Getting started with the LPC8N04 Development Board and its demo

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At ARM Techcon in San Jose, the LPC team will give out 100 free LPC8N04 Development Boards to LPC fans, in exchange for a business card. The product will become fully available in January, at which time a full set of free drivers and demo application source code will be available, and the board will be available for sale through NXP's distributors or for direct credit card purchase from www.nxp.com... but for the moment those lucky recipients of a free board can get a taster of what this exciting new part can do, using a smartphone and the Board's built-in demo application.

The LPC8N04 Development Board includes a 5x7 LED array for user applications and a surface mount speaker with amplifier for PWM-based sound output. It is capable of being powered from USB or using one of the two coin cell battery choices; operation using energy harvesting is also possible, with no external power needed, just an NFC-enabled smartphone.

Note that the standard, Android tag reading service will trigger the demo firmware on the board, but for best results please use the demo application.

Running the Android application

The free NXP App for this demo can be downloaded from the Google Play Store. Search for NXP LPC8N04 NFC Demo:
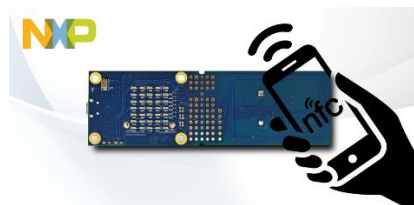
Android Nougat or later is recommended for best results.

Power up the LPC8N04 Board and press the reset (S3) button (note that the RESET label on Rev A PCBs is adjacent to S2, but S3 is the reset switch). Turn the board over so the LED array is on top and oriented to the left. The center column of LEDs will light in turn in a repeating pattern. Note that after 100 seconds of inactivity, the demonstration firmware will go into a low power state, and the center LED will blink approximately once every second. This is to prevent accidentally draining a battery (if fitted). Press the reset button to re-activate the demo.

Ensure NFC is enabled on the smartphone, then activate the App. Tap on the "LED TEXT AND MUSIC" tab at the top left, then the Read NDEF button.

Enabling and reading the and scrolling message & temperature

1. Bring the phone close to the antenna section of the board, to the right of the antenna section of the Board. As the smartphone detects the Board it will either vibrate and/or play a tone (depending on its settings). Once this happens, a message will start scrolling across the LED

array, and the message content will appear in the text box. This message is stored in the EEPROM, along with the current temperature of the LPC8N04 and will have been read over NFC. The default message is "The LPC Experience; Your World Reimagined Temp is 78.9F" (although the temperature value will vary). The read performance will also be read, and the currently set scroll speed will be shown:
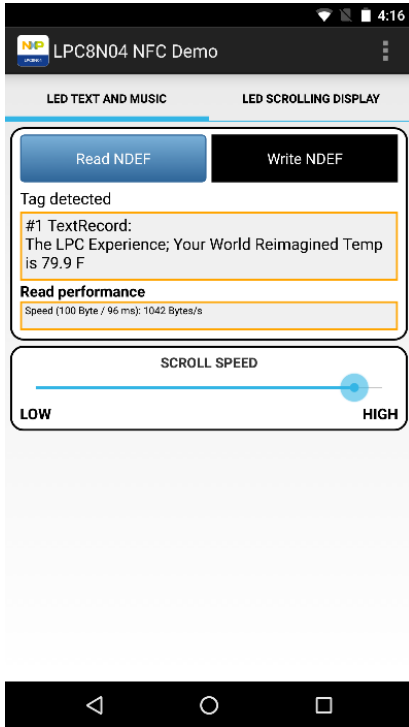

Figure 1 Read NDEF operation, after scanning the board

Updating the scrolling message

1. Tap the "Write NDEF" button; it will turn blue.
2. Type a message in the Text box, then tap "Write NDEF" to write the message to the LPC8N04. The message "TAG successfully written" should appear, along with the speed at which the write took place. The LED array will show your new text scrolling across the display.
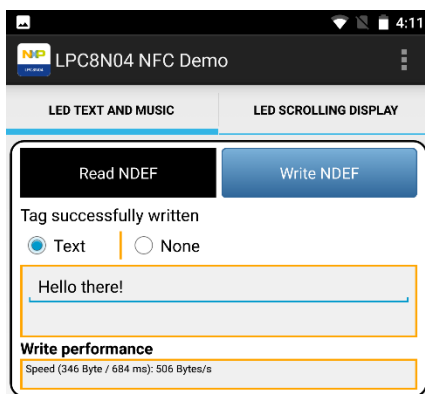
The speed of the message can be varied by moving the blue circle along the slider bar just below the text entry / write performance box:
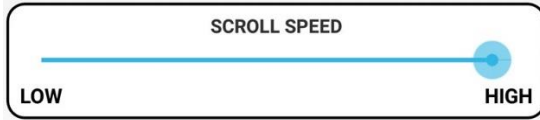
Tap the Write NDEF button to send the scroll speed updates to the board.

Playing a tune

1. To enable the speaker, move jumper P9 to the location shown below, and press button S2.

A GPIO line is shared for the speaker driver and the top row of the LED array. By default, the firmware will assume this GPIO is being used for the LED row, but will switch to driving the speaker once a push of button S2 is detected. Because of this, the speaker will making a buzzing sound until S2 is pressed.

2. There are 3 tunes available on the App. To change the tune simply tap on the name of the tune you want, then tap Write NDEF:

Fur Elise is programmed into the EEPROM during manufacture of the Development Board.

LED scrolling display demo (synchronized scrolling message)

The synchronized scrolling demo scrolls a message between the smartphone and the Board. To run this demo, tap the LED SCROLLING DISPLAY. Once the Android device detects the board, the text message set up using Write NDEF in the LED TEXT AND MUSIC tab (or the default programmed message, if Write NDEF hasn't been used) will scroll across its screen and continue on the LED array:

Using the demos with batteries

Any of the demos described above can be run without a USB connection by inserting a CR2032 battery in the larger battery holder on the board. Note that the smaller battery (type CR1225) may be used when the speaker is not being used. Protection diodes are provided on the board, so installing both batteries and/or USB power will not cause damage to the board or batteries.

Other information

The LPC8N04 has an on-board debug probe, and can also be used with an off-board debug probe (such as LPC-Link2, or from vendors such as SEGGER, P&E Micro or iSYSTEM). The SWD port for debug support requires two I/O pins, but these pins can be used as GPIOs in a final application. On the board, these two SWD/GPIO signals are connected to two of the LED array columns via jumpers P7 and P8. To use the full number of columns, the P8 and P7 jumpers need to be set as shown in Figure 2. As mentioned earlier, P9 must also be used as shown to enable the top row of LEDs.
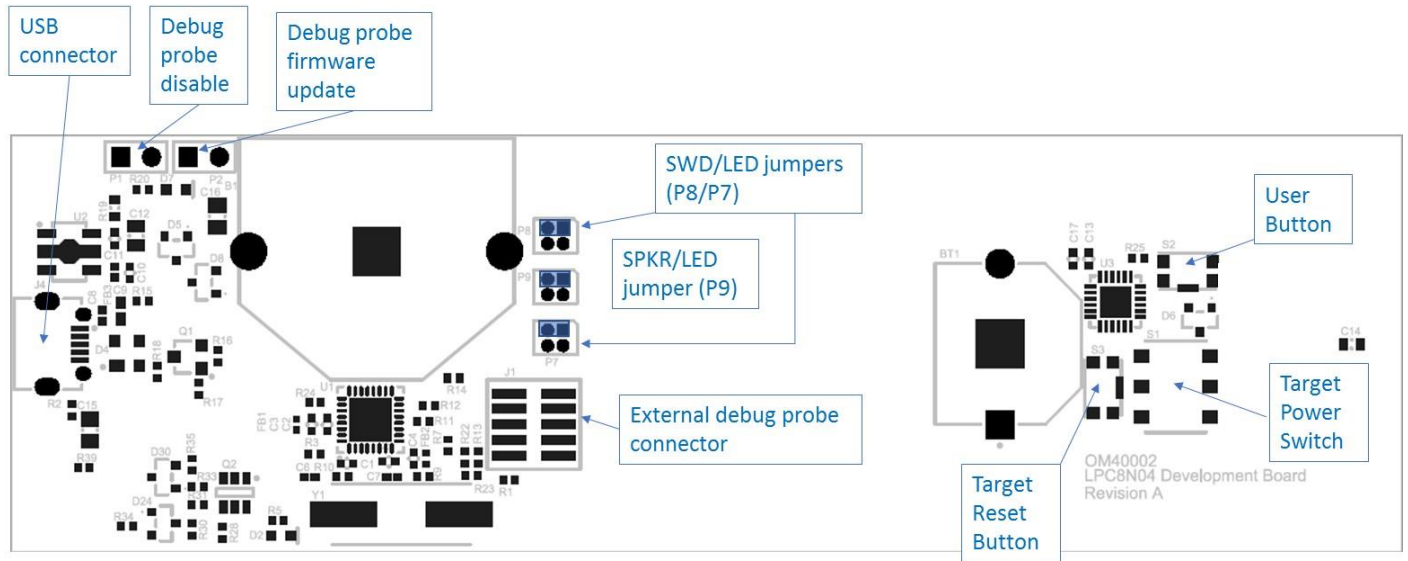
Figure 2 Board layout

In January 2018 NXP will be releasing:

- full details of the board design
- all sources for the demonstration application and Android App Source code
- free-to-use drivers, including examples of their use
- Full support for LPC8N04 MCUXpresso IDE
- In addition, NXP's ecosystem partners (IAR, ARM/Keil, SEGGER, P&E Micro and others) will also have support available for the LPC8N04 available