ACK/LPC55S16 EVK Quick Start Guide

Quickstart Guide

Rev. <00.01> — 20 July 2020 **QSG**

Document information

Info	Content
Keywords	Amazon ACK Module, LPC55S16 EVK
Abstract	Quick start guide for LPCXpresso55S16 development board with Amazon ACK Module

Revision history

Rev	Date	Description
0.1	20200720	Initial version

Contact information

For more information, please visit: http://www.nxp.com

1. Introduction

1.1 LPC551x/S1x

The LPC551x/S1x MCU family expands the world's first general purpose Cortex-M33-based MCU series, offering significant advantages for developers, including pin-, software- and peripheral-compatibility for ease of use and to accelerate time to market, while leveraging the cost-effective 40-nm NVM process technology.

The LPC551x/S1x is the baseline family within the LPC5500 MCU series, providing new levels of cost and performance efficiency in addition to advanced security and system integration for industrial and general embedded markets.

More information can be found at here.

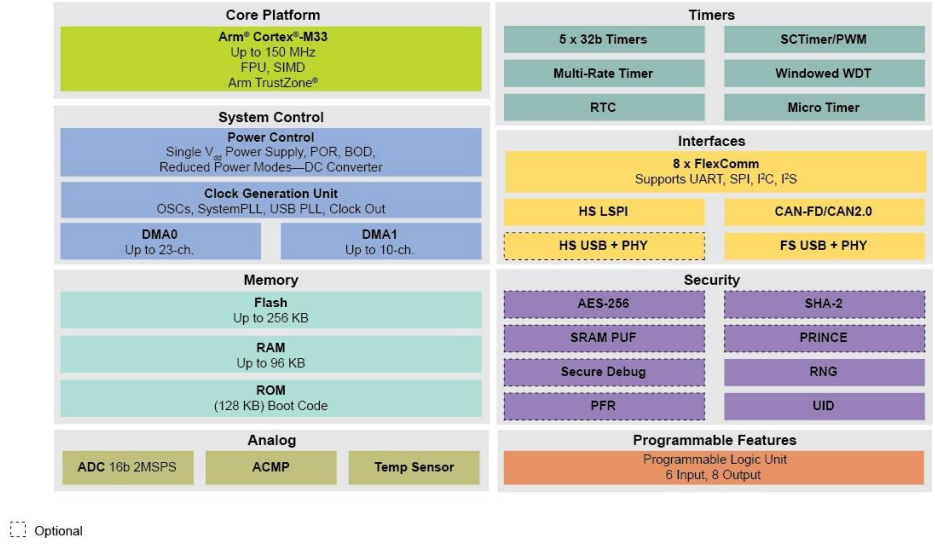

Fig 1. LPC551x/S1x MCU Family Block Diagram

1.2 LPC55S16-EVK: LPCXpresso55S16 Development Board

The LPCXpresso55S16 board provides the ideal platform for evaluation of the LPC55S1x/LPC551x MCU family, based on the Arm® Cortex®-M33 architecture. Arduino® UNO compatible shield connectors are included, with additional expansion ports around the Arduino footprint, along with a PMod/host interface port and MikroElektronika Click module site. The board features an on-board LPC-Link2 debug probe based on the LPC4322 MCU for a performance debug experience over high-speed

USB, with easy firmware update options to support CMSIS-DSP or a special version of J-link LITE from SEGGER. The board can also be used with an external debug probe such as those from SEGGER and P&E Micro.

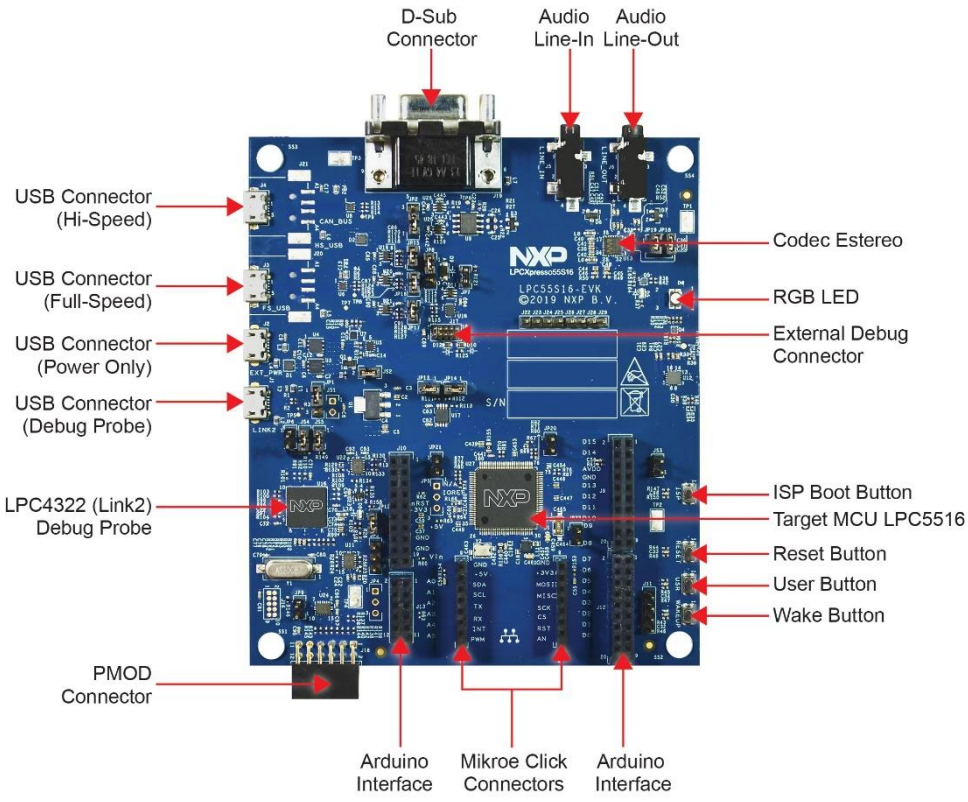

Fig 2. LPC55S16-EVK Pin Out

More information can be found at here.

1.3 Alexa Connect Kit (ACK)

Alexa Connect Kit (ACK) is a managed service that makes it easy to integrate Alexa into your product. With ACK, you don't need to write an Alexa skill, manage a cloud service, or develop complex network and security firmware to connect your product to Alexa. Instead, you integrate the ACK module into your product and pay a one-time fixed cost. ACK provides the managed services, software, and tools you can use to develop and manage your Alexa-connected products on an ongoing basis. Your users benefit from Alexa device control and other features, such as Amazon's Wifi Simple Setup (WSS).

Fig 3. Alexa Connect Kit (ACK)

More information can be found at here.

2. Hardware connection

Now you will physically connect the ACK Board to the LPC55S16 EVK.

Carefully insert the ACK board pins on the underside of the board into the Arduino headers. Make sure that the pins line up perfectly with the headers, and that the pins aren't bent.

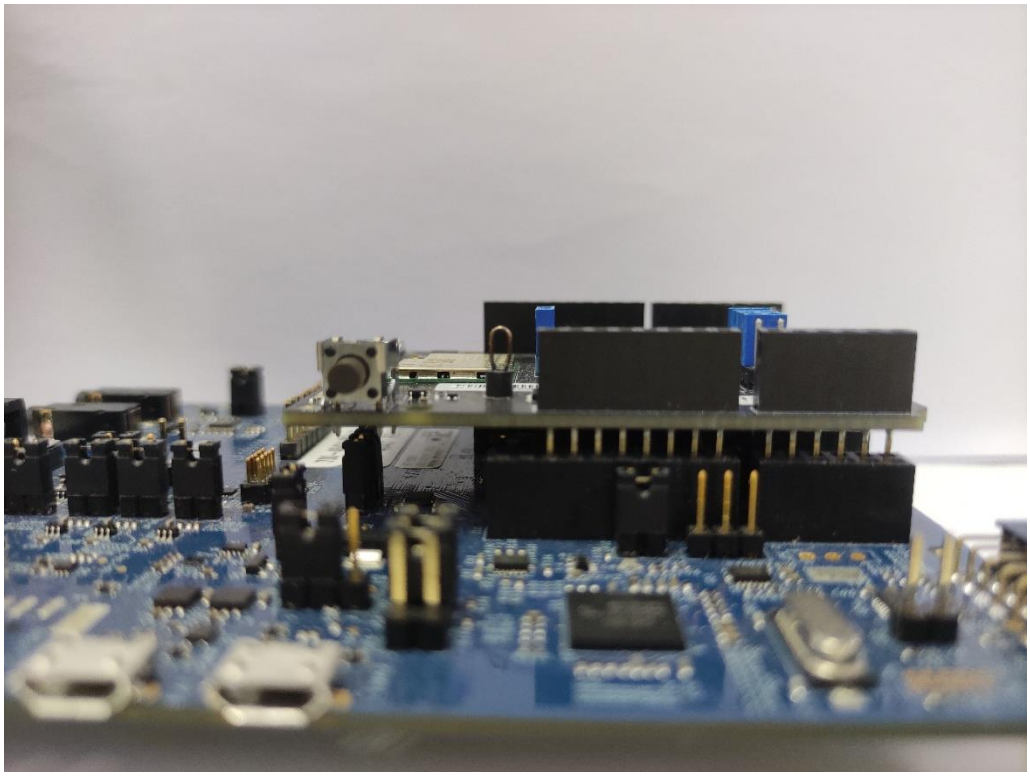

Fig 4. Hardware Connection

Insert the Micro-USB cable that came with the kit into the LPC55S16 EVK J1 Port (LINK2 Port), and connect it to your computer. You should see the USI Development Board's status and power LEDs light up.

Connect the LED long pin (+) into header 8, and then connect the LED short pin (-) into header 14 (GND), as shown in the following image.

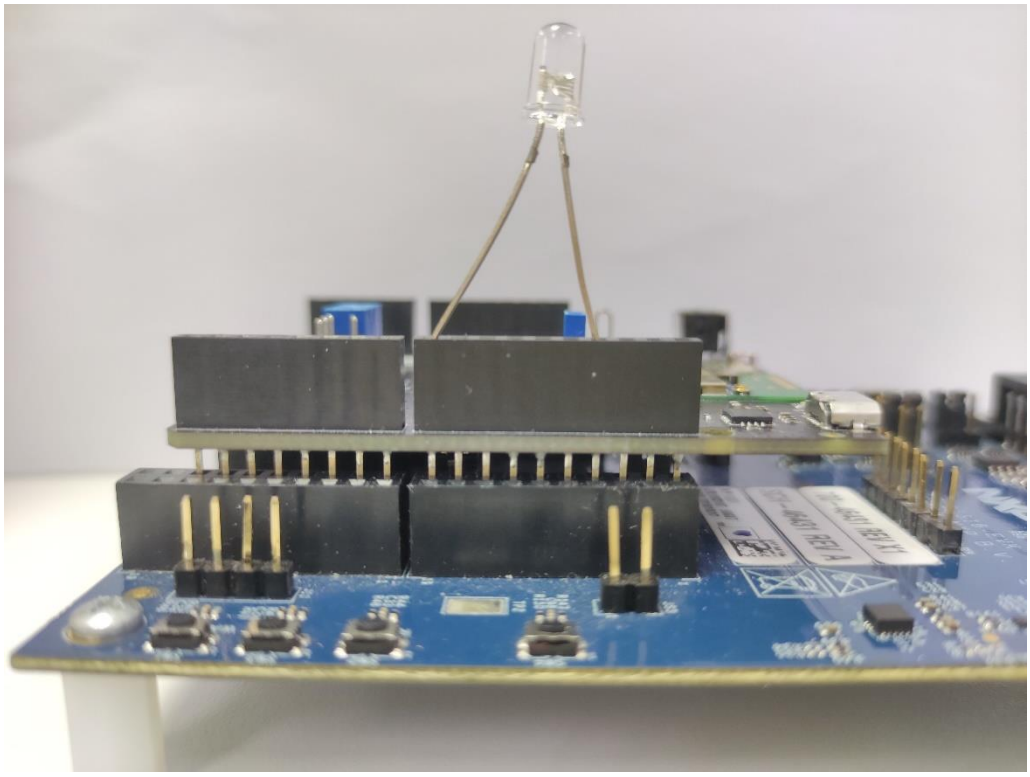

Fig 5. LED Connection

3. Program Code to the LPC55S16 EVK

The following procedure shows you how to compile the code, and then program it to the LPC55S16 EVK.

1. Connect the LPC55S16 EVK J1 Port (LINK2 Port) to your computer by using the micro-USB cable port, if the port isn't already connected.
2. Compile customerloader project and then download it.
3. Compile SmartLight project and then download it.
4. Reset the LPC55S16 EVK by RESET button.

4. Validation

Please follow Step 5: Register your Device and Step 6: Control the Smart Light to validate the function.

5. OTA and Development Guide

If an application's ack_user_config.h contains **#define ACK_HOST_FIRMWARE_UPDATE**, ImplCore is configured for OTA, and OTA support is enabled.

To prepare an OTA image, customers use the Python scripts in the ota\utility directory (Python3 required). Those scripts prepend the header expected by ImplCore's state machine, to a .hex file created by building an MCU application.

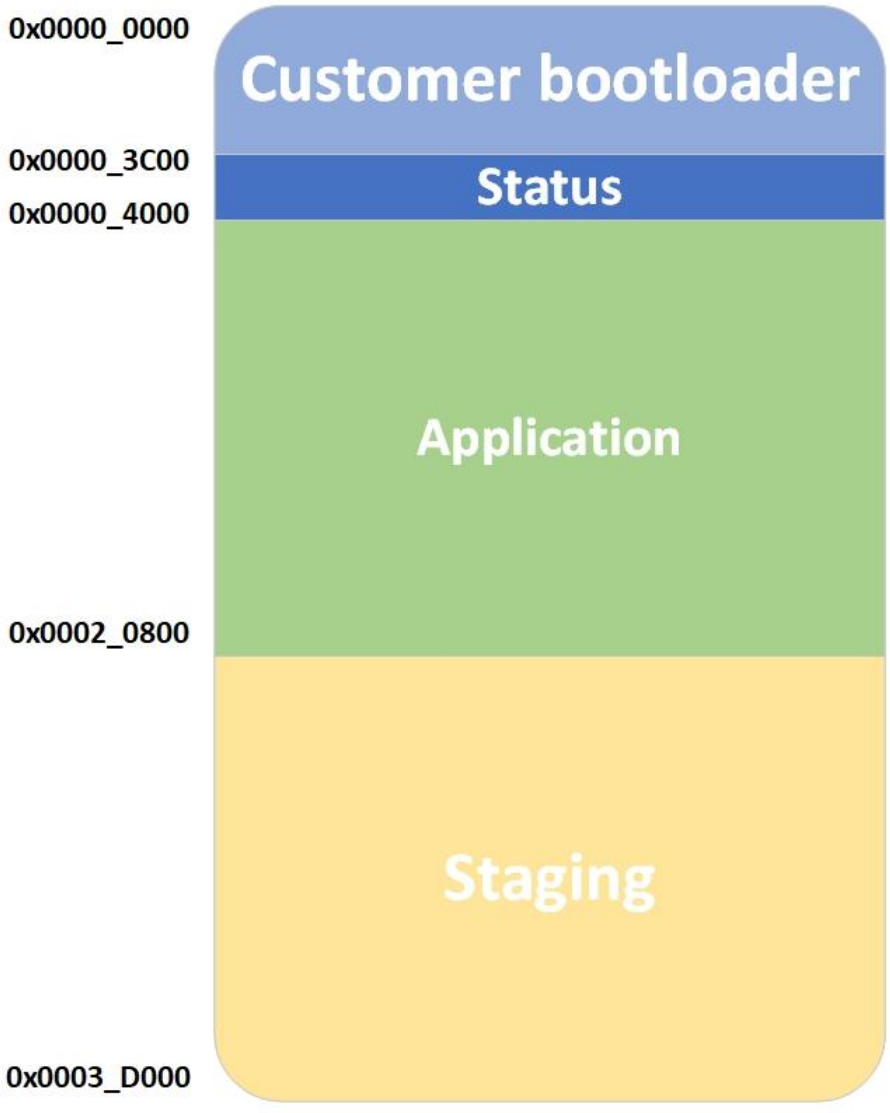

Fig 6. OTA Architecture

LPC55S16 code package currently implements a simple OTA. The OTA architecture for LPC55S16 EVK is shown above. No need to follow it blindly. You can add more features and modify the architecture as needed.

OTA update function can be validated using scripts in test\validation folder.

Make sure **#define CIRCULAR_BUFFER_SIZE** in ***ack_circularbuffer.h*** is >= 128, otherwise, the OTA validation will fail.

Note:

During the development, when the application image is programed into the flash, please ensure that the programing doesn't modify customer bootloader in flash.

6. Legal information

6.1 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

6.2 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Evaluation products — This product is provided on an "as is" and "with all faults" basis for evaluation purposes only. NXP Semiconductors, its affiliates and their suppliers expressly disclaim all warranties, whether express, implied or statutory, including but not limited to the implied warranties of non-infringement, merchantability and fitness for a particular purpose. The entire risk as to the quality, or arising out of the use or performance, of this product remains with customer.

In no event shall NXP Semiconductors, its affiliates or their suppliers be liable to customer for any special, indirect, consequential, punitive or incidental damages (including without limitation damages for loss of business, business interruption, loss of use, loss of data or information, and the like) arising out the use of or inability to use the product, whether or not based on tort (including negligence), strict liability, breach of contract, breach of warranty or any other theory, even if advised of the possibility of such damages.

Notwithstanding any damages that customer might incur for any reason whatsoever (including without limitation, all damages referenced above and all direct or general damages), the entire liability of NXP Semiconductors, its affiliates and their suppliers and customer's exclusive remedy for all of the foregoing shall be limited to actual damages incurred by customer based on reasonable reliance up to the greater of the amount actually paid by customer for the product or five dollars (US$5.00). The foregoing limitations, exclusions and disclaimers shall apply to the maximum extent permitted by applicable law, even if any remedy fails of its essential purpose.

6.3 Licenses

Purchase of NXP <xxx> components
<License statement text>

6.4 Patents

Notice is herewith given that the subject device uses one or more of the following patents and that each of these patents may have corresponding patents in other jurisdictions.

<Patent ID> — owned by <Company name>

6.5 Trademarks

Notice: All referenced brands, product names, service names and trademarks are property of their respective owners.

<Name> — is a trademark of NXP Semiconductors N.V.

7. List of figures

Fig 1. LPC551x/S1x MCU Family Block Diagram 3
Fig 2. LPC55S16-EVK Pin Out 4
Fig 3. Alexa Connect Kit (ACK).....5
Fig 4. Hardware Connection 6
Fig 5. LED Connection.....7
Fig 6. OTA Architecture 8

8. Contents

1. Introduction 3
1.1 LPC551x/S1x 3
1.2 LPC55S16-EVK: LPCXpresso55S16 Development Board 3
1.3 Alexa Connect Kit (ACK) 4
2. Hardware connection 5
3. Program Code to the LPC55S16 EVK 7
4. Validation 7
5. OTA and Development Guide 8
6. Legal information 10
6.1 Definitions 10
6.2 Disclaimers 10
6.3 Licenses 10
6.4 Patents 10
6.5 Trademarks 10
7. List of figures 11
8. Contents 12

For more information, visit: http://www.nxp.com

Date of release: 20 July 2020

Document identifier: ACK/LPC55S16 EVK Quick Start Guide