



**PD70210EVB**  
**PD70210 HDBT level PD**  
**Evaluation Board User Guide**

Revision 1.0

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# 1 About this Guide

This user guide provides both description and operation procedures for Microsemi's PD70210 evaluation board. This board type is used for evaluating the performance of PD70210 device.

PD70210ILD device supports both HDBT standard or standard IEEE802.3at PD application interface. The board supports a 95 Watt output at the received voltage level.

## 1.1 Audience

This user guide is intended for qualified personnel, that is, operators and technicians who have a background in basic concepts of electronics.

## 1.2 Organization

This guide is arranged according to the following:

- Chapter 2      **About this Guide:** Describes the objectives, audience, and organization.
- Chapter 2      **Introduction:** Provides an overview about evaluation board's main functions, features, physical characteristics and ordering information.
- Chapter 3      **Physical Description:** Provides explanation related to the physical description (switches, jumpers, connectors).
- Chapter 4      **Electrical Characteristics:** Provides electrical characteristics of the evaluation board.
- Chapter 5      **Installation:** Provides a description of the installation process.
- Chapter 6      **Schematic:** Provides a board schematic diagram.
- Chapter 7      **List of Materials:** Provides the board's list of materials.
- Chapter 8      **Board Layout:** Provides board Gerber files description for all layers.

## 1.3 Reference Documents

PD70210 datasheet, catalog number DS\_PD70210\_PD70210A

## 2 Introduction

Microsemi's PD70210ILD device is part of a family of devices which are targeted for realizing the HDBT or multi 802.3at standard PD interface.

The PD interface family of devices includes the following:

| Device type | Power Capability                                   | Integrates PWM Controller |
|-------------|----------------------------------------------------|---------------------------|
| PD70210ILD  | Twin HDBT ports                                    | No                        |
| PD70210AILD | Twin HDBT ports supporting Wall adapter connection | No                        |
| PD70211ILQ  | Twin HDBT ports supporting Wall adapter connection | Yes                       |

Microsemi's PD70210 Evaluation Board (see Figure 2) provides designers with the environment needed for evaluating the performance and implementation of PD applications based on PD70210 device.

The board uses a single PD device, PD70210ILD, to support the Detection, Class, and Power Supplying phases on the 2/4 Pairs of the Cat5 cable. PD70210ILD supports a standard Twin HDBT interface and compatible to IEEE802.3AT Type 2 interface.

All necessary steps and connection instructions required to install and operate this board are provided within this document.

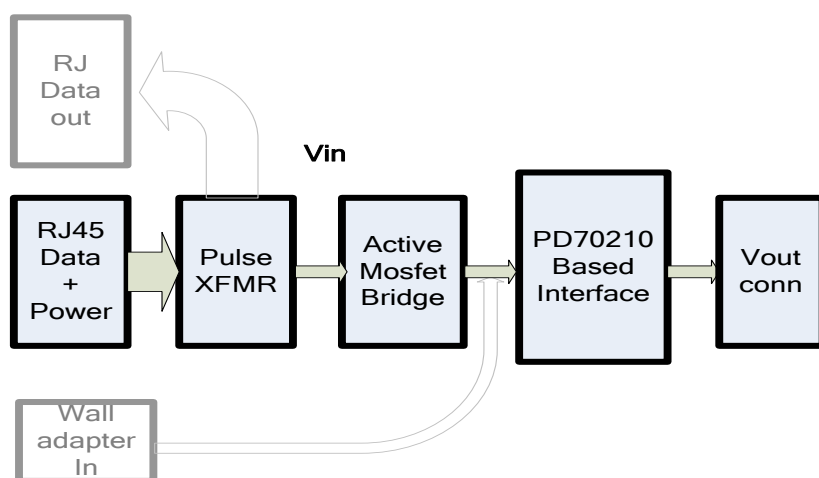


Figure 1: PD70210EVb Block Diagram

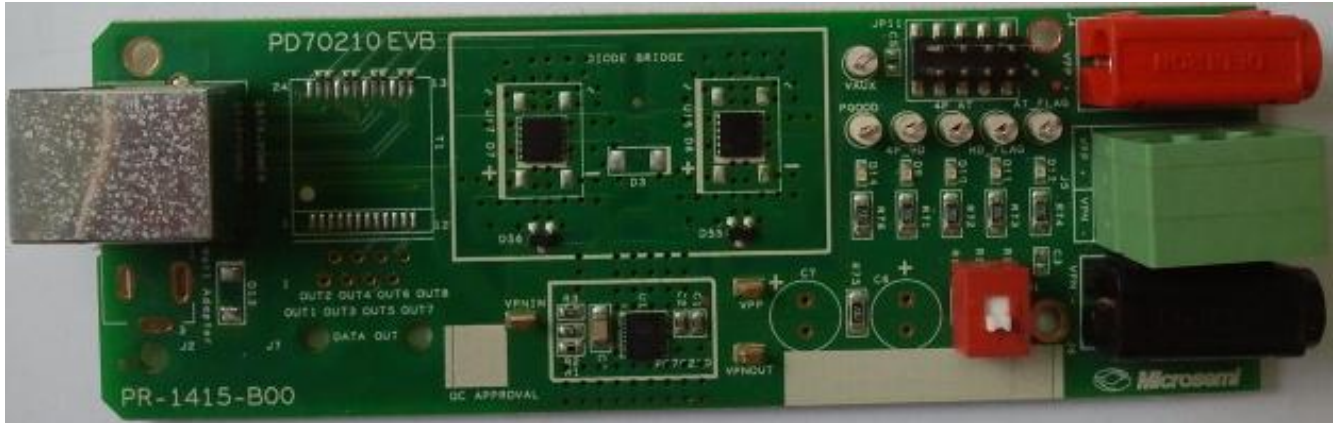


Figure 2: PD70210 Evaluation Board – General View

## 2.1 Evaluation Boards Ordering Information

Microsemi's supplies the following Evaluation Boards:

| Ordering Number | Description                                     |
|-----------------|-------------------------------------------------|
| PD70210EVB      | IEEE802.3AT Type 2 PD, based on PD70210 device, |

## 2.2 Evaluation Board Features

- Designed to support Data and Spare current by a single PD70210 device
- Input RJ45 connectors (Data and Power In)
- Output voltage connector.
- On board PSE type LED indicators
- Evaluation Board working temperature: 0° to +70°C
- RoHS compliant

## 3 Physical Description

### 3.1 Physical Characteristics

The following Table 1 lists the evaluation board's physical characteristics.

**Table 1: Physical Characteristics**

| Parameter                   | Value                       |
|-----------------------------|-----------------------------|
| Mechanical dimensions in mm | 134 x 45 x 19mm (L x W x H) |

### 3.2 Package Contents

Upon opening the Evaluation Board package, verify the following part is included; If it seems damaged, contact local representative or Microsemi's headquarters.

Package content for standard shipments is:

PD70210 Evaluation Board

### 3.3 Connectors

The following sections provide both general and detailed information regarding unit's connectors.

#### 3.3.1 Connectors Table

Table 2 lists the Evaluation Board's connectors.

**Table 2: Connectors List**

| # | Connector | Name             | Description                                        |
|---|-----------|------------------|----------------------------------------------------|
| 1 | J1        | RJ45 Connector   | RJ45 port for Data and Power In for PSE connection |
| 2 | J5        | PD device Output | Terminal blocks for connecting a load to output.   |
| 3 | J4,J6     | PD device Output | Banana Jacks for connecting a load to output.      |

#### 3.3.2 Connectors Detailed Explanation

The numbering is in reference to the numbers listed in Table 2.

##### 1. RJ45 Connector

There is a Data+Power dedicated RJ45 connector, See Figure 3.

**Table 3: RJ45 Connectors**

| CON1 Pin No | Signal Name       | Description                                                             |
|-------------|-------------------|-------------------------------------------------------------------------|
| 1, 2        | Data and Power In | Data and power input to powered device (HDBT Master Negative data port) |
| 3, 6        | Data and Power In | Data and power input to powered device (HDBT Master Positive data port) |
| 4, 5        | Data and Power In | Data and power input to powered device (HDBT Master Positive data port) |
| 7, 8        | Data and Power In | Data and power input to powered device (HDBT Master Negative data port) |

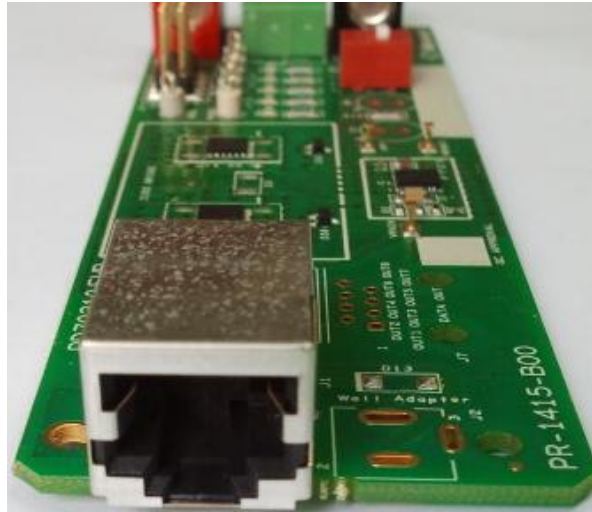


Figure 3: Front RJ45 Connector

## 2. $V_{out}$ Connectors

See Figure 4.

J5 –output connection, used for connecting to external load.

For easy connection, Black and Red Banana jacks are parallel to J5 connections.

Table 4: J5 Connector (Green)

| Pin No.          | Signal Name | Description                         |
|------------------|-------------|-------------------------------------|
| J5 (Left)- Pin 1 | Vout_Rtn    | Return PD received output voltage   |
| J5 (Right)-Pin 2 | Vout        | Positive PD received output voltage |

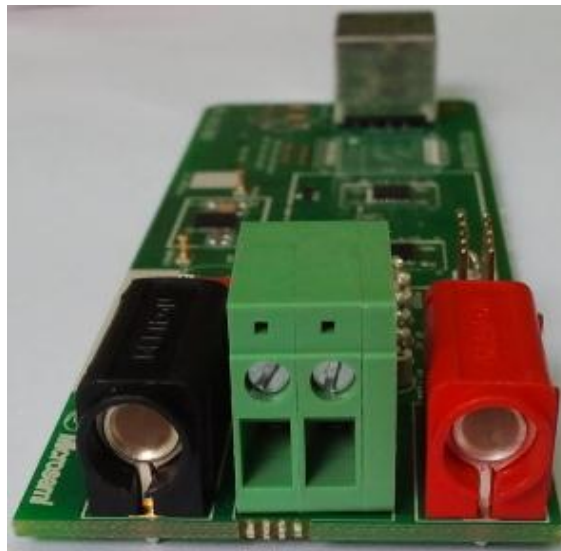


Figure 4:  $V_{out}$  Connectors

### 3.4 Indications

The following sections provide general information regarding unit indications.

#### 3.4.1.1 LED Indication

See Figure 5.

D14 is the Power\_GOOD indication LED, a PD70210 device output signal indicating the device isolation switch is operated. In all operating state this flag is lit.

D12 is the AT\_FLAG indication LED, a PD70210 device output signal indicating the device has detected a 2 finger class event from the PSE side in the class stage. The flag will be operative at 3, 4, and 6 fingers detection as well.

D10 is the 4P\_AT indication LED, a PD70210 device output signal indicating the device has detected a 4 finger class event from the PSE side in the class stage, or a 2 finger class event from the PSE side in the class stage, and SUPP\_Sa and SUPP\_Sb are both High.

The flag will be operative at 6 fingers detection as well.

D11 is the HD\_FLAG indication LED, a PD70210 device output signal indicating the device has detected a 3 finger class event from the PSE side in the class stage.

The flag will be operative at 6 fingers detection as well.

D9 is the 4P\_HD indication LED, a PD70210 device output signal indicating the device has detected a 6 finger class event from the PSE side in the class stage.

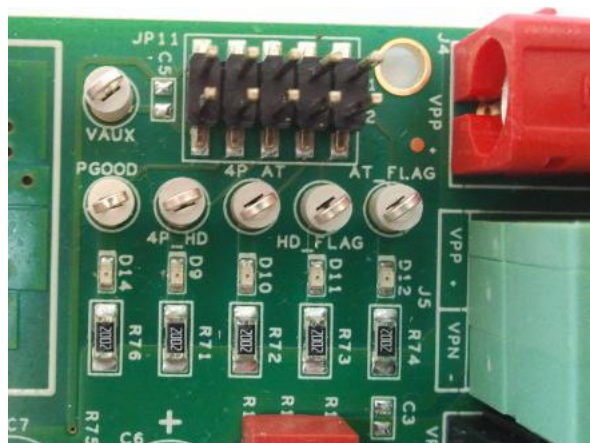


Figure 5: LED Indications

## 4 Electrical Characteristics

Evaluation board's electrical characteristics are described below:

Table 5: Electrical Characteristics

| Parameter                 | Min | Max |   |
|---------------------------|-----|-----|---|
| RJ45 connector            | 38  | 57  | V |
| Maximum Available Current | 2.2 |     | A |

## 5 Installation

### 5.1 Preliminary Considerations and Safety Precautions

Verify board's power supply is turned off before all peripheral devices are connected.

**Note:** In maximum power at the output, some of the devices may reach high temperatures (still less than 70 degrees). Pay attention while testing these devices.

### 5.2 Initial Configuration

**Note:** Prior to starting any operation, it is important to verify that the Evaluation Board is setup as shown in Figure 6.

1. Connect load to main board (J5), while it is turned Off.

**Notice:** To comply with IEEE802.3AT standard, the load should be set only after the PSE is On.  
The indication for PSE On is PGOOD led lit.

2. Connect a Cat5 cable from PSE to Evaluation Board (J1).
3. Turn On the Load.

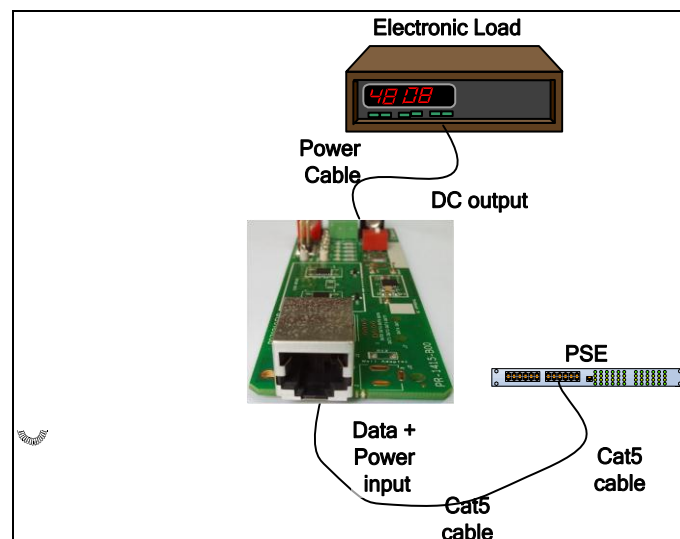


Figure 6: Test Setup







## 7 List of Materials

Table 6: PD70210EVB Components

|    | Item Description                                | Qty | Ref Des                          | Mfr         | Manufacturer PIN    |
|----|-------------------------------------------------|-----|----------------------------------|-------------|---------------------|
| 1  | HDbaseT, AF/AT PD CHIP Front End                | 1   | U1                               | Microsemi   | PD70210ILD          |
| 2  | CAP CRM 10nF 100V 5% X7R 0805 SMT               | 4   | C35-C38                          | AVX         | 08051C103JAT2A      |
| 3  | CAP CRM 1nF/2000V 10%++X7R 1206 SMT             | 1   | C88                              | AVX         | 1206GC102KAT1A      |
| 4  | CAP CRM 100nF 100V 10% X7R 1206 SMT             | 1   | C4                               | AVX         | 12061C104KAT2A      |
| 5  | Cap 1nF 100V 10% X7R 0603 SMT                   | 8   | C80-C87                          | Hitano      | 0603B102K101NT      |
| 6  | Capacitor,X7R, 1uF, 25V, 10% 0603               | 1   | C2                               | Murata      | GRM188R71E105KA12D  |
| 7  | Capacitor, X7R, 100nF,100v, 10% 0603            | 1   | C1                               | Murata      | GRM188R72A104KA35D  |
| 8  | PIN HEADER 2*5 PINS SMT 0.1" PIN SQUER TIN      | 1   | JP11                             | CviLux      | CH81-102M100-00     |
| 9  | CON RJ45 SINGLE 8 POS. SHILD ED                 | 1   | J1                               | Bel Stewart | SS71800-007F        |
| 10 | 90o Socket 4mm Red                              | 1   | J4                               | Deltron     | 571-0500            |
| 11 | 90oSocket 4mm Black                             | 1   | J6                               | Deltron     | 571-0100            |
| 12 | Terminal block 2 pole insert                    | 1   | J5                               | DINKLE      | DT-123RA-02P        |
| 13 | DIO 200V 250mA SOD323 SMT trr=50nSEC SWI        | 8   | D39,D42,D43,D46,D47, D50,D51,D54 | Diodes Inc. | BAV21WS-7-F         |
| 14 | DIO DUAL 70V 200mA 250mW Trr=6nS COM. CAT SOT23 | 2   | D55,D56                          | Infineon    | BAV70               |
| 15 | DIO 8.2V 225mW 5% Ir=5uA SOT23 SMT ZENER        | 8   | D40,D41,D44,D45,D48, D49,D52,D53 | ON Semi     | BZX84C8V2 LT1G      |
| 16 | LED SuperYelGrn 100-130o 20-40mcd h=1 0603 SMD  | 5   | D9-D12,D14                       | Everlight   | 19-21-SYGCS530E3TR8 |
| 17 | RES 75R 125mW 1% 0805 SMT                       | 4   | R139-R142                        | Bourns      | CR0805-FX-75R0-ELF  |
| 18 | Resistor, 0 Ohm, 5%, 1/16W 0402                 | 8   | R128-R135                        | ASJ         | CR10-000ZK          |
| 19 | RES 0R 250mW 5% 1206 SMT JUMPER<0.05R           | 2   | R78,R79                          | Samsung     | RC3216J000CS        |
| 20 | RES TK FLM 20K 250mW 1% 1206                    | 6   | R71-R76                          | Bourns      | CR1206-FX-2002-ELF  |
| 21 | Resistor, 20K, 5%, 1/16W 0603                   | 9   | R116-R124                        | ASJ         | CR16-203JL          |
| 22 | RES TCK FLM 24.9K 62.5mW 1% 0603 SMT            | 1   | R3                               | ASJ         | CR16-2492FL         |
| 23 | Resistor, 30.9R 1%, 1/10W 0603                  | 1   | R1                               | KOA         | RK73H1JTDD30R9      |



|    | Item Description                        | Qty | Ref Des   | Mfr         | Manufacturer PIN |
|----|-----------------------------------------|-----|-----------|-------------|------------------|
|    |                                         |     |           |             | F                |
| 24 | RES TCK FLM 60.4K 62.5mW 1% 0603 SMT    | 1   | R2        | ASJ         | CR16-6042FL      |
| 25 | DIP SWITCH 2 Positions 1 pole           | 1   | SW1       | Grayhill    | 7801T            |
| 26 | TRN PNP -30V -1A SOT23                  | 4   | Q5,Q8-Q10 | Fairchild   | FMMT549          |
| 27 | TRN NPN 40V 600mA SOT23 300 mW          | 4   | Q18-Q21   | Diodes Inc. | MMBT2222A-7-F    |
| 28 | IC Dual N/P CH power mosfet 100v 6A SMT | 2   | U16,U17   | Fairchild   | FDMQ8203         |

## 8 Board Layout

This paragraph presents the layout of the evaluation board.

The board is a 2 layer board. The layers are 2 Oz layers. Below figures present the two copper layers and the silk of the board for tracking devices placements.

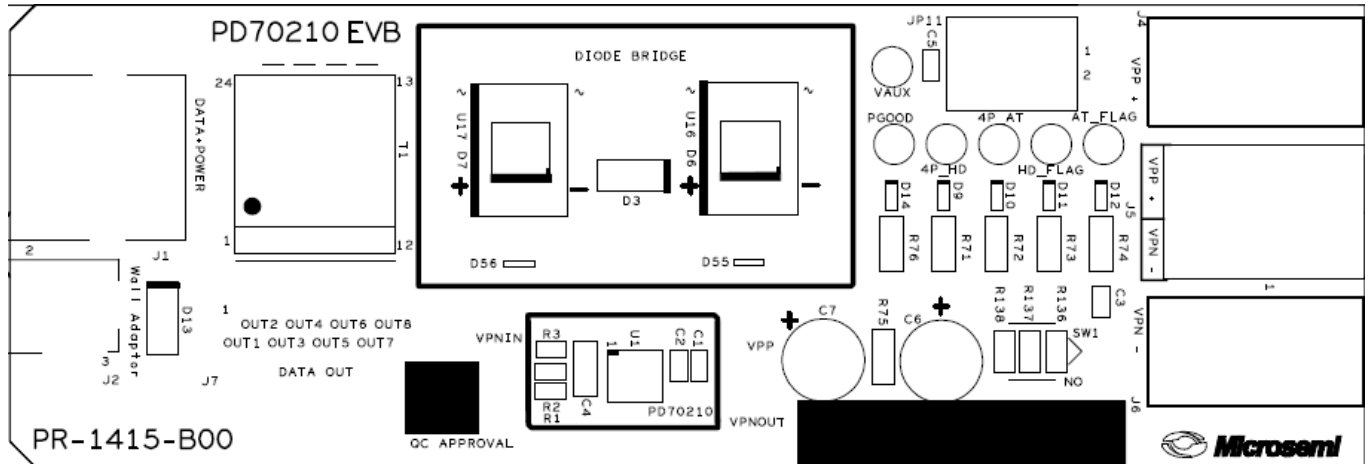


Figure 9: Top Silk

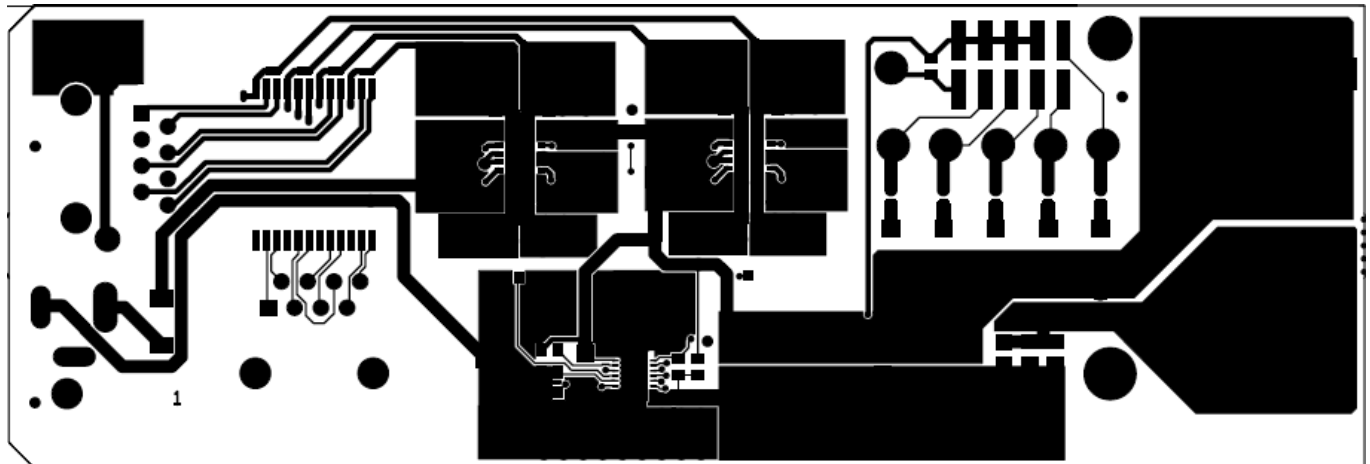
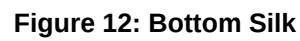


Figure 10: Top Layer





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## Revision History

| Revision Level / Date | Para. Affected/Page | Description      |
|-----------------------|---------------------|------------------|
| 0.1 / 07-01-13        |                     | Initial revision |
| 1.0 / 09-10-13        |                     | updated BOM      |

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