

UM11078

LPC54018 IoT module

Rev. 1.1 — 11 December 2017

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.

Contact information

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

For sales office addresses, please send an email to: salesaddresses@nxp.com

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.

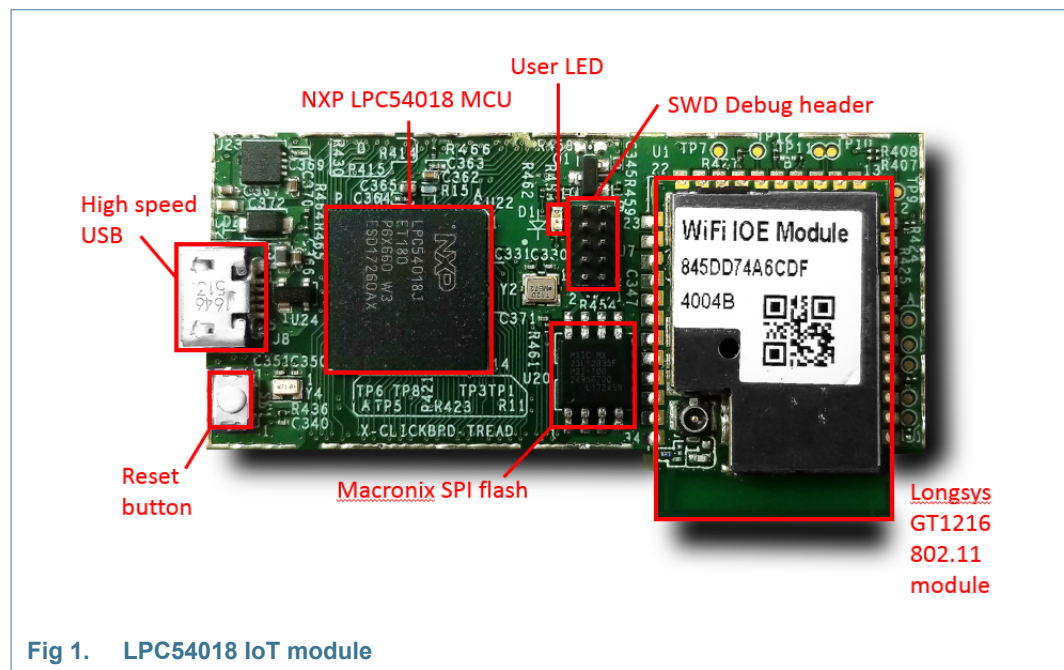


Fig 1. LPC54018 IoT module

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.

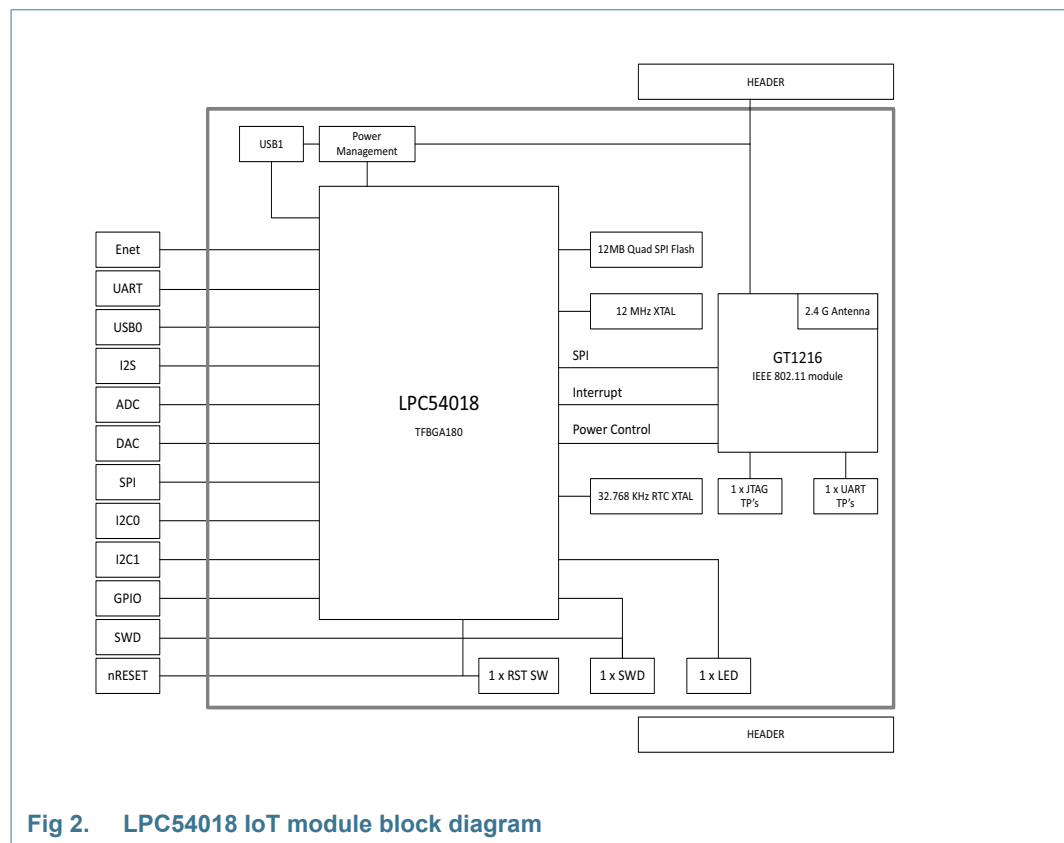


Fig 2. LPC54018 IoT module block diagram

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 support is available for MCUXpresso IDE, IAR EWARM and Keil MDK (MCUXpresso SDK support will be available from <https://mcuxpresso.nxp.com> from Q1 2018.) The following probes can be used with those development and the module:

- 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

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 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.

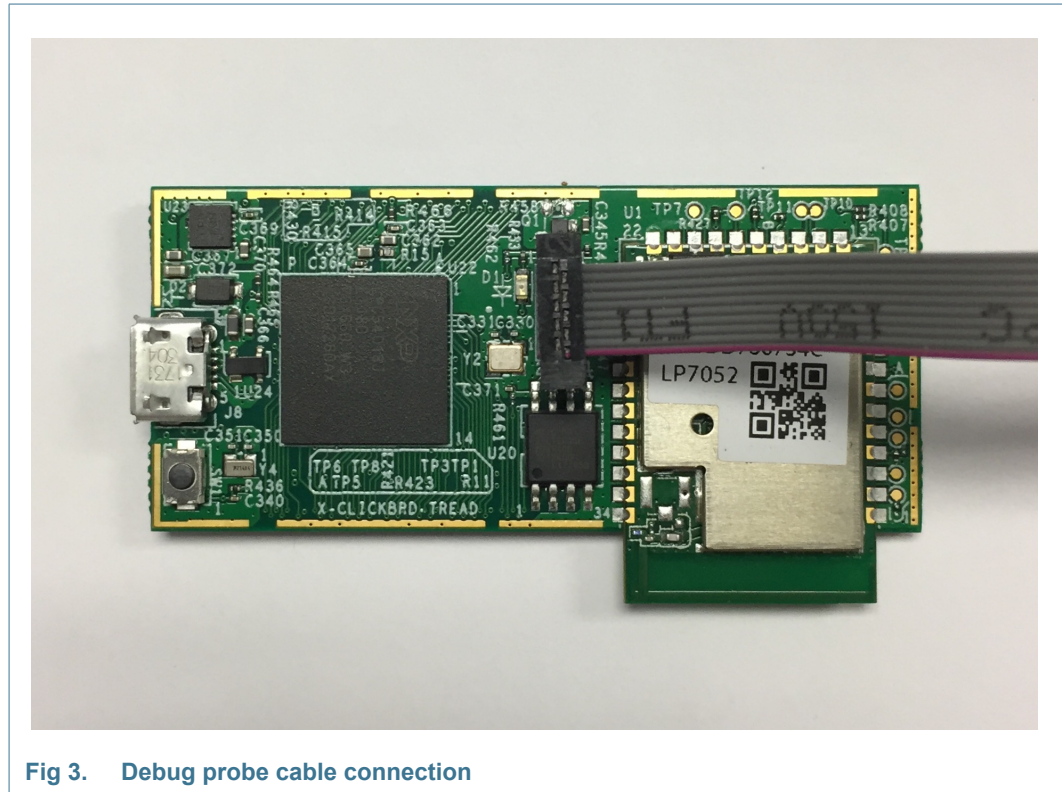


Fig 3. Debug probe cable connection

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.

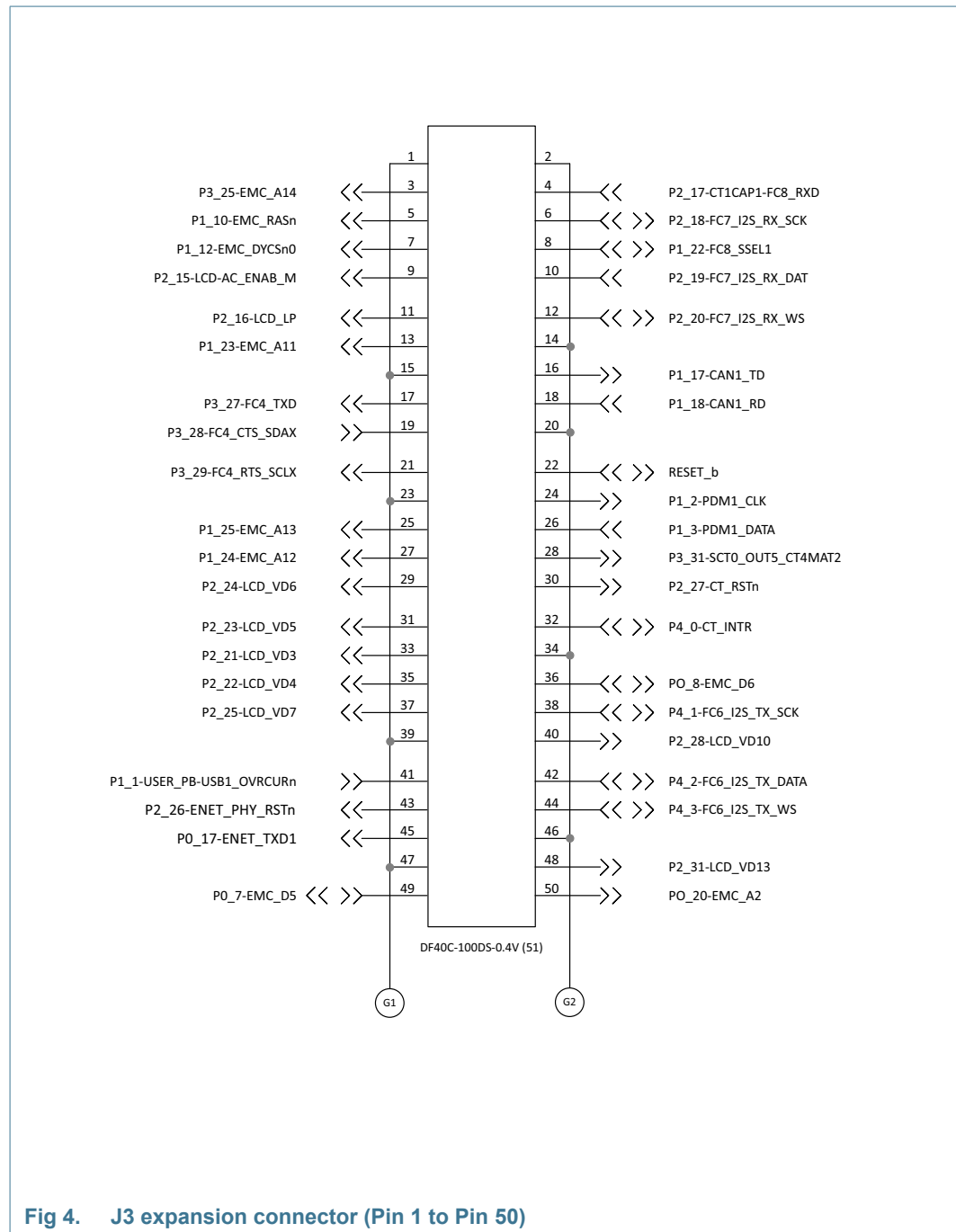


Fig 4. J3 expansion connector (Pin 1 to Pin 50)

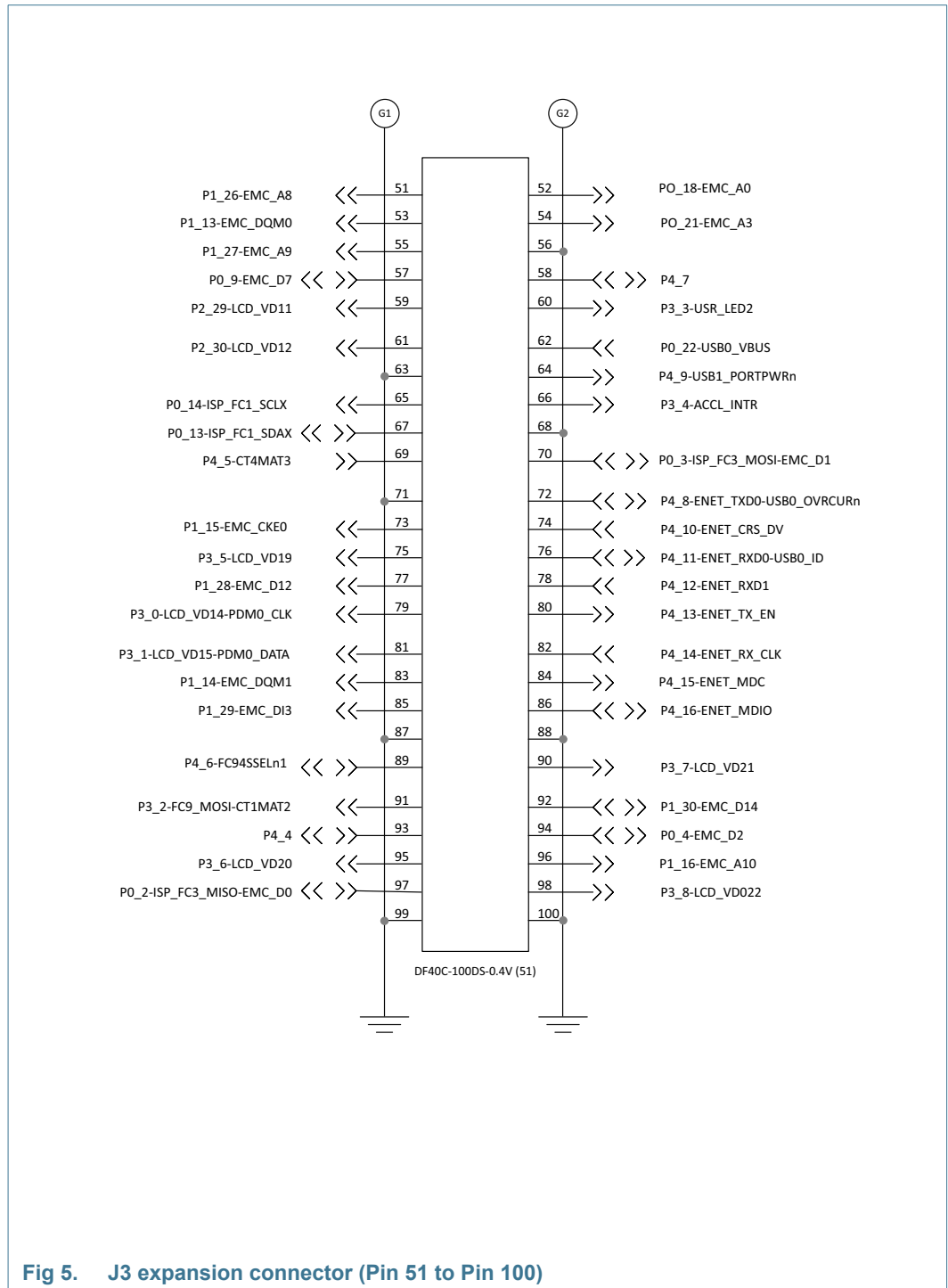


Fig 5. J3 expansion connector (Pin 51 to Pin 100)

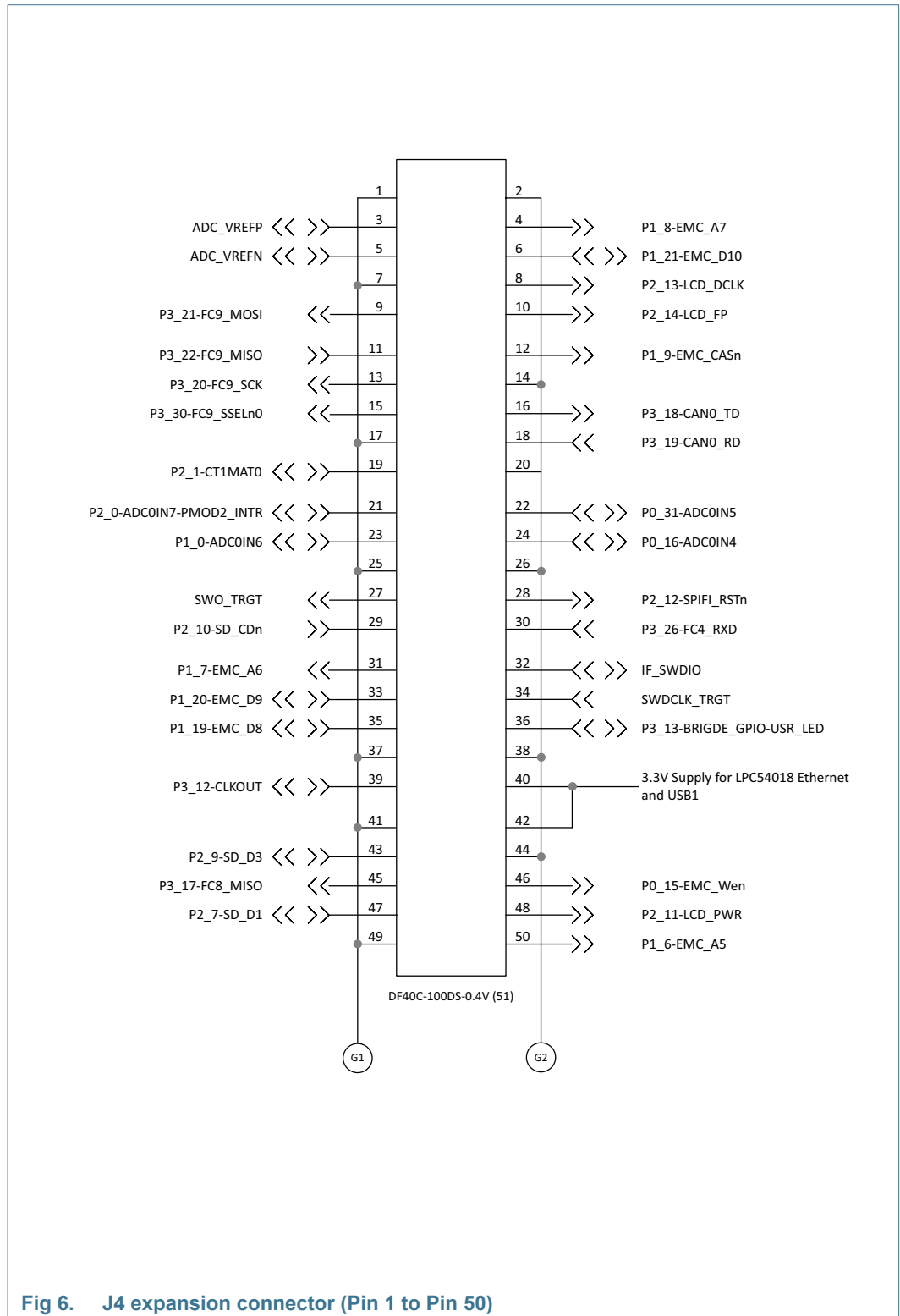
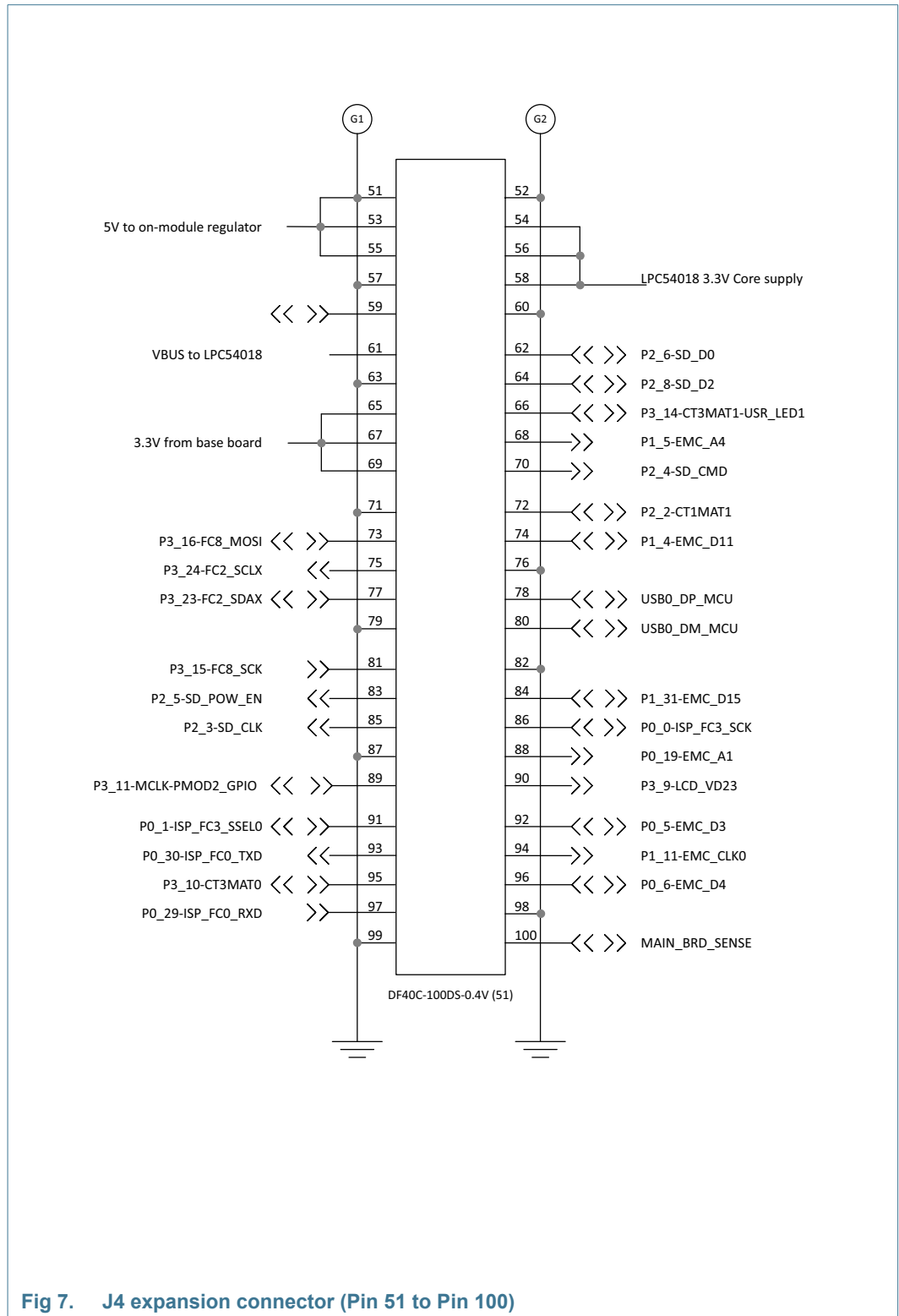


Fig 6. J4 expansion connector (Pin 1 to Pin 50)

For further details, refer to the board schematics.



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.

7. Legal information

7.1 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.

7.2 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.

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 accepts 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 national authorities.

7.3 Trademarks

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

8. Contents

1	Introduction	3
2	Board layout	5
3	Getting started	5
3.1	Attaching the debug probe and powering up (baseboard not used)	6
3.2	Powering up (baseboard used)	6
4	Expansion connectors	7
5	Power supplies	11
6	Compliance	11
7	Legal information	12
7.1	Definitions	12
7.2	Disclaimers	12
7.3	Trademarks	12
8	Contents	13

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP B.V. 2017.

All rights reserved.

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

For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 11 December 2017

Document identifier: UM11078