



DR1198 JN5168 USB Dongle Reference Manual

JN-RM-2065
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About this Manual

This manual provides a detailed reference for NXP's DR1198 JN5168 USB Dongle. The manual is part of the reference design JN-RD-6039. This USB Dongle provides an easy way of communicating with the NXP JN5168 wireless microcontroller from a USB connection. With suitable embedded software running on the JN5168 device, the dongle can then communicate with an IEEE 802.15.4, JenNet-IP or ZigBee PRO network.

Organisation

This manual consists of 4 chapters, as follows:

- [Chapter 1](#) outlines the features and functions of the USB dongle
- [Chapter 2](#) provides a hardware overview
- [Chapter 3](#) describes programming the JN5168 device on the dongle
- [Chapter 4](#) contains compliance statements and documentation

Conventions

Files, folders, functions and parameter types are represented in **bold** type.

Function parameters are represented in *italics* type.

Code fragments are represented in the Courier typeface.

Acronyms and Abbreviations

BOM	Bill Of Materials
DIO	Digital Input/Output
PCB	Printed Circuit Board
SDK	Software Developer's Kit
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

Related Documents

JN-DS-JN5168 JN5168 Data Sheet

1 Introduction

This manual provides a detailed reference for the DR1198 JN5168 USB Dongle, supplied with JN516x EK001 evaluation kit. The dongle provides a platform for hardware development environment for wireless microcontroller applications with a USB interface.

1.1 Overview

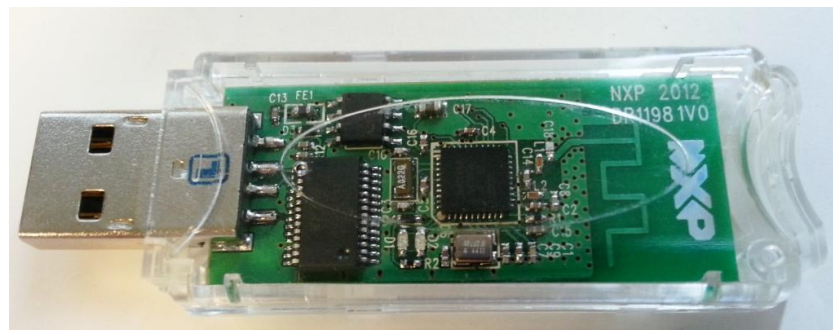
The DR1198 JN5168-001-U00 Dongle provides an easy way of interfacing a host machine (such as a PC) to a wireless network based on the IEEE802.15.4, JenNet-IP, ZigBee Light Link, ZigBee Smart Energy and RF4CE networking applications. The dongle incorporates the NXP JN5168 wireless microcontroller, allowing a direct USB connection between the host machine and the JN5168 device, which then 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, JenNet-IP, ZigBee Light Link, ZigBee Smart Energy and RF4CE 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 Co-ordinator

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 dongle is shown below.



1.2 Features

The dongle has the following features:

- USB 2.0 Full-Speed Compatible Interface
- IEEE 802.15.4-based wireless microcontroller (JN5168) with the following radio characteristics:
 - Transmit Power: 2.5 dBm (typ.)
 - Transmit Current: 15mA (typ.)
 - Receive Sensitivity: -95dBm (typ.)
 - Receive Current: 17.5mA (typ.)
- Printed RF antenna general-purpose LEDs (one green, one orange)
- Serial Flash memory device
- 32-kHz crystal oscillator

1.3 Reference Design

A reference design (JN-RD-6039) for the JN5168 High-Power USB Dongle is available from www.nxp.com/jennic/support. The reference design comprises a ZIP file containing the following files:

- This Reference Manual
- The schematic diagram for the board
- The BOM (Bill Of Materials) for the board
- Gerbers for the board

2 Hardware Overview

2.1 Dongle Layout

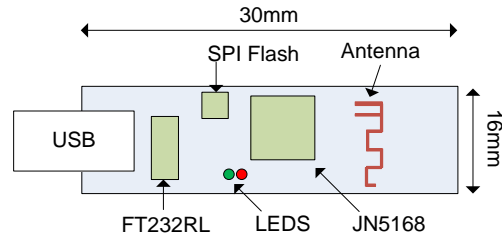
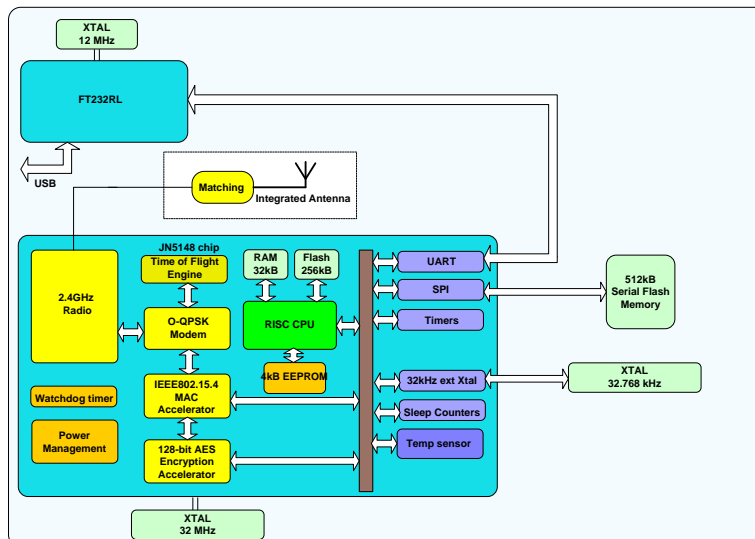


Figure 1: DR1198 Board Layout

2.2 Dongle Block Diagram



2.3 FT232L Device

The FT232L device is connected to the USB connector and acts as an interface between the PC and the JN5168 device. The FT232L will enumerate on the PC as a virtual COM port connected directly to UART0 on the JN5168.

2.4 JN5168 Device

The JN5168 circuit is based around the standard JN-RD-6038 JN5168 reference design; however it is built on a 2 layer board as the DIOs do not need to be externally available.

2.5 LEDs

There are two surface-mounted LEDs that can be controlled by the JN5148 wireless microcontroller (see Figure 2 for locations):

- LED D1 which is green
- LED D2 which is orange

Both LEDs are connected to DIO16 and DIO17. These DIOs can be used to control the LEDs as indicated in the table below.

		DIO 17	
		Low	High
DIO16	Low	D1: Off	D1: Off
		D2: Off	D2: On
	High	D1: On	D1: Off
		D2: Off	D2: Off

2.6 32-kHz Crystal Oscillator

The JN5168 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 USB dongle and can be enabled using the JN516x Integrated Peripherals API - refer to *JN516x Integrated Peripherals API User Guide (JN-UG-3087)*.

3 Programming

When the IEEE 802.15.4 USB Dongle is powered up, it attempts to load an application from the internal Flash and then run the application. 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 to an application running on the host, such as a Windows program, and communicate with a wireless device or network.

In order to program the serial Flash memory device, the JN51xx Flash Programmer can be used, which is described in the *JN51xx Flash Programmer User Guide (JN-UG-3007)*. This programming utility will place the JN5168 into its programming mode. It will then download the program to the Flash device and then reset the JN5168, causing the application to be loaded and executed.

4 Compliance Statements & Documentation

4.1 FCC Statements and Documentation

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

4.1.1 Federal Communication Commission 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: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

4.1.2 WARNING!

FCC Radiation Exposure Statement:

This portable equipment with its integrated antenna complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. To maintain compliance follow the instructions below;

Avoid direct contact to the antenna, or keep it to a minimum while using this equipment.

4.1.3 FCC Declaration of Conformity

FCC COMPLIANCE INFORMATION STATEMENT DECLARATION OF CONFORMITY



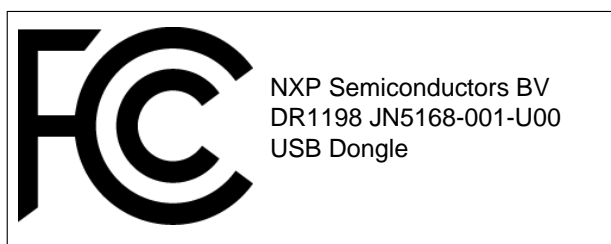
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Product:	DR1198 JN5168-001-U00 USB Dongle
Authorisation Procedure:	Declaration of Conformity

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.

We, NXP Laboratories (UK) Ltd, have determined that the above named equipment has been shown to comply with the applicable technical standards. Furthermore, we warrant that each unit of equipment marketed is identical to the unit tested and found acceptable with the standards. The records maintained continue to reflect the equipment being produced within the variation that can be expected due to quantity production and testing on a statistical basis.



Sheffield, December 4th, 2012

Conrad Farlow, Senior RF Hardware Engineer, NXP Laboratories Ltd

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.

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) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

4.3 European R & TTE Directive 1999/5/EC Statement

The JN5168-001-U00 is compliant with the following standards:

- Radio - ETSI EN 300 328 V1.7.1 (2006-10),
- EMC - EN 301 489-17 v2.1.1 (2009-02) and the
- Basic Safety Assessment (BSA) EN 60950-1:2006 (2006-06)

The JN5168-001-U00 is subject to a Notified Body Opinion.

Revision History

Version	Date	Description
1.0	17-Dec-2012	First release

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