

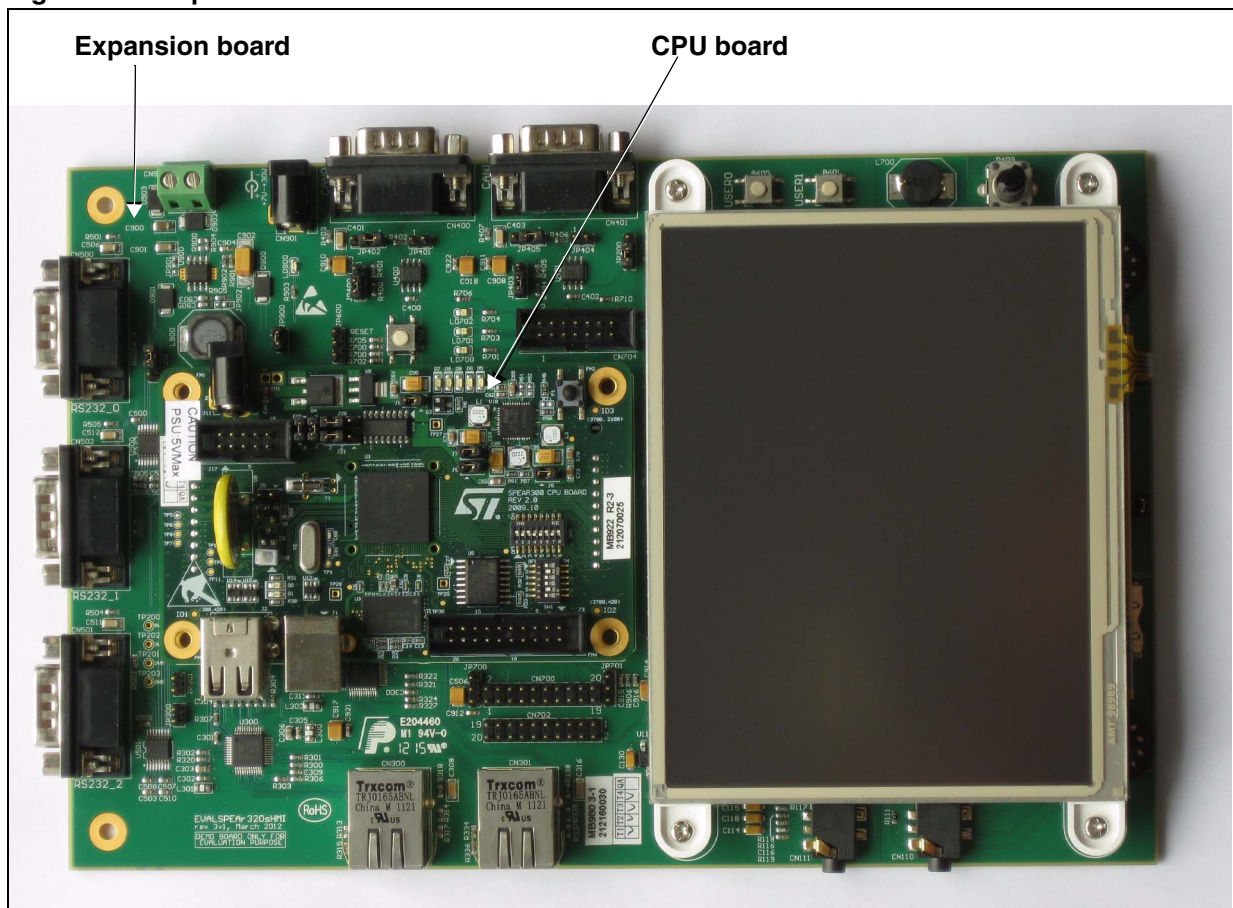
### Introduction

This document applies to the revision 2 EVALSP320SHMI expansion board.

This board is intended to be used in conjunction with a SPEAr320S CPU board (sold separately) to evaluate the SPEAr320S microprocessor with a variety of devices, especially in its RMII automation networking mode.

*Note:* The SPEAr320S CPU board order code is EVALSP320SCPU.

**Figure 1. Expansion board and CPU board**



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# 1 Features

- 2 x Ethernet RJ45 connectors (ST802RT1A)
- 1x LCD interface for 5.7" 640x480 EDT screen (ET057010DHU)
- 1x Unified LCD interface (EDT displays with Unified interface)
- 1x Resistive touch screen interface (STMPE811)
- 2 x CAN DB9 plug connectors
- 3 x RS232 DB9 plug connectors (ST3232EBTR)
- Onboard temperature sensor and potentiometer (STMPE811)
- 64 Kbit dual interface EEPROM: ISO 15693 and ISO 18000-3 mode 1 compliant contactless interface + I2C (M24LR64)
- 4Gb NAND Flash memory
- I2S stereo audio input and output
- Analog extension connector featuring 8 ADC lines
- General purpose extension connector with GPIOs and I2C functionality
- Unified Power Line modem (PLM) connector
- DC/DC converter L7986A (+24V/+5V)
- MicroSDcard socket
- 3 LEDs
- 2 general purpose buttons
- System reset button

# 2 Block diagram and layout

Figure 2. Expansion board block diagram

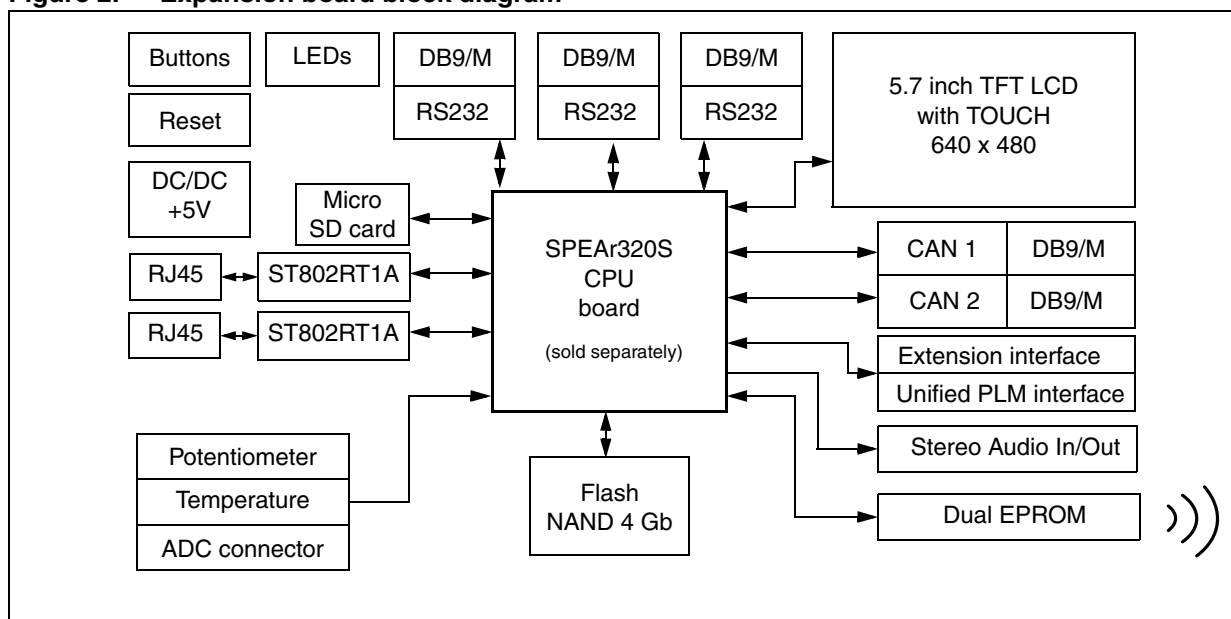
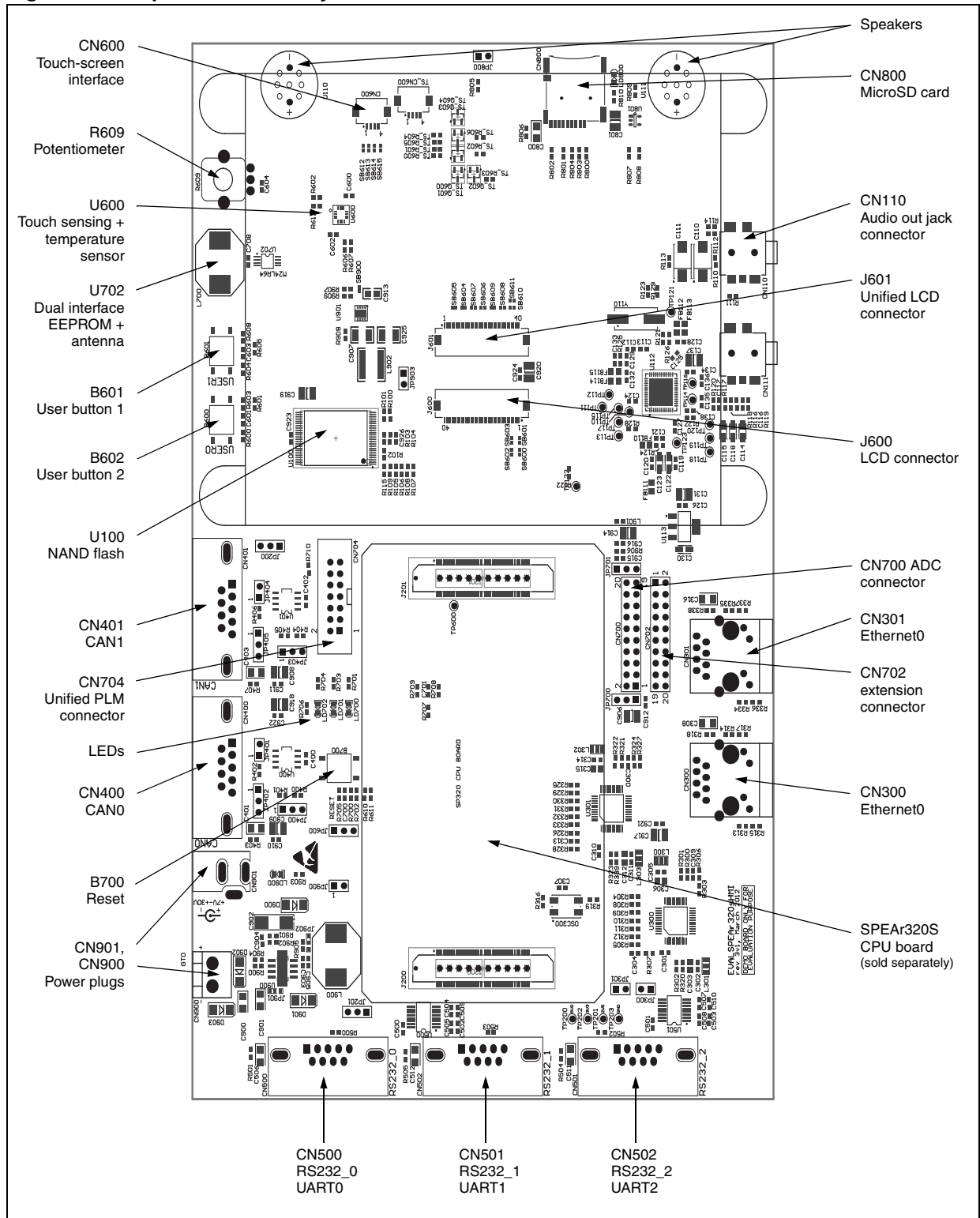


Figure 3. Expansion board layout



## 3 Getting started

### 3.1 Unpacking

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**Warning:** This board contains static sensitive devices.

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The EVALSP320SHMI evaluation board is shipped in protective anti-static packaging. Do not submit the board to high electrostatic potentials, and follow good practices for working with static sensitive devices.

- **Wear an anti-static wristband.** Wearing a simple anti-static wristband can help prevent ESD from damaging the board.
- **Zero potential.** Always touch a grounded conducting material before handling the board, and periodically while handling it.
- **Use an anti-static mat.** When configuring the board, place it on an anti-static mat to reduce the possibility of ESD damage.
- **Handle only the edges.** Handle the board by its edges only, and avoid touching board components.

### 3.2 Connecting

1. Carefully plug the CPU board into the expansion board.
2. On the EVALSP320SCPU board, set Switch 2 to parallel NAND 8 boot mode:  
Positions 1, 4, 6, and 7: Off      Positions 2, 3, 5, and 8: On
3. Connect a serial cable from the expansion board (connector CN500: RS232\_0/UART0) to the host PC (see [Figure 3: Expansion board layout](#)).
4. On the host PC running Windows or Linux, start the Terminal program.
5. Connect a power supply to the SPEAr320S HMI evaluation board as described in [Section 4.6: Power supply on page 16](#).
6. Apply power to the board. The Terminal program displays a sequence of boot messages followed by the Linux console prompt.

For more information, refer to user manual UM0844, *Getting started with Linux for SPEAr*, available at [www.st.com/spear](http://www.st.com/spear).

*Note:* In order to use the 5.7" TFT 680x480 LCD panel properly, the Linux kernel of LSP 3.2.5 must be rebuilt from source code through the "menuconfig" tool, by selecting the following configuration option:

```
Device Drivers -> Graphics Support -> Support for Frame Buffer Devices -> Arm  
Primecell PL110 support -> LCD Panel -> Emerging Display -> CLCD 5.7"  
TFT(680X480)
```

*This note does not apply when using the default pre-built binary images, since they are already configured for the 5.7" TFT 680x480 LCD panel.*



### 3.3 Booting

The SPEAr320S HMI evaluation board can boot a Linux kernel pre-installed in the parallel NAND Flash. At power on, the serial port outputs a brief header message with some uBoot information (uBoot version, SDK version, and some internal hardware information). At this point you can choose to:

- **Stop the system directly in uBoot:** Before the boot delay time expires (default is 3 seconds), press the spacebar on the host computer's keyboard.
- **Boot Linux:** The system boot is finished when the login prompt appears in the console. The default login user name for super user is *root*; no password is required.

## 4 Block descriptions and configurations

- [MicroSD card power up](#)
- [Ethernet on page 11](#)
- [TFT LCD with touch on page 11](#)
  - [Connecting an LCD on page 12](#)
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- [RS232 transceivers \(U500 and U501\) on page 16](#)
- [Power supply on page 16](#)
- [Dual interface EEPROM \(U702\) on page 17](#)
- [NAND Flash memory \(U100\) on page 17](#)
- [Audio output on page 17](#)
- [LEDs \(LD700 through LD703\) on page 17](#)
- [Reset button \(B700\) on page 18](#)

*Note:* See also: [Chapter 5: Connector pinouts on page 19](#)

### 4.1 MicroSD card power up

The MicroSD card connector is on the EVALSP320SHMI SDIO interface.

To power-up the MicroSD card properly:

1. Detect card insertion.  
Card detection is managed by the standard SDIO signal *SD\_CD*.
2. Enable the single channel power switch U801 by means of PL\_GPIO50 (active low).  
By default, U801 power output is disabled by the R808 pull-up resistor connected to the power switch enable pin.

JP800 controls the MicroSD card access that manipulates the MicroSD interface Write Protect signal. By default JP800 is closed, and the card is used in Write-Enabled mode.

See also: [MicroSD card connector \(CN800\) on page 26](#)

## 4.2 Ethernet

The board has two Ethernet PHYs (U300, U301) connected through the reduced-media-independent interfaces (RMII) to the Ethernet MAC on the CPU board processor.

Ethernet PHY default RMII addresses: 0x01 for U300 and 0x02 for U301

Two LEDs embedded in the RJ45 connectors (CN300, CN301) indicate the line status:

- The green LED is on whenever the Ethernet is linked.
- The yellow LED blinks during TX or RX activity.

[Table 1](#) lists the Ethernet PHY default configuration.

**Table 1. Ethernet PHYU300 default configuration**

Function	Default configuration
Auto negotiation	Enabled
10/100 Mbits	100 Mbits selected for auto negotiation advertisement
Half/Full duplex	Full duplex selected for auto negotiation advertisement
Internal Loopback	Disabled
Power down	Disabled (PHY is not in Power down)
MII/RMII mode	RMII selected

## 4.3 TFT LCD with touch




The expansion board has one 5.7" LCD screen that is attached to the internal SPEAr320 LCD controller.

### TFT LCD display characteristics

- Resolution: 640 x 480 pixels
- Display colors: up to 16.7M
- 24-bit RGB parallel interface

The LCD module has a white LED backlight and a resistive touch panel. The complete LCD module, including backlight, is connected to the 3.3 V power domain. LED backlight can be manually powered on or off using JP600; if JP600 is left open, the backlight can be powered by the microprocessor PWM signal (PWM2). See [Table 2](#).

**Table 2. LCD module backlight control**

Jumper	Description	Configuration
JP600	LCD backlight: on; Intensity: 100%	
	LCD backlight: off; Intensity: 0%	
	LCD backlight can be controlled using MPU PWM channel 0 Intensity: according to the PWM duty cycle Recommended signal operational frequency: 1.5 kHz	

### 4.3.1 Connecting an LCD

The expansion board has two physical interfaces for Emerging Display Technologies (EDT) LCDs:

- **J600**

- for ET057010DHU
- 24 bpp
- direct 8:8:8 RGB signaling

[Table 3](#) lists J600 configuration options.

See also [ET057010DHU LCD interface connector \(J600\) on page 21](#)

- **J601**

- for devices that have EDT displays with a unified interface
- 16 bpp

One bpp is normally not used, but this pixel is still output. It can be used as a bright bit to connect to the *least significant bit* (LSB) of R, G, and B components of a 6:6:6 TFT panel.

- direct 5:5:5 RGB

This interface can cover LCD screens from 3.5 to 7 inches (such as ET057090DHU and ET070080DH6).

[Table 4 on page 12](#) lists J601 configuration options.

See also [EDT unified LCD interface connector \(J601\) on page 21](#)

**Table 3. J600 configuration options (ET057010DHU)**

Jumper	Description	Configuration
<b>SB600, SB601:</b> Left/right internal shift register direction settings	STH->S01->...->S0960->STHO (Default)	SB600: open SB601: close
	STH->S0960->...->S01->STHO	SB600: close SB601: open
<b>SB602, SB603:</b> Up/down scan settings	Reverse scan	SB602: open SB603: close
	Normal scan (Default)	SB602: close SB603: open

**Table 4. J601 configuration options (unified interface displays)**

Jumper	Description	Configuration
<b>SB610, SB611:</b> Rotate settings	L/R: STH->S0960->...->S01->STHO U/D: Reverse Scan	SB610: open SB611: closed
	L/R: STH->S01->...->S0960->STHO U/D: Normal Scan (Default)	SB610: closed SB611: open
<b>SB604, SB605:</b> Blue LSB setting	Blue LSB bit connected to the blue MSB bit	SB604: open SB605: closed
	Intensity bit connected to the Blue LSB bit	SB604: closed SB605: open

**Table 4. J601 configuration options (unified interface displays) (continued)**

Jumper	Description	Configuration
<b>SB606, SB607:</b> Green LSB setting	Green LSB bit connected to the green MSB bit	SB606: open SB607: closed
	Intensity bit connected to the green LSB bit	SB606: closed SB607: open
<b>SB608, SB609:</b> Red LSB setting	Red LSB bit connected to the red MSB bit	SB608: open SB609: closed
	Intensity bit connected to the red LSB bit	SB608: closed SB609: open

### 4.3.2 Connecting a touch screen

See also: [STMPE811 touch screen connectors \(CN600 & TS\\_CN600\) on page 22](#)

The expansion board provides two ways to use the SPEAr320S touch screen interface.

- The first is based on the SPEAr320S internal Touch IP block, and can be used by means of the TS\_XXX block (in the schematics) and the TS\_CN600 interface connector.
- The second uses the standalone external touch screen controller, STMPE811 (U600). STMPE811 is interfaced by means of the I2C bus and interrupt output pin.

The STMPE811 has:

- A 4-wire touch screen controller (CN600)
- A multiplexed general purpose input/output (GPIO) port expander, or an 8-input, 12-bit ADC (the default configuration).
- Temperature sensor

The STMPE811 (U600) internal temperature sensor can be used for informative temperature measurements, such as a reference for compensation of the touch screen parameters.

Temperature measurement is optimized for temperatures from 0 to 85°C.

- User potentiometer

A 10 K $\Omega$  potentiometer is available on the board, connected to the analog input AIN0 of the STMPE811 (U600).

- User buttons

The remaining pins of the STMPE811 (U600) touch screen controller are used to service two user buttons (B600, B601) that are connected to the GPIO pins IO2 and IO3.

All temperature measurements, potentiometer voltage measurements, and button status information is available by means of the I2C bus.

Any of these tracked parameters can trigger a preconfigured interrupt event that is subsequently signaled to the SPEAr320S MPU by means of the STMPE811 Interrupt line.

The interrupt line can be connected either to PL\_GPIO30 (default) or to PL\_GPIO29. The configuration is done by jumpers JP200 and JP201.

Table 5. JP200, JP201 jumper configurations

Jumper	Description	Configuration
JP200	Connects the PL_GPIO30 to the CAN1_RX signal. CAN1 IP can be enabled and used by software.	1 2 3 
	Connects the PL_GPIO30 to the INT_STMPE811 interrupt line. CAN1 IP should be disabled and cannot be used. <b>(Default)</b>	1 2 3 
JP201	Connects the PL_GPIO29 to the UART1_TX signal. UART1 IP can be enabled and used by software. <b>(Default)</b>	1 2 3 
	Connects the PL_GPIO29 to the INT_STMPE811 interrupt line. UART1 IP should be disabled and cannot be used.	1 2 3 

## 4.4 CAN

The EVALSP320SHMI evaluation board supports two channels of CAN2.0A/B compliant CAN bus communication, based on a 3.3 V CAN transceiver.

High-speed mode, standby mode, and slope control mode are selected by setting JP400 and JP403 as shown in [Table 6](#) and [Table 7](#).

See also: [CAN DB9 plug connectors \(CN400 and CN401\) on page 19](#)

**Table 6. CAN0 transceiver settings**

Jumper	Description	Configuration
JP400	Standby mode	
	High-speed mode ( <i>Default</i> )	
	Slope control mode	
JP401	Installing JP401 enables the CAN0 terminal 120Ω resistor. Default: installed	

**Table 7. CAN1 transceiver settings**

Jumper	Description	Configuration
JP403	Standby mode	
	High-speed mode ( <b>Default</b> )	
	Slope control mode	
JP404	Installed, JP404 enables the CAN1 terminal 120Ω resistor. Default: installed	

## 4.5 RS232 transceivers (U500 and U501)

The board has three RS232 DB9 plug connectors; see also:

- [RS232/UART0 DB9 plug connector \(CN500\) on page 20](#)
- [RS232/UART2 DB9 plug connector \(CN501\) on page 20](#)
- [RS232/UART1 DB9 plug connector \(CN502\) on page 20](#)

Using reduced modem control signals, UART0 can fully utilize the U500 RS232 transceiver; the RS232\_0 signals are available through CN500.

*Note:* If the U500 RS232 transceiver is not soldered on the board, RS232\_TXD and RS232\_RXD signals can be brought in from the CPU board to the CN500 connector (see [Table 8](#)).

UART1 and UART2 have only RX/TX functionality, and are connected to the U501 RS232 transceiver; RS232\_1 signals are available from CN502, and RS232\_2 signals are available from CN501.

**Table 8. Bringing UART0/RS232 transceiver signals from the CPU board**

Jumper <sup>(1)</sup>	Description
JP20	Connects the RS232_TXD signal from the CPU board RS232 transceiver to CN500 (UART0) Default: Not installed
JP21	Connects the RS232_RXD signal from the CPU board RS232 transceiver to CN13 (UART0) Default: Not installed

1. Do *not* install if U10 is soldered to the expansion board.

## 4.6 Power supply

There are two ways to supply power to the SPEAr320S HMI evaluation board:

- Connect the +5 V voltage adapter (included in the EVALSP320SHMI package) to the J11 power voltage connector on the CPU board.
- Connect a 7 to 30 V DC power source (not included in the EVALSP320SHMI package) to either connector CN900 or connector CN901 on the expansion board.

The input voltage is connected to the DC/DC converter, U900 (either L7986A or L5973A, see [Table 9](#)).

The board is protected against overvoltage by the D903 Transil diode (SM6T33A), and against possible reverse polarity voltage (from an incorrect power plug-in) by the D902 Schottky diode (STPS3L40U).

See also: [Power supply connectors \(CN900 and CN901\) on page 26](#)

**Table 9. U900 DC/DC converter jumpers**






Jumper	Description	Configuration
JP900	Disconnects the +5V delivered from the DC/DC converter U900. Default: installed	



Table 9. U900 DC/DC converter jumpers (continued)

Jumper	Description	Configuration
JP901 (3-pin resistor)	Install to use L7986A ( <i>Default</i> )	
	Install to use L5973A	
JP902 (3-pin resistor)	Install to use L7986A ( <i>Default</i> )	
	Install to use L5973A	

## 4.7 Dual interface EEPROM (U702)

The expansion board has 64-Kbit EEPROM memory (M24LR64) with password protection and dual interface.

The M24LR64-R device is a dual-access, electrically erasable programmable memory (EEPROM) that features an I2C interface, and can be operated from a VCC power supply. It is a contactless memory, powered by the received 13.56 MHz carrier electromagnetic wave.

The M24LR64-R is organized as 8192 × 8 bits in the I2C mode, and as 2048 × 32 bits in the ISO 15693 and ISO 18000-3 mode 1 RF mode.

## 4.8 NAND Flash memory (U100)

The expansion board has a 4-Gbit (512Mx8bit with spare 16Mx8 bit) NAND flash memory device supplied from the 3.3V domain. This memory has a x8 interface, and is divided into blocks that can be erased independently; it is possible to preserve desired data while erasing data that is no longer of interest.

The device contains 4096 blocks, composed of 64 pages.

## 4.9 Audio output

The SPEAr320s HMI board is equipped with an I2S audio interface that is handled by an onboard STA529 audio codec. You can use this interface to evaluate stereo audio output and also stereo audio input. Output is available either through the onboard speakers (U110, U111) or via the stereo 3.5 mm audio jack connector (CN110). The audio output volume levels are controlled by software, acting on the dedicated STA529 register interface. The audio input is available via the stereo 3.5 mm audio jack connector (CN111).

## 4.10 LEDs (LD700 through LD703)

There are 3 general purpose LEDs on the top of the board. An LED turns on when its related GPIO pin is driven high.

**Table 10. General purpose LEDs**

GPIO pin	LED
PL_GPIO47	LD700
PL_GPIO48	LD701
PL_GPIO49	LD702

### 4.11 Reset button (B700)

The manual reset button on top of the board resets the microprocessor on the CPU board. To disconnect the reset button from the CPU board input reset signal, unsolder resistor R702.

### 4.12 Setting ADC conversion limits

- Lower limit: pin CN700-19, jumper JP700
- Upper limit: CN700-1, jumper JP701

See also: [General purpose ADC connector CN700 on page 23](#)

**Table 11. JP701, JP700 jumper configurations**

Jumper	Description	Configuration						
JP701	Connects the expansion board +2V5_ADC ADC supply voltage to the CPU board pin ADC_VREFP ( <i>Default</i> )	<table border="0"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>●</td><td>●</td><td>●</td></tr> </table>	1	2	3	●	●	●
	1	2	3					
●	●	●						
Connects the external ADC expansion supply voltage to the CPU board pin ADC_VREFP	<table border="0"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>●</td><td>□</td><td>□</td></tr> </table>	1	2	3	●	□	□	
1	2	3						
●	□	□						
JP700	Connects the expansion board ADC supply voltage domain GND to the CPU board pin ADC_VREFN ( <i>Default</i> )	<table border="0"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>□</td><td>□</td><td>●</td></tr> </table>	1	2	3	□	□	●
	1	2	3					
□	□	●						
Connects the external ADC expansion GND (lower limit) supply voltage to the CPU board pin ADC_VREFN	<table border="0"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>●</td><td>□</td><td>□</td></tr> </table>	1	2	3	●	□	□	
1	2	3						
●	□	□						

## 5 Connector pinouts

### 5.1 CAN DB9 plug connectors (CN400 and CN401)

Figure 4. CAN DB9 plug connectors (CN400 and CN401)

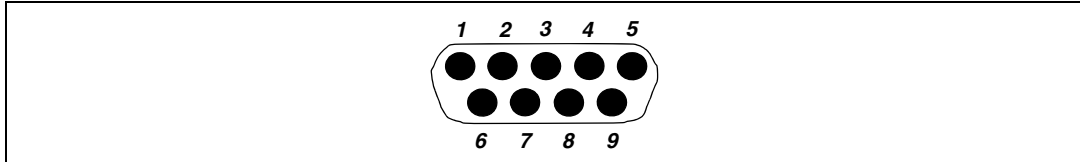


Table 12. CAN DB9 plug connector pinouts (CN400 and CN401)

Pin	Description	Pin	Description
1, 4, 8	NC	7	CANH
2	CANL	3, 6	GND
5	Chassis	9	Optional supply voltage (+3V3 or +5.0V)

### 5.2 Ethernet RJ45 connector (CN300, CN301)

Figure 5. Ethernet RJ45 connectors (CN300, CN301)

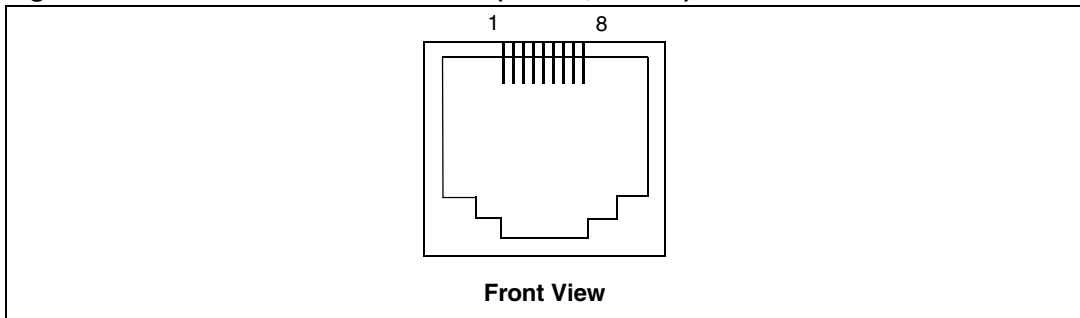


Table 13. Ethernet RJ45 connector pinout (CN300, CN301)

Pin	Description	Pin	Description
1	TxData+	5	TxData
2	RxData+	6	NC
3	NC	7	RxData
4	NC	8	NC

### 5.3 RS232/UART0 DB9 plug connector (CN500)

Figure 6. RS232/UART0/2/3 DB9 plug connectors (CN500, CN501, CN502)

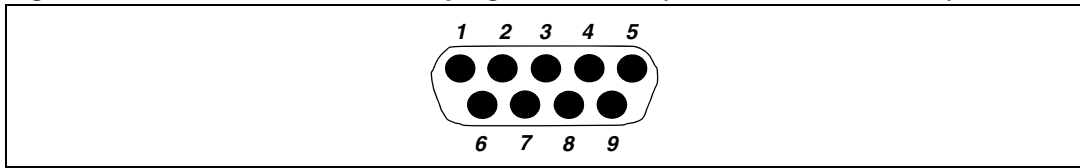


Table 14. RS232/UART0 DB9 plug connector pinout (CN500)

Pin	Description	Pin	Description
1	NC (R500 R79 can interconnect this pin with pins 4, 6)	6	Connected to pin 4
2	UART0_RX	7	UART0_RTS
3	UART0_TX	8	UART0_CTS
4	Connected to pin 6	9	NC
5	GND		

### 5.4 RS232/UART2 DB9 plug connector (CN501)

Table 15. RS232/UART2 DB9 plug connector pinout (CN501)

Pin	Description	Pin	Description
1	NC (R502 can interconnect this pin with pins 4, 6)	6	Connected to pin 4
2	UART2_RX	7	Connected to pin 8
3	UART2_TX	8	Connected to pin 7
4	Connected to pin 6	9	NC
5	GND		

### 5.5 RS232/UART1 DB9 plug connector (CN502)

Table 16. RS232/UART1 DB9 plug connector pinout (CN502)

Pin	Description	Pin	Description
1	NC (R503 can interconnect this pin with pins 4, 6)	6	Connected to pin 4
2	UART1_RX	7	Connected to pin 8
3	UART1_TX	8	Connected to pin 7
4	Connected to pin 6	9	NC
5	GND		

## 5.6 ET057010DHU LCD interface connector (J600)

Figure 7. LCD interface connectors (J600, J601)

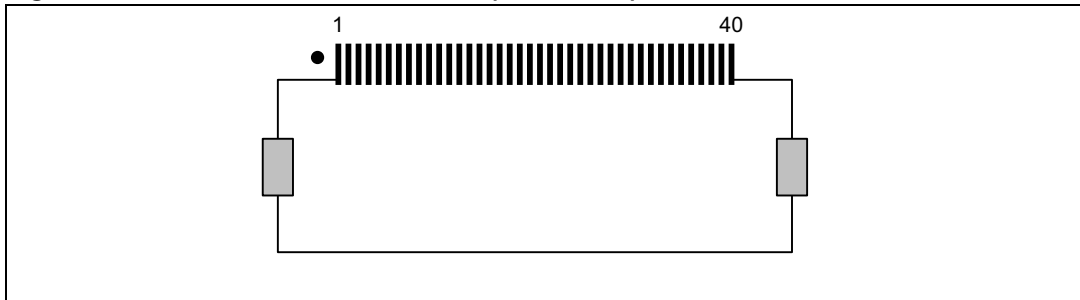


Table 17. ET057010DHU LCD interface connector pinout (J600)

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	L/R	11	CLLP (HSYNC)	21	CLD7 (R7)	31	CLD17 (B1)
2	U/D	12	CLCP (DCLK)	22	CLD8 (G0)	32	CLD18 (B2)
3	GND	13	GND	23	CLD9 (G1)	33	CLD19 (B3)
4	GND	14	CLD0 (R0)	24	CLD10 (G2)	34	CLD20 (B4)
5	+3V3	15	CLD1 (R1)	25	CLD11 (G3)	35	CLD21 (B5)
6	+3V3	16	CLD2 (R2)	26	CLD12 (G4)	36	CLD22 (B6)
7	CLPOWER (PWCTRL)	17	CLD3 (R3)	27	CLD13 (G5)	37	CLD23 (B7)
8	LCD_LEDCTRL (LEDCTRL)	18	CLD4 (R4)	28	CLD14 (G6)	38	nRESET
9	CLAC (ENB)	19	CLD5 (R5)	29	CLD15 (G7)	39	GND
10	CLFP (VSYNC)	20	CLD6 (R6)	30	CLD16 (B0)	40	+3V3

## 5.7 EDT unified LCD interface connector (J601)

Table 18. EDT Unified LCD interface connector pinout (J601)

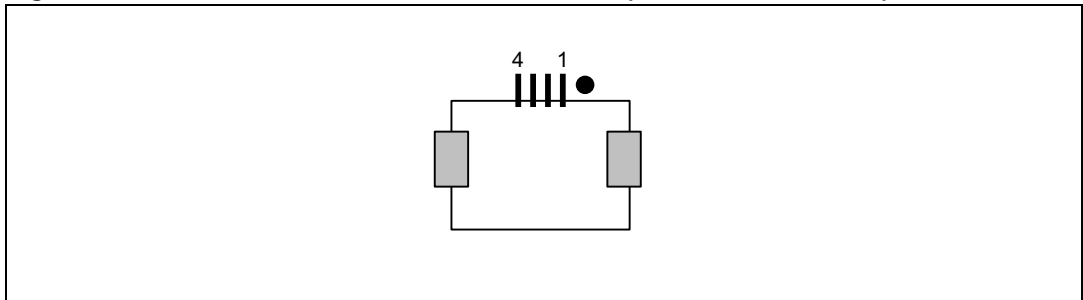
Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	11	CLD14 (B2)	21	GND	31	CLFP (VSYNC)
2	GND	12	CLD13 (B1)	22	CLD5 (R5)	32	CLAC (ENB)
3	+3V3	13	Intensity Bit / CLD17 (B0)	23	CLD4 (R4)	33	Rotate
4	+3V3	14	GND	24	CLD3 (R3)	34	NC
5	CLPOWER (PWCTRL)	15	CLD11 (G5)	25	CLD2 (R2)	35	GND
6	LCD_LEDCTRL (LEDCTRL)	16	CLD10 (G4)	26	CLD1 (R1)	36	+3V3
7	nRESET	17	CLD9 (G3)	27	Intensity Bit / CLD5 (R0)	37	Touch_YU
8	CLD17 (B5)	18	CLD8 (G2)	28	CLCP (DCLK)	38	Touch_XR

**Table 18. EDT Unified LCD interface connector pinout (J601)**

Pin	Description	Pin	Description	Pin	Description	Pin	Description
9	CLD16 (B4)	19	CLD7 (G1)	29	GND	39	Touch_YD
10	CLD15 (B3)	20	Intensity Bit / CLD11 (G0)	30	CLLP (HSYNC)	40	Touch_XL

### 5.8 STMPE811 touch screen connectors (CN600 & TS\_CN600)

**Figure 8. STMPE811 touch screen connectors (CN600 & TS\_CN600)**



**Table 19. STMPE811 touch screen connector pinout (CN600 & TS\_CN600)**

Pin	Description	Pin	Description
1	Touch_YU	3	Touch_YD
2	Touch_XR	4	Touch_XL

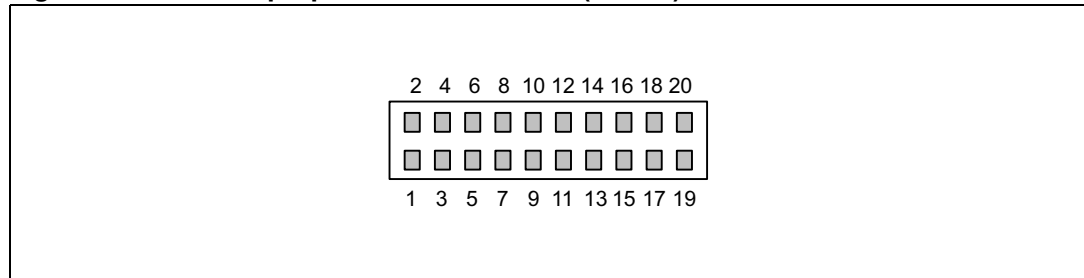
### 5.9 General purpose ADC connector CN700

Connector CN700 has eight analog input lines available.

When using the ADC connector, ensure the following relationship between the pins:

0V ≤ CN700-1 ≤ CN700-3 – CN700-17 ≤ CN700-19 ≤ +2.5V  
 GND ≤ ADC\_VREFN ≤ AIN0 – AIN7 ≤ ADC\_VREFP ≤ +2V5ADC

**Figure 9. General purpose ADC connector (CN700)**

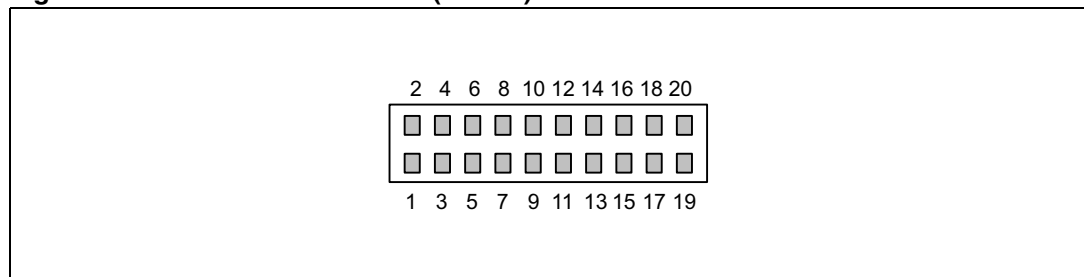


**Table 20. General purpose ADC connector pinout (CN700)**

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	ADC VREF negative or GND using JP8	6	GND	11	AIN4	16	GND
2	GND	7	AIN2	22	GND	17	AIN7
3	AIN0	8	GND	23	AIN5	18	GND
4	GND	9	AIN3	24	GND	19	ADC VREF positive or +2V5 using JP7
5	AIN1	10	GND	25	AIN6	20	GND

### 5.10 Extension connector (CN702)

**Figure 10. Extension connector (CN702)**



**Table 21. Extension connector pinout (CN702)**

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	+3V3	6	SSP0_MOSI	11	NC	16	UART2_TX
2	GND	7	SSP0_CLK	12	UART0_TX	17	NC
3	I2C_SCK <sup>(1)</sup>	8	SSP0_SS0	13	NC	18	UART2_RX

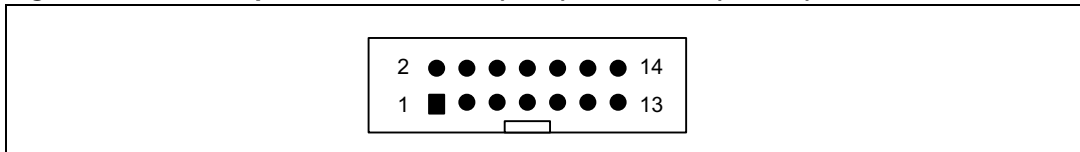
**Table 21. Extension connector pinout (CN702)**

Pin	Description	Pin	Description	Pin	Description	Pin	Description
4	I2C_SDA <sup>(1)(2)</sup>	9	NC	14	UART0_RX	19	+5V0
5	SSP0_MISO	10	NC	15	NC	20	GND

1. R708, R709 -Pull-ups for the SCLK and SDA line of I2C
2. R104, C80 -RC filter for the SDA line (R707, C701)

## 5.11 Unified power line modem (PLM) connector (CN704)

**Figure 11. Unified power line modem (PLM) connector (CN704)**



**Table 22. Unified power line modem (PLM) connector pinout (CN704)**

Pin	Description	Pin	Description
1	+3V3	8	NC
2	NC	9	PL_GPIO48
3	UART2_RX	10	GND
4	NC	11	PL_GPIO49
5	UART2_TX	12	GND
6	NC	13	INRESET
7	PL_GPIO47	14	GND



## 5.12 Stereo 3.5 mm audio jack connector (CN110, CN111)

Figure 12. Stereo 3.5mm Audio Jack connector CN110/CN111

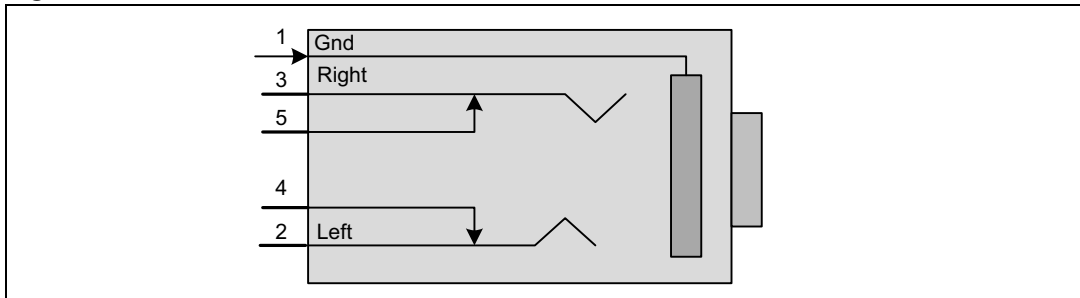


Table 23. CN110 connector pinout

Pin number	Description
1	GND
2	Left speaker output channel
3	Right speaker output channel
4	Left speaker (switch)
5	Right speaker (switch)

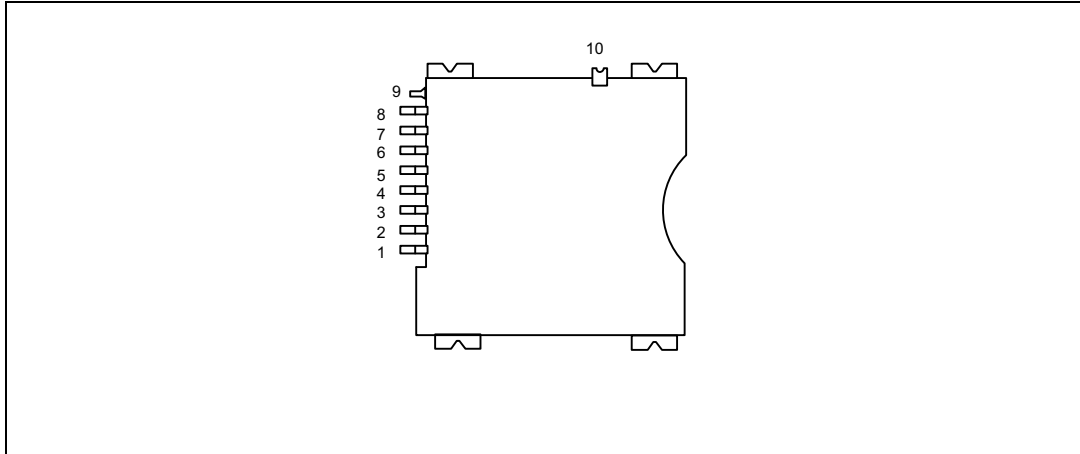
Table 24. CN111 connector pinout

Pin number	Description
1	GND
2	Left input channel
3	Right input channel
4	NC
5	NC

### 5.13 MicroSD card connector (CN800)

See also: [MicroSD card power up on page 10](#).

**Figure 13. MicroSD card connector (CN800)**

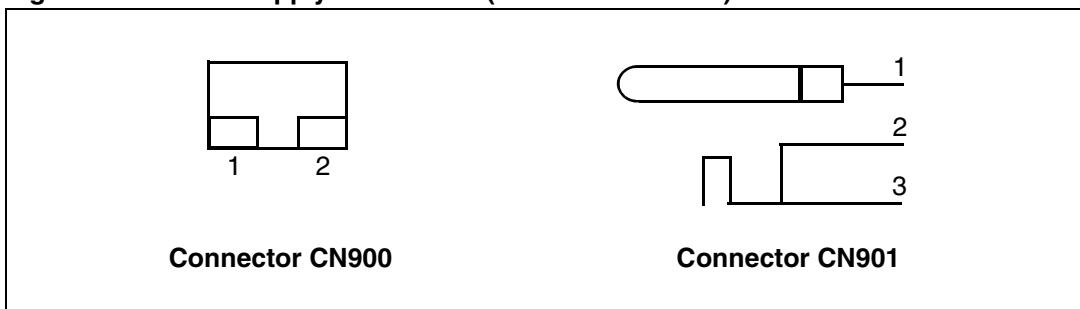


**Table 25. MicroSD card connector pinout (CN800)**

Pin number	Description	Pin number	Description
1	SDAT2 (PL_GPIO45)	6	GND
2	SDAT3 (PL_GPIO46)	7	SDAT0 (PL_GPIO43)
3	SD_CMD (PL_CLK4)	8	SDAT1 (PL_GPIO44)
4	+3V3 (from U801, single-channel power switch)	9	GND
5	SDCLK (PL_CLK2)	10	SD_CD (PL_GPIO51)

### 5.14 Power supply connectors (CN900 and CN901)

**Figure 14. Power supply connectors (CN900 and CN901)**



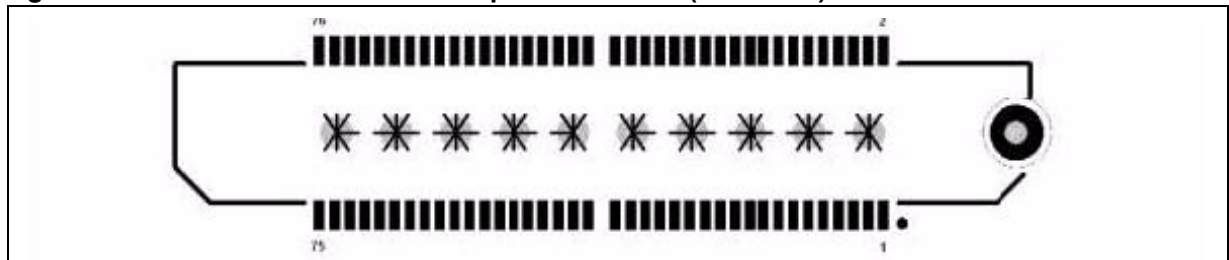
**Table 26. Power supply connector pinouts (CN900 and CN901)**

CN900		CN901	
Pin	Description	Pin	Description
1	24V DC	1	24V DC
2	GND	2	GND
		3	GND

### 5.15 SPEAr320S CPU board 86-pin connectors (J1 and J2)

The two 86 pin connectors J1 and J2 are used to connect the expansion board with the SPEAr320S CPU board.

**Figure 15. SPEAr320S CPU board 86-pin connectors (J1 and J2)**



**Table 27. SPEAr320S CPU board connector J1 pinout**

Pin	Description	Pin	Description	Pin	Description
1	NC	30	SSP_MOSI	59	RMII0_TXD1
2	+5V0	31	RMII1_TX_EN	60	nRESET
3	NC	32	RMII0_RX_ER	61	SD_CD
4	+5V0	33	RMII1_RX_ER	62	NC
5	NC	34	SSP_CLK	63	RMII_MDIO
6	+5V0	35	RMII_MDC	64	NC
7	NC	36	SSP_MISO	65	SSP_SS0
8	+5V0	37	RMII1_CRSDV	66	NC
9	UART0_TX	38	I2C_SCL / PL_GPIO4	67	UART2_TX
10	SDAT1	39	RMII0_RXD1	68	NC
11	UART0_RX	40	I2C_SDA / PL_GPIO5	69	UART2_RX
12	I2S_CLK	41	RMII0_CRSDV	70	+3V3
13	RS232_TXD	42	NC	71	NC
14	I2S_LR	43	PL_GPIO36 / TS_X	72	+3V3
15	RS232_RXD	44	NC	73	NC
16	PWM0	45	I2S_TX	74	+3V3
17	I2S_RX	46	NC	75	NC
18	UART1_TX	47	I2S_MCLK	76	+3V3

**Table 27. SPEAr320S CPU board connector J1 pinout (continued)**

Pin	Description	Pin	Description	Pin	Description
19	SDAT0	48	NC	77	GND
20	PWM1	49	CAN1_TX	78	GND
21	PL_GPIO34 / PWM2	50	+2V5	79	GND
22	CAN1_RX	51	CAN0_RX	80	GND
23	CAN0_TX	52	+2V5	81	GND
24	UART1_RX	53	RMII1_TXD0	82	GND
25	RMII0_TX_EN	54	+2V5	83	GND
26	RMII0_RXD0	55	RMII_REF_CLK	84	GND
27	RMII1_RXD0	56	+2V5	85	GND
28	RMII0_TXD0	57	RMII1_TXD1	86	GND
29	RMII1_RXD1	58	INRESET		

**Table 28. SPEAr320S CPU board connector J2 pinout**

Connector J2					
Pin	Description	Pin	Description	Pin	Description
1	LED1 / PL_GPIO47	30	CLD21	59	CLD9
2	+3V3	31	PL_GPIO_B2	60	AIN4
3	LED3 / PL_GPIO49	32	CLD12	61	CLD8
4	FSMC_D05	33	PL_GPIO_B0	62	GND
5	FSMC_RDY/BSY	34	CLD10	63	CLD5
6	SDAT3	35	PL_GPIO_B3	64	AIN5
7	FSMC_RE	36	CLD2	65	CLD4
8	FSMC_CMD_LE	37	CLD23	66	GND
9	FSMC_D04	38	CLD18	67	CLD0
10	FSMC_D07	39	CLD20	68	AIN6
11	SDAT2	40	CLD3	69	SD_CMD
12	FSMC_D02	41	CLD19	70	GND
13	LED2 / PL_GPIO48	42	ADC_VREFN	71	SD_SDWP
14	CLPOWER	43	CLD16	72	AIN7
15	SD_Power_EN	44	AIN0	73	SDCLK
16	CLFP	45	CLD17	74	GND
17	FSMC_CS0	46	GND	75	CLCP
18	CLAC	47	CLD13	76	ADC_VREFP
19	FSMC_WE	48	AIN0	77	GND
20	CLLE	49	CLD14	78	GND
21	FSMC_ADDR_LE	50	GND	79	GND

Table 28. SPEAr320S CPU board connector J2 pinout (continued)

Connector J2					
Pin	Description	Pin	Description	Pin	Description
22	FSMC_D01	51	CLD11	80	GND
23	FSMC_D03	52	AIN2	81	GND
24	CLLP	53	CLD6	82	GND
25	FSMC_D06	54	GND	83	GND
26	CLD22	55	CLD7	84	GND
27	FSMC_D00	56	AIN3	85	GND
28	CLD15	57	CLD1	86	GND
29	PL_GPIO_B1	58	GND		

## Appendix A Board components

**Table 29. EVALSP320SHMI board components**

Description		Designator	Ordering information	Qty
ST1S31	4 A peak step-down switching regulator	U901	ST: ST1S31	1
L7986A	DC/DC converter	U900	ST: L7986A	1
STMPS2141STR	Single channel power switch	U801	ST: STMPS2141STR	1
M24LR64	64 Kbit EEPROM with password protection & dual interface	U702	ST: M24LR64-R DW 6T	1
STMPE811	Advanced resistive touch screen controller	U600	ST: STMPE811QTR	1
ST3232EBTR	3.3V/5V Dual RS232 transceiver w/ Int. Cap.	U500, U501	ST: ST3232EBTR	2
SN65HVD230	CAN transceiver	U400, U401	Farnell: 8452148	2
ST802RT1A	10/100 Fast Ethernet 3.3 V transceiver	U300, U301	ST: ST802RT1A	2
ST LD1117S18TR	STM low drop fixed positive voltage regulator 1.8 V 800 mA	U113	ST: LD1117S18TR	1
STA529	STMicroelectronics 2x100 mW audio amplifier I2S in-out	U112	STA529Q	1
KSSG1708	Kingstate - KSSG1708 - transducer, speaker	U110, U111	Farnell: 1502738	2
Hynix semiconductor - HY27UF084G2B-TPCB - memory, Flash NAND 4 GB, TSOP48		U100	Farnell: 1712426	1
20k	Resistor	R909	Farnell: 1692455	1
8k2	Resistor	R908	Farnell: 9332324	1
62k5	Resistor	R907	Farnell: 9331417	1
47R	Resistor	R906	Farnell: 1646283	1
47K	Generic resistor	R905	Farnell: 1632440	1
1K28	Generic resistor	R904	Farnell: 1631324	1
1K5	Generic resistor	R903	Farnell: 1632406	1
1K0	Generic resistor	R707	Farnell: 1632391	1

Table 29. EVALSP320SHMI board components (continued)

Description		Designator	Ordering information	Qty
ALPS - 29 0016 - POTENTIOMETE R, 10KB	Variable resistor	R609	Farnell: 1191741	1
100R	Generic resistor	R603, R608, R705, R901	Farnell: 1632390	4
120R	Generic resistor	R402, R406	Farnell: 1514716	2
1M	Generic resistor	R318, R338, R403, R407, R501, R504, R505, R806	Farnell: 1631320	8
220R	Generic resistor	R314, R315, R335, R336, R701, R704	Farnell: 1646159	6
2K	Generic resistor	R313, R317, R334, R337	Farnell: 1632414	4
5K6	Generic resistor	R306, R327	Farnell: 1514773	2
91K	Generic resistor	R303, R324	Farnell: 1646361	2
1K2	Generic resistor	R300, R305, R321, R326	Farnell: 1632396	4
330R	Generic resistor	R124, R703, R810	Farnell: 1646224	3
2K2	Generic resistor	R118, R301, R302, R304, R307, R308, R309, R310, R311, R312, R322, R323, R325, R328, R329, R330, R331, R332, R333, R401, R405	Farnell: 1632417	21
4K7	Generic resistor	R116, R117, R119, R120, R125, R600, R604, R700, R708, R709	Farnell: 9367691	10
0R	Generic resistor	R111, R112, R114, R121, R122, R126, R127, R128, R500, R502, R503, R601, R605, R702, R706, R710	Farnell: 1573911	16
33R	Generic resistor	R105, R106, R107, R108, R109, R115, R319	Farnell: 9331050	7
10K	Generic resistor	R100, R101, R102, R103, R104, R123, R316, R320, R339, R400, R404, R602, R606, R607, R610, R611, R800, R801, R802, R803, R804, R805, R807, R808, R809, R902	Farnell: 1601277	26
CSX750FJC50.00 0M-UT	25Mhz oscillator SG-210SCB	OSC300	Farnell: 1611846	1
Red	Typical red, green, yellow, amber GaAs LED	LD800, LD900	Farnell: 1226392	2
Yellow	Typical red, green, yellow, amber GaAs LED	LD701	Farnell: 1226420	1
Green	Typical red, green, yellow, amber GaAs LED	LD700, LD702	Farnell: 1226373	2
3.3uH	Inductor EPCOS B82464Z4333M000	L902	Farnell: 1195259	1
BEAD	Inductor	L901	Farnell: 1515680	1

Table 29. EVALSP320SHMI board components (continued)

Description		Designator	Ordering information	Qty
33uH	Inductor EPCOS B82464Z4333M000	L900	Farnell: 1644514	1
4.7uH	BOURNS - SDR1006- 4R7ML - POWER INDUCTOR 4.7UH 7.3A 20% 40MHZ	L700	Farnell: 9315209	1
Ferrite bead	Ferrite bead	L300, L301, L302, L303	Farnell: 9528172	4
3-pin jumper wire		JP200, JP201, JP400, JP402, JP403, JP405, JP600, JP700, JP701	Farnell: 1593412	9
2-pin jumper wire		JP300, JP301, JP401, JP404, JP800, JP900	Farnell: 1593411	6
CON40		J600	Farnell: 1435694	1
SAMTEC-MIT-038		J200, J201	Samtec: MIT-38- 01-F-D	2
BLM21	Ferrite Murata 600 Ohm/100 MHz 200 mA 0.35 hm 0805	FB110, FB111, FB112, FB113, FB114, FB115	BLM21BD601SN 1D (Murata)	6
ST: SM6T33A	Transil diode	D903	ST: SM6T33A	1
ST: STPS3L40UF	Schottky diode	D900, D901, D902	ST: STPS3L40UF	3
GM: K375A	Input power, 4.4V-36V	CN901	Farnell: 224960	1
MKDS1.5-5.08 or GM: ARK103/2	2-pin terminal block, 5.08 mm pitch	CN900	Farnell: 3041529	1
PJS008-2000		CN800	YAMAICHI: PJS008-2003 (www.manudax.fr )	1
GM: MLW14G	HSD connector VN808, VN340, header, 7-pin, dual row, right angle	CN704	Farnell: 1099256	1
Header 10X2	Header, 10-pin, dual row	CN700, CN702	Farnell: 1593446, Farnell: 1593454	2
FPC, SMT, 1MM, 4WAY	FPC, SMT, 1MM, 4WAY	CN600	Farnell: 1245278	1
DB9-male	DB9-male connector	CN400, CN401, CN500, CN501, CN502	Farnell: 1653975	5
Pulse: J00-0086	RJ45 Ethernet connector with integrated magnetic, pulse: J00-0086	CN300, CN301	Pulse: J00- 0086NL	2
JACK- STEREO3.5MM SMD	3.5mm audio jack stereo 5 Contacts SMD	CN110, CN111	DigiKey: CP1- 3515SJCT-ND	2



Table 29. EVALSP320SHMI board components (continued)

Description		Designator	Ordering information	Qty
22uF	Capacitor	C925	Farnell: 1844357, C3225X7R1C22 6M TDK	1
1uF	Capacitor	C913	Farnell: 1833845	1
4.7uF	Capacitor	C907	Farnell: 1907366, C3225X7R1E10 6K TDK	1
100uF	Polarized capacitor (CDE)	C902	Farnell: 1696568	1
470nF	Capacitor	C901	Farnell: 1414741	1
10uF ceramic /35V	Capacitor	C900	Farnell: 1611967	1
1nF	Capacitor	C708, C904	Farnell: 1759088	2
47pF	Capacitor	C701, C905	Farnell: 1710243	2
10nF/500V	Capacitor	C308, C316, C401, C403, C506, C511, C512, C800	Farnell: 1216456	8
10nF	Capacitor, generic capacitor	C307, C604, C903, C915, C916	Farnell: 1709948	5
10uF/X5R ceramic	Generic capacitor	C303, C306, C312, C315	Farnell: 1463381	4
220pF	Capacitor	C133	Farnell: 1520286	1
22uF/6.3V	Polarized capacitor (B)	C131, C137, C801, C906, C908, C909, C914, C917, C918, C919, C920	Farnell:1432361	11
82pF	Capacitor	C129	Farnell: 1759065	1
100nF	Capacitor, generic capacitor	C121, C124, C125, C126, C127, C128, C132, C134, C135, C136, C138, C300, C301, C302, C304, C305, C309, C310, C311, C313, C314, C400, C402, C500, C501, C502, C503, C504, C505, C507, C508, C509, C510, C600, C601, C602, C603, C700, C910, C911, C912, C921, C922, C923, C924, C926	Farnell: 4532004	46
100pF	Capacitor	C116, C117	Farnell: 1759066	2
10 uF 10V	Tantalum capacitor 10 uF 10% 10 V 3216	C114, C115, C118, C122, C123, C130	Farnell: 9751041	6
12pF	Generic capacitor	C119, C120	Farnell 1710173	2
220 uF 10V	Polarized capacitor (CDE)	C110, C111	Farnell: 1135081	2
BTN	SE pushbutton	B600, B601, B700	Farnell: 177807	3

## Appendix B License agreements

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## Revision history

**Table 30. Document revision history**

Date	Revision	Changes
16-Jul-2012	1	Initial version.

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