UM11158

LPCXpresso55S69 Development Board

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Document information

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Abstract	LPCXpresso55S69 user manual

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0.1	20180816	Initial internal release
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1. Introduction

The LPCXpresso™ family of boards provides a powerful and flexible development system for NXP's LPC Cortex®-M family of MCUs. They can be used with a wide range of development tools, including NXP's MCUXpresso IDE. The LPCXpresso55S69 board (order code LPC55S69-EVK) is the evaluation and development platform for the LPC556x family of MCUs.

See http://www.nxp.com/demoboard/LPCXpresso55S69 for more information on this board, including tutorial videos, development software and board hardware design files. **Note: the schematics for this board indicate components that are not installed by default with a red cross.**

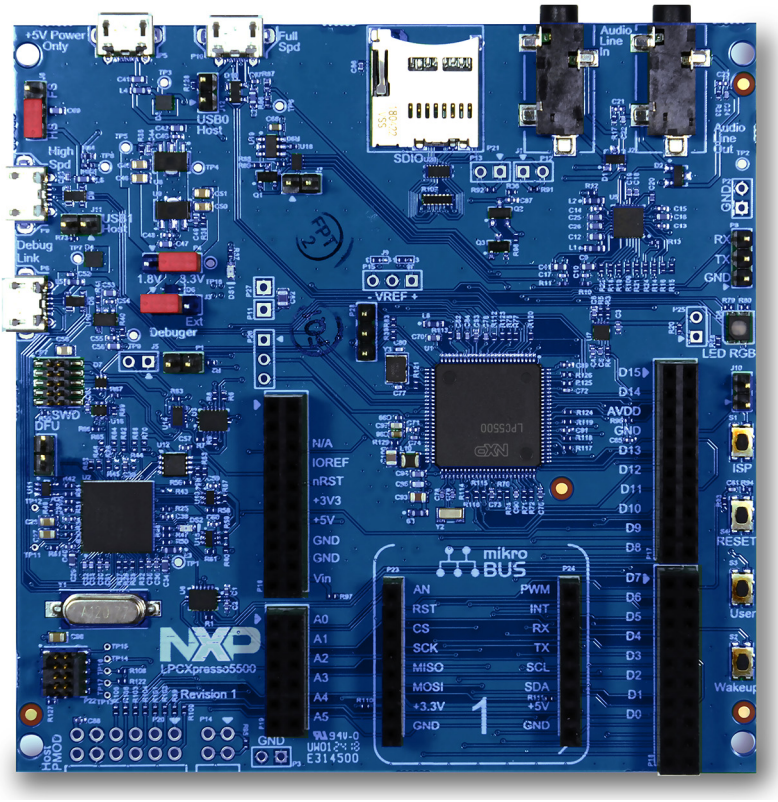

Fig 1. LPCXpresso55S69

The LPCXpresso55S69 includes the following features:

- LPC55S69 Dual Cortex-M33 core processor
- Onboard, high-speed USB, Link2 debug probe with CMSIS-DAP and SEGGER J-Link protocol options [Note: J-link support to follow by product general release]
- UART and SPI port bridging from LPC55S69 target to USB via the onboard debug probe
- Optional external debug probes with trace option (10 or 20 pin Cortex-M connectors)

- RGB user LED
- Reset, ISP, User/Wakeup and user buttons
- Multiple Expansion options, including Arduino UNO, Mikroe Click and PMod
- Micro SD card slot
- NXP MMA8652FCR1 accelerometer
- Stereo audio codec with line in/out
- High / full speed USB port with micro A/B connector for the host or device functionality Reset button

2. Board layout and Settings

Figure 2 shows the layout of the board (top side), indicating location of the connectors and buttons, while Figure 3 shows locations of jumpers and headers. Table 1 provides a description of connectors, jumpers, LEDs and buttons.

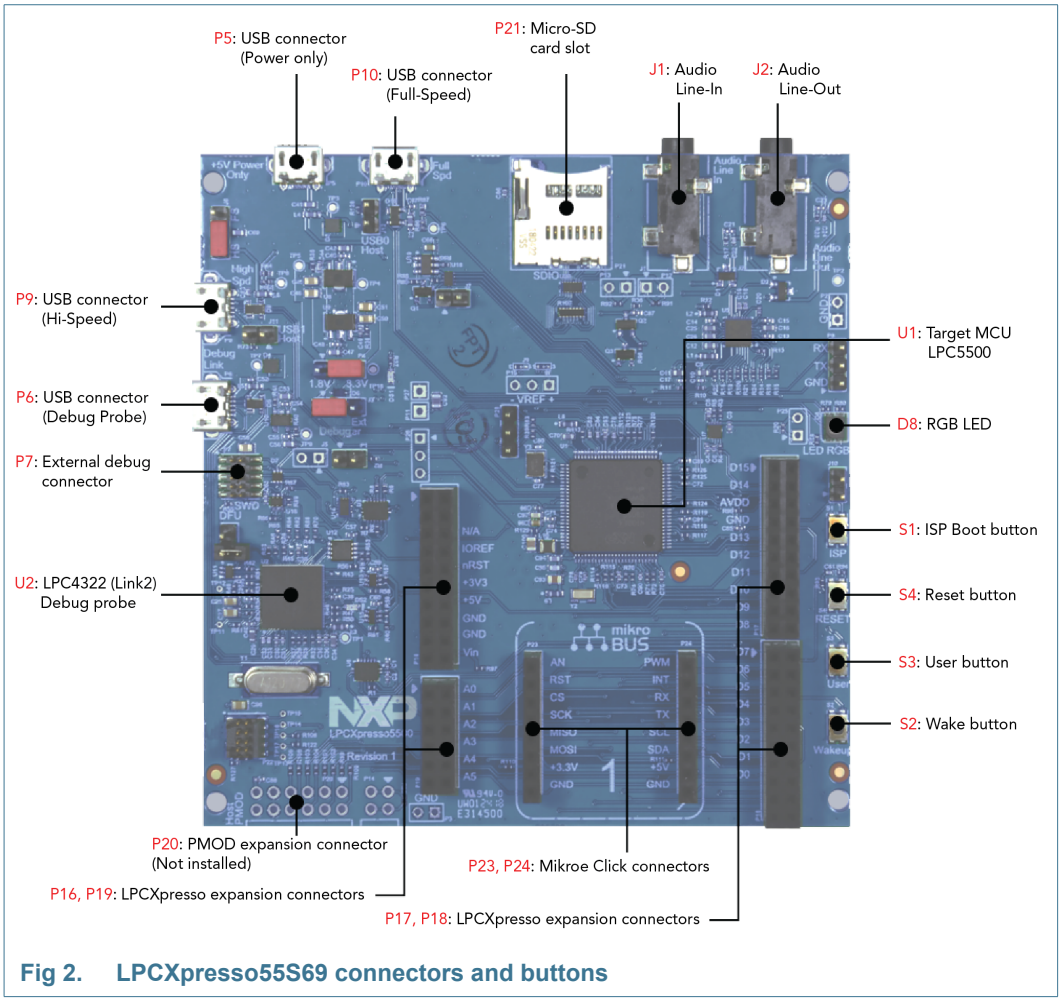

Fig 2. LPCXpresso55S69 connectors and buttons

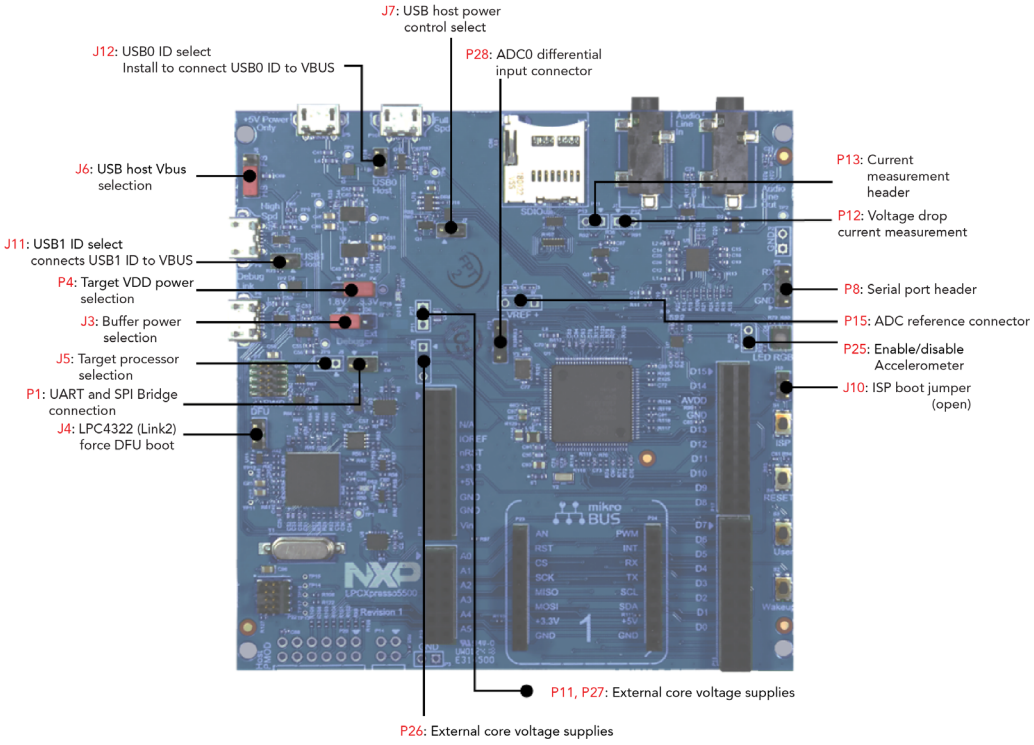

Fig 3. LPCXpresso55S69 jumpers and headers

Table 1. Indicators, buttons, connectors and LEDs

Circuit reference	Description	Default	Reference
DS1	Target power indicator LED	n/a	n/a
DS2	Link2 boot LED	n/a	[4.1]
D8	RGB User LED	n/a	n/a
J1	Audio codec line input jack	n/a	
J2	Audio codec line output jack	n/a	
J3	Buffer Power Selection For On-board Target place in position 1-2 (default) For Off-board Target place in position 2-3	1-2	

Table 1. Indicators, buttons, connectors and LEDs

Circuit reference	Description	Default	Reference
J4	Link2 (LPC43xx) force DFU boot. Leave this jumper open (default) for Link2 to follow the normal boot sequence. The Link2 will boot from internal flash if image is found there. With the internal flash erased the Link2 normal boot sequence will fall through to DFU boot. Install this jumper to force the Link2 to DFU boot mode. Use this setting to reprogram the Link2 internal flash with a new image (using the LPCScrypt utility) or to use the MCUXpresso IDE with CMSIS-DAP protocol. Note that the Link2 flash is pre-programmed with a version of CMSIS-DAP firmware by default.	Open	
J5	Target processor selection for the on-board Debug Probe. Jumper open (default) the LPC55S69 Target SWD interface enabled. Normal operating mode where the Target SWD is connected to either the on-board Link2 Debug Probe or an external Debug Probe. Jumper shunted, the LPC55S69 Target SWD interface is disabled. Use this setting only when the on-board Link2 Debug Probe is used to debug an off-board target MCU.	Not installed	
J6	USB host Vbus selection Note that only one of USB0 or USB1 can be configured as a USB host port at any given time (this is a board restriction, not a limitation of the LPC55S69.) Install jumper in position 1-2 for USB1 (High Speed) to provide Vbus (i.e. enable USB host capability) (Default) Install jumper in position 2-3 for USB0 (Full Speed) to provide Vbus (i.e. enable USB host capability)	1-2 (USB1)	
J7	USB host power control selection This jumper selects routing of USB port power and overcurrent detect from either the USB0 or USB1 ports of the LPC55S69. Note that only one of USB0 or USB1 can be configured as a USB host port at any given time (this is a board restriction, not a limitation of the LPC55S69.) Leave open when using USB1 (High Speed) as a USB host (Default) Install jumper for USB0 (Full Speed) to provide Vbus (i.e. enable USB host capability)	Installed (USB1)	
J10	ISP boot jumper for LPC55S69. Installing this jumper ties port P0_5 to ground, forcing the LPC55S69 into ISP mode whenever it is reset.	Open	n/a
J11	USB1 ID selection: USB1 ID is normally pulled to ground through a 100Kohm resistor. Installing this jumper connects USB1 ID to VBUS.	Open	
J12	USB0 ID selection: USB1 IDis normally pulled to ground through a 100Kohm resistor. Installing this jumper connects USB0 ID to VBUS.	Open	
P1	When open (default), the "Bridge" UART and SPI connections from the Link2 probe are driven to the LPC55S69 target. Install P1 when using the SPI interface at connector P20 and/or FC0 UART at P8. Note that this disables the Link2 SPI and UART (bridge) connections.	Open	

Table 1. Indicators, buttons, connectors and LEDs

Circuit reference	Description	Default	Reference
P4	Target VDD power selection. For 3.3V operation place jumper in position 2-3 For 1.8V operation place jumper in position 1-2 Note that the accelerometer on this board will only operate correctly when 3.3V operation is used.	2-3 (3.3V)	
P5	External +5V power Micro USB connection for power to the LPC55S69 target and peripheral circuitry (excluding Link2 Debug Probe).	n/a	
P6	Link2 Debug Probe connector Micro USB type B connection for the on-board Link2 Debug Probe. Note: do not use this connection when using an external Debug Probe.	n/a	
P7	10 pin external debug probe / off board target connector This standard Cortex-M debug connector is used either to (1) connect and off-board debug probe or (2) to connect an external debug target.	n/a	
P8	Serial port header 0.1” header providing convenient access to Flexcom 0 USART (the USART used for ISP boot). When using this port install jumper P1 to disable the Link2 connection to this port.	n/a	
P9	LPC55S69 USB1 (high speed) micro AB port connector	n/a	
P10	LPC55S69 USB0 (full speed) micro AB port connector	n/a	
P11, P26, P27	Headers for external core voltage supplies (not installed). Do not use these headers unless instructed to do so by NXP.	n/a	
P12	This header can be used to measure the voltage drop across a 2.43 ohm resistor connected in line with the LPC55S69 VDD supply, and hence measure current consumption.	Not installed	
P13	Current measurement header for LPC55S69. This header is in line with the VDD supply of the LPC55S69, with a zero ohm resistor (R92) installed in parallel with it. To measure supply current to the LPC55S69, remove R92 and insert an ammeter between the pins of P13.	Not installed	
P14	Host header for LPC55S69 reset control. This header is provided for convenient connection of a reset control input to the LPC55S69 from an off-board host.	Not installed	
P15	ADC reference connector This header provides an access point to inject positive and negative voltage references for the LPC55S69 ADC. An external positive reference may be connected to pin 1. Note that a solder jumper / zero ohm resistor must be in position 2-3 on J8. An external negative reference may be connected to pin 3. Note that a solder jumper / zero ohm resistor must be in position 2-3 on J9.	VREFP=VDD VREFN=GND	
P16-P19	LPCXpresso expansion connectors, including Arduino R3 compatible site. Provides connectivity to SPI (high speed SPI), USART (Flexcom 2), I2C (Flexcom 4 and Flexcom 1), I2S (Flexcom 7), ADC0, GPIO and PLU pins.	n/a	
P20	PMod expansion connector / Host interface connector This connector provides access to the SPI (Flexcom 3) and I2C (Flexcom 1) ports that support LPC55S69 ISP mode, along with 2 GPIO lines. When using the SPI port at this connector ensure jumper P1 is installed to disable the connection to the Link2 debug probe.	Not installed	

Table 1. Indicators, buttons, connectors and LEDs

Circuit reference	Description	Default	Reference
P21	SD card slot 8-bit, full size card slot connected to the LPC55S69 SD0 interface. Supports 3.3V operation only.	n/a	
P23, P24	Mikroe Click site Provides connectivity to standard Mikroe Click connectors. Shares SPI, ADC, I2C and USART connections with the P16-P19 expansion connectors.	n/a	
P25	A header may be added at P25 to provide a convenient way to enable/disable the on-board accelerometer. If this header is used, remove the zero ohm resistor R20, which is in parallel with this header.	Not installed	
P28	ADC0 differential input connector. This header provides access to the ADC0 negative and positive inputs, plus a ground pin.	n/a	
S1	ISP/User button When pressed, this button connect sport pin P0_5 to ground. Hold this button down while pressing and releasing Reset (S4) to force the LPC55S69 into ISP mode. Port P0_5 may also be reconfigured as a GPIO in user application code to enable this button to be used for other, user-defined purposes. A 2.2k ohm pull up is used to pull P0_5 high when the button is not pressed.	n/a	
S2	Wake/User button This button, when pressed, pulls P1_18 to ground. A 100K ohm pull up to VDD is connected to P1_18.		
S3	User button This button, when pressed, pulls P1_9 to ground. A 100K ohm pull up to VDD is connected to P1_9, and this port is also connected to pin 1 of expansion connector P18.		
S4	Reset button When pressed, reset is applied to the LPC55S69, expansion connector (Arduino reset) P16, the Mikroe Click site reset, and U14 (debug connector P7 reset when debugging an off-board target).		

3. Getting started

NOTE: Pre-production boards released are not set up with final out-of-box demo code, and debug probes listed may not yet support this product. The J-link version for Link2 to support this product is not yet available.

This section describes how to first power up the board and then how to start a first debug session using the MCUXpresso SDK. The board is pre-programmed with a simple program indicating that the target MCU is running. Connect a micro USB cable from connector P5 to a host computer or power supply to power-up the board and run this program.

The following debug probes can be used with those development and the board (check compatibility between debug probe and IDE used, including support for Arm Cortex M33 cores):

- On-board debug probe (LPC4322 “Link2”)
- LPC-Link2 (OM13054) debug probe from NXP or Embedded Artists

- SEGGER J-link probes (version 9 and older)
- P&E Micro probes
- Keil ULINK2 probes
- IAR i-Jet probes

Other debug probes may also be supported by IAR and Keil tools; refer the websites of these companies.

3.1 Starting a debug session using the on-board (Link2) Debug Probe

By default, the LPCXpresso55S69 is configured to use the on-board Debug Probe (Link2) to debug the on-board target (LPC55S69), using the CMSIS-DAP debug protocol pre-programmed into the Link2 Flash memory. The MCUXpresso IDE or other development tools that support the CMSIS-DAP protocol can be used in the default configuration. Check with your toolchain vendor for availability of specific device support packs for the LPC55S69 series devices.
Note that when using the MCUXpresso IDE, the on-board Link2 can also be booted in DFU mode by installing a jumper on J4; if this is done then the IDE will download CMSIS-DAP to the probe as needed. Using DFU boot mode will ensure that the most up-to-date / compatible firmware image is used with the MCUXpresso IDE.
NOTE: if the Debug Probe is set up to boot in DFU mode, the USB bridge functions (virtual COM port) and Debug Probe features will not be available if the board is not first initialized by the MCUXpresso IDE.

3.1.1 Installation steps for use with MCUXpresso IDE

Download and install the MCUXpresso IDE.

Configure and download an SDK package (with the MCUXpresso IDE tool chain option selected) from the MCUXpresso SDK Builder utility (http://mcuxpresso.nxp.com).

Recommended: Install J4 to force the Link2 Debug Probe to boot in DFU mode (see notes above).

Ensure jumper -- is fitted in position -- (local target powered), and -- is not installed (target SWD enabled). These are the default positions set during board manufacture.

Connect the board to the USB port of your host computer, connecting a micro USB cable to connector P6. The board will boot and run the pre-installed demo.

Allow about 10 seconds for the LPCXpresso55S69 device to enumerate for the first time; the device will appear as "LPC Device".

If the first attempt to debug a project fails in the IDE, cancel the debug session and repower the board. On some machines the drivers take longer to enumerate for the first time, so these steps should correct this issue.

The board is now ready to be used with the MCUXpresso SDK examples for the LPCXpresso55S69.

When the board is used for the first time, it is recommended to force the LPC55S69 target into a known state by performing an ISP boot before attempting to run your first example code. This can be achieved by pressing and holding down the ISP button while pressing and releasing the reset button or installing the LPC55S69 ISP jumper.

3.1.2 Installation steps to use Keil and IAR tools with on-board debug probe

Download and install LPCScrypt or the Windows drivers for LPCXpresso boards (http://www.nxp.com/lpcutilities). This will install required drivers for the board. Note that the Link2 (LPC4322 device) is pre-programmed with CMSIS-DAP firmware.

Ensure jumper J3 is fitted in position 1-2 (local target powered), and J5 is not installed (target SWD enabled). These are the default positions set during board manufacture.

The Link2 Debug Probe on the board will have been programmed with CMSIS-DSP firmware during manufacture. To start the board with this firmware running, ensure J4 is not installed as power is connected, so the Link2 Debug Probe boots from internal flash. If you wish to update/change the Link2 firmware please follow the steps described in Section 4.2.

Connect the LPC55S69 board to the USB port of your host computer, connecting a micro USB cable to connector P6 ("Debug-Link"). The board will boot and run the pre-installed demo. Allow about 30 seconds for the Link2 devices to enumerate for the first time. It is not necessary to check the Hardware Manager on your host computer, however if this is done there will be five devices (if using CMSIS-DAP protocol); four under Human Interface Devices (CMSIS-DAP, LPC-SIO, two HID Compliant Devices, and a USB Input Device) and one under Ports (LPC-LinkII Ucom.)

Your board is now ready to use with your 3rd party tool. Follow the instructions for those tools for using a CMSIS-DAP probe. MCUXpresso IDE can also be used with the board after setting up the board this way.

When the board is used for the first time, it is recommended to force the target into known state by performing an ISP boot before attempting to run your first example code. This can be achieved by pressing and holding down the ISP button while pressing and releasing the reset button.

3.1.3 Starting a debug session using an external Debug Probe

Code running on the LPC55S69 target can be debugged using an external Debug Probe that conforms to the standard ARM Cortex-M debug connector. To use an external Debug Probe connect the probe to the SWD connector (P7) and connect power via the micro USB connector P5.

Note: The Debug link USB connector P6 must be left unconnected so that the Link2 Debug Probe is left unpowered and does not contend with the SWD interface signals from the external Debug Probe. Also note that the VCOM function provided by the on-board Debug Probe is not available when using an external debug probe.

4. On-board (Link2) Debug probe

This section describes the features provided by the on-board Link2 Debug Probe, including how to use this to debug an exernal target.

The Link2 Debug Probe is implemented using an LPC432x MCU (circuit reference U2), which provides a high speed USB port interface to the host computer that runs the development tools. This device is not intended for developer use, and should only be used with approved firmware images from NXP. The Link2 on-chip flash memory is factory programmed with a firmware image that supports CMSIS-DAP debug protocol, but also includes other USB end point functions:

- Virtual COM (VCOM) port: a serial device that can be used with any host computer application design for serial port communication (e.g. Teraterm, puTTY, etc.) Set the terminal program for baud rate to 115200, no parity, 8 bit data, 1 stop bit, no flow control.
- SWO trace end point: this virtual device is used by MCUXpresso to retrieve SWO trace data. See the MCUXpresso IDE documentation for more information.
- I2S/SPI bridges: bridge device from I2C and SPI ports of the LPC target.

All of these devices are independent of each other and of the CMSIS-DAP debug device that is enumerated when the board is connected to a host computer; for example, the VCOM port can be used if the board is running an application when no debugger is running.

In order to correctly install and use the Link2 device on the LPCXpresso55S69 (required for any debugging purpose) for Windows 7 or 8 host computers, install the drivers first. These drivers will automatically be installed when MCUXpresso IDE has already been installed. If these IDEs are not being used, it is recommended LPCScrypt be installed as this also includes the required drivers. All these tools and utilities are available for free download at https://www.nxp.com/lpcscrypt.

The CMSIS-DAP firmware image installed at the factory (and by LPCScrypt) will uniquely identify itself to the host computer so that more than one board can be connected to that host computer at any time. Some toolchains cannot discern between multiple debug devices; refer to your toolchain documentation for more information (note the MCUXpresso IDE does support multiple LPCXpresso board targets.)

Note: The Link2 only boots when the board is power cycled; the reset button on the board does not reset the Link2.

When using MCUXpresso IDE, the Link2 can be automatically booted with the latest / most appropriate firmware for that IDE version by installing J4 (DFU jumper) before powering up the board. This is the recommended approach for the MCUXpresso IDE. Note that if J4 is installed when powering the board then the VCOM port (and other devices mentioned above) device will not appear until the MCUXpresso IDE boots the Debug Probe. The Debug Probe is booted once a debug session is started (that is, the IDE attempts to download code to the target).

4.1 Link2 boot LED

LED DS2 is the Link2 MCU BOOT0_LED indicator. This LED reflects the state of Link2 MCU pin P1_1. When the boot process fails, DS2 will toggle at a 1 Hz rate for 60 seconds. After 60 seconds, the Link2 MCU is reset.

4.2 Programming the Link2 firmware

As mentioned earlier in this section, it is not normally necessary to program the Link2 firmware. However, this can easily be accomplished using the supporting utility, LPCScrypt.

To program the Link2 Flash the Link2 device (LPC432x) must be in DFU mode. If the Link2 already has a valid image in the flash, it will need to be forced into DFU mode by placing a jumper shunt on J4 (DFU), and power cycling (disconnecting then reconnecting power via P6.) Link2 MCU programming is performed using the LPCScrypt utility (see http://www.nxp.com/lpcscrypt). Instructions for using the tool are located at the same web page

After installing LPCScrypt, use either the “Program LPC-Link2 with CMSIS-DAP” or “Program LPC-Link2 with JLink” utilities provided in that installation to update the firmware, following on-screen instructions. [Note: J-link support may not be available for early access boards.]

4.3 VCOM port

The identifier of the VCOM port will vary between boards and hosts as each board will enumerate with a unique identifier. On Windows, to determine the COM port, open the Windows operating system Device Manager. This can be achieved by going to the Windows operating system Start menu and typing “Device Manager” in the search bar. In the device manager look under “Ports”; the LPC-LinkII UCom Port device and its name should be visible. NOTE: this VCOM port will only appear if (a) the Debug Probe has been programmed with the CMSIS-DAP firmware and the Debug Probe DFU link (J4) is removed at power up, or (b) if the Debug Probe has been configured for DFU boot (J4 installed) at power up and MCUXpresso IDE has booted it (by starting a debug session.)

If the J-Link firmware image has been programmed into the Debug Probe and DFU boot mode is not being used, then a VCOM device called Jlink CDC UART port will appear instead of the LPC-LinkII UCom port.

Note that the VCOM port is not available when the Link2 Debug Probe is not powered.

4.4 Configuring the LPCXpresso55S69 to debug an off-board target

The LPCXpresso55S69 board’s Link2 Debug Probe may be used to debug an off-board target MCU. The on-board Link2 Debug Probe is capable of debugging target MCU’s with a VDDIO range of 1.6V to 3.6V. To keep the on-board target LPC55S69 MCU from interfering with the SWD interface, J5 must be fitted (note: the header for this jumper is not installed during board production). The Link2 Debug Probe SWD should be connected by a ribbon cable between the P1 connector to the off-board target MCU SWD interface. Power the LPCXpresso55S69 board from the Link USB connector P6, and fit jumper J3 across pins 2 - 3 (External Target).

5. Board Power

The LPCXpresso55S69 board requires +5V input to power the on-board voltage low dropout linear regulators, of which there are 3, all available from Torex Semiconductor.

The Link2 Debug probe has a 2.5V regulator (U10) which draws power from USB connector P6 (“Debug Link”) only. The Debug Probe is unpowered if P6 is unconnected.

There are two other regulators, providing the option of 1.8V (U8) or 3.3V (U9) to the other devices on the board; these regulators can be powered by any of the following (+5V) sources:

- USB +5V Power only connector (P5)
- USB Full Speed connector for LPC55S69 (P10)
- USB High Speed connector for LPC55S69 (P9)
- USB Debug Link connector (P6)

The +5V sources above are connected via protection diodes to prevent reverse powering of any of them by another source. The +5V output of these combined sources is also connected to the Arduino and Mikroe expansion sites. Note that if P9 or P10 is configured as a USB host port then those connectors will not supply power to the board and another source must be provided.

The LPC55S69 and most other circuitry on the board can be powered at 1.8V or 3.3V, selected at jumper P4. Note that the MMA8652 Accelerometer and use of most SD cards requires the board to be configured for 3.3V operation. The power connection to the Accelerometer may be disconnected by removing R20; installing header P25 provides a convenient way to connect/disconnect this.

For further details, refer to the board schematics.

5.1 Measuring LPC55S69 supply current

A 2.43 ohm resistor (R91) is connected in series with the 3.3V supply to the LPC55S69 device, and the voltage drop across this can be measured at header P12, providing a mechanism to measure current draw of the MCU using a voltmeter. The voltmeter positive probe should be applied to P12 pin 1. Use Ohm's law to calculate the current (LPC55S69 current = measured voltage / 2.43). As an example, if the measured voltage is 10 mV, then 10e-3 / 2.43 = 4.11 mA.

A current meter may be inserted at P11 to measure the LPC55S69 VDD input current after first removing R92. Note that a jumper needs to be installed at P13 once R92 has been removed in order for power reach the LPC55S69 target

6. Board serial connections

This section describes connections between LPC55S69 on-board serial peripherals and connectors for use with off-board devices.

6.1 LPC55S69 USB Ports

The Board incorporates micro AB connectors for both of USB0 (Full Speed, connector P10) and USB1 (High Speed, connector P9) ports of the LPCXpresso55S69. Both of these ports are capable of operating as a device or a host, and this is why micro AB connectors are used.

The Board can only be configured to support one of these ports as a host at a time (this is a limitation of the board, not the LPC55S69). When either port is used as a host, power must be supplied to the board via the +5V power only micro B USB port. Jumper J6 is used to connect power from a load switch to the VBUS signal of the port selected; J6 should be placed in position 1-2 for USB1 or position 2-3 for USB0. If neither USB port is being used as a USB host this jumper is not required.

6.2 USART header

Header P8 is provided as a convenient way to use an LPC55S60 USART with a serial to USB cable. Flexcom 0 ports (P0_29 and P0_30) are used for this feature, since these ports are assigned for USART ISP mode. Note that these ports are shared with the Link2 debug probe (LPC4322) and PMod connector; when using this header ensure that there is no conflicting device connected to the PMod connector and that jumper P1 is installed to disable the connection to the Link2.

7. On-board peripherals

This section describes how the on-board peripheral devices of the Board are connected to the LPC55S69 and relevant configuration options. For full details of these devices please refer to the individual device datasheets. For circuit further details, refer to the board schematics.

7.1 Audio Codec

The LPCXpresso55S69 board incorporates a Cirrus Logic (Wolfson) WM8904 audio codec. This codec has both I2C (for control) and I2S (for data) interfaces.
The I2C interface of the codec is routed to Flexcomm 4 of the LPC55S69, the same connection as used for the other I2C devices on the board; the Codec has an address of 0b0011010.

The Flexcomm 6 and Flexcomm 7 interfaces of the LPC55S69 are connected respectively to the Codec for data sent to / receive from the Codec. The board design assumes pad sharing between Flexcom 6 and Flexcom 7 for I2S connections.

Table 2. Audio Codec port connections

Circuit reference	Port	Flexcoms
I2S SCK	P0_21	Flexcom 6 & 7, pad shared
I2S TX/RX Data	P0_20	Flexcom 6 & 7, pad shared
I2S WS	P0_19	Flexcom 6 & 7, pad shared
I2C SDA	P1_21	Flexcom 4
I2C SCL	P1_20	Flexcom 4

I2S connections from the LPC55S69 are also connected to the Expansion connectors; solder jumpers may be removed to disconnect the on-board codec if an external I2S device is to be used instead.

Line input (J1) and line output (J2) 1/4” stereo jack sockets provide analog I/O connections to the Codec. See schematic for further information.

7.2 Micro SD card slot

The micro SD card (P21) included in the LPCXpresso55S69 board provides a 4-bit SDIO interface to support memory cards, plug-in WiFi modules, etc. Power enable to the socket is provided via transistor enabled by P1_0.

Table 3. Micro SD card connections

SDIO interface signals	Port	Notes
SDIO Clock	P0_7	IOCON function 2
SDIO Command	P0_8	IOCON function 2
D0	P0_9	IOCON function 2
D1	P0_17	IOCON function 2
D2	P0_24	IOCON function 2
D3	P0_25	IOCON function 2
Card detect	P0_21	IOCON function 2
Power enable	P1_0	GPIO. Active low.

7.3 Accelerometer

The board includes an NXP MMA8652FCR1 accelerometer, interfaced to Flexcom 4 (ports P1_21 and P1_20) with its interrupt output connected to P1_19 (this signal is also shared with the Expansion connector P18 via a 100 ohm resistor (R5).) The accelerometer has an I2C address of 0b0011101.

Note that the accelerometer can only be used when the board is configured for 3.3V operation. Resistor R20 may be removed to disconnect the MMA8652 from the supply rail, and P25 may be installed to provide a convenient way to connect/disconnect it to/from power.

Resistors R3 and R4 are zero ohm links, provided to enable the MMA8652 to be disconnected from P1_20 and P1_21 to avoid leakage effects when the board is configured for 1.8V operation.

7.4 RGB User LED

An User controlled RGB LED is provided on the Board, located on the right hand edge. The LEDs in this device are controlled by LPC55S69 ports P1_4 (Red), P1_6 (Blue), P1_7 (Green) with the LEDs being illuminated when the respective LED is pulled low. Note that these port lines are also connected to expansion connector J18.

7.5 Buttons

Four buttons are provided on the LPCXpresso55S69, as described in this section.

7.5.1 ISP (S1)

P0_5 is pulled up to VDD via a 2.2 kohm resistor; pressing this button will pull P0_5 low. This port is read by the LPC55S69 boot code to determine if the MCU should enter In System Programming (ISP) mode. The main purpose of this button is to force the LPC55S69 into ISP mode at boot time; to do this hold down this button while pressing and releasing the Reset button, or while connecting power to the board. While the main purpose of ISP mode is to program the flash of the LPC55S69, forcing the MCU into this mode places it into a known state in which development tools can gain debug control. If an application in flash is crashing or disabling the SWD port unintentionally, then ISP mode can be useful to recover control of the board. Refer to the LPC55S69 User Manual for more information on ISP mode.

The ISP button can also be used in user application code. Care should be taken if P0_5 is configured as an output driving high, since pressing this button will short it to ground.

Note that jumper J10 may also be used as a convenient way to always assert ISP when the LPC55S69 is reset or powered up. This jumper is in parallel with S1.

7.5.2 User (S3) and Wake (S2) buttons

The User (S3) and Wake (S2) buttons are intended for user application use. These buttons pull ports P1_9 (User) and P1_18 (Wake) low when the button is pressed. 100kohm resistors are used to pull these two ports to VDD then the buttons are not pressed.

7.5.3 Reset

Pressing this button will assert reset to the LPC55S69 and to the Mikroe and Arduino connector sites. Note that the Debug Probe (LPC4322) is not reset when this button is pressed.

8. Expansion connectors

The LPCXpresso55S69 includes 3 expansion connector sets, incorporating support for Arduino UNO R3, Mikroe Click and PMod standards. The Arduino UNO connector footprint is surrounded by additional connectors that are compatible with other LPCXpresso V3 boards. For further details, refer to the board schematics.

Information to follow.

9. Other board features

This section describes miscellaneous board features that we not covered elsewhere in this manual.

Information to follow.

10. Compliance

Information to follow.

11. Legal information

11.1 Definitions

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