:4] setting. The LED mode definitions are specified in Table 3. See Figure 1 for the LEDs' orientation on the KSZ8873MML evaluation board.

Table 3: LED Modes

Register 195 Bit[5:4]			
00	01	10	11
P2LED1 = Speed	P2LED1 = Active	P2LED1 = Duplex	P2LED1 = Duplex
P2LED0 = Link/Active	P2LED0 = Link	P2LED0 = Link/Active	P2LED0 = Link

The KSZ8873MML evaluation board provides two LEDs (P2LED1, P2LED0) for PHY port 2.

The KSZ8873MML evaluation board also has a power LED (D3) for the 3.3V power supply. When D3 is lit, the board's 3.3V power supply is “on”.

4.6 MII Port Configuration

The evaluation board provides access to the KSZ8873MML's 1st and third MAC via the MII port interfaces. The 1st and third MAC can be configured to MII PHY mode and MII MAC mode. To configure the 1st and MAC, the board's jumpers JP27 and JP26, respectively, are set as specified in Table 4.

Table 4: MII Mode Settings

MII Mode	MII PHY mode	MII PHY mode
JP27 for Port 1	Pins 1-2 closed	Pins 2-3 closed
JP26 for Port 3	Pins 1-2 closed	Pins 2-3 closed

In MII PHY mode, the MII transmit and receive signals will be on J3 and J7, the male MII port connectors. This mode is usually used to connect the KSZ8873MML to an external MAC processor. In MII MAC mode, the MII transmit and receive signals will be on J4 and J6, the

female MII port connector. This interface is normally used to connect the KSZ8873MML to an external PHY, for example the Micrel KS8721B.

5.0 Reference Documents

KSZ8873MML Datasheet Rev. 1.0 (Contact Micrel for latest Datasheet)

KSZ8873MML Evaluation Board Schematic Rev. 1.0 (Contact Micrel for latest Schematic)

KSZ8873MML Evaluation Board Gerber files

MIC29302WT Datasheet (Datasheet available at www.micrel.com)

Micrel USBSPI73 Configuration Software v1.0

