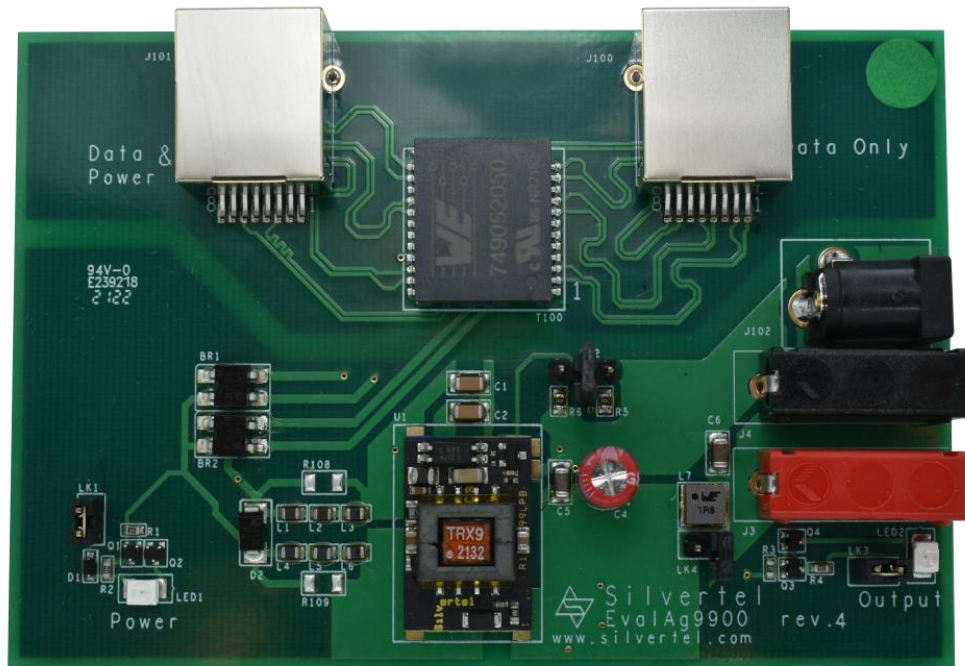




# Evaluation Board User Manual



## EvalAg9900 Evaluation Board User Manual

Version 1.0 – June 2022

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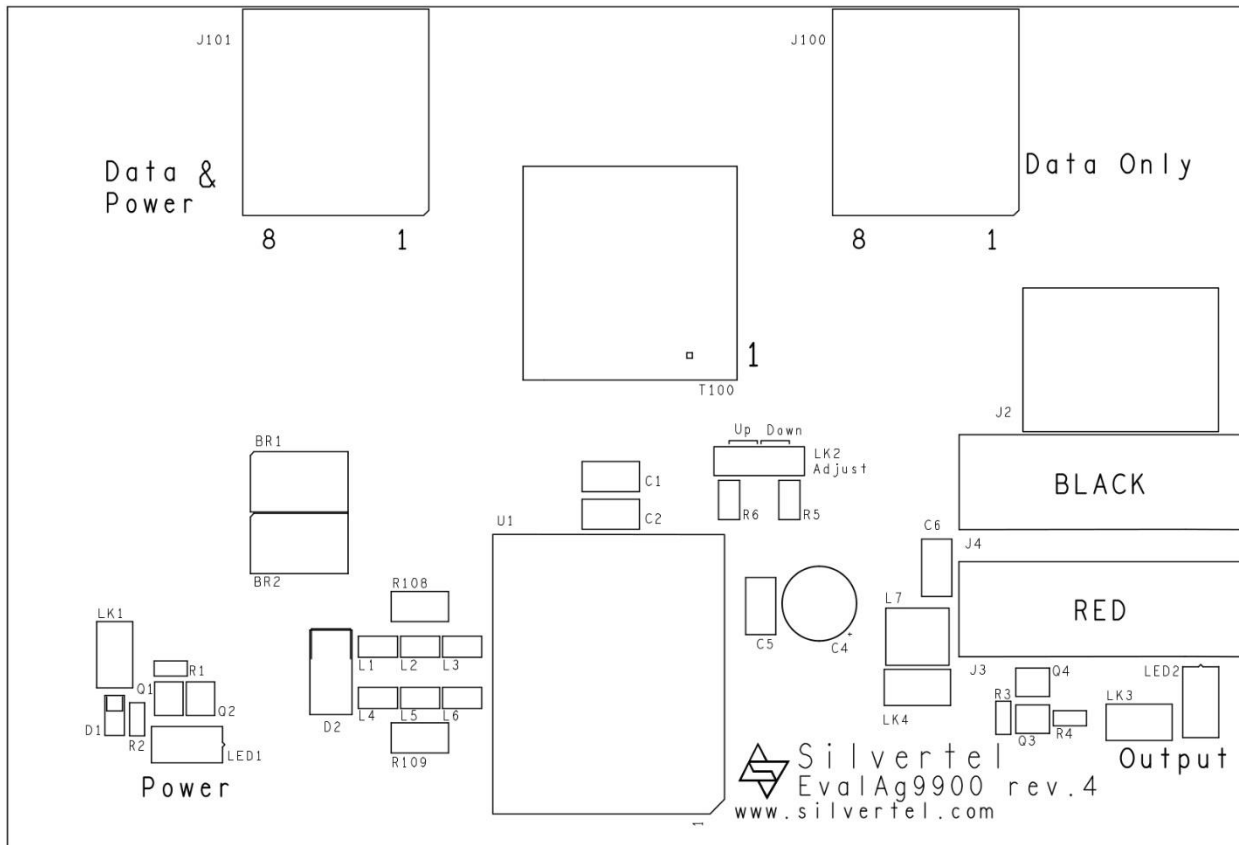
## 1 Introduction

This Manual is a guide to using the EvalAg9900 evaluation board fitted with one of Silvertel’s Ag9900 ultra miniature PoE module with block or pin terminations for use in a wide variety of power over ethernet (PoE) applications. as such, it has been designed to pass through Ethernet data signals (10/100/1000/10GBASE-T) from the Midspan PSE (Power Sourcing Equipment) or PoE enabled switch connected to J101, onto the system connected to J100.

## 2 Kit Contents

- EvalAg9900 Evaluation Board
- Ag9900 series Module Soldered to Evaluation Board

## 3 Board Layout



**Figure 1: EvalAg9900 Board Layout**

### 3.1 Link Settings

- LK1 – Power In LED
- LK2 – Output Adjust
- LK3 – Power Out LED
- LK4 – Pi filter bypass

### 3.2 Input Output Connections

- J100 – RJ45 Data pass through
- J101 – RJ45 PoE connection
- J2 – 2.5mm DC Load Output
- J3&J4 – Load Output



# Evaluation Board User Manual

## 4 Compatible Models

Output Voltage (V)	Package	Variant
3	SMT	Ag9903MTB
	Low Profile SMT	Ag9903LPB
	Low Profile DIL	Ag9903LP
	Gull Wing SMT	Ag9903MT
	Gull Wing SMT	Ag9903M
5	SMT	Ag9905MTB
	Low Profile SMT	Ag9905LPB
	Low Profile DIL	Ag9905LP
	Gull Wing SMT	Ag9905MT
	Gull Wing SMT	Ag9905M
12	SMT	Ag9912MTB
	Low Profile SMT	Ag9912LPB
	Low Profile DIL	Ag9912LP
	Gull Wing SMT	Ag9912MT
	Gull Wing SMT	Ag9912M
24	SMT	Ag9924MTB
	Gull Wing SMT	Ag9924MT
	Gull Wing SMT	Ag9924M

## 5 Input

### 5.1 Supply

The EvalAg9900 evaluation board can be powered using a compliant IEEE802.3af, or higher power, PoE PSE. The Power is extracted from the data pairsets using the LAN transformer T100. Data is then passively passed on to any peripheral equipment via J100, while the power is rectified to the correct polarity for the Ag9900 module using BR1 and BR2.

### 5.2 Power LED

LED1 illuminates when the module is being supplied with greater than 36V. This can be disabled by removing the jumper link LK1, removing this link does not affect the power being delivered to the Ag9900.

### 5.3 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 may 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.

## 5.4 Class Programming

The Ag9900 is internally set to Class 0, to be supplied with the full IEEE802.3af power allocation. As such, the EvalAg9900 does not contain any Class programming circuitry.

## 6 Output

### 6.1 Output Voltage Adjust

By default, with no jumper present on LK2, the nominal output voltage of the fitted module will be present on the output connectors. This can be adjusted up or down by fitting a jumper to the adjust connector, LK2.

The EvalAg9900 is fitted with two adjust resistors. The down adjust resistor R5 and the up adjust resistor R6, both are fitted with a 0Ω resistor for the maximum adjustment.

To increase the output voltage the jumper should be positioned connecting the centre pin to the left pin of LK2, above R6.

To decrease the output voltage the jumper should be positioned connecting the centre pin to the right pin of LK2, above R5.

For configuring the output voltage to a user specific value, a different value resistor can be fitted in place of R5 or R6 to configure the module output the desired voltage. Contact Silvertel applications support for assistance selecting an appropriate value resistor.

### 6.2 Output Filter

The EvalAg9900 is configured to Output filter B, see Ag9900 datasheet, when LK4 is not populated with a jumper. To change to Output Filter A, a jumper can be fitted to LK4, this will bypass the inductor in the pi filter, L7.

See the relevant datasheet for more details, regarding the output filter.

### 6.3 Output LED

LED2 illuminates when the module is outputting. This can be disabled by removing the jumper link LK3, removing this link does not affect the power being supplied by the Ag9900.

### 6.4 Output Power

The output voltage will be present on both the 2.5mm DC connector, J2 and the banana plug terminals J3 and J4.

J3 and the centre pin of J2 are the positive outputs, with the outer ring of J2 and J4 being the negative output.

### 6.1 Data Output

Any data that is provided over the PI (Ethernet cable) connected to the Data & Power port, J101 will be transposed onto the Data output port, J100 via the data transformer.

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.

## 7 EMI

The EvalAg9900 contains the recommended components for EMI filtering, see ANX-POE-EMI for more details.

The board is fitted with ferrite beads, L1-6; if these are not required, they can be effectively removed from the circuit by fitting R108 and R109 with 0Ω resistors.

## 8 Test Setup

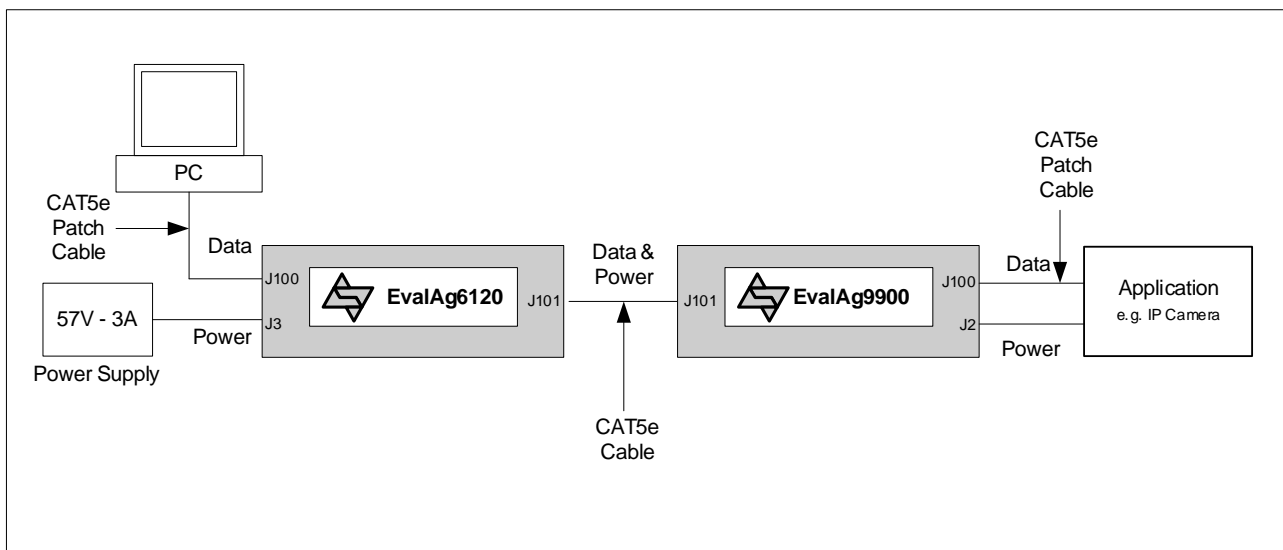
Figure 2 shows the basic set up using the EvalAg9900 evaluation board powered by Silvertel's EvalAg6120 PSE.

The equipment required: -

- EvalAg9900 fitted with compatible Silvertel Ag99xx PD Module.
- EvalAg6120 or other IEEE802.3 compliant PSE
- Power supply unit, +44-57V output e.g. 60V bench power supply
- CAT5e or greater cables
- Application Circuit

Optional equipment: -

Data source e.g. PC



**Figure 2: Basic Test Setup**

## 9 Additional information

Full operating conditions and feature set can be found in the Ag9900 product datasheet, available from [www.silvertel.com](http://www.silvertel.com).



## 11 Bill of Materials

***Strictly Private and Company Confidential***										
EvalAg9900 Eval Board - Rev.4										
Date: 5th August, 2022										
Silver Part No.	Description	Value	Location:	Qty:	Package:	Rating:	Tol:	Supplier Pt NO:	Comments:	
	PD Module	Ag9900	U1	1	Custom	-	-	Silver Telecom Part		
	Zener Diode	BZX384-C30	D1	1	SOD323	-	-	Würth- 824 500 581, Vishay, ST Micro, Diodes Inc		
	Protection Diode	SMAJ58A	D2	1	SMA	-	-	Vishay, Fairchild		
	Bridge Rectifiers	MB4S MB6S or S1ZB	BR1, BR2	2	SMT	-	-	Würth - 749052050		
	Transformer - Data	10G Base T PoE+	T100	1	SMT	-	-	TDK MPZ2012S102A, Würth 742792096		
	Ferrite Chip Inductor	≥100000@100MHz	L1 - L6	6	0805	≥ 1A	25%	NP143C1R8MTF/OW10403-1R8M-R-11-LF/Würth-74438356018		
	SMD LED	RED LED	L7	1	SMD	3A	20%	Würth - 150 141 RS7 310 0		
	NPN Transistor	BC846BW	Q1,Q2,Q3,Q4	4	SOT323	60V	-			
	Capacitor Electrolytic	100µF	C4	1	Through Hole	25V	20%	Vishay MAL203850101E3, Würth 860010573007		
	Ceramic multi-layer	4.7nF	C1,C2	2	1206	1KV	20%	Multicomp MC1206B472K10ZCT, Würth 885342208020		
	Ceramic multi-layer	10µF	C5,C6	2	1206	25V	20%	Multicomp MC1206F106Z250CT, Würth 885012208069		
	Ceramic multi-layer	10nF	C100 - C107	8	0805	250V	20%	Samsung, NTC, TDK, Murata, Kemet, AVX & Würth 885342207010		
	Ceramic multi-layer	10000µF 2KV	C108, C109	2	1206	2KV	20%	Samsung, NTC, TDK, Murata, Kemet & AVX, Würth- 885342208024		
	Resistor - 0603	330R	R1, R3	2	0603	63mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0603	47K	R2	1	0603	63mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0603	33K	R4	1	0603	63mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0603	0R	R5,R6	2	0805	63mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	75R	R100 - R107	8	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	0R	R108, R109 (Not Filter)	0	1206	200mW	1%	Royal Ohm, Eurohm & Yageo		
	Red Connector	4mm PCB Socket	J3	1	Through Hole	-	-	Hirschmann 973582101		
	Black Connector	4mm PCB Socket	J4	1	Through Hole	-	-	Hirschmann 973582100		
	DC Power Connector	DC-001	J2	1	Through Hole	-	-	Toby DC-001-B-2-SMM-R, Würth 694108301002		
	Ethernet Connector	RJ45	J100, J101	2	SMT	-	-	Toby 3004S-8821-SMT, Würth 634108185421		
	Link	2 Way	LK2	1	Through Hole	-	-	Toby LHCS-03S-R-060-034, Würth 61300311121		
	Link	3 Way	LK1,LK3, LK4	3	Through Hole	-	-	Toby LHCS-02S-R-060-034, Würth 61300211121		
	PCB Jumper Links	Rev.1 - 104, 14mm x 71, 12mm Links	LK1 - LK4	1	Through Hole	-	-			
			Total	62						



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