AN4118
Application note

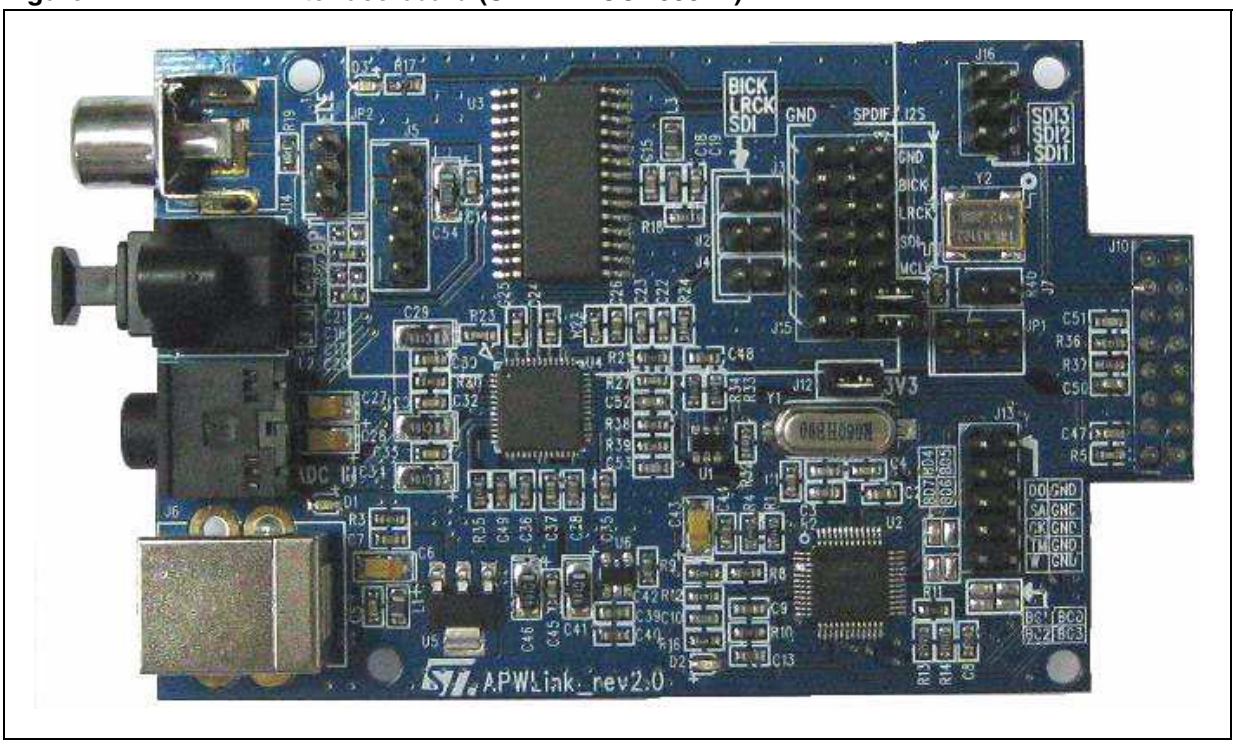
APWLink USB interface board for Sound Terminal® demonstration boards

Introduction

This document describes APWLink which has been designed as a USB interface board to control ST Sound Terminal® demonstration boards through APWorkbench, please refer to user manual UM1545, “Using the Audio Processor Workbench (APWorkbench)”.

The orderable part number for APWLink is STEVAL-CCA035V1.

Figure 1. APWLink interface board (STEVAL-CCA035V1)



Contents

1 Overview

In addition to providing control signals to the external Sound Terminal® demonstration board, analog/digital audio inputs are also provided from APWLink.

The system connections are shown below in the following figure.

Figure 2. System connections

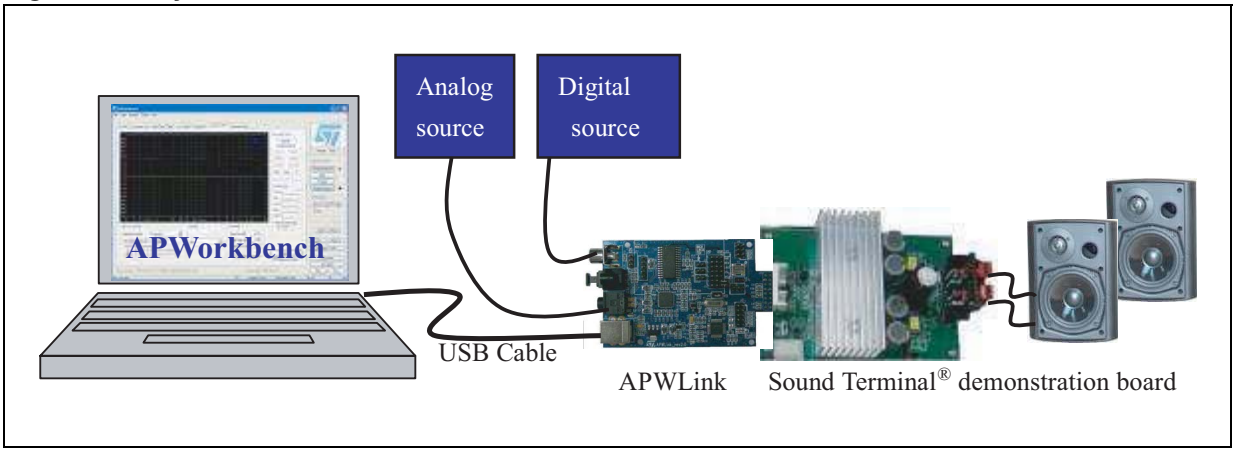
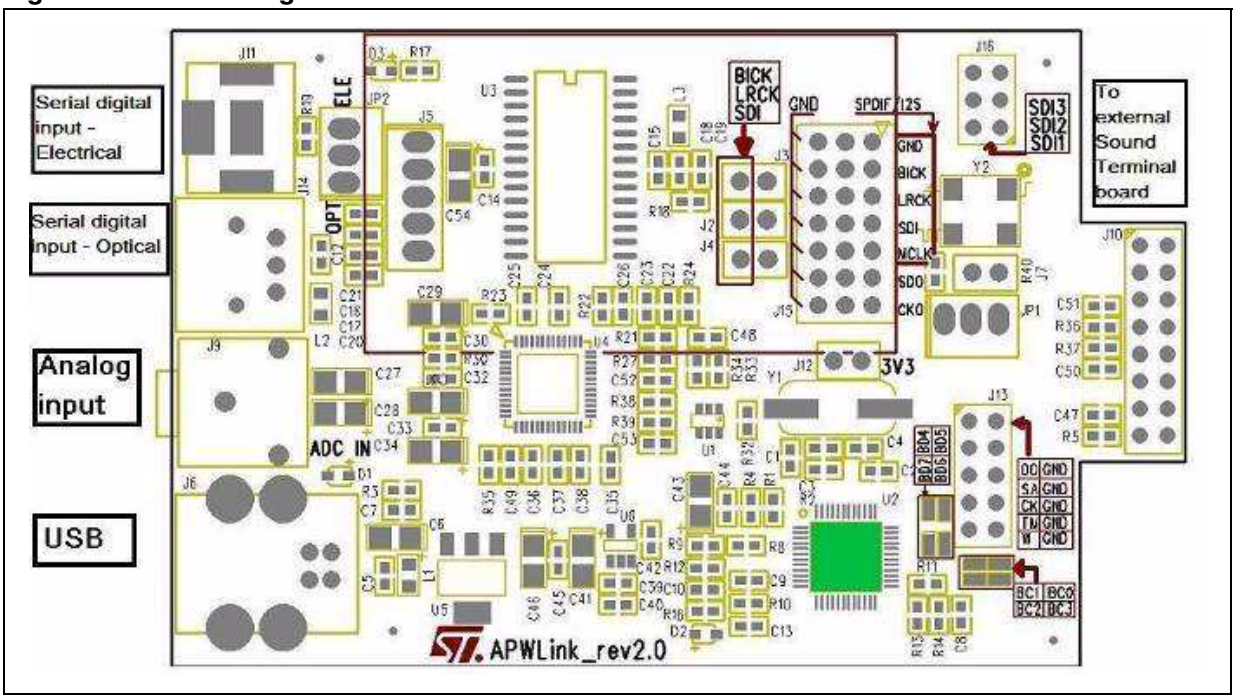


Figure 3. APWLink general view



2 Configuration

2.1 Power supply

APWLink is directly powered by a USB cable (Type B). No external power supply is needed.

Note that this power supply is NOT for the power bridge supply on the Sound Terminal® demonstration board. Please refer to the application note of each specific Sound Terminal® demonstration board.

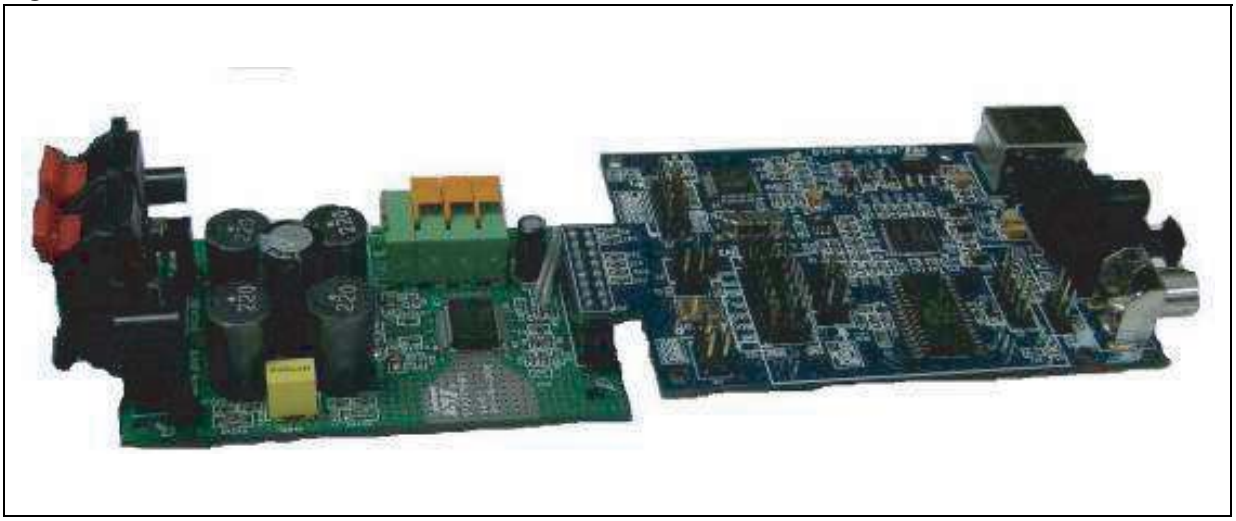
2.2 3.3 V digital power output to Sound Terminal® demonstration board

Jumper J12 is used for the selection of the external Sound Terminal® demonstration board digital power supply. When J12 is closed, 3.3 VDC is provided to the external Sound Terminal® demonstration board, and if the external Sound Terminal® demonstration board has its own 3.3 V digital power supply, J12 has to be left open to avoid any current loop.

2.3 Connection to Sound Terminal® demonstration board

APWLink is simply connected to the Sound Terminal® demonstration board through J10, an on-board 16-pin female 8x2 2.54 mm connector as shown below.

Figure 4. Connection to Sound Terminal® demonstration board



2.4 LEDs

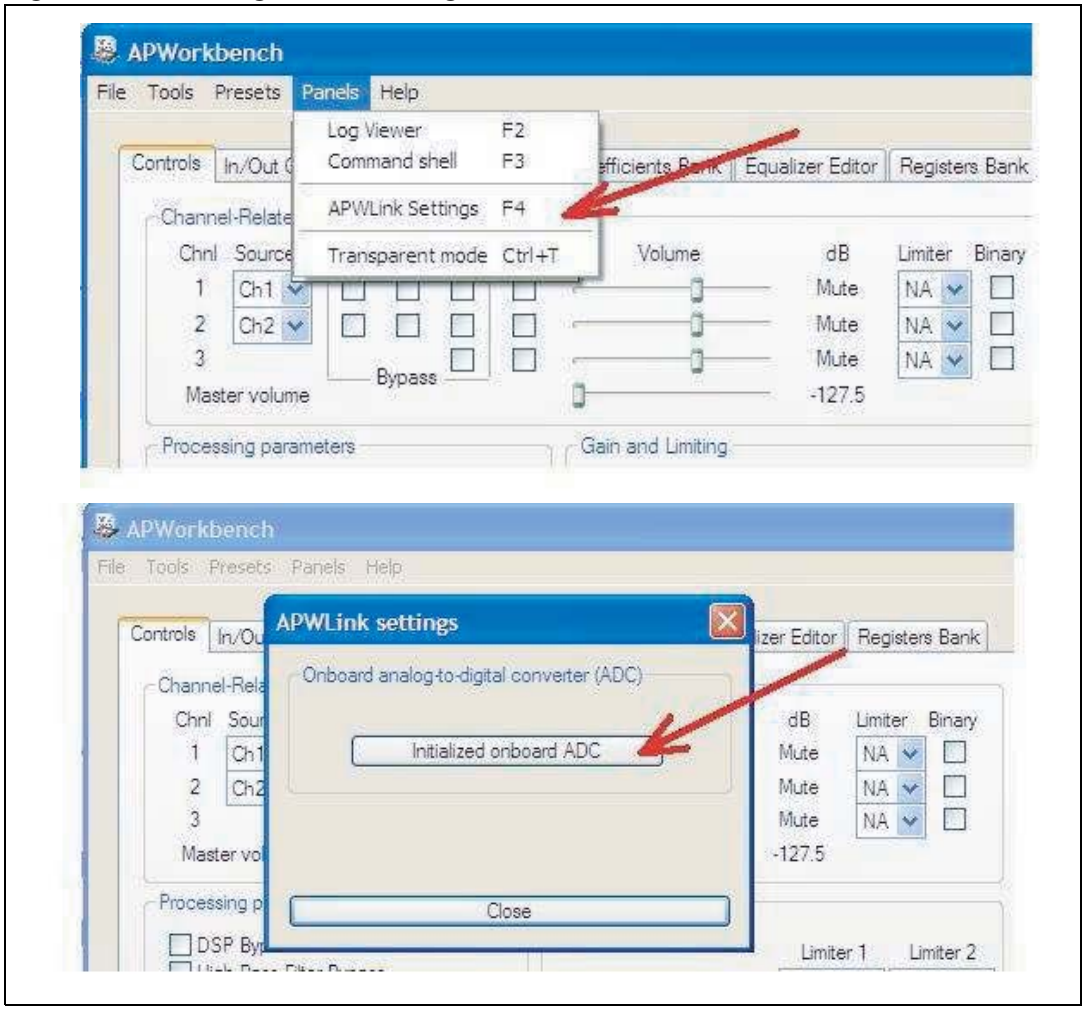
APWLink provides the following three LEDs:

- D1: power supply
  - ON when USB power is supplied
- D2: communication wrong
  - ON when communication between PC and APWLink is wrong
- Digital audio input error
  - ON when the digital input signal is not validated or no digital signal is input

2.5 Analog input

An analog signal (can be DC coupled) can be input from J9 (3.5 mm phone jack). There is an on-board ADC (ST part number: STA529Q) to convert the analog signal to a digital I^2S format signal and feed it to the external Sound Terminal® demonstration board. To enable the on-board STA529Q ADC, the following actions should be taken within APWorkbench as shown in the screenshots below.

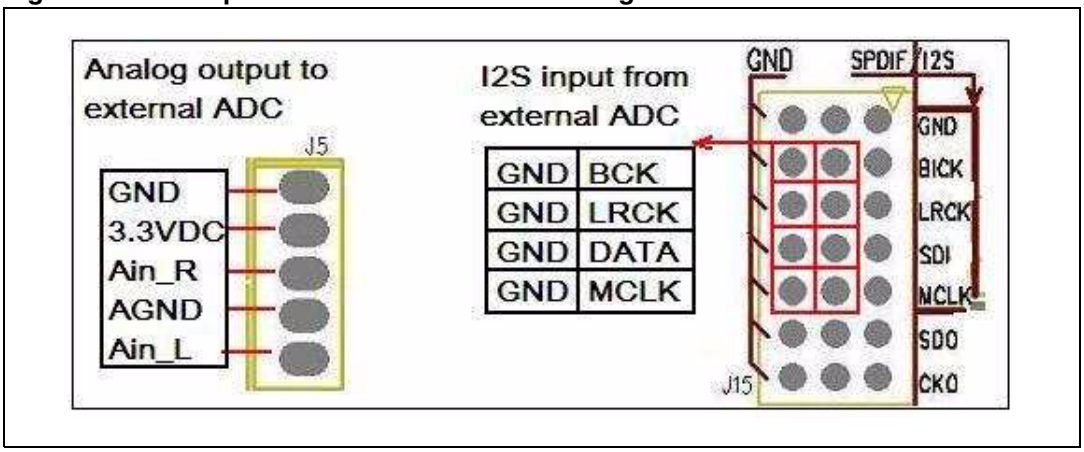
Figure 5. Enabling the ADC using APWorkbench



2.6 External I²S input

The external I²S signal can be input to APWLink through J15 directly. For example, the external I²S signal can come from an external ADC if the on-board ADC is bypassed. J5 includes the analog signals from J9 (stereo analog input jack), plus 3.3 VDC power supply, which can be fed to the external ADC. The I²S from the external ADC can be fed into APWLink through J15, as indicated below.

Figure 6. I²S input from an external ADC through J15



2.7 Serial digital audio input

Electrical and optical inputs are supported on-board to receive serial digital audio signals. A jumper (JP2) is used to select either the electrical or optical signal. The input signal is then converted to an I²S format by the on-board decoder (ST part number: STA120D) and fed to the external Sound Terminal® demonstration board.

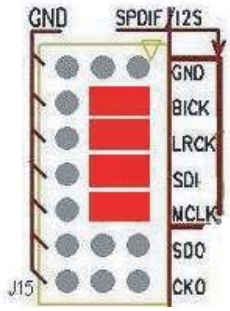
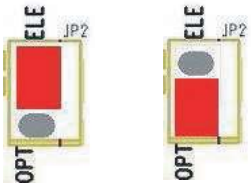
Serial digital formats supported by the STA120D:

- S/PDIF
- AES/EBU
- IEC 958
- EIAJ CP-340/1201

The proper jumper setting is described in *Section 2.8: Jumper configuration*.

2.8 Jumper configuration

Table 1. Jumper configuration

Jumper	Mode	Serial digital input	External I^2S	On-board ADC(1)
J2	LR clock from STA529Q - on-board ADC	Open	Open	Close
J3	Bit clock from STA529Q - on-board ADC	Open	Open	Close
J4	I^2S data from STA529Q - on-board ADC	Open	Open	Close
J5	Analog output / 3.3 VDC for external ADC	All open	See footnote(2)	All open
J7	MCLK to STA529Q – on-board ADC	Open	Open	Close
J12	3.3 VDC to external Sound Terminal® demonstration board	Close	Close	Close
J13	Reserved, not used	All open	All open	All open
J15	I^2S selector for external Sound Terminal® demonstration board	Close only the relevant pins 	See footnote(3)	All open
J16	I^2S data selector for external Sound Terminal® demonstration board	All close	All close	All close
JP1	Reserved, not used	All open	All open	All open
JP2	Serial digital audio source selector	For electrical: For optical: 	Do not care	Do not care

1. APWorkbench supports on-board ADC function.
2. Please refer to *Section 2.6: External I^2S input on page 6* for detailed signal definition for each pin.
3. Please refer to *Section 2.6: External I^2S input on page 6* for detailed signal definition for relevant pins. All other pins can be left open.

3 Schematic and bill of material

Figure 7. APWLink schematic - part 1

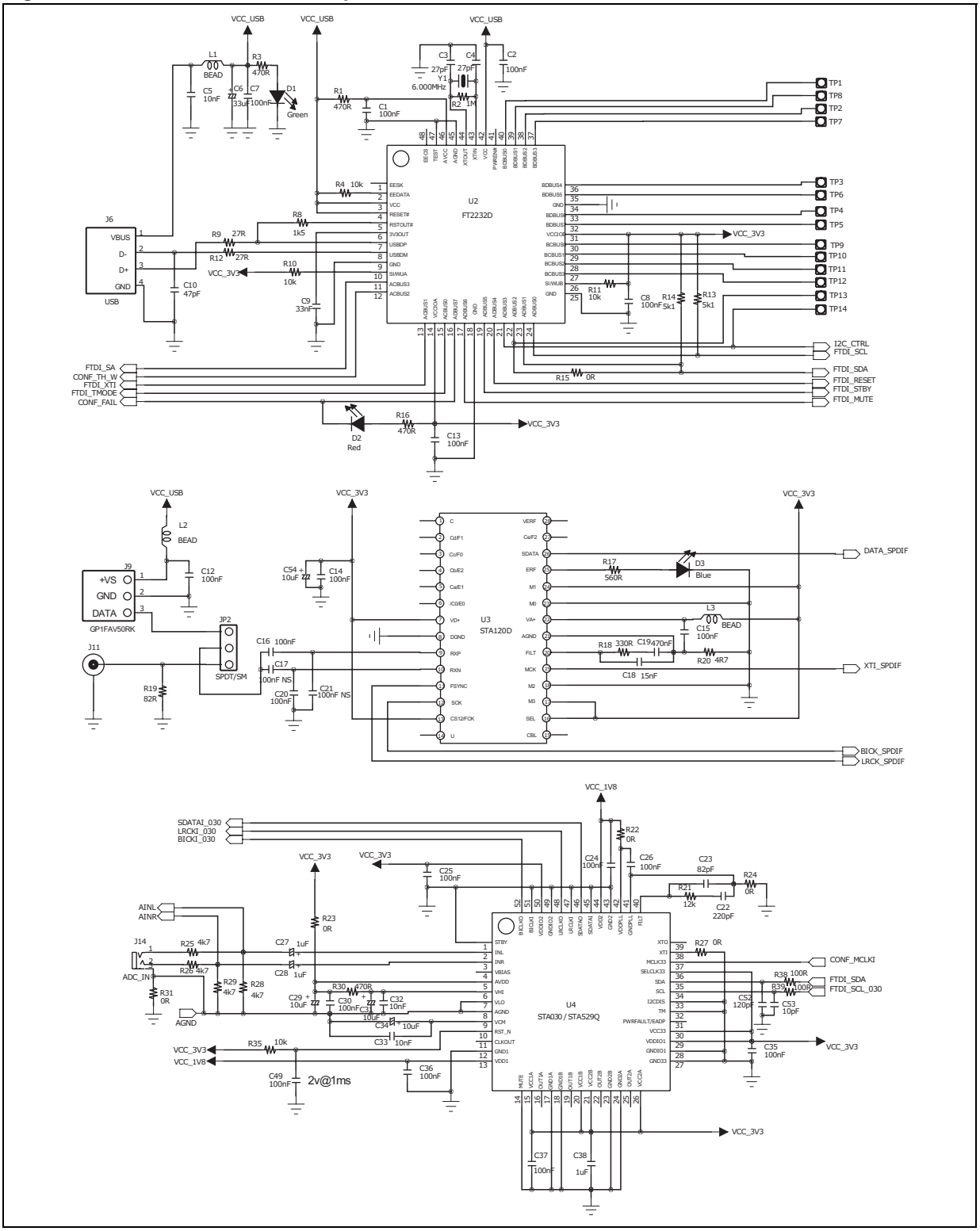


Figure 8. APWLink schematic - part 2

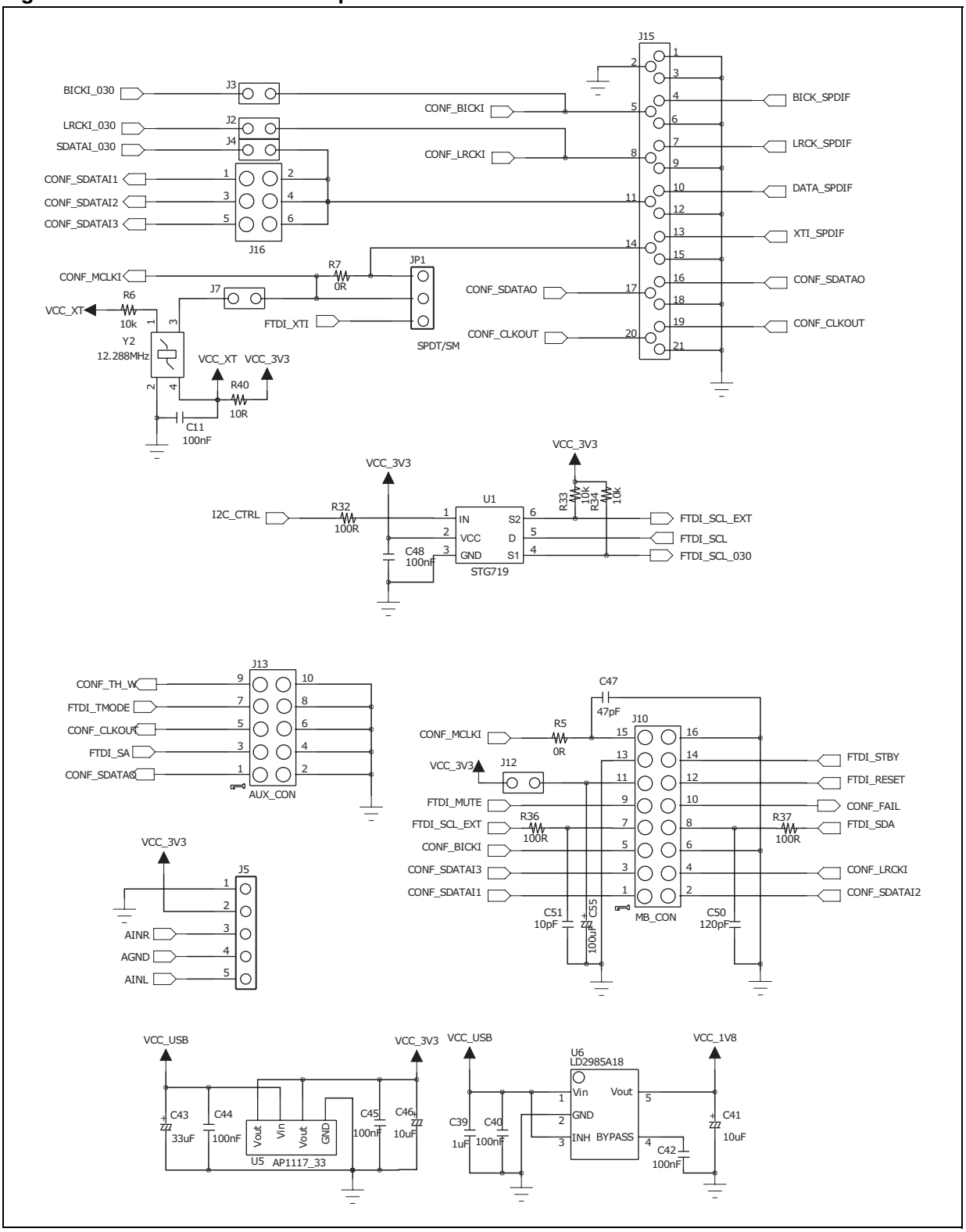


Table 2. Bill of material

Item	Qty	Reference	Part name	Value	Footprint	Remarks
1	1	U1	IC	STG719	SOT23-6L	
2	1	U2	IC	FT2232D	LQFP48	
3	1	U3	IC	STA120D	SO28	
4	1	U4	IC	STA529Q	VFQFPN52	
5	1	U5	IC	LD1117	SOT223	
6	1	U6	IC	LD2985B18	SOT23-5L	
7	1	D1	LED	Green	0603	
8	1	D2	LED	Red	0603	
9	1	D3	LED	Blue	0603	
10	3	L1-3	Ferrite bead	600 ohms / 100 MHz	0805	
11	1	Y1	Crystal, 6.000 MHz	6.000 MHz	XTAL_HC49SMT	
12	1	Y2	Oscillator, 12.288 MHz	12.288 MHz	SMD, 7 mm x 5 mm	
13	5	J2-4, J7, J12	Header	Header 2 x 1	2.54 mm x 2	
14	1	J5	Header	Header 5 x 1	2.54 mm x 5	
15	1	J6	USB connector	Type B	Type B	
16	1	J9	Optical receiver	GP1F31R		
17	1	J10	Female connector	Female 8 x 2	2.54 mm x 8 x 2	bottom side
18	1	J11	RCA	RCA connector	RCA	
19	1	J13	Header	Header 5 x 2	2.54 mm x 5 x 2	
20	1	J14	Headphone jack	Stereo headphone jack		
21	1	J15	Header	Header 7 x 3	2.54 mm x 7 x 3	
22	1	J16	Header	Header 3 x 2	2.54 mm x 3 x 2	
23	2	JP1-2	Header	Header 3 x 1	2.54 mm x 3	
24	24	C1-2, C7-8, C11-16, C20, C24-26, C30, C35-37, C40, C42, C44-45, C48-49	CAP	100 nF	0603	
25	2	C17, C21	CAP	100 nF NS	0603	Not fitted
26	3	C5, C32-33	CAP	10 nF	0603	
27	2	C51, C53	CAP	10 pF	0603	
28	2	C50, C52	CAP	120 pF	0603	
29	1	C18	CAP	15 nF	0603	

Table 2. Bill of material

Item	Qty	Reference	Part name	Value	Footprint	Remarks
30	2	C38-39	CAP	1 µF	0603	
31	1	C22	CAP	220 pF	0603	
32	2	C3-4	CAP	27 pF	0603	
33	1	C9	CAP	33 nF	0603	
34	1	C19	CAP	470 nF	0603	
35	2	C10, C47	CAP	47 pF	0603	
36	1	C23	CAP	82 pF	0603	
37	1	C55	Tantalum-CAP	100 µF	Sized	
38	6	C29, C31, C34, C41, C46, C54	Tantalum-CAP	10 µF	1206	
39	2	C27-28	Tantalum-CAP	1 µF	1206	
40	2	C6, C43	Tantalum-CAP	33 µF	1206	
41	8	R5, R7, R15, R22-24, R27, R31	RES	0R	0603	
42	5	R32, R36-39	RES	100R	0603	
43	1	R40	RES	10R	0603	
44	7	R4, R6, R10-11, R33-35	RES	10K	0603	
45	1	R21	RES	12K	0603	
46	1	R2	RES	1M	0603	
47	1	R8	RES	1K5	0603	
48	2	R9, R12	RES	27R	0603	
49	1	R18	RES	330R	0603	
50	4	R1, R3, R16, R30	RES	470R	0603	
51	1	R20	RES	4R7	0603	
52	4	R25-26, R28-29	RES	4K7	0603	
53	1	R17	RES	560R	0603	
54	2	R13-14	RES	5K1	0603	
55	1	R19	RES	82R	0603	

4 Revision history

Table 3. Document revision history

Date	Revision	Changes
22-Jun-2012	1	Initial release.
16-Oct-2012	2	Minor textual updates; revised presentation of schematics.