

*Silvertel*

**Ag210**  
**Evaluation Board**  
**User Manual**

Version 1.0 – January 2020

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### 3 Kit Contents

- Ag210 Evaluation Board
- Ag210 PoE LED Driver Module

### 4 Introduction

This manual is intended to be a guide to using the “EvalAg210 Evaluation Board” with a Silvertel Ag210 constant-current LED driver module with integrated IEEE compliant PD module. The board is designed to handle 10/100/1000/10GBASE-T Ethernet data rates. The Ag210 is pre-configured as a Type 3 Class 6 PD, capable of drawing 60W when connected via a IEEE802.3bt compliant PSE. The AG210 is implemented with buck converter topology and as such the input voltage supplied via PoE must be higher than the string (output) voltage.

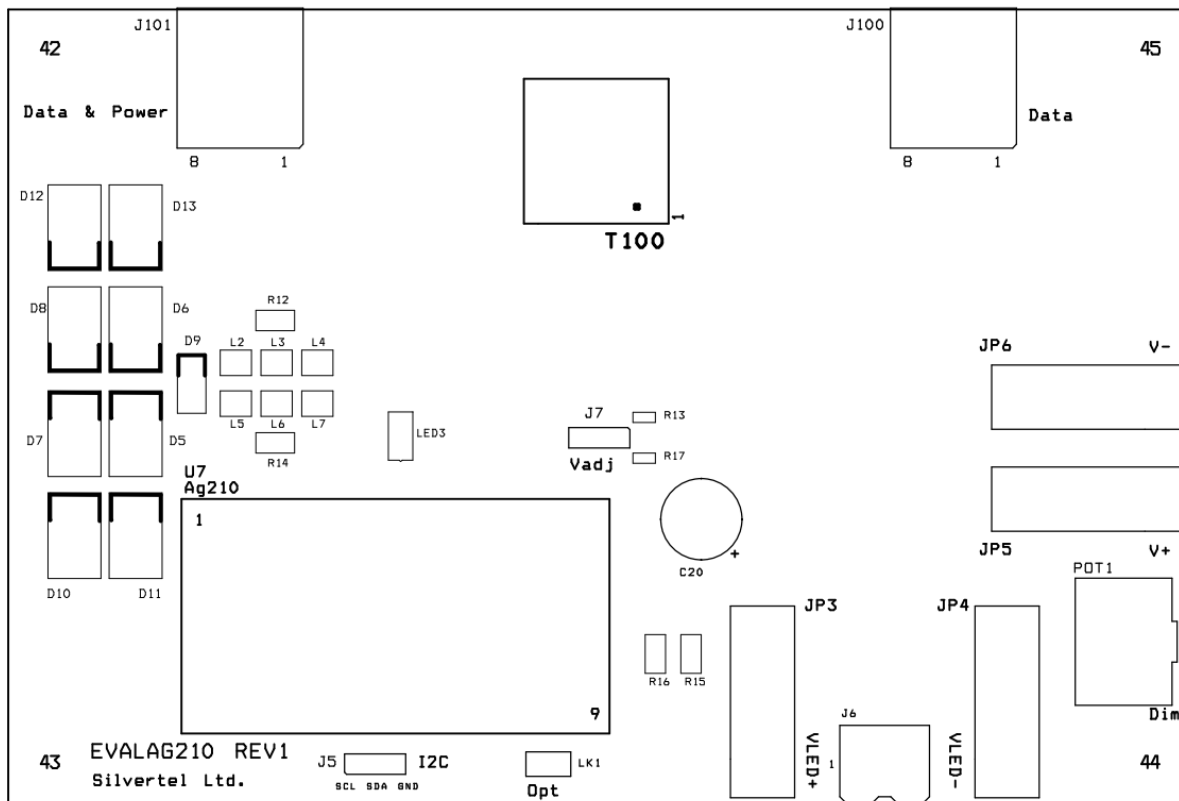


Figure 1: Board Layout

#### 4.1 Link Settings

- LK1 – Option Control
- J7 – Auxiliary Voltage Adjust

## **5 Board Description**

### **5.1 Input**

The EvalAg210 evaluation board is fitted with SilverTel's Ag210 and can extract power from an IEEE compliant PSE through its RJ45 connector J101.

### **5.2 Diode Bridge Selection**

The EvalAg210 on-board diode bridge rectifiers will ensure that the correct input polarity is applied to the Ag210 by extracting the power from the input center taps of T100 and passing the voltage to the input of the Ag210.

Due to the amount of power and high currents involved in the IEEE802.3bt standard we would recommend using SMC package Schottky diodes with low reverse leakage current to be used as diode bridges. The EvalAg210 is fitted with SS36 Schottky diodes configured as a diode bridge.

### **5.3 Input Signature**

The EvalAg210 board will automatically direct the power from J101 to the Ag210's input. The Ag210 provides a 25K signature required to be powered from an IEEE compliant PSE. The EvalAg210 has been designed to be powered from an IEEE802.3bt PSE such as SilverTel's Ag6800 PSE module. The Ag210 can also be powered by either a IEEE802.3af or IEEE802.3at PSE, however the maximum possible output power may be reduced.

### **5.4 PSE Detect**

When the Ag210 has detected it is being powered via either a IEEE802.3bt type 3 or IEEE802.3bt type 4 PSE the 'bt Flag' pin will be pulled low, this will cause LED3 to be illuminated on the EvalAg210 board.

### **5.5 Output**

An LED with a string voltage ranging from 2V up to 40V can be connected to either the screw terminal labelled J6 or the Banana connectors, JP3 and JP4, with the Ag210 able to provide a maximum power of 40W to the LEDs.

## 5.6 Output Current Selection

The EvalAg210 is set to a constant current output of 300mA by default. To adjust the power up to the maximum constant current output of 1000mA a resistance can be installed between Vin- and LED- pins. Pads for R15 & R16 are provided to install the appropriate resistors as per the table below. Installing resistors with an effective series resistance of less than  $0.713\Omega$  may cause damage to the Ag210.

<b>Increase the constant output current, connect CSx between LED- and VIN-</b>		
I <sub>out</sub>	CS <sub>x</sub> <sub>a</sub> Value (Ohms)*	CS <sub>x</sub> <sub>b</sub> Value (Ohms)*
300mA	Not Fitted	Not Fitted
400mA	5R1	Not Fitted
500mA	2R49	Not Fitted
600mA	3R9	3R
700mA	2R49	2R49
750mA	3R	1R8
800mA	2R	2R
900mA	1R8	1R6
1000mA	1R0	2R49

\* We would recommend a low temperature coefficient resistor with a package size of 1206, for the appropriate power dissipation.

## 5.7 Auxiliary Voltage adjust

The Ag210 has an auxiliary DC voltage out for providing power to a control system. The voltage level can be adjusted by placing a resistor between the VA and +V<sub>out</sub> pins. The header J7 on EvalAg210 allows the Ag210 to output either 12V, or 5V across JP5 & JP6. However R13 can be populated to allow for a specified voltage, please contact Silvertel for details.

With no jumper installed the output across the auxiliary supply will be 12V. Bridging pins 1&2 (C20 side) will result in an output of 5V. Bridging pins 2&3 (LED3 side) will result in the custom set voltage across the output.

## 5.8 Dimming Control

The brightness control of the Ag210 LED driver can be controlled in several different ways, using either the 0-10V DC voltage source, a Potentiometer or via an I<sup>2</sup>C interface\*. The EvalAg210 is setup to provide the latter two options.

With a jumper across LK1, the output power of the Ag210 will be controlled by the potentiometer POT1.

With the jumper removed from LK1, the output power of the Ag210 will be controlled by the I<sup>2</sup>C interface using the provided three pin header, J5. The pinouts on J5 are as below.

Pin 1: SCK Pin 2: SDA Pin 3: GND

\*Please see section 6 of the datasheet for full explanation of the Ag210 dimming control.

## 6 Typical Setup

### 6.1 Basic setup

Figure 3&4 shows example setups using the EvalAG210 evaluation board powered by Silvertel's EvalAG6800 PSE.

The equipment required: -

- Power supply Input +57V IN e.g. Meanwell SP-240-48 available from mouser which will give 57V
- LED e.g. CREE 9-V CXA1304
- Brightness controller e.g. on-board POT, external 0-10V DC controller or I<sup>2</sup>C interface

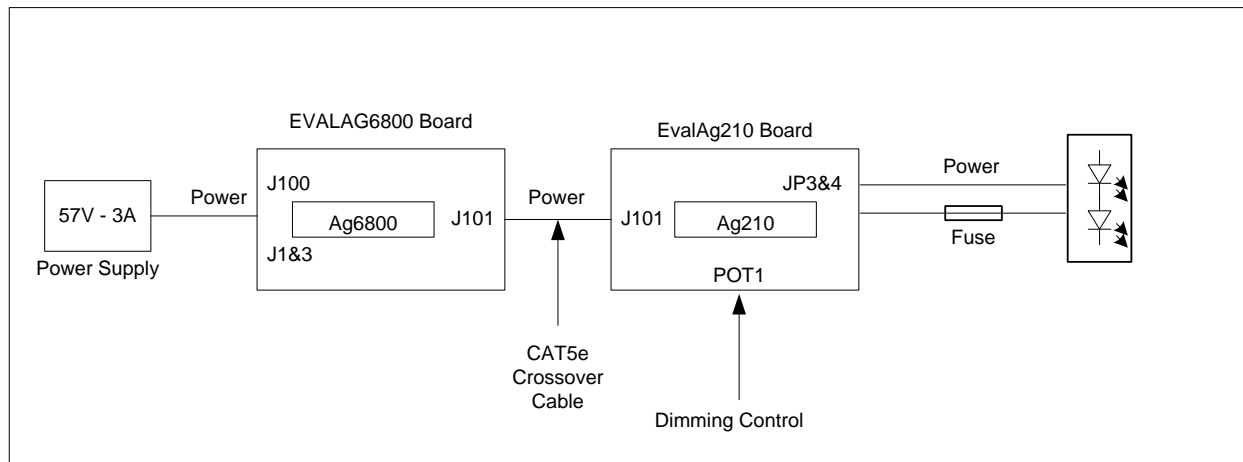


Figure 2: Basic Setup

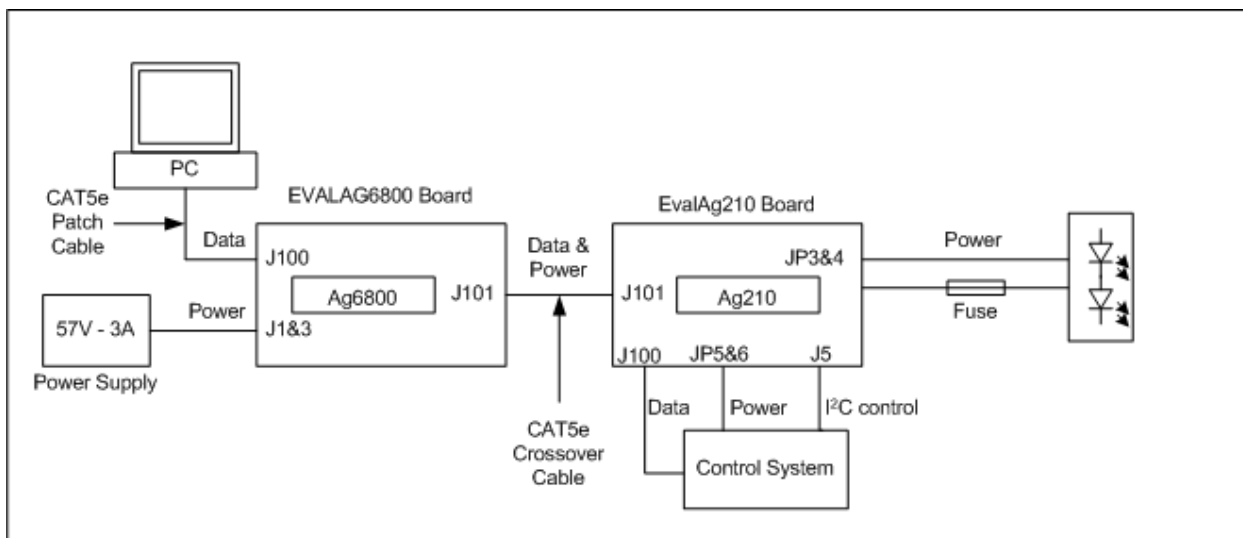


Figure 3: Typical Setup

## **6.2 Data Input**

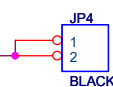
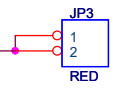
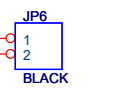
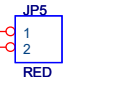
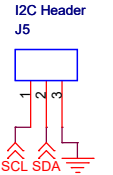
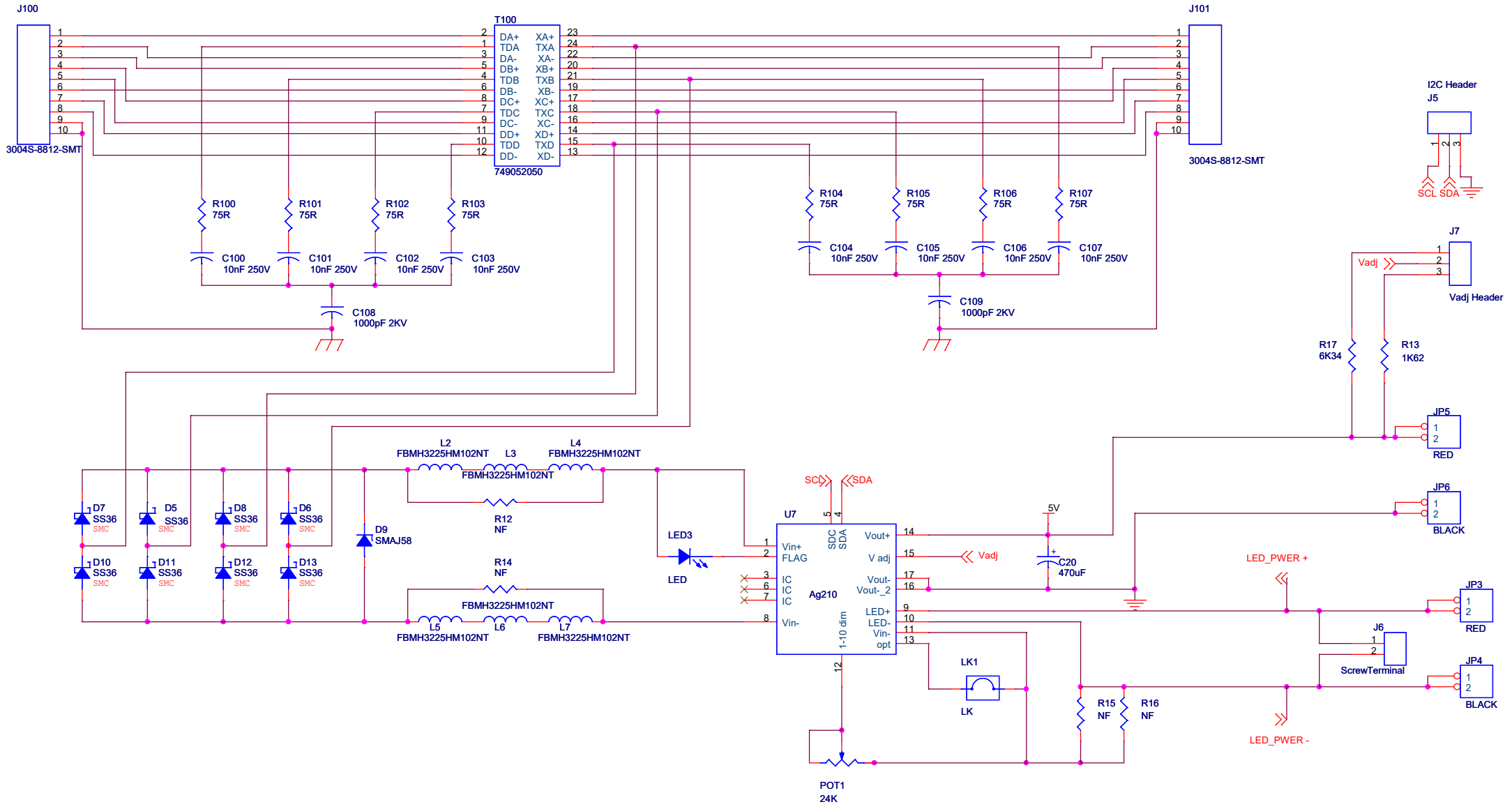
To pass data via the Evaluation boards, the data input (e.g. Internet) can be connected to J100 on the EvalAg6800 Board using a cat5e cable. The data is then passed through the data transformer, where power is added and sent out via connector J101 of the EvalAg6800 Board. The Data and power is extracted through J100 of the EvalAg210 board and then divided into its separate power and data through the data transformer. The data output is then available from J100 of the EvalAg210 Board, which can then be connected to your device.

## **6.3 LED Array Protection**

While not required for operation, it is always recommended to add a fusible element between an LED Driver and the LED array, in order to reduce the risk of damage to either element caused by an unexpected failure.

## **6.4 Ag210 Information**

Full operating conditions and feature set can be found in the Ag210 product datasheet, available from [www.silvertel.com](http://www.silvertel.com).



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**EvalAg210 - Rev-1R      9th January 2020**

**Date**

\*\*\*Strictly Private and Company Confidential\*\*\*

<u>Silver Part No.</u>	<u>Description</u>	<u>Value</u>	<u>Location:</u>	<u>Qty:</u>	<u>Package:</u>	<u>Rating:</u>	<u>Tol:</u>	<u>Supplier Pt NO:</u>	<u>Comments:</u>
	PD Module	Ag210	U7	1	Custom	-	-	Silver Telecom Part	
	Protection Diode	SMAJ58A	D9	1	SMA	-	-	Vishay, Diodes Inc, Wurth- 824 500 581,	
	Diode Bridges	SS36	D5-D8, D10-D13,	8	SMC	-	-	Vishay, Fairchild	
	Transformer - Data	10G BaseT PoE+	T100	1	SMT	-	-	Wurth 749052050	
	Ferrite Chip	≥1000Ω@100MHz	L2-L4, L5-7	6	0805	≥ 1A	25%	TDK MPZ2012S102A, Wurth 742792096	
	SM LED	RED LED	LED3	1	SMT	-	-	Wurth - 150 141 RS7 310 0	
	Capacitor Electrolytic	470µF	C20	1	Through Hole	16V	20%	Multicomp MCGPR25V477M10X16, Wurth 860040475008	
	Ceramic multi-layer	1000pF 2KV	C108, C109	2	1206	2KV	20%	Samsung, NIC, TDK, Murata, Kemet & AVX, Wurth-885342208024	
	Ceramic multi-layer	10nF	C100 - C107	8	0805	250V	20%	Samsung, NIC, TDK, Murata, Kemet & AVX WE_885342207010	
	Resistor - 0603	0R	R12, R14	NF	1206	63mW	1%	Royal Ohm, Eurohm & Yageo	
	Resistor - 0603	1k62	R13	NF	0603	63mW	1%	Royal Ohm, Eurohm & Yageo	
	Resistor - 0603	1R0 ±100ppm/K	R15	NF	1206	250mW	1%	Royal Ohm, Eurohm & Yageo	
	Resistor - 0603	2R49 ±100ppm/K	R16	NF	1206	250mW	1%	Royal Ohm, Eurohm & Yageo	
	Resistor - 0603	6K34	R17	1	0603	63mW	1%	Royal Ohm, Eurohm & Yageo	
	Resistor - 0805	75R	R100 - R107	8	0805	125mW	1%	Royal Ohm, Eurohm & Yageo	
	Potentiometer	24K - linear	POT1	1	Through Hole	1W		91A1A-B28-B17L (Farnell-9357777)	
	Red Connecor	4mm PCB Socket	JP3, JP5	2	Through Hole	-	-	Hirschmann 973582100	
	Black Connector	4mm PCB Socket	JP4, JP6	2	Through Hole	-	-	Hirschmann 973582101	
	DC Power Connector	2 WAY SCREW TERMINAL	J6	1	Through Hole	-	-	Farnell - 2008004	
	Ethernet Connector	RJ45	J100, J101	2	SMT	-	-	Toby 3004S-8821-SMT	
	Link	2 Way	LK1	1	Through Hole	-	-	Toby LHCS-02S-R-060-034, Wurth 61300211121	
	Link	3 Way	J5, J7	2	Through Hole	-	-	Toby LHCS-03S-R-060-034, Wurth 61300311121	
	Module Socket	8 Way	U1a	1	Through Hole	-	-	Toby SLW-108-01-G-S WE_61300811821	
		9 Way	U1b	1	Through Hole	-	-	Toby SLW-109-01-G-S WE_61300911821	
	PCB	Rev.1R - mm xmm		-					
	Jumper Links	Links	LK1, J7	2					
				51		Total			