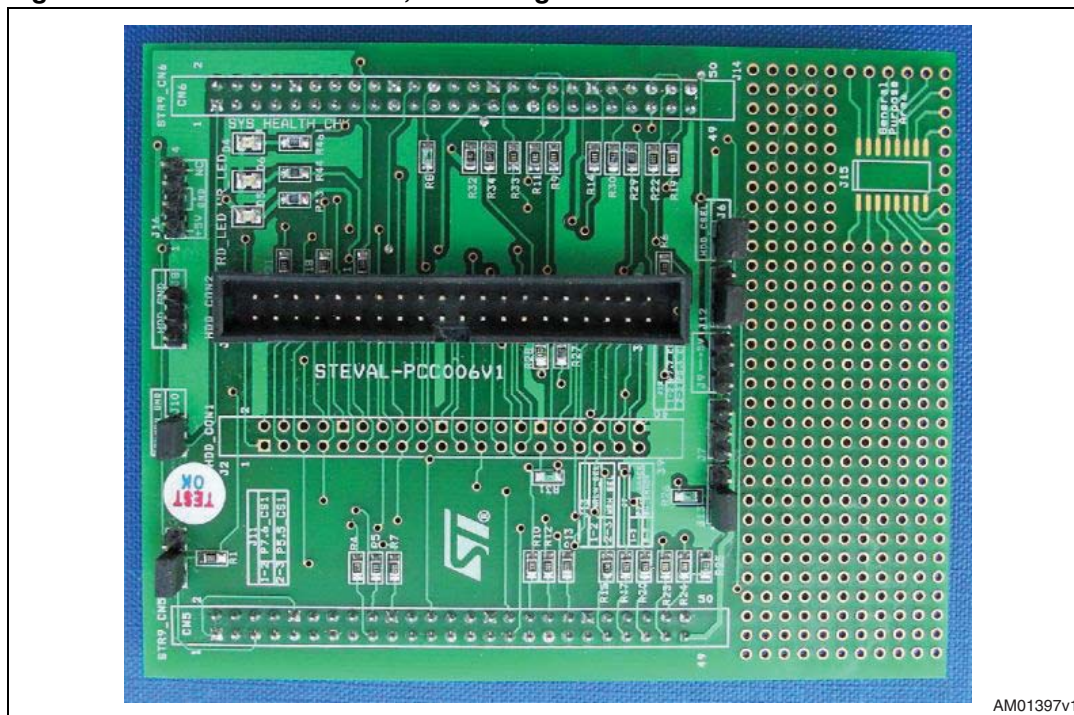STEVAL-PCC006V1, HDD bridge extension
board for mass storage applications

Introduction

This document explains the use of the HDD extension demonstration board (STEVAL-PCC006V1) which can be used for interfacing the hard disk to the EVAL-STR910 board. The HDD bridge extension board for the EVAL-STR910 is built around STMicroelectronics' ARM® core-based STR912FAW44X6 ARM966E-S in a 128-pin LQFP128 package. This is an extension board which connects to the EVAL-STR910. The extension board consists of a hard disk connector, host termination resistors, general purpose connectors which connect the CN5 and CN6 of EVAL-STR910, and a wrap area with 2.54 mm pitch through-hole with one SO16 footprint.

Figure 1.   STEVAL-PCC006V1, HDD bridge extension board

AM01397v1

Contents

List of figures

1 Getting started

1.1 Package

The HDD bridge extension board for the EVAL-STR910 includes the following items:

1. Hardware content:
   – Extension board interface between the EVAL-STR910 and the hard disk
2. Documentation:
   – User manual (this document)
3. Firmware:
   – Hex file is available for the firmware

No PC software nor drivers are required in order to use the Microsoft® operating system.

1.2 Setting up the board

The following hardware is required for the correct usage of the system.

● EVAL-STR910 demonstration board
● Extension board interface between the EVAL-STR910 and the hard disk
● ATX-SMPS to power on the hard disk
● 40-pin hard disk cable.

The HDD bridge extension board for the STR9-EVAL should be set up as follows:

1. Before connecting the extension board to the EVAL-STR910 remove resistors R51, R81, R82, R83, R84, and R90. Refer to *Figure 8* in *Appendix A*. The EVAL-STR910 provides a utility to connect a daughterboard through the CN5 and CN6 connectors by disconnecting the resistors from the functional blocks.
2. Connect the jumper between pin 1 and 2 of JP9 of the EVAL-STR910 board. The 1.5 kΩ resistor pull-up is controlled by this jumper.
3. Fix the extension board on the EVAL-STR910 board. Please make sure that the STR9 CN5 connector is aligned with the extension board STR9_CN5 connector. Refer to *Figure 9*.
4. Connect the 40-pin hard disk cable between the hard disk and extension board.
5. To power on the hard disk as well as the board, set the jumpers according to the available source of power, refer to *Section 1.4.1: Power supply on page 6*.
6. Insert the USB cable in the CN3 connector of the EVAL-STR910 board and the PC.
7. Now the PC shows the hard disk as a removable drive, and the user can access the hard disk as a normal storage unit.

1.3 Hardware layout configuration

The hardware layout in *Figure 2* shows the location of the different components on the extension board. For the hardware layout of the EVAL-STR910 board refer to user manual UM0174 "EVAL-STR910 demonstration board".

Figure 2.   Hardware layout details
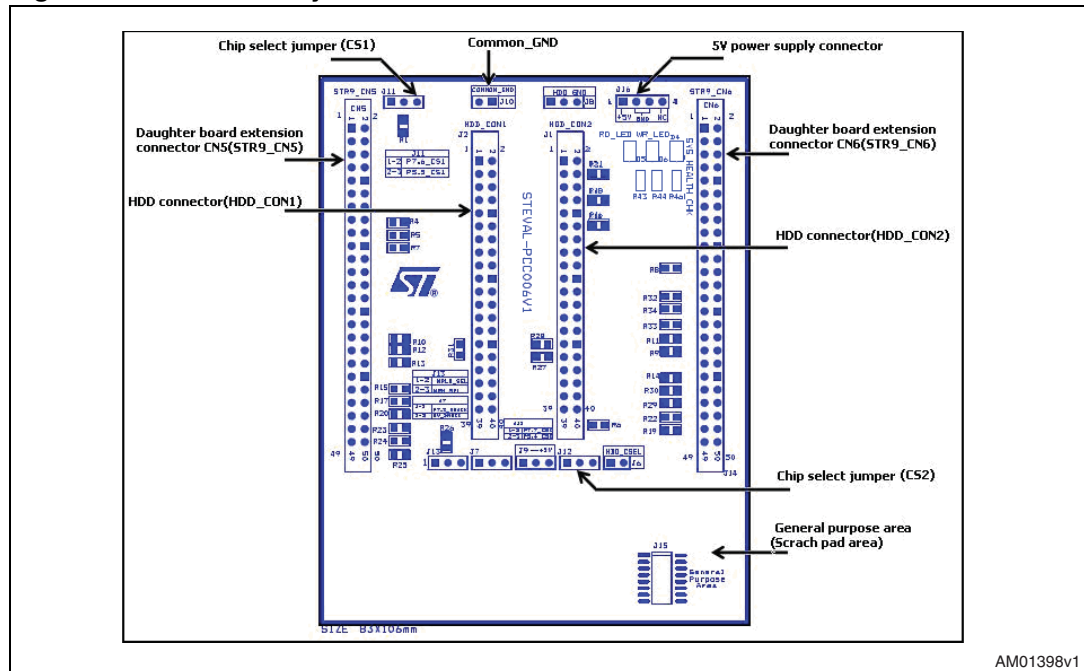
1.4   Hardware configuration

The following sections provide jumper settings for the EVAL-STR910 and jumper settings for the configuration of the HDD bridge extension board for the EVAL-STR910.

Two types of jumpers are used on the HDD bridge extension board for the EVAL-STR910:

● 3-pin jumpers with two possible positions, for which settings are presented in the schematics in the following sections

● 2-pin jumpers with two possible settings: fitted (the circuit is closed), and not fitted (the circuit is open).

The following jumper positions given in *Figure 3* illustrate the different configurations in this document.

Figure 3.   Jumper positions
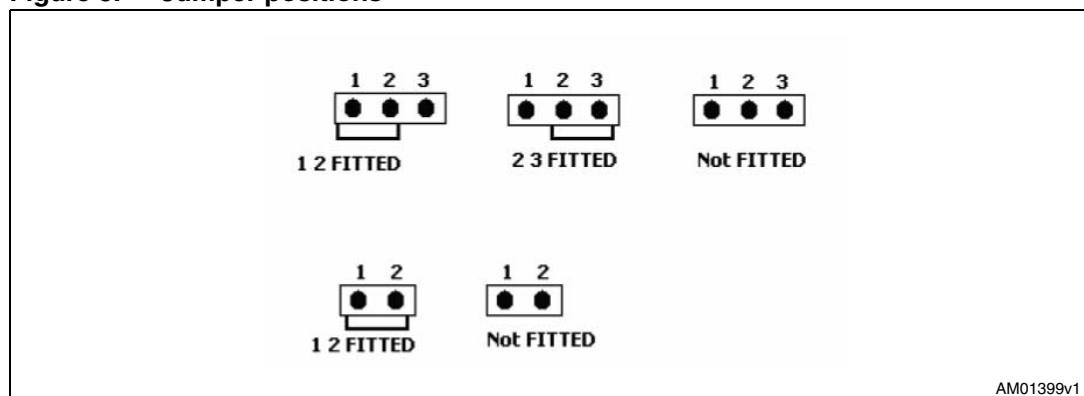
1.4.1 Power supply

A typical HDD requires both 5 V and 12 V supplies. The HDD bridge extension board for the EVAL-STR910 is designed to be powered by the following:

● an ATX-SMPS to provide a 5 V supply to the board, and a 5 V and 12 V supply to the hard disk

● or by using separate 5 and 12 V DC supplies to power on the hard disk and board.

Note: The *supply should meet the current ratings mentioned on the hard disk. The better option is to choose the ATX-SMPS.*
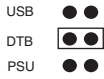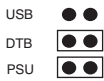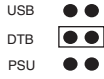
The EVAL-STR910 demonstration board is designed to be powered by a 5 V DC power supply. It is possible to provide 5 V DC power from the daughterboard extension connectors by selecting the suitable jumper of the EVAL-STR910 board and extension board as explained below. The power supply is configured by setting the related jumpers and connectors as described in *Table 1*.

Table 1. Power supply jumper setting

Power supply	Description
ATX-SMPS	The board has a power-on provision using the ATX-SMPS. Connect the floppy drive power-on connector to J16 of the extension board as shown in *Figure 10*. Also connect the ATX-PWR-ON connector provided by the SMPS to power on the external HDD. Jumper settings are as follows: – J16 (of extension board): make sure the direction of the 5 V and 12 V connection on the board is correct.[1] – J6 (of EVAL-STR910 board): open: fit the jumper on DTB of CN6 to provide 5 V DC power from the extension board extension connectors USB ● ● DTB ▣ ● ● PSU ● ●
Separate 5 and 12 V DC supply	Fit the jumpers on DTB and PSU of JP6 to provide the 5 V supply to the board and the extension board. External 12 V and 5 V are needed to power on the hard disk. [2] If the user does not have a separate supply to power on the board, then these options are better. – J16 (of extension board): open – J6: (of EVAL-STR910 board): for the power supply jack (CN2) to both the EVAL-STR910 demonstration board and the extension board connected to CN5 and CN6, JP6 is set as shown: USB ● ● DTB ▣ ● ● PSU ▣ ● ● or – J16 (of extension board): fitted – J6 (of EVAL-STR910 board): fit the jumper on DTB of CN6 to provide 5 V DC power from the daughterboard extension connectors. USB ● ● DTB ▣ ● ● PSU ● ●

1. A reverse connection will damage the board

2. Supply should meet the current ratings mentioned on the hard disk

1.4.2 USB

The EVAL-STR910 demonstration board supports USB 2.0 compliant full-speed communication via a USB type-B connector (CN3). The ESD protection device U6 (USBLC6-2P6) is connected between CN3 and the microcontroller. The USBLC6-2P6 is a monolithic application-specific device dedicated to ESD protection of high-speed interfaces such as USB 2.0, Ethernet links and video lines. Two clock sources are available for the USB:

● PLL generated clock from the STR91xF

● External oscillator U12

● Clock source is selected by setting JP17.

Table 2.   Clock source setting

Jumper	Description
JP17	Enables the external USB 48 MHz clock source. To use an external oscillator via P27 of the STR91xF for the USB clock input, JP17 is fitted. To use the internal clock of the STR91xF, JP17 is not fitted Default setting: not fitted
JP9	Fit the jumper between pin 1 and 2 of JP9. 1.5 kΩ resistors pull-up controlled by this jumper.

1.4.3 Selection

Table 3.   Jumper selection

Jumper	Description
J7	HDD_DMACK signal is used by the host in response to DMARQ to initiate DMA transfer. For PIO mode transfer this signal is not used. – Current version does not support the DMA mode transfer. 1 2 3 ● ● ● Not FITTED
J11	– 1:2 to select P76 as HDD_CS1, fit jumper into pin 1 and 2 of J11 1 2 3 ● ● ● 1 2 FITTED – 2:3 to select P55 as HDD_CS1, fit jumper into pin 2 and 3 of J11. Current version does not support the DMA mode transfer

Table 3.   Jumper selection (continued)

Jumper	Description
J12	– 1:2 to select P77 as HDD_CS0, fit jumper into pin 1 and 2 of J12 1 2 3 1 2 FITTED – 2:3 to select P54 as HDD_CS0, fit jumper into pin 2 and 3 of J12
J13	– 1:2 to select EMI_WRLN as write strobe, fit jumper into pin 1 and 2 of J13 – 2:3 to select EMI_WRH as write strobe, fit jumper into pin 2 and 3 of J13 1 2 3 2 3 FITTED

1.5   LED indicators

● SYS-HEALTH-CHK LED (D4): This LED ensures that the board is properly powered up as well as connected and that the hard disk is initialized correctly.

● RD-LED (D5): This LED blinks when a read operation is performed on the hard disk.

● WR-LED (D6): This LED blinks when a write operation is performed on the hard disk.

2 Connector details

2.1 Hard disk connector (J1)

Figure 4.   **Hard disk interface connector**

AM01400v1
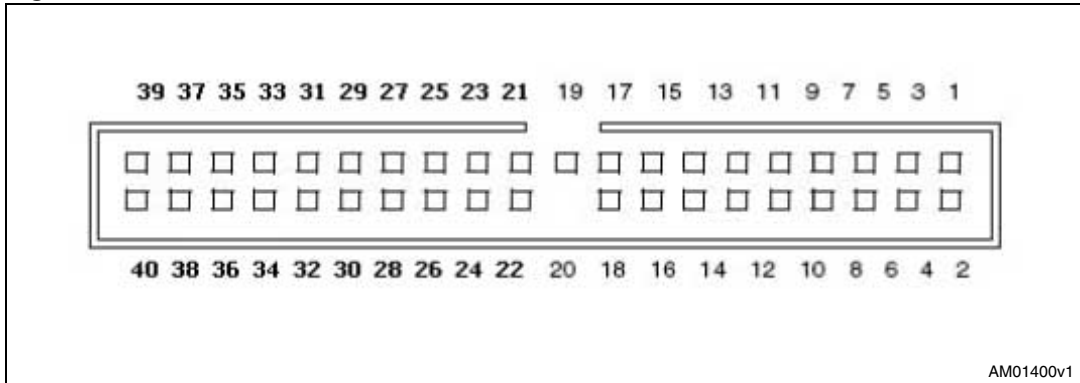
Table 4.   **Hard disk pin description**

Pin number	Description	Pin number	Description
1	RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	KEY
21	DMARQ	22	GND
23	DIOW-	24	GND
25	DIOR-	26	GND
27	IORDY	28	CSEL
29	DMACK-	30	GND
31	INTRQ	32	IOCS16-
33	DA1	34	PDIAG-
35	DA0	36	DA2
37	CS0-	38	CS1-
39	DASP-	40	GND

2.2 USB type-B connector CN3

Figure 5. USB connector

AM01401v1
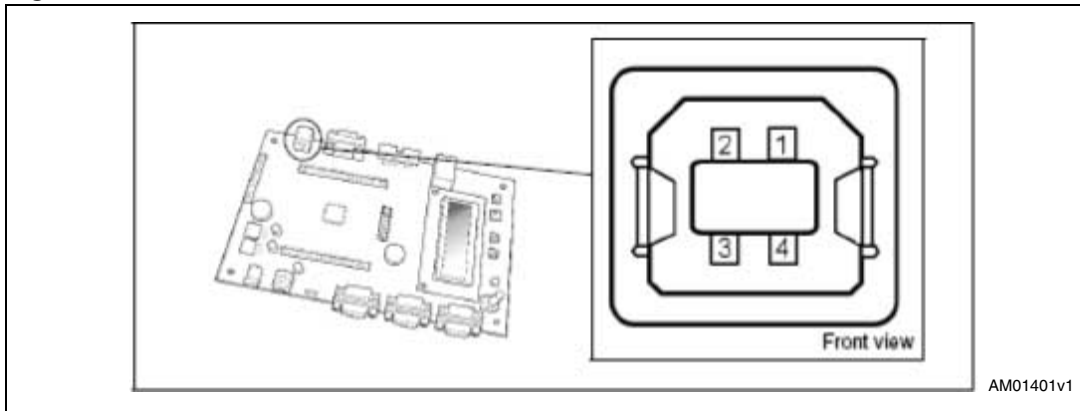
Table 5. USB connector pin description

Pin number	Description	Pin number	Description
1	VBUS (power)	4	GND
2	DM	5	SHIELD
3	DP	6	SHIELD

2.3 Daughterboard extension connector CN5 and CN6 of STR9-EVAL board

Two 50-pin male headers CN5 and CN6 are used to connect a daughterboard or standard wrapping board to the EVAL-STR910 demonstration board. All 80 GPI/Os and the EMI interface control signals are available on these connectors. Each pin on CN5 and CN6 can be used by a daughterboard after disconnecting it from the corresponding function block on the EVAL-STR910 demonstration board. CN5 and CN6 of STR9-EVAL are mapped to respectively STR9_CN5 and STR9_CN6 of the daughterboard.

Table 6. Daughterboard extension connector (CN5)

Pin	Description	Alternate function	Interface with extension card
1	GND	-	-
3	P16	Ethernet	Open
5	P76	Joystick	To select P76 as HDD_CS1 fit jumper into pin 1 & 2 of J11
7	P47	Microphone	Open
9	P46	Motor control speaker	Open
11	P44	Motor control	Open
13	P42	Motor control	Open
15	P40	Motor control	Open

Table 6. Daughterboard extension connector (CN5) (continued)

Pin	Description	Alternate function	Interface with extension card
17	P71	Ethernet	P71 of EVAL board connected to DA1 (device address bit) of HDD. [1]
19	GND	None	-
21	P20	ETM trace UART1 CTS	Open
23	P50	CAN RX	Open
25	P74	Joystick	Open
27	P51	UART1 RXD	Open
29	P63	Motor control	Open
31	EMI_WRL	None	To select EMI_WRL as write strobe fit jumper into pin 1 & 2 of J13
33	P52	Ethernet	Open
35	P53	Ethernet	Open
37	P60	Motor control	Open
39	GND	None	-
41	P83	LCD	P83 of EVAL board connected to data3 of HDD
43	P84	LCD	P84 of EVAL board connected to data4 of HDD
45	P85	LCD	P85 of EVAL board connected to data5 of HDD
47	P86	LCD	P86 of EVAL board connected to data6 of HDD
49	D5V	None	-
2	P14	Ethernet	Open
4	P15	Ethernet	Open
6	P17	Ethernet	Open
8	P77	Joystick	To select P77 as HDD_CS0 fit jumper into pin 1 & 2 of J12
10	GND	None	-
12	P45	Motor control	Open
14	P43	Motor control	Open
16	P41	Motor control	Open
18	P70	Motor control	P70 of EVAL board connected to DA0 (device address bit) of HDD.
20	P72	Motor control	P72 of EVAL board connected to DA2 (device address bit) of HDD.
22	P21	ETM trace UART1 DSR	Open

Table 6.   Daughterboard extension connector (CN5) (continued)

Pin	Description	Alternate function	Interface with extension card
24	P73	Motor control	Option provided to connect DMACK of HDD to P73.[2]
26	P75	Joystick	Open
28	P62	Motor control	Open
30	GND	None	-
32	EMI_WRH	None	To select EMI_WRH as write strobe fit jumper into pin 2 & 3 of J13
34	P80	LCD	P80 of EVAL board connected to data0 of HDD
36	P81	LCD	P81 of EVAL board connected to data1 of HDD
38	P82	LCD	P82 of EVAL board connected to data2 of HDD
40	P61	Motor control	Open
42	P22	ETM UART1 DCD	Open
44	P23	ETM UART1 RI	Open
46	P24	ETM	Open
48	P87	LCD	P87 of EVAL board connected to data7 of HDD[3]
50	GND		-

1. Remove the resistor R51 from EVAL board

2. Open

3. Remove the resistor R90 from EVAL board.

Table 7.   Daughterboard extension connector (CN6)

Pin	Description	Alternate function	Interface with extension card
1	GND	None	-
3	P12	Ethernet	Open
5	P11	Ethernet	Open
7	P67	ETM motor control	Open
9	TAMPER_IN	None	Open
11	RESET#	None	Open
13	P05	Ethernet	Open
15	P64	Motor control	Open
17	P56	SPI Flash	Open
19	D5V	No	-
21	P03	Ethernet	Open

Table 7.   **Daughterboard extension connector (CN6) (continued)**

| Pin	Description	Alternate function	Interface with extension card
23	EMI_ALE	None	Open
25	P54	SPI Flash	To select P54 as HDD_CS0 fit jumper into pin 2 & 3 of J12
27	P37	Motor control	Open
29	P00	Ethernet	Open
31	P35	UART3 TX	P35 of EVAL board connected to IORDY of HDD
33	P34	UART1 TX	P34 of EVAL board connected to INTRQ of HDD
35	P33	UART1 RTS UART2 TX	Open
37	P31	UART3 RX	Open
39	GND	None	-
41	P27	ETM trace USB clock	Open
43	P94	LCD	P94 of EVAL board connected to Data12 of HDD
45	P92	LED2	P92 of EVAL board connected to Data10 of HDD
47	P90	LED0	P90 of EVAL board connected to Data8 of HDD
49	P25	ETM trace motor control	Open
2	P13	Ethernet	Open
4	RESET_OUT	None	Open
6	P10	Ethernet	Open
8	P66	ETM trace motor control	Open
10	GND	None	-
12	P07	Ethernet	Open
14	P06	Ethernet	Open
16	P65	Motor control	Open
18	P57	SPI Flash	Open
20	P04	Ethernet	Open
22	P55	SPI Flash	To select P55 as HDD_CS1 fit jumper into pin 2 & 3 of J11
24	EMI_RD	None	EMI_RD of EVAL board connected to RD strobe of HDD
26	P02	Ethernet	Open
28	P01	Motor control	Open
30	GND	None	-

Table 7. **Daughterboard extension connector (CN6) (continued)**

Pin	Description	Alternate function	Interface with extension card
32	P36	CAN TX	P36 of EVAL board connected to reset of HDD
34	P97	LCD	P97 of EVAL board connected to data15 of HDD
36	P96	LCD	P96 of EVAL board connected to data14 of HDD
38	P32	UART1 DTR UART2 RX	Open
40	P95	LCD	P95 of EVAL board connected to data13 of HDD
42	P30	Motor control	DMARQ of HDD connected to P30 of EVAL board
44	P26	ETM trace	-
46	P93	LED3	P93 of EVAL board connected to data11 of HDD
48	P91	LED1	P91 of EVAL board connected to data9 of HDD
50	GND	NONE	-

3 User interface flow

3.1 Power-on sequence

Figure 6.   **Power-on sequence flowchart**

AM01402v1
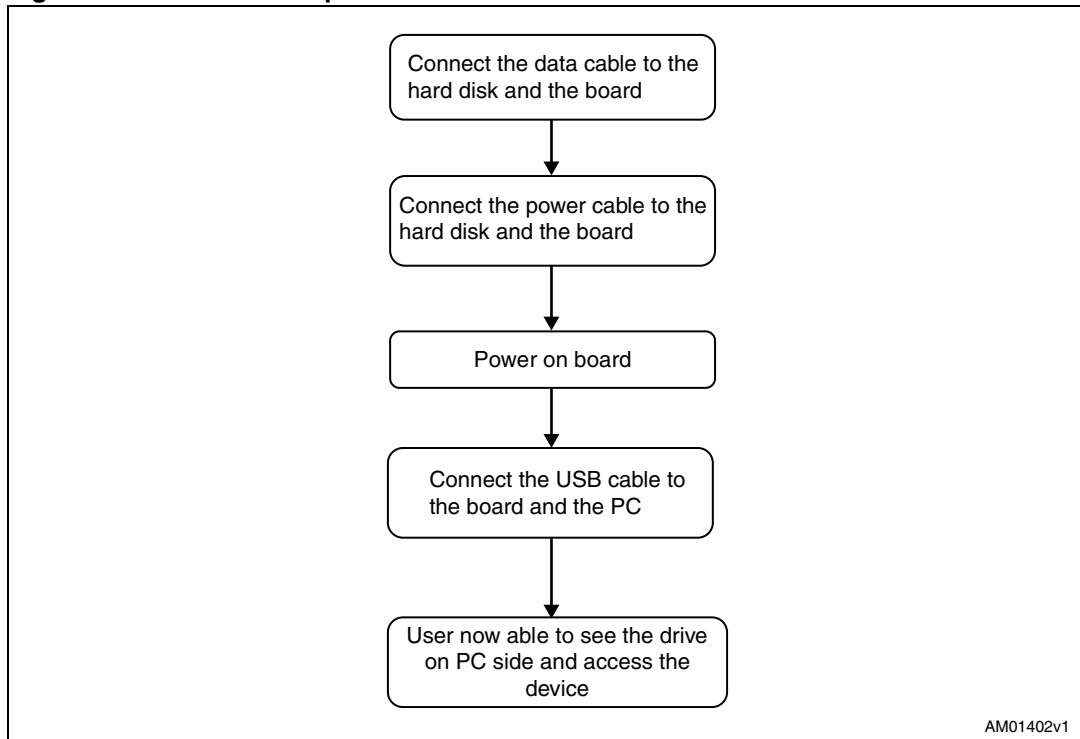
4 Schematics

Figure 7.   HDD bridge extension board schematic
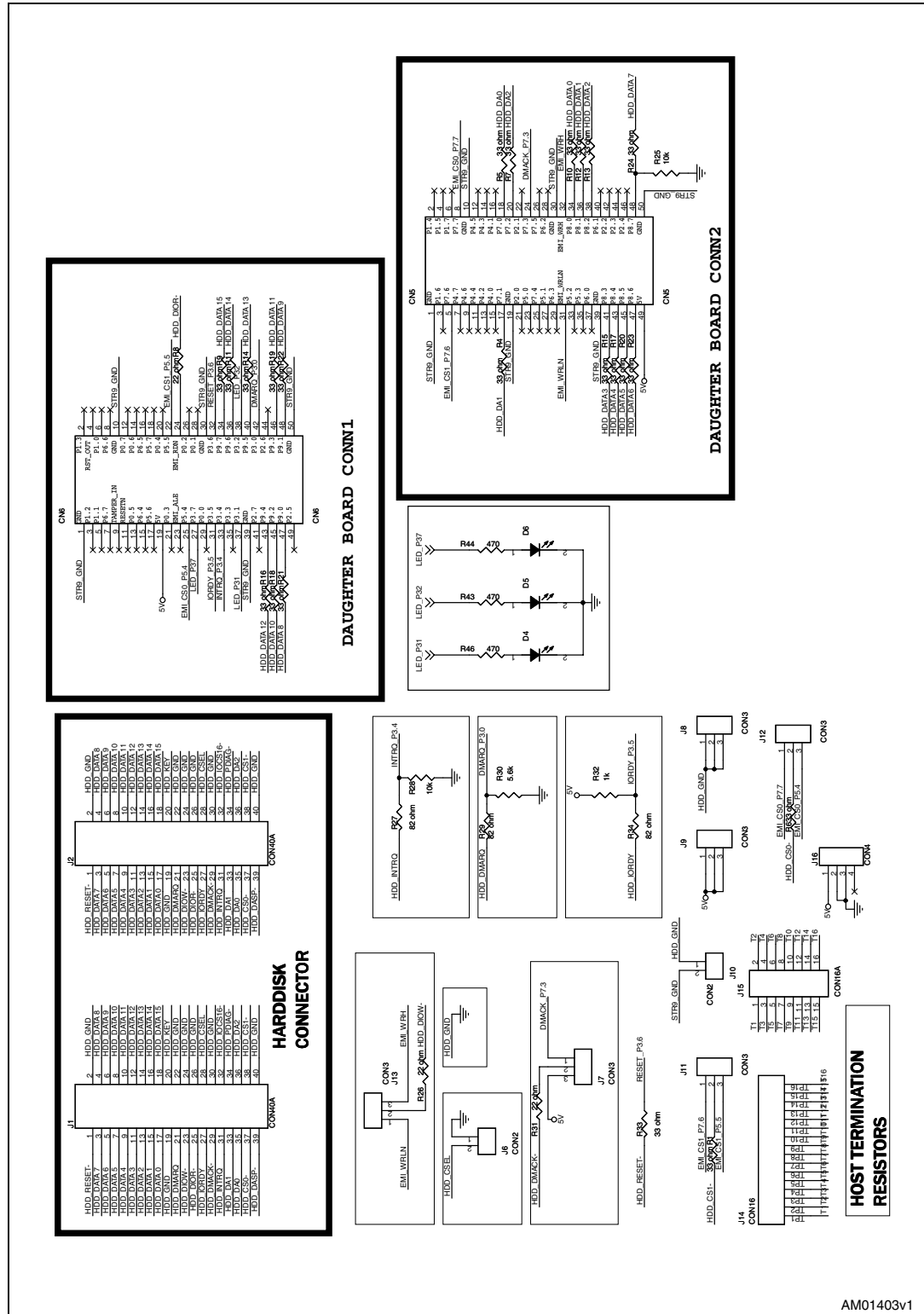
AM01403v1

5 Bill of material

Table 8. Bill of material

Index	Qty	Reference	Value/generic part number	Package	Manufacturer
Connectors and jumpers					
1	2	J1,J2	CON40A	Header 2 x 20-pin, 2.54 mm x 2.54 mm pitch	Any
2	2	CN5,CN6	CON50	Header 2 x 25-pin, 2.54 mm x 2.54 mm pitch	Any
3	6	J7,J8,J9,J11, J12,J13	CON3	Jumper 3-pin, 2.54 mm pitch	Any
4	2	J10,J6	CON2	Jumper 2-pin, 2.54 mm pitch	Any
5	1	J14	CON16	2.54 mm scratch pad area	Any
6	1	J16	CON4	Jumper 4-pin, 2.54 mm pitch	Any
7	1	J15	CON16A	S016 package	Any
Passive components					
1	22	R1,R4,R5,R6, R7,R9,R10, R11,R12,R13, R14,R15,R16, R17,R18,R19, R20,R21,R2, R23,R24,R33	33	SMD0805	Any
2	2	R25,R28	10k	SMD0805	Any
3	3	R29,R34,R27	82	SMD0805	Any
4	1	R30	5.6k	SMD0805	Any
5	3	R8,R31,R26	22	SMD0805	Any
6	1	R32	1k	SMD0805	Any

6 Related documents

- STR9 datasheet
- EVAL-STR910 evaluation board user manual (UM0174).

Appendix A   Hardware setup diagrams

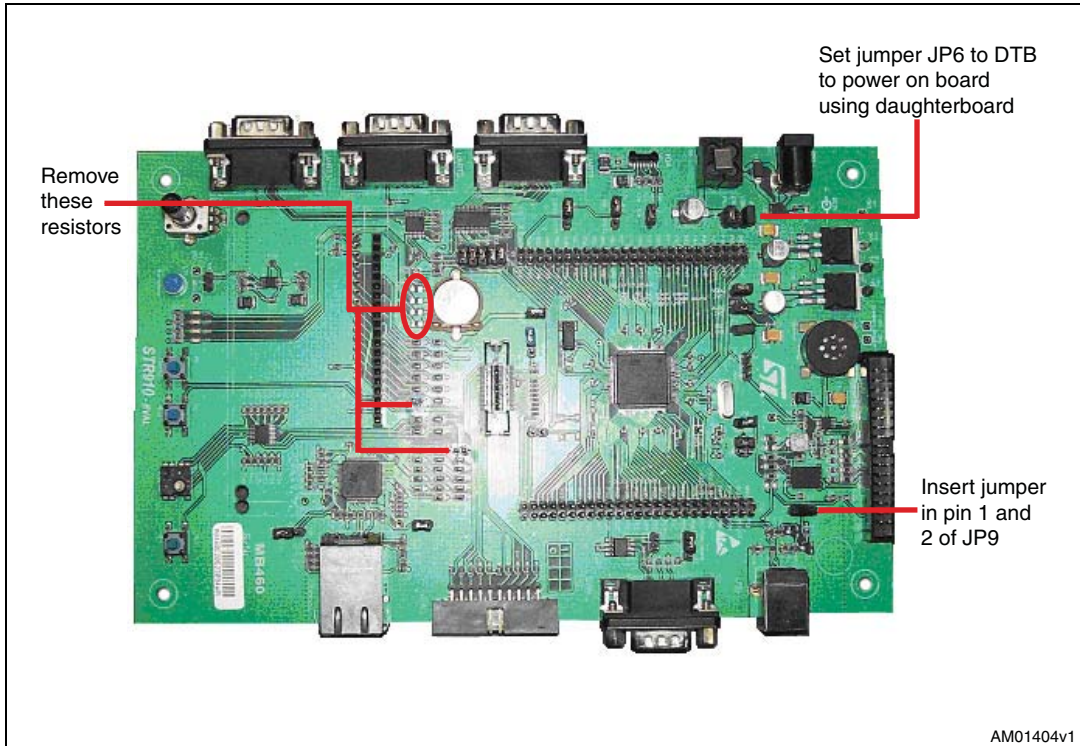**Figure 8.   Initial setup of STR9-EVAL board before connection to daughterboard**

Remove these resistors

Set jumper JP6 to DTB to power on board using daughterboard

Insert jumper in pin 1 and 2 of JP9

AM01404v1

Figure 9.   Fix the daughterboard on the STR9-EVAL board as shown

Attach the daughterboard to the STR9-EVAL as shown here

AM01405v1
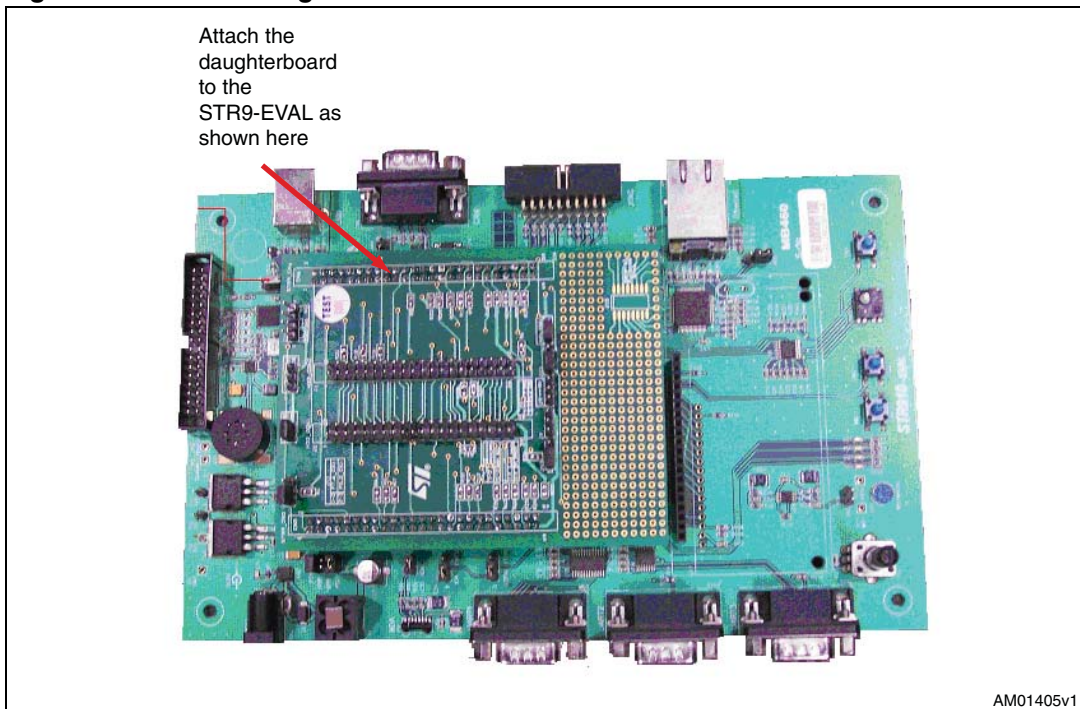
Figure 10. Daughterboard interfaced to STR9 (full setup)

AM01406v1
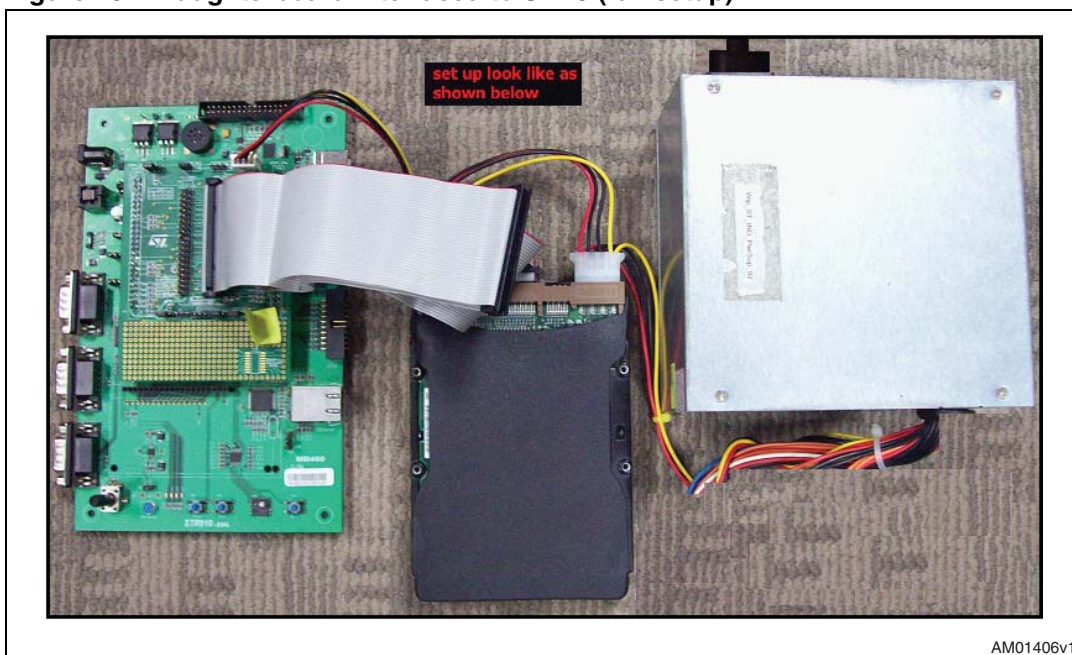
Revision history

Table 9. Document revision history

Date	Revision	Changes
11-Aug-2009	1	Initial release.

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