UM11078

LPC54018 IoT module

Rev. 1.2 — 20 March 2018 User manual

Document information

Info	Content
Keywords	LPC54018, OM40007, Amazon FreeRTOS, AWS, GT1216
Abstract	LPC54018 IoT module user manual

Revision history

Rev	Date	Description
1.0	20171206	Initial release
1.1	20171205	Added FreeRTOS getting started information, improved diagrams.
1.2	20180320	Updated Getting started to reflect MCUXpresso SDK support now available.

Contact information

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

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1. Introduction

The LPC54018 IoT module, developed by NXP in partnership with Embedded Artists, is self-contained, high performance, IEEE802.11 enabled microcontroller module for the development of products utilizing Amazon FreeRTOS or other IoT platforms. The module can be used as a standalone or plugged into a motherboard or baseboard for rapid product development and prototyping.

The IoT module baseboard (part number OM40006) is jointly developed by NXP and Embedded Artists. It provides several on-board peripherals for rapid prototyping and evaluation. The on-board peripherals include SDRAM, LCD with touchscreen, audio CODEC, digital microphone, Ethernet PHY, micro SD card slot and Arduino UNO expansion connectors. The baseboard also includes an on-board debug probe. See http://www.nxp.com/demoboard/OM40007 or visit http://www.embeddedartists.com for more information on this board.

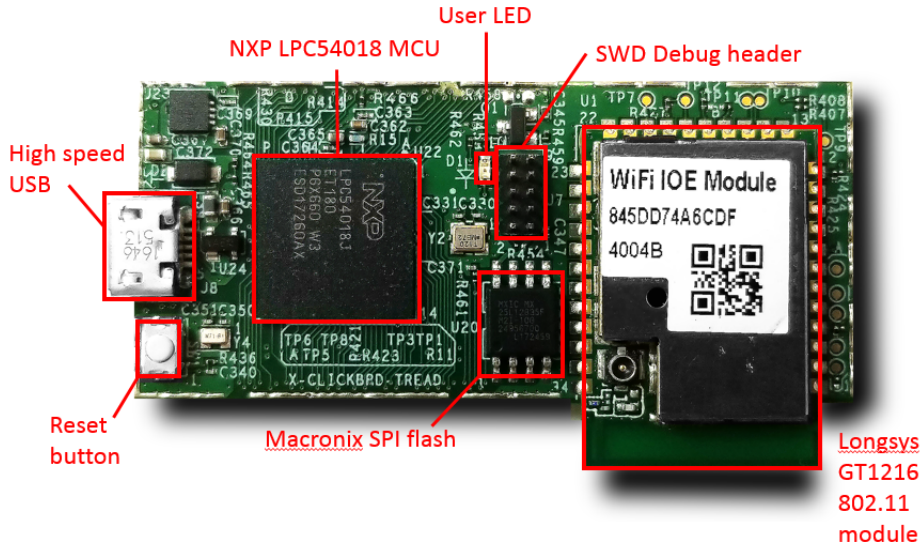

Fig 1. LPC54018 IoT module

The LPC54018 IoT module includes the following features:

- Amazon FreeRTOS enabled, ready for use in designs powered by AWS
- LPC54018 power-efficient Microcontroller Units (MCUs) with advanced peripherals based on Arm® Cortex®-M4 Core, running at 180 MHz
- High speed USB device port
- Longsys IEEE802.11b/g/n module based on Qualcomm GT1216
- Macronix 128 Mb flash (MX25L12835FM2)
- User LED
- External debug probe connector can be used to connect NXP (LPC-Link2), SEGGER, P&E Micro, and other popular ARM Cortex compatible probes
- Reset button

Dual Hirose expansion connectors provide access to wide range of peripherals and memory expansion provided by the LPC54018:

- LCD interface with DMA controller, supporting up to 24-bit color
- External memory interface, supporting SDRAM, SRAM and/or parallel flash
- Up to 10 Flexcom serial ports, configurable as UART, SPI, I2C, I2S (2 ports), or GPIO
- Dual CAN/CAN-FD
- SDIO
- 10/100Mbps Ethernet
- Full speed host/device USB
- DAC
- ADC
- Smart card

The block diagram in Figure 2 shows the features of the module in diagrammatic form.

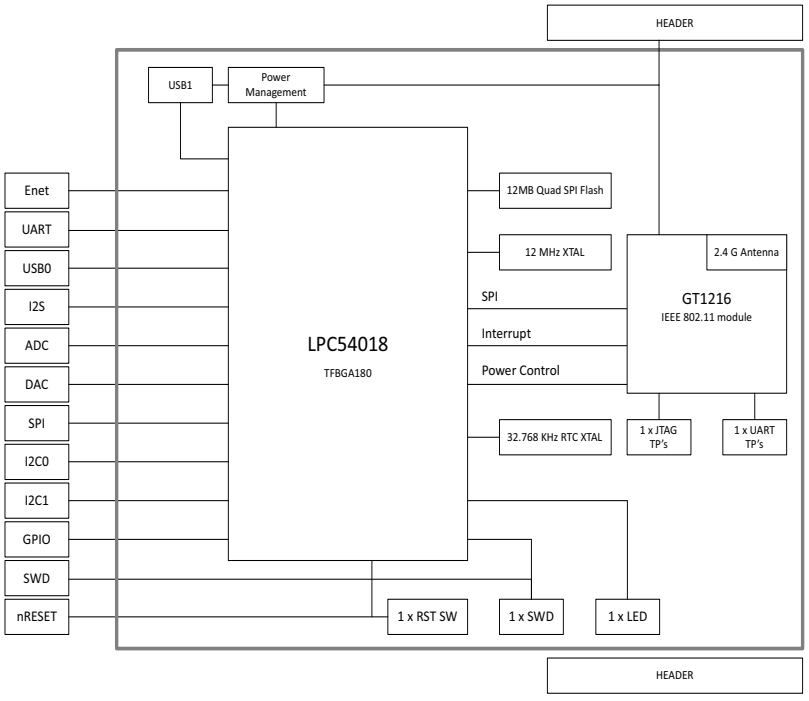

Fig 2. LPC54018 IoT module block diagram

2. Board layout

Figure 1 shows the layout of the module (top side), indicating location of the main components, connectors and reset button. Table 1 shows the layout of the module board, indicating location of jumpers, buttons, connectors/expansion options and MCU devices.

Table 1. Indicators, buttons, connectors and LEDs

Circuit reference	Description	Top or bottom side
D1	user LED; off by default, the LED will illuminate when LPC54018 port PIO3_13 is enabled and pulled low	top
SW1	reset button; while this button is pressed the LPC54018 is held in reset	top
J3, J4	expansion connectors	bottom
J7	SWD debug connector; compatible with standard ARM Cortex probes	top
J8	micro B USB connector for LPC54018 USB1 high speed USB port	top

3. Getting started

The module is pre-programmed with a simple program to blink the user LED, indicating that the target MCU is running. Connect a micro USB cable from connector J8 to a host computer or power supply to power-up the board and run this program. For information on how to get started with Amazon FreeRTOS, please follow the links provided at the main board page on NXP's website (http://www.nxp.com/demoboard/OM40007) under the Software and Tools and/or Getting Started tabs.

Code can be downloaded and debugged on the LPC54018 MCU using a debug probe that conforms to the standard Arm Cortex 10-pin debug connector. Amazon FreeRTOS and MCUXpresso SDK packages are available for MCUXpresso IDE, IAR EWARM and Keil MDK at https://mcuxpresso.nxp.com. At the Amazon FreeRTOS github site tutorials are provided for this module (as mentioned above); although not all tool chains are shown in the Amazon example, IAR, Keil and MCUXpresso IDE are all supported. SEGGER Development Studio may also be used with the MCUXpresso SDK; please contact SEGGER for more information.

The following debug probes can be used with those development and the module (check compatibility between debug probe and IDE used):

- LPC-Link2 (OM13054) debug probe from NXP or Embedded Artists
- SEGGER J-link probes
- P&E Micro probes
- Keil ULINK2 probes
- IAR i-Jet probes
- Debug probe built into a baseboard, such as the OM40006 IoT Module Baseboard (check the specific base board being used)

Other debug probes may also be supported by IAR and Keil tools; refer the websites of these companies. For more information (check for LPC540xx family support).

The module may also be mounted on to an OM40006 baseboard from Embedded Artists. This baseboard includes an on-board LPC-Link2 debug probe, which can be programmed to support either CMSIS-DAP or SEGGER J-Link protocols - all tool chains mentioned above will support either of these protocols (note that CMSIS-DAP is required to use SWO trace/profiling and data watch features with MCUXpresso IDE).

3.1 Attaching the debug probe and powering up (baseboard not used)

Observing appropriate anti-static measures, connect the debug probe, ensure that pin 1 of the debug probe cable is aligned to the lower right pin of connector J7, as shown in Figure 3. Note that in the figure, the red cable strand indicates pin 1.

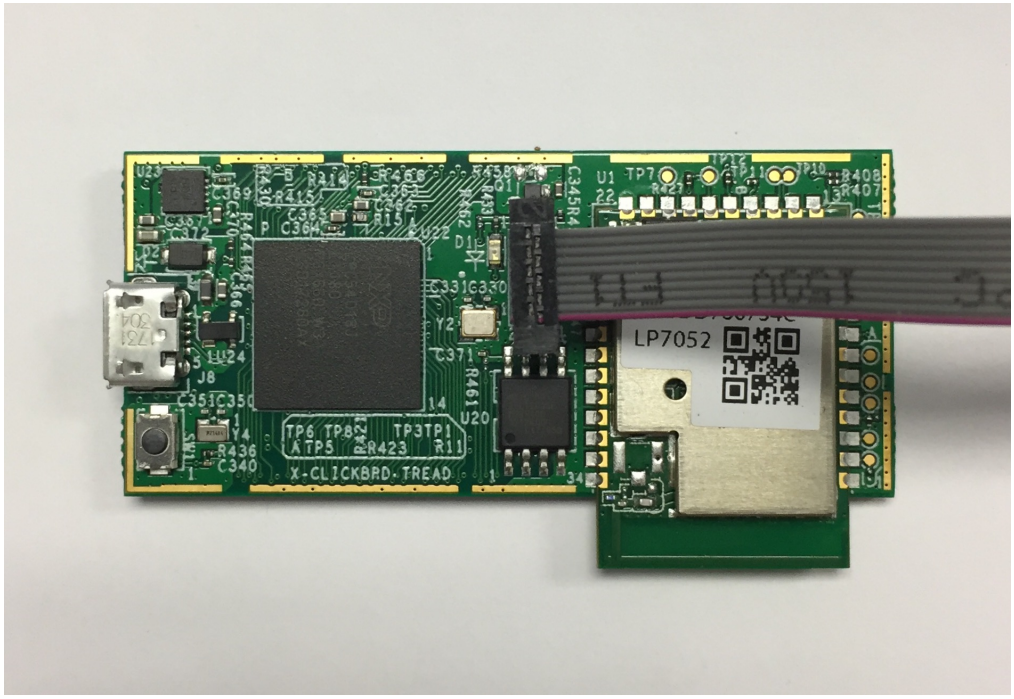

Fig 3. Debug probe cable connection

Power the module by connecting to it to a power supply or PC via J8. Note that when the 802.11 module is transmitting, the current drawn may be several hundred milliamperes. So, a power supply capable of delivering more than 500 mA is recommended.

3.2 Powering up (OM40006 Baseboard used)

Observing appropriate anti-static measures, carefully align the module expansion connectors with those on the baseboard. Apply a gentle pressure until the module is heard to click into the place. If the module does not click into the place easily, do not apply excessive force, and check if the connectors are aligned correctly.

Refer to the baseboard manual for powering options and configuration to use either the on-board debug probe or an external probe.

4. Expansion connectors

The module incorporates two expansion connectors to give access to the I/Os of the LPC54018 device, as shown in Figure 4 and Figure 6. Note that many port pins of the LPC54018 can be configured to one of the several functions. So, a baseboard designed to receive the module may use different functions shown on the labels in these diagrams. For full information on I/O configuration, refer to the user manual for the LPC540xx family devices. DF40C-100DP-0.4V(51) is the mating part number for use on baseboard designs from Hirose.

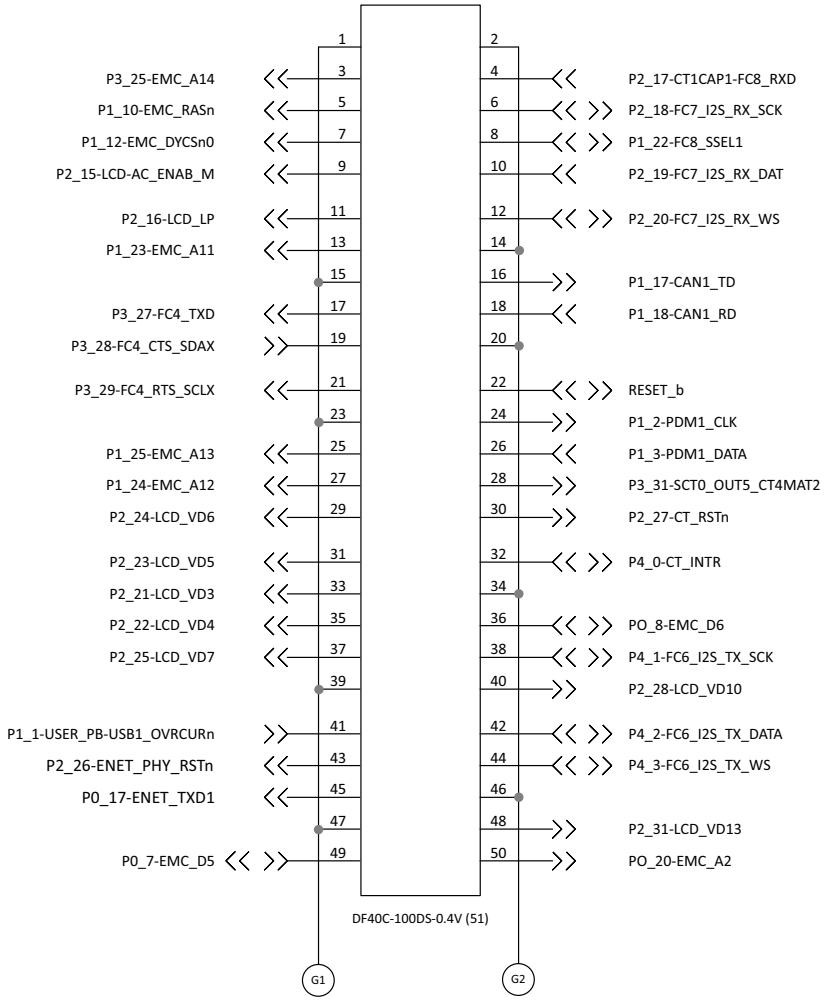

Fig 4. J3 expansion connector (Pin 1 to Pin 50)

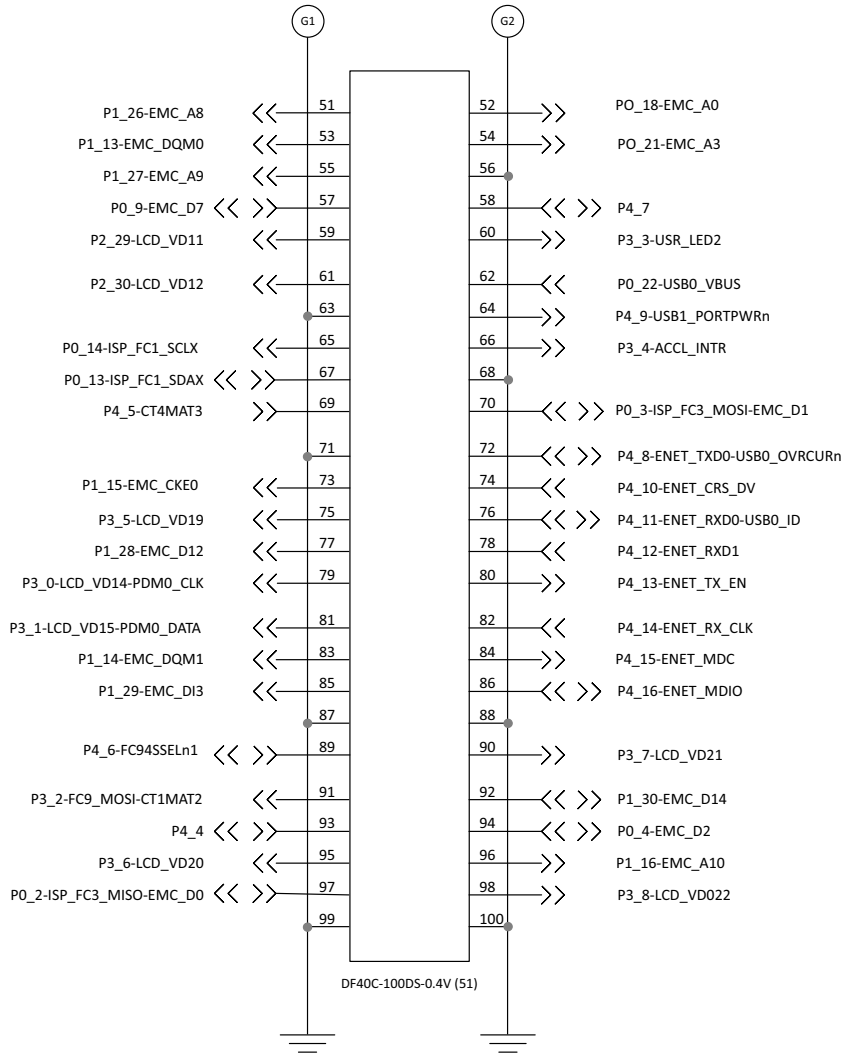

Fig 5. J3 expansion connector (Pin 51 to Pin 100)

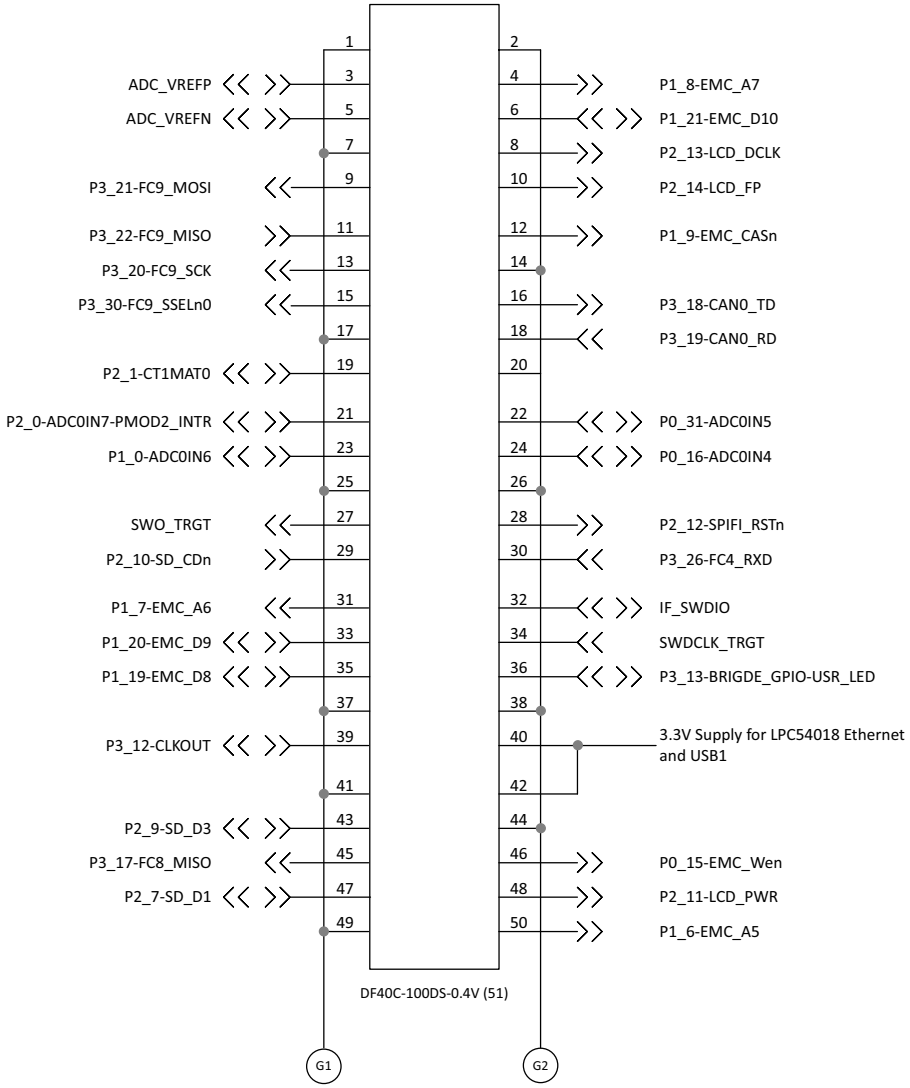

Fig 6. J4 expansion connector (Pin 1 to Pin 50)

For further details, refer to the board schematics.

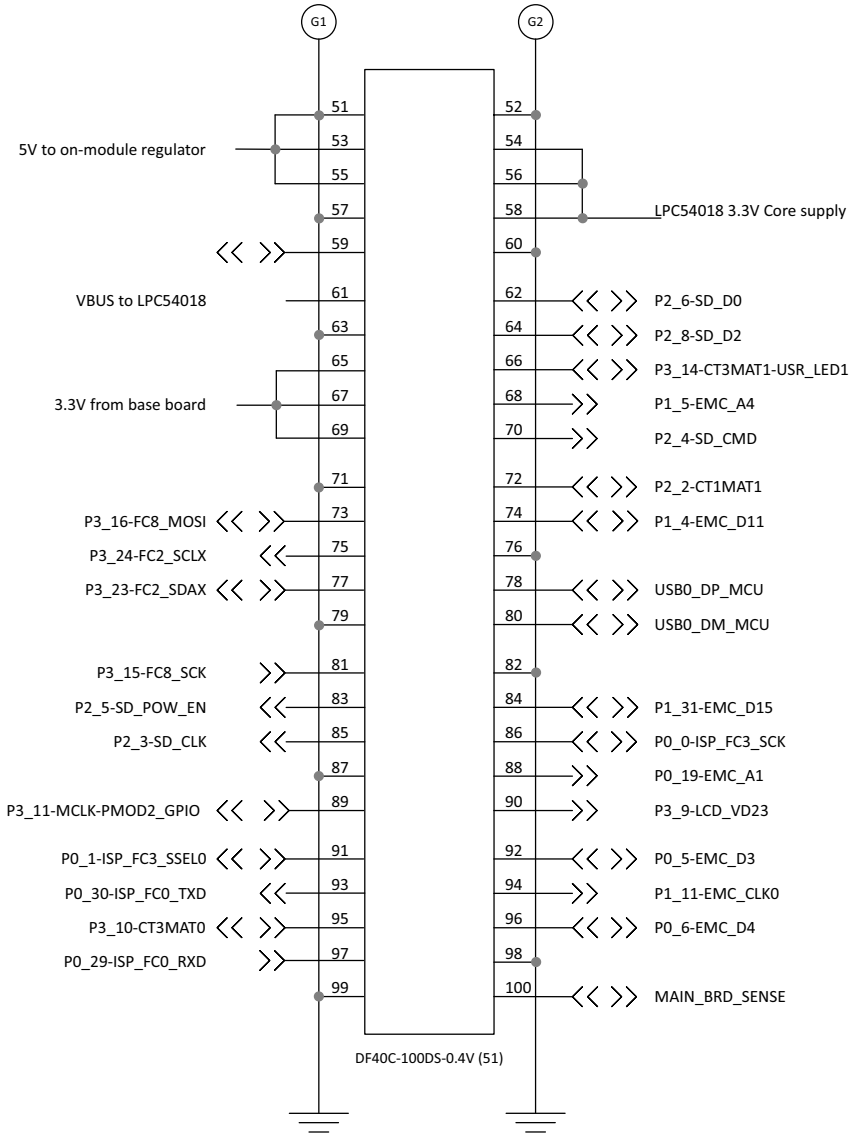

Fig 7. J4 expansion connector (Pin 51 to Pin 100)

5. Power supplies

The module may be powered either from its on-board USB connector or via the expansion connector (at pins 51, 53 and 55 of J4). The module incorporates a 5 V to 3.3 V regulator, which powers the other components on board.

A connection on the J4 connector (pin 100) of the module is used to sense when it is plugged into a baseboard. The baseboard should connect this signal to its 3.3 V supply.The module has an FET switch, which is turned off when the baseboard sense is driven to 3.3 V. It effectively separates the LPC54018 VDD from the VDD of other components, allowing its current drawn to be measured separately.

6. Compliance

The following information is provided per Article 10.8 of the Radio Equipment Directive 2014/53/EU:

a) Frequency bands in which the equipment operates.

b) The maximum RF power transmitted.

Table 2. Frequency bands and maximum transmitted power

PN	RF technology	(a) Freq ranges (EU)	(b) Max transmitted power
OM40007	IEEE802.11b-2.4GHz (Wi-Fi)	2412 to 2472 MHz	20.0 dBm
	IEEE802.11g-2.4GHz (Wi-Fi)	2412 to 2472 MHz	20.0 dBm
	IEEE802.11n-2.4GHz (Wi-Fi)	2412 to 2462 MHz	20.0 dBm

EUROPEAN DECLARATION OF CONFORMITY (Simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU)

This apparatus, namely OM40007 LPC54018 IoT module, conforms to the Radio Equipment Directive 2014/53/EU.

The full EU Declaration of Conformity for this apparatus can be found at this location:

www.nxp.com/demoboard/OM40007.

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Date of release: 20 March 2018
Document identifier: UM11078