
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.

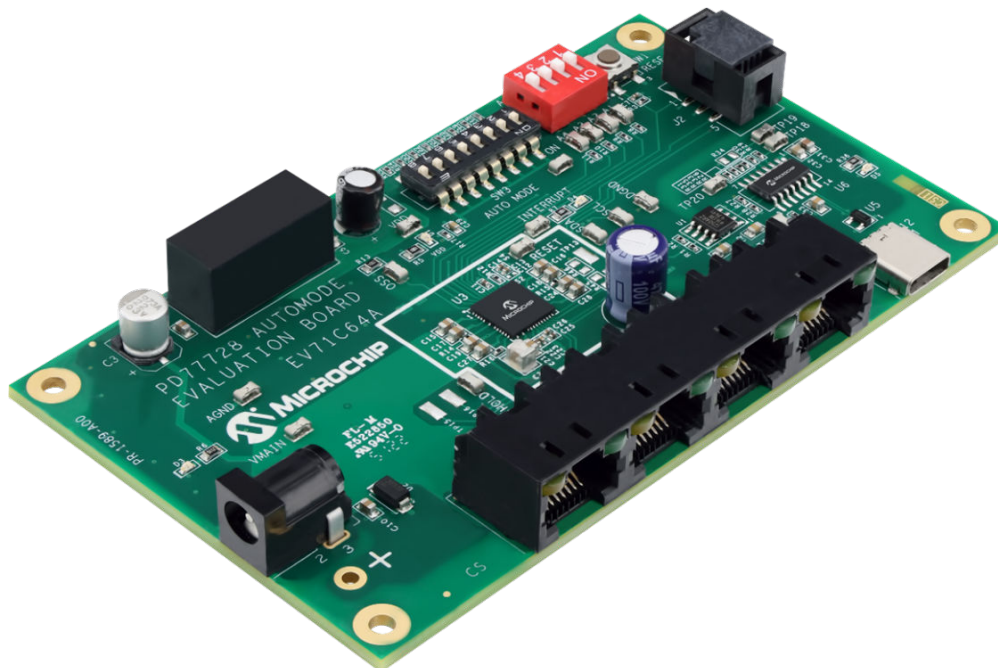
EVB includes green and yellow bi-color LEDs that provide visual status of each port by two dedicated LEDs per port.

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

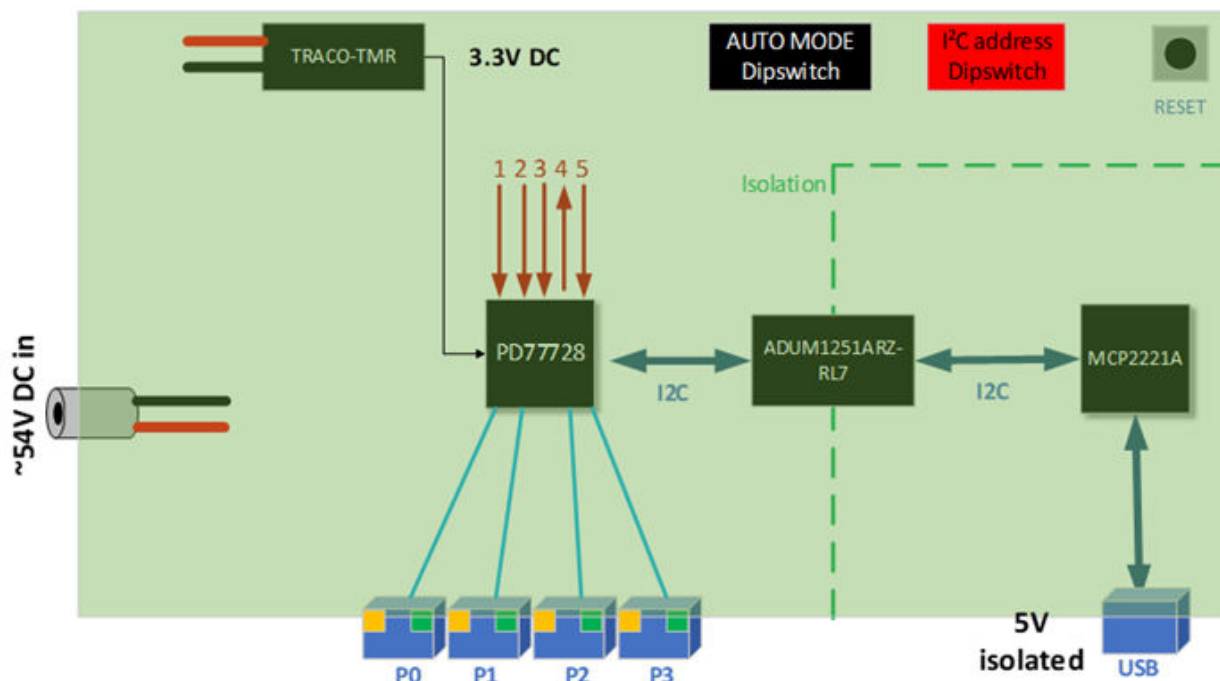
The following figure shows an EV71C64A EVB.

Figure 1. EV71C64A Evaluation Board



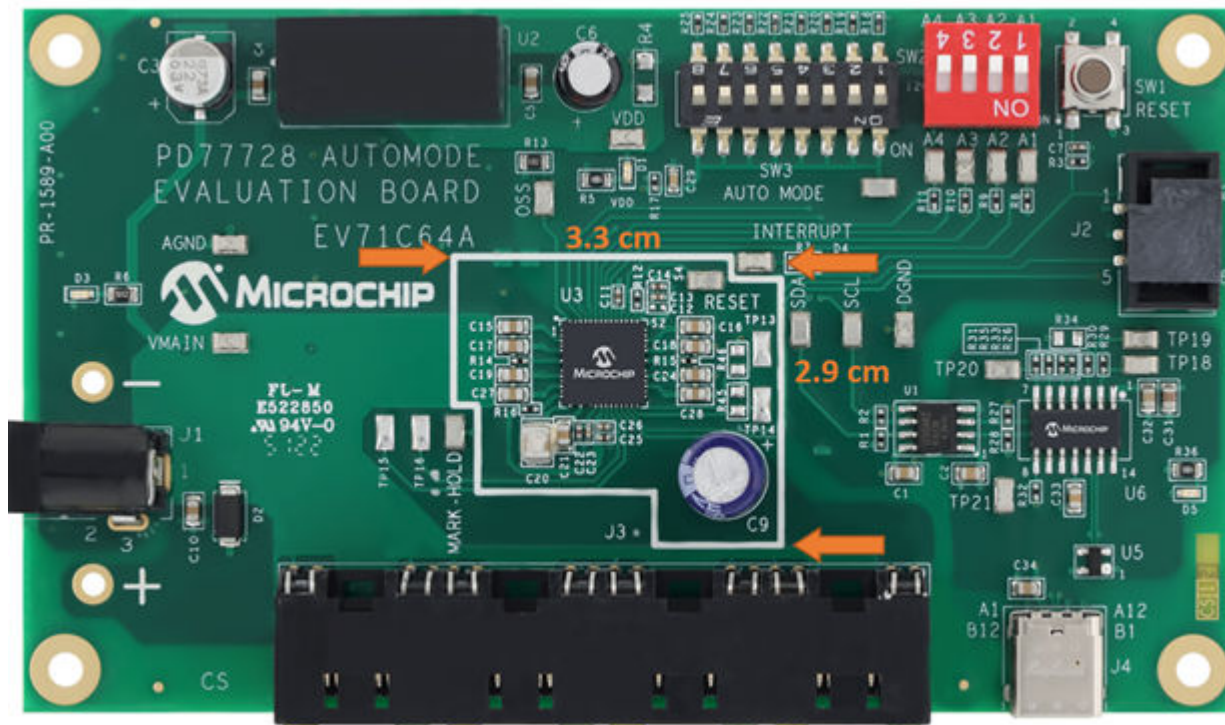
The following figure shows an EV71C64A Evaluation System block diagram.

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.

Table of Contents

Introduction.....	1
1. Overview.....	4
1.1. Power.....	4
1.2. Interface and Control.....	5
1.3. LED Indication.....	9
1.4. RJ45 Connectors Polarity.....	10
2. Installation and Setting.....	11
2.1. Schematics.....	11
3. Revision History.....	12
Microchip Information.....	13
The Microchip Website.....	13
Product Change Notification Service.....	13
Customer Support.....	13
Microchip Devices Code Protection Feature.....	13
Legal Notice.....	13
Trademarks.....	14
Quality Management System.....	15
Worldwide Sales and Service.....	16

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.

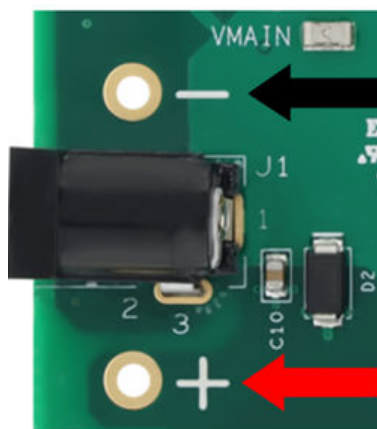
Figure 1-1. DC Connector J1 Polarity



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

EV71C64A 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 EV71C64A 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

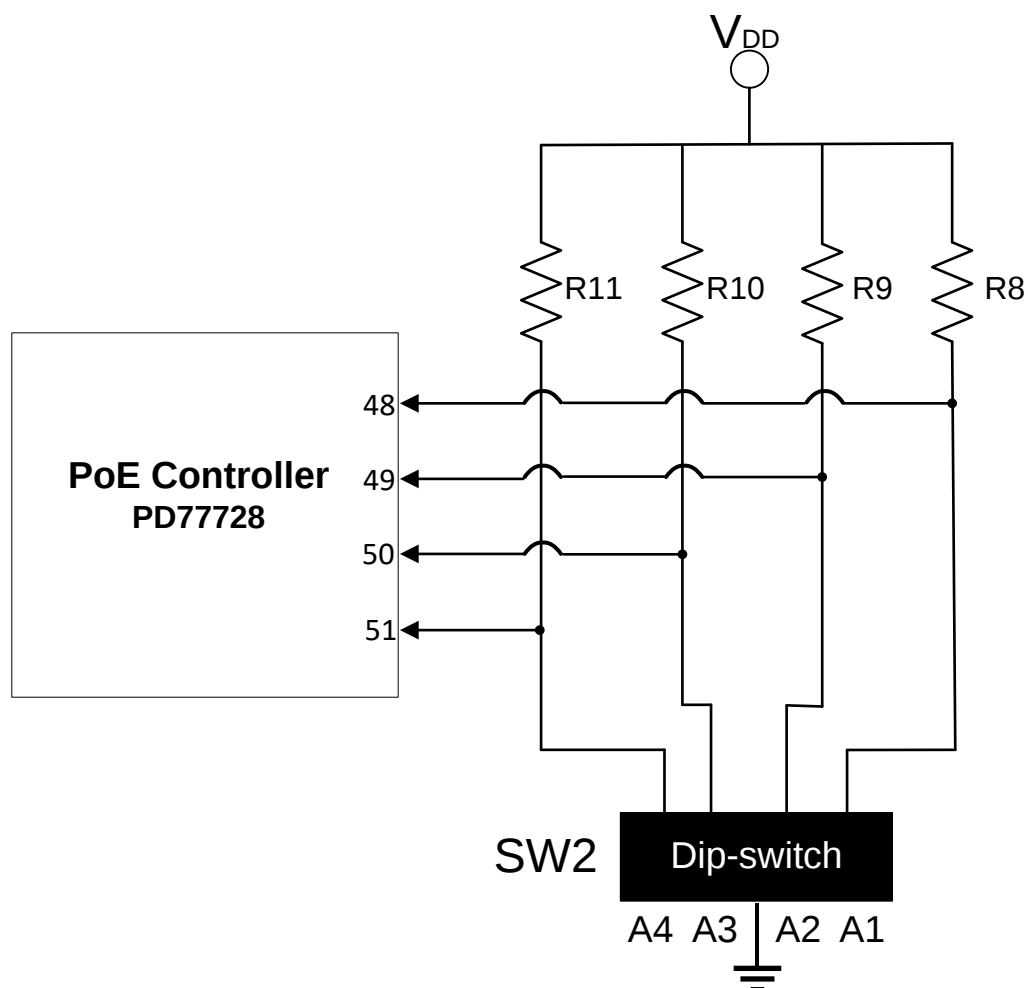
A4	A3	A2	A1	Ports	I ² C Address
0	0	0	0	0–3	0x20
				4–7	0x21
0	0	0	1	0–3	0x22
				4–7	0x23
0	0	1	0	0–3	0x24
				4–7	0x25
0	0	1	1	0–3	0x26
				4–7	0x27
0	1	0	0	0–3	0x28
				4–7	0x29
0	1	0	1	0–3	0x2A
				4–7	0x2B
0	1	1	0	0–3	0x2C
				4–7	0x2D
0	1	1	1	0–3	0x2E
				4–7	0x2F
1	0	0	0	0–3	0x30
				4–7	0x31
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	I ² C 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

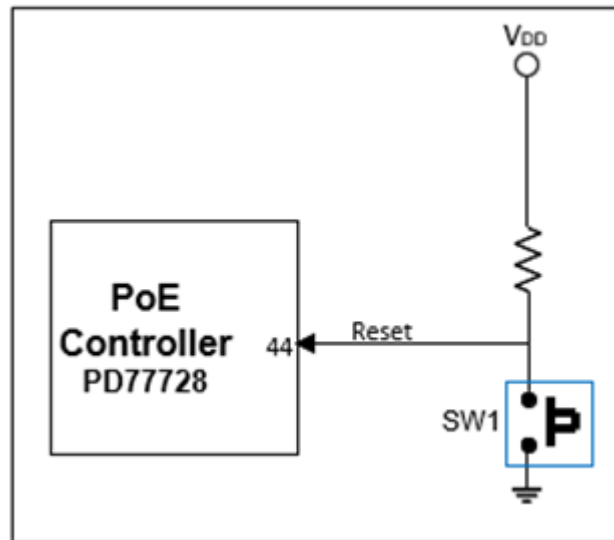


1.2.2 Reset Pushbutton

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.

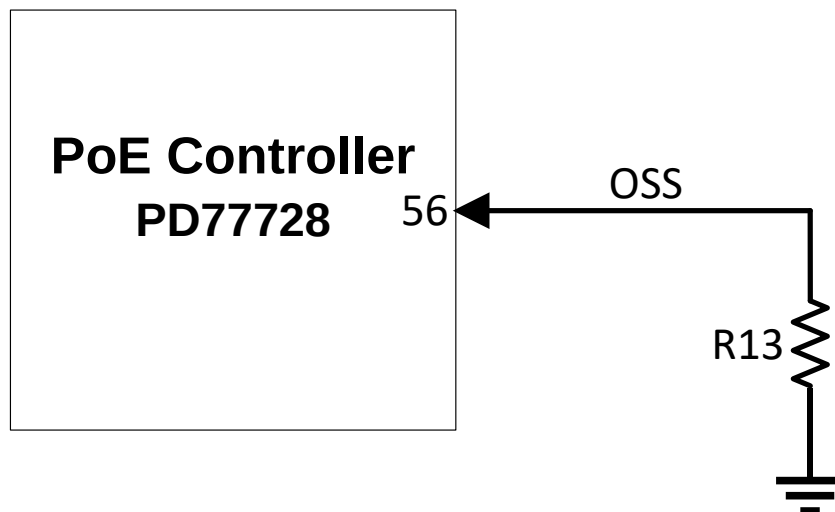
Figure 1-4. Reset Control Diagram



1.2.3 Over Supply Shutdown (OSS)

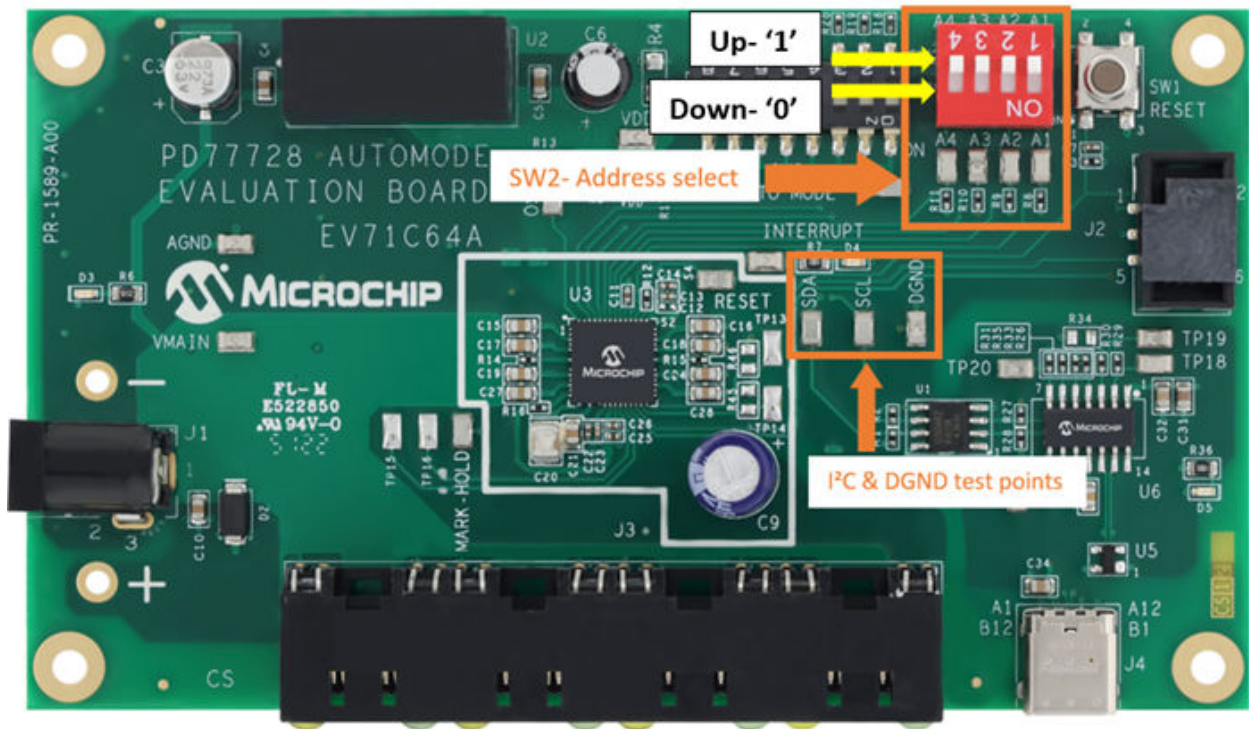
OSS is used to shut down ports based on the priority settings. The following figure shows the OSS Control diagram.

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

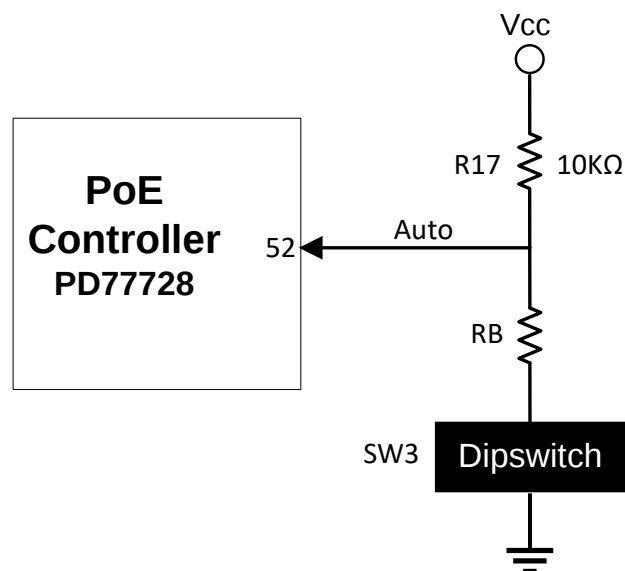


1.2.4 Unmanaged Auto Mode

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.

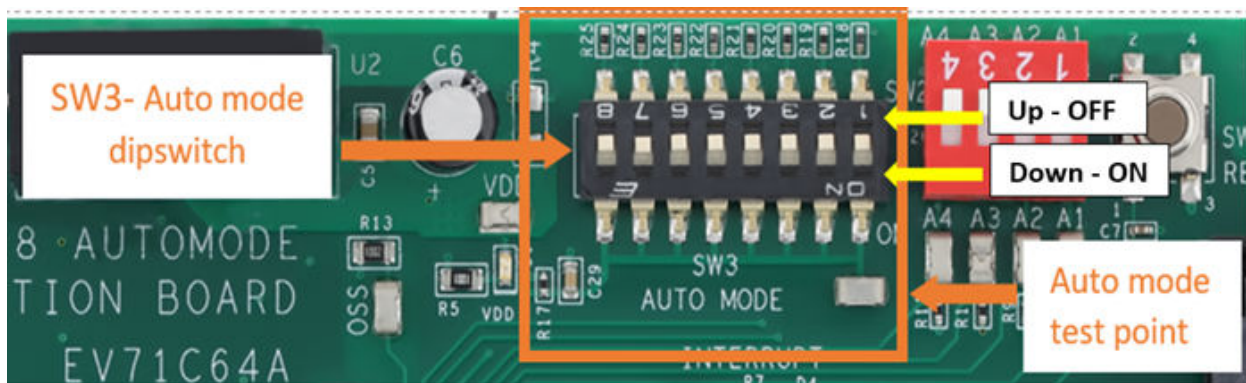
Table 1-2. AUTO Pin Configuration

Level	Level Range (V)	Mode	RB (k Ω)	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

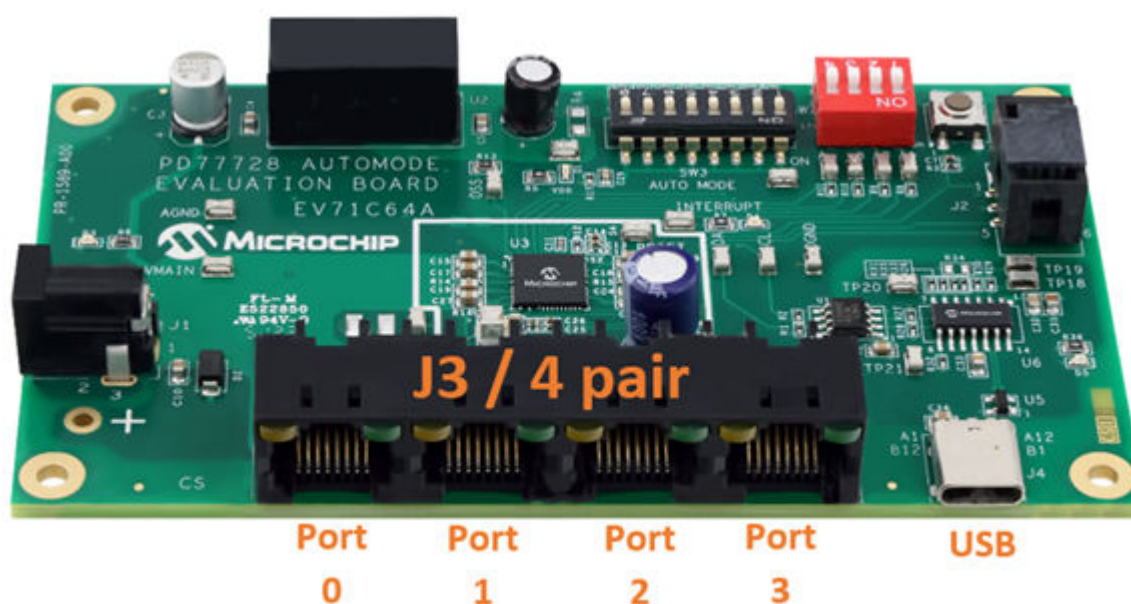
The four ports of J3 are 4-pair, up to 90W each. The following table lists the polarity of the port.

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 connector
- 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

Microchip Information

The Microchip Website

Microchip provides online support via our website at www.microchip.com/. This website is used to make files and information easily available to customers. Some of the content available includes:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip design partner program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

Product Change Notification Service

Microchip's product change notification service helps keep customers current on Microchip products. Subscribers will receive email notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, go to www.microchip.com/pcn and follow the registration instructions.

Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in this document.

Technical support is available through the website at: www.microchip.com/support

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is "unbreakable". Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.

Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded

by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at www.microchip.com/en-us/support/design-help/client-support-services.

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet- Wire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePicta, TimeProvider, TrueTime, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, Clockstudio, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, KoD, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, TSHARC, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2023, Microchip Technology Incorporated and its subsidiaries. All Rights Reserved.

ISBN: 978-1-6683-2267-3

Quality Management System

For information regarding Microchip's Quality Management Systems, please visit www.microchip.com/quality.

Worldwide Sales and Service

AMERICAS	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
Corporate Office 2355 West Chandler Blvd. Chandler, AZ 85224-6199 Tel: 480-792-7200 Fax: 480-792-7277 Technical Support: www.microchip.com/support Web Address: www.microchip.com	Australia - Sydney Tel: 61-2-9868-6733 China - Beijing Tel: 86-10-8569-7000 China - Chengdu Tel: 86-28-8665-5511 China - Chongqing Tel: 86-23-8980-9588 China - Dongguan Tel: 86-769-8702-9880 China - Guangzhou Tel: 86-20-8755-8029 China - Hangzhou Tel: 86-571-8792-8115 China - Hong Kong SAR Tel: 852-2943-5100 China - Nanjing Tel: 86-25-8473-2460 China - Qingdao Tel: 86-532-8502-7355 China - Shanghai Tel: 86-21-3326-8000 China - Shenyang Tel: 86-24-2334-2829 China - Shenzhen Tel: 86-755-8864-2200 China - Suzhou Tel: 86-186-6233-1526 China - Wuhan Tel: 86-27-5980-5300 China - Xian Tel: 86-29-8833-7252 China - Xiamen Tel: 86-592-2388138 China - Zhuhai Tel: 86-756-3210040	India - Bangalore Tel: 91-80-3090-4444 India - New Delhi Tel: 91-11-4160-8631 India - Pune Tel: 91-20-4121-0141 Japan - Osaka Tel: 81-6-6152-7160 Japan - Tokyo Tel: 81-3-6880-3770 Korea - Daegu Tel: 82-53-744-4301 Korea - Seoul Tel: 82-2-554-7200 Malaysia - Kuala Lumpur Tel: 60-3-7651-7906 Malaysia - Penang Tel: 60-4-227-8870 Philippines - Manila Tel: 63-2-634-9065 Singapore Tel: 65-6334-8870 Taiwan - Hsin Chu Tel: 886-3-577-8366 Taiwan - Kaohsiung Tel: 886-7-213-7830 Taiwan - Taipei Tel: 886-2-2508-8600 Thailand - Bangkok Tel: 66-2-694-1351 Vietnam - Ho Chi Minh Tel: 84-28-5448-2100	Austria - Wels Tel: 43-7242-2244-39 Fax: 43-7242-2244-393 Denmark - Copenhagen Tel: 45-4485-5910 Fax: 45-4485-2829 Finland - Espoo Tel: 358-9-4520-820 France - Paris Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79 Germany - Garching Tel: 49-8931-9700 Germany - Haan Tel: 49-2129-3766400 Germany - Heilbronn Tel: 49-7131-72400 Germany - Karlsruhe Tel: 49-721-625370 Germany - Munich Tel: 49-89-627-144-0 Fax: 49-89-627-144-44 Germany - Rosenheim Tel: 49-8031-354-560 Israel - Ra'anana Tel: 972-9-744-7705 Italy - Milan Tel: 39-0331-742611 Fax: 39-0331-466781 Italy - Padova Tel: 39-049-7625286 Netherlands - Drunen Tel: 31-416-690399 Fax: 31-416-690340 Norway - Trondheim Tel: 47-72884388 Poland - Warsaw Tel: 48-22-3325737 Romania - Bucharest Tel: 40-21-407-87-50 Spain - Madrid Tel: 34-91-708-08-90 Fax: 34-91-708-08-91 Sweden - Gothenberg Tel: 46-31-704-60-40 Sweden - Stockholm Tel: 46-8-5090-4654 UK - Wokingham Tel: 44-118-921-5800 Fax: 44-118-921-5820

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[EV71C64A](#)