



1 Introduction

This user manual describes the STarGrid powerline modem, the latest family of powerline modems from STMicroelectronics™. The powerline modem itself, although a powerful device, always needs an external superior system which it uses in order to exchange information with another node, where another powerline modem and superior system can be found.

There are various superior systems and this document deals with the hardware interconnection to powerline modems. These superior systems are from very simple 32-bit microcontroller boards running standalone firmware to very complex 32-bit micro processor units running operating systems. This document describes the possible ways of interconnection and available HW and SW tools for building the system consisting of the STM32 or SPEAr3xx, and powerline communication coming from the ST7570, 80, and 90 STarGrid family.

The related demonstration boards are:

- STEVAL-PCC012V1
- STM3210C-EVAL
- EVALSPEAr310
- EVALSPEAr320PLC
- EVALSPEAr320HMI
- EVALST7570, 7570-1 KIT, 7580-1, 7590-1.

Contents

1	Introduction	1
2	STM32 (STEVAL-PCC012V1) and EVALST7570-1	5
3	STM32 (STEVAL-PCC012V1) and EVALST7590-1	7
4	STM32 (STM3210C-EVAL) + EVALST7590-1	9
5	SPEAr320 and EVALST7590-1	10
6	EVALSPEAr310 and EVALST7590-1 via RS232	11
7	SPEAr3xx and ST7570, ST7580, ST7590 via USB	13
8	EVALSPEAr320HMI and ST7570, ST7580, ST7590 via UART	14
Appendix A HW images		16
A.1	STM32 (STEVAL-PCC012V1) and EVALST7570-1	16
A.2	STM32 (STEVAL-PCC012V1) and EVALST7590-1	17
A.3	STM32 (STM3210C-EVAL) and EVALST7590-1	17
A.4	SPEAr320 and EVALST7590-1	18
A.5	SPEAr310 and EVALST7590-1 via RS232	18
A.6	Any SPEAr3xx and ST7570, ST7580 or ST7590 via USB	19
A.7	EVALSPEAr320HMI and ST7570, ST7580, ST7590 via UART	20
Appendix B Additional schematics		21
B.1	STEVAL-PCC001V1	21
B.2	Extension connectors at SPEAr320HMI board	22
Appendix C Endnotes		23
Revision history		23

List of tables

Table 1.	Interconnection of demonstration boards EVALST7570 and STEVAL-PCC012V1	6
Table 2.	Interconnection of demonstration boards EVALST7590 and STEVAL-PCC012V1	8
Table 3.	Interconnection of STM3210C-EVAL and EVALST7590-1	9
Table 4.	STM3210C-EVAL jumper position	9
Table 5.	Interconnection of EVALSPEAR320 and EVALST7590-1	10
Table 6.	EVALSPEAR320HMI, unified PLM connector CN704 (ST7570/80/90)	15
Table 7.	Document revision history	23

List of figures

Figure 1.	EVALST7570 - microcontroller extension connection	5
Figure 2.	STEVAL-PCC012V1 - PLM connector CN7	5
Figure 3.	STEVAL-PCC012V1 - board settings by JP2 and JP3	6
Figure 4.	Connectors interconnection - 14-pin STM32	6
Figure 5.	Connectors interconnection - 20-pin ST7570	6
Figure 6.	EVALST7590 - microcontroller extension connector	7
Figure 7.	EVALST7590 - jumper setup	7
Figure 8.	STEVAL-PCC012V1 - PLM connector CN7	7
Figure 9.	Connectors interconnection - 14-pin STM32 and 14-pin ST7590	8
Figure 10.	SPEAr320 and EVALST7590-1	10
Figure 11.	EVALSPEAr310 and EVALST7590-1 via RS232	11
Figure 12.	STEVAL-PCC001V1	12
Figure 13.	EVALSPEAr3xx and ST7570, ST7580, ST7590 via USB	13
Figure 14.	EVALSPEAr320HMI and ST7570, ST7580, ST7590 via UART	14
Figure 15.	EVALSPEAr320HMI, unified PLM connector CN704 (ST7570/80/90)	14
Figure 16.	ST7570 and STEVAL-PCC012V1	16
Figure 17.	ST7590 and STEVAL-PCC012V1	17
Figure 18.	ST7590 and STM3210C-EVAL	17
Figure 19.	SPEAr320 and EVALST7590-1	18
Figure 20.	SPEAr310 and EVALST7590-1 via RS232	18
Figure 21.	Any SPEAr3xx and ST7570, ST7580 or ST7590 via USB	19
Figure 22.	SPEAr320HMI and ST7570 via the unified connector, UART	20
Figure 23.	STEVAL-PCC001V1 schematic	21
Figure 24.	SPEAr320HMI, CN701	22
Figure 25.	SPEAr320HMI, CN702	22

2 STM32 (STEVAL-PCC012V1) and EVALST7570-1

The demonstration boards necessary to connect the STM32 and ST7590 boards and their configuration:

1. STEVAL-PCC012V1
 - Flash the correct firmware into STM32.
 - Configure the board according to [Figure 3](#).
2. EVALST7590-1
 - Put the jumper into position JP12 - USB_RES (see paragraph [1](#) in [Appendix C](#)).
 - Interconnect EVALST7570-1 according to [Table 1](#), [Figure 4](#) and [Figure 5](#).

Figure 1. EVALST7570 - microcontroller extension connection

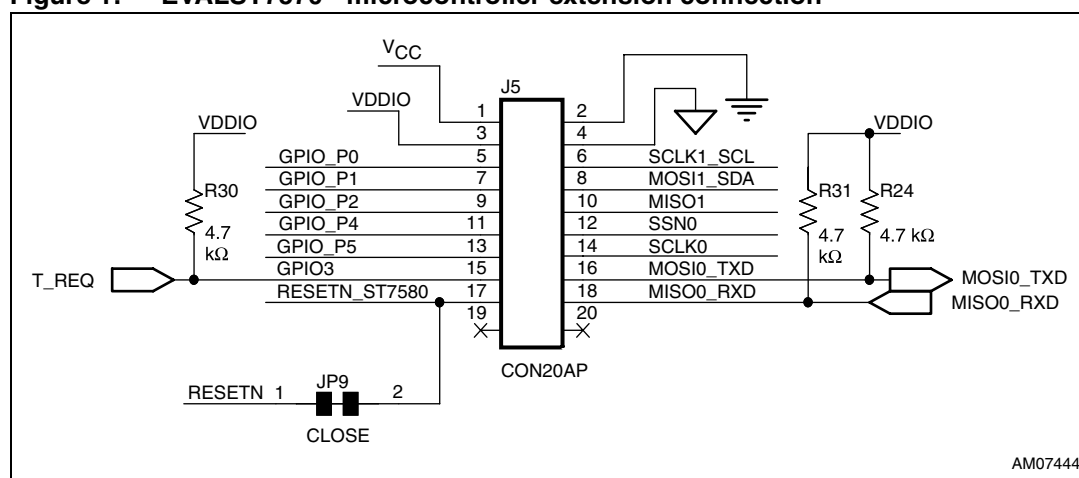


Figure 2. STEVAL-PCC012V1 - PLM connector CN7

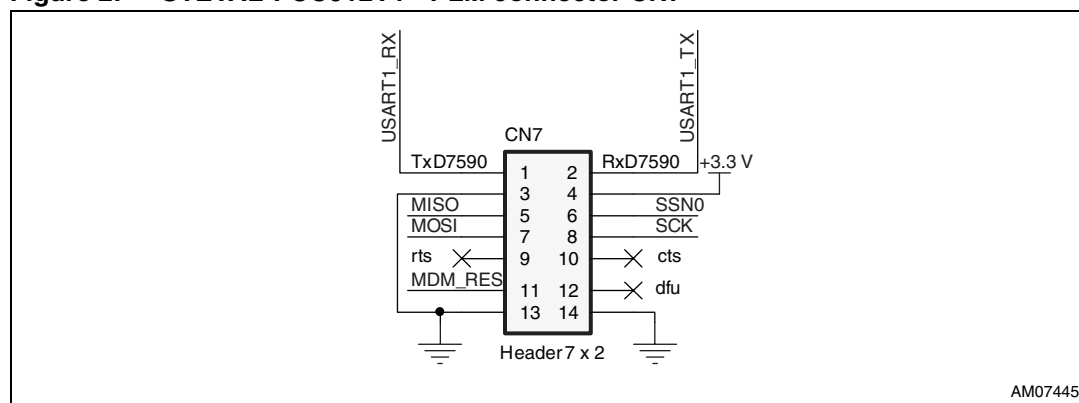
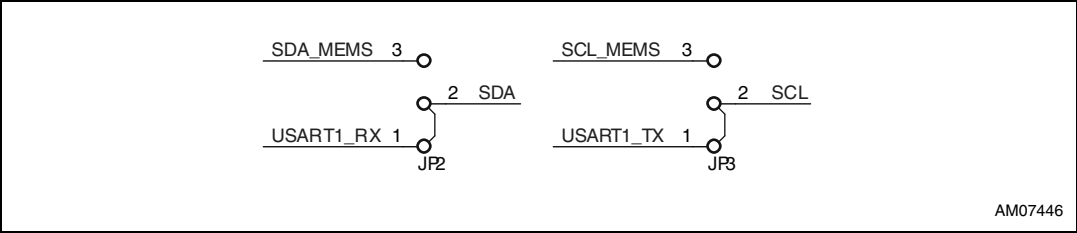


Figure 3. STEVAL-PCC012V1 - board settings by JP2 and JP3



AM07446

Table 1. Interconnection of demonstration boards EVALST7570 and STEVAL-PCC012V1

Signal	J5 (ST7570)	CN7 (STM32)	Color notation
TxD --> RX	16 (TxD)	1 (RX)	Blue
RxD <-- TX	18 (RxD)	2 (TX)	Green
T_REQ	15 (GPIO3)	11 (MDM_RES)	Purple
+3.3 V	Not connected	4	Red
GND	2	13, 14	Black

Figure 4. Connectors interconnection - 14-pin STM32

2	1
4	3
6	5
8	7
10	9
12	11
14	(13)

AM07492

Figure 5. Connectors interconnection - 20-pin ST7570

2	1
4	3
6	5
8	7
10	9
12	11
14	13
16	15
18	17
20	19

AM07493

3 STM32 (STEVAL-PCC012V1) and EVALST7590-1

The demonstration boards necessary to connect the STM32 and ST7590 boards and their configuration:

1. STEVAL-PCC012V1
 - Flash the correct firmware into STM32.
 - Configure the board according to [Figure 3](#).
2. EVALST7590-1
 - Put the jumper into position JP12 - USB_RES (see paragraph 1 in [Appendix C](#)).
 - Configure the board according to [Figure 7](#).
 - Interconnect EVALST7590-1 according to [Table 2](#) and [Figure 9](#).

Figure 6. EVALST7590 - microcontroller extension connector

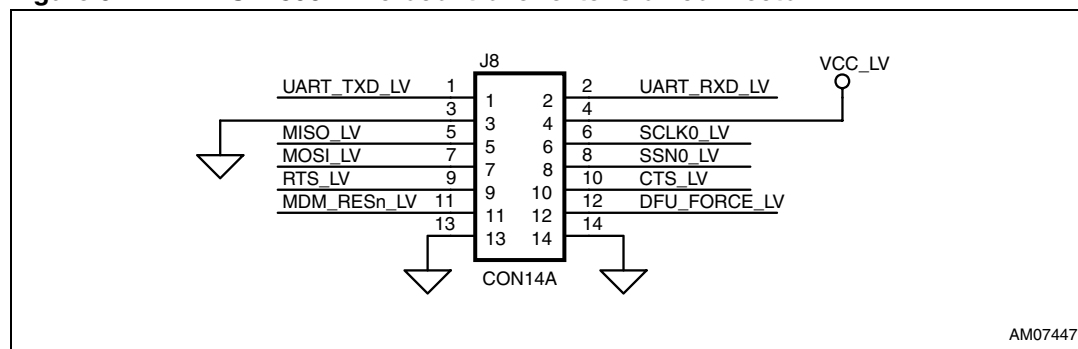


Figure 7. EVALST7590 - jumper setup

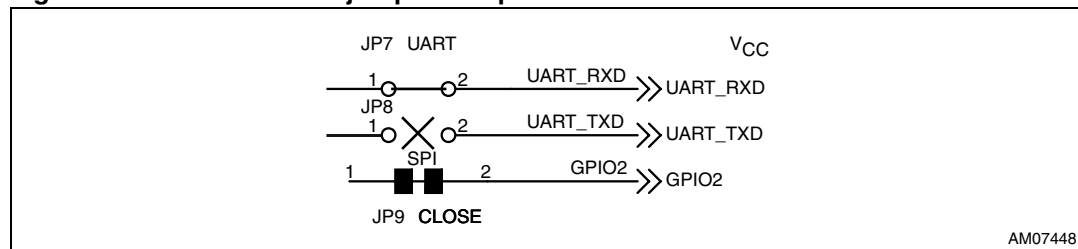


Figure 8. STEVAL-PCC012V1 - PLM connector CN7

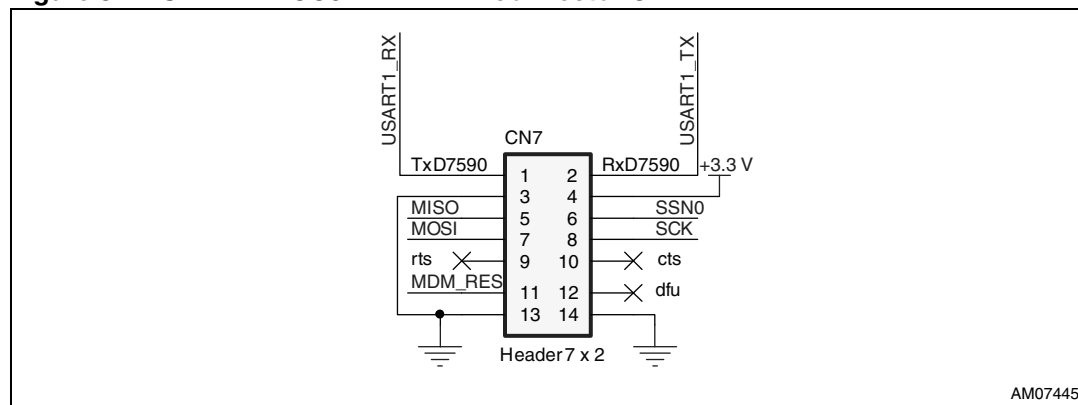


Table 2. Interconnection of demonstration boards EVALST7590 and STEVAL-PCC012V1

Signal	J8 (ST7590)	CN7 (STM32)
TxD --> RX	1 (TxD_LV)	1 (RX)
RxD <-- TX	2 (RxD_LV)	2 (TX)
MDM_RES	11 (MDM_RESn_LV)	11 (MDM_RES)
MOSI_LV	7 (JP8 disconnected)	7 (MOSI) no collision if JP8 disconnected
MISO_LV	5	5 (MISO) ⁽¹⁾
SSN0	6	6 (SSN0) no collision
SCK	8	8 (SCK) ⁽¹⁾
+3.3 V	4 (VCC_LV)	4 (+3.3 V)
GND	13, 14	13, 14

1. Possible collision with SD Card™ (if inserted), Wi-Fi (if assembled), MEMS analog (if SPI signal used by R63, R64 with zero value), MEMS digital (if plugged).

Figure 9. Connectors interconnection - 14-pin STM32 and 14-pin ST7590⁽¹⁾

	2	1
	4	3
	6	5
	8	7
	10	9
	12	11
	14	(13)

AM07494

1. See paragraph 2 in [Appendix C](#).

4 STM32 (STM3210C-EVAL) + EVALST7590-1

The demonstration boards necessary to connect the STM3210C-EVAL and EVALST7590 boards and their configuration:

1. STM3210C-EVAL
 - Configure the board: jumper positions according to [Table 4](#).
 - Flash the correct firmware into STM32.
2. EVALST7590-1
 - Put the jumper into position JP12 - USB_RES (see paragraph 1 in [Appendix C](#)).
 - Interconnect EVALST7590-1 according to [Table 3](#) and [Figure 9](#).

Table 3. Interconnection of STM3210C-EVAL and EVALST7590-1

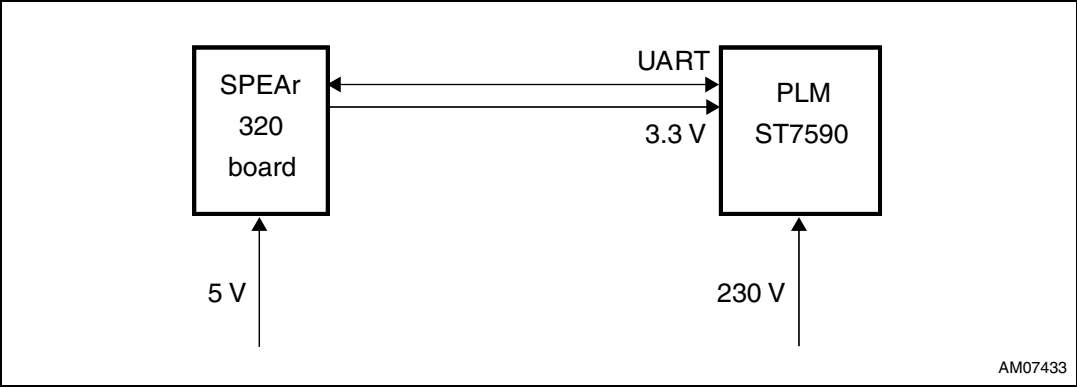
Signals - STM3210C-EVAL	Cable color	ST7590 connector
+3.3 V (CN8 - pin 48)	Red	+5 V (or +3.3 V) (pin 4)
GND (CN8 - pin 50)	Black	GND (pin 14)
STM32 UART TX (CN9 - pin 12 - PD8)	Green	ST7590 RX (pin 2)
STM32 UART RX (CN9 - pin 8 - PD9)	Blue	ST7590 TX (pin 1)

Table 4. STM3210C-EVAL jumper position

Signals - STM3210C-EVAL	ST7590 connector
JP25	USB - open, DTB - open, PSU - closed
JP26	Closed
JP15	SD position closed
JP13	No jumper
JP11	No jumper
JP12	No jumper
JP1	Anti_TMP position closed
JP24	No jumper
JP9	Closed
JP17	Closed
JP20	Open

5 SPEAr320 and EVALST7590-1

Figure 10. SPEAr320 and EVALST7590-1



The demonstration boards necessary to connect the EVALSPEAr320 and EVALST7590 boards and their configuration:

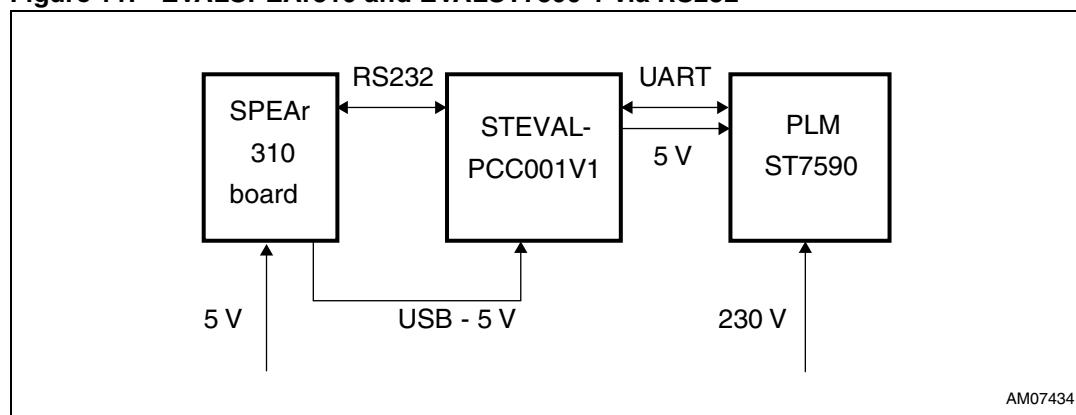
- 1. EVALSPEAr320
 - Interconnect PC with UART1.
 - Interconnect Ethernet to network.
 - Plug Flash disk with correct SW into the first USB, use the file system of this USB.
- 2. EVALST7590-1
 - Put the jumper into position JP12 - USB_RES (see paragraph 1 in [Appendix C](#)).
 - Interconnect EVALST7590-1 and EVALSPEAr320 according to [Table 5](#), [Figure 9](#) and [Figure 10](#).

Table 5. Interconnection of EVALSPEAr320 and EVALST7590-1

Signals - EVALSPEAr320 - UART0	Cable color	ST7590 connector
+5 V (or +3.3 V) (J3 - pin 2)	Red	+5 V (or +3.3 V) (pin 4)
GND (J3 - pin 4)	Black	GND (pin 14)
SPEAr UART0 TX (J20 - pin 2)	Green	ST7590 RX (pin 2)
SPEAr UART0 RX (J21 - pin 2)	Blue	ST7590 TX (pin 1)

6 EVALSPEAr310 and EVALST7590-1 via RS232

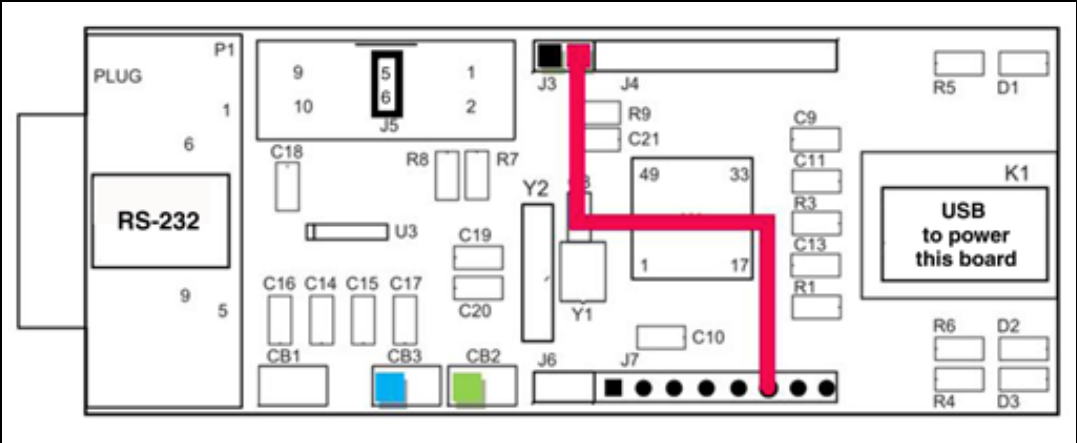
Figure 11. EVALSPEAr310 and EVALST7590-1 via RS232



The demonstration boards necessary to connect the SPEAr310 and ST7590 boards and their configuration:

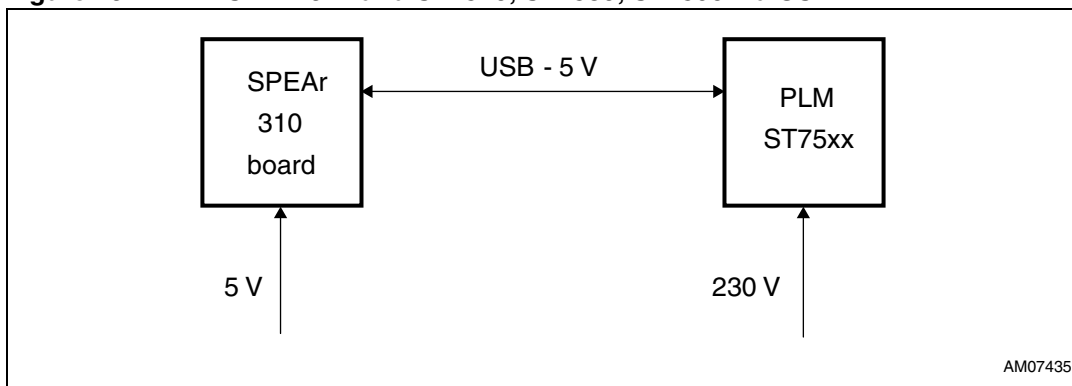
1. EVALSPEAr310
 - Interconnect PC with UART1.
 - Interconnect Ethernet to network.
 - Plug Flash disk with correct SW into the first USB, use file system of this USB.
 - Interconnect STEVAL-PCC001V1 with the second USB.
2. STEVAL-PCC001V1
 - Put jumper to JP5 (central position) in order to short pins 5 and 6, see [Figure 12](#). (see also paragraph 1 in [Appendix C](#)).
 - Cut CB1, CB2, and CB3.
 - Interconnect J3 - pin 2 with J7 - pin 6, see [Figure 12](#) (see paragraph 1 in [Appendix C](#)).
 - Interconnect CB2, CB3, and J3 signals according to [Table 5](#), [Figure 12](#), and [Figure 9](#) with the ST7590 microcontroller extension connector.
3. EVALST7590-1
 - Put the jumper into position JP12 - USB_RES (see paragraph 1 in [Appendix C](#)).
 - Interconnect STEVAL-PCC001V1 according to [Table 5](#) ([Cable color](#) and [ST7590 connector](#) columns) and [Figure 9](#).

Figure 12. STEVAL-PCC001V1



7 SPEAr3xx and ST7570, ST7580, ST7590 via USB

Figure 13. EVALSPEAr3xx and ST7570, ST7580, ST7590 via USB

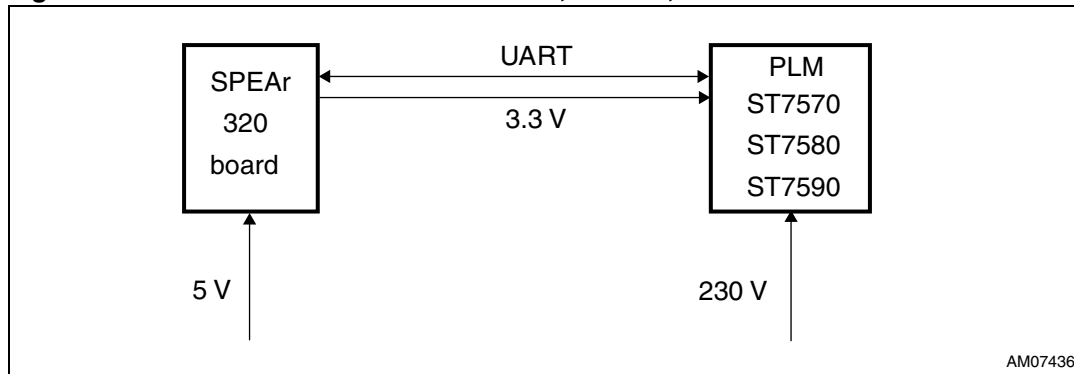


The demonstration boards necessary to connect the SPEAr3xx and ST7590 boards and their configuration:

1. EVALSPEAr3xx:
 - Interconnect PC with UART1.
 - Interconnect Ethernet to network.
 - Plug Flash disk with correct SW into the first USB, use file system of this USB.
 - Interconnect EVALSPEAr3xx using the second USB with EVALST7570/80/90.
2. EVALST7590-1
 - Do not put the jumper into position JP12 - USB_RES (see paragraph 1 in [Appendix C](#)).

8 EVALSPEAr320HMI and ST7570, ST7580, ST7590 via UART

Figure 14. EVALSPEAr320HMI and ST7570, ST7580, ST7590 via UART



The demonstration boards necessary to connect the EVALSPEAr3xx with the ST7570/80/90 board and their configuration:

1. EVALSPEAr3xx
 - Plug Flash disk with correct SW into the first USB, use file system of this USB.
 - Interconnect connector CN704 with EVALST75xx unified extension connector ([Table 6](#)) by the flat ribbon cable as shown in [Figure 24](#) and [Figure 25](#). If additional signals are needed use information from [Figure 25](#).
2. EVALST75xx
 - Put the jumper into position JP12 - USB_RES (see paragraph [1](#) in [Appendix C](#)).

Figure 15. EVALSPEAr320HMI, unified PLM connector CN704 (ST7570/80/90)

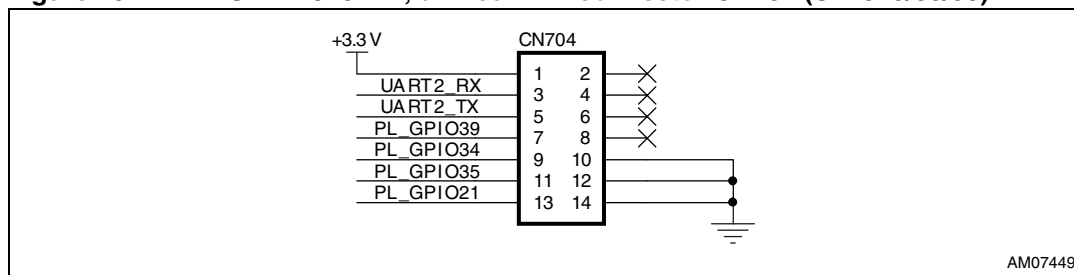


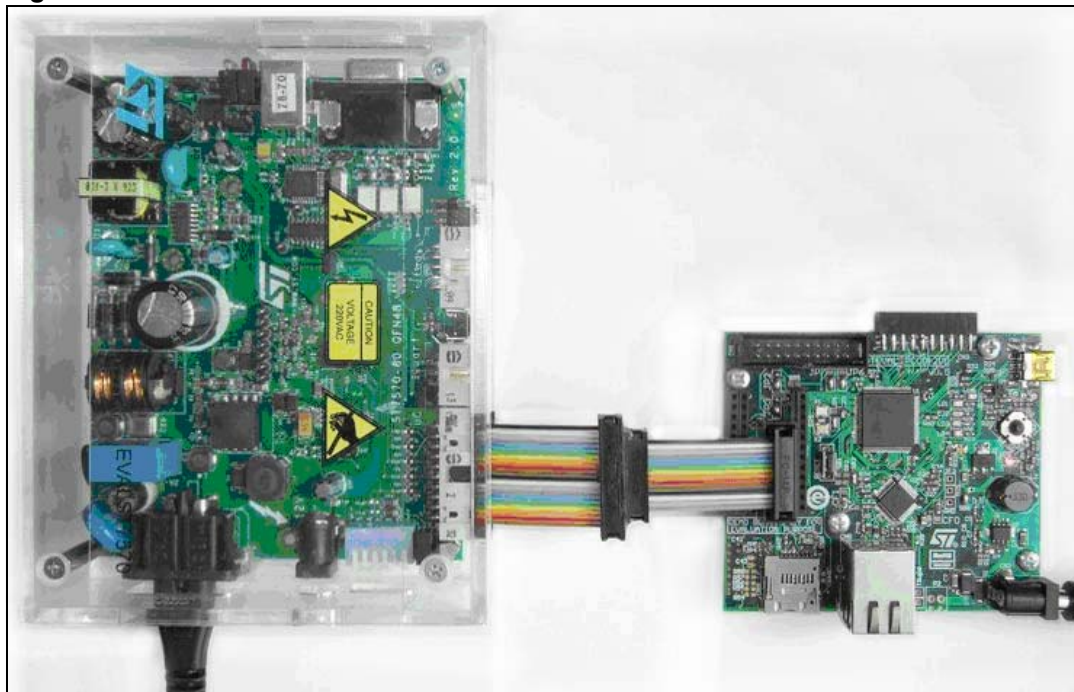
Table 6. EVALSPEAR320HMI, unified PLM connector CN704 (ST7570/80/90)

Signal	ST7570 + 80/90	CN7	Color notation
TxD --> RX	3 (TxD)	3 (RX)	Blue
RxD <-- TX	5 (RxD)	5 (TX)	Green
Auxiliary IO1	7 (TREQ / RTS)	7 (PL GPIO39)	Purple
Auxiliary IO2	9 (BR1 / CTS)	9 (PL GPIO34)	Purple
Auxiliary IO3	11 (BR2 / DFU)	11 (PL GPIO35)	Purple
Auxiliary IO4	13 (RESETN / MDM)	13 (PL GPIO21)	Purple
+3.3 V	1	1	Red
GND	10, 12, 14	10, 12, 14	Black

Appendix A HW images

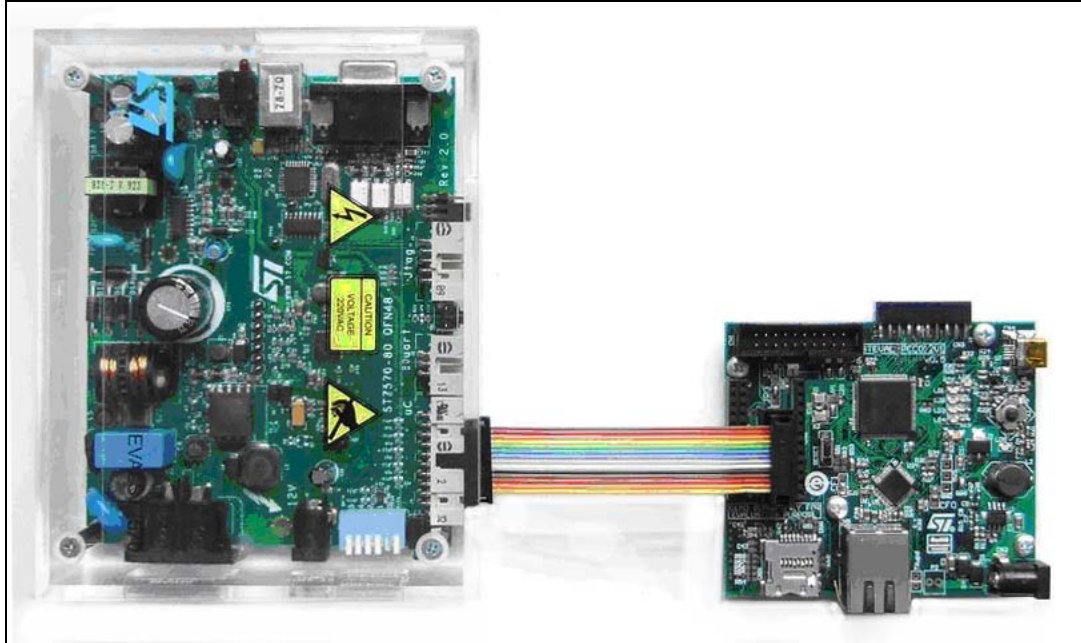
A.1 STM32 (STEVAL-PCC012V1) and EVALST7570-1

Figure 16. ST7570 and STEVAL-PCC012V1



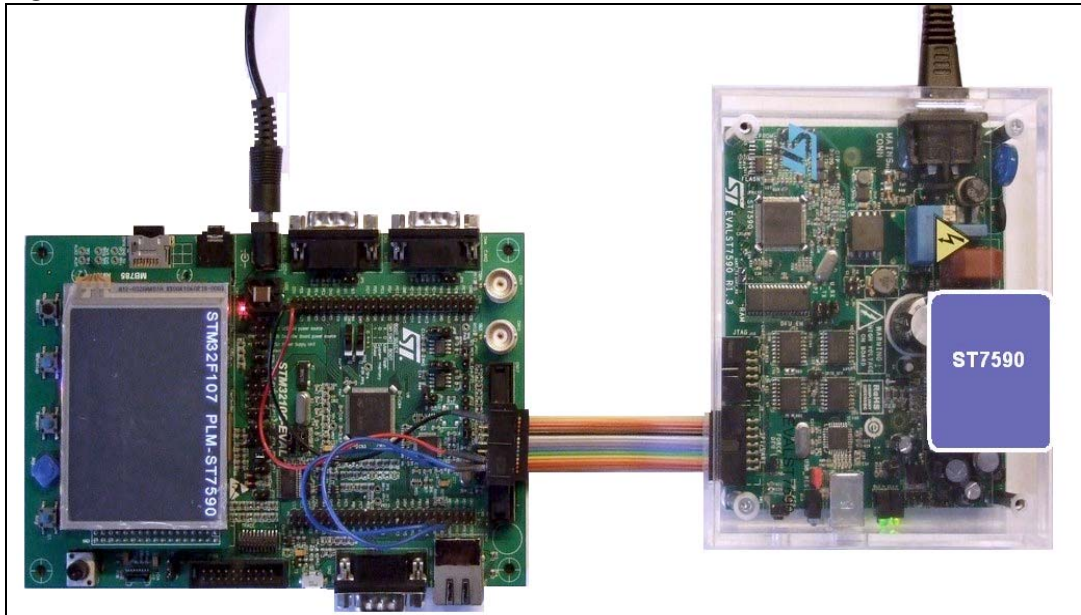
A.2 STM32 (STEVAL-PCC012V1) and EVALST7590-1

Figure 17. ST7590 and STEVAL-PCC012V1



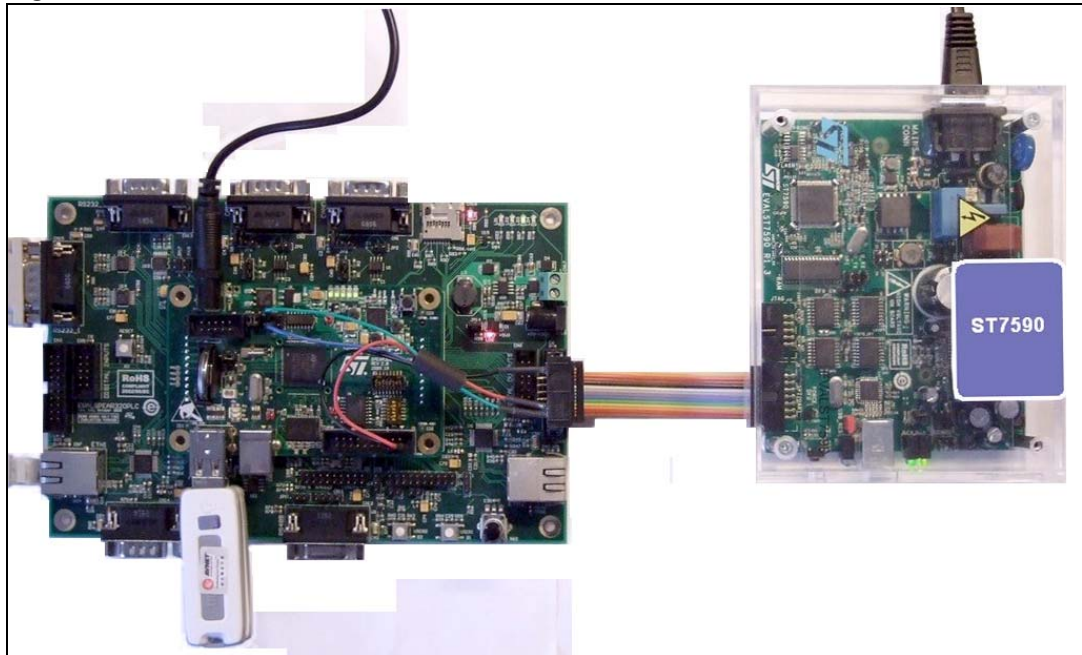
A.3 STM32 (STM3210C-EVAL) and EVALST7590-1

Figure 18. ST7590 and STM3210C-EVAL



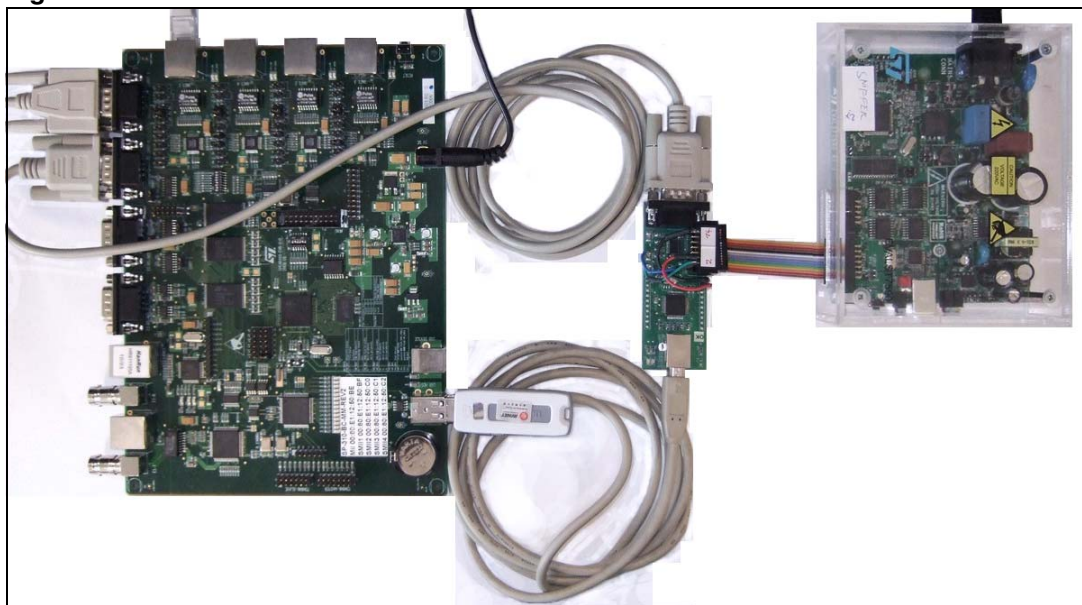
A.4 SPEAr320 and EVALST7590-1

Figure 19. SPEAr320 and EVALST7590-1



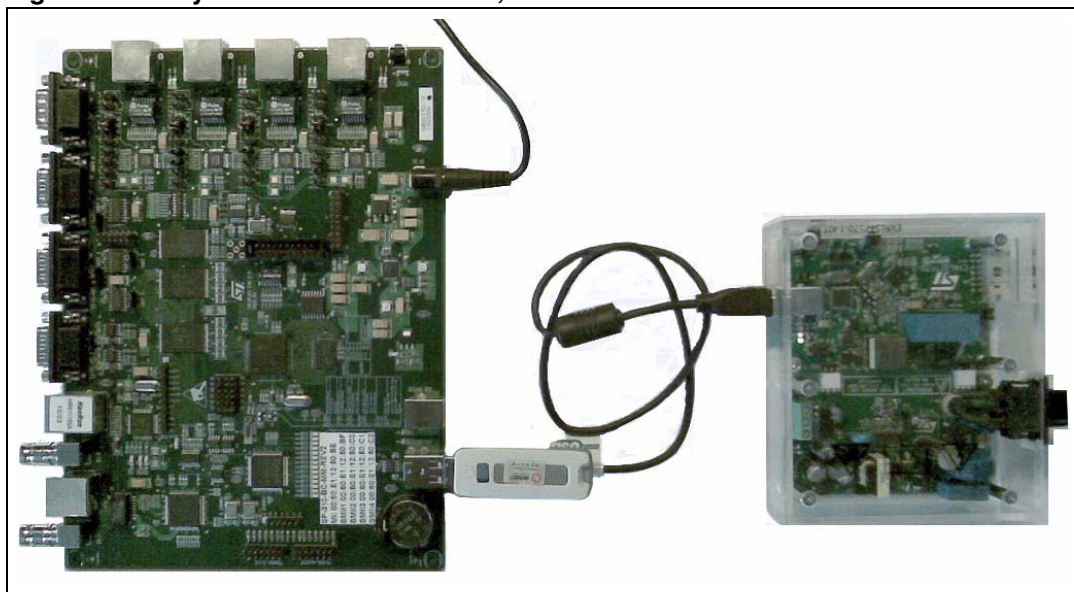
A.5 SPEAr310 and EVALST7590-1 via RS232

Figure 20. SPEAr310 and EVALST7590-1 via RS232



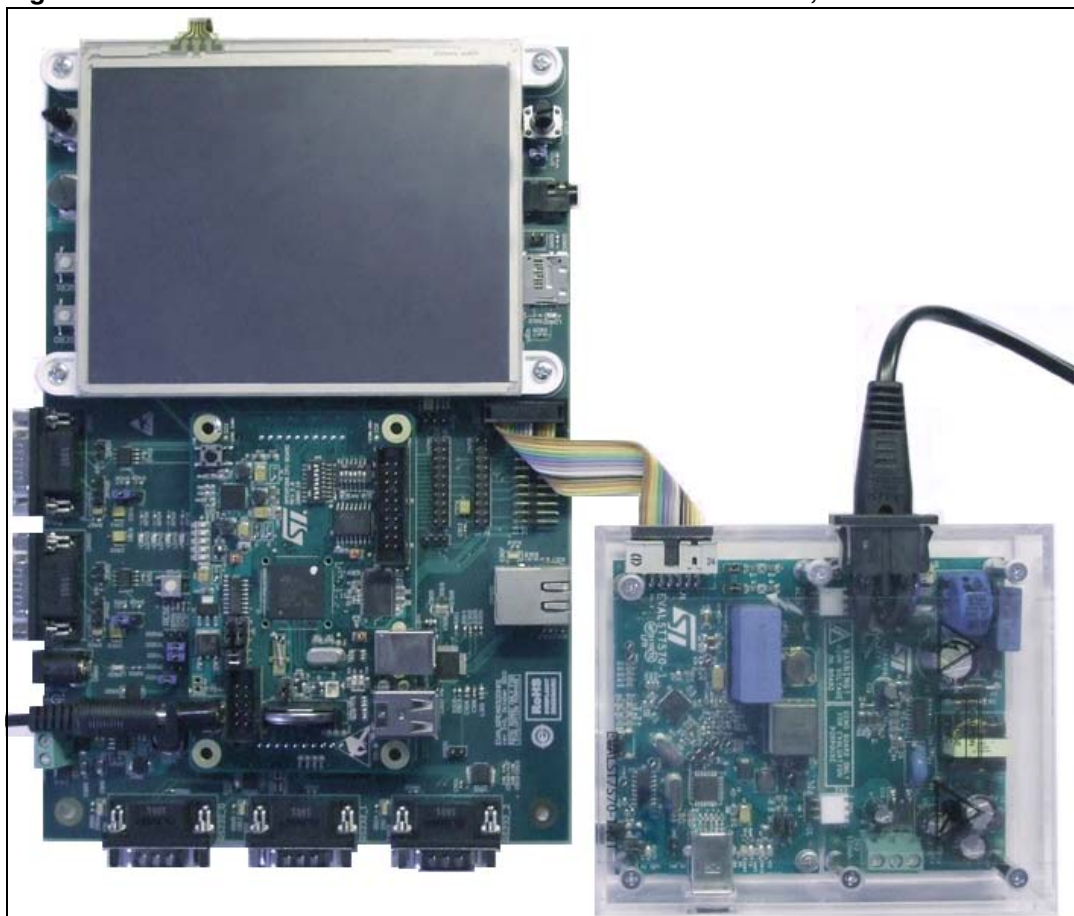
A.6 Any SPEAr3xx and ST7570, ST7580 or ST7590 via USB

Figure 21. Any SPEAr3xx and ST7570, ST7580 or ST7590 via USB



A.7 EVALSPEAR320HMI and ST7570, ST7580, ST7590 via UART

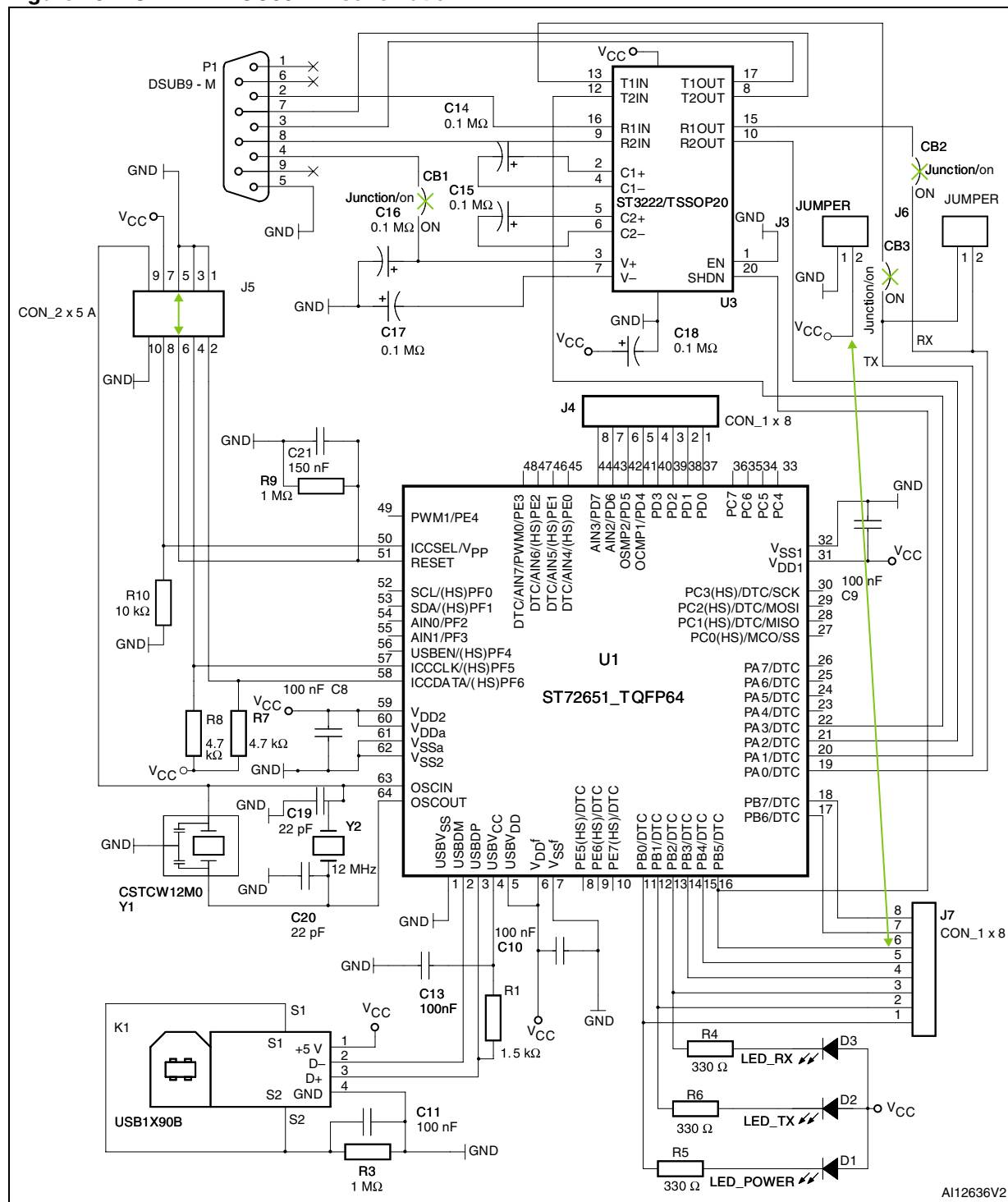
Figure 22. SPEAr320HMI and ST7570 via the unified connector, UART



Appendix B Additional schematics

B.1 STEVAL-PCC001V1

Figure 23. STEVAL-PCC001V1 schematic



B.2 Extension connectors at SPEAr320HMI board

Figure 24. SPEAr320HMI, CN701

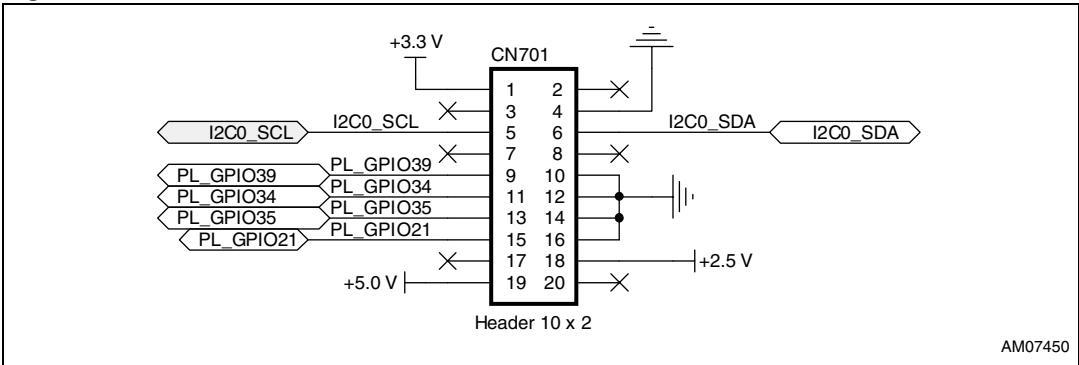
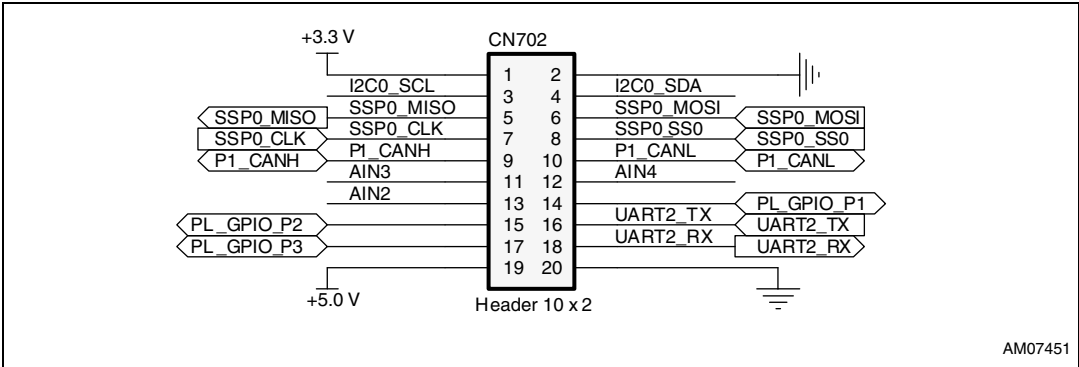


Figure 25. SPEAr320HMI, CN702



Appendix C Endnotes

1. The tri-states output pins of the FTDI chip FT232 are used on EVALST7590-1 in order to make it possible to use an external microcontroller to control the EVALST7590-1 board. (The FTDI chip should be also in reset when not connected to USB).
2. This interconnection does not implement signals for asynchronous communication from ST7590 to STM32.

Revision history

Table 7. Document revision history

Date	Revision	Changes
18-Apr-2011	1	Initial release.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2011 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com