

INTRODUCTION

This evaluation kit (EVK) is designed to enable system designers to rapidly evaluate the PoweredEthernet™ IEEE802.3bt PoE modules using a complete plug-and-play platform. It is compatible with any IEEE 802.3af compliant PSE and is backward compatible with IEEE802.3af and IEEE802.3at standards. The EVK supports Ethernet data rates of up to 1000BASE-T (1-Gigabit Ethernet).

The kit is supplied with the selected module pre-assembled on the board, allowing immediate evaluation and testing. It features a pass-through design that routes data from a compliant PSE when connected using a Cat6 or higher Ethernet cable.

KEY FEATURES

- Supports the IEEE802.3bt PoE standard and backward compatible operation.
- Supports auxiliary DC input via a wall adapter, with priority given to the auxiliary supply.
- LED status indicators for PSE type and power class reporting.
- Optional Auto-class support, for more information refer to [The Benefits of using Auto-class](#).
- Dedicated voltage measurement test points.
- Provision for additional input filtration and EMI optimisation.

LAYOUT

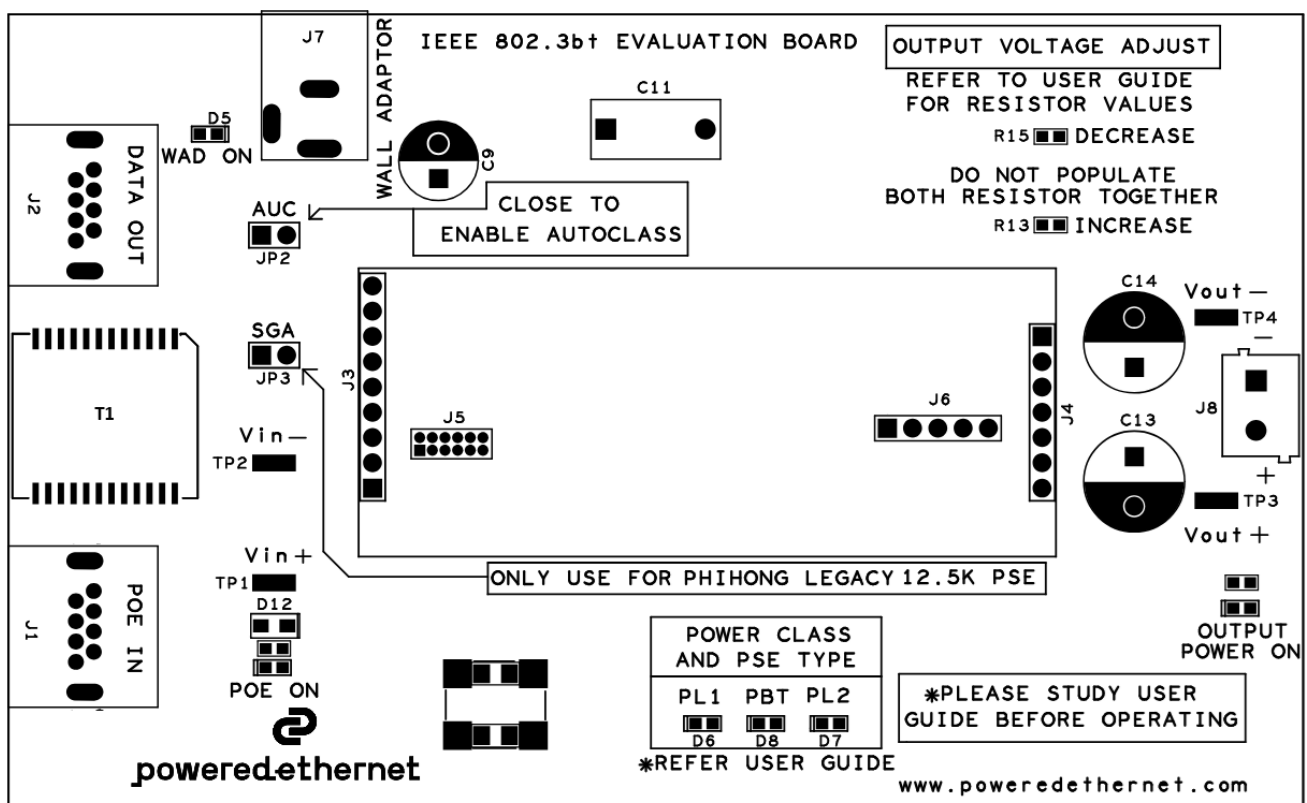


Figure 1- EVK Layout (Top side)

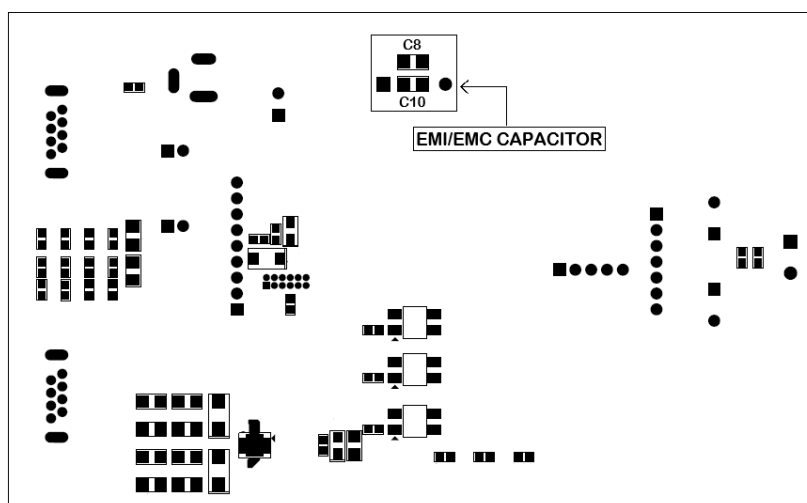


Figure 2- EVK Layout (Bottom side)

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COMPATIBLE MODULES

SERIES	EVK PARTNUMBER	MODULE FITTED	Output Voltage	SERIES	EVK PARTNUMBER	MODULE FITTED	Output Voltage
PEM9300	EVK9312BTD	PEM9312BT	12V	PEM6300	EVK6312BTD	PEM6312BT	12V
	EVK9320BTD	PEM9320BT	20V		EVK6320BTD	PEM6320BT	20V
	EVK9324BTD	PEM9324BT	24V		EVK6324BTD	PEM6324BT	24V

INPUTS

This EVK is designed to be powered by any IEEE 802.3af/at/bt compliant Power Sourcing Equipment (PSE). An option is also provided to power the kit using an auxiliary DC wall adapter. Both data and power are supplied through the J1 connector (RJ45 port), as shown in *Figure 1*. The data signals are routed through the data transformer (U1) and then passed to the data output connector J2 (RJ45 port).

This board includes an inbuilt KTA1170 bridge rectifier for power rectification. For more detailed information, please contact Infomart.

WALL ADAPTOR (WAP) SUPPLY

When EVK equipped with the auxiliary DC power input. DC power can be directly connected from DC jack (J7) of the EVK. The system gives priority to the WAD and smoothly switches from PoE Input to Wall adaptor Input. When a wall power adapter is detected, the internal isolation MOSFET is turned off, the classification current is disabled if VIN is within the classification range, and the Smart MPS comparator is also turned off.

OUTPUT

The regulated DC output from the PoE BT module is available on connector J8, a 2-pin 5mm terminal block. A minimum wire size of 18 AWG is recommended for load connection to maintain voltage integrity under maximum power.

DATA OUTPUT

Any data provided over the PoE interface (Ethernet cable) connected to the Data & Power port (J1) is passed through to the Data Output port (J2) via the data transformer (U1). The data traces on the EVK are designed to support pass-through of 1GBASE-T (Gigabit Ethernet) signals. No signal processing or amplification is performed on the EVK.

OPERATION

To ensure safe delivery of PoE power, the PSE performs detection and classification prior to power activation. The PSE checks for a valid PoE signature from the PD. If a valid signature is not detected, power is not applied and the PSE retries after approximately 2 seconds. Once a valid signature is confirmed, the PSE performs classification to determine the power requirement. After classification is complete, the PSE enables power to the PD. The module then converts the PoE input voltage into a regulated DC output.

SGA FEATURE

Place a jumper between the SGA pins at the JP3 location to provide 12.5K Ω signature resistance required by certain Phihong PSEs. Leave these pins unconnected otherwise.

LED'S INDICATION

The EVK includes 6 LEDs to indicate PoE status, wall adapter status, power level, and output status.

LED INDICATION NAME	DESCRIPTION
POE ON	Indicates that the evaluation kit is receiving power from a compliant PSE.
WAD ON	Indicates that an auxiliary wall adapter is connected.
PL1	Shows the allocated power level and classification. Refer to the <i>POWER LEVEL INDICATION</i> section for details.
PL2	
PBT	
OUTPUT ON	Indicates that the regulated output power is active.

Table 1- LED Indication

POWER LEVEL INDICATION

PSE Type	PD Class	Class Events	PSE available power	PL1	PL2	PBT
1 or 2	0	1	12.95	OFF	OFF	OFF
1 or 2	1	1	3.84	OFF	OFF	OFF
1 or 2	2	1	6.49	OFF	OFF	OFF
1 or 2	3	1	12.95	OFF	OFF	OFF
2	4	2	25.5	ON	OFF	OFF
3 or 4	0	1	12.95	OFF	OFF	ON
3 or 4	1	1	3.84	OFF	OFF	ON
3 or 4	2	1	6.49	OFF	OFF	ON
3 or 4	3	1	12.95	OFF	OFF	ON
3 or 4	4	2 or 3	25.5	ON	OFF	ON
3 or 4	5	4	38.25	OFF	ON	ON
3 or 4	6	4	51	OFF	ON	ON
4	7	5	62	ON	ON	ON
4	8	5	71.3	ON	ON	ON

Table 2- Power Level Indication

AUTO CLASS FEATURE

Auto class is a classification mechanism that allows a PD to communicate its effective maximum power consumption to the PSE. allowing the PSE to allocate the appropriate power budget.

To enable Auto-Class, place a jumper between the AUC pins at the JP2 location. Leave the pins open if Auto-Class is not required.

AUC (JP2) PIN CONFIGURATION	SUPPORT AUTOCLASS
AUC OPEN	NO
AUC PINS SHORT	YES

Table 3- Auto Class Feature

EMI/EMC (C8 and C10)

To further improve EMI/EMC performance, extra capacitor pads (C8 and C10) are provided, allowing system designers to add extra filtering as needed. These capacitors are connected between the input ground and output ground. To maintain isolation integrity, use capacitors with a minimum rated voltage of 1500V DC.

MEASUREMENT SECTION

The EVK provides test points for monitoring voltage at both the input and output sections. TP1 and TP2 measure the input voltage, while TP3 and TP4 measure the output voltage of the module.

OUTPUT VOLTAGE ADJUSTMENT

The BT modules support output voltage adjustment through the OADJ pin. To adjust the voltage, connect a resistor (minimum 1/16W, 1% tolerance) between the OADJ pin and either +VDC or –VDC, as specified in the provided table. Only one resistor should be installed at a time, and the adjustment should not exceed $\pm 10\%$ or $\pm 1.5V$ from the nominal voltage.

PEM6312BT and PEM9312BT			PEM9320BT		
Output Voltage	OADJ to +VDC	OADJ to -VDC	Output Voltage	OADJ to +VDC	OADJ to -VDC
11V	34.8K Ω		18.3V	61.9K Ω	
11.5V	64.9K Ω		19.1V	104K Ω	
12V	DNP	DNP	20V	DNP	DNP
12.50V		32.4K Ω	20.9V		41.7K Ω
13V		13.7K Ω	21.8V		14.7K Ω
PEM 6312BT and PEM9324BT					
Output Voltage	OADJ to +VDC	OADJ to -VDC			
22V	83.5K Ω				
22.99V	152K Ω				
24V	DNP	DNP			
24.99V		38.3K Ω			
25.99V		15K Ω			

Table 4- Output Voltage Adjustment

TEST SETUP

Figure 3 shows the basic set up using the EVK powered by 90W PSE.

The equipment required:

- PoE BT compliant switch or Midspan injector
- IEEE802.3BT Evaluation Kit
- BT module (PEM6300 / PEM9300)
- Load (electronic load or fixed resistive load)
- Multimeter or oscilloscope
- CAT6 or higher Ethernet cables

Optional equipment:

- Application Circuit
- Data source e.g. PC

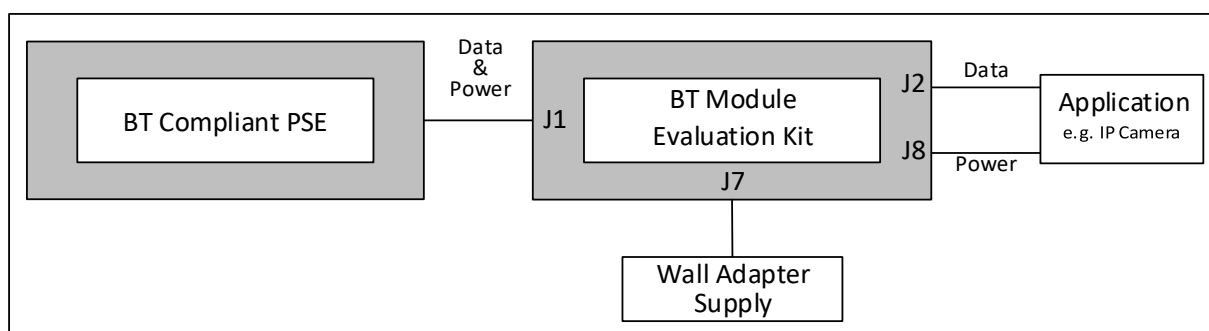


Figure 3- Test Setup

SCHEMATIC



BILL OF MATERIALS

BT EV KIT				
S.no	Location	IPN	DESCRIPTION	Qty
1	C1	CC1041607R0603	CAPACITOR CERAMIC SMT 0U1F 16V X7R 0603 10%	1
2	C2,C3,C4	CC1031017R0603	CAPACITOR CERAMIC SMT 0U01F 100V X7R 0603 10%	3
3	C5	CC1031017R0603	CAPACITOR CERAMIC SMT 0U01F 100V X7R 0603 10%	1
4	C6,C7,C8,C10	CC1022027R1206	CAPACITOR CERAMIC SMT 1000PF 2KVDC X7R 1206 10%	4
5	C9	CE336101TH0811	CAPACITOR AL E 33UF 100V 105 DEG THD 8 X 11.5mm	1
6	C11	CF104212SXB10	CAPACITOR BOX POLY FILM 0U1F 305VAC X2 SAFETY 10mm	1
7	C12	CC1045007R0603	CAPACITOR CERAMIC SMT 0U1F 50V X7R 0603 10%	1
8	C13,C14	CE477350TH1020	CAPACITOR AL E 470UF 35V 105 DEG THD 10 X 20mm	2
9	C15	CC1045007R0603	CAPACITOR CERAMIC SMT 0U1F 50V X7R 0603 10%	1
10	D1,D2	DZ58V0XXCAXSMA	DIODE TVS BI DIRECTIONAL 58V SMAJ58CA SMA/DO-214AC	2
11	D3,D11	DZ05V60W50S123	DIODE ZENER 5.6V 500MW SOD-123	2
12	D4	DLYGMX0A020603	DIODE LIGHT EMITTING YELLOW GREEN WATER CLEAR 60mcd 575nm SMT 0603	1
13	D5	DLYGMX0A020603	DIODE LIGHT EMITTING YELLOW GREEN WATER CLEAR 60mcd 575nm SMT 0603	1
14	D6	DLYGMX0A020603	DIODE LIGHT EMITTING YELLOW GREEN WATER CLEAR 60mcd 575nm SMT 0603	1
15	D7	DLYGMX0A020603	DIODE LIGHT EMITTING YELLOW GREEN WATER CLEAR 60mcd 575nm SMT 0603	1
16	D8	DLYGMX0A020603	DIODE LIGHT EMITTING YELLOW GREEN WATER CLEAR 60mcd 575nm SMT 0603	1
17	D9	DLYGMX0A020603	DIODE LIGHT EMITTING YELLOW GREEN WATER CLEAR 60mcd 575nm SMT 0603	1
18	D10	DS100V02A0SMAF	DIODE SCHOTTKY RECTIFIER 2A, 100V, SMAF	1
19	JP2,JP3	JHMTS254S3062P	PIN HEADER MALE BERG STRAIGHT 2.54mm X 2 PINS	2
20	J1	JGMRTRUPDXX4P	CONNECTOR MODULAR JACK RJ 45 TAB UP METAL SHIELD 8P8C	1
21	J2	JGMRTRUPDXX4P	CONNECTOR MODULAR JACK RJ 45 TAB UP METAL SHIELD 8P8C	1
22	J3	JUFTS254SXXX9P	CONNECTOR SOCKET STRAIGHT 2.54mm 9 PINS	0
23	J4	JUFTS254SXXX7P	CONNECTOR SOCKET STRAIGHT 2.54mm 7 PINS	0
24	J5	JUFTS127DXXX6P	CONNECTOR SOCKET STRAIGHT DUAL ROW 1.27mm 12 PINS(6 X 2)	1
25	J6	JUFTS254SXXX5P	CONNECTOR SOCKET STRAIGHT 2.54mm 5 PINS	1
26	J7	JJMR200S14XXP	CONNECTOR 2mm DC JACK THD	1
27	J8	JTMR500SXXX2P	CONNECTOR - 2 PIN TERMINAL BLOCK STRAIGHT THROUGH HOLE 5mm 15A BIG	1
28	L1,L2,L3,L4,L6,L7,L8	LC1K002A2S1206	FERRITE BEADS 1K 2A 1206	7
29	L5	LS25702A0S1065	COMMON MODE INDUCTOR 2 X 250uH 2A 2 X 35mOhm 8.7 X 10 X 6.5mm	1
30	L9	LC1K002A2S1206	FERRITE BEADS 1K 2A 1206	1
31	R1,R3	RS000RX01X1206	RESISTOR SMT 0R 1% 1206 1/4 W	DNP
32	R2	RS26K7X01X1206	RESISTOR SMT 26K7 1% 1206 1/4 W	1
33	R4,R5,R6,R7,R8,R9,R10,R11	RS75R0X01X0603	RESISTOR SMT 75R 1% 0603 1/10 W	8
34	R12,R14,R25	RS49K9X01X0603	RESISTOR SMT 49K9 1% 0603 1/10 W	3
35	R13,R15	DNP	DNP	DNP
36	R16,R17,R18,R22	RS10K0X01X0603	RESISTOR SMT 10K 1% 0603 1/10 W	4
37	R19,R20,R21	RS2K49X01X0603	RESISTOR SMT 2K49 1% 0603 1/10 W	3
38	R23	RS1M50X01X0603	RESISTOR SMT 1M5 1% 0603 1/10 W	1
39	R24	RS100KX01X0603	RESISTOR SMT 100K 1% 0603 1/10 W	1
40	TP1	TPSMDXXXSX1206	TEST POINT SMD 1206	1
41	TP2	TPSMDXXXSX1206	TEST POINT SMD 1206	1
42	TP3	TPSMDXXXSX1206	TEST POINT SMD 1206	1
43	TP4	TPSMDXXXSX1206	TEST POINT SMD 1206	1
44	U1	TDXTRC609924SM	GIGABIT IEEE802.3BT DATA TRANSFORMER 3A (-40 °C to +85 °C)	1
45	U2	UBRDKA1170DFN4	IC DUAL MOSFET BRIDGE RECTIFIER DFN 4X4	1
46	U3,U4,U5	UPHCLTV357SOP4	IC PHOTOCOUPLER 80V 50MA CTR 80%-160% SOP 4 MUST MATCH CTR RANK A	3

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