

FCC & IC TEST REPORT for Co-location
No. 171100706SHA-007

Applicant : GES Singapore Pte Ltd.
28 Marsiling Lane, Singapore 739152

Manufacturing site : Same as applicant

Product Name : 802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card

Type/Model : QCNFA364A

TEST RESULT : PASS

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2017): Radio Frequency Devices

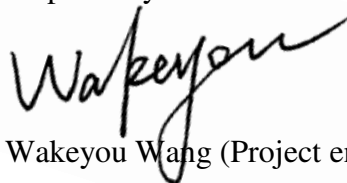
ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-247 Issue 2 (Feb 2017): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 4 (December 2014): General Requirements for Compliance of Radio Apparatus

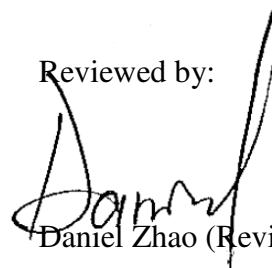
Date of issue: Jan 19, 2018

Prepared by:



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Reviewed by:



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Description of Test Facility

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1. General Information

1.1 Applicant Information

Applicant : GES Singapore Pte Ltd.
28 Marsiling Lane, Singapore 739152

Manufacturing site : Same as applicant

1.2 Identification of the EUT

Product Name : 802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card

Type/model : QCNFA364A

FCC ID : 2AOJ9-7357622

IC : 9871A -7357622

1.3 Technical specification

Description of EUT : This device is a module supporting 802.11a/b/g/n/ac as well as Bluetooth dual modes.
Among this report, only 802.11a/n/ac was assessed.

Port identification : /

Antenna : PIFA, 5dBi, 2*2 MIMO

Rating : 3.3Vdc from host equipment

Declared Temperature : -10°C ~ 70°C
range

Category of EUT : Class B

EUT type : Table top
 Floor standing

Sample received date : Nov 5, 2017

Sample Identification : /
No

Date of test : Nov 5, 2017 – Jan 18, 2018

2. Test Specification

2.1 Standards or specification

47CFR Part 15 (2017)
ANSI C63.10 (2013)
RSS-247 Issue 2 (Feb 2017)
RSS-Gen Issue 4 (December 2014)
789033 D02 General UNII Test Procedures New Rules v01r04
KDB 662911 D01 Multiple Transmitter Output v02r01
KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01

2.2 Mode of operation during the test

Mode 1: the Wi-Fi 5G & Bluetooth classic mode transmitted simultaneously;
Mode 2: the Wi-Fi 5G & Bluetooth LE mode transmitted simultaneously;
Mode 3: the Wi-Fi 2.4G & Bluetooth classic mode transmitted simultaneously;
Mode 4: the Wi-Fi 2.4G & Bluetooth LE mode transmitted simultaneously;

The Wi-Fi 5G of 5500MHz, Wi-Fi 2.4GHz of 2437MHz, Bluetooth LE 2440MHz and Bluetooth classic 2441MHz (GSFK) was chosen to perform test as representative.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	HP, EliteBook 2530P	-

2.5 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2018-10-18
<input checked="" type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2018-05-30
<input checked="" type="checkbox"/>	Horn antenna	R&S	HF 906	EC 3049	2018-09-22
<input type="checkbox"/>	Horn antenna	ETS	3117	EC 4792-1	2018-08-23
<input checked="" type="checkbox"/>	Pre-amplifier	R&S	Pre-amp 18	EC5881	2018-06-19
<input checked="" type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2018-09-08

2.6 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emission	15.407(b), 15.205, 15.209	RSS-247 Issue 6.2 RSS-Gen Issue 4 Clause 8.10	Pass

2.7 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT

Item No.	Test Items	Expanded Uncertainty (k=2) (±)
1	Radiated Emissions up to 1 GHz	4.90 dB
2	Radiated Emissions 1-6GHz	5.02 dB
3	Radiated Emissions 6-18GHz	5.28 dB

3. Radiated emission

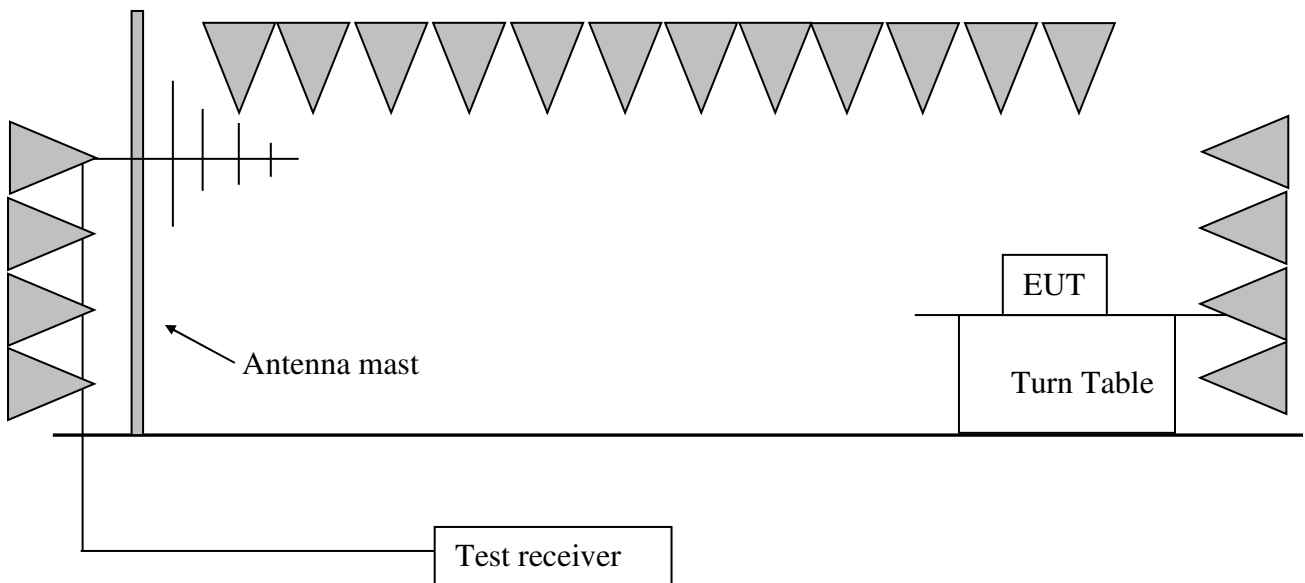
Test result: PASS

6.1 Test limit

6.1.1 The radiated emissions which are lower than 1GHz or fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The EUT was tested according to KDB 789033D02: Section G.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);

RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);

RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)

RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. If the PK measured level is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,

Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.

Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;

Measured level = 10dBuV + 0.20dB/m = 10.20dBuV/m

Assuming limit = 54dBuV/m,

Measured level = 10.20dBuV/m, then Margin = 54 - 10.20 = 43.80dBuV/m.

6.4 Test protocol

Temperature: 25 °C
Relative Humidity: 55 %

Mode 1:

Channel	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB)	Limits (dBμV/m)	Margin (dB)	Detector	Polarization
5500 & 2441	5470.00	63.90	-1.10	74.00	10.10	PK	V
	5470.00	51.50	-1.10	54.00	2.50	AV	V
	4880.65	51.60	-1.10	54.00	2.40	PK	V
	7320.08	42.50	3.10	54.00	11.50	PK	V

Note: after test, no additional Co-location emission was found.

Mode 2:

Channel	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB)	Limits (dBμV/m)	Margin (dB)	Detector	Polarization
5500 & 2440	5470.00	63.90	-1.10	74.00	10.10	PK	V
	5470.00	51.70	-1.10	54.00	2.30	AV	V
	4881.03	50.10	-1.10	54.00	3.90	PK	V
	7319.82	40.60	3.10	54.00	13.40	PK	V

Note: after test, no additional Co-location emission was found.

Mode 3:

Channel	Frequency (MHz)	Measured level (dB μ V/m)	Factor (dB)	Limits (dB μ V/m)	Margin (dB)	Detector	Polarization
2437 & 2441	4874.00	54.60	-1.10	74.00	19.40	PK	V
	4874.00	45.30	-1.10	54.00	8.70	AV	V
	4880.65	51.30	-1.10	54.00	2.70	PK	V
	7320.08	42.60	3.10	54.00	11.40	PK	V
Note: after test, no additional Co-location emission was found.							

Mode 4:

Channel	Frequency (MHz)	Measured level (dB μ V/m)	Factor (dB)	Limits (dB μ V/m)	Margin (dB)	Detector	Polarization
2437 & 2440	4874.00	54.90	-1.10	74.00	19.10	PK	V
	4874.00	45.50	-1.10	54.00	8.50	AV	V
	4881.03	50.30	-1.10	54.00	3.70	PK	V
	7319.82	40.50	3.10	54.00	13.50	PK	V
Note: after test, no additional Co-location emission was found.							