



UM11030

JN5169-001-U00-2 USB Dongle User Manual

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User manual

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Rev	Date	Description
1.0	20160928	First release
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Contact information

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1. Introduction

This chapter introduces the NXP JN5169-001-U00-2 USB Dongle (DR1198), which provides a hardware development platform for wireless microcontroller applications with a USB interface.

1.1 Overview

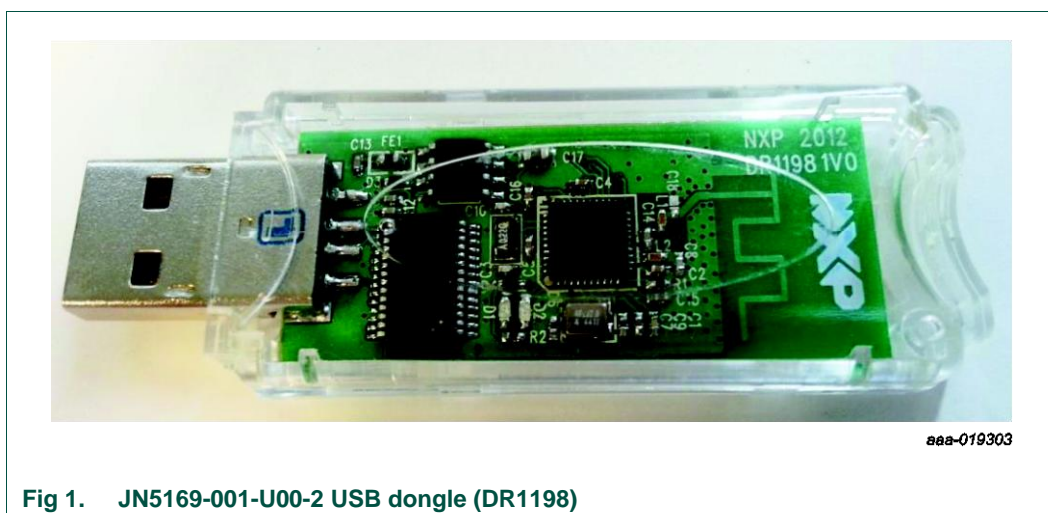
The JN5169-001-U00-2 USB Dongle features a JN5169 wireless microcontroller and allows communication with this JN5169 device from a USB connection. The JN5169 device can act as a node of a wireless network. Thus, the dongle provides an easy way of interfacing a host machine (such as a PC) to a wireless network based on the IEEE802.15.4, ZigBee Smart Energy or ZigBee-Home Automation networking protocol. An FTDI device provides the USB connection between the host machine and the JN5169 device, which in turn provides the radio interface to the wireless network.

Typical uses of the dongle include:

- A complete and stable hardware environment for the development of IEEE802.15.4, ZigBee Smart Energy and ZigBee-Home Automation networking applications, facilitating an accelerated time-to-market for wireless network products
- The basis of a packet sniffer for IEEE 802.15.4-based wireless communications
- A means of integrating the host machine into a wireless network, typically as the network Coordinator

The small-footprint PCB of the dongle provides all the necessary components for a wireless microcontroller with access to a USB connection. All RF layout and decoupling issues are handled by the design of this dongle. Therefore, this design is ready for application development without the necessity of hardware development.

The JN5169 USB dongle, shown [Fig 1](#), is supplied in the JN5169-EK004 Evaluation Kit.



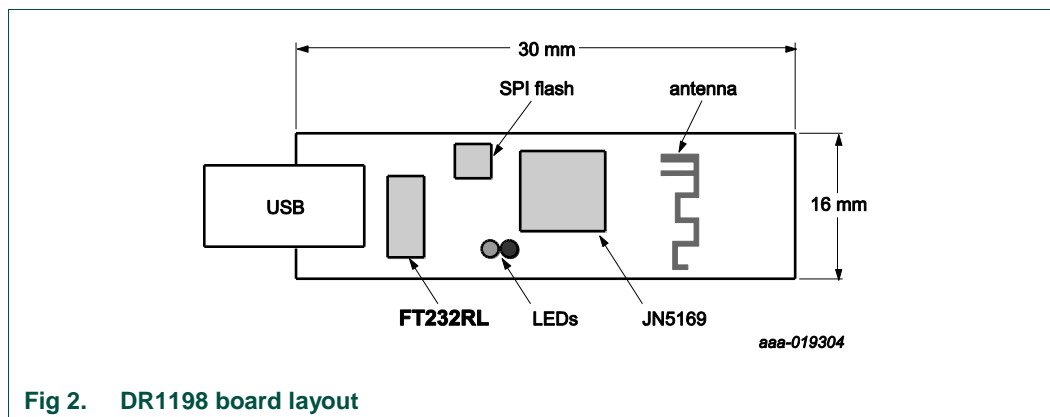
1.2 Features

The dongle has the following features:

- USB 2.0 Full-Speed Compatible Interface
- IEEE 802.15.4-based wireless microcontroller (JN5169) with the following radio characteristics:
 - Transmit power: 8.5 dBm (typ.), can be increased to 10 dBm (typ.)
 - Transmit current: 19.6 mA (typ) at 8.5 dBm / 23.3 mA (typ.) at 10 dBm
 - Receive sensitivity: -96dBm (typ.)
 - Receive current: 13 mA (typ.)
- Integrated printed RF antenna
- General-purpose LEDs (one green, one orange)
- Serial Flash memory device (4 Mbits)
- 32-kHz crystal oscillator

2. Hardware overview

2.1 Dongle layout



2.2 Dongle block diagram

The [Fig 3](#) illustrates the main hardware blocks of the dongle.

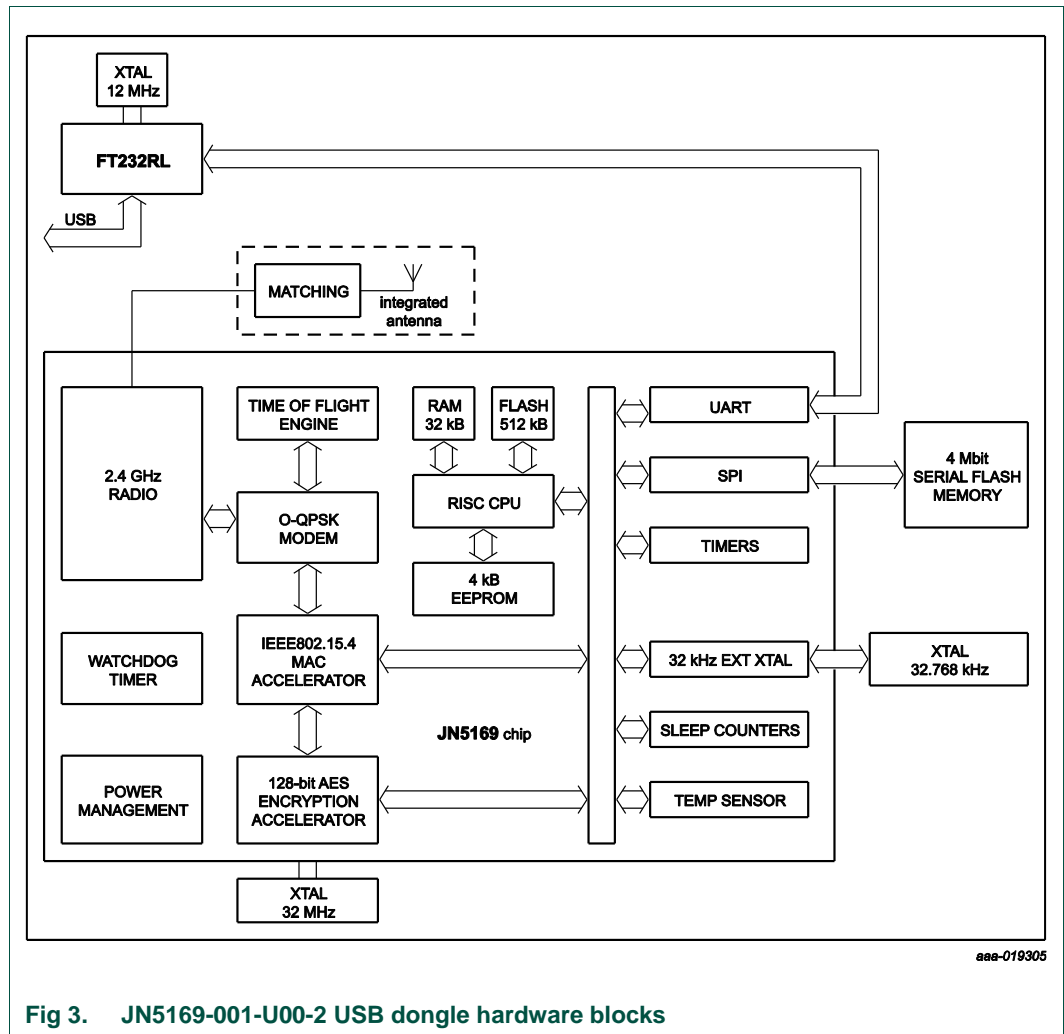


Fig 3. JN5169-001-U00-2 USB dongle hardware blocks

2.3 Hardware components

The hardware components on the board are described in the following sub-sections.

- JN5169 wireless microcontroller – see [section 2.3.1](#)
- FTDI FT232RL driver device – see [section 2.3.2](#)
- LEDs – see [section 2.3.3](#)
- 32-kHz crystal oscillator – see [section 2.3.4](#)

2.3.1 JN5169 device

The JN5169 circuit on the board is based around the standard JN5169-001-M00 module. However, it is built on a 2-layer board, as the DIOs do not need to be externally available.

The JN5169 device uses an integrated antenna on the PCB of the dongle.

2.3.2 FT232RL device

The FT232RL device is connected to the USB connector and acts as an interface between the PC and the JN5169 device. The FT232RL will enumerate on the PC as a virtual COM port connected directly to UART0 on the JN5169 device.

The IO controls C2 and C3 in the FT232RL device need to be set to 'I/O Mode' to allow the RESET and PGM signals to operate correctly. To do this, execute the following instructions.

1. Download the application FT_Prog from the FTDI website www.ftdichip.com
2. Insert the JN5169 USB Dongle into a USB port of your computer and wait for the device to enumerate
3. Start FT_Prog and click Scan and Parse (the magnifying glass button)
4. Update the IO controls C2 and C3 to I/O MODE – see [Fig 4](#)

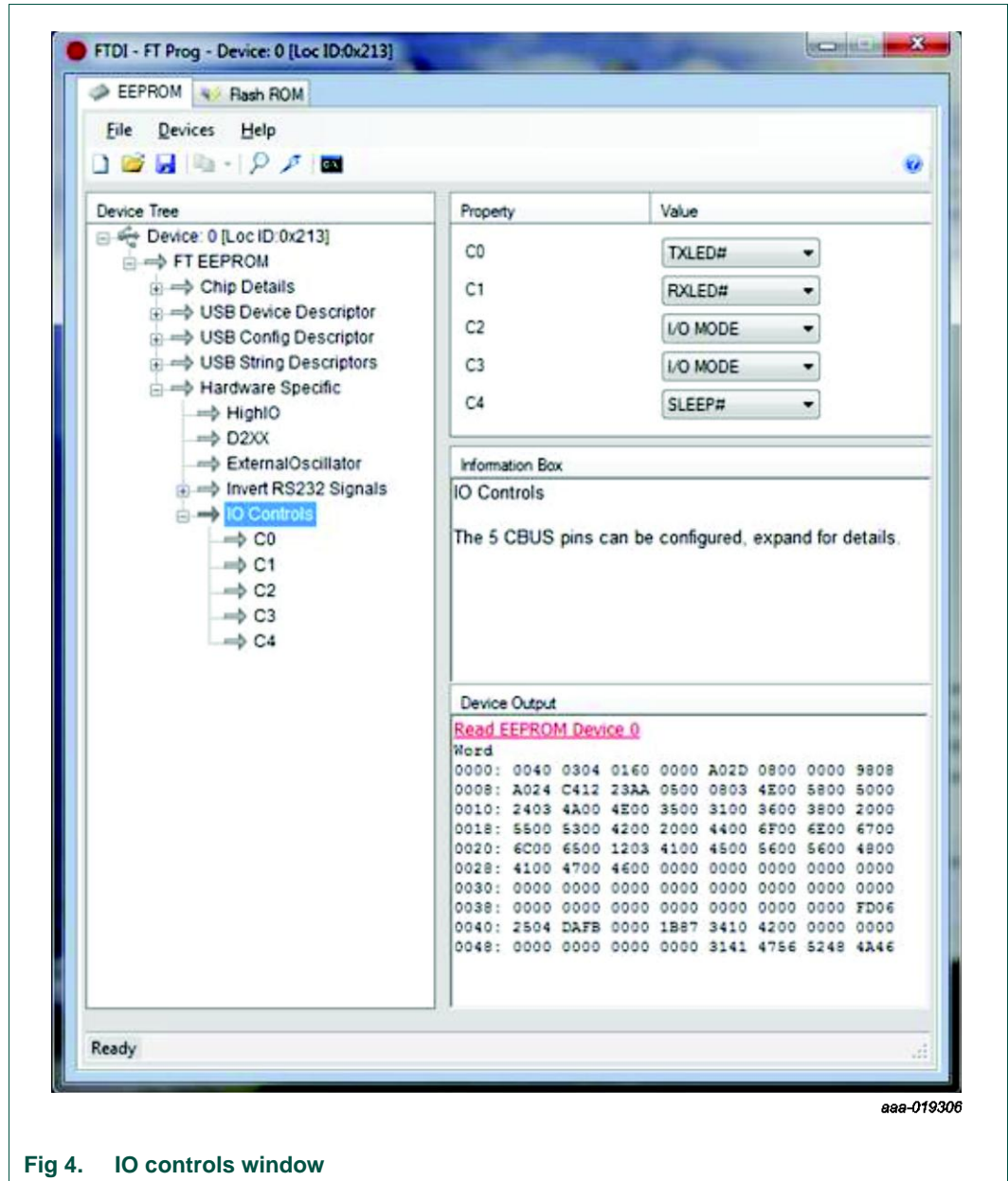


Fig 4. IO controls window

5. Click Program Devices (the lightning button)
6. On the resulting screen, click Program – see [Fig 5](#)

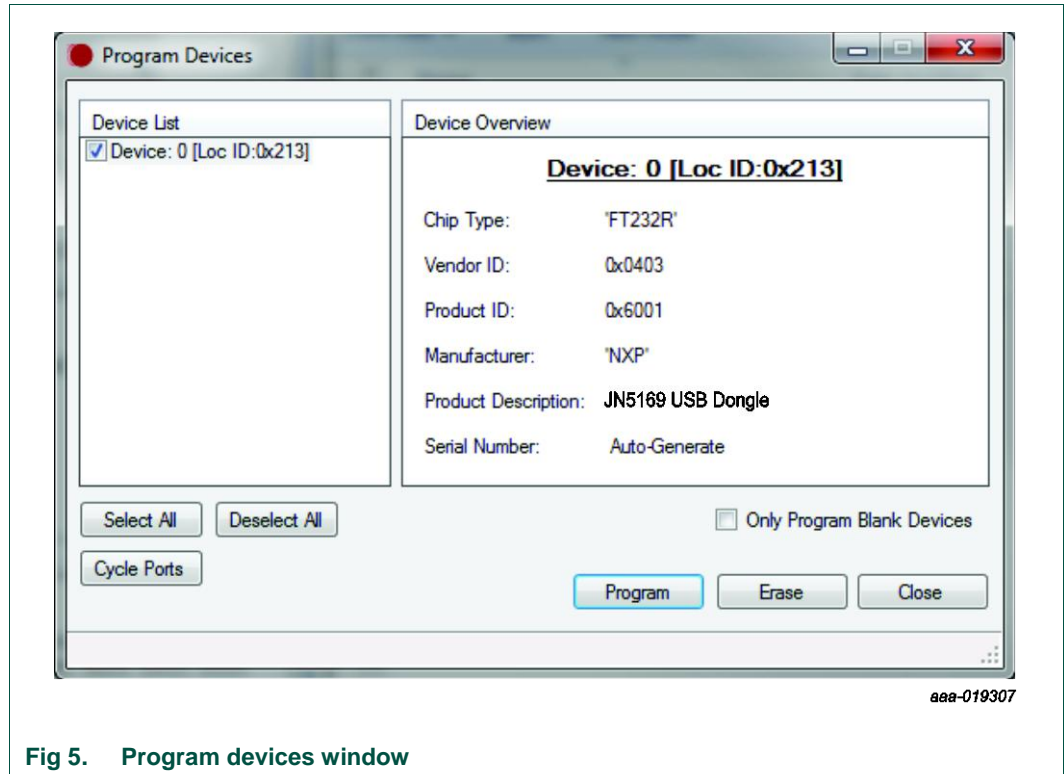


Fig 5. Program devices window

2.3.3 LEDs

There are two surface-mounted LEDs that can be controlled by the JN5169 wireless microcontroller (see [Fig 2](#) for locations):

- LED D1 (green)
- LED D2 (orange)

Both LEDs are connected to DIO16 and DIO17. These DIOs can be used to control the LEDs as indicated in the [Table 1](#).

Table 1. DIO control of LEDs

		DIO17	
		Low	High
DIO16	Low	D1: Off	D1: Off
		D2: Off	D2: On
	High	D1: On	D1: Off
		D2: Off	D2: Off

2.3.4 32-kHz crystal oscillator

The JN5169 device has an internal 32-kHz RC oscillator. In order to provide more accurate system timings, an external 32-kHz crystal can be used with the device. This is provided on the JN5169-001-U00-2 USB dongle and can be enabled from the JN5169 application using the JN5169 Integrated Peripherals API - refer to the JN5169 Integrated Peripherals API User Guide (JN-UG-3087).

3. Flash programming

When the JN5169-001-U00-2 USB dongle is powered up, it attempts to run an application from the internal Flash memory of the JN5169 device. This may be a self-contained application that sends and receives wireless data, and which does not need to communicate with the host. Alternatively, it may communicate via the USB with an application running on the host, such as a Windows program, and also communicate with a wireless device or network.

In order to program an application binary into Flash memory, the JN51xx Production Flash Programmer can be used, which is described in the JN51xx Production Flash Programmer User Guide (JN-UG-3099). This programming utility will place the JN5169 into its programming mode. It will then download the program to the Flash memory and reset the JN5169 device, causing the application to be executed.

4. Compliance statements and documentation

The FCC ID number of the JN5169-001-U00-2 USB dongle is XXMJN5169U0V2

The IC ID number of the JN5169-001-U00-2 USB dongle is 8764A-JN5169U0V2

4.1 FCC statements and documentation

This section contains the Federal Communication Commission (FCC) statements and documents.

4.1.1 FCC interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC caution:

User guide mandatory statements

User's instructions of the host device must contain the following statements in addition to operation instructions:

* "This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation"

* "Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment"

WARNING!**FCC radiation exposure statement:**

This device complies with FCC radiation exposure limits set forth for general population (uncontrolled exposure). This device must not be collocated or operating in conjunction with any other antenna or transmitter.

RF exposure guidelines require that the device be used at a minimum of 0.5cm from the human body. Failure to observe this guideline may result in RF exposure exceeding limits.

Certification information (SAR):

This device is also designed to meet the requirements for exposure to radio waves established by the FCC (USA).

The SAR limit adopted by the USA is 1.6 W/kg averaged over one gram of tissue. The highest SAR value reported to the FCC for this device complies with this limit.

4.2 Industry Canada statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF exposure requirements:

This device complies with FCC radiation exposure limits set forth for general population (uncontrolled exposure). This device must not be collocated or operating in conjunction with any other antenna or transmitter.

RF exposure guidelines require that the device be used at a minimum of 0.5 cm from the human body. Failure to observe this guideline may result in RF exposure exceeding limits.

Certification information (SAR):

This device is also designed to meet the requirements for exposure to radio waves established by the Industry Canada.

The SAR limit adopted by Canada is 1.6 W/kg averaged over one gram of tissue. The highest SAR value reported to IC for this device complies with this limit.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) il ne doit pas produire de brouillage, et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

Exigences RF en matière d'exposition :

Cet appareil est conforme aux limites d'exposition RF générales des personnes. Cet appareil ne doit pas être co-localisé ou utilisé en conjonction avec d'autres émetteurs.

Les directives d'exposition RF exigent que l'appareil soit utilisé à une distance minimum de 0.5 cm du corps humain. Le non-respect de cette directive peut entraîner une exposition RF dépassant les limites.

Informations de Certification (DAS):

Cet appareil est également conçu pour répondre aux exigences d'exposition aux ondes radio établies par l'Industrie Canada. La limite DAS adoptée par le Canada est de 1,6 W/kg sur 1 gramme de tissu. La valeur DAS la plus élevée signalée à l'IC pour ce type d'appareil est conforme à cette limite.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that permitted for successful communication

5. Abbreviations

Table 2. Abbreviations

Acronym	Description
BOM	Bill Of Materials
DIO	Digital Input/Output
FCC	Federal Communication Commission
IC	Industry Canada
PCB	Printed Circuit Board
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

6. References

- [1] **JN5169** – JN5169 Data Sheet
- [2] **JN-UG-3087** – JN516x Integrated Peripherals API User Guide
- [3] **DR1198_JN5169_USB_Dongle_1V0b** – DR1198 USB dongle PCB files

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8. List of figures

Fig 1. JN5169-001-U00-2 USB dongle (DR1198) 3
Fig 2. DR1198 board layout 4
Fig 3. JN5169-001-U00-2 USB dongle hardware blocks 5
Fig 4. IO controls window 7
Fig 5. Program devices window 8

9. List of tables

Table 1.	DIO control of LEDs	8
Table 2.	Abbreviations	12

10. Contents

1.	Introduction	3
1.1	Overview	3
1.2	Features	4
2.	Hardware overview	4
2.1	Dongle layout	4
2.2	Dongle block diagram	5
2.3	Hardware components	5
2.3.1	JN5169 device	5
2.3.2	FT232RL device	6
2.3.3	LEDs	8
2.3.4	32-kHz crystal oscillator	8
3.	Flash programming	9
4.	Compliance statements and documentation	9
4.1	FCC statements and documentation	9
4.1.1	FCC interference statement	9
4.2	Industry Canada statement	11
5.	Abbreviations	12
6.	References	12
7.	Legal information	13
7.1	Definitions	13
7.2	Disclaimers	13
7.3	Trademarks	13
8.	List of figures	14
9.	List of tables	15
10.	Contents	16

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