



PD70100EVB15B
Evaluation Board User Guide
Revision 0.1

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1 About this Guide

This user guide provides both description and operation procedures for Microsemi's PD70100EVB15B Evaluation Board, used for evaluating the performance of PD70100 PD applications.

1.1 Audience

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

1.2 Organization

This guide is divided into several sections as follows:

| | |
|-------------|---|
| • Chapter 1 | 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 description of the installation process. |
| • Chapter 6 | Schematic: Provides board schematic diagram |
| • Chapter 7 | List of Materials: Provides board's list of materials. |

1.3 Reference documents

PD70100 datasheet, catalogue number DS_PD70100_70200

2 Introduction

Microsemi's PD70100EVB15B Evaluation Board (see

Figure 2) provides designers with the needed environment to evaluate the performance and implementation of PD applications based on PD70100 PDchip. The evaluation board enables PD designers to evaluate Microsemi's PDchip solution.

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

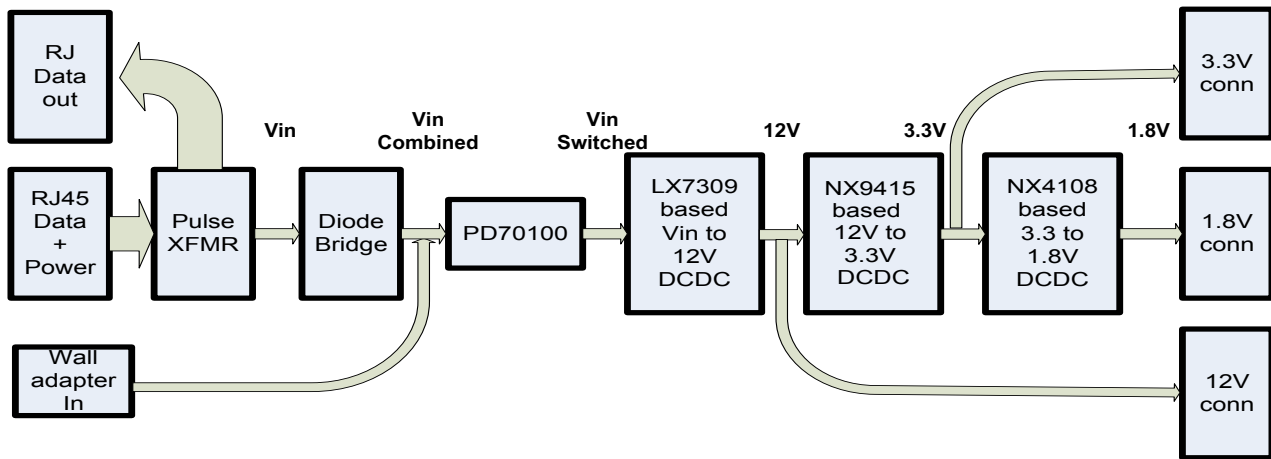


Figure 1: PD70100EVB15B Block Diagram

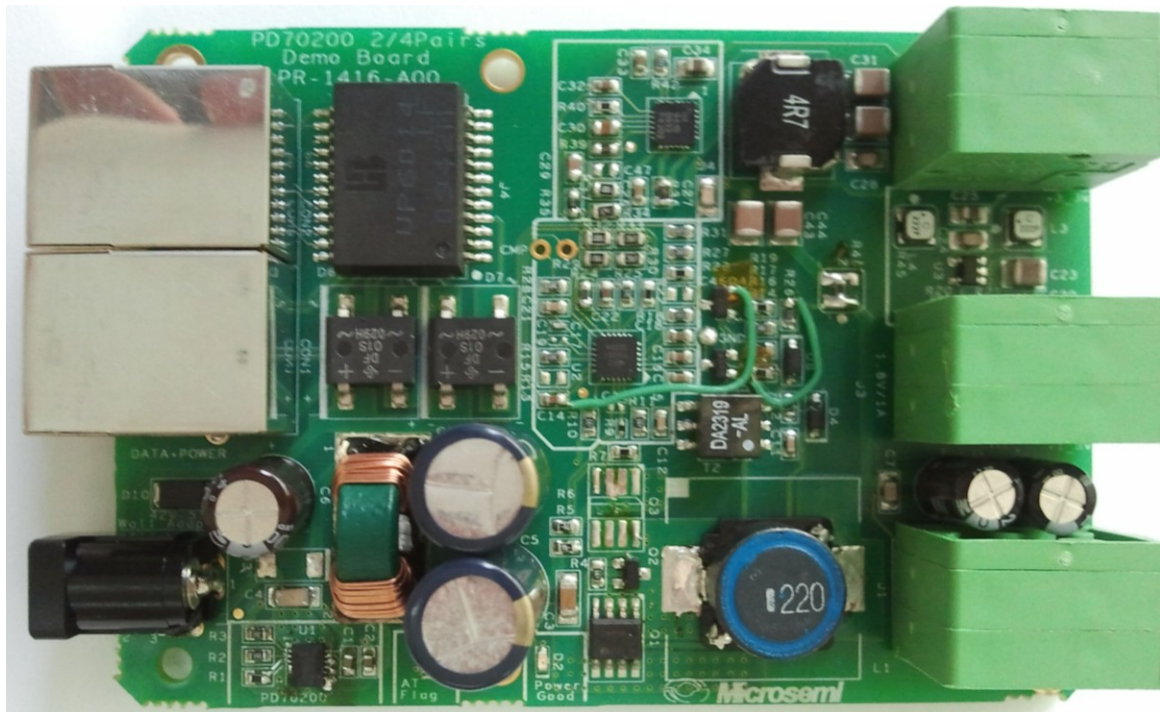


Figure 2: PD70100EVB15B Evaluation Board – General View

2.1 Evaluation Boards Ordering Information

Microsemi’s supplies the following Evaluation Boards as shown below:

| Ordering Number | Description |
|-----------------|--|
| PD70100EVB15B | PD70100 based application supporting 15 Watt application using three voltage output signals: 1. 12V 0.6A. 2. 3.3V 2A. 3. 1.8V 0.5A. |

2.2 Evaluation Board Features

- Designed to support one PDchip application (2-pairs)
- Two RJ45 connectors (Data and Power In, Data Out)
- Optional Wall adapter – DC in connector
- Output voltage connectors.
- On board LED indicator
- Pulse transformers and common mode chocks
- Evaluation Board working temperature: 0° to +70°C
- RoHS compliant.

Notice:
 Although the board supplies AF power of 15 Watt, All DCDC sections are designed for a total power delivery of 25Watt. The board is subset of AT levels 25Watt board, based on the PD70200 device.

2.3 Evaluation Board Interfaces and Connections

Board has several interfaces:

- **RJ45 Interface:** Running from PSE side to PD (powered device), based on PD70100 (CON1)
- **Vin Connectors:** DC in, alternative wall adapter connection (J2)
- **LEDs Indication:** Power good LED indication
- **Output Voltage Connectors:**
 1. 12V
 2. 3.3V
 3. 1.8V

2.4 Physical Characteristics

Table 1 lists evaluation board’s physical characteristics.

Table 1: Physical Characteristics

| Parameter | Value |
|-----------------------------|-----------------------------|
| Mechanical dimensions in mm | 95 x 65 x 17 mm (L x W x H) |

3 Physical Description

3.1 Package Contents

Upon opening the Evaluation Board package, verify the following part is included. If it is missing or seems damaged, contact local representative or Microsemi's headquarters. Package content for standard shipments is:

- PD70100EVB15B Evaluation Board

3.2 Connectors

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

3.2.1 Connectors Table

Table 2 lists the Evaluation Board's connectors.

Table 2: Connectors List

| # | Connector | Name | Description |
|---|-----------|-----------------------|---|
| 1 | CON1 | RJ45 Connector | RJ45 port for Data and Power In for PSE connection |
| 2 | CON2 | RJ45 Connectors | RJ45 port for Data Out for PD data connection |
| 3 | J2 | Optional Wall Adapter | Optional DC in connection for powering the board instead of CON1. Insertion of wall adapter connector disconnects CON1. |
| 4 | J1 | 12V Output | A terminal block for connecting a load to 12V output regulator |
| 5 | J5 | 3.3V Output | A terminal block for connecting a load to 3.3V output regulator |
| 6 | J3 | 1.8V Output | A terminal block for connecting a load to 1.8V output regulator |

3.2.2 Connectors Detailed Explanation

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

1. RJ45 Connectors (#1)

See Figure 3. There are two dedicated RJ45 connectors.

Table 3: RJ45 Connectors

| CON2 Pin No | Signal Name | Description |
|------------------------|-------------------|--|
| 1, 2, 3, 4, 5, 6, 7, 8 | Data Out | Data output to PD |
| CON1 Pin No | Signal Name | Description |
| 1, 2 | Data and Power In | Data and power input to powered device (PoE Master Negative data port) |
| 3, 6 | Data and Power In | Data and power input to powered device (PoE Master Positive data port) |
| 4, 5 | Data and Power In | Data and power input to powered device (PoE Master Negative data port) |
| 7, 8 | Data and Power In | Data and power input to powered device (PoE Master Positive data port) |

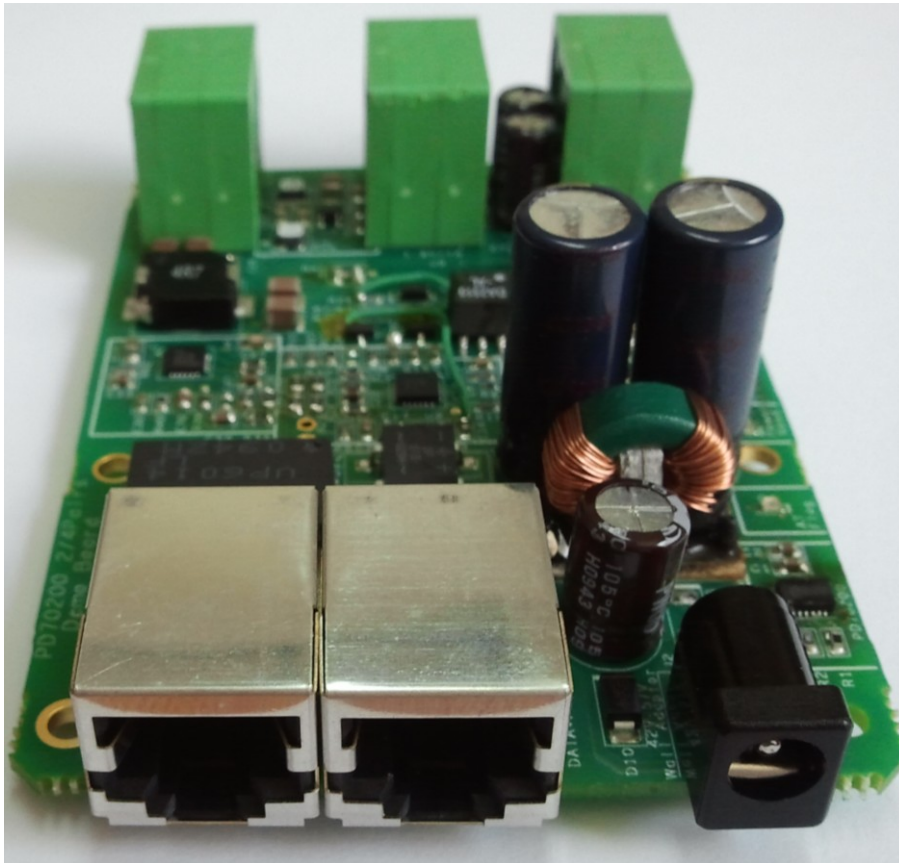


Figure 3: Front RJ45 and Wall Adapter Connectors

2. Vin Connectors (J2)

DC in connection can be used to power Evaluation Board instead of RJ45 PSE connection
 $42V > V_{in} > 57VDC$.

Table 4: Vin Connectors

| Pin No. | Signal Name | Description |
|---------------|---------------|------------------------|
| External ring | Vmain (Vin -) | Negative input voltage |
| Internal pin | Vmain (Vin +) | Positive input voltage |

- Manufacturer: **TAI CHUNG ELECTRONIC COMPONENT PARTS CO., LTD.**
- Manufacture part number: **TC18-013-02**

3. Vout Connectors

See Figure 4.

J1 – 12VDC out connection, used for connecting to external load.

Table 5: J1 Connectors

| Pin No. | Signal Name | Description |
|-----------|--------------|-----------------------|
| 1 – Left | 12V Positive | Positive 12V voltage |
| 2 – Right | 12V GND | Return of 12V voltage |

J3 – 1.8VDC out connection, used for connecting to external load.

Table 6: J3 Connectors

| Pin No. | Signal Name | Description |
|-----------|---------------|------------------------|
| 1 – Left | 1.8V Positive | Positive 1.8V voltage |
| 2 – Right | 1.8V GND | Return of 1.8V voltage |

J1 – 3.3VDC out connection, used for connecting to external load.

Table 7: J5 Connectors

| Pin No. | Signal Name | Description |
|-----------|---------------|------------------------|
| 1 – Left | 3.3V Positive | Positive 3.3V voltage |
| 2 – Right | 3.3V GND | Return of 3.3V voltage |

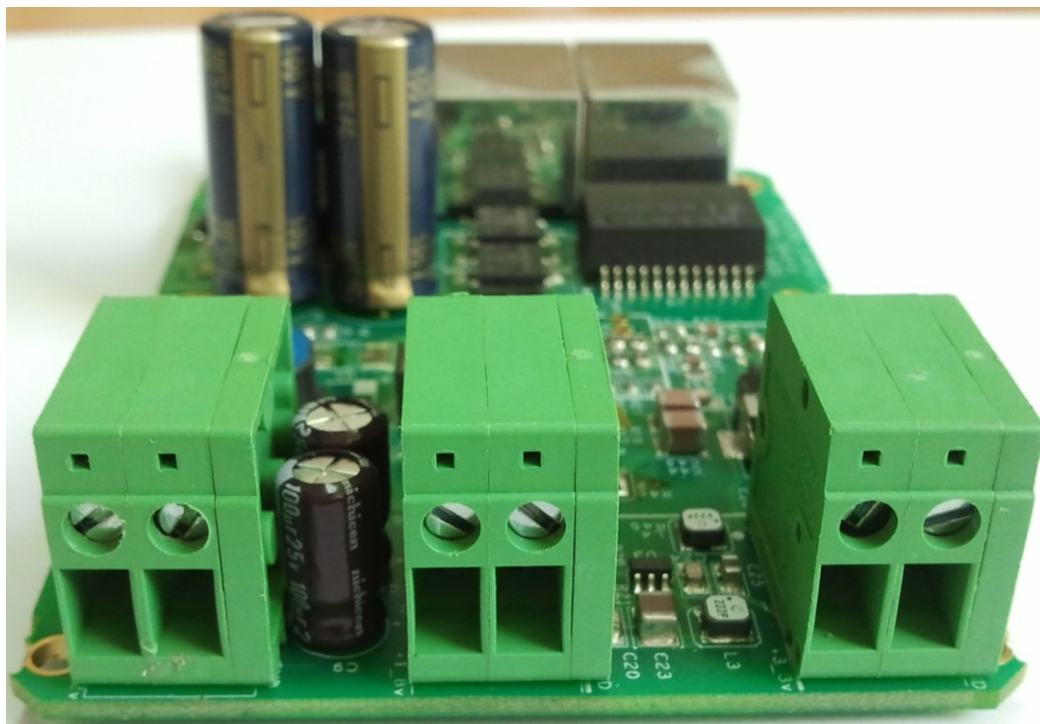


Figure 4: Vout Connectors

4. LED Indication

See Figure 5.

D2 is the Power_GOOD indication LED, an PD70100 device output signal indicating device's isolation switch is operated.

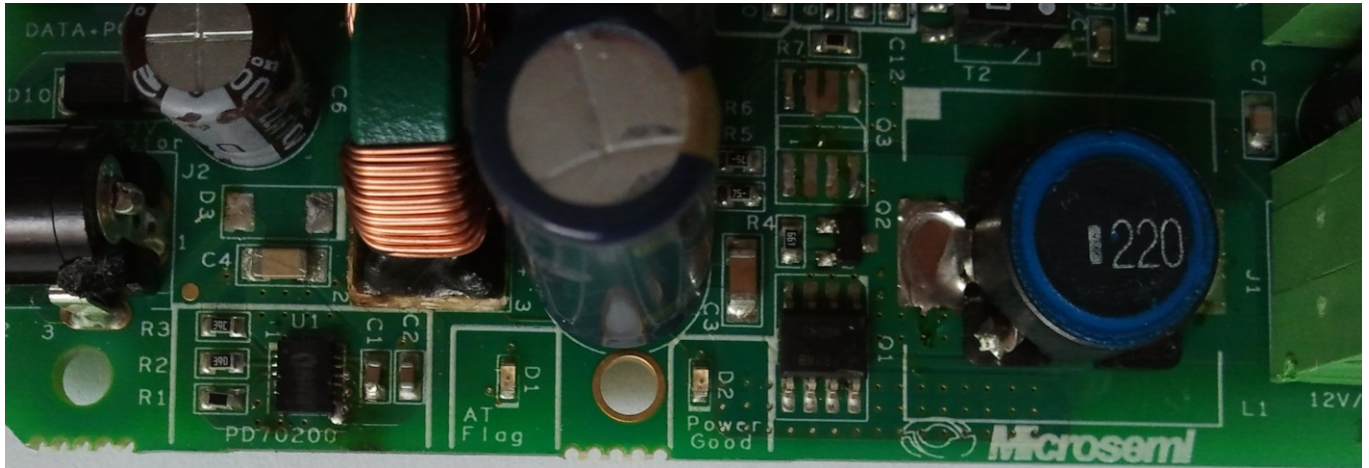


Figure 5: Powr_Good LED Indication

4 Electrical Characteristics

Evaluation board's electrical characteristics are described below:

Table 8: Electrical Characteristics

| Parameter | Symbol | Min. | Max. | Units |
|--|--------|------|------|-------|
| Main DC Supply – V_{main} | | 44 | 57 | V |
| Port Isolation to Chassis | | - | 1.5 | kVrms |
| All Communication's Isolation to Chassis | | - | 1.5 | kVrms |

5 Installation

This chapter describes the steps required to install and operate Evaluation Board with any PoE application.

5.1 Preliminary Considerations and Safety Precautions

- Verify board's power supply is turned on before peripheral devices are turned on.

5.2 Initial Configuration

Note: It is important to verify Evaluation Board is setup as shown in Figure 6 prior to starting any operation.

1. Connect configuration board to main board (J1, J2, J3).
2. Connect a power cable from power supply to Evaluation Board (CON1).
3. Connect Ethernet Cable from Evaluation Board (CON2) to Ethernet Host.

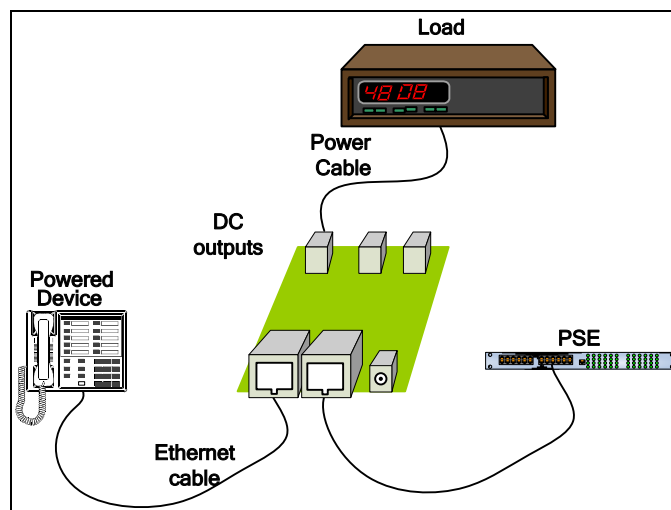
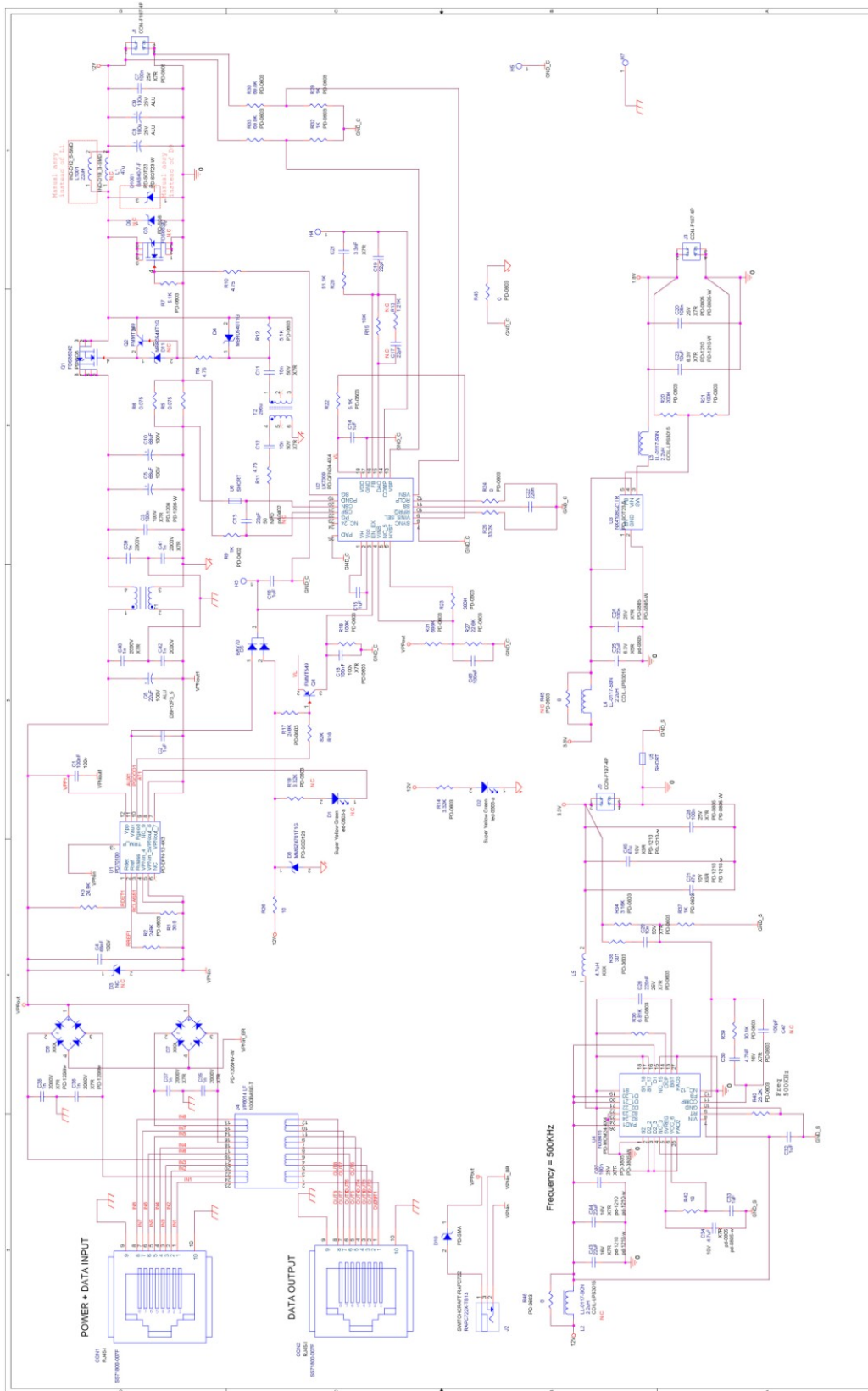


Figure 6: Test Setup

6 Schematic



7 List of Materials

| Item # | Description | Reference Des | MFR part Number | Manufacturer |
|--------|---|--------------------|--------------------|----------------------------|
| 1 | CAP CRM 4.7μF 10V 10% X7R 0805 SMT | C34 | GRM21BR71A475KA73K | Murata |
| 2 | Cap X5R 22μF 6.3V 10% 0805 | C25 | 08056D226KAT2A | AVX |
| 3 | CAP CRM 100nF 25V 5% X7R 0805 SMT | C7,C20,C24,C27,C28 | 08053C104JAT2A | AVX |
| 4 | CAP CRM 68nF 100V 10% X7R 1206 SMT | C4 | 12061C683KAT2A | AVX |
| 5 | CAP CRM 1nF/2000V 10%++X7R 1206 SMT | C35-C42 | 1206GC102KAT1A | AVX |
| 6 | CAP CRM 100nF 100V 10% X7R 1206 SMT | C3 | 12061C104KAT2A | AVX |
| 7 | CAP CER 22pF 50V 5% NPO 0402 SMT | C19 | C0402C220J5GAC | Kemet |
| 8 | Capacitor, X7R, 10μF, 10V, 10% 1210 | C23 | 1210ZC106KAT2A | AVX |
| 9 | CAP CRM 22μF 16V 20% X7R 1210 SMT | C43,C44 | 210YC226MAT2A | AVX |
| 10 | CAP CRM X5R 47μF 10V 20% 1210 SMT | C31,C45 | C1210C476M8PAC | Kemet |
| 11 | CAP CRM 4.7nF 16V 10% X7R 0603 SMT | C30 | GRM188R71H472KA01 | Murata |
| 12 | Capacitor, X7R, 3.3nF, 16V, 10% 0603 | C21 | GRM188R71H332KA01 | Murata |
| 13 | Capacitor, X7R, 220nF, 16V, 10% 0603 | C22 | C0603C224K4RAC | Kemet |
| 14 | CAP 220NF 25V X7R 10% 0603 | C26 | GRM188R71E224KA88D | Murata |
| 15 | Capacitor,X7R, 1μF, 25V, 10% 0603 | C2,C14-C16,C32,C33 | GRM188R71E105KA12D | Murata |
| 16 | Capacitor, X7R, 100nF,100v, 10% 0603 | C1,C18,C46 | GRM188R72A104KA35D | Murata |
| 17 | CAP CRM 10nF 50v 10% X7R 0603 SMT | C11,C12,C29 | GRM188R71H103KA01 | Murata |
| 18 | CAP ALU 68μF 100V 20% 10X25 105C P=5mm T/H | C5,C10 | UPM2A680MPD | Nichicon |
| 19 | CAP ALU 22μF 100V 20% 8X11.5 105C P=3.5mm T/H | C6 | UPS2A220MPD1TD | Nichicon |
| 20 | CAP ALU 100μF 25V 20% 6.3*11 105C Low Imp P2.5 | C8,C9 | UPW1E101MED | Nichicon |
| 21 | CON RJ45 SINGLE 8 POS. SHILDED after vibration | CON1,CON2 | SS71800-007F | Bel Stewart |
| 22 | CON DC POWER JACK RA 2.0X6.3 T/H | J2 | MJ-179P | Shogyo International Corp. |
| 23 | Terminal block 2 pole interlocking 5mm pitch PBC insert | J1,J3,J5 | DT-123RA-02P | DINKLE |
| 24 | DIO DUAL 70V 200mA 250mW Trr=6nS COM. CAT SOT23 | D5 | BAV70 | Infineon |
| 25 | DIO BRIDGE 100V 1A SMT | D6,D7 | DF01S-E3/45 | Vishay |



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| Item # | Description | Reference Des | MFR part Number | Manufacturer |
|--------|--|---------------|---------------------|------------------------------|
| 26 | Diode, Schottky 40V SOT23,BAS40 | D1001 | BAS40-7-F | Diodes Inc. |
| 27 | DIO SCHOTTKY 90V 1A SMA REC SMT | D10 | SS1H10-E3 | Vishay |
| 28 | DIO SCHOTTKY 40V 500mA SOD123 REC. SMT | D4 | MBR0540T1G | ON Semiconductor |
| 29 | DIO ZNR 14V 500mW 5% SOD-123 SMT | D8 | MMSZ4701T1G | ON Semiconductor |
| 30 | Ofek AF PD chip front end PD70100 | U1 | PD70100 | Microsemi |
| 31 | Synchronous Flyback DC/DC Controller LX7309 | U2 | LX7309 | Microsemi |
| 32 | 5A SYNCHRONOUS BUCK SWITCHING REGULATOR | U4 | NX9415CMTR | Microsemi |
| 33 | 1A SYNCHRONOUS BUCK SWITCHING REGULATOR W. FET | U3 | NX4108CZ1TR | Microsemi |
| 34 | IC, N-CH POWER MOSFET 150v 4.1A SO8 | Q1 | FDS86242 | Fairchild |
| 35 | 1000 BASE T SINGLE PORT VOICE OVER IP MAGNETICS MODULE SMT | J4 | VP6014 HF | BOTHHAND |
| 36 | Inductor, 22µH 20% SMT | L1001 | SLF12575T-220M4R0 | TDK |
| 37 | Power Inductors 2.2µHy 1.5A 110mOhm SMT Shilded | L3,L4 | LPS3015-222ML | Coilcraft |
| 38 | Inductor 4.7µHy DCR=12.5mohm shielded SMD11.2x10 | L5 | SEP1004EC-4R7M-LF | Coilmaster |
| 39 | Transformer, Gate driver SMT 269µH 0.795 DCR | T2 | DA2319-AL | Coilcraft |
| 40 | Common Mode Choke 10mHy 0.5R Hip Split T/H RoHS | T1 | LT-6960-I2G | ICE Components Asia Co. Ltd. |
| 41 | LED SuperYelGrn 100-130o 20-40mcd h=1 0603 SMD | D2 | 19-21-SYGCS530E3TR8 | Everlight |
| 42 | RES TCK FLM 1K 1% 62.5mW 0402 SMT 100 PPM | R9 | CR0402-FX-1001GLF | Bourns |
| 43 | RES TCK FLM 0R 62.5mW 5% 0603 SMT | R24,R43,R46 | CR16-000ZL | ASJ |
| 44 | Resistor, 82K, 5%, 1/16W 0603 | R16 | CR16-823JL | ASJ |
| 45 | RES TCK FLM 22.6K 0.1W 1% 0603 SMT 100ppm | R27 | CR16-2262FL | ASJ |
| 46 | RES TCK FLM 24.9K 62.5mW 1% 0603 SMT | R3 | CR16-2492FL | ASJ |
| 47 | RES TCK FLM 249K 62.5mW 1% 0603 SMT | R2,R17 | CR16-2493FL | ASJ |
| 48 | RES 383K 100mW 1% 0603SMT MTL FLM | R23 | CR16-3833FL | ASJ |
| 49 | Resistor, 3.32K, 1%, 1/16W 0603 | R14 | CR16-3321FL | ASJ |
| 50 | Resistor, 30.9R 1%, 1/10W 0603 | R1 | RK73H1JTTD30R9F | KOA |
| 51 | Resistor, 3.16K, 1%, 1/16W 0603 | R34 | CR16-3161FL | ASJ |
| 52 | Resistor, 69.8K, 1%, 1/16W 0603 | R30,R33 | CR16-6982FL | ASJ |

| Item | Description | Reference Des | MFR part Number | Manufacturer |
|------|-------------|---------------|-----------------|--------------|
|------|-------------|---------------|-----------------|--------------|



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| # | | | | |
|----|--------------------------------------|-------------|-------------------|---------|
| 53 | RES TCK FLM 5.1K 62.5mW 1% 0603 SMT | R7,R12,R22 | CR16-5101FL | ASJ |
| 54 | Resistor, 0.075 Ohm, 1%, 1/10W 0603 | R5,R6 | UR73D1JTDD75LF | KOA |
| 55 | Resistor, 698K, 1%, 1/16W 0603 | R31 | CR16-6983FL | ASJ |
| 56 | RES TCK FLM 23.2K 0.1W 1% 0603 SMT | R40 | RK73H1JTDD2322F | KOA |
| 57 | RES 4.75R 0.1W 1% 0603 SMT MTL FLM | R4,R10,R11 | RC1608F4R75CS | Samsung |
| 58 | RES TCK FLM 10R 62.5mW 1% 0603 SMT | R26,R42 | MCR03EZPFX10R0 | Rohm |
| 59 | RES SMT 301R 100mW 1% 0603 MTL FLM | R35 | CR0603-FX-3010ELF | Bourns |
| 60 | RES 1K 62.5mW 1% 0603 SMT MTL FLM | R29,R32,R37 | CR16-1001FL | ASJ |
| 61 | RES TCK FLM 6.81K 62.5mW 1% 0603 SMT | R36 | CR16-6811FL | ASJ |
| 62 | RES 10K 62.5mW 1% 0603 SMT MTL FLM | R15 | CR16-1002FL | ASJ |
| 63 | RES 30.1K 62.5mW 1% 0603 SMT MTL FLM | R39 | CR16-3012FL | ASJ |
| 64 | RES 33.2K 62.5mW 1% 0603 SMT MTL FLM | R25 | RC1608F3322CS | Samsung |
| 65 | RES 51.1K 62.5mW 1% 0603 SMT MTL FLM | R28 | CR16-5112FL | ASJ |
| 66 | RES 100K 62.5mW 1% 0603 SMT MTL FLM | R18,R21 | CR16-1003FL | ASJ |
| 67 | RES MTL FLM 200K 62.5mW 1% 0603 SMT | R20 | CR16-2003FL | ASJ |
| 68 | TRN PNP -30V -1A SOT23 | Q2,Q4 | FMMT549 | Zetex |



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| Revision Level / Date | Para. Affected/Page | Description |
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