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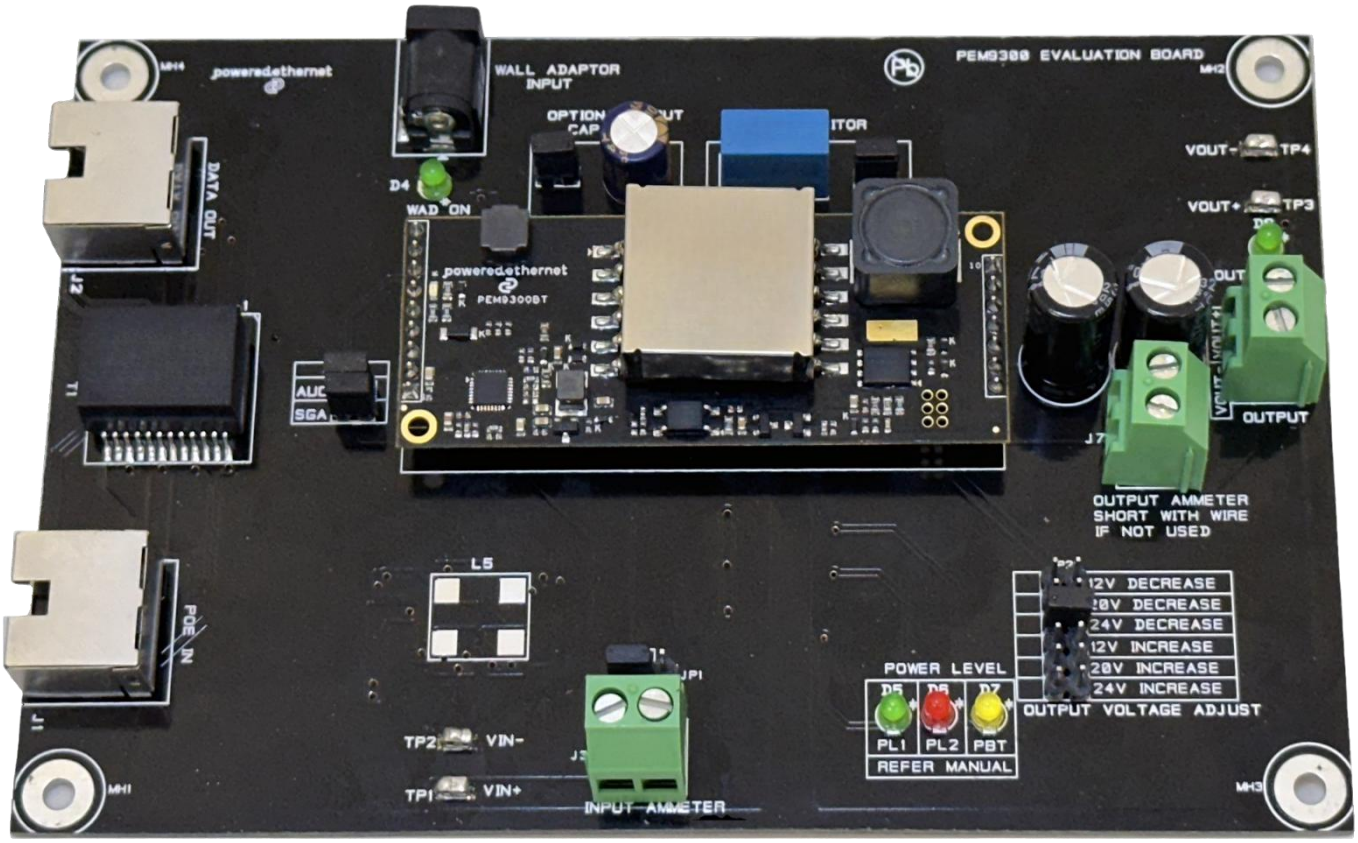

PEM9300BT
EVALUATION KIT
USER MANUAL

VERSION 1.0 – OCTOBER 2024

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by INFOSMART

INTRODUCTION

This manual serves as a guide for using the "PEM9300BT Evaluation Board" with one of the PEM9300BT modules. The evaluation board fully complies with the IEEE 802.3bt Power over Ethernet (PoE) standard and is backward compatible with the IEEE 802.3af and IEEE 802.3at standards. It is designed to support Ethernet data rates of 10/100/1000/10GBASE-T.

The board facilitates the evaluation of PEM9300BT format modules within applications. It is specifically engineered to pass Ethernet data signals from the Midspan PSE or PoE-enabled switch connected to the J1 port (RJ45), while also connecting to the system through the J2 port (RJ45).

KIT CONTENTS

- 01 x Evaluation Board
- 04 x Mounting Stem- 4nos
- 06 x Jumpers
- 04 x Stem End Cap
- 04 x Bumper Feet

LAYOUT

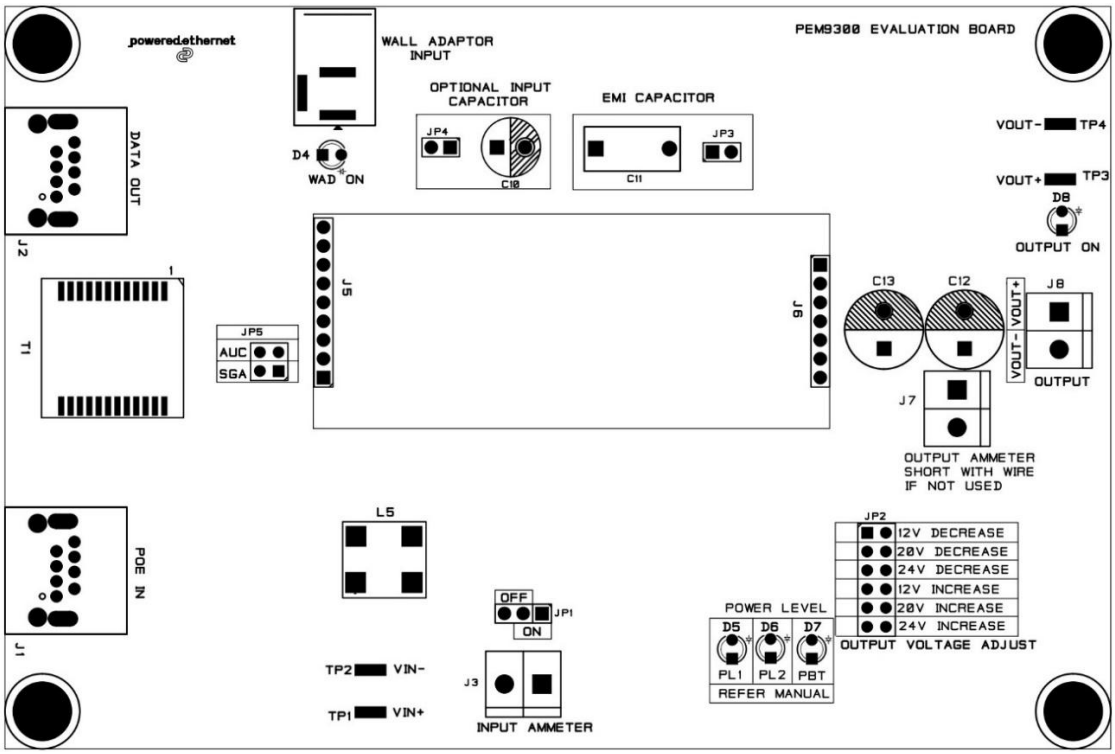


Figure 1- Board Layout

COMPATIBLE MODULES

Series power	Power Class	Variant	Voltage (V)
PEM9300BT	8	PEM9312BT	12
		PEM9320BT	20
		PEM9324BT	24

INPUTS

The PEM9300BT evaluation board can be powered either by a DC power supply or any IEEE 802.3bt PSE. Both data and power input are supplied via the J1 connector (RJ45 port), as shown in Figure 1. The data signals are transmitted through the data transformer (T1) and then passed to the data output connector J2 (RJ45 port)

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

WALL ADAPTOR (WAP) SUPPLY

When PEM9300BT evaluation board equipped with the auxiliary DC power input. DC power can be directly connected from DC jack of the evaluation board. 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 turns off, the classification current is disabled if VIN is in the classification range, and the Smart MPS comparator is turned off.

OUTPUT

The output voltage will present on the connector J8 which is 2pin 5mm terminal block. We recommended minimum 18 AWG wire size for DC Out connection.

DATA OUTPUT

Any data that is provided over the PI (Ethernet cable) connected to the Data & Power port (J1) will be transposed onto the Data output port (J2) via the data transformer (T1). The data traces on the evaluation board have been designed to pass through 10/100/1000/10GBASE-T Ethernet data signals. No processing or amplification of this signal will be performed on the evaluation board

OPERATION

To ensure that the PSE does not apply power to a non-PoE enabled device the output port first checks for a valid PoE signature. If the PSE does not see a valid signature, then it will disconnect, wait approximately 2 seconds then try again. Once a valid signature has been detected the PSE will then perform classification to determine the power requirement of the PD, only after this has occurred will the PSE supply power to the powered device.

SGA FEATURE

Place a jumper between SGA pins in JP5 location to provide 12.5Kohm signature resistance required by certain Phihong PSEs. Leave these pins not connected otherwise.

LED'S INDICATION

In PEM9300BT evaluation board, we provide 5 LEDs for indicating output on, wall adaptor on and power level indication.

LED INDICATION NAME	DESCRIPTION
WAD ON	Wall adaptor is connected
PL1	Power level indication and classification. See the section Power level indication for more details
PL2	
PBT	
OUTPUT ON	Output power on LED

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. This happens in such a way that the PSE will be able to set the power budget to the effective maximum PD power.

Place a jumper between AUC pins in JP5 location, if Auto class is enabled. Otherwise left the pin open.

AUC (JP5) PIN CONFIGURATION	SUPPORT AUTOCLASS
AUC OPEN	NO
AUC PINS SHORT	YES

Table 3- Auto Class Feature

OPTIONAL INPUT CAPACITOR

In evaluation board, we provide optional input capacitor for system stability. Place a jumper in JP2 location to connect the electrolytic capacitor (recommended min.value-22uF/100V) to the input of the module. Leave these pins not connected otherwise.

EMI/EMC

In evaluation board, we provide optional capacitor for improving EMI/EMC noise. Place a jumper in JP3 location to connect the EMI filtering capacitor between input and outputs. Leave these pins not connected otherwise.

MEASUREMENT SECTION

In evaluation board, we provide test points for measuring voltage and current for input and output section.

- INPUT SECTION

Test points TP1 and TP2 are for measuring voltage from input side. For measuring current, we provide 5mm terminal block(J3). If AMMETER is connected, place a jumper on pins 2 and 3 or “ON” (mention in Fig 1.) on JP1, otherwise place on 1 and 2 or “OFF” (mention in Fig 1).

- OUTPUT SECTION

Test points TP3 and TP4 are for measuring voltage at the output side of the module. For measuring current, we provide 5mm terminal block(J7). Short the J7 connector with wire, if not used.

OUTPUT VOLTAGE ADJUSTMENT

By default, the nominal output voltage of the PEM9300BT module will be present on the output connectors. This can be adjusted up or down using the adjust jumper section (JP2).

Please use proper jumper selection for output voltage as per the below table,

JP2 PINS	FUNCTION
1,2	12V DECREASE
3,4	20V DECREASE
5,6	24V DECREASE
7,8	12V INCREASE
9,10	20V INCREASE
11,12	24V INCREASE

TEST SETUP

Figure 2 shows the basic set up using the PEM9300 evaluation board powered by 90W PSE.

The equipment required: -

- PEM9300 evaluation board fitted with compatible PEM9300BT Module.IEEE802.3bt compliant PSE
- CAT5e or greater cables
- Application Circuit

Optional equipment:
Data source e.g. PC

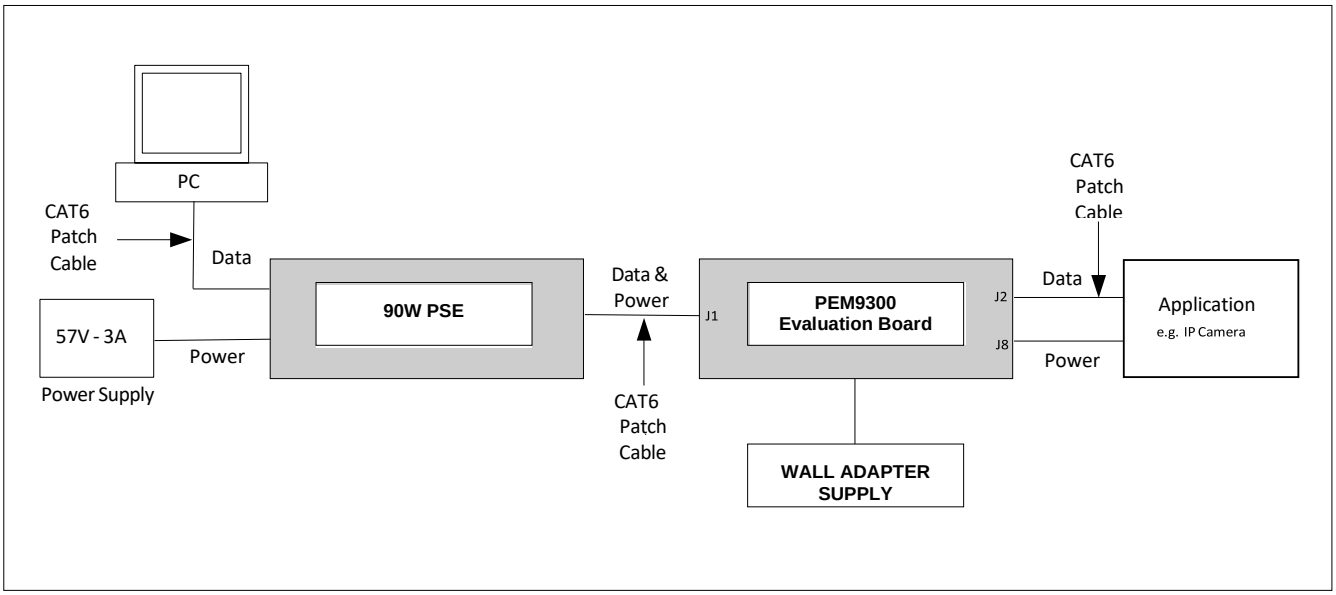
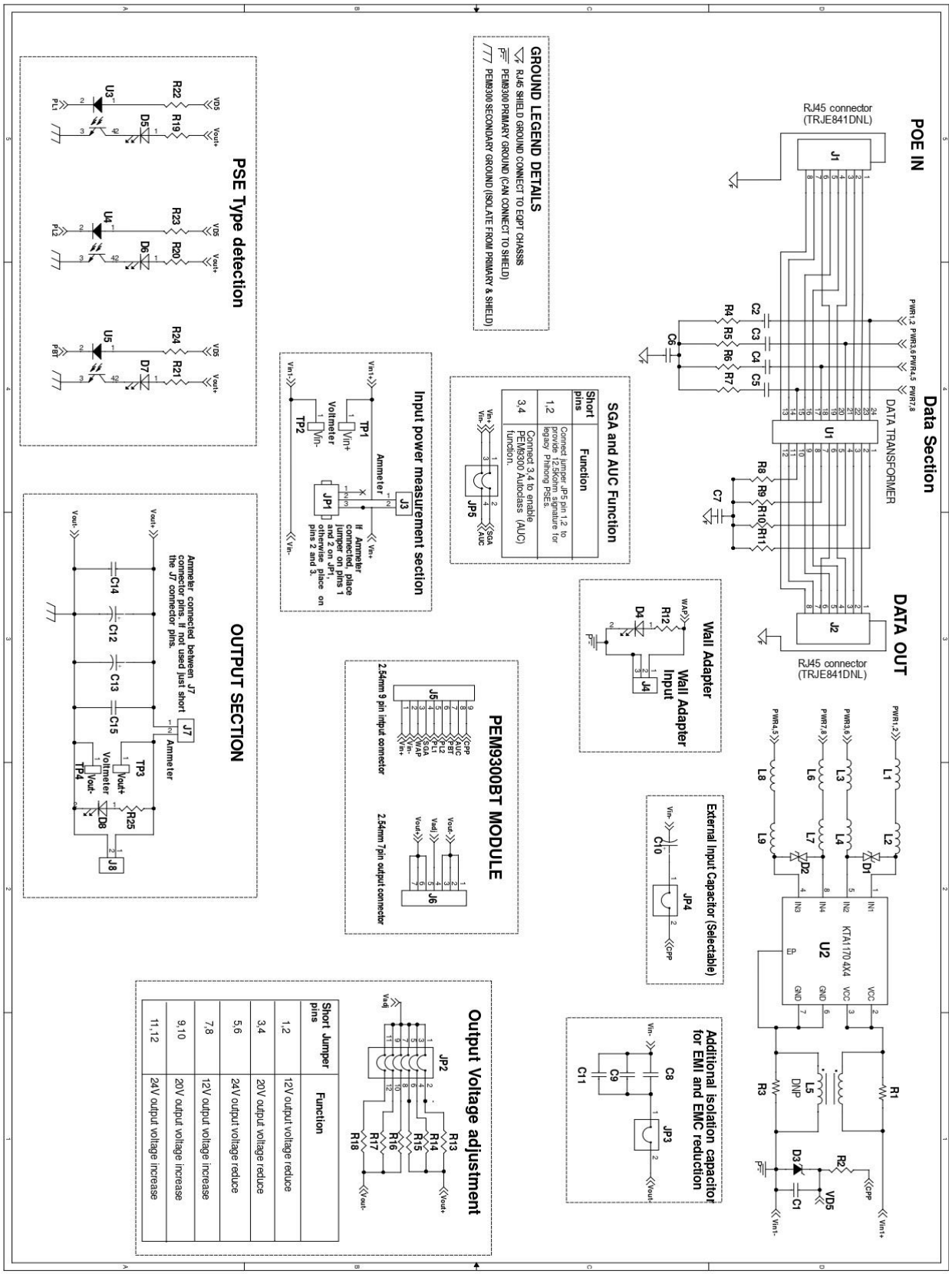


Figure 2- Test Setup

SCHEMATIC


POE IN
Data Section
DATA OUT
RJ45 connector (TRJE841DNL)
DATA TRANSFORMER
RJ45 connector (TRJE841DNL)
GROUND LEGEND DETAILS
RJ45 SHIELD GROUND CONNECT TO EQPT CHASSIS
PEM9300 PRIMARY GROUND (CAN CONNECT TO SHIELD)
PEM9300 SECONDARY GROUND (ISOLATE FROM PRIMARY & SHIELD)
SGA and AUC Function
Short pins
Function
1,2
Connect Jumper JP5 pin 1,2 to provide 12.5Kohm signature for legacy Phihong PSEs.
3,4
Connect 3,4 to enable PEM9300 Autoclass (AUC) function.
Wall Adapter
Wall Adapter Input
External Input Capacitor (Selectable)
Additional isolation capacitor for EMI and EMC reduction
PEM9300BT MODULE
2.54mm 9 pin intput connector
2.54mm 7pin output connector
Input power measurement section
Voltmeter
Ammeter
If Ammeter connected, place jumper on pins 1 and 2 on JP1. otherwise place on pins 2 and 3.
PSE Type detection
OUTPUT SECTION
Ammeter connected between J7 connector pins. If not used just short the J7 connector pins.
Output Voltage adjustment
Short Jumper pins
Function
1,2
12V output voltage reduce
3,4
20V output voltage reduce
5,6
24V output voltage reduce
7,8
12V output voltage increase
9,10
20V output voltage increase
11,12
24V output voltage increase

BILL OF MATERIALS

S.no	Location	Qty	Value	Description
1	C1	1	0u1F 16V 0603	CAPACITOR CERAMIC SMT 0U1F 16V X7R 0603 10%
2	C10	1	33uF 100V E-CAP	CAPACITOR ALUM ELECTROLYTIC 33UF 100V 105 DEG
3	C11	1	0u1F 2KV X2 SAFETY CAPACITOR	CAPACITOR POLYESTER FILM 0U1F 305VAC X2
4	C12, C13	2	470uF 35V E-CAP	CAPACITOR ALUM ELECTROLYTIC 470UF 35V 105 DEG
5	C14, C15	2	0u1F 50V 0603	CAPACITOR CERAMIC SMT 0U1F 50V X7R 0603 10%
6	C2, C3, C4, C5	4	0u01F 100V 0603	CAPACITOR CERAMIC SMT 0U01F 100V X7R 0603 10%
7	C6, C7, C8, C9	4	1000pF 2KV 1206	CAPACITOR CERAMIC SMT 1000PF 2KVDC X7R 1206 10%
8	D1, D2	2	LITTLEFUSE SMAJ58CA	DIODE TVS BI DIRECTIONAL 58V SMA / DO-214AC
9	D3	1	5V6 ZENER DIODE 0W25 SOD-523	DIODE ZENER 5.6V 250MW SOD-523
10	D4	1	3mm LED	LED GREEN (WAD ON)
11	D5	1	3mm LED	LED GREEN (PL1)
12	D8	1	3mm LED	LED GREEN (OUTPUT ON)
13	D6	1	3mm LED	LED RED (PL2)
14	D7	1	3mm LED	LED YELLOW (PBT)
15	J1, J2	2	RJ45 CONNECTOR TRJE841DNL	CONNECTOR MODULAR JACK RJ 45 TAB UP METAL SHIELD 8P8C
16	J3, J7, J8	3	5mm TERMINAL BLOCK	2PIN TERMINAL BLOCK 5mm 15A
17	J4	1	DC JACK	2.5mm ROUND JACK DC
18	J5	1	9 POS RECEPTACLE CONNECTOR 2.54mm SAMTEC CES-109-01-T-S	9 POS RECEPTACLE CONNECTOR 2.54mm
19	J6	1	7 POS RECEPTACLE CONNECTOR 2.54mm SAMTEC CES-107-01-T-S	7 POS RECEPTACLE CONNECTOR 2.54mm
20	JP1	1	2.54mm 3 PIN JUMPER	STRAIGHT MALE BERG PIN 2.54mm, 3PIN
21	JP2	1	2.54mm 12 PIN 2 PIN x 6 ROW JUMPER	STRAIGHT MALE BERG PIN 2.54mm, 12PIN 2X6
22	JP3, JP4	2	2.54mm 2 PIN JUMPER	STRAIGHT MALE BERG PIN 2.54mm, 2PIN
23	JP5	1	2.54mm 4 PIN 2 PIN x 2 ROW JUMPER	STRAIGHT MALE BERG PIN 2.54mm, 4PIN 2X2
24	L1, L2, L3, L4, L6, L7, L8, L9	8	FERRITE BEAD 1K OHM 2A 1206	FERRITE BEADS 1K OHM 2A 1206
25	L5	0	WURTH PN: 744272251	COMMON MODE CHOKE 250UH 2A (DNP)
26	R1, R3	2	0R 1206	RESISTOR SMT 0R 1% 1206 1/4 W
27	R12	1	50K 0603	RESISTOR SMT 49K9 1% 0603 1/10 W
28	R13	1	64K9 0603	RESISTOR SMT 64K9 1% 0603 1/10 W
29	R14	1	100K 0603	RESISTOR SMT 100K 1% 0603 1/10 W
30	R15	1	150K 0603	RESISTOR SMT 150K 1% 0603 1/10 W
31	R16	1	33K 0603	RESISTOR SMT 33K 1% 0603 1/10 W
32	R17	1	41K2 0603	RESISTOR SMT 41K2 1% 0603 1/10 W

S.no	Location	Qty	Value	Description
33	R18	1	38K3 0603	RESISTOR SMT 38K3 1% 0603 1/10 W
34	R19, R20, R21, R25	4	10K 0603	RESISTOR SMT 10K 1% 0603 1/10 W
35	R2	1	26K7 1206	RESISTOR SMT 26K7 1% 1206 1/4 W
36	R22, R23, R24	3	2K49 0603	RESISTOR SMT 2K49 1% 0603 1/10 W
37	R4, R5, R6, R7, R8, R9, R10, R11	8	75R 0603	RESISTOR SMT 75R 1% 0603 1/10 W
38	TP1	1	TEST POINT KOA SPEER RCWCTE	TEST POINT KOA SPEER RCWCTE
39	TP2	1	TEST POINT KOA SPEER RCWCTE	TEST POINT KOA SPEER RCWCTE
40	TP3	1	TEST POINT KOA SPEER RCWCTE	TEST POINT KOA SPEER RCWCTE
41	TP4	1	TEST POINT KOA SPEER RCWCTE	TEST POINT KOA SPEER RCWCTE
42	U1	1	TRXCOM TRC6099ANL	GIGABIT IEEE802.3BT DATA TRANSFORMER 3A
43	U2	1	KINETIC KTA1170	IC INTEGRATED DUAL MOSFET BRIDGE RECTIFIER KTA1170 DFN4X4
44	U3, U4, U5	3	LITEON LTV-357T	IC PHOTOCOUPLER 80V 50MA CTR SOP 4

REVISION HISTORY

REVISION NUMBER	DESCRIPTION
24JR1	▪ New release
25BR2	▪ Update in SCHEMATIC
25DR3	▪ Update in BILL OF MATERIAL and SCHEMATIC

by INFOMART

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