802.11ac WiFi Radio Module

Model #: TRM9995G

Users Manual

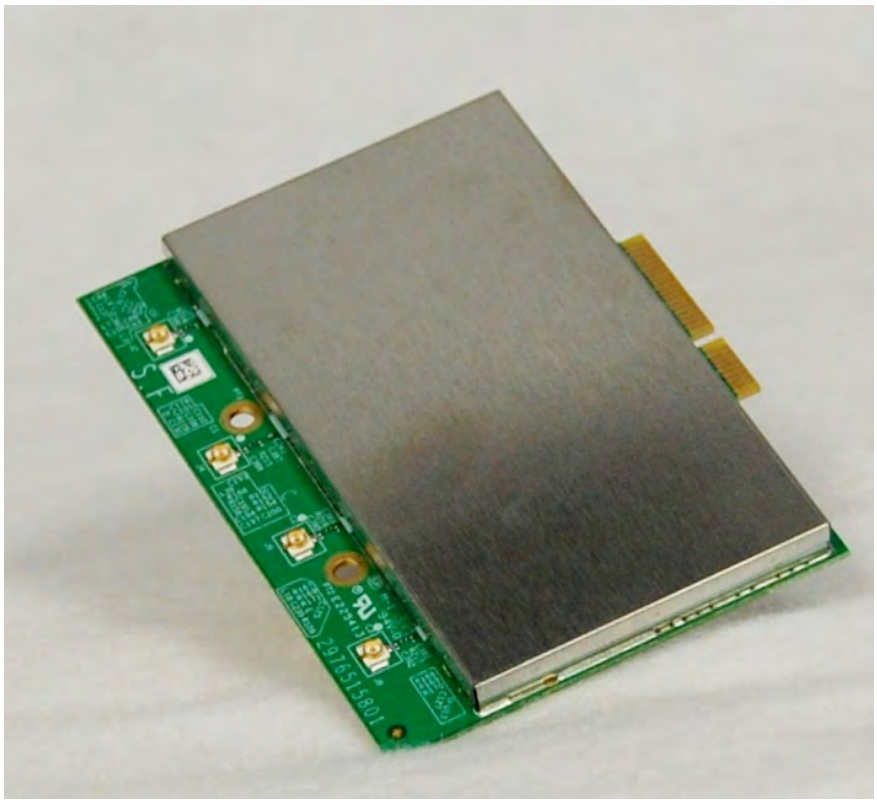

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Table of Contents

Revision History

Version	Change Summery	Author	ECO	Date
05	• Added statement for Installation perpendiculare to the horizion			
04	• Added AP1004UNe	T. Fitch		April 2018
03	• Added Samtec IJ5 Connector Version • Model Name to 1004WRi • Updated Antenna Gain Values • Added AP1004UNe	T. Fitch		Feb 2018 March 2018 Aoril 2018
02	• Corrected Max Net Gain for PCA-000007-XXX-X/PCA-000015-XXX-X to -4.8 dBi • Revised Antenna Gains for PCB-000006-000-D & PCB-000006-001-D	T. Fitch	TBD	TBD
01	Document Released	T. Fitch	ECO-000027	August 8. 2016

Statement of Conditions

In the interest of improving internal design, operation function, and/or reliability, Tembo Systems, Inc. reserves the right to make changes to products described in this document without notice. Tembo Systems, Inc. does not assume any liability that may occur due to the use or application of the product(s) described herein.

Safty Warnings

The 802.11ac WiFi Radio Module MUST be installed by licensed sub-contractor

ESD Safety

Sensitive Electronic Equipment. Please observe all ESD safety precautions

Chapter 1: Product Description for the 802.11ac WiFi Radio Module

This document is to specify the product requirements for the 802.11ac WiFi Radio Module. This 802.11ac WiFi Radio Module is based on QCA chip that complied with IEEE 802.11ac for 5GHz, and it is also backward compatible to comply with IEEE 802.11a and IEEE 802.11n standard.

Product Features

- Compatible with IEEE 802.11a high rate standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11n standard to provide wireless 800Mbps data rate
- Compatible with IEEE 802.11ac standard to provide wireless 1733Mbps data rate
- Operation at 5.15~5.85GHz frequency band to meet worldwide regulations
- Supports 802.1x, WPA, WPA2, TKIP enhanced security
- Available with U.FL connectors or Samtec IP5 connecters.

Chapter 2: Installing the 802.11ac WiFi Radio Module

This document provides the information related to installing the 802.11ac WiFi Radio Module; Model Number: TRM9995G, HW Version **2976515801** - U.FL connectors and HW Version **2976571700** - Samtec IP5 connectors

Tools and Equipment

The following tools and equipment are required to install the 802.11ac WiFi Radio Module

- Screwdriver

TRM9995G 802.11ac WiFi Radio Module (HW 2976515801 - U.FL connectors)

The 802.11ac WiFi Radio Module; Model Number: TRM9995G, HW Version **2976515801** - U.FL connectors is intended for OEM integrator only and has been certified to operate in the following Everest™ Network Solutions' Systems

- AP1002We (Model Number AP12E612)
- AP1004WRe (Model Number AP14E612)
- AP1004NRe (Model Number AP14E153)
- AP1004WRi (Model Number AP24I612)
- AP1004UNe (Model Number A14E1515)

To avoid exceeding the +30° elevation angle outdoor restriction, the antenna system connected to this radio must be installed perfectly vertical or tilted downward, except when used in the AP1004NRe, where the antenna systems must be positioned facing downward with at least 10° of declination below the horizion.

TRM9995G 802.11ac WiFi Radio Module - U.FL connectors - Top View

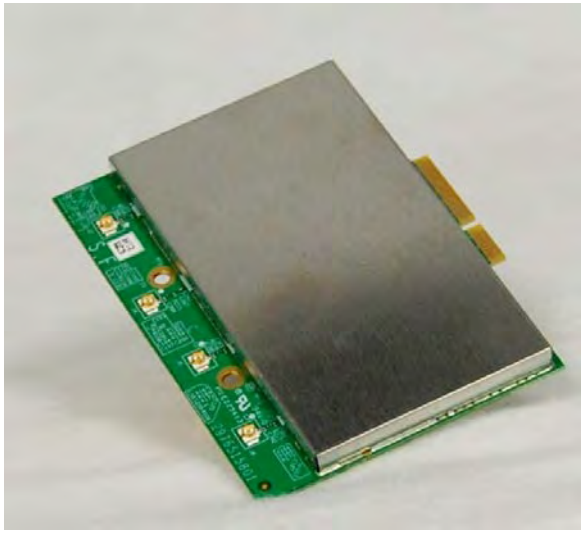

Figure 1 – Top View of the 802.11ac WiFi Radio Module - U.FL connectors

TRM9995G 802.11ac WiFi Radio Module - U.FL connectors - Bottom View

Figure 2 - Bottom View of the 802.11ac WiFi Radio Module - U.FL connectors

Install the 802.11ac WiFi Radio Module (HW 2976515801 - U.FL connectors)

Locate the PCIe Connector. With the 802.11ac WiFi Radio Module facing up, Install the card edge fingers of the module in to the PCIe Connector.

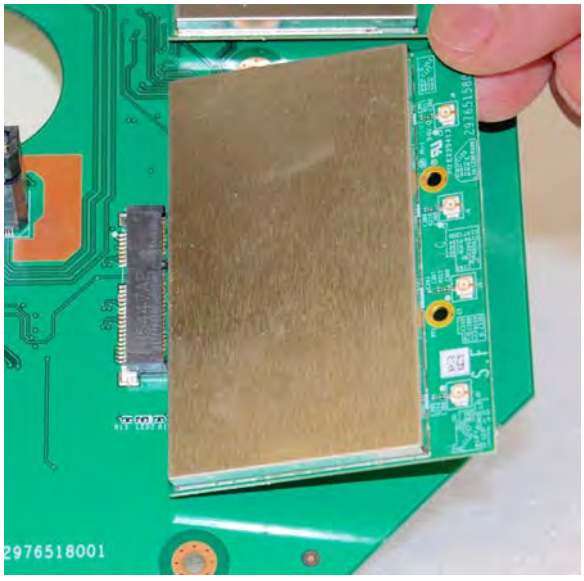

Figure 3 – Insert 802.11ac WiFi Radio Module in to the PCIe Connector

Secure the 802.11ac WiFi Radio Module (HW 2976515801 - U.FL connectors)

Using a #1 Phillips Screw Driver, secure the 802.11ac WiFi Radio Module to the PCIe Adapter using two M2.5 Screws..

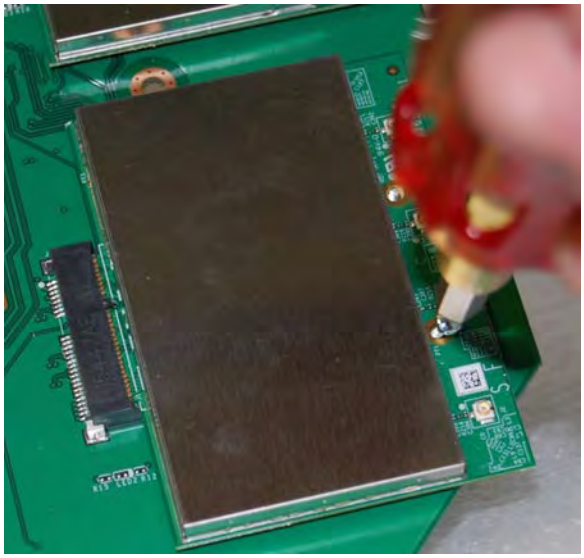

Figure 4 – Secure the 802.11ac WiFi Radio Module in to the PCIe card

Note: it is recommend to use a drop of LocTite 243 Medium Strength Blue ThreadLocker on each screw .

Connect the 802.11ac WiFi Radio Module (HW 2976515801 - U.FL connectors)

Complete the installation process by installing the 4 U.FL Coax Cables on to the four U.FL connectors on the outside edge of the board.

Figure 5 – Connect the Coax Cables to the 802.11ac WiFi Radio Module

TRM9995G 802.11ac WiFi Radio Module (HW 2976571700 - Samtec IP5 connectors)

The 802.11ac WiFi Radio Module; Model Number: TRM9995G, HW Version **2976571700** - Samtec IP5 connectors is intended for OEM integrator only and has been certified to operate in the following Everest™ Network Solutions' Systems

- AP1004WRi (Model Number AP24I612)

TRM9995G 802.11ac WiFi Radio Module - Samtec IP5 connectors - Top View

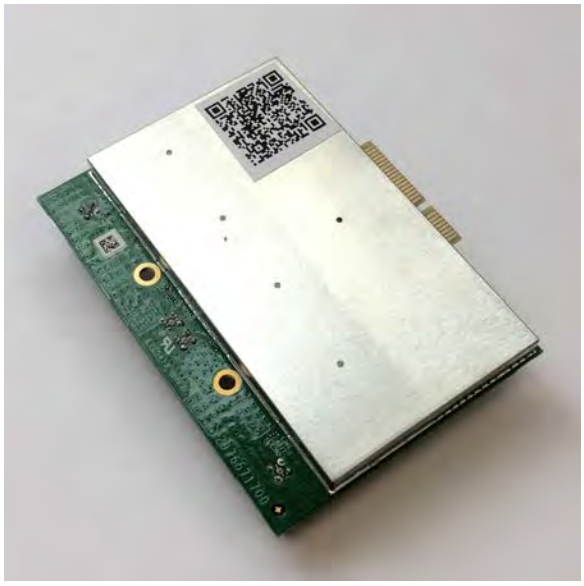

Figure 6 – Top View of the 802.11ac WiFi Radio Module - Samtec IP5 connectors

TRM9995G 802.11ac WiFi Radio Module - Samtec IP5 connectors - Bottom View

Figure 7 - Bottom View of the 802.11ac WiFi Radio Module - Samtec IP5 connectors

Install the 802.11ac WiFi Radio Module (HW 2976571700 - Samtec IP5 connectors)

Locate the PCIe Connector where the 802.11ac WiFi Radio Module (HW Version 2976571700 - Samtec IP5 connectors) will be installed. With the 802.11ac WiFi Radio Module facing up, Install the card edge fingers of the module in to the PCIe Connector.

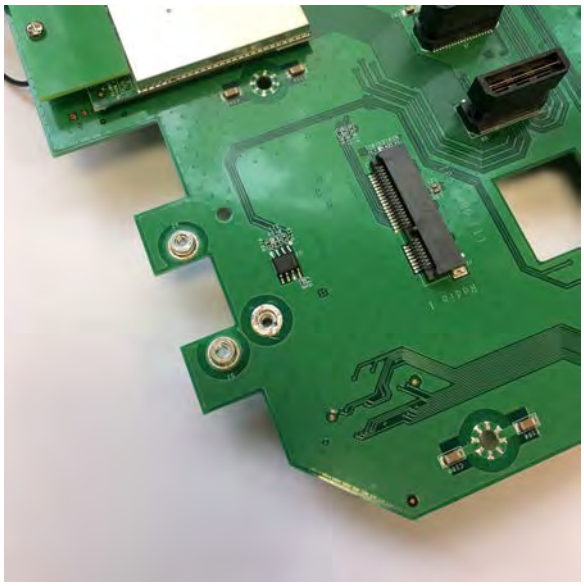

Figure 8 –PCIe Board PCB that accomodates the 802.11ac WiFi Radio Module - Samtec IP5 connectors

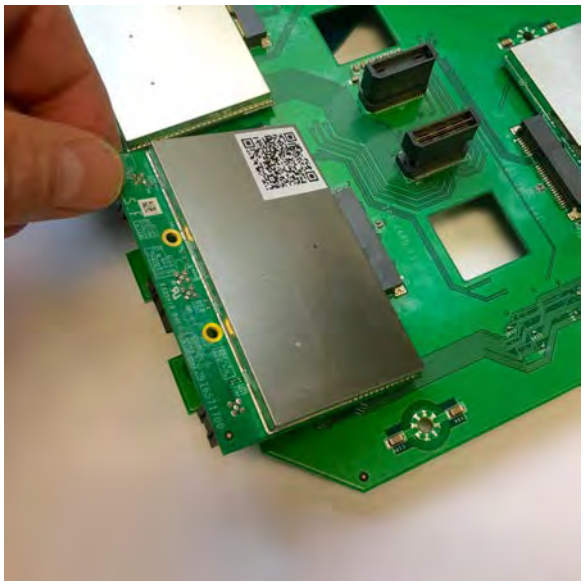

Figure 9 – Insert 802.11ac WiFi Radio Module in to the PCIe Connector

Secure the 802.11ac WiFi Radio Module (HW 2976571700 - Samtec IP5 connectors)

Using a #1 Phillips Screw Driver, secure the 802.11ac WiFi Radio Module to the PCIe Adapter using two M2.5 Screws..

Figure 10 – Secure the 802.11ac WiFi Radio Module in to the PCIe card

Completing the 802.11ac WiFi Radio Module (HW 2976571700 - Samtec IP5 connectors) installation.

When complete, the 802.11ac WiFi Radio Module (HW Version 2976571700 - Samtec IP5 connectors should be secured with two screws.

Figure 11 – Top View - Final Position of 802.11ac WiFi Radio Module on PCIe Card.

When viewed from the bottom side, the Samtec IP5 connectors should protrude to accommodate the Switch Matrix PCB.

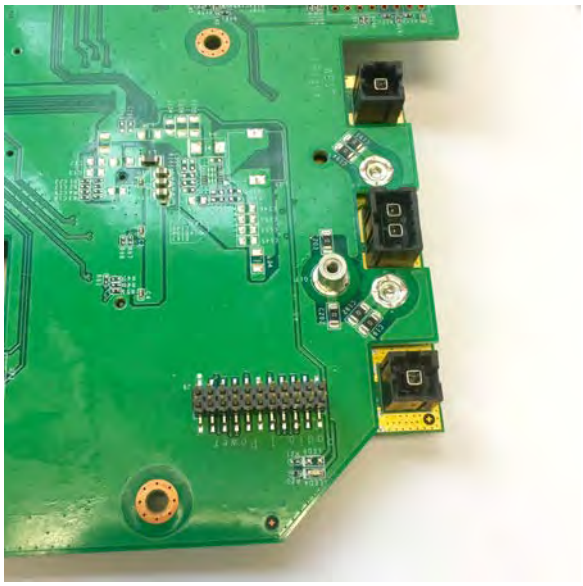

Figure 12 – Bottom View - Final Position of 802.11ac WiFi Radio Module on PCIe Card.

Chapter 3: Module TRM9995G Regulatory Declarations

This Section provides the Regulatory Declatations for the 802.11ac WiFi Radio Module;
Model Number: TRM9995G, HW Version **2976515801** .
FCCID: 2AGMRTRM9995G
IC: 21218-TRM9995G

FCC Statement:

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.

IMPORTANT NOTE:

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.

IMPORTANT NOTE:

Country Code Selection: The Country Code selection feature is disabled for products marketed to the US/CANADA.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

IMPORTANT NOTE:

This module is intended for OEM integrator only and is certified to be compliant when installed in, one of the following systems:

- AP1002We (Model Number AP12E612)
- AP1004WRe (Model Number AP14E612)
- AP1004NRe (Model Number AP14E153)
- AP1004WRi (Model Number AP24I612)
- AP1004UNe (Model Number A14E1515)

The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

IMPORTANT NOTE:

To avoid exceeding the +30° outdoor angle elevation restriction, any connected antenna system, when deployed outdoors, must be positioned perfitically vertical or tilted downward below the horizion.

IC Statement:

Industry Canada Interference Statement

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, 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.

This radio transmitter (802.11ac WiFi Radio Module/IC:21218-TRM9995G) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (802.11ac WiFi Radio Module/IC:21218-TRM9995G) *a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.*

- PCA-000006-001-X/PCB-000015-XXX-X; 2.4G/5G Omni Antenna Panel .....(Max Gain 7.2dBi)
- PCA-000006-000-X/PCB-000015-XXX-X; 2.4G/5G-UNII2c 120 Antenna Panel .....(Max Gain 4.8dBi)
- PCA-000007-XXX-X /PCA-000005-XXX-X; 5G-UNII1-2a/5G-UNII3 120 Antenna System.... (Max Net Gain -4.8dBi)
- PCA-000009-XXX-X ; 5G-UNII1/2A 1530 Configurable Antenna Panel.....(Max Gain 13.6dBi)
- PCA-000010-XXX-X ; 5G-UNII3 1530 Configurable Antenna Panel .....(Max Gain 13.6dBi)
- PCA-000011-XXX-X ; 5G-UNII2C 1530 Configurable Antenna Panel .....(Max Gain 15.3dBi)
- PCA-000020-000-X; Multi-Band Omni Antenna Panel ..... (Max Gain 6.4 dBi)
- PCA-000032-000-X/PCA-000024-XXX-X;
  5G-UNII1-2a/5G-UNII3 Antenna System through 5G-UNII1/2a Switch Matrix..... (Max Net Gain 3.5 dBi)
- PCA-000032-000-X/PCA-000025-XXX-X;
  5G-UNII1-2a/5G-UNII3 Antenna System through 5G-UNII3 Switch Matrix ..... (Max Net Gain -0.1 dBi)
- PCA-000033-000-X, 5G-UNII1/2A 1515 Ultra Narrow Antenna Panel .....(Max Net Gain 19.25 dBi)
- PCA-000034-000-X, 5G-UNII3 1515 Ultra Narrow Antenna Panel.....(Max Net Gain 19.25 dBi)
- PCA-000046-000-A, 5G-UNII2C 1530 Narrow Antenna Panel.....(Max Gain 15.3dBi)

Dynamic Frequency Selection (DFS) for devices operating in the bands 5250- 5350 MHz, 5470-5600 MHz and 5650-5725 MHz.

Sélection dynamique de fréquences (DFS) pour les dispositifs fonctionnant dans les bandes 5250-5350 MHz, 5470-5600 MHz et 5650-5725 MHz.

The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit.

le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limite de p.i.r.e.

The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5850 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

Users are advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Les utilisateurs êtes avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

La bande 5 150-5 250 MHz est réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

IMPORTANT NOTE:
IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

IMPORTANT NOTE:

This module is intended for OEM integrator only and is certified to be compliant when installed in, one of the following systems:

- AP1002We (Model Number AP12E612)
- AP1004WRe (Model Number AP14E612)
- AP1004NRe (Model Number AP14E153)
- AP1004NRi (Model Number AP24I153)
- AP1004UNe (Model Number A14E1515)

The OEM integrator is still responsible for the IC compliance requirement of the end product, which integrates this module.

IMPORTANT NOTE:

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Japan Statement:

5GHz band 1 and band 2: Indoor use only

Chapter 4: Radio Specifications

Radio

	Description
Wireless Protocol	IEEE 802.11a, 802.11n, 802.11ac
Radio and Modulation Schemes	HT20: MCS0 – MCS31 HT40: MCS0 – MCS31 VHT20: MCS0 - MCS9 VHT40: MCS0 – MCS9 VHT80: MCS0 – MCS9
Operating Frequency and Channel Support	U-NII-1, 5150 MHz – 5250MHz, non-DFS channel Ch. 36, 40, 44, 48 U-NII-2A, 5250 MHz – 5350 MHz, DFS channel Ch. 52, 56, 60, 64 U-NII-2C, 5470 MHz – 5725 MHz, DFS channel Ch. 100 – 140 U-NII-3, 5725 MHz – 5850 MHz, non-DFS channel Ch. 149, 153, 157, 161, 165
Data Rate Support	802.11a: 1, 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6.5 – 600 Mbps (MCS0-MCS31) 802.11ac: 6.5 – 1733.3 Mbps (MCS0-MCS9, 1 to 4 Nss)
Media Access Protocol	CSMA/CA with ACK
Encryption	Open, WPA, WPA2, TKIP
Receiver Sensitivity	802.11a: -93dBm 802.11n(MCS0, HT20): -93dBm, 802.11ac(MCS0, VHT20): -93dBm
Transmitter Output Power	+19dBm 802.11ac, VHT80 MCS9 +20dBm 802.11n, HT40 MCS7

Security

	Description
Encryption	• RC4 encryption algorithm • Support AES-128, AES192, AES-256
802.1x	• Support EAP-TLS, EAP-TTLS, and EAP-PEAP
WPA/WPA2	• Support WPA/WPA2-PSK and WPA/WPA2-EAP • Support Cipher Mode AES and TKIP

Chapter 5: General Specifications

Mechanical

Dimensions:	
Height: Front Surface, Top to Bottom	56mm (2.2”)
Width: Front Surface, Left to Right	73mm (2.86”)
Depth: Front Surface to Rear Surface	15mm (0.59”)
Weight:	
	26 g (0.8 oz)

Operational

Condition:	Input Power Requirement	Max Power Consumption
Max Power	3.3 Vdc, 2.5A, 8.25W	8.25 Watts Max (0.469 BTU/Minute)

Environmental

Operating temperature	0 to 45°C (0 to 113°F)
Storage temperature	–40 to 85 ° C (–40 to 185 ° F)
Humidity	0 to 95% (operating and nonoperating)
Maximum elevation	Operating: Sea level 45 ° C (113 ° F) 4,206 m (13,800 ft) at 35 ° C (95 ° F) Non-operating: 12,500 m (40,000 ft) at –65 ° C (– ° F)

Antenna Connections

Antenna Connector	2976515801	Up to four (4) U.FL compatable coax cable assemblies
Antenna Connector	2976571700	Up to three Samtec IP5 connectors • Stream 1 1x1(IP5-1)[1] • Stream 2 & 3 1x2 (IP5-2)[2] • Stream 4 1x1 (IP5-1)[1]

[1] Samtec IP5-1-05.0-L-S-1 on the Radio Module mates with IJ5-1-05.0-L-S-1 on the Switch Matrix
[2] Samtec IP5-2-05.0-L-S-1 on the Radio Module mates with IJ5-2-05.0-L-S-1 on the Switch Matrix