

<b>Board Description</b>		<b>hitex</b>  DEVELOPMENT TOOLS
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## **Board Description** **LPC1850EVA-A2** **Evaluation Board**

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## Document management

### Document history

Version	Status	Date	Responsible	Reason for change
0.1	in progress	05.01.2011	Ma	New creation
0.2		27.04.2011	Ma	Changes to fit PCB Rev. -A2
1.0	Release	04.05.2011	Ma	Minor changes
1.01		15.09.2011	Ma	Minor changes

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## Purpose of the document

This document describes the jumpers and connectors on the NXP LPC1850EVA-A2 evaluation board developed by Hitex.

## Authoring tools

MS-Word

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# 1 Overview

The evaluation board has the following features:

- CPU: LPC1850 (ARM Cortex-M3)
- Power-over-Ethernet
- Ready for energy consumption analysis with PowerScale of the complete board, the CPU-core and other peripherals
- SDRAM, SRAM, parallel flash, NAND flash, qSPI flash
- Temperature sensor, SD card, media-connector
- CAN, UART, Ethernet, USB (Host, Device, OTG)
- Debug with standard ARM JTAG and JTAG + Trace connector
- Ready for Jennic ZigBee module
- Small onboard display and NXP standard display / LCD interface
- Touch buttons and LEDs
- Wrap field for user circuits
- Audio IN and OUT, microphone IN, headphones OUT and a D-Class amplifier
- Ready for 4x ADC1415 analog-to-digital converters with user filtering option

# 2 Power

## 2.1 USB

VBUS (+5V) can be supplied by either X13 or X2/X9. Please note that USB current is limited to 100mA. If the LPC1850 is running a program, which enumerates at the USB-Bus, the current limit can be set to 500mA (within that program)

## 2.2 AC/DC Power Supply

A wall mount (or similar) AC/DC supply with 5V (DC) output can be connected to X14. Inner plug is positive, outer shell is negative. Jumper JP33 has to be set to pos 1-2.

## 2.3 Power-over-Ethernet (PoE)

A Power-over-Ethernet module (U33) is populated on the evaluation board. Jumper JP33 has to be set to pos 2-3. Maximum output power of the module is 5V - 9W.

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### 3 Connectors

Designator	Function	Description								
X1	UART	D-SUB9 female connector for UART								
X2	USB0	USB-B (device) connector								
X3	Media	This connector is to connect media devices like iPod and others with the Hitex Mediacable HK279. Please note: HK279 is not delivered within the LPC1850 evaluation board, but can be purchased separately at <a href="http://www.ehitex.de">www.ehitex.de</a>								
X4	JTAG	Shrouded connector for attaching a standard ARM debugger (2.54mm pitch, 20 pins)								
X5	JTAG/Trace	Connector for attaching an ARM Cortex-Debug+Trace debugger (1.27mm pitch, 20 pins)								
X6	SD Card	Not mounted SD card connector								
X7	CANopen	D-SUB9 male connector with CANopen pinout								
X8	D-Class amplifier	Screw connector for the D-Class amplifier output <table><tr><th>Pin</th><th>Function</th></tr><tr><td>1</td><td>GND</td></tr><tr><td>2</td><td>OUTB</td></tr><tr><td>3</td><td>OUTA</td></tr></table>	Pin	Function	1	GND	2	OUTB	3	OUTA
Pin	Function									
1	GND									
2	OUTB									
3	OUTA									
X9	USB0	USB-microAB (OTG) connector								
X10	USB0	USB-A (host) connector								
X11	LCD	LCD connector for attaching an external LCD with NXP's standard LCD interface								
X13	USB1	USB-B (device) connector								
X14	Power	A wall mount (or similar) AC/DC supply with 5V (DC) output can be connected to X14. Inner plug is positive, outer shell is negative								
X15	Ethernet/PoE	An Ethernet device for communication and/or a PSE device for powering the LPC1850 Evaluation Board can be connected to X15								
LI1	Line In	Connector to the input amplifier of U10 When no plug is connected, the signal is automatically routed to connector X3								
LI2	Line Out	Connector from the output amplifier of U10 When no plug is connected, the signal is automatically routed to connector X3								
HP	Headphone	Connector from the headphones output amplifier of U10								
MIC	Microphone	Connector to the microphone input amplifier of U10								
SW1	Reset	Global hardware reset								
SW2	ISP	Switch to pull EXTBUS_A9 low								
SW4	Wakeup	In combination with SV22 pins 7-8, pull WAKEUP0 low								
T1	Touch1	Touch button connected to U14								
T2	Touch2	Touch button connected to U15								
T3	Touch3	Touch button connected to U16								
T4	Touch4	Touch button connected to U17								

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## 4 Mutual Exclusive Functions

In general, all signals with double names like “Ethernet/SD card” show that this signal is used in more than one function.

### 4.1 Ethernet, SD Card

The Ethernet (MII) is multiplexed with the SD card interface (SDIO).

Therefore jumper array SV3 and SV6 is used to connect ENET\*-signals to the Ethernet PHY (U1) as well as jumper array SV12 connects SDIO\*-signals to the SD card interface (X6).

In the schematic the double used pins can be identified by their double name ENET\_\*/SDIO\_\*.

Please note: The SD card connector is not populated and not supported by LPC1850 devices.

### 4.2 CAN Interface, I2S (Audio)

The CAN interface is multiplexed with some I2S functionality. The audio outputs can't be used when the CAN interface is used.

Jumper array SV9 routes the I2S signals to the Audio-Codec UDA1380 (U10) and SV10 routes them to the D-Class amplifier (U19).

Jumper array SV1 pins 1-2 and 3-4 connect the CAN transceiver (U7) to the signals.

In the schematic the double used pins can be identified by their double name CAN1\_TD/I2S\_TX\_SDA and CAN1\_RD/I2S\_TX\_WS.

### 4.3 UART, Memories and UART-Bootloader

The UART bootloader pins at the CPU are multiplexed with the external bus interface and so with all onboard memories. Also there is only one UART transceiver available (U6).

At jumper array SV1 the user can set the jumpers to pins 5-6 and 7-8 for normal UART operation. If set to pins 9-10 and 11-12 the UART transceiver will be connected to signals EXTBUS\_A13 and EXTBUS\_A12. To avoid short circuit and damage to the CPU and UART transceiver, the user should not use the external bus interface while using UART bootloader on those pins.

Please note: UART bootloader is not supported by the LPC1850 evaluation board.

### 4.4 Ext. LCD and ULPI

The ULPI (USB1) interface is brought out to a pin-header for easier access. User should take care not to use these signals in parallel with the external LCD.

### 4.5 USB0

The USB0 functionality is brought out to a HOST (X10), a DEVICE (X2) and an OTG (X9) connector. Use only one connector at a time.

### 4.6 USB1

The USB1 functionality is brought out to a DEVICE (X13) connector. Also there is the option to connect the media connector X3 (USB lines) to the bus by closing jumper array SV28.

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#### **4.7 Media Connector and Audio**

If no 3,5mm audio plug is inserted into Audio IN (LINEIN1) or AUDIO OUT (LINEIN2), the corresponding signals of the audio codec (U10) will automatically connect to the media connector (X3).

#### **4.8 SSP0**

Signals SSP0\_x are connected to Jennic ZigBee module (M1), to the internal LCD (LCD1), and to the fast ADCs (U11, U20, U21, U22).

#### **4.9 SPI**

Signal SPI\_SIO3 is connected to the qSPI device (U18) and to the I2C-EEPROM (U12).  
Use SV19 pins 1-2 or SV4 pins 9-10 to connect either to U12 or U18.



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#### 4.10 Default settings

Jumper	Function	Description
SV1	CAN	Pin 1-2 and 3-4 are open No CAN interface (mutual exclusive to input-data of U10 and U19)
	UART	Pin 5-6 and 7-8 are closed UART is connected to UART1 interface of the CPU
	UART bootloader	Pin 9-10 and 11-12 are open The external bus interface is not available when using the UART bootloader. Please note: UART bootloader is not supported by the LPC1850 evaluation board.
SV3 and SV6	Ethernet (MII)	SV3 and SV6 are completely closed (pin 1-2, 3-4, etc.) Ethernet is available in MII-Mode Ethernet is mutual exclusive to SD card.
SV4	SPI flash (qSPI)	SV4 is completely closed (pin 1-2, 3-4, etc.) Pin 9-10 is mutual exclusive to SV19 pin1-2
SV5	USB power	SV5 is completely closed (pin 1-2, 3-4, etc.)
SV9	UDA_RST	Pin 1-2 is closed, Reset of U10
	Pin 3-4	Open, not connected
	I2S_TX*	Pins 5-6, 7-8, 9-10 are closed (mutual exclusive to CAN)
	I2S_RX*	Pins 11-12, 13-14, 15-16 are closed
	I2C0*	Pins 17-18, 19-20 are closed
SV10	I2C0*	Pins 1-2, 3-4 are closed
	I2S_TX*	Pins 5-6, 7-8, 9-10 are closed (mutual exclusive to CAN)
SV11	U11	Signals for fast ADCs
SV12	SD card	SV12 is open and is mutual exclusive to Ethernet Please note: The SD card connector is not populated and not supported by LPC1850 devices.
SV13	U20	Signals for fast ADCs
SV14	U24	Signals for fast ADCs
SV15	U21	Signals for fast ADCs
SV16	U22	Signals for fast ADCs
SV18	JENIC_RST	Pin 15-16 is closed
	SPI	Pins 1-2, 3-4, 5-6, 7-8 are closed Pin 9-10 is open (jumper only set to one pin)
	Pin 11	SPISWP
	Pin 13	SPISSM
SV19	I2C0*	Pins 3-4, 5-6 are closed
	SPI_SIO3	EVENT# (output), pin 1-2 is open (jumper only set to one pin) Mutual exclusive to SV4 9-10
SV22	WAKEUP0	Pos 7-8 is closed Pos 1-2, 3-4, 5-6 are open
SV28	Media Connector USB	Pos 1-2, 3-4, 5-6 are open (jumpers only set to one pin)

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## 5 Jumpers

Jumper	Function	Description
JP1	R42	Connects R42 to GND when set to position 1-2 Default: pos. 1-2
JP2	USB0_ID	Pulls USB0_ID permanently to GND Default: pos. 1-2 (closed)
JP3	USB0_IND1	Connects USB0_IND1 to LED D10 Default: pos. 1-2 (closed)
JP4	USB1_IND1	Connects ADC3_DAV to LED D9 Default: pos. 1-2 (closed)
JP5	Boot control	-tbd-, strapping option for the CPU Default: pos. 1 (open)
JP9	SD power	Switches power to the SD card either by CPU (signals SDIO_POW) or permanently (position 1-2) Default: open Please note: The SD card connector is not populated and not supported by LPC1850 devices.
JP10	LCD	Clock return from LCD Default: pos. 1 (open)
JP11	RTC	With this jumper the CPU can set signal RTC_ALARM to power up or shut down its IO +3V3IO or the complete +3V3 power of the board. Default: pos. 1-2
JP15	GPIO_IRQ	Connects GPIO expander (U35) IRQ-signal to the CPU Default: pos. 1-2 (closed)
JP16	PowerScale	At this point a Hitex PowerScale probe can be connected for current sensing the +3V3C (CPU Core power) and +3V3IO (CPU IO power) Default: pos. 1-2 (closed)
JP17	DBGEN	-tbd- Default: pos. 1 (open)
JP19	LCD	Switches signals LCDLE or permanently +3V3 to pin 29 of the external LCD Interface LCDLE = PWM or fixed signal from CPU +3V3 = Full brightness Default: pos. 1-2
JP20	LCD	LCDVDDEN -tbd- Default: pos. 1-2 (closed)
JP21	LCD	Switches +5V to the LCD backlight Default: pos. 1-2 (closed)
JP22	LCD	LCDVEEEN -tbd- Default: pos. 1-2 (closed)
JP23	Write protect	Write protect of parallel flash (U5) Default: pos. 1 (open)
JP25	Write protect	Write protect of NAND flash (U4) Default: pos. 1 (open)

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JP30	PowerScale	At this point a Hitex PowerScale probe can be connected for current sensing of the whole board. Default: pos. 1-2 (closed)
JP31	PowerScale	At this point a Hitex PowerScale probe can be connected for current sensing the +3V3 power. Default: pos. 1-2 (closed)
JP32	CAN 120R	Connects a 120OHM termination resistor to the CANH/CANL lines Default: pos. 1-2 (closed)
JP33	Power	Switches between Power-over-Ethernet or 5V wall plug for board supply. Default: pos. 1-2
JP43	VBAT	Connects either a battery (not mounted) or +3V3C (Core power) to the VBAT pin of the CPU. Also hardware reset pullup R41 is connected to that power. Default: pos. 2-3

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## Related documents

- Schematics SCM\_LPC1850EVA-A2-2.pdf, 2011-04-27
- Assembly BPL\_LPC1850EVA-A2-2.pdf, 2011-04-02