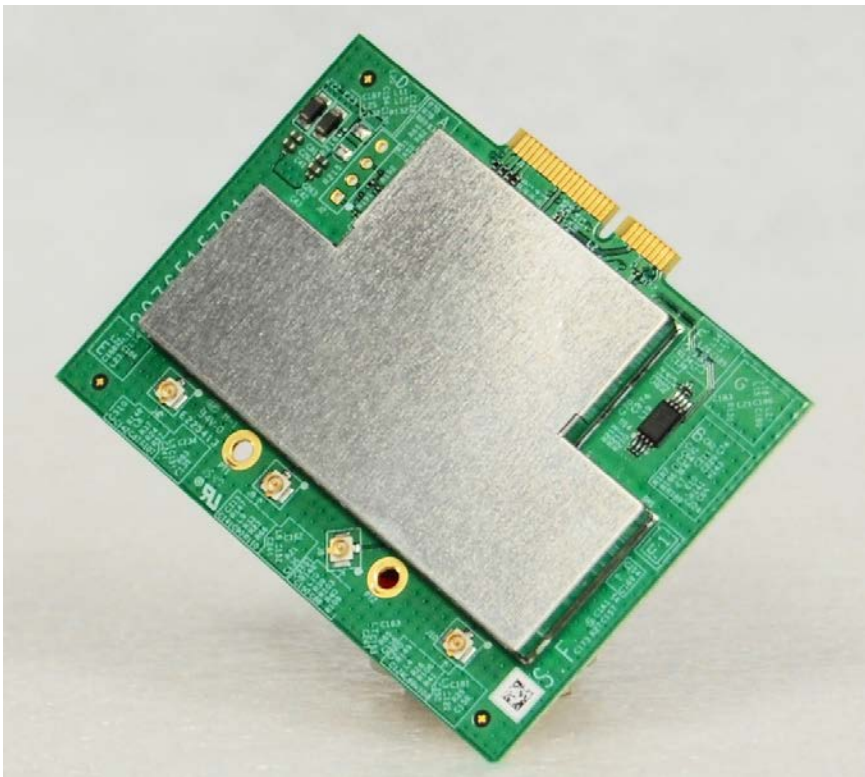


802.11bgn WiFi Radio Module

Model #: TRM9992G
Users Manual



Document #: DOC-000010-000
Revision: 02
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Revision History

Version	Change Summary	Author	ECO	Date
02	Revised Antenna Gains for PCB-000006-001-D	T. Fitch	TBD	TBD
01	Document Released	T. Fitch	ECO-000027	August 8, 2016

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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.

Safety Warnings

The 802.11bgn 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 802.11bgn WiFi Radio Module

This document is to specify the product requirements for the 802.11bgn WiFi Radio Module. This 802.11bgn WiFi Radio Module is based on QCA chip that complied with IEEE 802.11n for 2.4GHz, and it is also backward compatible to comply with IEEE 802.11b and IEEE 802.11g standard.

Product Features

- Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate
- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11n standard to provide wireless 800Mbps data rate
- Operation at 5.15~5.85GHz frequency band to meet worldwide regulations
- Supports 802.1x, WPA and WPA2 enhanced security

Chapter 2: Installing the 802.11bgn WiFi Radio Module

This document provides the information related to the 802.11bgn WiFi Radio Module; Model Number: TRM9992G, HW Version 2976515701

The 802.11bgn WiFi Radio Module

The 2.4GHz WiFi Radio Module; Model Number: TRM9992G, HW Version 2976515701, is intended for OEM integrator only and has been certified to operate in the following Systems

- AP1002We (Model Number AP12E612)
- AP1004WRe (Model Number AP14E612)
- AP1004NRe (Model Number AP14E153)

The 802.11bgn WiFi Radio Module - Top View

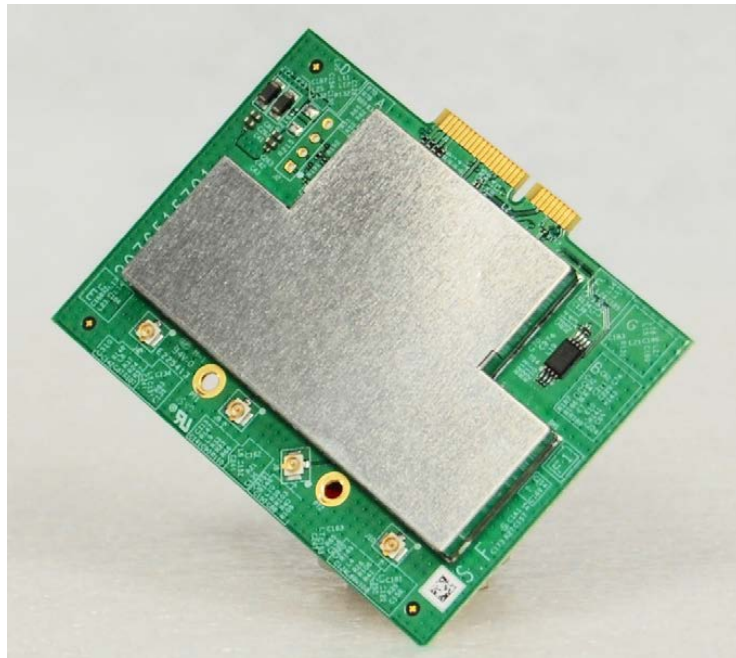


Figure 1 - 802.11bgn WiFi Radio Module Front View

The 802.11bgn WiFi Radio Module Bottom View

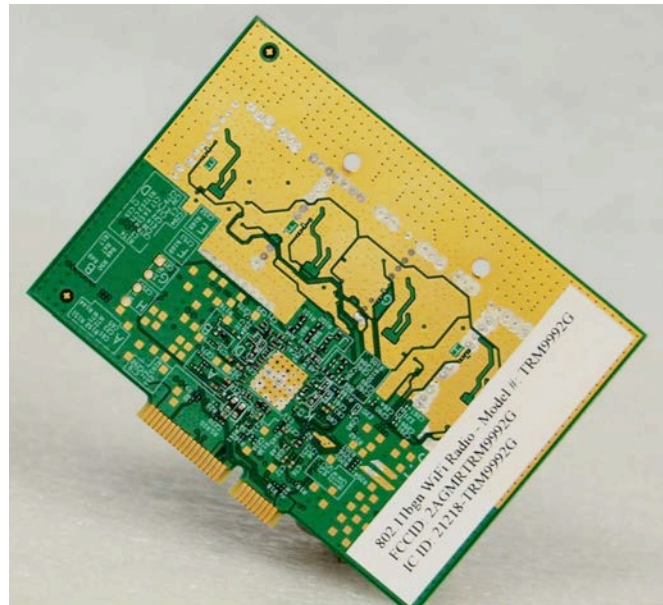


Figure 2 - 802.11bgn WiFi Radio Module Bottom View

Tools and Equipment

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

- Screwdriver

Install the 802.11bgn WiFi Radio Module

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

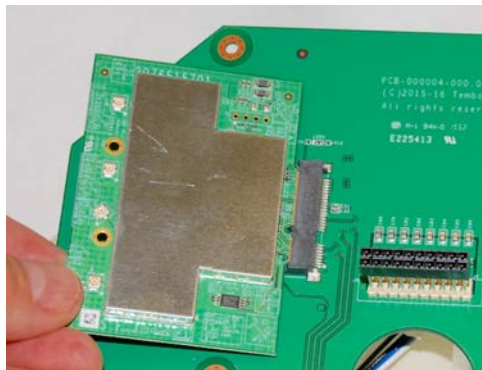


Figure 3 - Insert 802.11bgn WiFi Radio Module in to the PCIe Connector

Secure the 802.11bgn WiFi Radio Module

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

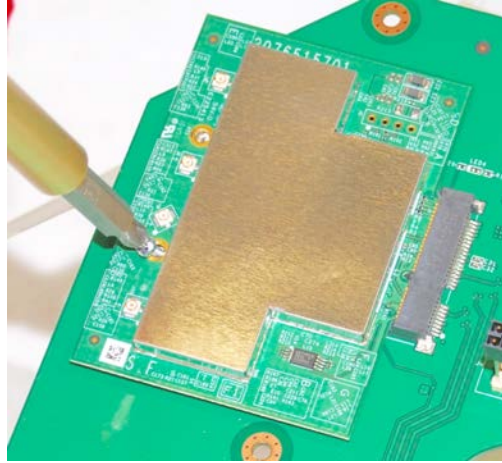


Figure 4 – Secure the 802.11bgn WiFi Radio Module in to the PCIe card

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

Connect the 802.11bgn WiFi Radio Module

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

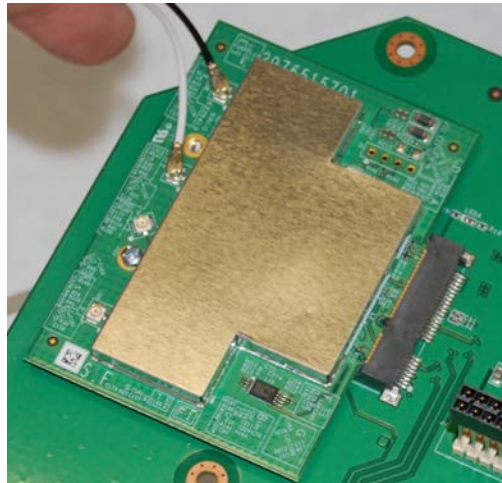


Figure 5 – Connect the Coax Cables to the 802.11bgn WiFi Radio Module

Chapter 3: Module TRM9992G Regulatory Declarations

This Section provides the Regulatory Declarations for the 802.11bgn WiFi Radio Module; Model Number: TRM9992G, HW Version 2976515701

FCCID:2AGMRTRM9992G
IC:..... 21218-TRM9992G

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 feature are disabled for products marketed to the US/CANADA

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

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)

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

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.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

This device and it's antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with IC multi-transmitter product procedures.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

This radio transmitter (802.11bgn WiFi Radio Module/IC:21218-TRM9992G) 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 (802.11bgn WiFi Radio Module/IC:21218-TRM9992G) 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 6.4dBi)
 PCA-000006-000-X/PCB-000015-XXX-X; 2.4G/5G-UNII2c 120 Antenna Panel (Max Gain 6.4dBi)
 PCA-000008-XXX-X ; 2.4G 1530 Antenna Panel..... (Max Gain 13.5 dBi)

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 **24 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 **24 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)

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

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

Chapter 4: Radio Specifications

Radio

	Description
Wireless Protocol	IEEE 802.11b, 802.11g, 802.11n
Radio and Modulation Schemes	802.11b: DSSS 802.11g: OFDM BPSK 1/2- QAM64 3/4 802.11n: MCS0-MCS31
Operating Frequency and Channel Support	2400 MHz – 2500 MHz Ch. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 ¹
Data Rate Support	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n (HT20): 6.5 – 288.9 Mbps 802.11n (HT40): 6.5 – 600 Mbps
Media Access Protocol	CSMA/CA with ACK
Encryption	Open, WPA, WPA2, TKIP
Receiver Sensitivity	802.11b, (1Mbps): -98dBm 802.11g (6Mbps): -93dBm, 802.11n (MCS0, HT20): -92dBm
Transmitter Output Power	+20dBm 802.11b, 1Mbps +20dBm 802.11g, 6Mbps +19dBm 802.11n, HT40

Security

	Description
Encryption	<ul style="list-style-type: none"> • RC4 encryption algorithm • Support AES-128, AES192, AES-256
802.1x	<ul style="list-style-type: none"> • Support EAP-TLS, EAP-TTLS, and EAP-PEAP
WPA/WPA2	<ul style="list-style-type: none"> • Support WPA/WPA2-PSK and WPA/WPA2-EAP • Support Cipher Mode AES and TKIP

¹ Channel selection limited to 1-11 for US/Canada.

Chapter 5: General Specifications

Mechanical

Dimensions:	
Height: Front Surface, Top to Bottom	56mm (2.2")
Width: Front Surface, Left to Right	75mm (2.95")
Depth: Front Surface to Rear Surface	6mm (0.25")
Weight:	
	3.4 kg (7.5 lbs)

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	-20 to 65°C (-40 to 131°F)
Storage temperature	-40 to 85 ° C (-40 to 185 ° F)
Humidity	0 to 95% (operating and nonoperating)
Maximum elevation	Operating: Sea level 55 ° C (131 ° F) 4,206 m (13,800 ft) at 40 ° C (104 ° F) Non-operating: 12,500 m (40,000 ft) at -65 ° C (- ° F)

Antenna Connections

Antenna Connectors	Up to four U.FL compatible antenna connectors
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