PD69208-PD69220-PD69200

PD-IM-7604-4MH and PD-IM-7604-4T4H Four 2-Pair Ports and Four 4-Pair Ports Evaluation Boards

Introduction

The PD-IM-7604-4M/T4H evaluation board is based on two PD69208M/PD69208T4-PD69204T4 and either the PD69220 Controller or the PD69200 Controller. It demonstrates the operation of four 4-pair ports and four 2-pair ports systems.

Microchip's PD69208M/PD69208T4/PD69204T4 Power over Ethernet (PoE) manager IC integrates power, analog, and state-of-the-art logic into a single 56-pin, plastic QFN package. The device is used in Ethernet switches and midspans to allow network devices to share power and data over the same cable. The PD69208M/PD69208T4 device is an 8-port and PD69204T4 device is a 4-port, mixed-signal, and high-voltage PoE driver. With either the PD69220 or the PD69200 external MCU, it performs as a power sourcing equipment (PSE) system. Microchip's PD69220 or PD69200 PoE controllers are a cost-effective and pre-programmed MCUs designed to implement enhanced mode.

The PD69220 controller is based on the Microchip SAM D21 family and the PD69200 controller is based on the NXP Kinetis® L family. PD69200 and PD69220 are pin compatible with an identical feature set. In this document, the two controllers are referred to as PD692x0.
Note: PD69220 is the preferred device as PD69200 is no longer recommended for new designs.

The PD69208M/PD69208T4/PD69204T4 and PD692x0 chipset supports PoE powered device (PD) detection, power-up, and protection according to IEEE® standards as well as legacy/pre-standard PD detection. It provides a real-time PD protection through the following mechanisms such as, overload, under-load, over-voltage, over-temperature, and short-circuit; and enables operation in a standalone mode. It also executes all real-time functions as specified in IEEE 802.3at and IEEE 802.3bt draft 3.0 standards, including PD detection (AF and AT).

PD69208M/PD69208T4/PD69204T4 supports supply voltages between 32V and 57V without additional power sources. A system that powers over four pairs can be implemented by combining two ports of PD69208M/T4 and PD69204T4, enabling an extra feature for simple and low-cost high-power PD devices. Ongoing monitoring of system parameters for the host software is available through communication. Internal thermal protection is implemented in the chip. PD69208M/PD69208T4/PD69204T4 is a low-power dissipation device that uses internal MOSFETs and internal 100 mΩ sense resistors.

The PD692x0 features an ESPI bus for each PD69208M/PD69208T4/PD69204T4. The PD692x0 uses an I²C or UART interface to the host CPU. It is designed to support software field-upgradable through the communication interface.

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1. Evaluation System Block Diagram

The evaluation system provides designers with the required environment to evaluate the performance and implementation of the following.

- PD69204T4 (four ports) and PD69208T4 (eight ports) PoE managers and PD692x0 PoE controller (in board PD-IM-7604-4T4H)
- PD69208M (eight ports) PoE manager and PD692x0 PoE controller (in board PD-IM-7604-4MH)

The evaluation board, shown in the following figure, enables PoE designers to evaluate Microchip's PoE solution with flexibility and easy configuration. The application circuit of two PD69208M/PD69208T4-PD69204T4 and PD692x0 chipset is compact in size (highlighted in the white box on board).

Figure 1-1. PD-IM-7604-4M/T4H Evaluation System Block Diagram
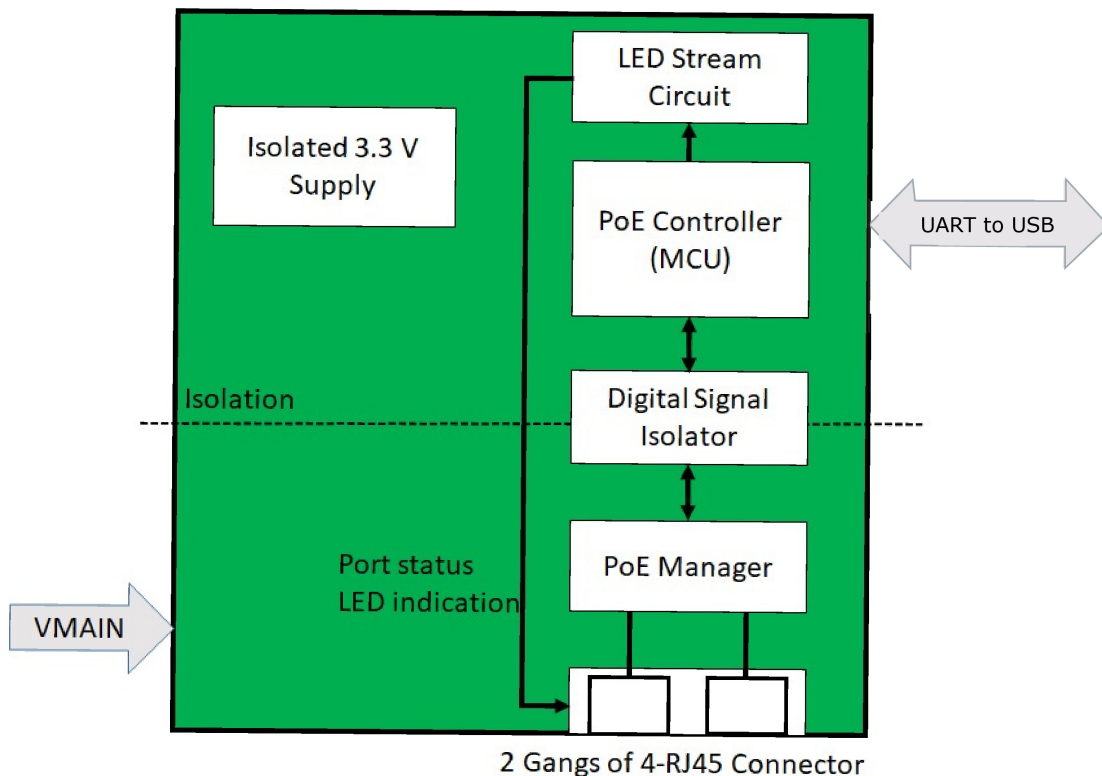
Input supply to the board is DC and it can be fed through the V_{IN} connector (see 7. Electrical Characteristics for the input voltage range). The auxiliary power supply (5V and 3.3V) for the PD69208M/PD69208T4/PD69204T4 is generated internally and the auxiliary power supply (3.3V) for the PD692x0 MCU is generated using a 3.3V isolated DC–DC converter.

The board communicates with the host environment using UART communication, available through a USB connector (U11). For this connection, a driver for CP210x should be installed. The driver can be downloaded from http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx.

A dedicated reset push button (SW1) is provided for resetting the PoE controller. The board consists of eight output ports, of which four are 2-pair ports and the remaining four are 4-pair ports.

The board consists of different test points (for more information, see 4. Test Points). The board also provides different LED indications (for more information, see 5. LED Indication).

The following figure shows a top view of the evaluation board.

Figure 1-2. PD-IM-7604-4M/T4H Evaluation Board
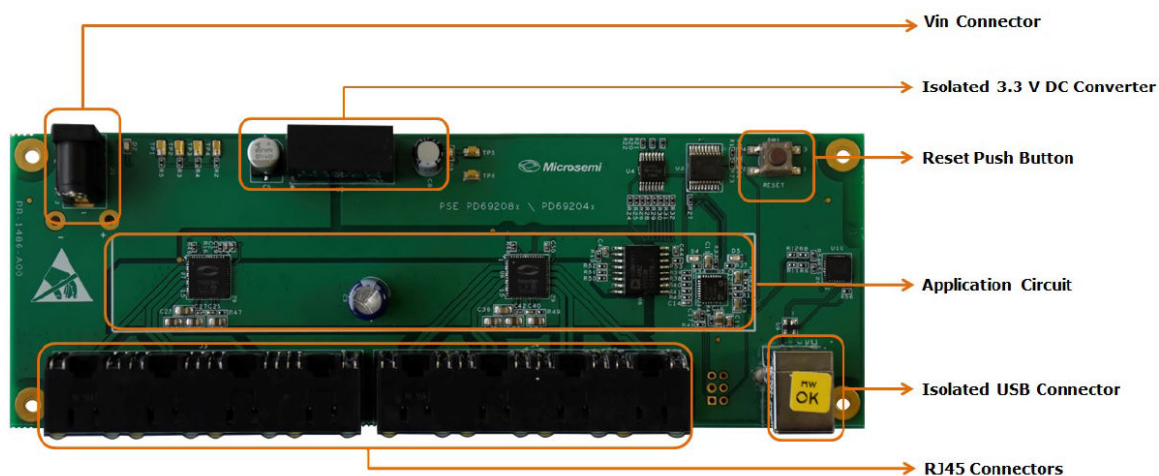
2.   Evaluation System Features

The evaluation system has the following features.

- Two gangs (each contains four RJ45 connectors)
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- LED status indication for all the ports (LED stream)
- Requires single power source only
- 0 °C to 40 °C working temperature
- RoHS compliant

3. Evaluation System Interfaces and Connections

The evaluation system interfaces and connectors are listed in the following table.

Table 3-1. Evaluation board Connectors

Serial Number	Connector	Name	Description
1	J3, J4	RJ45 connectors	Eight RJ45 ports are connected to the powered device load
2	J1	VIN connector	The DC in (VMAIN) connection is used to power the evaluation board
3	U11	Isolated USB	The USB communication, coming from the hosting system (U11), is converted to UART and directed to the PoE controller

3.1 RJ45 Connectors

There are two dedicated RJ45 connectors. Each contains four RJ45 ports, so there are eight ports in total. The four ports of J3 are 2-pair ports (port numbers 0, 1, 2, and 3) and the power connections of the port are listed in the following table.

Table 3-2. RJ45 Connectors 2-pair Port

Pin Number (each RJ45)	Signal Name	Description
4, 5	SPARE - Vport_Pos	PoE's positive spare port
7, 8	SPARE - Vport_Neg	PoE's negative spare port

The four ports of J4 are 4-pair ports (port numbers 4, 5, 6, and 7) and the power connections of the port are listed in the following table.

Table 3-3. RJ45 Connectors 4-pair Port

Pin Number (each RJ45)	Signal Name	Description
1, 2	DATA - Vport_Neg	PoE's negative data port
3, 6	DATA - Vport_Pos	PoE's positive data port
4, 5	SPARE - Vport_Pos	PoE's positive spare port
7, 8	SPARE - Vport_Neg	PoE's negative spare port

- Manufacturer: Amphenol
- Manufacturer part number: RJHSE508104

The following figure shows the RJ45 connectors.

Figure 3-1. RJ45 Connectors
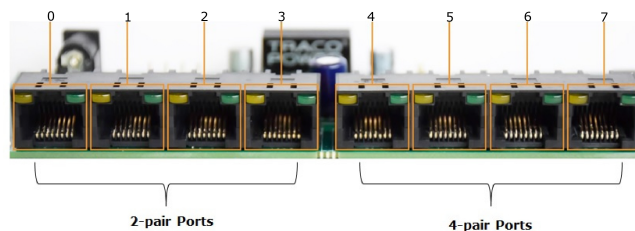
3.2 V$_{IN}$ Connector

The DC input (V$_{MAIN}$) connection is used for powering the evaluation system. The recommended input voltage range is 44V DC < VMAIN < 57V DC. The input connector is rated for 5A (See Figure 1-2 for the V$_{IN}$ connector). The DC cable should be connected to the EVB and to the power-supply before the power supply is turned-on.

Table 3-4. V$_{IN}$ Connector

Pin Number	Signal Name	Description
1	V$_{MAIN}$	Main positive voltage (referenced to GND_ANALOG)
2	GND_ANALOG	Analog ground
3	GND_ANALOG	Analog ground

- Manufacturer: SWITCHCRAFT
- Manufacturer part number: RAPC722X

The polarity of the V$_{IN}$ connector is as shown in the following figure.

Figure 3-2. Power Supply Cable Polarity

3.3 Isolated USB Interface

This interface supplies USB communication coming from the hosting system (U11), converted to UART communication (See Figure 1-2 for the isolated USB connector).

Table 3-5. Isolated USB Interface

Pin Number	Signal Name	Description
1	VBUS	Voltage supply from USB bus
2	D–	Dedicated USB signal
3	D+	Dedicated USB signal
4	GND_F	Floating ground

- Manufacturer: Samtec
- Manufacture part number: USB-B-S-S-B-TH

4. Test Points

The following table lists the test points in the evaluation board.

Table 4-1. Test Points

Designation	Description
TP1	Connected to power good pin, PG3
TP2	Connected to power good pin, PG2
TP3	Connected to power good pin, PG1
TP4	Connected to power good pin, PG0
TP5	PD692x0 supply (3.3V) test point
TP6	PD692x0 ground test point
TP7	I^{2}C bus serial data (SDA)
TP8	I^{2}C bus serial clock (SCL)
h1 (+)	Evaluation board positive input (V_{MAIN}) test point
h2 (−)	Evaluation board input ground test point

5. LED Indication

The evaluation board contains status indication LEDs, listed in the following table.

Table 5-1. LED Indication

Designation	Description
D2	Input voltage indication
D3	PoE controller 3.3V indication
D4	System OK indication; by default, turns on when input voltage is within operating range
D5	Interrupt indication; LED turns on when a pre-configured event is happening

Apart from these LEDs, each RJ45 connector port contains a dedicated LED (green LED), which displays the status of the particular port.

Table 5-2. Port Status Indications

Port LED Color	Port Load Conditions	Port Voltage
Green	Active load is plugged in and complies with normal load conditions	Continuous nominal DC voltage is present
Off	Inactive load or unplugged load	Power to port is disconnected, no DC voltage is present on port output lines
Blinking green	Overload, short circuit, or power management	Power to port is disconnected, no DC voltage is present on port output lines

6. Physical Characteristics

The mechanical dimensions of the board are 180 mm × 60 mm × 16 mm (L × W × H).

7. Electrical Characteristics

The following table lists the electrical characteristics of the evaluation system.

Table 7-1. Electrical Characteristics

Parameter	Minimum	Maximum	Units
Main DC supply V_{MAIN}	44	57	V

8. Installation and Settings

This section describes the steps required for installing and operating the PD-IM-7604-4M/T4H evaluation system. Take the following precautions before installation.

- Ensure that the power supply of the board is turned on before the peripheral devices are turned on.
- Ensure that all the required peripherals are connected before powering the board.
- Ensure that power bank15 is set to 200W.
- Ensure the correct polarity of the power supply cable. The polarity of the power supply cable is as shown in Figure 3-2.

Note: Confirm that the evaluation board is properly configured prior to starting any operation. For more information about the software and GUI used for enhanced mode operation, see *Software GUI User Guide*, catalog number 06-0027-056.

8.1 Initial Configuration

The board based on PD69208T4 and PD69204T4 devices (ordering part number, PD-IM-7604-4T4H) is configured with the following matrix.

Table 8-1. PD-IM-7604-4T4H Port Matrix

Port Identification Number	Logical Port	Physical Port (ALT-A)	Physical Port (ALT-B)
0	0	0	255
1	1	1	255
2	2	2	255
3	3	3	255
4	4	4	5
5	5	6	7
6	6	8	9
7	7	10	11

The board based on two PD69208M devices (ordering part number, PD-IM-7604-4MH) is configured with the following matrix.

Table 8-2. PD-IM-7604-4MH Port Matrix

Port Identification Number	Logical Port	Physical Port (ALT-A)	Physical Port (ALT-B)
0	0	0	255
1	1	1	255
2	2	2	255
3	3	3	255
4	4	8	9
5	5	10	11
6	6	12	13
7	7	14	15

9. Ordering Information

The following table lists the ordering information for the PD-IM-7604-4MH/4T4H evaluation boards.

Table 9-1. Ordering information

Ordering Number	Description
PD-IM-7604-4MH	Four 2-pair and four 4-pair type-3 ports, the PD69200+PD69208M-based enhanced evaluation board supports up to 60W (4-pair) with LED stream and is RoHS compliant.
PD-IM-7604-4T4H	Four 2-pair and four 4-pair type-4 ports, the PD69200+PD69208T4/PD69204T4-based enhanced evaluation board supports up to 99W (4-pair) with LED stream and is RoHS compliant.
EV82F61A	Four 2-pair and four 4-pair type-3 ports, the PD69220+PD69208M-based enhanced evaluation board supports up to 60W (4-pair) with LED stream and is RoHS compliant.

10. Reference Documents

For access to documents, device datasheets, or application notes, consult your local Microchip Client Engagement Manager or visit our website at www.microchip.com/poe.

For technical support, consult your local Embedded Solutions Engineers or go to microchipsupport.force.com/s/.

- *PD69208T4/PD69204T4/PD69208M - PoE PSE Manager Datasheet* - DS00003428
- *PD69210/PD69220 PoE PSE Controller Datasheet* - DS00003424
- *PD69200 PoE PSE Controller Datasheet* - DS00003460
- *AN3361, Designing an IEEE 802.3af/at/bt PoE System Based on PD692x0/PD69208*
- *AN1625, BT PoE LED Stream Interface*
- *PD692x0 Serial Communication Protocol User Guide*

11. Revision History

Revision	Date	Description
À	August 2020	The following is a summary of changes in revision A of this document. • The document was migrated to Microchip template. • The document number was updated from PD-000354473 to DS00003569A. • The reference to PD69200 chipsets was updated with PD69220 or PD69000 Controller. • The reference section was updated. For more information, see 10. Reference Documents.
2.0	June 2019	Editorial corrections.
1.0	November 2017	Initial Revision

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