TECHNOLOGY SOLUTIONS 3N1X Rain RFID Reader Module User Guide

Contents

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Product Information

The product is a versatile and user-friendly device designed to provide various functionalities. It is equipped with advanced technology and features to enhance your experience.

Key Features

- Versatile and user-friendly design
- Advanced technology for optimal performance
- Multiple functionalities to meet various needs

Specifications

- **Model:** [Model Number]
- **Dimensions:** [Dimensions]
- **Weight:** [Weight]
- **Power Source:** [Power Source]
- **Connectivity:** [Connectivity Options]

Product Usage Instructions

To get started with the product, please follow the instructions below:

1. **Unboxing:** Remove the product from its packaging and ensure all accessories are included.
2. **Powering On:** Connect the product to a power source using the provided cable. Press and hold the power button until the device powers on.
3. **Initial Setup:** Follow the on-screen instructions to complete the initial setup process, including language selection, Wi-Fi connection, and personalization options.
4. **Functionality:** The product offers multiple functionalities. Familiarize yourself with the product manual to understand all available features and how to access them.
5. **Maintenance:** To ensure optimal performance and longevity of the product, follow these maintenance guidelines:
    - Keep the product clean and free from dust or debris.
    - Avoid exposing the product to extreme temperatures or moisture.
    - Regularly update the product's software to benefit from the latest enhancements.

- Refer to the manual for any specific maintenance recommendations.

If you encounter any issues or have further questions about the product, refer to the troubleshooting section in the user manual or contact our customer support for assistance.

Overview

TSL® have drawn upon years of industry leading mobile RFID experience to design and manufacture a family of high performance, energy efficient UHF RFID modules that can be easily integrated into OEM applications such as mobile/battery powered devices or small, fixed reader applications. The compact and slim form factor of these modules provide flexible mounting options, supported by industry standard USB and serial UART port interfaces combined with four configurable 3.3V I/O lines. The 50 0 MMCX Antenna Ports) provide the freedom to specify an antenna perfectly tuned to your unique application. These class-leading modules support multiple RF modes including High Speed Tag Acquisition Mode, High Sensitivity Mode and Dense Reader Mode (DRM). Software programmable output power allows the conducted output to be configured in 0. 1 dBm steps from 1 – 30 dBm (1mW – 1W). The next-generation Impinj E710 reader chip in the 3117 and 3417 sports cutting-edge hardware and the latest anti-collision recognition algorithms, enabling read rates of › 1300 tags/s. The 3419 RAIN RFID Reader Module is our ultra-high sensitivity, flagship model, sporting a top-end Impini E910 reader chip. TSL®'S STORM RFID protocol (a sophisticated, parameterised set of commands that carry out multiple actions locally within the RFID module) makes embedded integration a breeze, reducing time-to-market and development costs. Multiple complex tag operations can be executed using simple pre-configured commands. TSL® provides the free, comprehensive STORM Protocol SDK, allowing development in C, C# and Java languages on platforms including .NET, Android, Windows and Linux. For full technical specifications, please refer to the 3117 and 3417/3419 Modules Datasheet

Mounting The Module

M2 threaded holes have been provided as mounting points in the aluminium enclosure. There are three mounting points on the 3117 module and four mounting points on the 3417/3419 modules. For further information on the exact positioning of these mounting points relative to one other, please refer to the 3117 and 3417/3419 Modules Datasheet

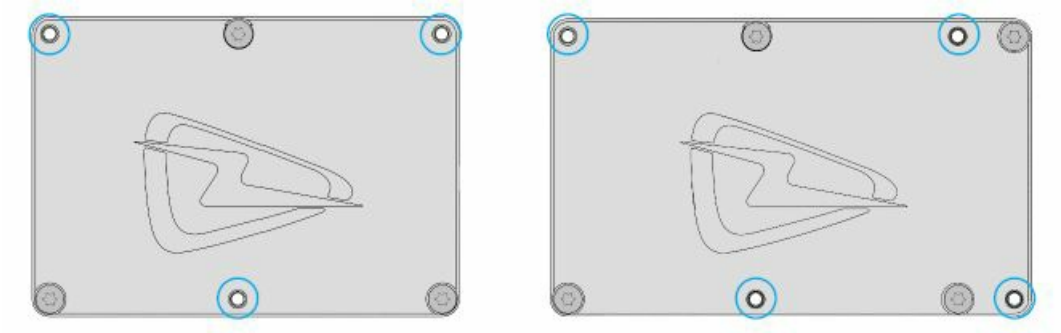


Figure 1 – position of mounting points (left- 3117, right – 3417/3419)

Connecting The Module

Host Interface

The 3N1X series modules require a 5-15V DC, 6W power supply. Connection from the host to the module is through a single 18-Way, 0.5mm Pitch FPC connector that, in addition to power, provides:

- 1 x USB CDC Virtual COM Port
- 1 × UART serial interface
- 4 x GPIO lines (or 2 GPIO and an PC bus)
- The module Enable pin.

See TABLE 1 – FPC CONNECTOR PIN FUNCTIONS for details

Figure 2 – The FPC connector

PIN	NAME
1 – 4	VCC (5 – 15V DC)
5	ENABLE
6	I/O 1 (I2C Master SCL)
7	I/O 2 (I2C Master SDA)
8	UART TX
9	UART RX
10	USB DM
11	USB DP
12	I/O 4
13	I/O 3
14	DNU (Connect to GND or leave floating)
15 – 18	GND

Table 1-FPC Connector Pin Functions

The module is enabled by setting the Enable pin high – if dynamic control is not required then the Enable pin can simply be connected to VCC as it is a 15V tolerant line.

Antenna Connection

Antennas are connected to the module's 50 Q, Mono-Static, MMCX Ports. One MMCX port is provided on the 3117 module and four ports are provided on the 3417/3419 modules. Integrators should ensure that any antenna cable used is inserted fully and maintains a right-angle with the module otherwise performance may be degraded. The 3N1X module is compatible with many different antennas however, regulatory approvals for the module only apply to specific antenna types as described in the Third-Party Integration Regulatory Requirements section, below.

Figure 3 – MMCX port for antenna connection

Controlling The Module

Once the hardware is connected to a host, the 3N1X module can be commanded on either (or both) of its serial interfaces – with responses returned on the same interface that received the command. The 3N1X modules are commanded using the TSL STORM Protocol. The STORM Protocol supports both ASCII and Binary encodings – comprehensive details of this protocol are described in the document STORM Protocol for ISI 3N1X modules. The Developer Kit for RAIN RFID Reader Modules provides additional hardware and software to explore and test the capabilities of any 3N1X module The kit is accompanied by an SDK which includes libraries, code samples, and a desktop application that allows the construction and execution of STORM command banks using a visual interface. The desktop app is a great way to become familiar with the STORM protocol and the module's capabilities. Additional details can be found on the Developer Kit web page

Professional Installation Instructions

To ensure regulatory compliance, the regulatory region is fixed, at the factory, to US Operation only (FCC) and is not modifiable by any other third parties (including OEM/host integrators). This module is intended for OEM integrators only.

Personnel

This product is a specialised component and needs to be installed by a qualified person with knowledge of RF circuitry and the appropriate FCC Regulations. This part cannot be installed or configured by a general user.

Antenna Requirements

The following guidelines apply if the 3417 module is to be operated under its FCC ID:OEM/Host Integrators may operate the module: With the following, qualified, antenna (See Table 2)

Table 2 Qualified Antennas

Type	Model	Connector	Gain	Cable Length	Cable Loss
Panel Antenna	S9025PR	MMCX**	2.5dBi (5.5dBic)	-	-
Antenna Cable	N/A			0.15M	0.3dB

- For detailed antenna specification please refer to antennaphotos/or drawings, including antenna dimensions
- MMCX cable is permanently attached to antenna at factory (prior to shipment) SMA connection is permanently glued with Araldite 2022-01 2 part epoxy
- The antenna must be installed such that 20 cm can be maintained between the antenna and users to meet the regulatory RF Exposure requirement.

Warning

- Use of non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which can lead to violation of the FCC Limit and is strictly prohibited.
- Failure to ensure correct installation positioning and module output power configuration could lead to serious federal penalties.
- If the OEM/Integrator cannot meet all the necessary requirements for operation under the module's FCC
- ID, then the OEM/Integrator must seek separate, full FCC approvals and obtain their own FCC ID for their product.
- Integrators should also ensure that all of the FCC Module Integration Requirements (below) are followed to ensure regulatory compliance.

Regulatory Compliance Statements
The 3417 module is approved for modular certification by the FCC under the FCC ID: S6J-3417. Other 3N1X modules, such as the 3117 & 3419, require separate, independent approval by the integrator/OEM Host manufacturer. The following sections apply only to the 3417 module.

FCC

FCC Interference 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 A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense
FCC Caution

- Any changes or modifications not expressly approved by Technology Solutions (UK) Ltd (the party responsible for compliance) could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this equipment should be installed and operated with a minimum distance of 20cm between the radiator and a user body.

FCC Module Integration Requirements
The following conditions must be strictly followed when using this certified module:
Applicable FCC Rules
This module has been tested for compliance to FCC Part 15
Specific Operational Use Conditions
The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitters) or being used in a portable condition will need a separate reassessment through a class I permissive change application or new certification

Limited Module Procedures
FCC Limited Module Procedures are not applicable to this module.

RF Exposure Considerations
This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.
Antenna Requirements

- The antenna requirements are listed in the section Professional Installation Instructions (above).
- The antenna must be installed such that 20 cm can be maintained between the antenna and users
- This module cannot be used with a trace antenna.

Label and Compliance Information

- The integrator's final end product must be labelled in a visible area with the following: "Contains FCC ID: S6J-3417".
- The grantee's FCC ID can be used only when all FCC compliance requirements are met.
- Information on Test Modes and Additional Testing Requirements
- This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitters) or portable use will require a separate class II permissive change re evaluation or new certitication.

Additional Testing, Part 15 Subpart B Disclaimer

- This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host.
- The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.
- Provided all the above FCC module integration requirements are met, further transmitter testing will not be required.
- However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

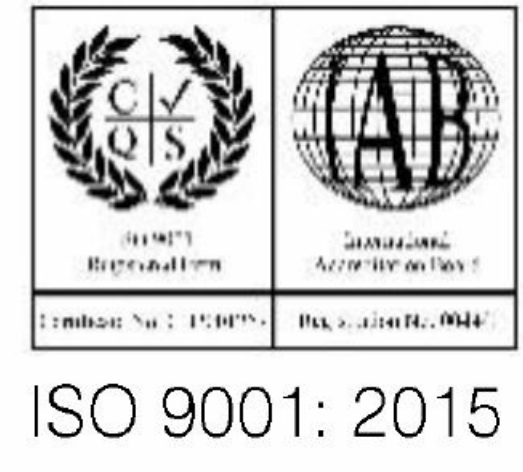
IMPORTANT NOTE: In the event that these conditions cannot be met (for example, co-location with another transmitter), then the FCC authorization is no longer considered valid, and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

FCC User Manual Requirements
The User documentation accompanying the end-product must meet the following requirements:

- The OEM Integrator must not provide information to the end user regarding how to install or remove this RF module in the user manual of the end product which integrates this module.
- The end user manual shall also include all required regulatory information/warnings as shown in this manual:
- FCC Interference Statement
- FCC Radiation Exposure Statement

OEM/Host Manufacturer Responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment. Technology Solutions UK Ltd (TSL, part of HID Global, is a leading manufacturer of high performance mobile RFID readers used to identify and track products, assets, data or personnel. For over two decades, TSL® has delivered innovative data capture solutions to Fortune 500 companies around the world using a global network of distributors and system integrators. Specialist in-house teams design all aspects of the finished products and software ecosystems, including electronics, firmware, application development tools, RF design and injection mould tooling. TSL® is an ISO 9001:2015 certified company.



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Documents / Resources

	TECHNOLOGY SOLUTIONS 3N1X Rain RFID Reader Module [pdf] User Guide S6J-3417, S6J3417, 3417, 3N1X Rain RFID Reader Module, Rain RFID Reader Module, RFID Reader Module, Reader Module

References

- Powering Trusted Identities of the World's People, Places and Things | HID Global
- Technology Solutions (UK) Ltd Home Page
- STORM Protocol for TSL 3N1X modules - Technology Solutions (UK) Ltd
- Developer Kit for RAIN RFID Reader Modules - Technology Solutions (UK) Ltd

Manuals+.