EV71C64A

Auto Mode Evaluation Board User Guide for PD77728

Introduction

The EV71C64A Evaluation Board (EVB) is developed based on Microchip's PD77728 PoE controller/manager. EV71C64A demonstrates four IEEE® 802.3bt 4-pair ports using PD77728 in Unmanaged Auto mode.

The PD77728 device is a part of Microchip's seventh generation IEEE 802.3bt compliant Power over Ethernet (PoE) Power Sourcing Equipment (PSE) family. This device is a fully integrated eight port PoE controller and PoE manager with integrated Field Effect Transistor (FET) switches and current sense resistors. The PD77728 chipset supports IEEE 802.3af/at/bt standards and legacy/pre-standard PD detection. The device is available in a 56-pin 8 mm × 8 mm QFN package.

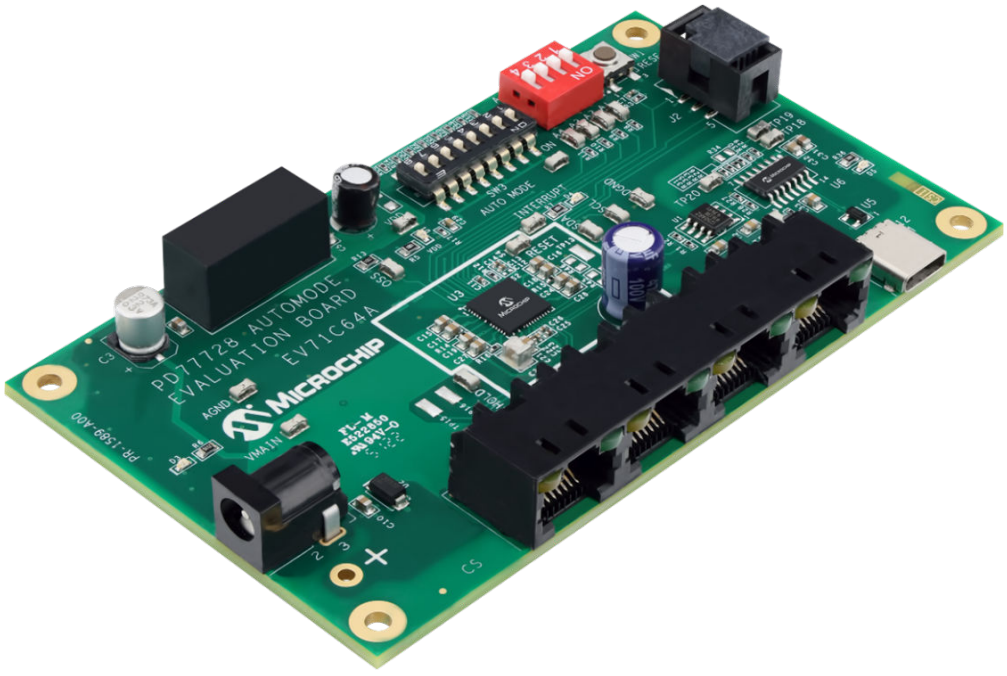
EVB includes green and yellow bi-color LEDs that provide visual status of each port by two dedicated LEDs per port.

The evaluation system has the following features:

- RJ45 Gang (contains four RJ45 connectors)
- Four 4-Pair Ports Structured by PD77728
- Switch Domain USB Interface to be Connected to a PC with Microchip GUI
- PoE Controller Manual Reset and Serial Communication Setting
- Green and Yellow Bi-Color LED Status Indication for all Four Ports
- Requires a Single Power Source only
- 0 °C to 40 °C Operating Temperature
- RoHS Compliant

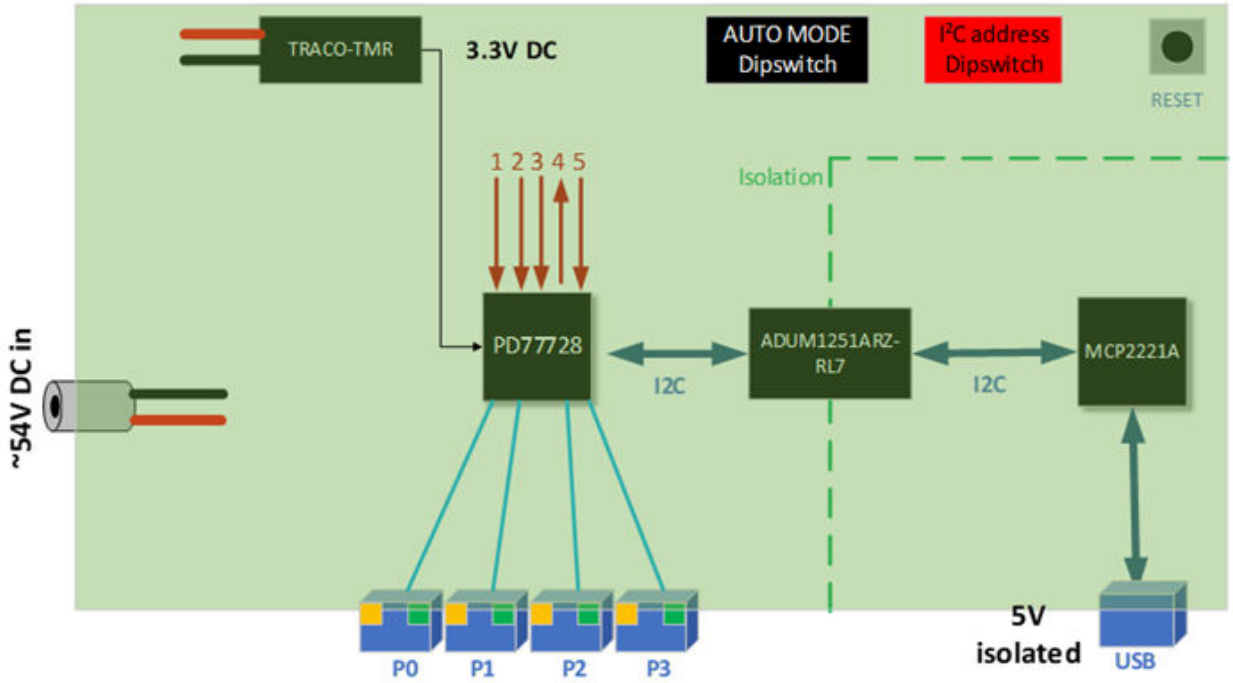
The following figure shows an EV71C64A EVB.

Figure 1. EV71C64A Evaluation Board



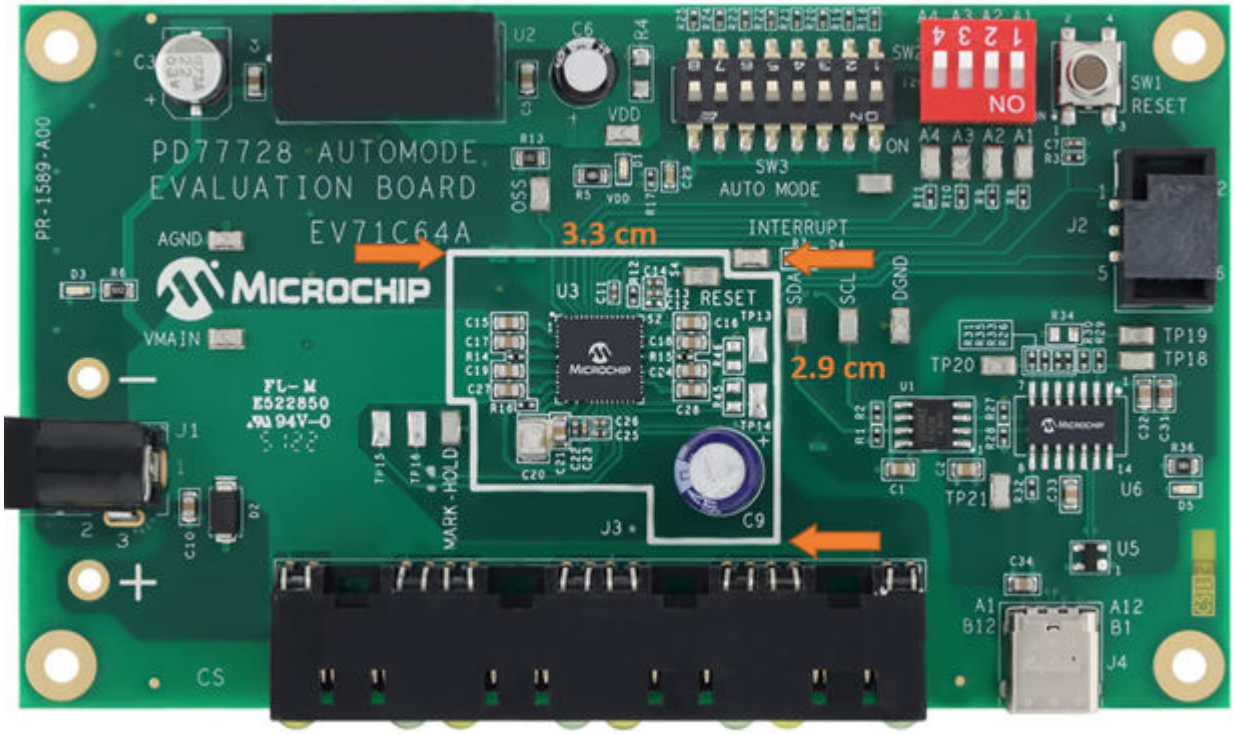
The following figure shows an EV71C64A Evaluation System block diagram.

Figure 2. EV71C64A Evaluation System Block Diagram



The following figure shows the EV71C64A top view.

Figure 3. EV71C64A Top View



Note: The actual PoE size is 2.9 cm × 3.3 cm.

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1. Overview

This section provides the basic overview of the EV71C64A EVB.

1.1 Power

The EV71C64A EVB is powered by a single source through the DC connector J1. The input voltage level can be selected according to the IEEE 802.3bt PoE standard:

- Type 1: 44 V_{DC} to 57 V_{DC}
- Type 2: 50 V_{DC} to 57 V_{DC}
- Type 3: 50 V_{DC} to 57 V_{DC}
- Type 4: 52 V_{DC} to 57 V_{DC}

The recommended voltage level is 53 V_{DC} to 55 V_{DC}, which covers all PoE types. The EV71C64A EVB has the following three power domains:

- PoE domain, which is fed directly by the main supply and is the power domain provided by the RJ45
- 3.3 V_{DC}, which feeds the PD77728 and serial communication peripherals
  - The 3.3 V_{DC} is generated by U2 (a DC/DC module)
  - Test points **VDD** and **DGND** can be used for connecting external signals to control the PD77728 device
- Isolated 5V to the USB port. This power is provided by the PC's USB port

Note: EVB is polarity sensitive.

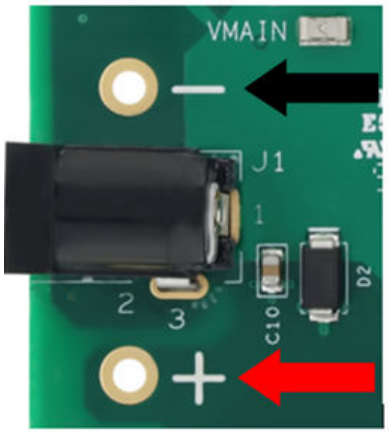
The following figure shows the correct polarity of the EVB.

Figure 1-1. DC Connector J1 Polarity

Important: DC input connector J1 is limited to current level up to 4A. If higher current is needed, the two via holes next to J1 are used by soldering a cable to it. The two via holes support up to 7A to feed the whole EVB.

The following figure shows the power via holes.

Figure 1-2. Power Via Holes



1.2 Interface and Control

This section describes the serial communication, reset pushbutton, OSS, and the Unmanaged Auto mode.

1.2.1 Serial Communication

EVB supports serial communication with the PD77728 device by I²C. The serial communication is converted to USB by the Microchip MCP2221A (U6) to allow a user-friendly experience using the Microchip dedicated GUI.

To use the USB port, install the MCP2221A driver on your PC. The driver can be downloaded from the Microchip website at www.microchip.com/wwwproducts/en/MCP2221A.

If R34 is installed as 0Ω, then the USB converter (U6) is disabled. This allows you to connect directly to the I²C bus through the two test points and control the EVB through I²C. DGND test-point is the GND for the I²C bus. For the test points location, see Figure 1-6.

The I²C address port is programmed through pins A1, A2, A3, and A4 (pins 48–51) on PD77728.

Note: The I²C address is a 7-bit address. Change the dipswitch (SW2), as listed in the following table.

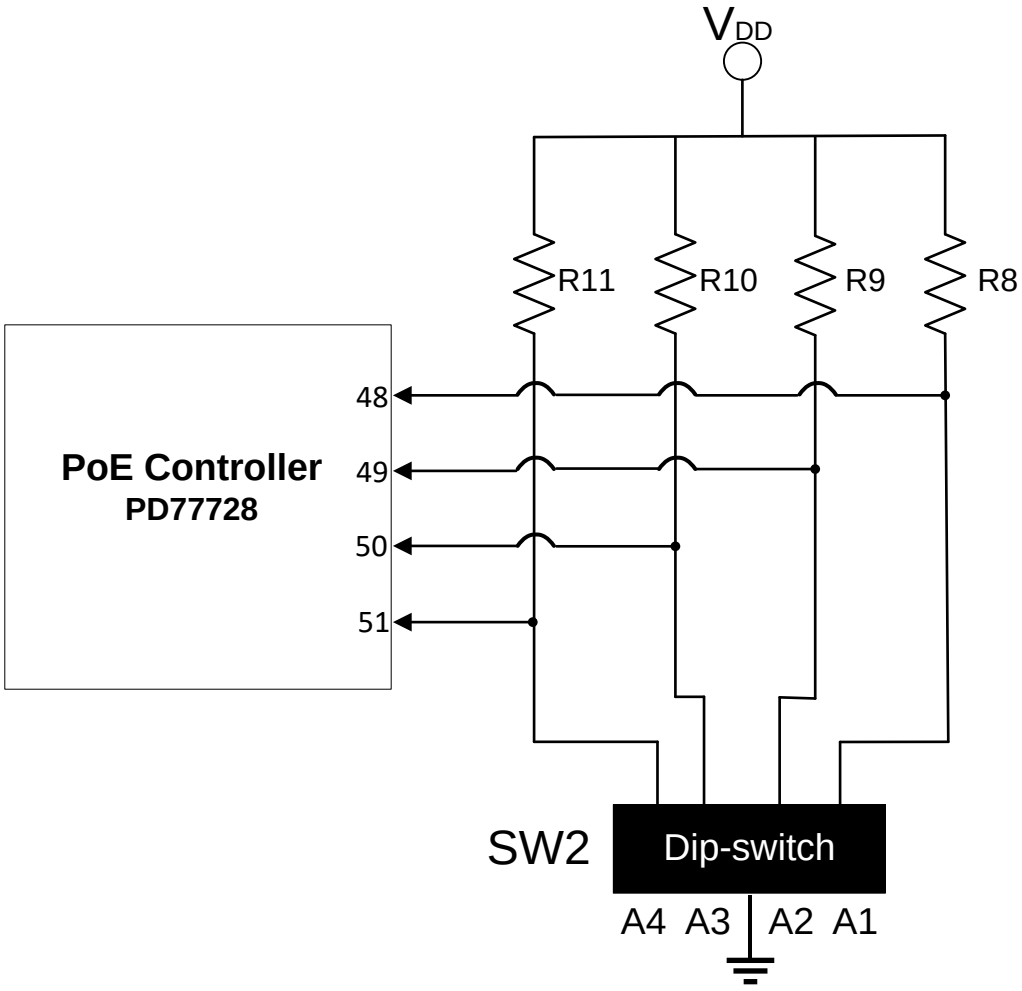
Table 1-1. I²C Address Select

A4	A3	A2	A1	Ports	I²C Address
0	0	0	0	0–3	0x20
				4–7	0x21
0	0	0	1	0–3	0x22
				4–7	0x23
0	0	1	0	0–3	0x24
				4–7	0x25
0	0	1	1	0–3	0x26
				4–7	0x27
0	1	0	0	0–3	0x28
				4–7	0x29
0	1	0	1	0–3	0x2A
				4–7	0x2B
0	1	1	0	0–3	0x2C
				4–7	0x2D
0	1	1	1	0–3	0x2E
				4–7	0x2F
1	0	0	0	0–3	0x30
				4–7	0x31
1	0	0	1	0–3	0x32
				4–7	0x33
1	0	1	0	0–3	0x34
				4–7	0x35
1	0	1	1	0–3	0x36
				4–7	0x37

.....continued					
A4	**A3**	**A2**	**A1**	**Ports**	**I²C Address**
1	1	0	0	0–3	0x38
				4–7	0x39
1	1	0	1	0–3	0x3A
				4–7	0x3B
1	1	1	0	0–3	0x3C
				4–7	0x3D
1	1	1	1	0–3	0x3E
				4–7	0x3F

The following figure shows the I²C address setting diagram.

Figure 1-3. I²C Address Setting Diagram

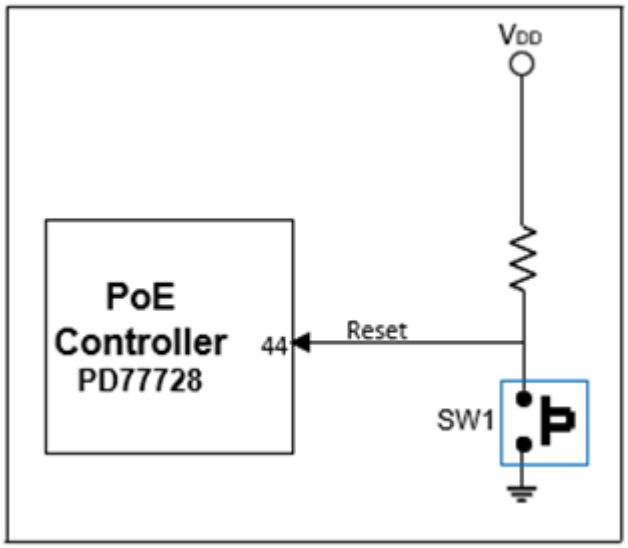


1.2.2 Reset Pushbutton

The pushbutton is connected to the Reset pin of the PD77728 device (pin 44). Press on SW1 to connect the Reset pin to GND. The PoE system is reset.

The following figure shows the Reset Control diagram.

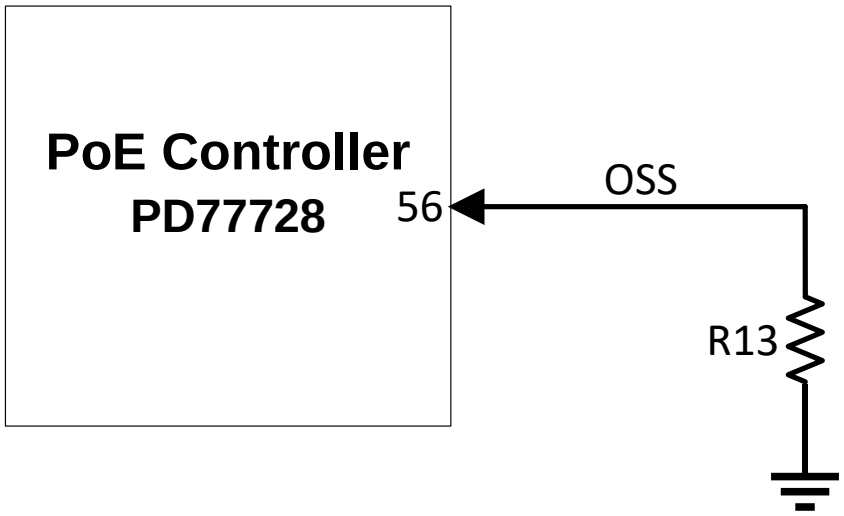
Figure 1-4. Reset Control Diagram



1.2.3 Over Supply Shutdown (OSS)

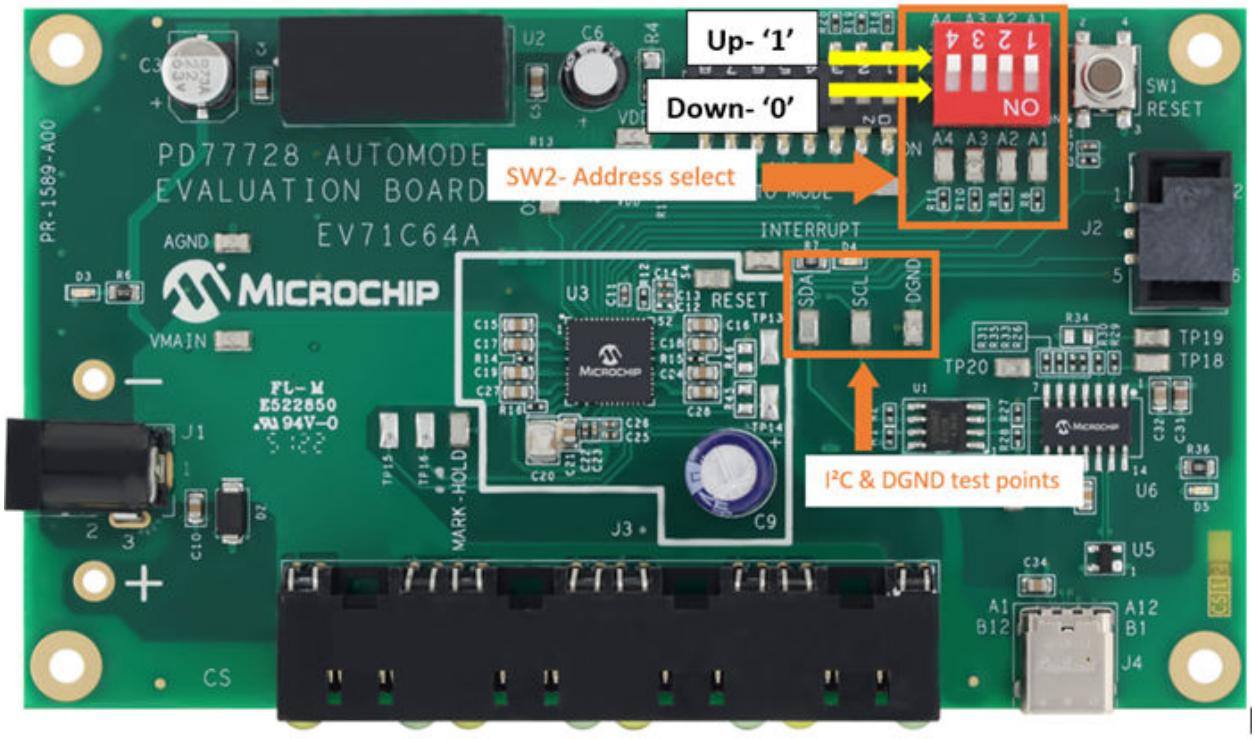
OSS is used to shut down ports based on the priority settings. The following figure shows the OSS Control diagram.

Figure 1-5. OSS Control Diagram



The following figure shows the I²C bus test point and address select.

Figure 1-6. I²C Bus Test Point and Address Select

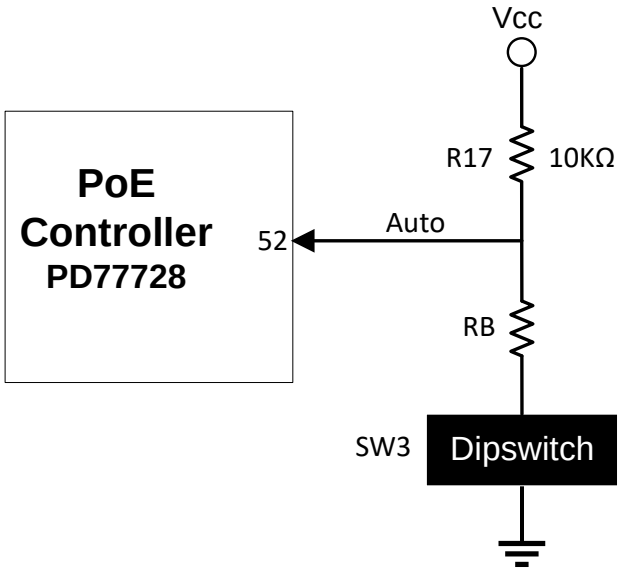


1.2.4 Unmanaged Auto Mode

EVB supports the Unmanaged Auto mode, where the device is a stand-alone system. There is no host I²C communication to the device. The voltage level that decides the class is set manually. To change the mode, use the Auto Mode dipswitch (SW3), as listed in Table 1-2.

The following figure shows the Auto mode.

Figure 1-7. Auto Mode



The following table lists the AUTO pin configurations.

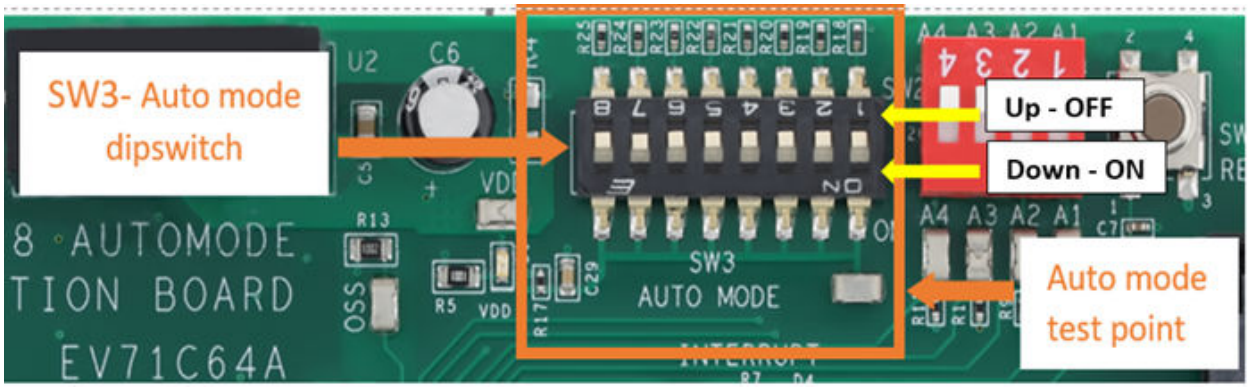
Table 1-2. AUTO Pin Configuration

Level	Level Range (V)	Mode	RB (kΩ)	Set Value (V)
1	0–0.278	Class8	0.442	0.140
2	0.279–0.557	Class7	1.47	0.423
3	0.558–0.847	Class6	2.67	0.695
4	0.847–1.115	Class5	4.22	0.979
5	1.115–1.393	Class4–4P	6.19	1.262
6	1.394–1.693	Class4–2P	8.87	1.551
7	1.694–1.951	Class3–2P	12.4	1.827
8	1.951–2.23	AUTO mode disabled	> 17.4 or open	2.096

Note: Only one switch can be at ON position, the rest must be at OFF.

The following figure shows the Auto mode test point.

Figure 1-8. Auto Mode Test Point



1.3 LED Indication

The following table lists the status indication LEDs contained in EVB.

Table 1-3. LED List

Designation	Function
D1	V_{DD} ON (powers the PD77728, reset, communication, and the Auto mode)
D3	V_{MAIN} ON
D4	Interrupt out (active low)
D5	USB ON (active when connected to PC)
Port (0–3)	Green and yellow LED per port: • LED OFF = Port is OFF • Green LED ON = 2-pair port is on: ALT-A • Yellow LED ON = 2-pair port is on: ALT-B • Green + Yellow LED on = 4 pair port is on

1.4 RJ45 Connectors Polarity

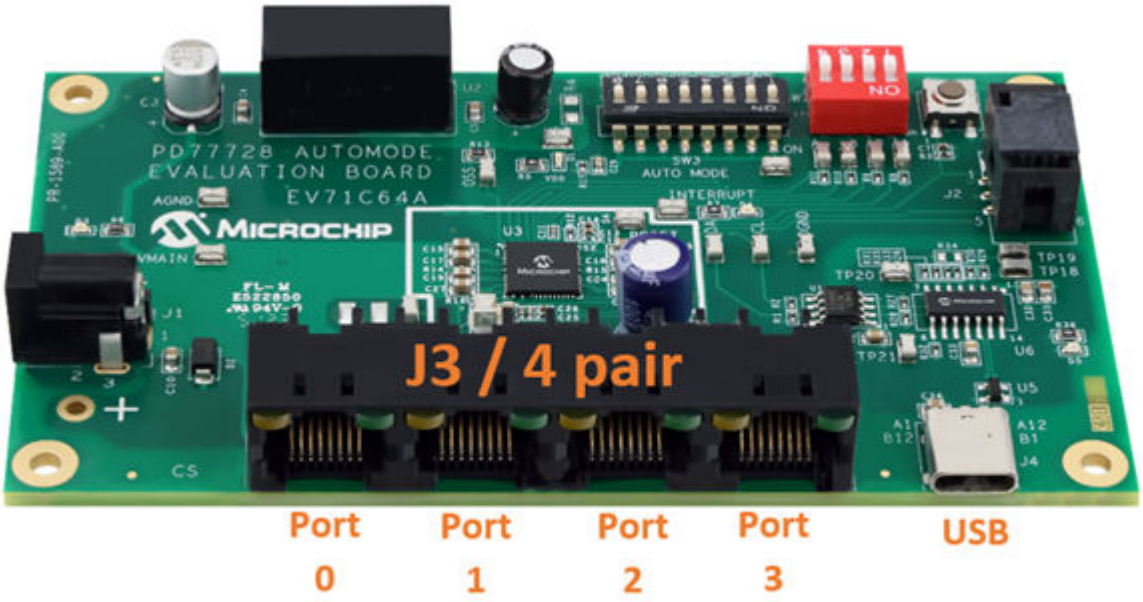
The four ports of J3 are 4-pair, up to 90W each. The following table lists the polarity of the port.

Table 1-4. J3/RJ45 Connector 4-Pair Port (Ports 0–3)

Pin Number (Each RJ45 Port)	Polarity
1, 2	NegativeAlt A
3, 6	Positive Alt A
4, 5	Positive Alt B
7, 8	NegativeAlt B

The following figure shows the port numbering.

Figure 1-9. Port Numbering



Note: The J2 header is for internal use by Microchip.

2. Installation and Setting

This section describes the steps required for installing and operating the EVB. Take the following precautions before starting the installation:

- Ensure that the power supply of the board is turned OFF before plugging in the DC connecter
- Turn the main supply ON only after the DC connector is plugged in
- Ensure the correct polarity of the power supply cable. Figure 1-1 shows the polarity of the power supply cable

2.1 Schematics

Contact Microchip for the full board schematics.

3. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	04/2023	Initial revision

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