X-NUCLEO-IDW04A1

Wi-Fi expansion board based on SPWF04SA module for STM32 Nucleo

Data brief

- Compatible with STM32 Nucleo boards
- Equipped both with Arduino® UNO R3 and (optional) ST morpho connector
- Scalable solution; can cascade multiple boards for larger systems
- Free development firmware library and examples, compatible with STM32Cube
- X-NUCLEO-IDW04A1 hosts FCC, IC and CE certified SPWF04SA module
- RoHS compliant

Features

- Based on SPWF04SA Wi-Fi module
- SPWF04SA module major characteristics:
  - Low power IEEE 802.11 b/g/n transceiver
  - Integrated SMD antenna
  - STM32 ARM Cortex®-M4, with 256 KB SRAM and 2 MB Flash memory
  - 1 MB Flash memory for user storage, extendable via SD/MMC interface or external SPI Flash
  - Integrated protocol stacks: TCP/IP (eight simultaneous TCP/UDP clients and two socket servers supporting up to eight clients each), TLS1.2
  - Application layer functions: web server supporting dynamic web pages
  - Open, WEP, WPA2 Personal, WPA2 Enterprise Security
  - WPS for station
  - System modes: station, IBSS, and miniAP (with up to five client STAs)
  - Firmware and FileSystem updates via UART and (secure) over the air (OTA)
  - 19 configurable GPIOs available
  - Advanced low-power modes
  - Simple AT command set host interface through UART, or equivalent proprietary protocol over SPI
  - Embedded real-time microPython environment for customer applications and on-board development

Description

The X-NUCLEO-IDW04A1 Wi-Fi evaluation board is based on the SPWF04SA module and expands the STM32 Nucleo portfolio. The SPWF04SA module has an embedded STM32 MCU, a low-power Wi-Fi b/g/n SoC with integrated power amplifier and power management, and an SMD antenna. The SPWF04SA module relies on 2 MB MCU internal Flash. 1 MB of the internal Flash is for storing the user file system and to perform secure firmware update over the air (FOTA). A hardware interface allows the use of external memory to extend file system storage capability with no size limit. The firmware includes a complete IP stack, dynamic web pages with SSI to interact with the module and a REST API (get & post) for conveniently transferring files to and from servers in the cloud. The module can simultaneously behave as a socket server and socket client. The firmware supports secure sockets with TLS encryption, ensuring secure end-to-end communications with the cloud. The X-NUCLEO-IDW04A1 interfaces with the MCU on the STM32 Nucleo board via the UART serial port and SPI interface.

1 Radio certification

1.1 Formal notices required by the U.S. federal communications commission (FCC)

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment. 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
2. this device must accept any interference received, including any interference that may cause undesired operation.

This device uses, generates and radiates radio frequency energy. The radio frequency energy produced by this device is well below the maximum exposure limit established by the federal communications commission (FCC). The X-NUCLEO-IDW04A1 contains the FCC certified SPWF04SA module (FCC ID: S9NSPWFS04).

1.2 Formal notices required by industry Canada (IC)

English:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference
2. this device must accept any interference, including interference that may cause undesired operation of the device.

French:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. 'Exploitation est autorisée aux deux conditions suivantes: (1)

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

The X-NUCLEO-IDW04A1 contains the IC certified SPWF04SA module (IC: 8976C-SPWFS04)

1.3 Formal notices required by the ETSI (CE)

This module complies with the following European EMI/EMC and safety directives and standards:

- ETSI EN 300 328 V1.9.1:2015
- EN 301 489-1 V1.9.2:2011 + EN 301 489-17 V2.2.1:2012 + EN 301 489-1 V1.8.1:2008
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- EN 62479:2010

1.4   SPWF04SA module

This section provides some information regarding the SPWF04SA Serial-to-Wi-Fi b/g/n intelligent modules (order code: SPWF04SA). More detailed information can be found at www.st.com.

The main features of the SPWD04SA module are:

- 2.4 GHz IEEE 802.11 b/g/n transceiver
- High performance STM32F439
    - ARM Cortex®-M4
    - 256 KB SRAM
    - Embedded 2 MB high speed Flash memory
- Integrated TCP/IP protocol stack
    - 8 simultaneous TCP or UDP clients and 2 socket servers (supporting up to 8 clients each)
    - secured socket supporting up to TLS 1.2, including common encryption algorithms AES (128, 256), hash (MD5, SHA-1, SHA-256) and public key algorithms (RSA)
    - web server supporting dynamic web pages
- Open, WEP, WPA2 Personal and WPA2 enterprise security
- WPS push button for station
- System modes: Station, IBSS, and miniAP (supporting up to 5 stations)
- miniAP easily provisioned (SSID, PWD)
- Fast Wi-Fi reassociation to AP
- Firmware and FileSystem updates via UART and (secure) over the air (OTA)
- Advanced low-power modes
- Simple AT-command set host interface through UART
- High speed SPI interface with simple protocol
- Application subsystem
    - Embedded real-time microPython environment for customer applications and on-board development
    - microPhyton API library for easy access to Wi-Fi subsystem capabilities and device peripherals (i.e. UART, SPI, I2C)
- Industrial temperature range: -40 °C to 85 °C
- FCC/CE/IC certified
- RoHS compliant

It is suitable for evaluating Wi-Fi connectivity in the following applications:

- Smart appliances
- Industrial control and data acquisition
- Home automation and security systems
- Wireless sensors
- Cable replacement
- Medical equipment
- Machine-to-machine communication

Figure 1: SPWF04SA module footprint
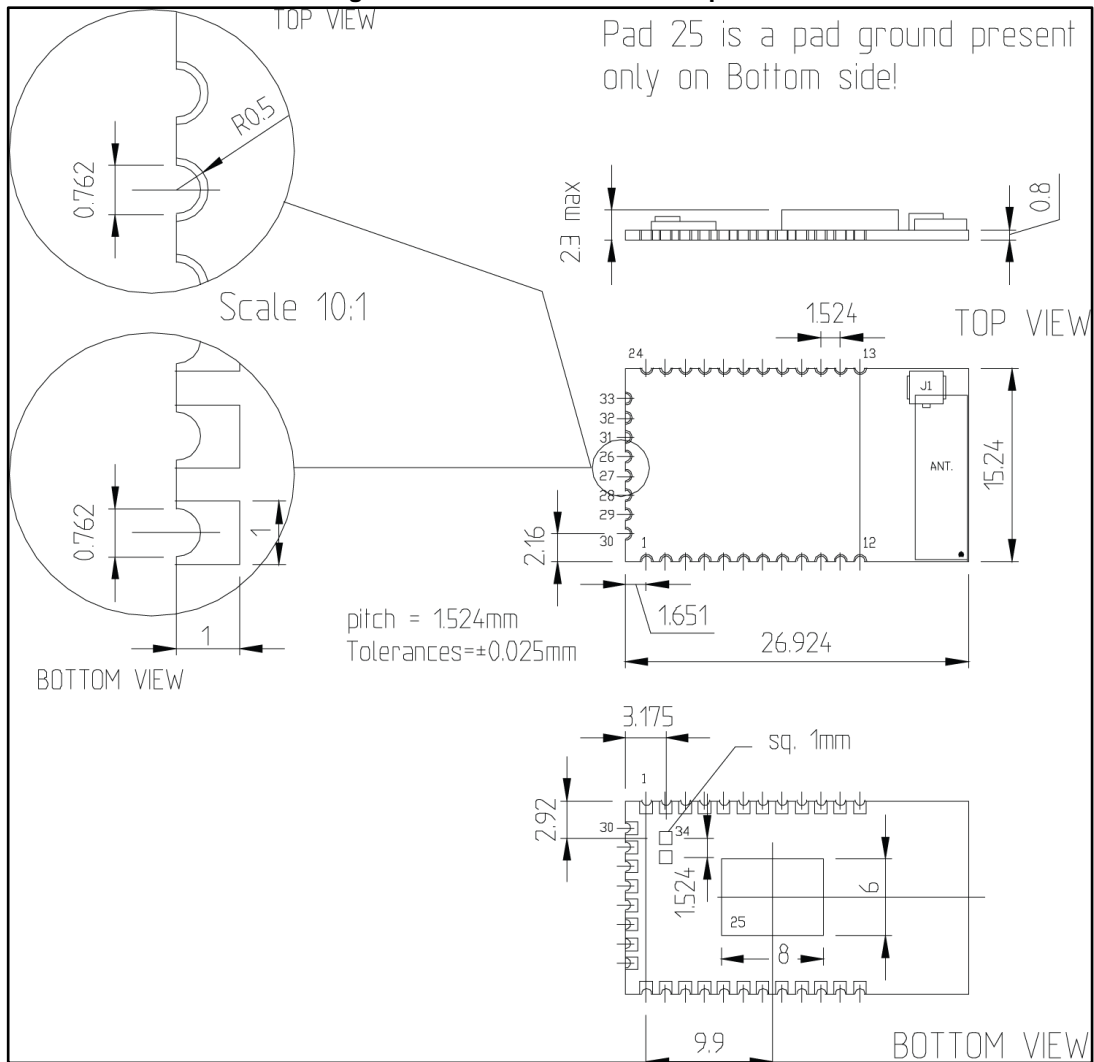
1.5 STM32 Nucleo connections

The X-NUCLEO-IDW04A1 expansion board is designed to be plugged directly on the STM32 Nucleo board connectors. The X-NUCLEO-IDW04A1 is configured by default to be compatible with as many STM32 Nucleo boards as possible. It may also be configured, via jumper or resistor placement, to use different I/O configurations to match specific customer targets.

Refer to the X-NUCLEO-IDW04A1 user manual on www.st.com for more detailed information regarding the possible I/O configuration options.

2 Schematic diagram

Figure 2: X-NUCLEO-IDW04A1 circuit schematic
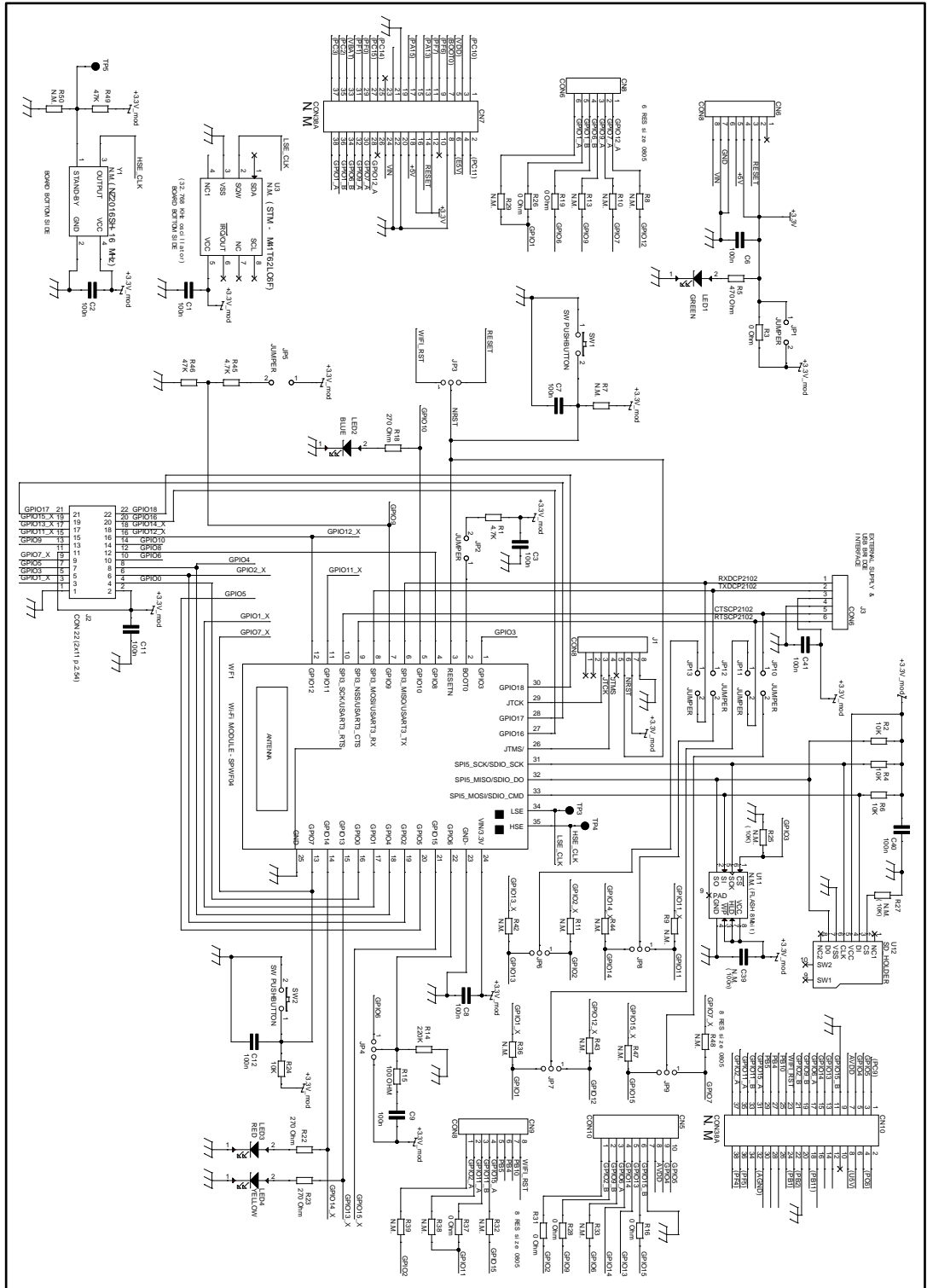
3 Revision history

Table 1: Document revision history

Date	Version	Changes
14-Mar-2017	1	Initial release.

IMPORTANT NOTICE – PLEASE READ CAREFULLY