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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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# PD7211EVB72FW-12

72W Isolated Forward Converter PD  
Evaluation Board

## PD70211EVB72FW-12

### 12V/72W Isolated Active Clamp Forward Converter PD

### Evaluation Board User Guide

Revision 1.01







## 1 About this guide

This user guide provides both description and operation procedures for Microsemi's PD70211EVB72FW-12 evaluating board. This board is used for evaluating the performance of PD70211A PD controller with integrated switching regulator, and PD70224 Dual MOSFET – Based Active Bridge Rectifier.

PD70211ILQ device supports both the standard IEEE802.3at PD application interface, and a PWM controller that is used to provide the PD operational voltage.

The evaluation board supports a 72 Watt, 12V output in its existing configuration, with no heat sink, at room temperature.

### 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:

<ul style="list-style-type: none"> <li>Chapter <b>Error! Reference source not found.</b></li> </ul>	<b>Error! Reference source not found.:</b> Describes the objectives, audience, and organization.
<ul style="list-style-type: none"> <li>Chapter 2</li> </ul>	<b>Introduction:</b> Provides an overview about evaluation board's main functions, features, physical characteristics and ordering information.
<ul style="list-style-type: none"> <li>Chapter 3</li> </ul>	<b>Physical Description:</b> Provides explanation related to the physical description (switches, jumpers, connectors).
<ul style="list-style-type: none"> <li>Chapter 4</li> </ul>	<b>Electrical Characteristics:</b> Provides electrical characteristics of the evaluation board.
<ul style="list-style-type: none"> <li>Chapter 5</li> </ul>	<b>Installation:</b> Provides description of the installation process.
<ul style="list-style-type: none"> <li>Chapter 6</li> </ul>	<b>Test Data:</b> Provides board test data information
<ul style="list-style-type: none"> <li>Chapter 7</li> </ul>	<b>Schematic:</b> Provides board schematic diagram
<ul style="list-style-type: none"> <li>Chapter 8</li> </ul>	<b>List of Material:</b> Provides board's list of materials.
<ul style="list-style-type: none"> <li>Chapter 9</li> </ul>	<b>Board Layout:</b> Provides board Gerber files description for all layers..

### 1.3 Reference Documents

PD70211 datasheet, catalogue number DS\_PD70211

PD70224 datasheet, catalogue number DS\_PD70224

PD System Layout Guidelines, catalogue number AN208

Implementing Auxiliary Power in PoE, catalogue number TN\_214



## 2 Introduction

Microsemi's PD70211ILQ device is part of a family of devices which are targeted for realizing the 802.3at standard PD interface.

The PD interface family of devices includes the following:

Device type	Power capability	Integrates PWM controller
PD70100	IEEE802.3at Type 1 (IEEE802.3 af level)	No
PD70101	IEEE802.3at Type 1 (IEEE802.3 af level)	Yes
PD70200	IEEE802.3at Type 2	No
PD70201	IEEE802.3at Type 2	Yes
PD70210(A)	2 x IEEE802.3at Type 2 (4 pair) HDBaseT (95W)	No
PD70211	2 x IEEE802.3at Type 2 (4 pair) HDBaseT (95W)	Yes

Microsemi's PD70211EVB72FW-12 Evaluation Board (see Figure 2) provides designers with an environment needed for evaluating the performance and implementation of PD applications based on PD70211 controller.

The board is using a single PD controller, PD70211ILQ, to support the Detection, Class, and Power Supplying phases on the 4 Pairs of the Cat5 cable. The board supports sync detection of the 4 pairs. PD70211ILQ supports the current of the HDBaseT over 4 Pairs, which is more than twice the power of a standard IEEE802.3AT Type 2 interface.

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

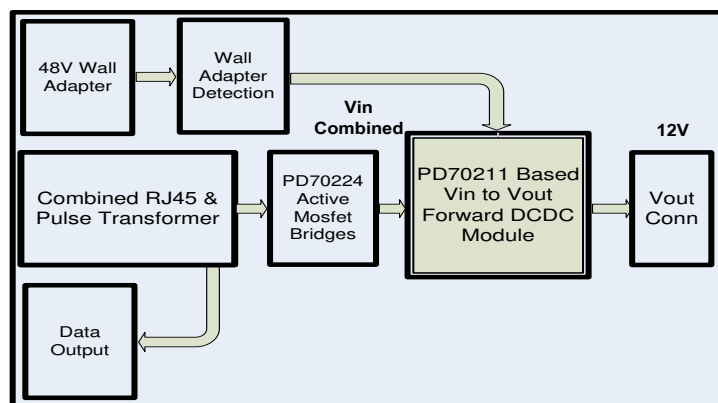


Figure 1: PD70211EVB72FW-12 Block Diagram



Figure 2: PD70211EVB72FW-12 Evaluation Board – General View

### Evaluation Boards Ordering Information

Microsemi supplies the following Evaluation Board as shown below:

Ordering Number	Description
PD70211EVB72FW-12	2 x IEEE802.3at Type 2 (4 pair) PD based on PD70211 device having 4 pair supply, controlling an <b>isolated Forward converter</b> , having a <b>12V 6 Amp</b> output.

## 2.1 Evaluation Board Features

- Designed to support Data and Spare current by a single PD70211A device
- Power is supplied through the 4-pairs of the Cat5 cable
- Wall Adapter input – Standard Barrel Jack available for connecting to an external 48-54V Wall Adapter.
- Data pass-through connector
- On board PSE class type LED indicators
- On board AT detected LED indicator
- On board 4P\_AT detected LED indicator
- On board HD detected LED indicator
- On board 4P\_HD detected LED indicator
- On board Power Good LED indicator which may be configured to monitor PD Front End or VPP UVLO.
- Ta: -40° to +70°C (with derating curve)
- RoHS compliant

## 2.2 Physical Characteristics

Table 1 lists evaluation board's physical characteristics.

**Table 1: Physical Characteristics**

Parameter	Value
Mechanical dimensions in mm	202 x 57 x 16 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 seems damaged, contact local representative or Microsemi's headquarters.

Package content for standard shipments is:

- PD70211EVB72FW-12 Evaluation Board.
- Wall Adapter Input Cable

#### 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	J1	RJ45 Connector	RJ45 port for Data + Power In for PSE connection
2	J2	Wall Adapter Input	Standard Barrel Jack used for 48V Wall Adapter. Wall adapter connection will be automatically sensed and will override the PSE power connected to J1.
3	J3	Converter Output	Terminal pins for connecting a load to 5V output. J3 provides screw terminals for easy connection
4	J4	RJ45 Connector	RJ45 port for Data pass – through output

##### 3.2.2 Connectors Detailed Explanation

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

###### 1. RJ45 Connectors.

See

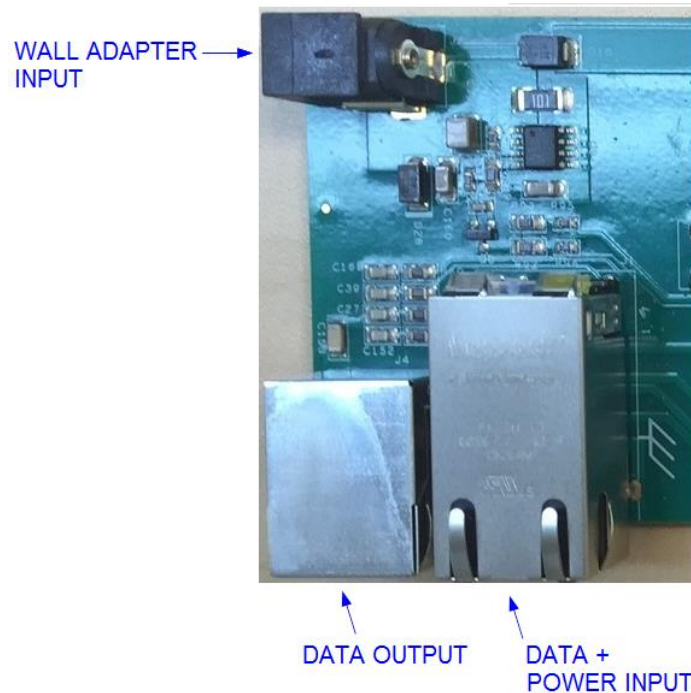
Figure 3.

**Table 3: RJ45 Connectors**

J1 & J4 Pin No	Signal Name	Description
J1 - 1, 2	Data and Power In	Data and power input to powered device (PoE Master Negative data port)
J1 - 3, 6	Data and Power In	Data and power input to powered device (PoE Master Positive data port)
J1 - 4, 5	Data and Power In	Data and power input to powered device (PoE Master Positive data port)
J1 - 7, 8	Data and Power In	Data and power input to powered device (PoE Master Negative data port)



J1 & J4 Pin No	Signal Name	Description
J4 - 1, 2	Data Output	Isolated data pass-through to external monitoring device.
J4 - 3, 6	Data Output	Isolated data pass-through to external monitoring device.
J4 - 4, 5	Data Output	Isolated data pass-through to external monitoring device.
J4 - 7, 8	Data Output	Isolated data pass-through to external monitoring device.



**Figure 3: Front RJ45 and Auxiliary 48V Wall Adapter Connectors**

**2. Wall Adapter Connections**

See Figure 3.

J2 Pin No	Signal Name	Description
Center Pin	VIN (+)	42V to 57V input from wall adapter.
Outer Barrel	VIN (-)	Wall Adapter Return

**3. V<sub>out</sub> Connections**

See Figure 4.



**Table 4: Output Load Connections**

Pin No.	Signal Name	Description
J3 - 2	Vout (-)	Return of DCDC output voltage
J3 - 1	Vout (+)	Positive DCDC output voltage



**Figure 4: V<sub>out</sub> Connections**

### 3.3 Indications

The following sections provide general information regarding unit's indications.

#### 1. LED Indication

See Figure 5.

##### 3.3.1.1 LED Indication

See Figure 5.

D16 is the AT\_FLAG indication LED, a PD70211 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.

D15 is the 4P\_AT indication LED, a PD70211 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.

D20 is the HD\_FLAG indication LED, a PD70211 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.

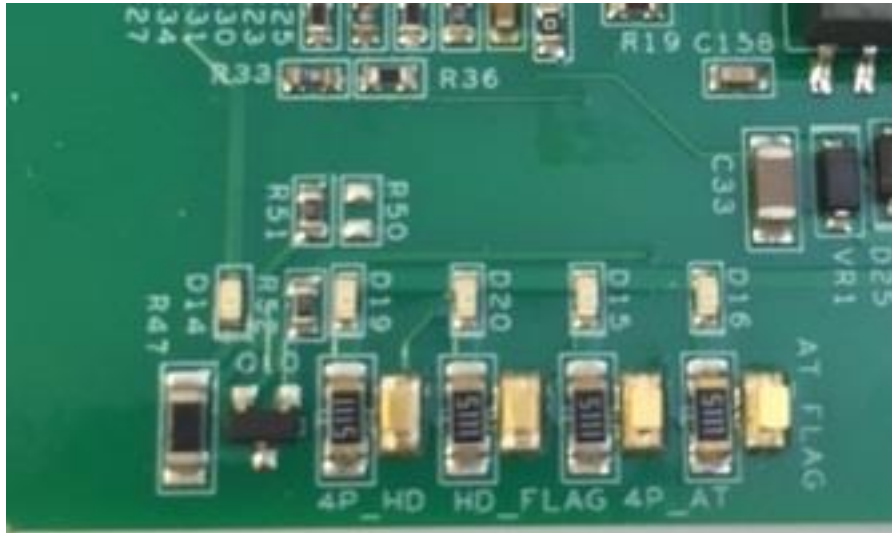
D19 is the 4P\_HD indication LED, a PD70211 device output signal indicating the device has detected a 6 finger class event from the PSE side in the class stage.

D14 is the Power Good indication. This LED indicates the presence of power. This indicator may be configured to monitor PD Front End VAUX (Asserts when VPP = 36V min.; de-asserts when VPP = 31V min.), or it may be configured to monitor the VPP UVLO, which is user selectable by the resistor values at VINS and HYST pins (R13, R19, and R25). See the PD70211 datasheet for further details regarding setting VPP UVLO limits. EVB default for



Power Good EVB is monitoring VPP UVLO, and will track the operation of the DC-DC converter. To change Power Good to monitor PD Front End VAUX:

- 1) Remove R51, 100 Ohm Resistor (located on top of PCB near D19).
- 2) Add R50 Zero Ohm Jumper (also located on top of PCB near D19).
- 3) Insure that only R51 or R50 are installed; do not operate with both resistors installed.



**Figure 5: LED Indications**



## 4 Electrical Characteristics

Evaluation board's electrical characteristics are described below:

**Table 5: Electrical Characteristics**

Parameter		Min	Max	
Main DC Supply – J1, VIN+, VINRTN		42*	57	V
Wall Adapter Supply – J2, VIN+, VINRTN		42	57	V
Output voltage		11.8	12.2	V
Maximum Output Current			6	A
Port Isolation to Chassis		-	1.5	kVrms

\*After start-up, the minimum voltage is 36V with load  $\leq 13W$  per IEEE specification.



## 5 Installation

### 5.1 Preliminary Considerations and Safety Precautions

- If using an external supply in place of a PSE, verify the external power supply is turned “off” before all peripheral devices are connected. Insure the external supply is connected to the RJ45 input (J1) per Table 3.

### 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 load to evaluation board (J3 -1 (+) & J3 - 2 (-), or TP17 (+) & TP16 (-)).
  2. Connect a Cat5 cable from PSE to Evaluation Board (J1), or a 48V Wall Adapter to Evaluation Board (J2).
- Note: Wall Adapter will override power from PSE.

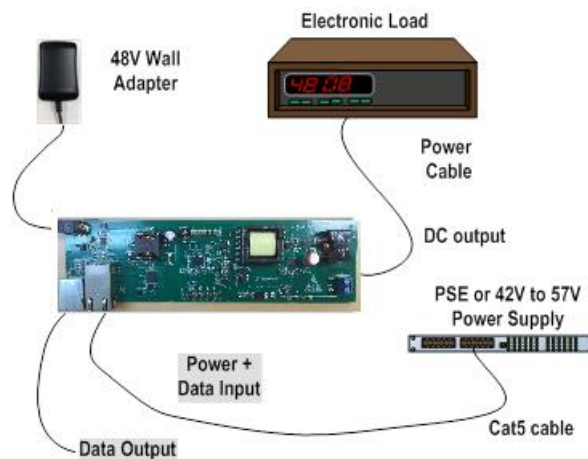


Figure 6: Test Setup





### 6 Test Data

This chapter describes typical EVB test data under various loads and POE input voltage levels. The efficiency is indicated up to 72W output power.

Overall efficiency is measured at the input to the bridge. It does not include system-level components (input/output connectors, data transformer, and EMI filter).

$$Eff = \frac{V_{out} * I_{out}}{V_{in} * I_{in}}$$

DC-DC efficiency is measured after the PD chip.

#### 6.1 Efficiency vs. Input Voltage to the bridge at full load (72W output)

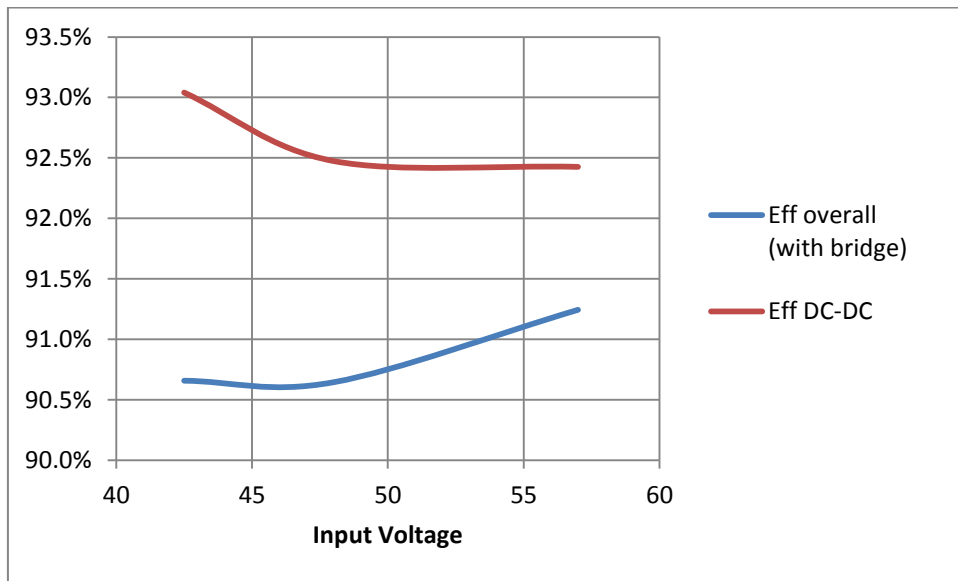


Figure 7: Efficiency vs. Input Voltage

#### 6.2 Efficiency vs. Load Current at 48V Input to the bridge

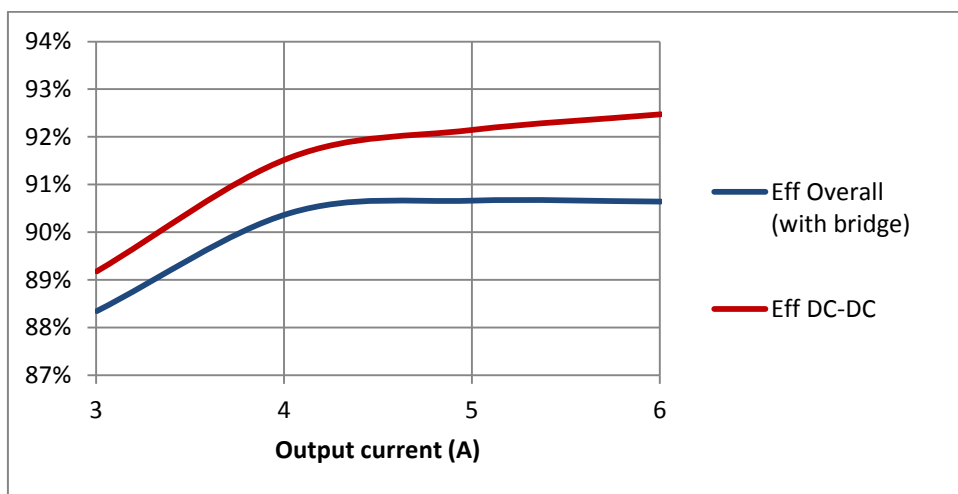
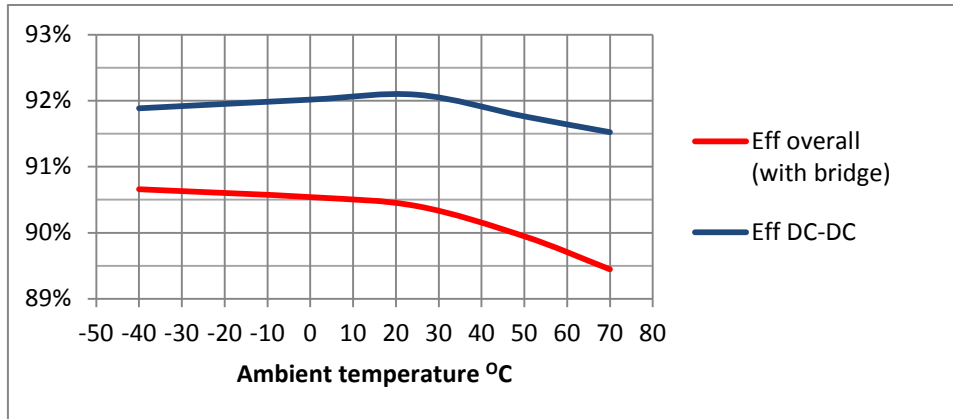


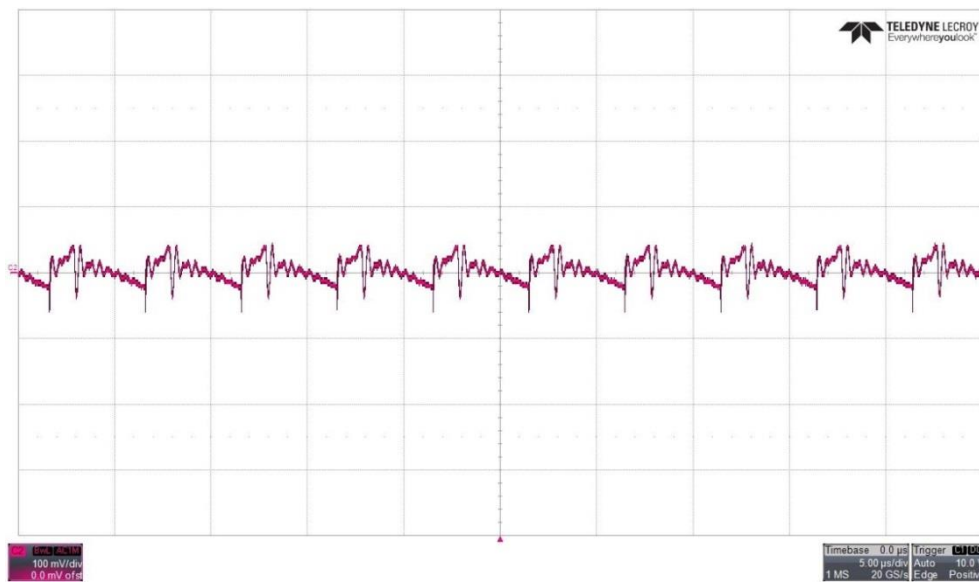
Figure 8: Efficiency at 48V Input

**6.3 Efficiency vs. ambient temperature at 48V input**



**Figure 9: Efficiency vs. temperature at 48V Input**

**6.4 Output Ripple measured with 20MHz bandwidth**



**Figure 10: Full Load Voltage Ripple and Noise at 48V Input (100mV/div)**



6.5 Bode Plots at full load at 48Vin

Frequency Sweep

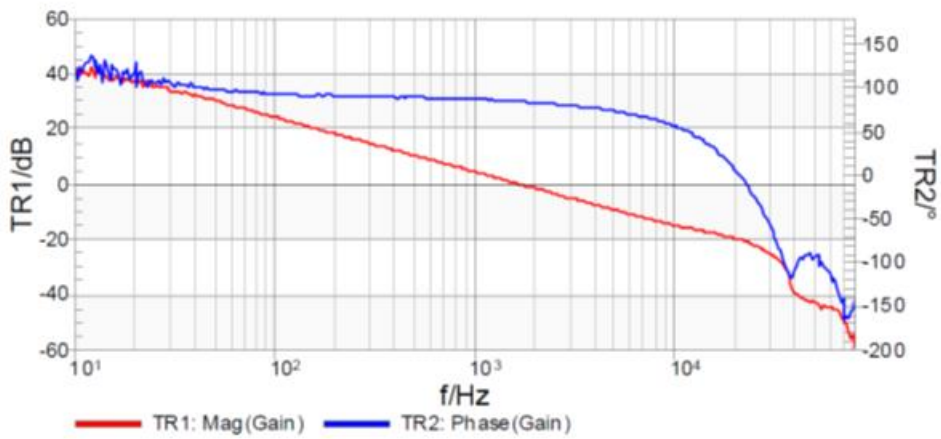


Figure 11. Bode plots

Phase Margin: 80°  
Gain Margin: -22 dB

6.6 Step Load Response for transitions between 10% load and 100% load (rise and fall time 100us)

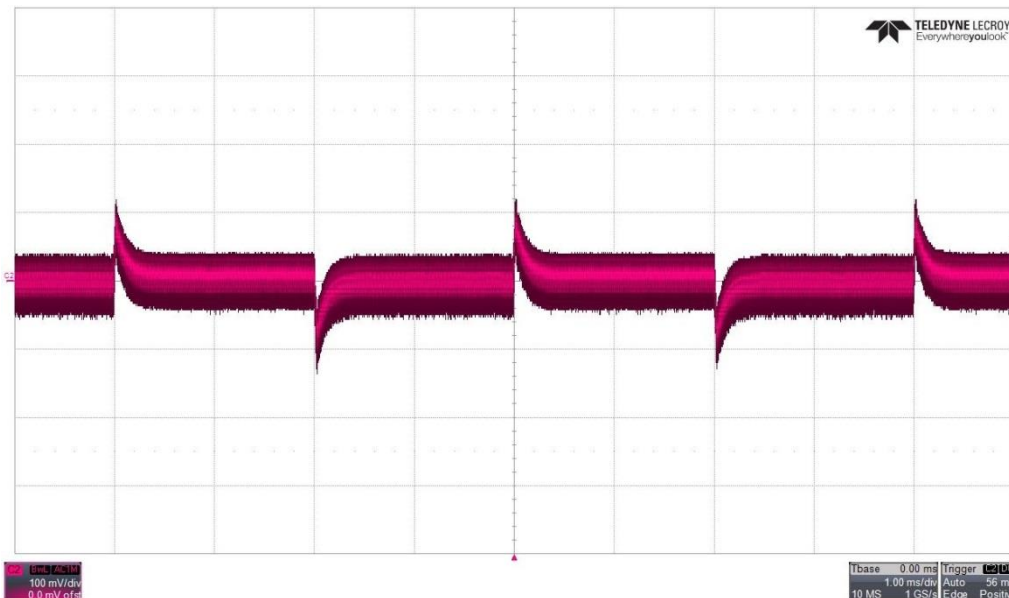


Figure 12: Load Step Response (100mV/div)



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# 7 Schematic

# PD70211EVB72FW-12

72W Isolated Forward Converter PD  
Evaluation Board

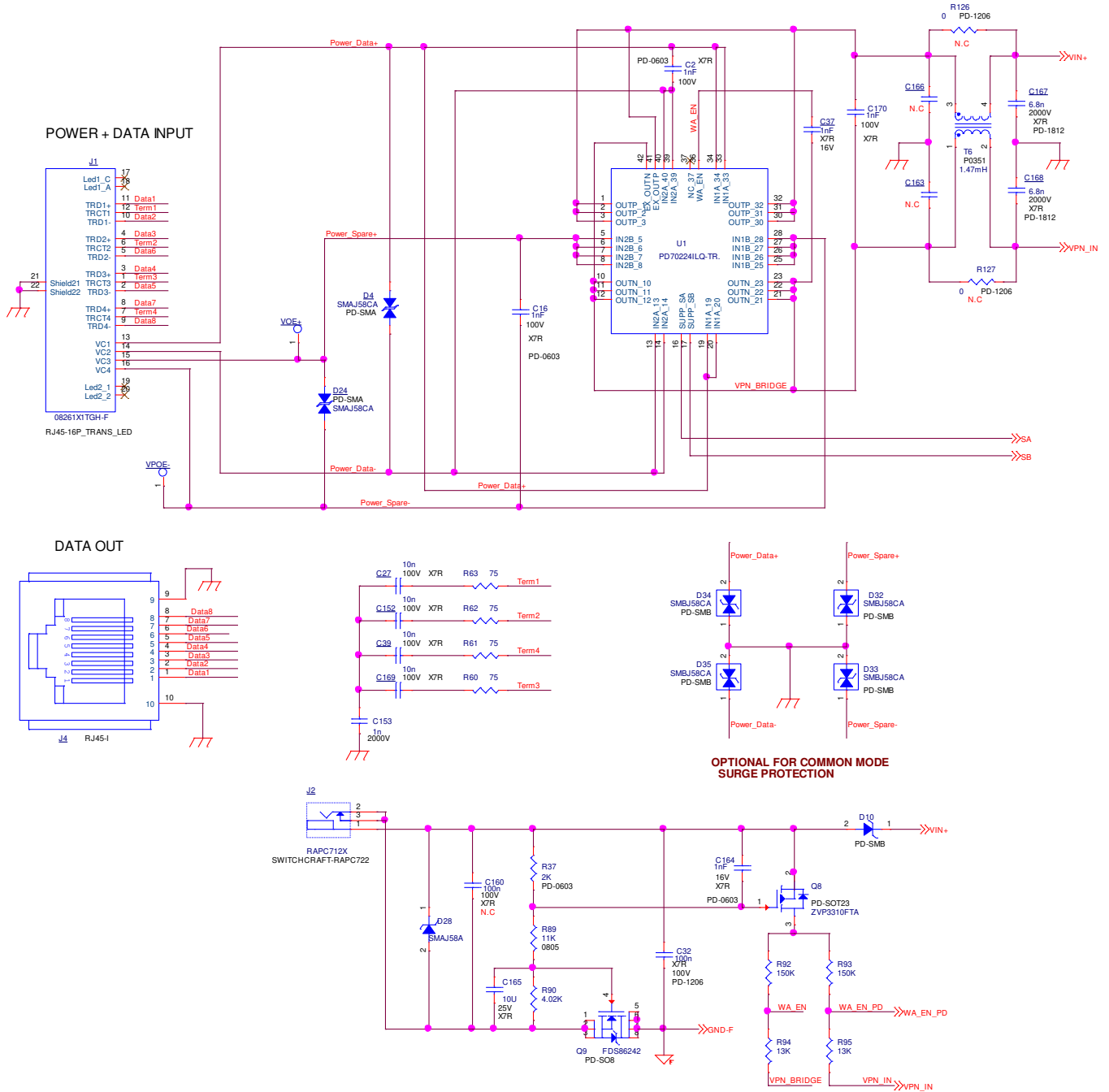


Figure 13: Evaluation Board Schematic (1 of 2)





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72W Isolated Forward Converter PD  
Evaluation Board

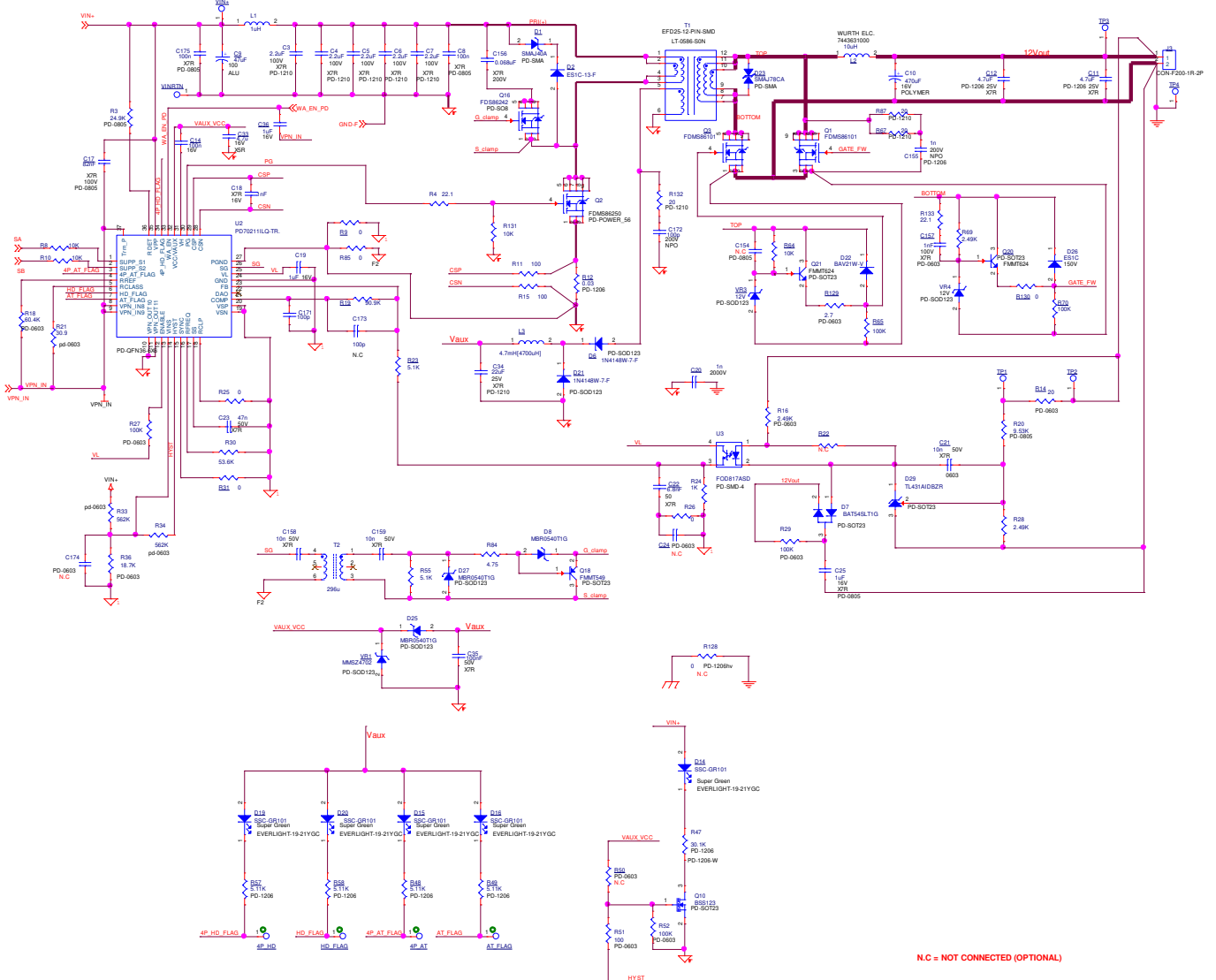


Figure 14: Evaluation Board Schematic (2 of 2)



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## 8 List of Materials

QTY	Reference	Value	Description	Mfr. Name	Mfr. Part Number
4	C2,C16, C157,C170	1nF	Cap 1nF 100V 10% X7R 0603 SMT	Samsung	CL10B102KC8NNNC
5	C3,C4,C5, C6,C7	2.2uF	CAP CER 2.2uF 100V 10% X7R 1210 SMT	Kemet	C1210C225K1RACTU
2	C8,C175	100n	Capacitor, X7R, 100nF 100V 10% 0805	TDK	C2012X7R2A104K
1	C9	47uF	CAP ALUM 47uF 100V 20% 105C RADIAL 8X15	Samsung	NHA100VB47M
1	C10	470uF	CAP ALU POLYMER 470UF 20% 16V	Nichicon	RNE1C471MDN1PX
2	C11,C12	4.7uF	CAP CRM 100nF 50v 10% X7R 0603	TDK	C3216X7R1E475KT
1	C14	100n	Capacitor, X7R, 100nF, 16V, 20% 0805	Kemet	C0805C104M4RACTU
1	C17	82nF	CAP CRM 100nF 100V 10%X7R 1206 SMT	Kemet	C0805C823K1RACTU
2	C18,C37	1nF	Capacitor, X7R, 1nF, 16V, 10% 0603	Samsung	CL10B102KANNNC
2	C19,C36	1uF	CAP CRM 1uF 10V 10%X7R 0805 SMT	Samsung	CL10A105MO8NNNC
2	C20,C153	1n	CAP CRM 1nF/2000V 10%++X7R 1206 SMT	AVX	1206GC102KAT1A
3	C21,C158, C159	10n	CAP CRM 10nF 50v 10%X7R 0603 SMT	Rohm	MCH185CN103KK
1	C22	6.8nF	CAP CRM 4.7nF 16V 10% X7R 0603 SMT	Yageo	CC0603KRX7R9BB682
1	C23	47n	Capacitor, X7R, 47nF, 50V, 10% 0603	TDK	C1608X7R1H473K
2	C24,C174	0.1 uF	Capacitor,0.1uF, X7R, 10V, 10% 0603	Kemet	C0603C104K8RACTU
1	C25	1uF	CAP CRM 1uF 16V 10%0805 X7R SMT	Murata	GRM21BR71C105KA01
4	C27,C39, C152,C169	10n	CAP CRM 10nF 100V 5% X7R 0805 SMT	Kemet	C0805C103J1RAC
1	C32	100n	CAP CRM 100nF 100V 10%X7R 1206 SMT	Kemet	C1206C104K1RACTU
1	C33	4.7u	CAP CRM 4.7uF 16V 10% X5R 1206 SMT	Murata	GRM31CR71C475KA01L
1	C34	22uF	CAP CRM 22uF 25V 20% 1210 X7R SMT	Murata	GRM32ER71E226ME15L



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## 72W Isolated Forward Converter PD Evaluation Board

1	C35	100nF	CAP CRM 100nF 50v 10% X7R 0603	Meritek	MA0603XR104K500
1	C154	10pF	CAP CRM 10pF 50V 5%NPO 0805 SMT	Samsung	CL21C100JBANNNC
1	C155	1n	CAP CRM 1200pF 100V 5% NPO 1206 SMT	EPCOS	B37871-K2102-J62
1	C156	0.068uF	CAP CRM 2.2uF 100V 10% X7R 1210 SMT	AVX	12062C683KAT2A
1	C160	100n	CAP CRM 100nF 100V 10%X7R 1206 SMT	Samsung	CL31B104KCFNNNE
2	C163,C166	1n	CAP CRM 1nF/2000V 10%++X7R 1206 SMT	Kemet	C1206C102KGRAC
1	C164	1nF	Capacitor,X7R, 1nF, 16V, 10% 0603	Kemet	C0603C102K4RAC
1	C165	10uF	Capacitor, X7R, 10uF, 25V, 20% 1210	Murata	GRM32DR71E106MA12L
2	C167,C168	6.8n	CAP CRM 1nF/2000V 10%++X7R 1206 SMT	Novacap	1812B682J202NXT
1	C171	100p	CAP CRM 100pF 100v 5% NPO 0603 SMT	Vishay	VJ0603A101JXBT
1	C172	100p	CAP CRM 100pF 200V 10% NPO 0805 SMT	AVX	08052A101KAT2A
1	D1	SMAJ40A	DIODE TVS 40V 400W 5uA 6.2 Amps Uni-Dir SMT	Bourns	SMAJ40A
1	D2	ES1C-13-F	DIODE SUPER FAST 150V 1A SMA SMT	Diodes Inc.	ES1C-13-F
2	D4,D24	SMAJ58CA	TVS DIODE 58VWVM 93.6VC SMA	Diodes Inc.	SMAJ58CA
2	D6,D21	1N4148W	DIODE SW 100V 0.15A SOD123 SMT	Diodes Inc.	1N4148W-7-F
1	D7	BAT54SLT1G	Diode Schottky Dual 200mA 30V 230mWSOT23 BAT54S	ON Semiconductor	BAT54SLT1G
3	D8,D25,D27	MBR0540T1G	DIO SCHOTTKY 40V 500mASOD123 REC. SMT	ON Semiconductor	MBR0540T1G
1	D10	B2100-13-F	DIODE SCHOTTKY 100V 2A SMB	Diodes Inc.	B2100-13-F
5	D14,D15, D16,D19, D20	SSC-GR101	LED SuperGreen 16mcd h=0.8 0603 SMD	SEOUL	SSC-GR101
1	D22	BAV21W-V	DIODE SWITCH 200V 100MW SOD123 - BAV21W	Vishay	BAV21W-V
1	D23	SMAJ78CA	DIODE TVS 78V SMA	Littelfuse	SMAJ78CA
1	D26	ES1C	DIODE SUPER FAST 150V 1A SMA SMT	Fairchild	ES1C



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## 72W Isolated Forward Converter PD Evaluation Board

1	D28	SMAJ58A	DIO TVS 58V 40A SRG400WPK SMA SMT	STMicroelectronics	SMAJ58A
1	D29	TL431AIDBZR	IC VREF SHUNT PREC ADJ SOT23-3 36V SMT	Texas Instruments	TL431AIDBZR
4	D32,D33, D34, D35	SMBJ58CA	DIO TVS 58V 6.4A 600W DO-214AA SMT	Bourns	SMBJ58CA
1	J1	08261X1TGH-F	CONN MAGJACK 1PORT 1000 BASE-T	Bel Stewart	08261X1TGH-F
1	J2	RAPC712X	DC Power Jack 16V 5A TH Pin dia 2.5mm	Switchcraft	RAPC712X
1	J3	ED500/2DS	TERMINAL BLOCK 5MM 2POS PCB	On Shore	ED500/2DS
1	J4	RJ45	CON RJ45 SINGLE 8 POS. SHILDED	Bel Stewart	SS71800-007F
1	L1	1uH	INDUCTOR SHIELDED PWR 1UH IRMS=11A SMT	Bourns	SRP7030-1R0M
1	L2	10uH	FIXED IND 10UH 16A 7.96mOHM SMD	WURTH ELC.	7443631000
1	L3	4.7mH	FIXED IND 4700uH 40mA 48OHM SMD	Bourns	SDR0503-472JL
1	Q1	FDMS86202	MOSFET N-ch 120V 64A 7.2mOhm Power-56 SMT	Fairchild	FDMS86202
1	Q3	FDMS86101	MOSFET N-CH 100V 8mOhm Power-56 SMT	Fairchild	FDMS86101
1	Q2	FDMS86250	MOSFET 150V 25mOhm N-ch Power-56	Fairchild	FDMS86250
1	Q8	ZVP3310FTA	MOSFET P-CH 100V 75MA SOT23-3	Diodes Inc.	ZVP3310FTA
2	Q9,Q16	FDS86242	IC, N-CH POWER MOSFET 150v 4.1A SO8	Fairchild	FDS86242
1	Q10	BSS123	FET NCH 100V 0.15A Logic Level SOT23	Infineon	BSS123
1	Q18	FMMT549	TRN PNP -30V -1A SOT23	Fairchild	FMMT549
2	Q20,Q21	FMMT624	Transistor NPN 125V 1A SOT23	Fairchild	FMMT624
1	R3	24.9K	RES TK FLM 24.9K 100mW1% 0805	Bourns	CR0805-FX-2492-ELF
2	R4,R133	22.1	RES TCK FLM 22.1R 62.5mW 1% 0603 SMT	Yageo	RC0603FRF0722R1
4	R8,R10, R64,R131	10K	RES 10K 62.5mW 1% 0603 SMT MTL FLM	Rohm	MCR03EZPFX1002
3	R9,R85, R130	0	RES TCK FLM 0R 62.5mW 5% 0603 SMT	Panasonic	ERJ3GEY0R00V
2	R11,R15	100	RES TCK FLM 100R 62.5mW 1% 0603 SMT	Yageo	RC0603FR-07100RL





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## 72W Isolated Forward Converter PD Evaluation Board

1	R12	0.03	RES TCK FLM 0.03 OHM 0.5W 1% 1206 SMT	Stackpole	CSR1206FK30L0
1	R14	20	Resistor, 20 OHM 5% 1/10W 0603	Rohm	MCR03EZPJ200
3	R16,R28, R69	2.49K	RES 2.49K 62.5mW 1% 0603 SMT MTL FLM	Samsung	RC1608F2491CS
1	R18	60.4K	RES TCK FLM 60.4K 62.5mW 1% 0603 SMT	ASJ	CR16-6042FL
1	R19	90.9K	Resistor, 90.9K, 1%, 1/16W 0603	Rohm	MCR03EZPF9092
1	R20	9.53K	RES 9.53K 125mW % 0805 SMT MTL FLM	Samsung	RC2012F9531CS
1	R21	30.9	Resistor, 30.9R 1%, 1/10W 0603	Panasonic	ERJ3EKF30R9V
2	R22,R50	2.94K	Resistor, 2.94K, 1%, 1/16W	Rohm	MCR03EZPF2941
2	R23,R55	5.1K	RES TCK FLM 5.1K 62.5mW 1% 0603 SMT	Vishay	CRCW06035K1FKEA
1	R24	1K	RES 1K 62.5mW 1% 0603 SMT MTL FLM	Panasonic	ERJ3EKF1001V
3	R25,R26, R31	0	RES TCK FLM 0R 62.5mW 5% 0603 SMT	Rohm	MCR03EZPJ000
3	R27,R65, R70	100K	RES 100K 62.5mW 1% 0603 SMT MTL FLM	Samsung	RC1608F1003CS
2	R29,R52	100K	Resistor, 100K, 5%, 1/16W	ASJ	CR16-104JL
1	R30	53.6K	RES TCK FLM 53.6K 62.5mW 1% 0603 SMT	Samsung	RC1608F5362CS
2	R33,R34	562K	RES 562K, 1%, 1/16W, 0603	Vishay	CRCW0603562KFKEA
1	R36	18.7K	Resistor, 18.7K, 1%, 1/16W 0603	Rohm	MCR03EZPF91872
1	R37	2K	RES 2K 62.5mW 1% 0603 SMT MTL FLM	Vishay	CRCW06032KFKEA
1	R47	30.1K	RES 30.1K 250mW 1%1206 SMT MTL FLM	Yageo	RC1206FR-0730K1L
4	R48,R49, R57,R58	5.11K	RES TCK FLM 5.11K 250mW1% 1206 SMT	Samsung	RC3216F5111CS
1	R51	100	Resistor, 100 Ohm, 5%, 1/16W 0603	Samsung	RC1608J101CS
4	R60,R61, R62,R63	75	RES 75R 125mW 1% 0805SMT	Yageo	RC0805FK-0775RL
3	R67,R87, R132	20	RES 20 OHM 1/2W 5% 1210 SMT	KOA	RK73B2ETTD200J
1	R84	4.75	RES 4.75R 0.1W 1% 0603 SMT MTL FLM	Vishay	CRCW06034R75FKEA



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# PD70211EVB72FW-12

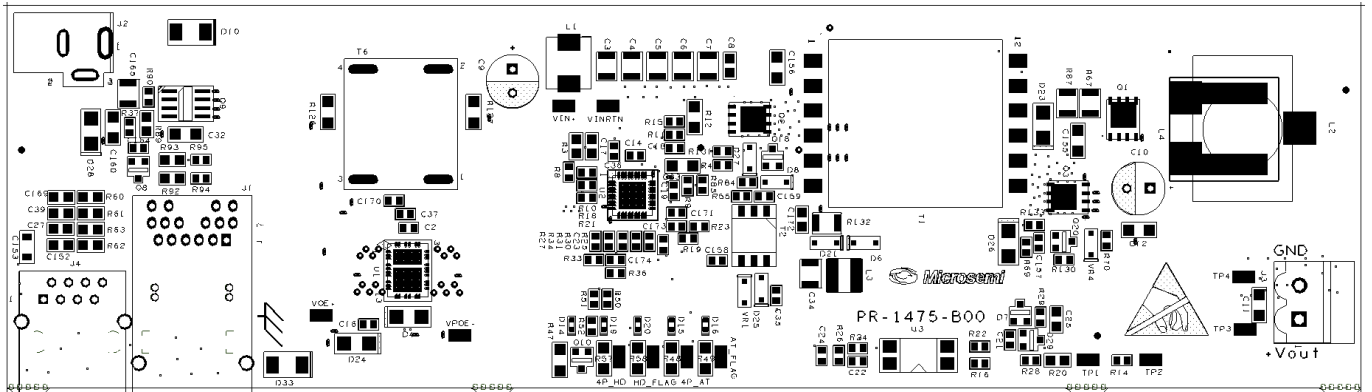
## 72W Isolated Forward Converter PD Evaluation Board

1	R89	11K	RES 11K 125mW 1% 0805 SMT MTL FLM	Yageo	RC0805FR-0711KL
1	R90	4.02K	Resistor, 4.02K, 1%, 1/16W 0603	Panasonic	ERJ3EKF4021V
2	R92,R93	150K	RES 150K 125mW % 0805 SMT MTL FLM 100 ppm	Panasonic	ERJ6ENF1503V
2	R94,R95	13K	Resistor, 13K, 1%, 1/16W 0603	ASJ	CR16-1302FL
3	R126,R127, R128	0	RES OR 250mW 5% 1206 SMT JUMPER<0.05R	Samsung	RC3216J000CS
1	R129	2.7	Resistor, SMT 2.7 Ohm, 5%, 1/16W 0603	Panasonic	ERJ3GEYJ2R7V
1	T1	N/A	Transformer 12V 72W forward 180 uH	ICE Components	TX15061
			Alternate source	Shinohm	STEFD25-005
1	T2	296u	Transformer, Gate driver SMT 269uH 0.795 DCR	Coilcraft	DA2319-AL
1	T6	1.47mH	Inductor common mode 1.47mH 2.8A SMD	Pulse	P0351
1	U1	PD70224	Ideal Diode Bridg dual bridge 6x8 SMT PD70224	Microsemi	PD70224ILQ-TR
1	U2	PD70211	IEEE 802.3 AF/AT,HDbaseT Powere Device PD70211	Microsemi	PD70211ILQ-TR
1	U3	FOD817ASD	OPTOISOLATOR 5KV TRANSISTOR 4 SMD	Fairchild	FOD817ASD
1	VR1	15V	DIODE ZENER 15V 500mW SOD123 MMSZ4702	Fairchild	MMSZ4702
1	VR3	12V	DIO ZENER 12V 500mW SOD123 SMT	Diodes Inc.	BZT52C12-7-F
1	VR4	12V	DIO ZENER 12V 500mW SOD123 SMT	Diodes Inc.	BZT52C12-7-F
12	TP1,TP2,TP3, TP4, 4P_HD, 4P_AT, VPOE-, VPOE+, VINRTN, VIN+, HD_FLAG, AT_FLAG	HK-2-G-S05	TEST POINT TIN PLATED HEAD	MAC-8	K0-HK2H-S00

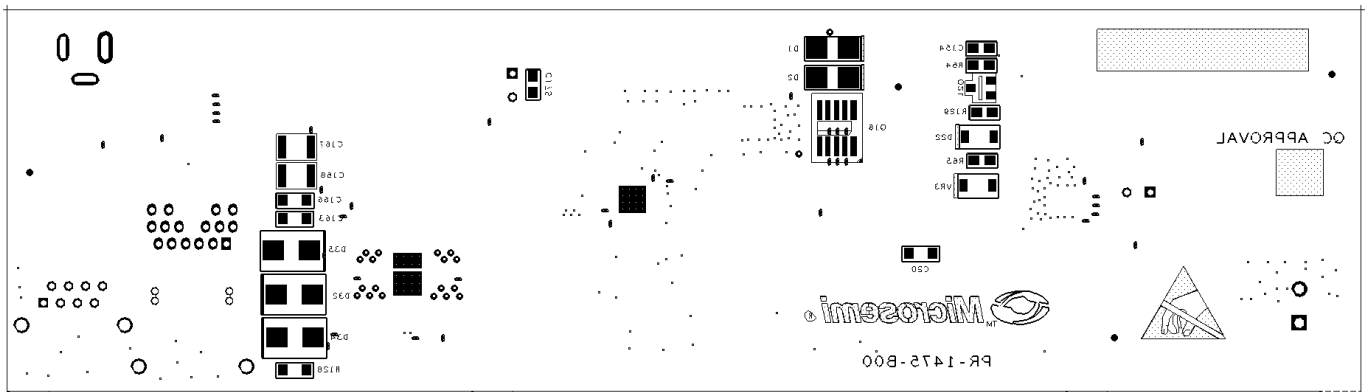
Parts may be replaced by approved equivalents.

## 9 Board Layout

This section presents the layout of the evaluation board. The board is a 2 layer board. All layers are 2 Oz copper. Below figures present the copper layers and the silk of the board for tracking devices placements.



**Figure 15: Top Silk and Solder Mask**



**Figure 16: Bottom Silk and Solder Mask (Image Looking From Bottom)**



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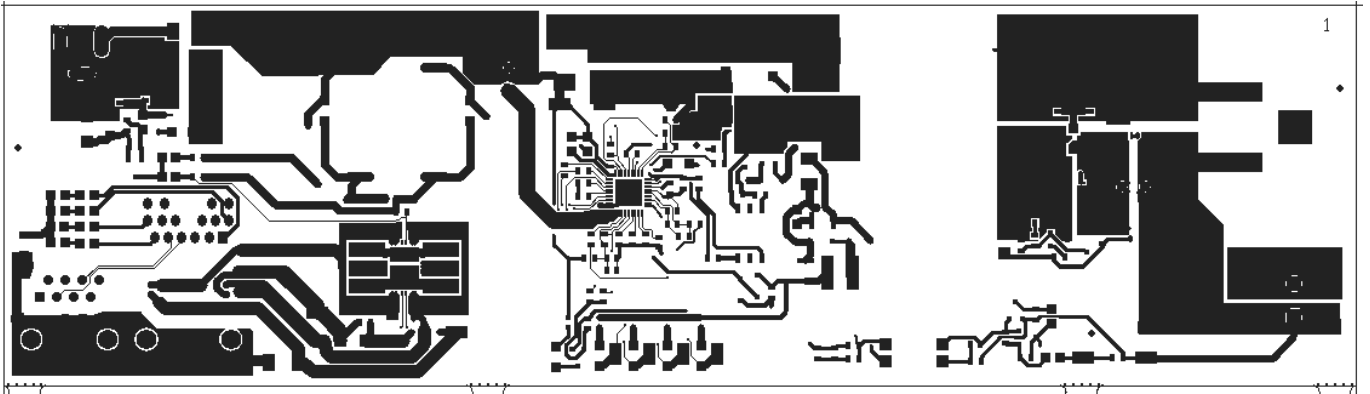


Figure 17: Top Layer

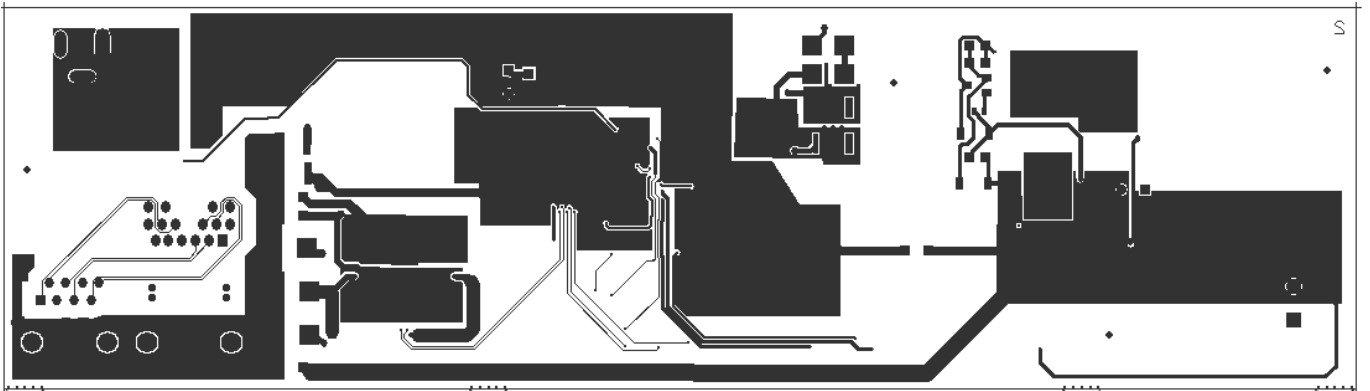
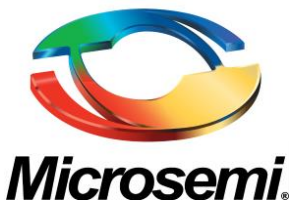


Figure 18: Bottom Layer



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**Revision History**

Revision Level / Date	Par. Affected/Page	Description
1.01 / 28-June-16		Initial release

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For support contact: [PoEsupport@microsemi.com](mailto:PoEsupport@microsemi.com)

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