



Hong Kong

FCC/IC – Test report

Report Number : **60/790.14.022.01** Date of Issue: October 30, 2014

Model : **WFBTSC02**

Product Type : **Bike speed and cadence transmitter**

Applicant : **DAYTON INDUSTRIAL CO.,LTD**

Address : **2-12 Kwai Fat Road,11-A Kwai Chung, New Territories, Hong Kong**

Production Facility : **KENDY ENTERPRISE LTD**

Address : **2-12 Kwai Fat Road,11-A Kwai Chung, New Territories, Hong Kong**

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : **34**

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2. Details about the Test Laboratory

Details about the Test Laboratory

Test site 1

Company name: TÜV SÜD HONG KONG LTD.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin
HK.

Telephone: 852 2776 1323
Fax: 852 2776 1372

Test site 2

Company name: Shenzhen Academy of Metrology and Quality Inspection
No.4 TongFa Road, Xili Town Nanshan District, Shenzhen, China
Test Firm FCC Registration number:994606

National Digital Electronic Product Test
No.4 TongFa Road, Xili Town Nanshan District, Shenzhen, China
IC Assigned Code: 11177A

3. Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Bike speed and cadence transmitter
Model no.:	WFBTSC02
Serial number:	NIL
Options and accessories:	NIL
FCC ID:	O4GBTSC02
IC:	7666A-BTSC02
Rated Voltage:	3 VDC
Rated Current:	NIL
Rated Power:	NIL
Frequency:	2402-2480MHz
RF Transmission Frequency:	2402-2480MHz
Antenna gain:	0 dBi
No. of Operated Channel:	40
Modulation:	GFSK
Description of the EUT:	Battery operated – 1x 3V CR2032 battery

4. Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C, Intentional Radiators, 10-1-12 Edition	PART 15 – RADIO FREQUENCY DEVICES Subpart C – Intentional Radiators
RSS-Gen Issue 3 December 2010	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 Issue 8 December 2010	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

5. Mode of Operation

All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: GFSK Continuous Transmitting Mode
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Note:

The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Y axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

6. Summary of Test Standards and Results

Emission Tests					
Test Condition	Pages	Test site	Test Result		
			Pass	Fail	N/A
AC Line Conducted Emissions FCC §15.207(a) RSS-GEN 7.2.4	NIL	/	☐	☐	☒
Spurious Emissions at Antenna Terminals FCC §2.1051 & §15.247(d)	8	Site 2	☒	☐	☐
Spurious Radiated Emissions FCC §15.205, §15.209 & §15.247(d) RSS-GEN 4.9	11	Site 2	☒	☐	☐
6 dB Bandwidth & 99%OBW FCC §15.247(a)(2) RSS-GEN 4.6.2 & RSS 210 A8.2(a)	15	Site 2	☒	☐	☐
Peak Output Power FCC §15.247(b) RSS-GEN 4.8 & RSS 210 A8.4(4)	18	Site 2	☒	☐	☐
100 kHz Bandwidth of Band Edges FCC §15.247(d) RSS 210 A8.5	21	Site 2	☒	☐	☐
Power Spectral Density FCC §15.247(e) RSS 210 A8.2(b)	23	Site 2	☒	☐	☐
Antenna Requirements FCC §15.203	26	Site 2	☒	☐	☐

Remark: 1.NA: Battery operated only.

7. General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: O4GBTSC02 complies with the FCC Part 15, Subpart C Rules.

This submittal(s) (test report) is intended for IC: 7666A-BTSC02, complies with the IC RSS 210 and RSS-GEN Rules.

All the configurations of the product were tested and only the worst test results are listed in the report.

SUMMARY:

All tests according to the regulations cited on page 6 were

- ☒ - Performed
- ☐ - **Not** Performed

The Equipment Under Test

- ☒ - **Fulfills** the general approval requirements.
- ☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: September 22, 2014

Testing Start Date: October 16, 2014

Testing End Date: October 22, 2014

- TÜV SÜD HONG KONG LTD. -

Reviewed by:


Edmond FUNG



Prepared by:


CHAN Kwong Ngai

8. Emission Test Results

7.1 Spurious Emissions at Antenna Terminals

Date of test : October 21, 2014

Test requirement : FCC §2.1051 & §15.247(d)

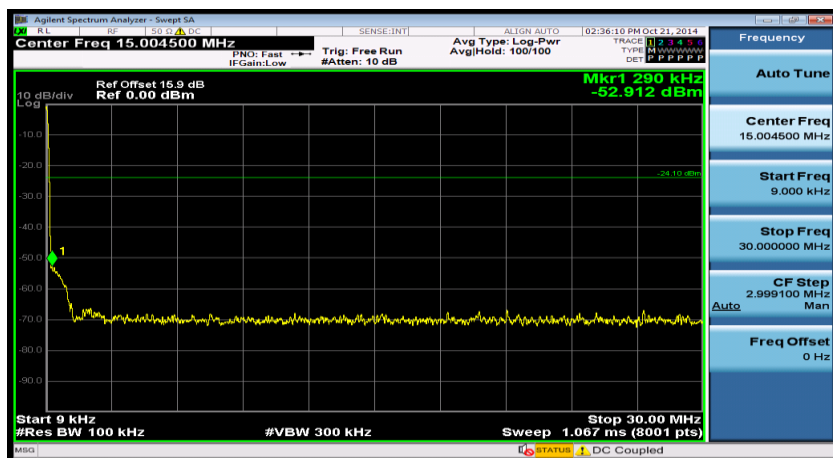
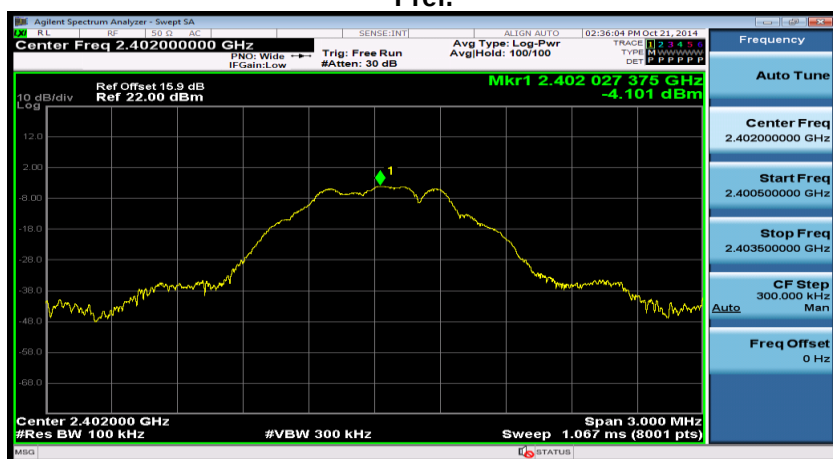
Test method : Conducted

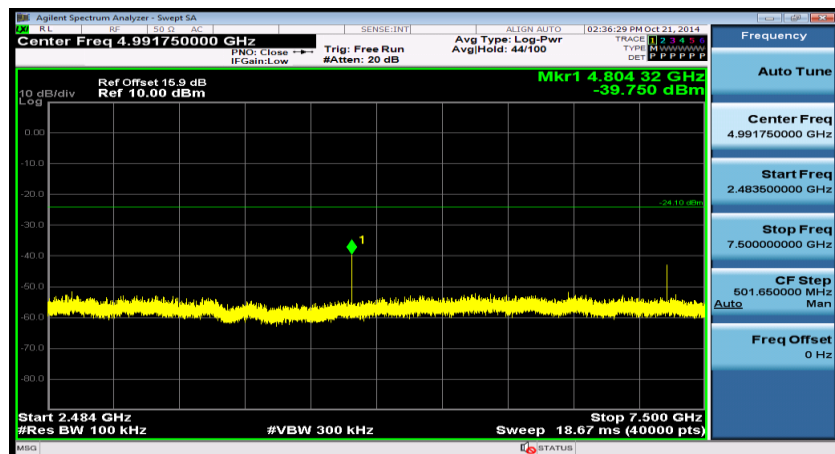
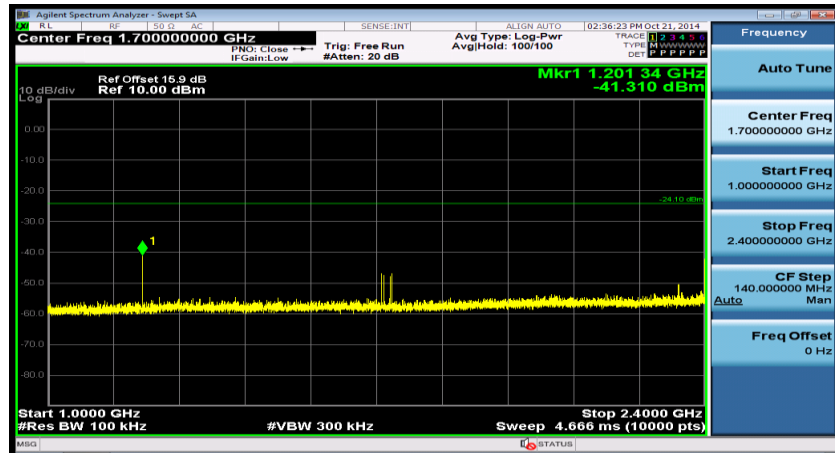
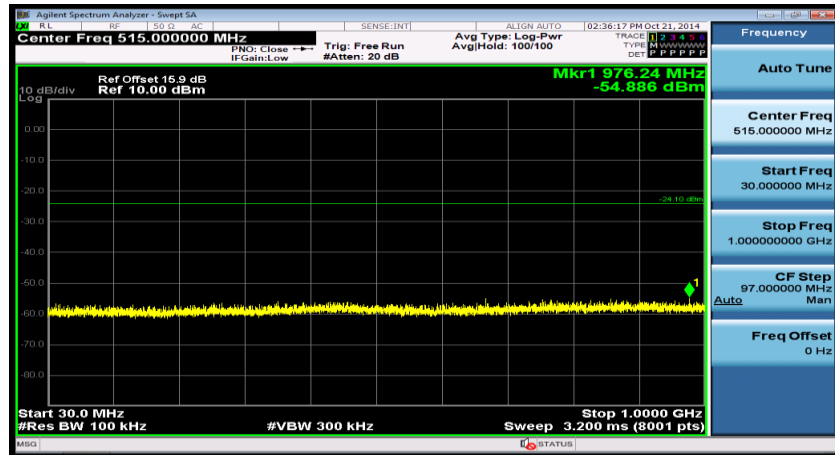
Operating mode : Transmit mode

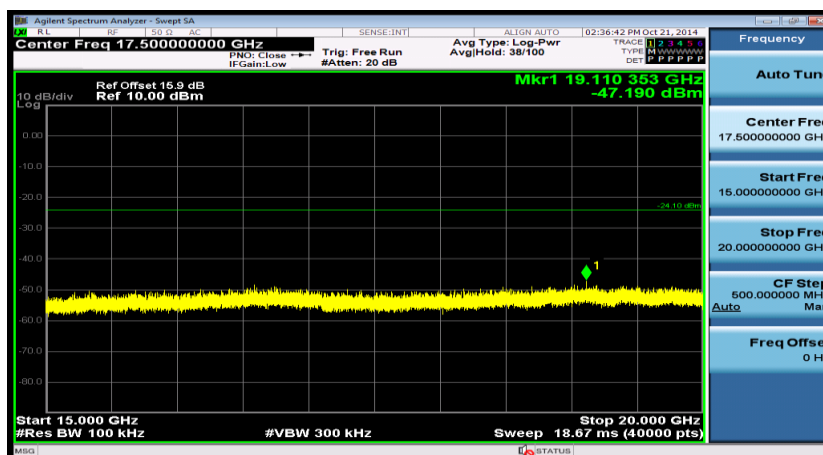
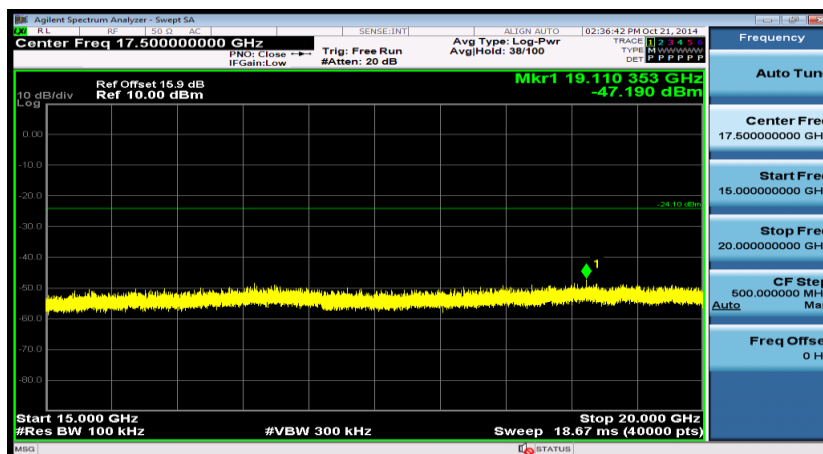
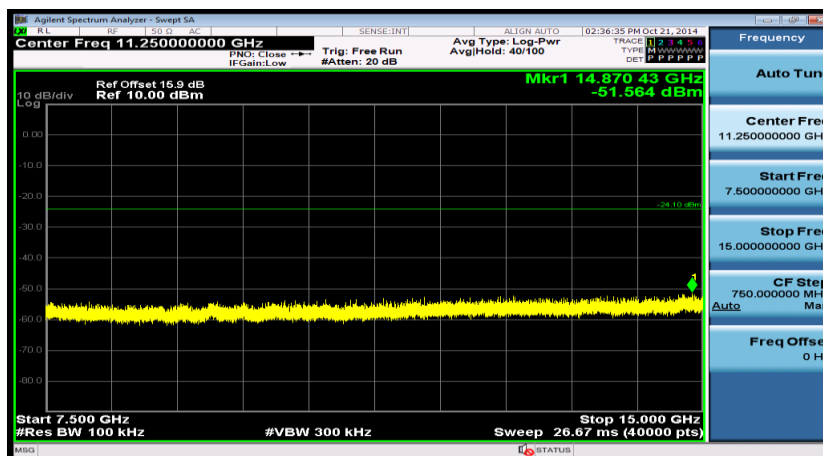
Frequency channel : 2402MHz

Remarks : 9KHz-25GHz

Pref.







Date of test : October 21, 2014

Test requirement : FCC §2.1051 & §15.247(d)

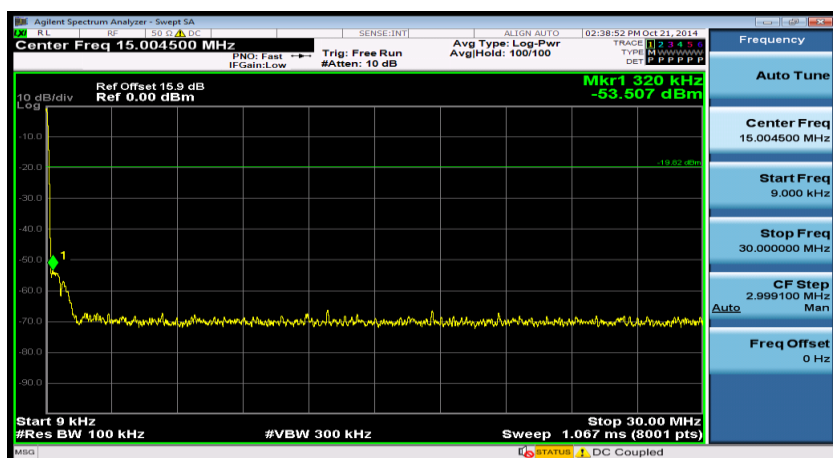
Test method : Conducted

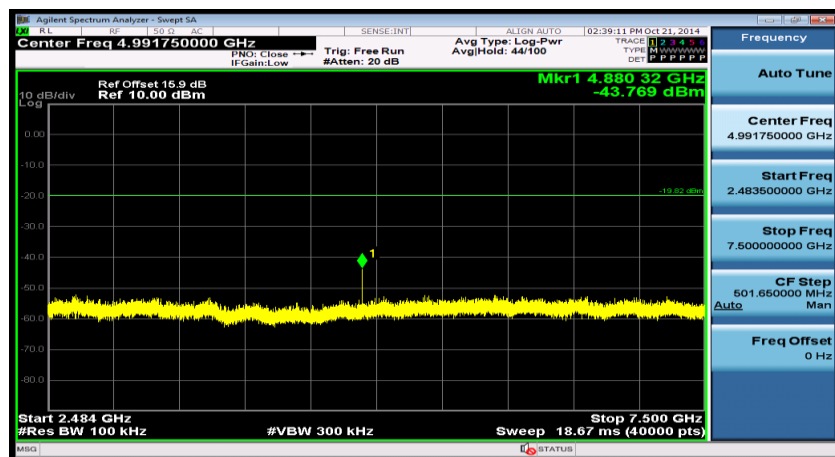
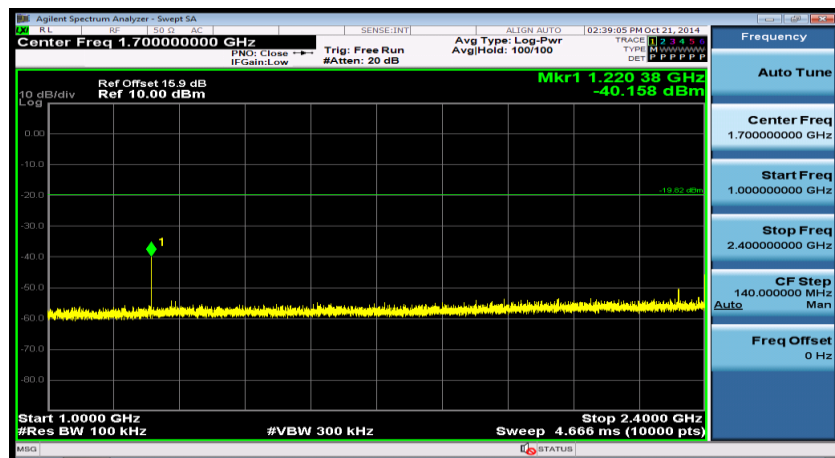
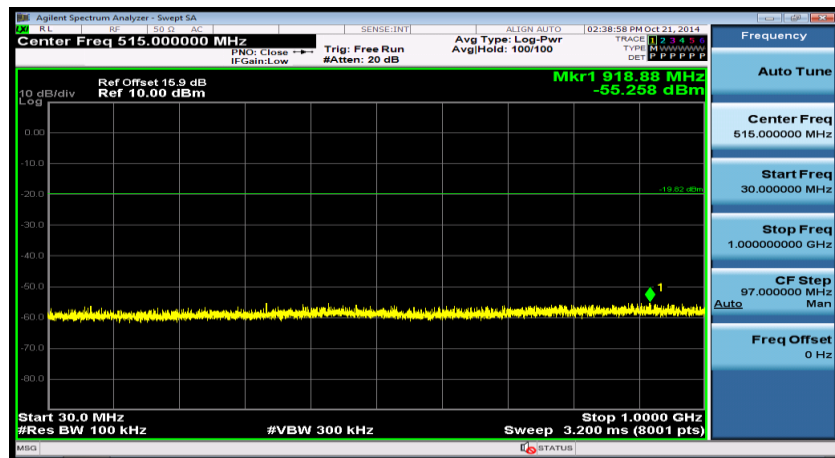
Operating mode : Transmit mode

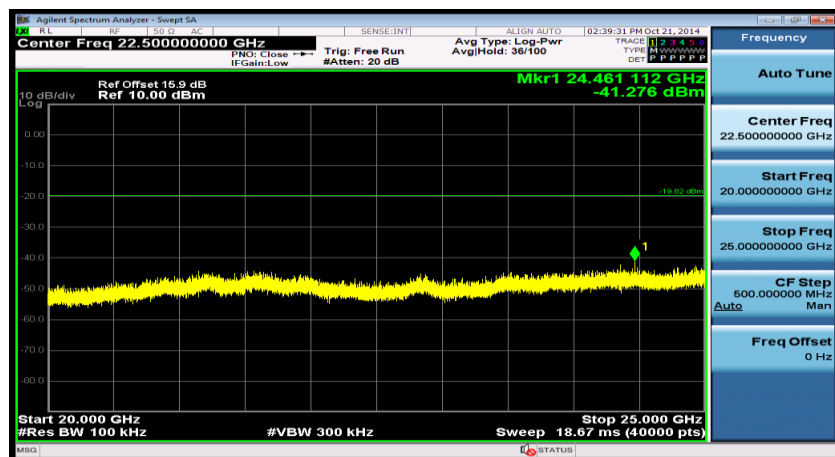
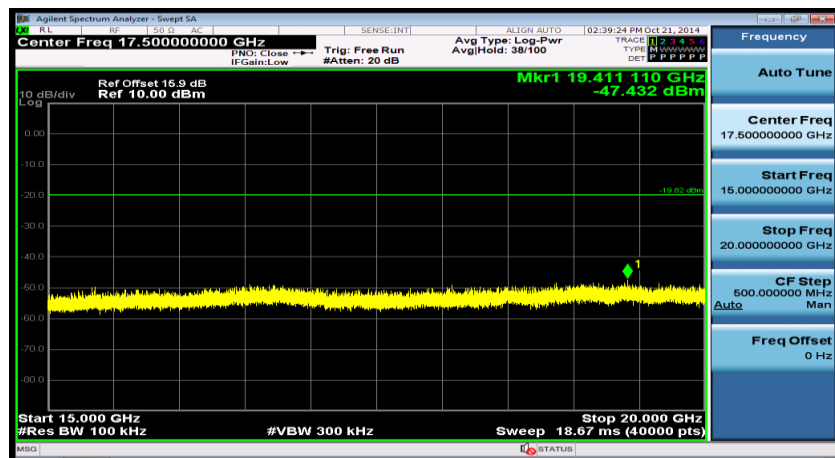
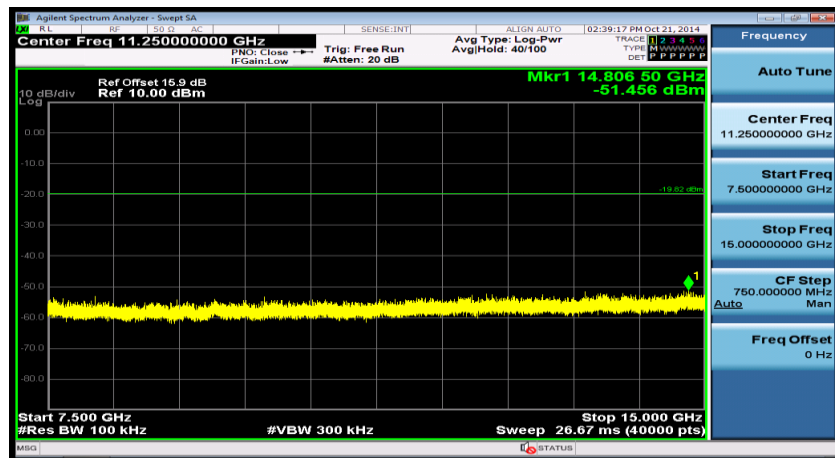
Frequency channel : 2440MHz

Remarks : 9KHz-25GHz

Pref.







Date of test : October 21, 2014

Test requirement : FCC §2.1051 & §15.247(d)

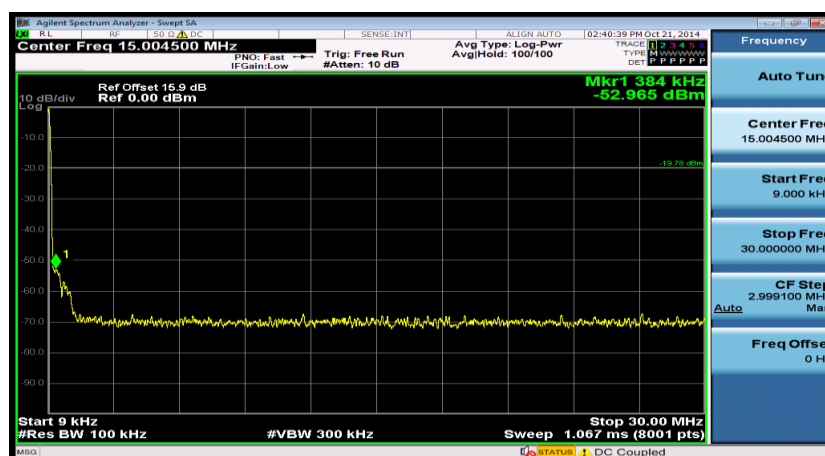
Test method : Conducted

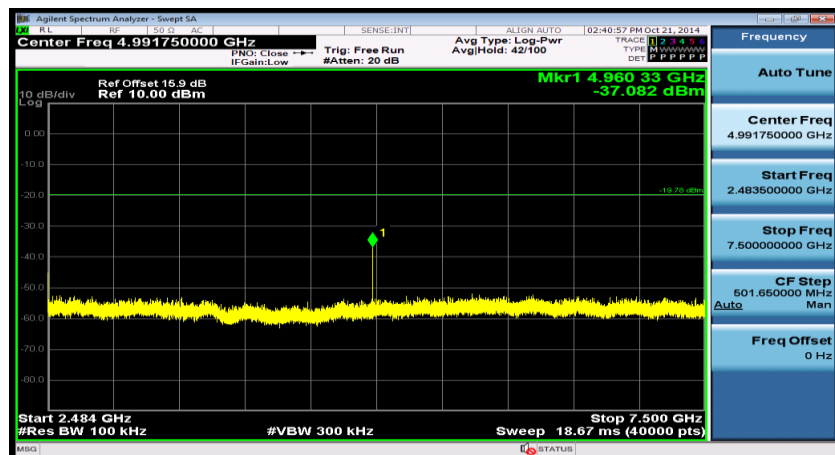
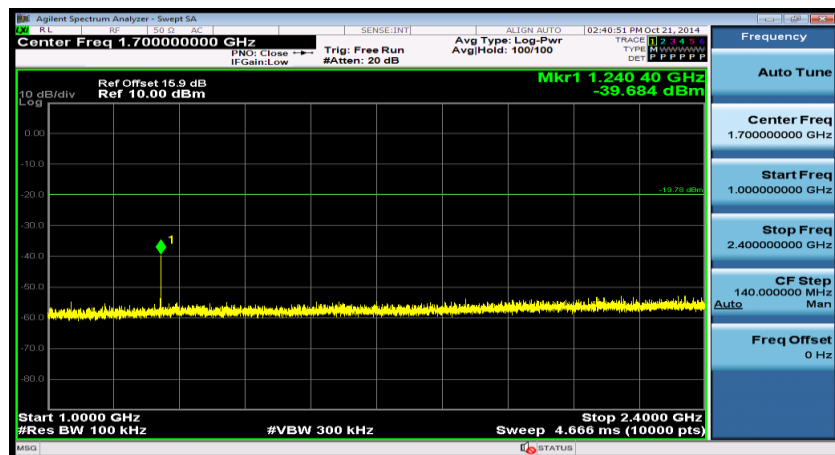
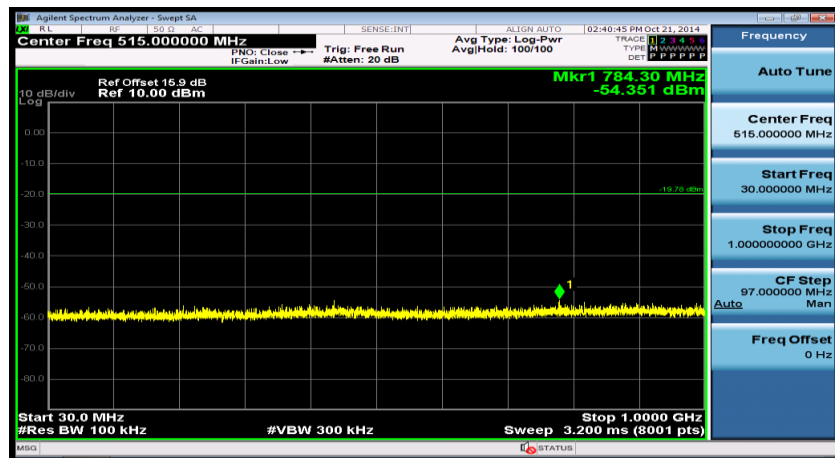
Operating mode : Transmit mode

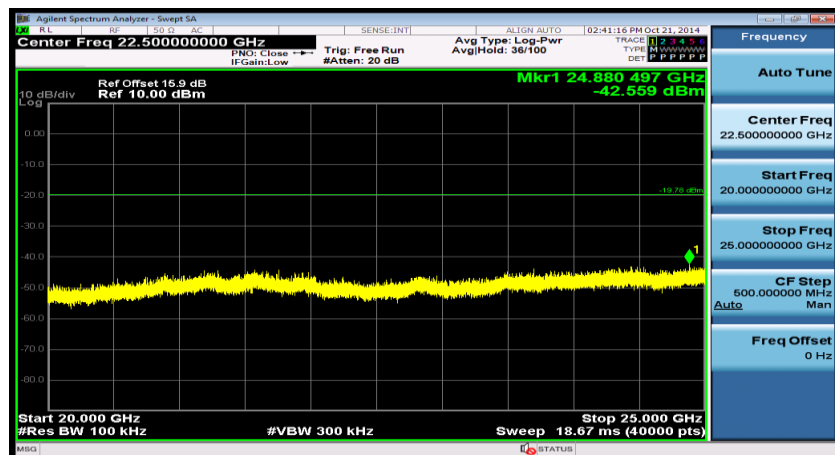
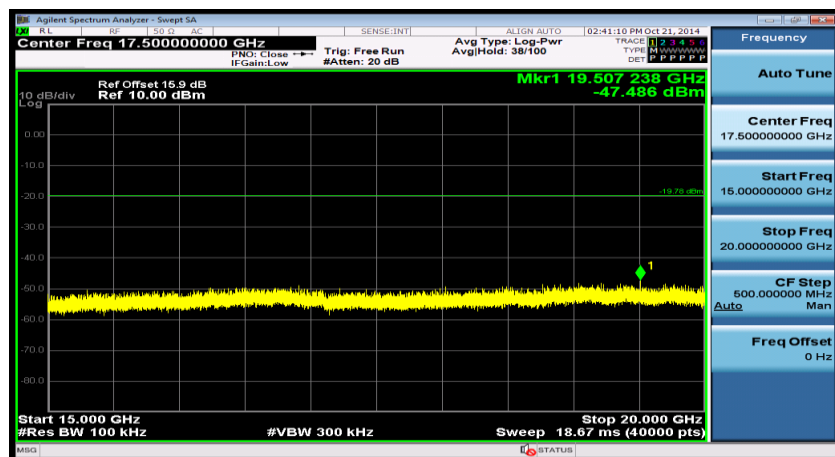
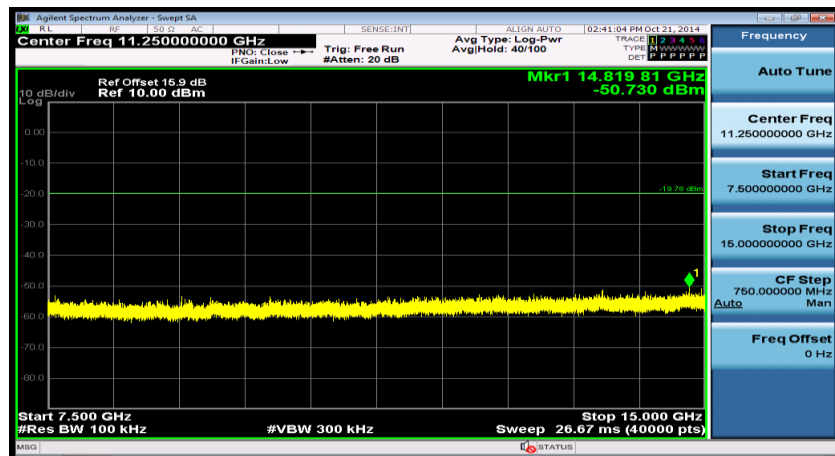
Frequency channel : 2480MHz

Remarks : 9KHz-25GHz

Pref.







7.2 Spurious Radiated Emissions

Date of test : October 16, 2014

Test requirement : FCC §15.205, §15.209 & §15.247(d)

Test method : Radiated

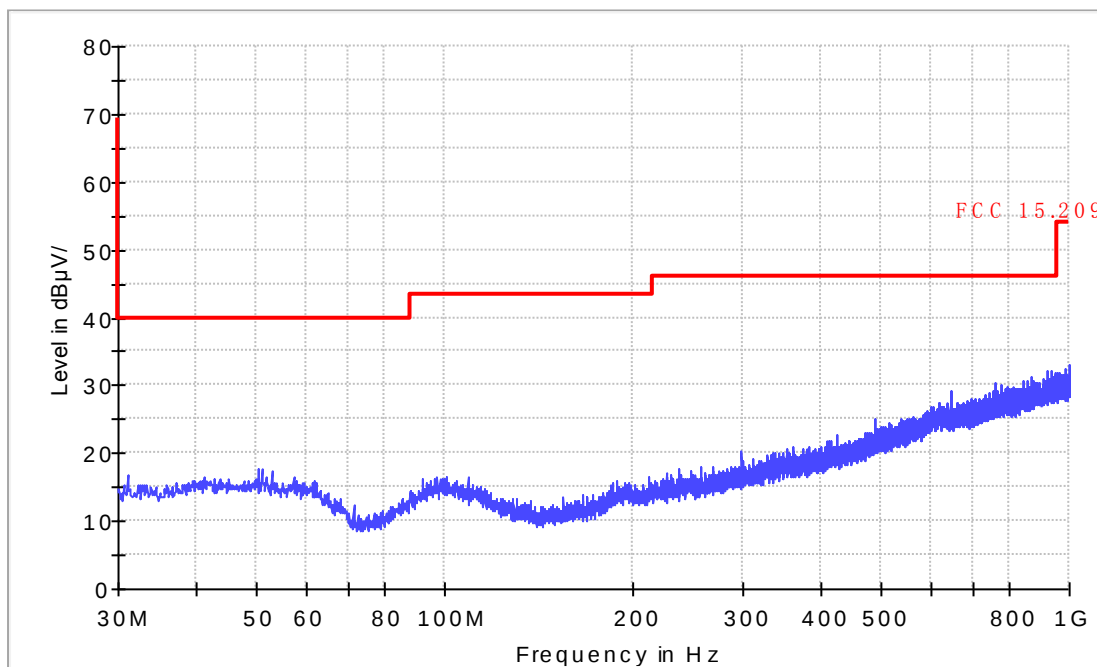
Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks : 9kHz-1GHz

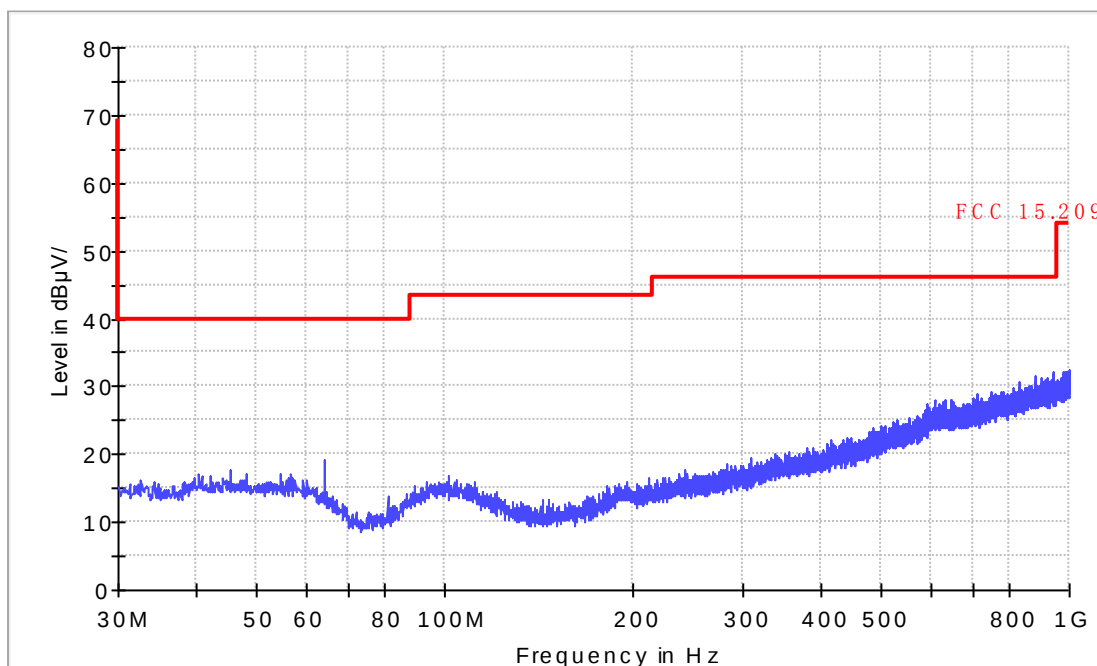
Horizontal

Electric Field Strength 30M-1GHz



Vertical

Electric Field Strength 30M-1GHz



Frequency (MHz)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
40.8	-33.8	12.2	40	-27.8	QP	H
54.4	-34.2	12.4	40	-27.6	QP	H
63.7	-35.3	11.4	40	-28.6	QP	H
101.2	-34.7	13.5	43.5	-30.0	QP	H
411.0	-30.2	18.1	46	-27.9	QP	H
605.5	-26.7	22.7	46	-23.3	QP	H
40.8	-35.0	11.4	40	-28.6	QP	V
54.4	-34.7	12.8	40	-27.2	QP	V
63.7	-35.9	10.5	40	-29.5	QP	V
101.2	-34.0	14.2	43.5	-29.3	QP	V
411.0	-30.9	17.9	46	-28.1	QP	V
605.5	-27.2	24.8	46	-21.2	QP	V

Remark: 1.No emissions can be detected between 9 kHz and 30 MHz.

2.All three channels (2042MHz, 2440MHz and 2480MHz) were performed test, and the 2440MHz was the worst case.

Date of test : October 16, 2014
 Test requirement : FCC §15.205, §15.209 & §15.247(d)
 Test method : Radiated
 Operating mode : Transmit mode
 Frequency channel : 2402MHz
 Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4804.000	60.0	-5.4	54.6	74.00	-19.4	peak	H
4804.000	45.2	-5.4	39.8	54.00	-14.2	Average	H
7206.000	67.4	-2.7	64.7	74.00	-9.3	peak	H
7206.000	44.0	-2.7	41.3	54.00	-12.7	Average	H
9608.000	58.0	1.4	59.4	74.00	-14.6	peak	H
9608.000	39.7	1.4	41.1	54.00	-12.9	Average	H
4804.000	62.2	-5.4	56.8	74.00	-17.2	peak	V
4804.000	46.9	-5.4	41.5	54.00	-12.5	Average	V
7206.000	71.2	-2.7	68.5	74.00	-5.5	peak	V
7206.000	53.3	-2.7	50.6	54.00	-3.4	Average	V

Date of test : October 16, 2014
 Test requirement : FCC §15.205, §15.209 & §15.247(d)
 Test method : Radiated
 Operating mode : Transmit mode
 Frequency channel : 2440MHz
 Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4880.000	60.6	-5.4	55.2	74.00	-18.8	peak	H
4880.000	43.9	-5.4	38.5	54.00	-15.5	Average	H
7320.000	71.2	-2.5	68.7	74.00	-5.3	peak	H
7320.000	53.5	-2.5	51.0	54.00	-3.0	Average	H
4880.000	62.0	-5.4	56.6	74.00	-17.4	peak	V
4880.000	44.6	-5.4	39.2	54.00	-14.8	Average	V
7320.000	68.9	-2.5	66.4	74.00	-7.6	peak	V
7320.000	51.6	-2.5	49.1	54.00	-4.9	Average	V

Date of test : October 16, 2014

Test requirement : FCC §15.205, §15.209 & §15.247(d)

Test method : Radiated

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4960.000	60.0	-5.4	54.6	74.00	-19.4	peak	H
4960.000	43.5	-5.4	38.1	54.00	-15.9	Average	H
7440.000	62.0	-2.1	59.9	74.00	-14.1	peak	H
7440.000	41.5	-2.1	39.4	54.00	-14.6	Average	H
4960.000	60.6	-5.4	55.2	74.00	-18.8	peak	V
4960.000	43.9	-5.4	38.5	54.00	-15.5	Average	V
7440.000	64.1	-2.1	62.0	74.00	-12.0	peak	V
7440.000	46.9	-2.1	44.8	54.00	-9.2	Average	V

7.3 6dB & 99% Bandwidth

Date of test : October 21, 2014

Test requirement : FCC §15.247(a)(2)

Test method : Conducted

Operating mode : Transmit mode

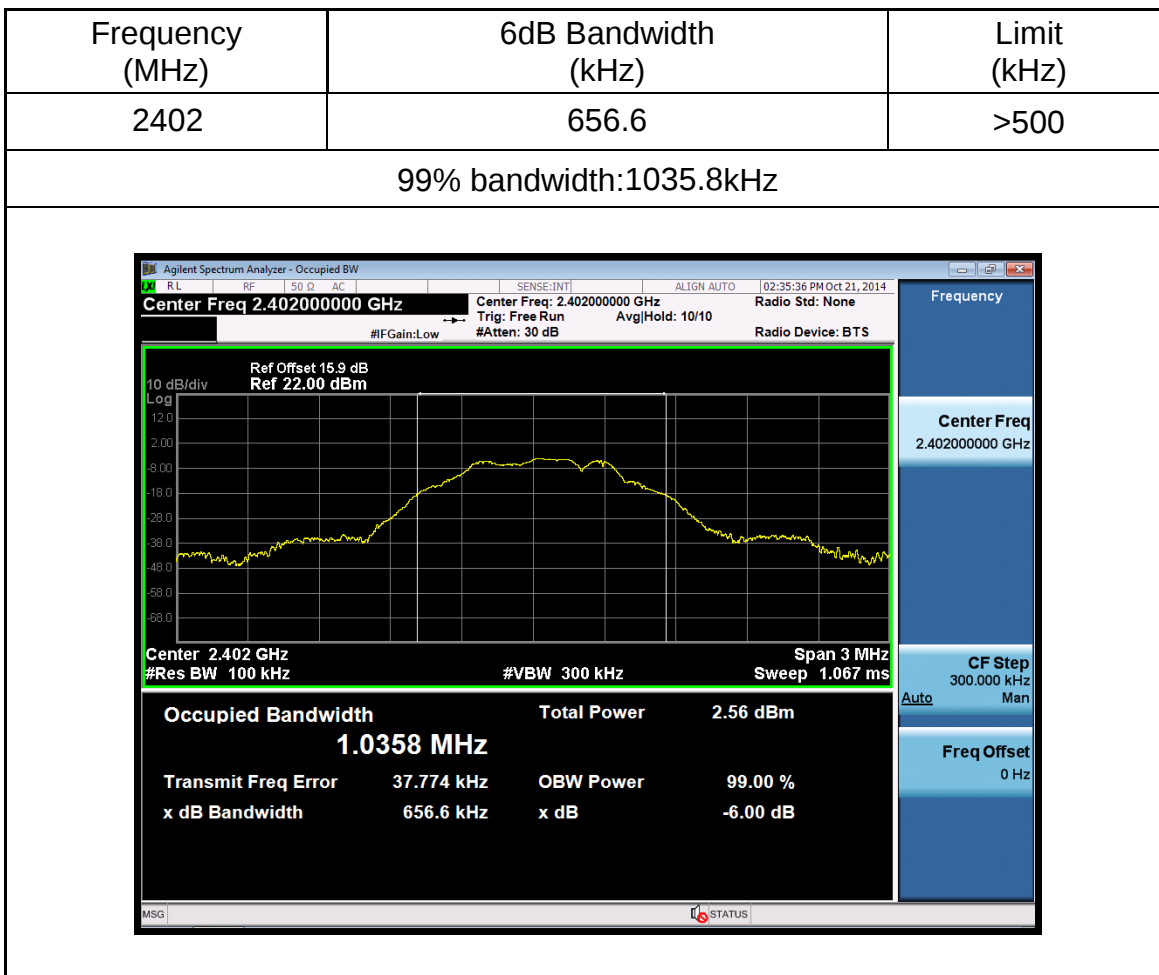
Frequency channel : 2402MHz

Remarks : NIL

Test Result

☒ Passed

☐ Not Passed



Date of test : October 21, 2014

Test requirement : FCC §15.247(a)(2)

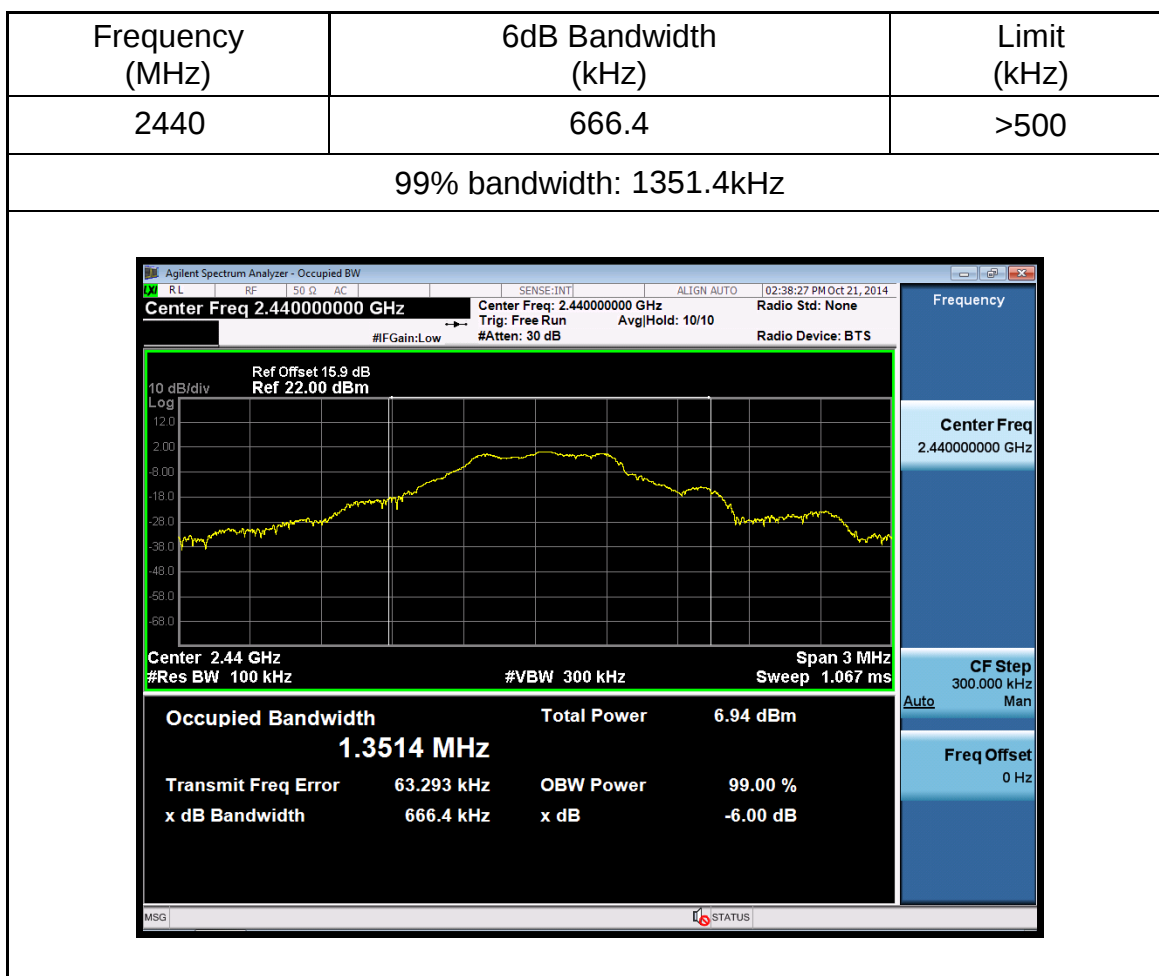
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks : NIL

Test Result	
☒	Passed
☐	Not Passed



Date of test : October 21, 2014

Test requirement : FCC §15.247(a)(2)

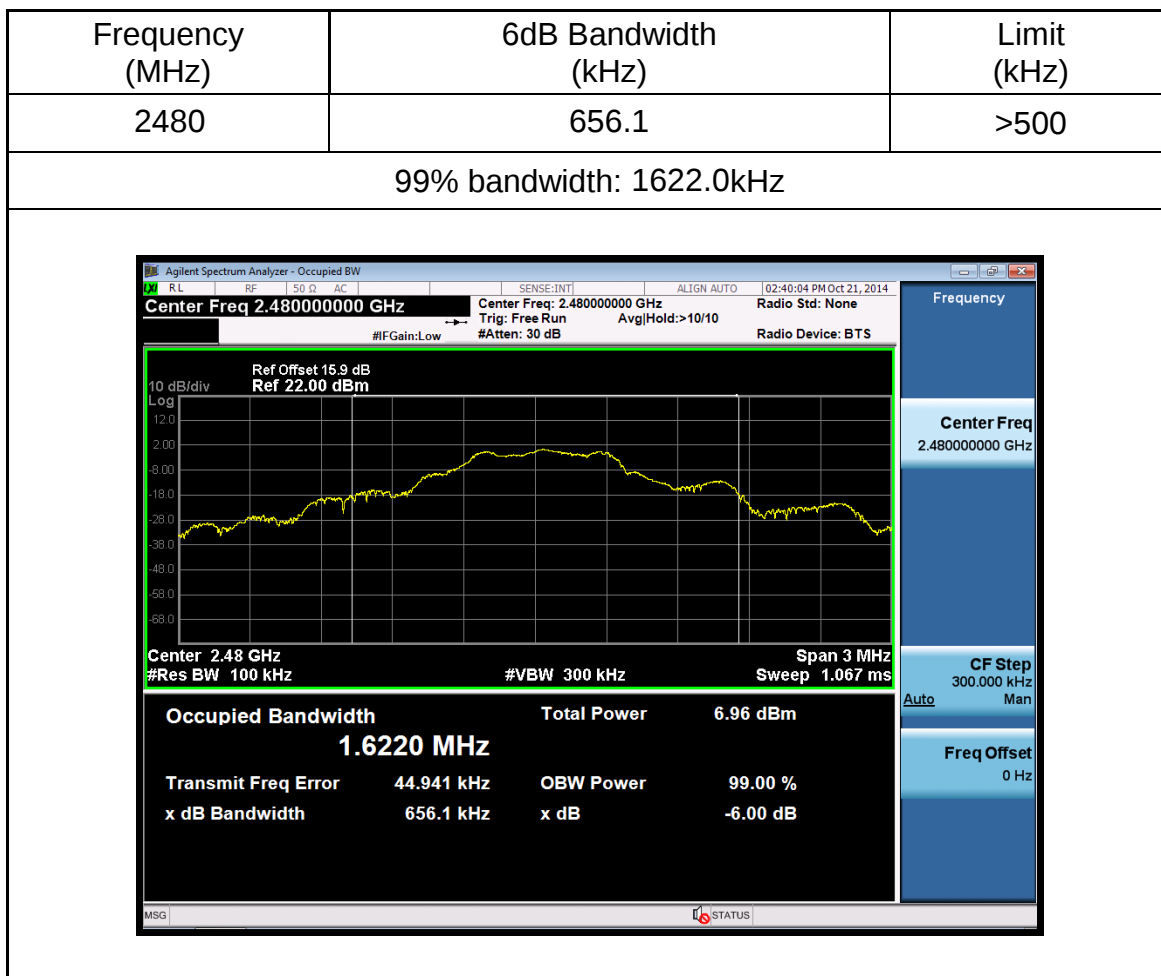
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks : NIL

Test Result	
☒	Passed
☐	Not Passed



7.4 Peak Output Power Measurements

Date of test : October 21, 2014
Test requirement : FCC §15.247(b)
Test method : Conducted
Operating mode : Transmit mode
Frequency channel : 2402/2440/2480MHz
Remarks :

Test Result	
☒	Passed
☐	Not Passed

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2402	-3.69	30
2440	0.152	30
2480	0.241	30

Note: The relevant measured result has the offset with cable loss already.

7.5 100 kHz Bandwidth of Band Edges

Date of test : October 21, 2014

Test requirement : FCC §15.247(d)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2402MHz

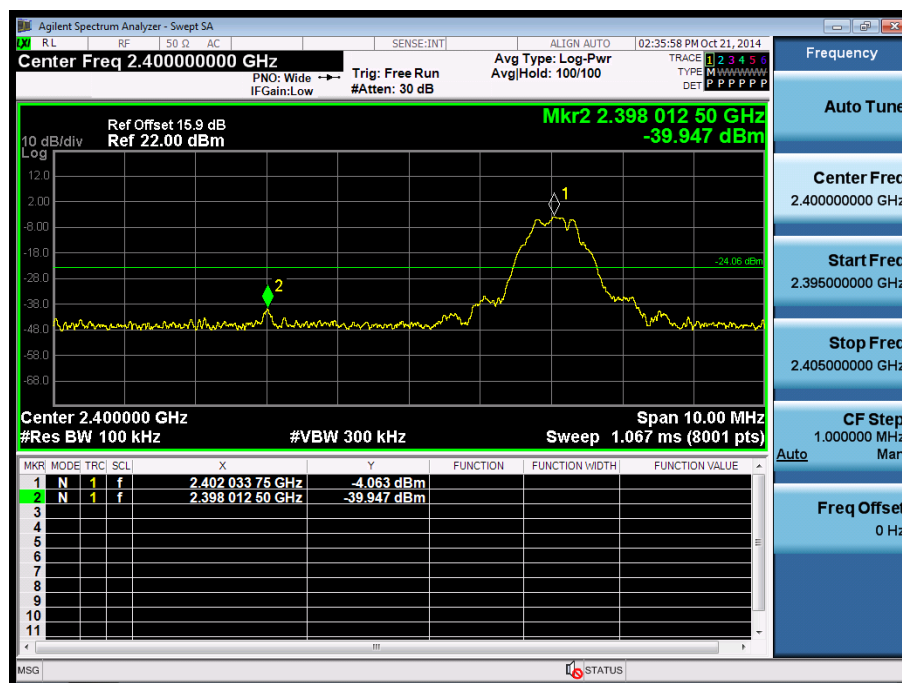
Remarks : Conducted

Test Result

☒ Passed

☐ Not Passed

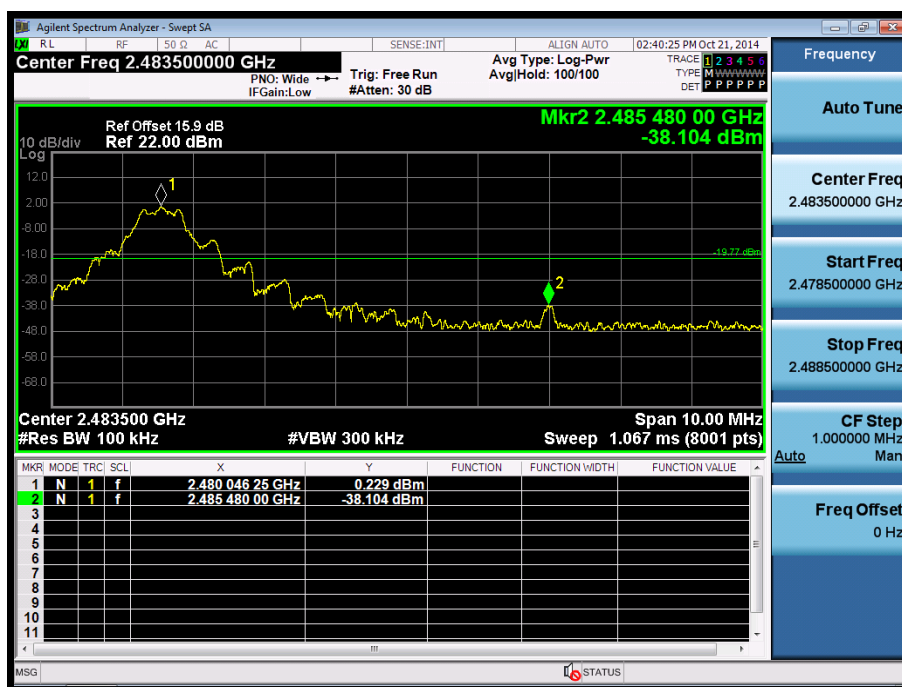
Frequency (MHz)	Delta Peak to Band Emission (dB)	Limit (dB)
2402	35.884	>20



Remarks : Conducted

☐ Not Passed

Frequency (MHz)	Delta Peak to Band Emission (dB)	Limit (dB)
2480	38.333	>20



Date of test : October 16, 2014
 Test requirement : FCC §15.247(d)
 Test method : Radiated
 Operating mode : Transmit mode
 Frequency channel : 2402MHz&2480MHz
 Remarks :

Test Result	
☒	Passed
☐	Not Passed

Channel	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2402MHz	2315	41.4	74.00	-32.6	peak	H
	2315	33.6	54.00	-20.4	Average	H
	2371	43.9	74.00	-30.1	peak	H
	2371	34.5	54.00	-19.5	Average	H
	2315	39.6	74.00	-34.4	peak	V
	2315	30.8	54.00	-23.2	Average	V
	2371	39.4	74.00	-34.6	peak	V
	2371	31.2	54.00	-22.8	Average	V
2480MHz	2490	47.2	74.00	-26.8	peak	H
	2490	38.7	54.00	-15.3	Average	H
	2490	45.0	74.00	-29.0	peak	V
	2490	37.4	54.00	-16.6	Average	V

7.6 Power Spectral Density

Date of test : October 21, 2014

Test requirement : FCC §15.247(e)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2402MHz

Remarks :

Test Result

☒ Passed

☐ Not Passed

Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
2402	-4.070	<8



Note: The relevant measured result has the offset with cable loss already.

Date of test : October 21, 2014

Test requirement : FCC §15.247(e)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed

Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
2440	0.183	<8



Note: The relevant measured result has the offset with cable loss already.

Date of test : October 21, 2014

Test requirement : FCC §15.247(e)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed

Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
2480	0.236	<8



Note: The relevant measured result has the offset with cable loss already.

7.7 Antenna Requirement

Limit

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Connector Construction

The antenna used in this product is PCB antenna. And the maximum Gain of this antenna is 0.0 dBi.

9. Test Equipment List

DESCRIPTION	Type No.	Serial No.	Calibrated date	Calibrated until
EMI Test Receiver	ESU40	SB8501/09	2014.05.16	2015.05.15
Bilog Antenna	Schwarzbeck	SB8501/04	2014.01.20	2015.01.19
Horn Antenna	HF906	SB3435	2014.01.20	2015.01.19
Amplifier(1-18GHz)	--	SB3435/01	2014.01.20	2015.01.19
Amplifier(18-40GHz)	--	SB3435/02	2014.01.20	2015.01.19
Horn Antenna	AT4560	SB5392/02	2014.05.16	2015.05.15
3m Semi-anechoic chamber	9X6X6	SB3450/01	2014.10.12	2015.10.11
Loop Antenna	6512	29604	2014.09.25	2015.09.24
RF cable(0.4m)	/	S02-1404-09-065	2014.05.11	2015.05.10
RF cable(3.5m)	/	S02-1404-09-047	2014.05.11	2015.05.10
RF cable(1.2m)	/	S02-1404-09-052	2014.05.11	2015.05.10
Spectrum Analyzer	N9020A	MY53420615	2014.05.12	2015.05.11
Power Sensor	U2021XA	MY53180015	2014.05.24	2015.05.23
Power Sensor	U2021XA	MY53260040	2014.05.24	2015.05.23
Power Sensor	U2021XA	MY53360002	2014.05.24	2015.05.23
Power Sensor	U2021XA	MY53360006	2014.05.24	2015.05.23
USB Modular Simultaneous Data Acquisition	U2531A	TW53353509	N.C.R	/
USB Modular Simultaneous Data Acquisition	U2531A	TW53353511	N.C.R	/
EMI Test Receiver	ESC130	SB3319	2014.01.20	2015.01.19
LISN	ENV216	SB4357	2014.01.20	2015.01.19
Spectrum Analyzer	E4445A	MY46181814	2013.12.11	2014.12.10
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.18	2015.02.17
Amplifier	150A250	326446	2014.03.19	2015.03.17
Temp. & Humid. Chamber	FACT5-2.0	4166	2013.11.22	2014.11.21

N.C.R: No calibration request

10. System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=3.59dB (9kHz-30MHz) U=5.08dB (30MHz-1GHz) U=4.56dB (1GHz-18GHz) U=4.42dB (18GHz-25GHz)
CE	Disturbance Voltage (dB μ V)	U=2.7dB