TapNLink TnL-FIW103 (Wi-Fi, BLE, NFC) Datasheet

19 October 2022
Version 1.8

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1 Introduction

IoTize™ offers a complete solution for instant integration of wireless connectivity that links electronics to mobile devices and the Cloud. This solution is inspired by the advantages of adding network connectivity without redesigning existing systems or recoding their firmware. It supports integrators with software and features for instant creation of customized Human Machine Interfaces (HMI) that run on mobile devices, configurable access control, security and Cloud integration.

The **TapNLink™** line uses technologies and techniques that are typically reserved for system programming and debugging to connect directly the target system's microcontroller. This unique approach makes it possible to add connectivity without redesigning the system. It speeds integration, eliminates risks and delivers design flexibility through encapsulation of complex wireless communication, network and security technologies. This facilitates the initial integration, but also makes it possible to easily evolve the wireless connection to meet future needs or technology evolutions... and still without ever recoding the system's original software.

TapNLink provides fully qualified wireless implementations. These allow local connection to mobile devices (smartphones, PDAs, tablets, PCs, etc.) allowing users to monitor or update a system and transfer data to the Cloud if/when necessary. Depending on the connectivity channels on the module, TapNLink can also enable connection to WAN or LPWAN for remote supervision and remote access control from the Cloud.

For the embedded application, TapNLink enables:

- Mobile device-based HMI
- Data transfer to the internet

TapNLink provides software and hardware encapsulation of the mobile device / target application communication. It manages communication with:

- Target application via hardware module RF interface(s) and communication co-processor
- Mobile devices via a low-level service application

2 Summary

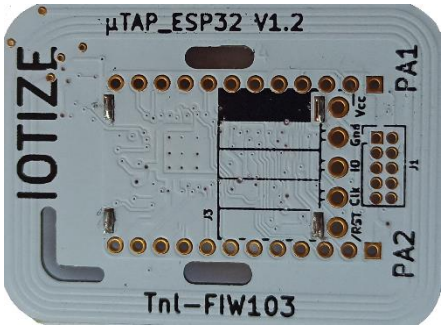
The TapNLink Wi-Fi, Bluetooth Low Energy (BLE), NFC module (Part N°: TnL-FIW103) offers instant integration of contactless/radio interfaces to enable the connection of a microcontroller-based target system to a local information appliance (smartphones, PDAs, tablets, PCs, etc.).

TapNLink connects directly the microcontroller of the target system and allows non-intrusive read and/or write access to variables in the target microcontroller's memory. The data addresses and access parameters for the target system are configured in the TapNLink. No coding of the target system's native functionality is required to connect TapNLink to the target microcontroller.

TapNLink supports local connection to mobile devices (Android or iOS, Windows 10), where data can be viewed and modified via a graphical user interface created by the target system designer. The solution includes MQTT infrastructure to enable data transmission via the local mobile device to any Cloud-based IoT platform. Data that is read by the TapNLink can be transmitted via the mobile device's data or network connection when available. For this, IoTize provides an MQTT-base relay with IoT Cloud platform translators. This MQTT infrastructure is open source software that target system designers can install on servers and adapt to any private or public IoT Cloud platform.

Communication Channels

- Near Field Communication (NFC) Type5 tag (ISO/IEC 15693)
- Wi-Fi 802.11b/g/n
- Bluetooth Low Energy (BLE) 4.2



Target system interface protocols

- SWD debugging/programming interface protocol
- Software Secure Serial Port (S3P)

Security features

- Configurable access profiles
- Configurable, encrypted passwords
- AES-128 module-level data encryption
- Configurable secure pairing with NFC

Configurable target memory access controls

- Accessible data addresses: up to ~ 500
- User profiles: up to ~ 100
- Access capabilities: Read or Write or Read/Write

Electrical characteristics

- Input voltage: 2.3V to 3.6V
- Power consumption:
  - Standby: 10 ~ 20 µA
  - WiFi Tx/Rx: 118 ~ 122 mA
  - WiFi Advertising: 116 ~ 120 mA
  - BLE Tx/Rx: 58 ~ 62 mA
  - BLE Advertising: 44 mA
  - NFC Only: 40 mA



Mechanical characteristics

- Dimensions: 28 x 38 x 3 mm

Package options

- Bare board
- Plastic casing (IP44)
- Silicone resin (IP65)

Operating temperature range

- -20°C, +55°C

Acceptance

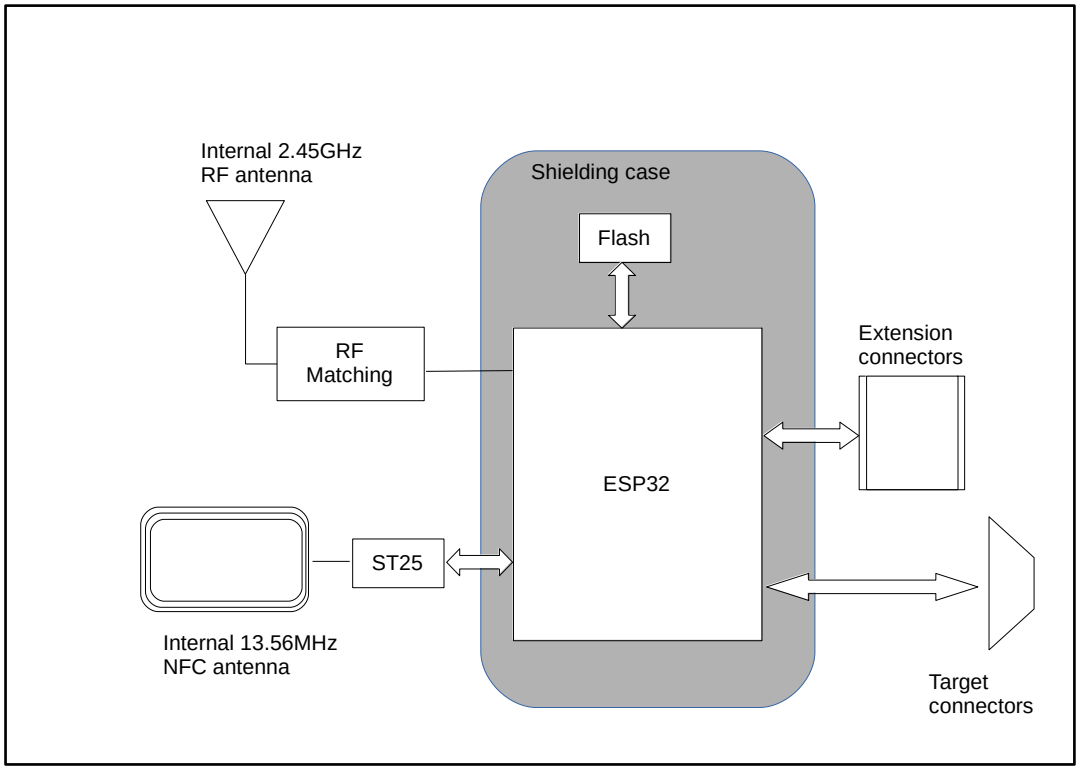
- CE (Europe), FCC (USA), IC (Canada).
- REACH and RoHS compliant

3 Block schematic

The TapNLink Wi-Fi, BLE, NFC module is equipped with an ESP32 microcontroller that executes:

1. The main program
2. Manages the upper level protocols
3. Manages the configuration and access control
4. Manages the Wi-Fi or BLE stack and acts as a simple transmitter.

The circuitry for both the NFC and the Wi-Fi/BLE antennas are outside of the shielding case. The NFC antenna is a trace at the periphery of the printed circuit board. The 2.45 GHz antenna is a ceramic device located close to the L slot in the printed circuit board.



4 Development environment

4.1 TapNLink module configuration

TapNLink is implemented by configuration only using the free IoTize Studio software environment, which is available on the IoTize website.

IoTize Studio provides a simple yet complete interface for managing the configuration of IoTize radio modules so that they interface correctly with the target system. IoTize Studio provides:

- Drag-and-drop configuration of target data addresses using the target system's source code (ELF files)
- Instant configuration transfer without extensive hardware installations
- Immediate configuration verification on the designer's PC and mobile device
- Mobile app generation (for iOS and Android)

When creating the TapNLink configuration, the designer imports the target system's firmware source (ELF file). Designating the addresses to access via TapNLink is as easy as dragging-and-dropping them into the configuration project. All variable information (address, type, etc.) is copied directly from the firmware source file, greatly reducing the risk of configuration errors. IoTize Studio also notifies the designer if the firmware source file is modified after the configuration has been created.

IoTize Studio allows users to transfer their configuration for testing and deployment with just the click of a button. No complicated or expensive hardware is required.

After configuration, the designer can connect to the module and visualize in IoTize Studio the results of the configuration. The integrated app viewer in IoTize Studio shows the resulting user app exactly as it would display on a mobile device. When the designer is satisfied with the configuration, visualizing the result on a mobile device requires only that the designer connect it to the TapNLink via one of the supported radio interfaces.

IoTize Studio and TapNLink are designed to allow the transfer of the Designer's configuration using a direct Wi-Fi or BLE connection with the designers PC, or via a mobile device connection either directly with the designer's PC or IoTize's Cloud-based MQTT relay. Thanks to this implementation no additional hardware is required during the design phase.

4.2 Mobile device software

Various application notes are available at the IoTize website to describe how to design HTML pages to monitor the TapNlink from a mobile device. APIs for native programs are also available.

5 Features

The TapNLink NFC, Wi-Fi, BLE module (root part number: TnL-FIW103) offers instant integration of contactless/wireless radio interfaces to enable the connection of a microcontroller-based target system to a local mobile device (smartphone, PDA, tablet, PC, etc.).

TapNLink connects directly to two GPIOs on the microcontroller in the target system. These GPIOs can be either the target microcontroller's debugging/programming port (ex. SWD) or any pair of GPIOs enabled by the IoTize S3P protocol (application relinking is required). Standard serial (UART) protocol is also supported. The connection to the target microcontroller is non-intrusive and allows read and/or write access to variables in the target microcontroller's memory. The data addresses and access parameters for the target system are configured in the TapNLink using the IoTize Studio configuration environment.

TapNLink communicates with local mobile devices via their NFC and/or Wi-Fi or BLE interfaces. The Tap Manager app (Android or iOS) on the mobile device manages its communication interfaces, thus eliminating the need for the target-system designers to code or validate these mechanisms. Designers instead focus on creating the user interface for the target system.

With TapNLink NFC, Wi-Fi, BLE modules, a local mobile device can serve as a network gateway to bring data to or retrieve data from the Cloud. Data that is read by the TapNLink can be transmitted via the mobile device's data or network connection when available. For this, IoTize provides an MQTT-based relay with IoT Cloud platform translators. This MQTT infrastructure is open source software that designers can install on servers and adapt to any private or public IoT Cloud platform.

5.1 Communication channels

5.1.1 Near Field Communication (NFC)

- Data transmission rate[1]: 2 kilobytes per second
- Range[2]: to 4 centimeters
- Supports use of NFC for dynamic wakeup and pairing of the Wi-Fi interface.

5.1.2 Wi-Fi

- Max power: 16 dBm (conducted power)
- Data transmission rate[1]: DSSS, 1Mbps ; OFDM, 54 Mbps ;
- Range[2]: to 30 meters

5.1.3 Bluetooth Low energy (BLE)

- Max power: 3 dBm (conducted power)
- Data transmission rate[1]: 0.5 kilobytes per second
- Range[2]: to 30 meters

Notes:

1. *Average speed while acquiring 1000 times 220 bytes from the target.*
2. *Measured line-of-site in an environment free of obstructions and rebound effects.*

5.2 Target system interface

Requires 2 GPIO enabled by the target microcontroller's debug protocol or IoTize Simulated Secure Serial Port (S3P). Other possibility : standard UART (with Modbus support).

5.3 Security features

Customized firmware allows differentiated algorithms for each application. The communication chain is fully secured using classic techniques such as:

- Authentication: secured passwords or signed tokens
- Encryption: AES-128

When implementing on GPIO that are enabled by the target microcontroller's debug protocol, data encryption is enabled to the level of the TapNLink module.

When implementing with S3P protocol, security features can be implemented on the target microcontroller. Features include data encryption and filtering of accessible addresses in the target's memory space.

For communication to the Cloud, MQTT protocol is used with or without SSL handling.

5.3.1 Access control configuration

IoTize stores access control data in a 16KB section of FLASH:

- Accessible data addresses: up to ~ 500
- User profiles: up to ~ 100
- Access rights: Read/Write
- Plus 3 predefined profiles of up to 96 characters.

5.4 Electrical characteristics

5.4.1 Power supply

- Maximum DC supply voltage 3.6V
- DC supply voltage 2.3V to 3.6V

5.4.2 Power consumption

The power consumption depends on the CPU Frequency, three different frequencies are settable: Normal, Fast and Slow. The default is the normal frequency, if needed the frequency can be lowered to minimize the power consumption of the Tapioca.

Operating Mode	Slow CPU Frequency	Normal CPU Frequency	Fast CPU Frequency
Standby	10 ~ 15 µA	10 ~ 15 µA	10 ~ 15 µA
WiFi Hotspot[1] Tx/Rx	116 ~ 126 mA	123 ~ 128 mA	150 ~ 165 mA
WiFi Hotspot[1] Advertising	112 ~ 114 mA	116 ~ 120 mA	143 ~ 145 mA
WiFi Network[2] Tx/Rx	58 ~ 72 mA	68 ~ 93 mA	85 ~ 105 mA
WiFi Network[2] Advertising	39 ~ 49 mA	56 ~ 65 mA	68 ~ 74 mA
BLE[3] Tx/Rx	40 ~ 50 mA	52 ~ 62 mA	72 ~ 78 mA
BLE[3] Advertising	33 mA	44 mA	65 mA
NFC[4] Only	28.5 mA	40 mA	59 mA

Notes:

1. NFC, BLE and Wi-Fi in hotspot mode enabled by configuration.
2. NFC, BLE and Wi-Fi in network mode enabled by configuration.
3. Wi-Fi disabled by conf, NFC and BLE available.
4. BLE and Wi-Fi disabled by configuration, only NFC available

5.4.3 Digital levels

- Maximum voltage on input/output Vcc + 0.3V
- Minimum voltage on input/output - 0.3V
- Input low voltage (max) 0.25 x Vcc
- Input high voltage (min) 0.75 x Vcc

5.5 Radio specifications

For details, see ESP32 specifications.

Parameter	Min	Typ	Max	Unit
Frequency range	2412	-	2484	MHz
Rx sensitivity(1) Wi-Fi	-70	-93	-98	dBm
Output power(1) range Wi-Fi	+10	-	+20	dBm
RX sensitivity BLE @0.1% BER	-94	-93	-92	dBm
Output power range BLE	-12	0	+9	dBm

(1) Typical value, it depends on the type of modulation.

5.6 Mobile device support

TapNLink includes radio implementations for NFC, Wi-Fi and BLE, which are compatible with a wide range of mobile devices running Android or iOS operating systems.

The Tap Manager app manages the radio interfaces on mobile devices running Android v4.0.3 and iOS v10 or later versions. Note that on iPhone devices, NFC is supported since version iOS13 (dated of September 2019).

5.7 Cloud support

TapNLink includes an open source MQTT interface. Full information about IoTize Cloud support for TapNLink is provided in the IoTize Documentation center.

5.8 Low power modes

Such as all IoTize products, the TapNLink can be switched to low power mode. For now, only standby mode is available.

When in standby mode, wake-up of the TapNLink is possible by NFC or by a configurable periodic timer.

Important Note: Due to a hardware issue the low power mode does not work on TapNLink TnL-FIW103 rev1.6. Please contact IoTize for a software workaround.

5.9 Operating temperature range

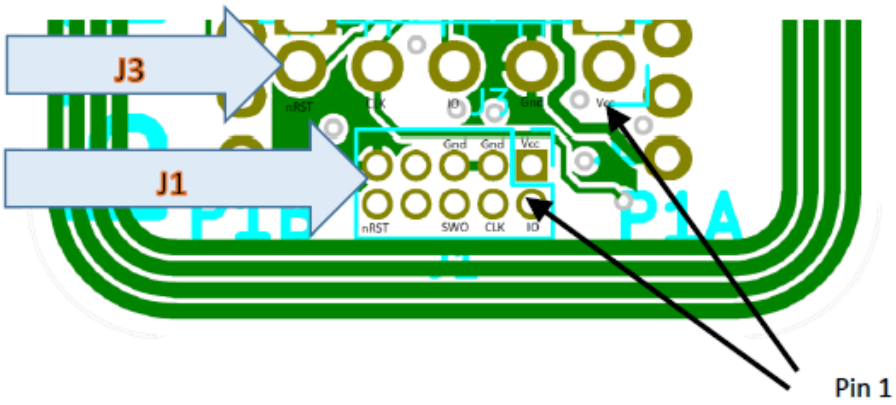
The behavior and the radio characteristics have been tested to guarantee a correct operation in the range [-20°C, +55°C].

6 Pin assignment

The TapNLink Wi-Fi/NFC module has 4 connectors:

- J1 (2x5 in 1.27mm steps): connects TapNLink to the debug connector (ARM-SWD standard) of the target board via a flex cable (in 0.635mm steps).
- J3 (1x5 in 2.54mm steps) connects TapNLink to the target board using free wires that need not be grouped in a ribbon cable or with a single end connector. Note that J3 is a subset of J1.
- Px extension connectors (PA and PB) are composed of two rows of contacts with 2mm spacing. These connectors were mainly reserved for the addition of expansion cards and is only briefly described in this document. With the introduction of the Embedded Java Virtual Machine these connectors are used to interact to the target directly from the Java code using most of the peripherals and IO capabilities. Note that in the first batches (prior to rev 1.6), PA was noted as PA1 and PB as PA2.

The following figure shows (bottom view) the signals connected to J1 and J3:



6.1 J1 pinout

This connection corresponds to the format specified by ARM for Cortex-M microcontrollers.

Vcc	1	●	●	2	S3PIO/SWDIO (TMS)
Gnd	3	●	●	4	S3PCLK/SWDCLK (TCK)
Gnd	5	●	●	6	SWO (TDO)
Not connected	7	●	●	8	-- (TDI)
Gnd	9	●	●	10	nRST

Note: The names in parentheses correspond to the JTAG protocol. In general, it is advisable to privilege using SWD over JTAG for Cortex M-based microcontrollers. For any other microcontroller, use the S3P protocol.

The signals to be connected in SWD or S3P are:

- Gnd and Vcc (the target must provide the TapNLink power),
- S3PIO/SWDIO, a bi-directional data signal. This signal can optionally be used as RTS for TapNLink serial (UART) Interface.
- S3PCLK/SWDCLK, the clock signal, bi-directional in S3P. This signal can optionally be used as RTS for TapNLink serial (UART) Interface.

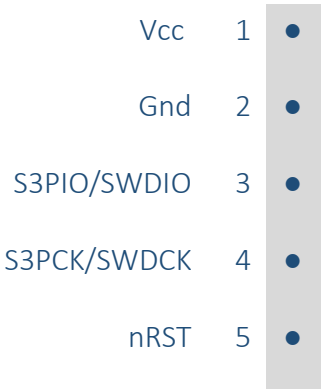
- TDI (TXD for TapNLink) and TDO (RXD for TapNLink) are used as serial (UART) interface.
- NRST: Reset signal of the target processor. Its connection is optional. It should be maintained if you want to use the reset command, or if you want to use TapNLink as a programmer (the reset signal is required in some programming situations).

Note: If no target protocol is used these pins are accessible from the internal JVM and can be used as SPI, UART or standard GPIO.

6.2 J3 pinout

J3 was added for practical reasons. The 2.54 mm step connectors are cheaper and more robust and can connect to a wide range of other connectors. It is easier to use this connector to connect to the 20-point ARM 2.54mm-step standard.

J3 does not correspond to a standard. It contains the main signals necessary for the S3P and SWD protocols (note that the UART signals are NOT available on this connector):



6.3 Px extension connector

Px extension connector is composed of two mechanically independent parts:

- PA (named PA1 on versions prior to revision 1.6).
- PB (named PA2 on versions prior to revision 1.6).

Both PA and PB have 12 points. These connectors are used:

- As power pins (PA1, PB1, PA12, PB12)
- To setup special modes at reset (2 pins including /RST are involved).
- As possible host UART to upload a configuration file in wire mode at manufacturing time. Host UART is also available from the JVM.
- As standard peripherals signals controlled from a Java program.
- As logic/analog input/output pins driven from a Java program (most of the pins). Some pins can be used as analog input, others as input only, others as output only, others as standard Input/output (see description below).

The figure below shows the position of the TapNLink's power, peripherals, GPIOs, reset and invalid points.

GND	PA12	●		●	PB12	VCC
SCL for I2C (or GPIO)	PA11	●		●	PB11	DO NOT CONNECT
GPIO IMPORTANT: This pin is not available if S3P is used.	PA10	●		●	PB10	(optional) RTS for UART (or GPIO)
GPIO IMPORTANT: Connected to Target TDI signal.	PA9	●		●	PB9	MISO for SPI (or GPIO)
IMPORTANT: OUTPUT ONLY!	PA8	●		●	PB8	Rx for Host UART (or GPIO)
Start « FACTORY RESET »	PA7	●		●	PB7	Tx for Host UART (or GPIO)
DO NOT CONNECT	PA6	●		●	PB6	DO NOT CONNECT
nRST	PA5	●		●	PB5	(optional) CTS for UART, NSS for SPI, CAN_D for CAN (or GPIO)
DO NOT CONNECT	PA4	●		●	PB4	SCK for SPI, CAN_R for CAN, PWM output (or GPIO)
DO NOT CONNECT	PA3	●		●	PB3	Input only, ADC is available
MOSI for SPI (or GPIO) IMPORTANT: OUTPUT ONLY!	PA2	●		●	PB2	SDA for I2C (or GPIO)
VCC	PA1	●		●	PB1	GND

6.4 Extension PA connector: pin assignment and description

Pin	Type	Description
PA1	PWR	VCC
PA2	O	This pin must be used with care: it is fetched at reset to configure the voltage of the processor => do not apply any external voltage and do not modify its impedance (no pullup, no pulldown). Once started, the pin can be used as a **logic output only.**
PA3	NA	Reserved for factory programming/testing
PA4	NA	Reserved for factory programming/testing
PA5	CNF	Reset (active low) pin. Input only
PA6	NC	Not connected
PA7	NA	Reserved. Use it only at reset time to trigger a 'factory reset'. Note that the factory reset feature can be enabled/disabled by configuration. Do not use it after factory reset (this pin is used by the TapNLink).
PA8	O	This pin must be used with care: it is fetched at reset to select the boot mode => do not apply any external voltage and do not modify its impedance (no pullup, no pulldown). Once started, the pin can be used as a **logic output only.**
PA9	IO	This pin is connected to Target TDI and cannot be used if Target UART is active. Analog/digital IO. Analog (ADC) is not available when WiFi is active.
PA10	IO	Analog/digital IO. Analog (ADC) is not available when WiFi is active
PA11	IO	Analog/digital IO. Analog (ADC) is not available when WiFi is active Alternate function: SCL for the JVM I2C driver. Note: For TapNLink Firmware versions prior to 2.14 the SCL signal of the JVM's I2C driver is on PA9.
PA12	PWR	GND

PWR: power pin (either GND or VCC)
O: output only
I: input only
I/O: input/output
CNF: configuration pin at reset
NA: not available (test pin)
NC: not connected

6.5 Extension PB connector: pin assignment and description

Pin	Type	Description
PB1	PWR	GND
PB2	IO	Analog/digital IO. Analog (ADC) is not available when WiFi is active. Alternate function: SDA for the JVM I2C driver.
PB3	I	Analog or digital input (input only). ADC always available.
PB4	IO	Analog/digital IO. Analog (ADC) is not available when WiFi is active. Alternate function: Used as SCK signal for the JVM SPI driver, CAN_R signal of the CAN driver, as PWM output for the JVM PWM driver.
PB5	IO	Analog/digital IO. Analog (ADC) is not available when WiFi is active. Alternate function: Optionally used as CTS for the Host UART when used by the JVM driver, CAN_D signal for the CAN driver.
PB6	NA	This pin is connected to the data signal of the target (S3PIO/SWDIO). Do NOT use it when connected to a target via SWD or S3P.
PB7	IO	Analog/digital IO. Analog (ADC) is not available when WiFi is active Alternate function: Used as Txd for the Host UART
PB8	IO	Digital IO. No analog conversion. Alternate function: Used as Rxd for the Host UART
PB9	IO	Digital IO. No analog conversion. Alternate function: Used as MISO signal for the JVM SPI driver.
PB10		Analog/digital IO. Analog (ADC) is not available when WiFi is active Alternate function: Used as CTS for the Host UART when used by the JVM driver.
PB11	NA	This pin is connected to the clock signal of the target (S3PCK/SWDCK). Do NOT use it when connected to a target via SWD or S3P
PB12	PWR	VCC

PWR: power pin (either GND or VCC)
O: output only
I: input only
I/O: input/output
CNF: configuration pin at reset
NA: not available (test pin)
NC: not connected

7 Regulatory compliance

Changes or modifications not expressly approved by IOTIZE S.A.S. could void the user's authority to operate the equipment.

TapNLink TnL-FIW103 is tested and qualified under the following standards:

7.1 CE certification (Europe)

The TapNLink TnL-FIW103 operating range corresponds to:

- Frequency Band: 2412-2484MHz
- Maximum Transmitting Power: Wi-fi 32mW and BLE 10mW (EIRP)

This device has been tested and certified for use in the European Union and IOTIZE hereby declares that the device "TapNLink TnL-FIW103" is in conformity with the essential requirements of Directive RED 2014/53/EU. The complete Declaration of Conformity can be found at:

- Appendix 1 of the present notice,
- www.iotize.com for the electronic version.

If this device is used in a product, the OEM is responsible for verifying compliance of the final product with the relevant EU standards. A Declaration of Conformity must be issued and kept on file. The 'CE' mark must be placed on the OEM product per the labeling requirements of the Directive.

7.2 FCC (USA) and IC (Canada)

7.2.1 FCC Part 15 compliance statement

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.

NOTE: 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 or more 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 different circuit from that which the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

7.2.2 ISED - Industry Canada Licence-Exempt Radio Apparatus

This device contains licence-exempt transmitter(s)/receivers(s) that comply with Innovation, Science and Economic Development Canda's licence-exempt RSS(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.

7.2.3 ISED - Industrie Canada appareil radio exempts de licence

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'innovation, Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

7.2.4 RF Exposure Compliance of Radio communication for mobile Apparatus

To satisfy FCC and IC RF Exposure requirements for the mobile devices, a separation distance of 30cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

7.2.5 Conformité à l'exposition aux champs RF des équipements radio mobiles

Pour satisfaire aux exigences FCC et IC concernant l'exposition aux champs RF pour les appareils mobile, une distance de séparation de 30 cm ou plus doit être maintenu entre l'antenne de ce dispositif et les personnes pendant le fonctionnement. Pour assurer la conformité, il est déconseillé d'utiliser cet équipement à une distance inférieure. Cet émetteur ne doit pas être co-situé ou fonctionner conjointement avec une autre antenne ou un autre émetteur.

7.2.6 End Product Labeling

7.2.6.1 FCC Certification

The final end product must be labeled in a visible area with the following:

"*Contains Transmitter Module FCC ID: 2APCX-TNLFIW10*"
or "*Contains FCC ID: 2APCXTNLFIW10*"

7.2.6.2 ISED Certification

The final end product must be labeled in a visible area with the following:

L'équipement final doit être étiqueté sur un endroit visible avec le texte suivant :

"Contains IC: 23741-TNLFIW10"

7.2.7 End Product User Manual:

The user manual for end users must include the following information in a prominent location:

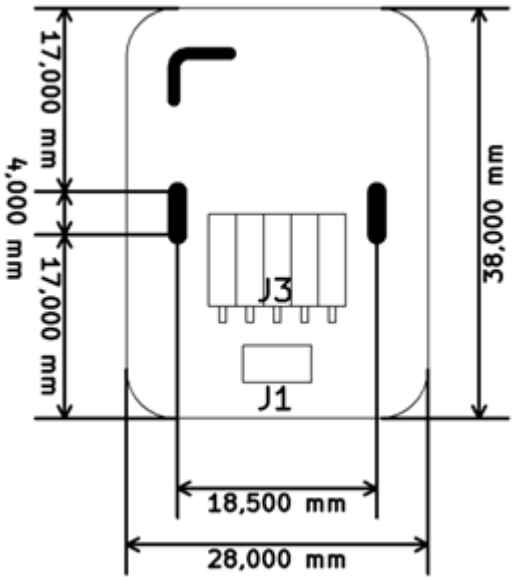
To satisfy FCC and ISED RF Exposure requirements for the mobile devices, a separation distance of 30cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be colocated or operating in conjunction with any other antenna or transmitter.

Pour satisfaire aux exigences FCC et ISDE concernant l'exposition aux champs RF pour les appareils mobile, une distance de séparation de 30 cm ou plus doit être maintenu entre l'antenne de ce dispositif et les personnes pendant le fonctionnement. Pour assurer la conformité, il est déconseillé d'utiliser cet équipement à une distance inférieure. Cet émetteur ne doit pas être co-situé ou fonctionner conjointement avec une autre antenne ou un autre émetteur.

8 Mechanical characteristics

8.1 Module dimensions

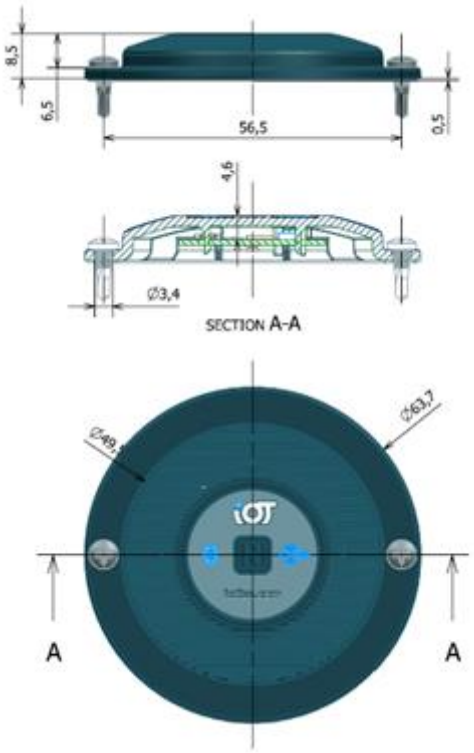
The main dimensions are noted in the diagram below (bottom view):



Dimensions[3]:	28 x 38 x 3 mm
Weight:	3 g

8.2 Standard plastic case

An optional plastic casing is available from IoTize (see dimensions below):



9 Ordering Information

Example part number: **TnL-FIW103**[1]

Product Line	Use Mode	Physical Interface	Radio Interface[1]	Product Prefix	Security
TnL	**F**	**I**	**W**	**10**	**3**

Product Lines: **TnL = TapNLink**

Use Mode: **F** **= Fixed Standard DIN rail casing**

Physical interface: **I** **= SWD/S3P**

Radio interface[2]:
T = NFC Only
R = BLE
W = Wi-Fi, BLE
L = LoRa, BLE

Security:
3 **= software-based security**
5 = hardware-based security with embedded secure element

Notes:

1. The features of the part number shown in the table are indicated in bold.
2. All products include NFC by default for advanced functionalities such as secure wake-up and pairing.

10 EU Declaration of Conformity (Doc)

EU Declaration of Conformity (DoC)

We, the undersigned:	**IoTize S.A.S.** **960, Chemin de la Croix Verte** **38330 Montbonnot St Martin** **France** Email: contact@iotize.com Phone : +33 4 76 41 87 99
Designated product:	**TapNLink Wifi Low Energy module**

Model:	TnL-FIW10x
Frequency band 1:	2412-2484MHz
Max Power:	Wi-fi 32mW and BLE 10mW (e.i.r.p)

Certify and declare: **under our sole responsibility that the designated product is in conformity with the essential requirements and provisions of the following European Directives:**

☒ Directive **2014/53/EU** of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of **radio equipment (RED)**.
The conformity of the designated product(s) with the provisions of this European Directive is given by the compliance with the following European Standard(s):

Essential requirements of article 3.1a) of RED: (Safety, electrical)	- EN 62368-1 (2014)
Essential requirements of article 3.1a) of RED: (Safety, health)	- EN 62311 (2008)
Essential requirements of article 3.1b) of RED: (Electromagnetic Compatibility)	- ETSI 301 489-1 (V2.1.1) - ETSI 301 489-3 (V2.1.1)
Essential requirements of article 3.2) of RED: (Efficient use of radio spectrum)	- ETSI EN 300 328 (V2.1.1)

☒ Directive **2011/65/EU** of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances **(ROHS)** in electrical and electronic equipment.

☒ Directive **2012/19/EU** of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment **(WEEE)**.

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TapNLink DoC, page 1 of 2

EU Declaration of Conformity (DoC)

Important Notice:	Red approval is only valid for products in delivery state, including standard hardware and software. The user is responsible for operating the radio equipment and the accessories as intended and in accordance with the provided instructions. It is the responsibility of the OEM manufacturer to demonstrate compliance with all applicable EU directives and standards. The IoTize declaration of conformity serves as a support input for the declaration of conformity for the final equipment.

The technical construction file is available from:

IoTize S.A.S

960 Chemin de la croix verte

38330 Montbonnot Saint Martin

Phone: +33 4 76 41 87 99

Issued on November 8th, 2019.

Name and position of person binding the manufacturer or his authorized representative:

Name: Francis Lamotte
Position: President
Email: francis.lamotte@iotize.com

Signature:



iotize.com

11 History

Date	Version	Author	Modification
May 10th 2019	1.0	AM	First release version.
June 14th 2019	1.1	PF, SG	Text revisions and corrections.
June 27th 2019	1.2	SG	Product photo updates.
November 8th 2019	1.3	PF	Add BLE features.
March 23rd 2020	1.4	PF	Add 7.2.6 and 7.2.7
July 13th 2020	1.5	JH	Product photo update, P1 UART pins.
July 15th 2020	1.6	PF	NFC Tx/Rx -> NFC in summary Update WiFi and BLE max power. Update distance between antenna and people. FCC ID: 2APCX-TNLFIW10 -> 2APCXTNLFIW10
September 29th 2020	1.7	ES, FL	Update power consumption. Improve pin list description.
October 19th 2022	1.8	ES	Update pin description, Radio specifications table, power consumption and ordering information. Move low power information to specific part and ad important note about low power for TapNLink TnL-FIW103 rev1.6.

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