Silvertel

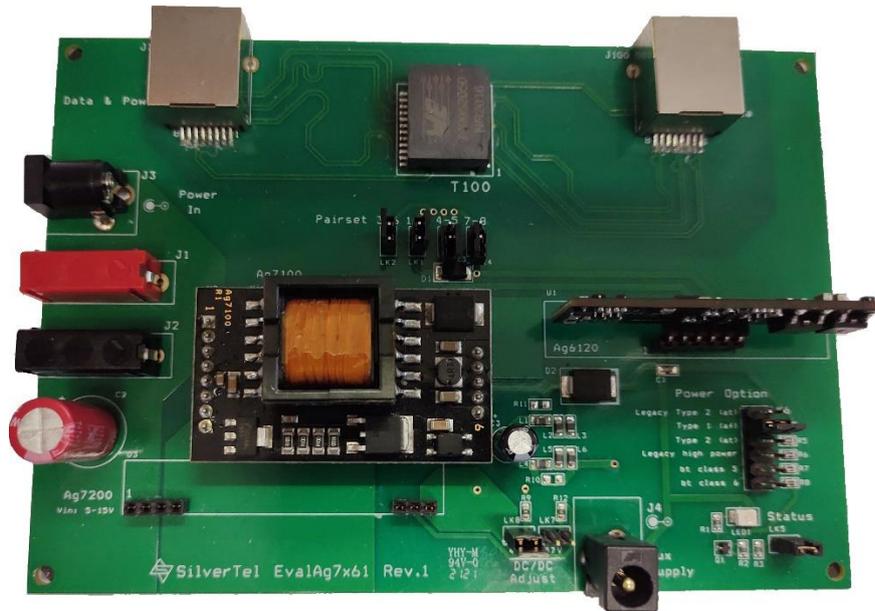# Evaluation Board
User Manual

EvalAg7x61
Evaluation Board
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Version 1.0 – February 2022

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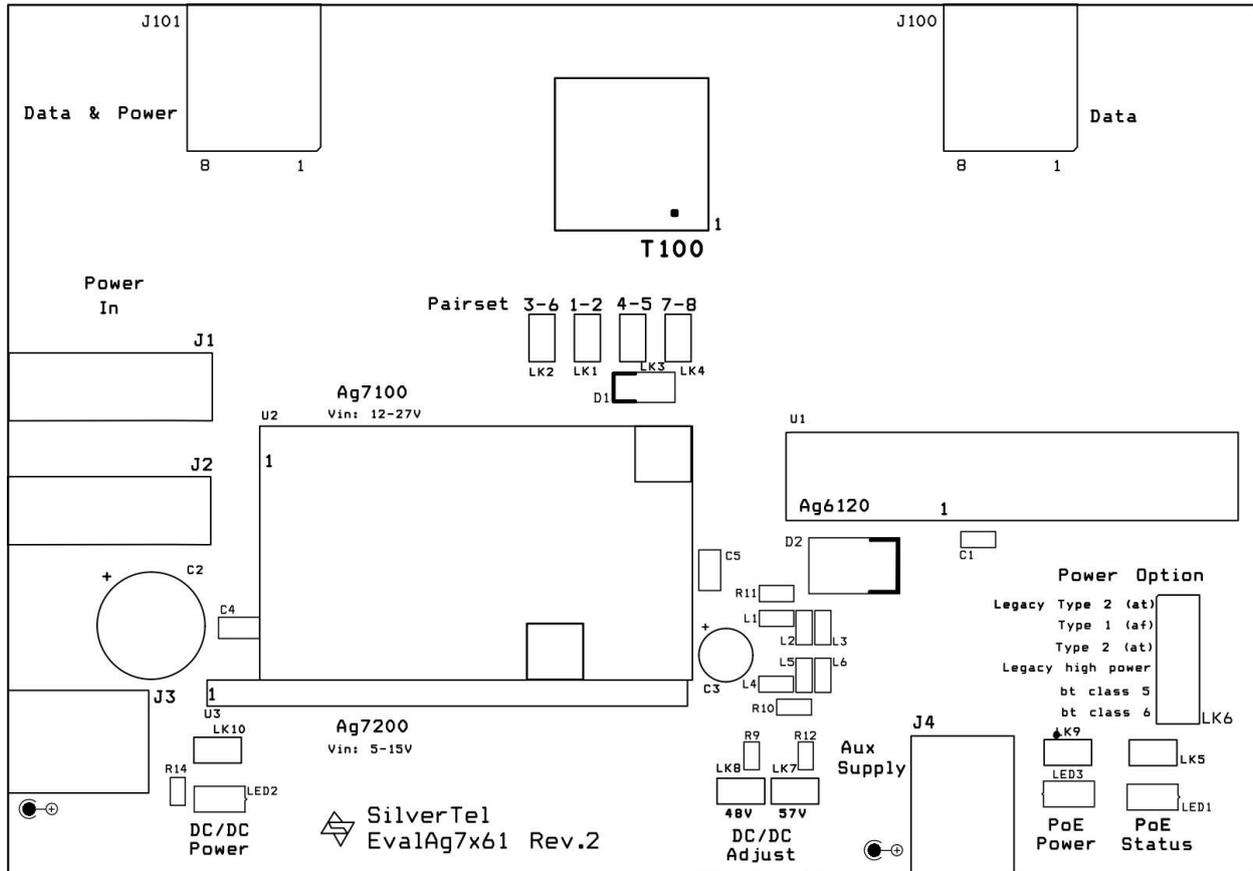
3 Board Layout

Figure 1: EvalAg6120 Board Layout

3.1 Link Settings

LK1-4 – Output Pairset Enable

LK5   – Status LED Enable

LK6   – Output Power Select

LK7&8 – DC/DC Adjust

LK9   – PoE Power LED Enable

LK10   – DC/DC Converter Power LED Enable

4 Introduction

This Manual is a guide to using the EvalAg7x61 evaluation board which can be fitted with a Silvertel Ag6120 Single Channel Power Sourcing Equipment (PSE) module along with either a Silvertel Ag7200 or Ag7100 isolated boost converter module for a single port PSE powered via 5V-15V for Type 1 applications or 12V-27V for Type 2 applications.

This board is designed to assist with evaluating the use of Silvertel's Ag6120 in conjunction with one of Silvertel's isolated boost modules in an application; as such it has been designed to pass through 10/100/1000/10GBASE-T Ethernet data signals from any source connected to J100 onto the powered device connected to J101

This Evaluation board can also be used with the Ag6100 or Ag6110 PSE Modules; however, the output power settings, set by LK6, are not a feature of those modules.

5 Input

5.1 Supply

The EvalAg7x61 evaluation board is powered using a DC Power supply connected to either J3 or J1 and 2. This supply should deliver either 5V-15V or 12V-27V depending on the model of boost converter fitted.

For Type 1 (IEEE802.3af) applications the EvalAg7x61 can be fitted with an Ag7200 isolated boost converter for a maximum power output of 20W. With the Ag7200 fitted the EvalAg7x61 should be supplied with a DC Power supply of 5V-15V

For Type 2 (IEEE802.3at) applications the EvalAg7x61 can be fitted with an Ag7100 isolated boost converter for a maximum power output of 40W. With the Ag7100 fitted the EvalAg7x61 should be supplied with a DC Power supply of 12V-27V

Additionally, the EvalAg7x61 can be supplied from an auxiliary DC Power supply delivering between 44V and 57V to J4.

Both DC jack connectors J3 and J4 are configured with the positive supply connected to the centre pin and 0V to the outer ring.

5.1.1 DC/DC Adjust

The output voltage of the Boost module can be adjusted by moving the jumper on DC/DC Adjust headers between LK7 and LK8. Placing the Jumper on LK8 will result in the output of the DC/DC converter being set to 48V. Removing the jumper from LK8 and inserting it on LK7 will result in the DC/DC converter outputting 57V.

If a different voltage is required, please contact Silvertel for more details.

5.2 Data

A data source can be connected to the Data port J100 via RJ45 connector. This data will be transposed onto the Data and Power output port J101 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

6 Auxiliary Supply

The Auxiliary supply port, J4, can be used to either inject a secondary supply for the Ag6120 or as an output so that the fitted DC/DC converter can be used to power external devices.

If J4 is used as an output, it is important to remember that there is an OR-ing diode fitted to the EvalAg7x61, so there will be a voltage drop on the output of the Boost converter.

7 PSE Output

7.1 Power option select

The Ag6120 has an option to select its output power and class. These can be chosen by placing a jumper on the appropriate pins of LK6. The power option select should be set while the Ag6120 is powered off, if the power option is changed while the device is powered, the change will not occur until after the Ag6120 output has been power cycled.

Mode	Classification type[2]	Max output power[3]	Connected pair sets[4]
Legacy Type 2 (at)[1]	IEEE802.3at	38W	Either 2
Type 1 (af)	IEEE802.3bt	20W	Either 2
Type 2 (at)	IEEE802.3bt	38W	Either 2
Legacy high power	at + legacy class 5	75W	All 4
BT 1 pair (bt class 5)[5]	IEEE802.3bt	46W	Either 2/all 4
BT Type 3 (bt class 6)[5]	IEEE802.3bt	75W	All 4

Table 1: option selections and limits

[1] Not recommend for new designs only for use as drop in replacement of the Ag6100

[2] See section 5.5.2: Classification of the Ag6120 Datasheet for details

[3] See sections 5.7: Output Current Limits & 5.8: Output Power of the Ag6120 Datasheet for details

[4] See section 5.4: Port Output of the Ag6120 Datasheet for details

[5] Compatible with IEEE802.3bt single signature PDs

7.2 Pairset Select

The EvalAg7x61 contains four links LK1-4 that connect the pairsets to the outputs of the Ag6120. In order to enable power transfer down a given pairset a jumper should be inserted onto the relevant link or removed if power is not desired down that given pairset.

Pairsets 1-2 and 4-5 are connected to the positive output of the Ag6120. While pairsets 3-6 and 7-8 are connected to the negative output of the Ag6120. In high power modes all four jumpers should be fitted.

When only two pairsets are to be connected, in order to guarantee operation either pairsets 1-2 & 3-6 should be connected or pairsets 4-5 & 7-8 should be connected.

7.3 **Operation**

To ensure that the Ag6120 does not apply power to a non-PoE enabled device the output port first checks for a valid PoE signature. If the Ag6120 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 Ag6120 will then perform classification to determine the power requirement of the PD, only after this has occurred will the Ag6120 supply power to the powered device.

7.4 **Status Output**

The Status LED will illuminate if the Ag6120 is providing power to the output port. It will also flash as per the table below when an error has occurred. If this functionality is not desired, it can be disabled by removing the jumper on link LK5.

Fault Condition	Status Pulses (200ms)
Short Circuit	1 x Flash
Over Current	2 x Flashes
Signature/Class Error	3 x Flashes
Input Voltage < UVLO limit	4 x Flashes

Table 2: Status Output

8 Test Setup

Figure 2 shows the basic set up using the EvalAg7x61 evaluation board fitted with an Ag6120 and Ag7100 for a Type 2 PSE setup capable of supplying the application with up to 40W of power. This setup is powered using a 12V DC power supply capable of supplying up to 4A to full power output is available.

The power option select and Pairset links should already be set before supplying power to the evaluation board. The powered device and data source need not be connected before power is applied.

The equipment required: -

➢ Power supply unit, 5V-27V output e.g. 30V bench power supply

➢ Powered device

➢ CAT5e/CAT6a cables

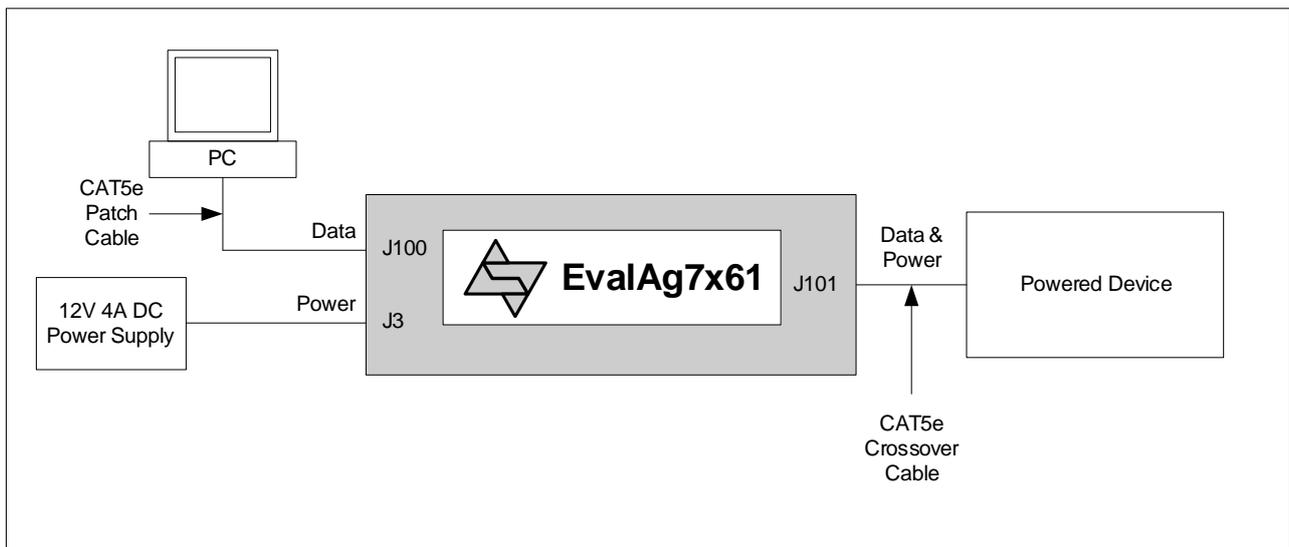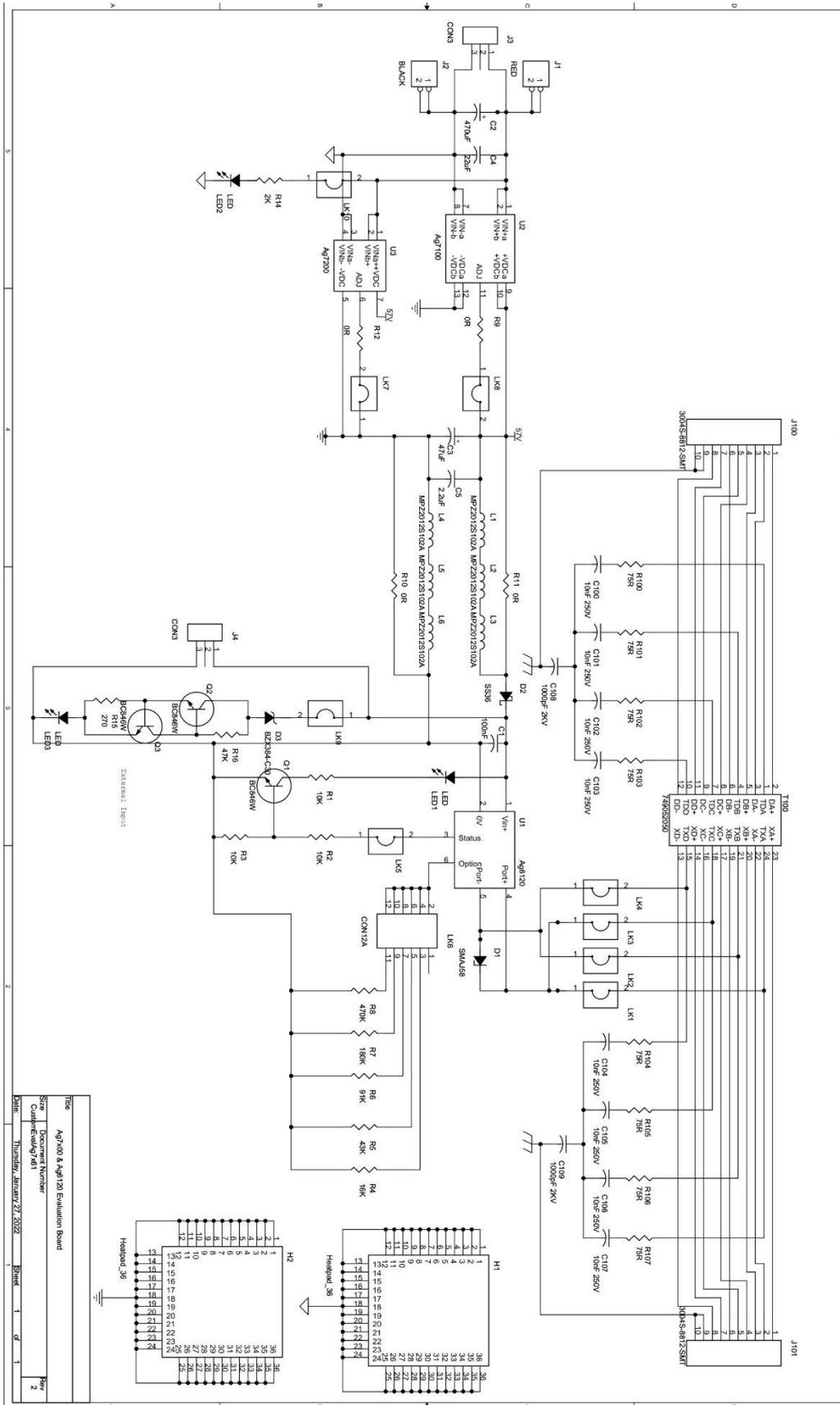Optional equipment: -
➢ Data source e.g. PC

Figure 2: Basic Test Setup

9 Additional information

Full operating conditions and feature set can be found in the Ag6120, Ag7100 and Ag7200 product datasheets, available from www.silvertel.com.

EvalAg7x61

**Single Channel PSE with
Boost Converter Evaluation Board**

10 Schematic

11 Bill of Materials

EvalAg7x61 Eval Board - Rev.1   28th Jan 2022

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

Silver Part No.	Description	Value	Location:	Qty:	Package:	Rating:	Tol:	Supplier Pt NO:	Comments:	Date
	POE+ PSE Module	Ag6120	U1	0	Custom	-	-	Silver Telecom Part		
	Isolated Boost Converter Module	Ag7100	U2	0	Custom	-	-	Silver Telecom Part		
	Isolated Boost Converter Module	Ag7200	U3	0	Custom	-	-	Silver Telecom Part		
	Transistor NPN 60v Single	BC846BW	Q1-Q3	3	SOT323	-	-	Infineon or NXP Only		
	Protection Diode	SMAJ58A	D1	1	SMA	-	-	Wurth - 824 500 581,Vishay, ST Micro, Diodes Inc		
	Barrier Diode	SS36	D2	1	SMC	-	-	Vishay, Fairchild		
	Zener Diode	BZX384C30V	D3	1	SOD-323-2	-	-	Vishay		
	SM LED	RED LED	LED1, LED2, LED3	3	SMT	-	-	Wurth - 150 141 RS7 310 0		
	Transformer - Data	10G BaseT PoE+	T100	1	SMT	≥ 1A	25%	Wurth - 749052050		
	Ferrite Chip	≥1000Ω@100MHz	L1 - L6	6	0805	35V	25%	TDK:MPZ2012S102A, Wurth 742792096		
	Capacitor Electolytic	470uF	C2	1	Through Hole	35V	20%	Panasonic, Samsung, NIC, TDK, Murata, Kemet, AVX, Wurth	Pitch: 5mm	
	Capacitor Electolytic	47uF	C3	1	Through Hole	63V	20%	Panasonic, Samsung, NIC, TDK, Murata, Kemet, AVX, Wurth	Pitch: 2.54mm	
	Ceramic multi-layer	100nF	C1	1	0805	100V	20%	Samsung, NIC, TDK, Murata, Kemet & AVX		
	Ceramic multi-layer	22uF	C4	1	1206	25V	20%			
	Ceramic multi-layer	2.2uF	C5	1	1206	100V	20%			
	Ceramic multi-layer	10nF	C100 - C107	8	0805	250V	20%	Samsung, NIC, TDK, Murata, Kemet & AVX		
	Ceramic multi-layer	1000pF 2KV	C108, C109	2	0805	2KV	20%	Samsung, NIC, TDK, Murata, Kemet & AVX, Wurth-8853422080024		
	Resistor - 0805	10K	R1, R2, R3	3	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	75R	R100 - R107	8	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	16K	R4	1	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	43K	R5, R16	2	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	91K	R6	1	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	180K	R7	1	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	470K	R8	1	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	0R	R9, R12	2	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	0R	R10, R11	0	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	2K	R14	1	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Resistor - 0805	270R	R15	1	0805	125mW	1%	Royal Ohm, Eurohm & Yageo		
	Red Connecor	4mm PCB Socket	J1	1	Through Hole	-	-	Hirschmann 973582100		
	Black Connector	4mm PCB Socket	J2	1	Through Hole	-	-	Hirschmann 973582101		
	Ethernet Connector	RJ45	J100, J101	2	SMT	-	-	Toby 3004S-8821-SMT		
	DC Power Connector	DC-001	J3,J4	2	Through Hole	-	-	Toby.DC-001-B-2.5MM-R, Wurth 694108301002		
	Link	2x6 Way	LK6	1	Through Hole	-	-	Toby.FTHD-06R-110-D55-030, Wurth: 61301221121		
	Link	2 Way	LK1-LK5, LK7-10	9	Through Hole	-	-	Toby LHCS-02S-R-060-034, Wurth 6130021121		
	Module Socket	3 Way	U3b	1	Through Hole	-	-	Toby SLW-103-01-G-S		
	Module Socket	4 Way	U3a	1	Through Hole	-	-	Toby SLW-104-01-G-S		
	Module Socket	5 Way	U2b	1	Through Hole	-	-	Toby SLW-105-01-G-S		
	Module Socket	6 Way	U1	1	Through Hole	-	-	Toby SLW-106-01-G-S		
	Module Socket	8 Way	U2a	1	Through Hole	-	-	Toby SLW-108-01-G-S		
	PCB	Rev.1 - 146.7mm x 103.5mm	-	1	-	-	-			
	Jumper Links	Links	LK1 - LK7	7	-	-	-			
	Feet	Sticky Feet	-	4	-	-	-	Affix RF-022, SJ-5003		
			Total	85						