



Hong Kong

FCC/IC – Test report

Report Number : **60/790.14.026.01** Date of Issue: November 26, 2014

Model : **QI Watch**

Product Type : **BLE Watch**

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

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

Production Facility : **KENDY ENTERPISE LTD**

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

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

Total pages including Appendices : **37**

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Report Number: **60/790.14.026.01**

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Rev. no.: 2.1

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Hong Kong

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:817957

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:	BLE Watch
Model no.:	QI Watch
Serial number:	NIL
Options and accessories:	NIL
FCC ID:	O4GMW3
IC:	7666A-MW3
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 4 November 2014	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. 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.

2.For Spurious Radiated Emissions test, three set-up directions(X,Y,Z) were pretested, but only direction Y test data was recorded in this report for it is the worst case.

6. General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: O4GMW3 complies with the FCC Part 15, Subpart C Rules.

This submittal(s) (test report) is intended for IC: 7666A-MW3, 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: November 6, 2014

Testing Start Date: November 24, 2014

Testing End Date: November 26, 2014

- TÜV SÜD HONG KONG LTD. -

Reviewed by:


Edmond FUNG



Prepared by:


CHAN Kwong Ngai

Report Number: **60/790.14.026.01**

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7. Emission Test Results

7.1 Spurious Emissions at Antenna Terminals

Date of test : November 26, 2014

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

Test method : Conducted

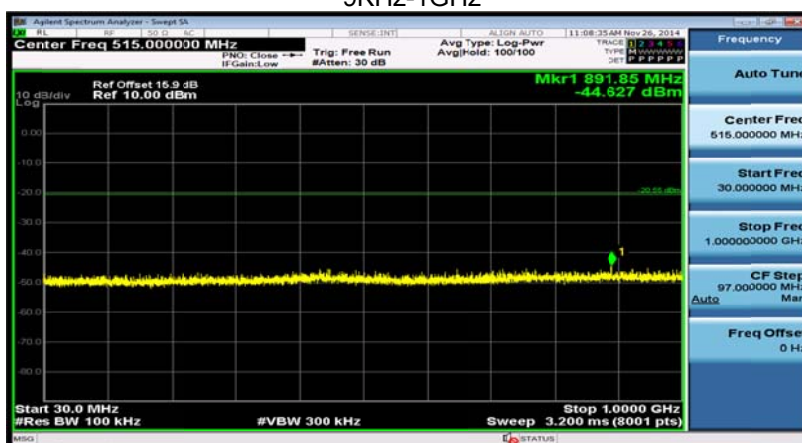
Operating mode : Transmit mode

Frequency channel : 2402MHz

Pref

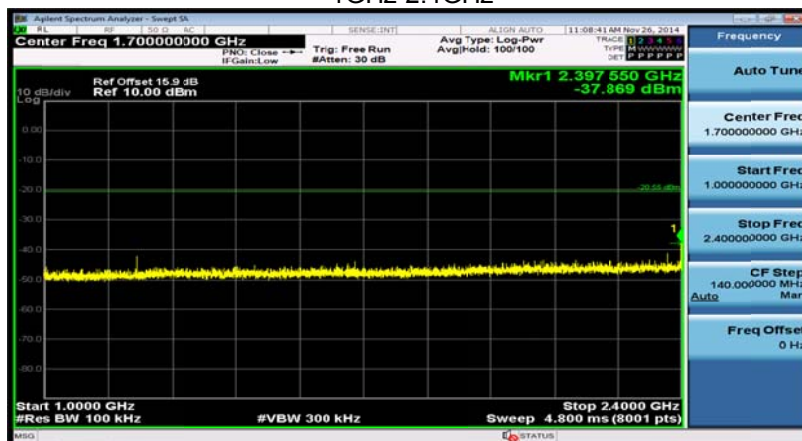


9KHz-1GHz

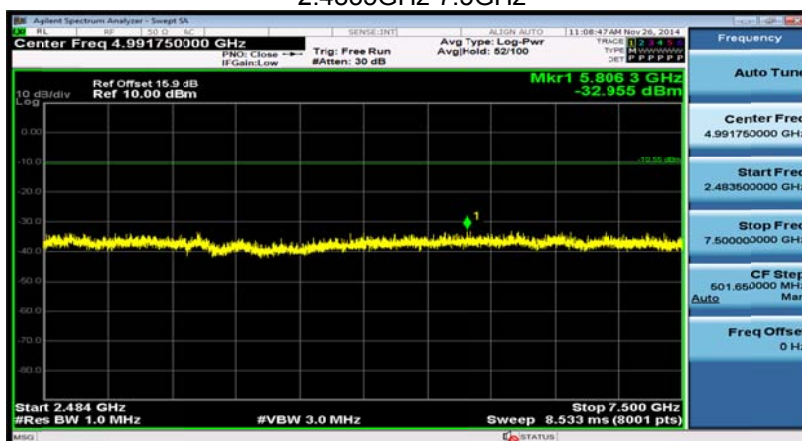


Remark: No emissions can be detected between 9kHz and 30MHz.

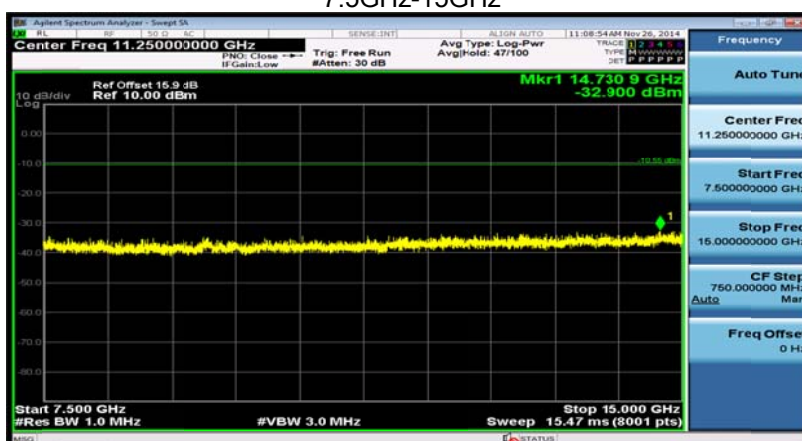
1GHz-2.4GHz



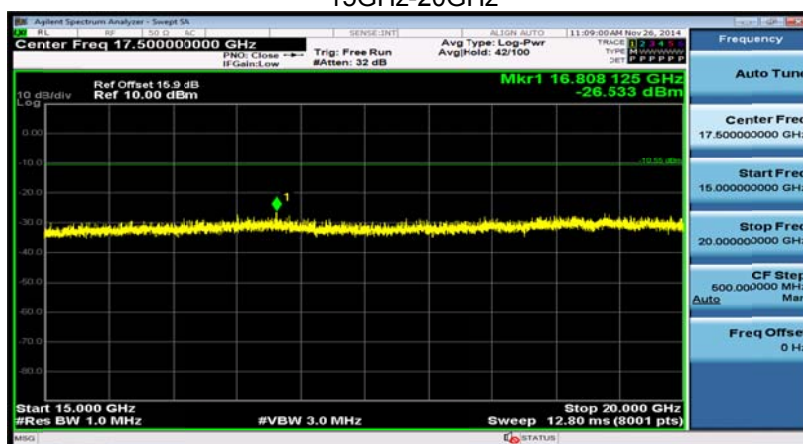
2.4835GHz-7.5GHz



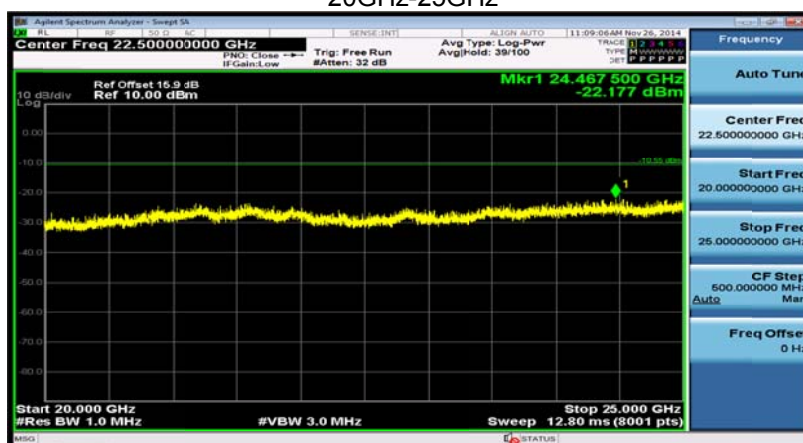
7.5GHz-15GHz



15GHz-20GHz



20GHz-25GHz



Date of test : November 26, 2014

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

Test method : Conducted

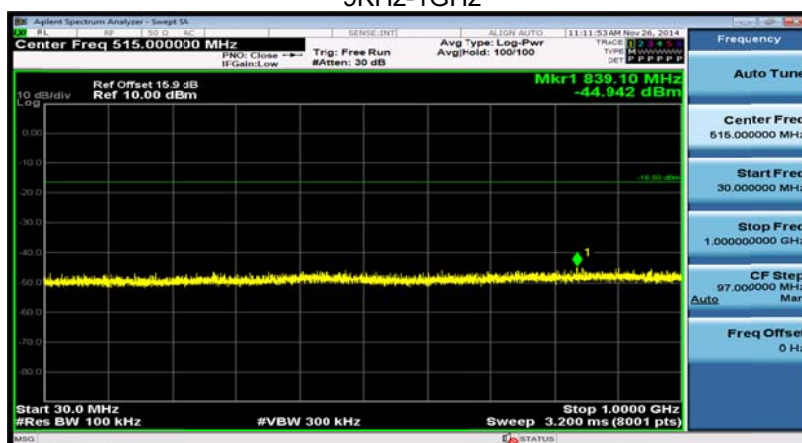
Operating mode : Transmit mode

Frequency channel : 2440MHz

Pref

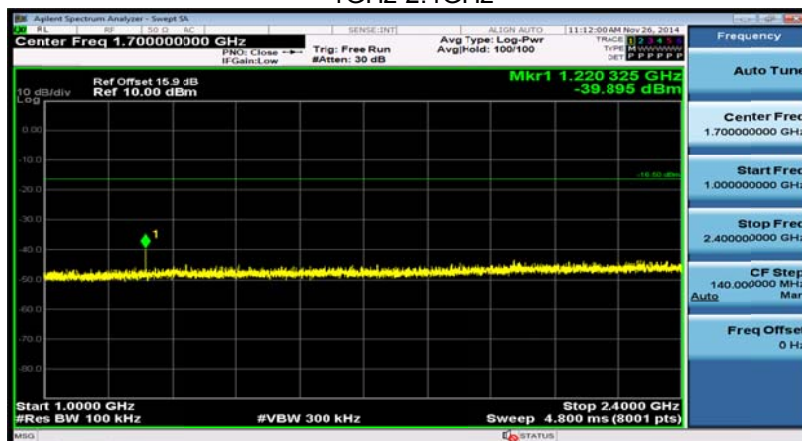


9KHz-1GHz

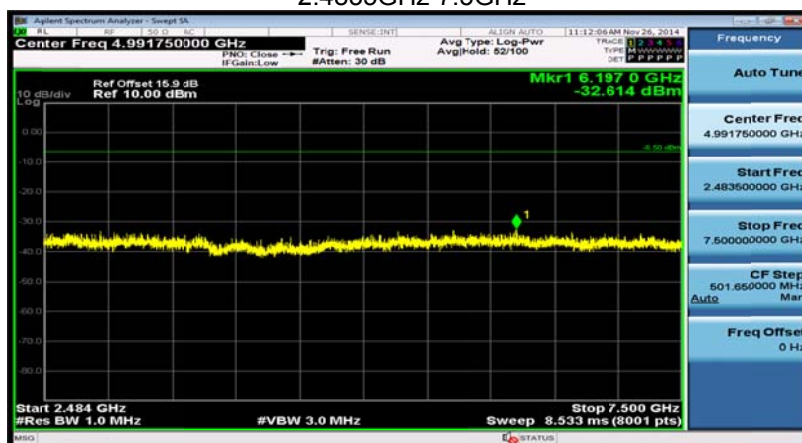


Remark: No emissions can be detected between 9kHz and 30MHz.

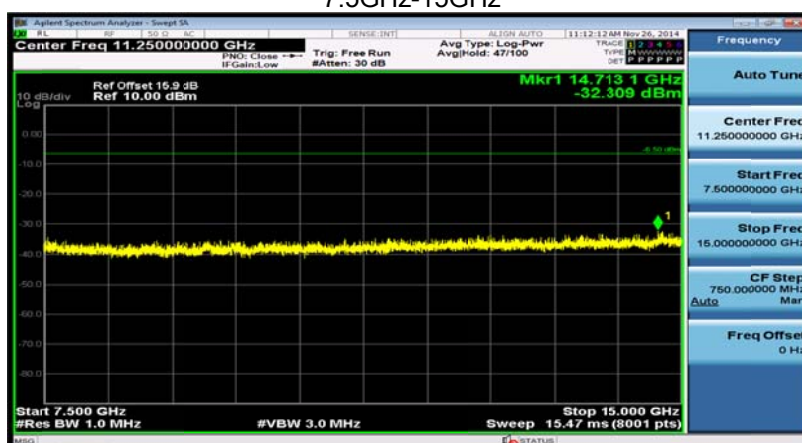
1GHz-2.4GHz



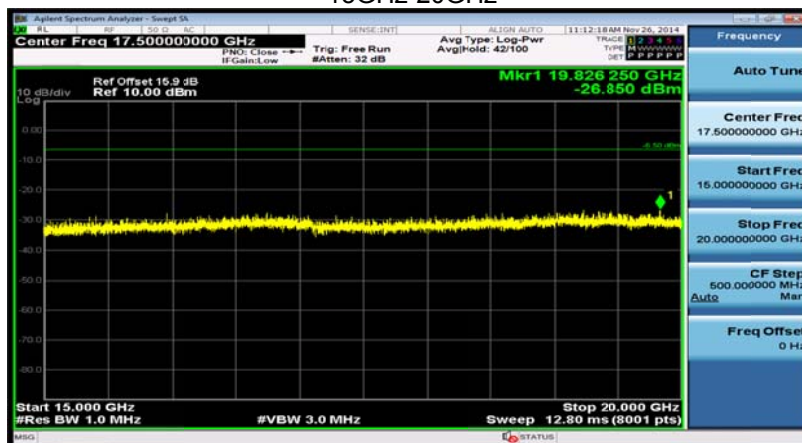
2.4835GHz-7.5GHz



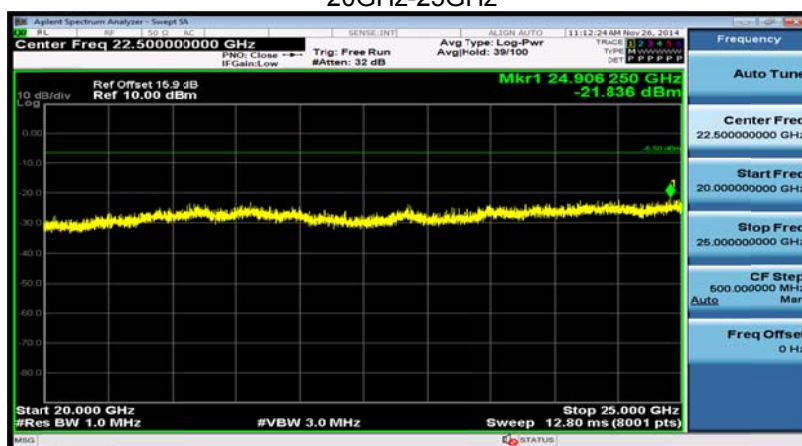
7.5GHz-15GHz



15GHz-20GHz



20GHz-25GHz



Date of test : July 23, 2014

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

Test method : Conducted

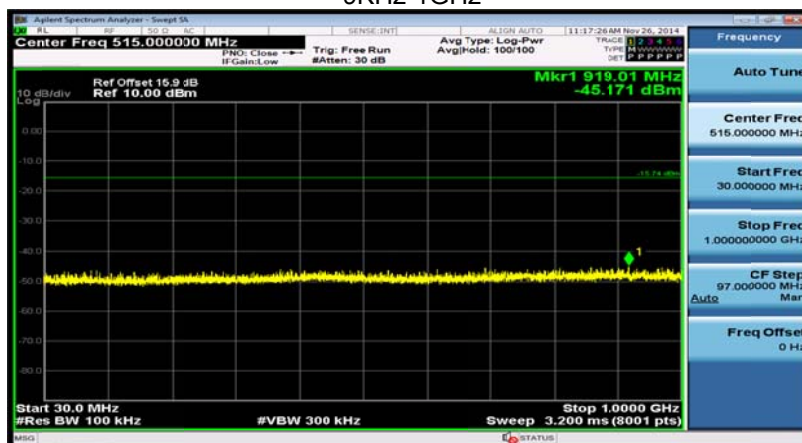
Operating mode : Transmit mode

Frequency channel : 2480MHz

Pref

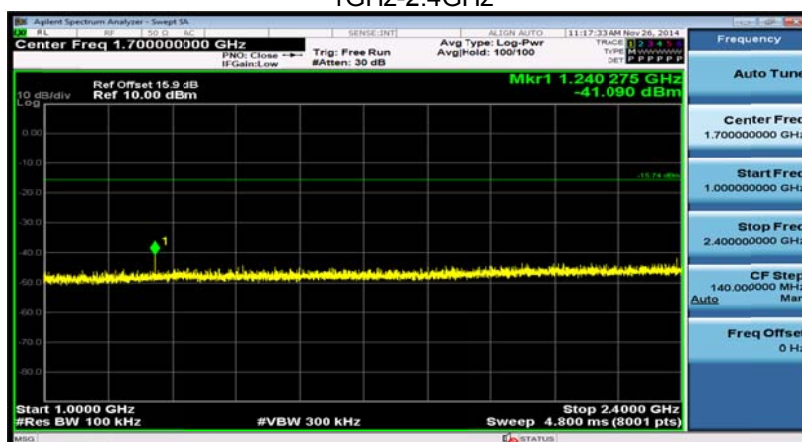


9KHz-1GHz

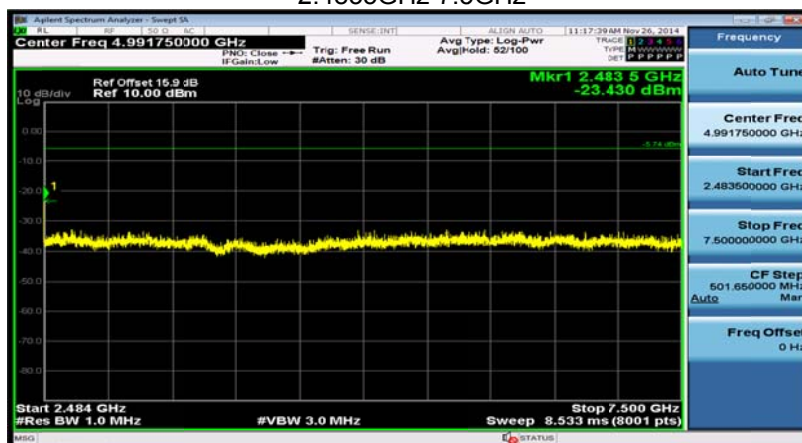


Remark: No emissions can be detected between 9kHz and 30MHz.

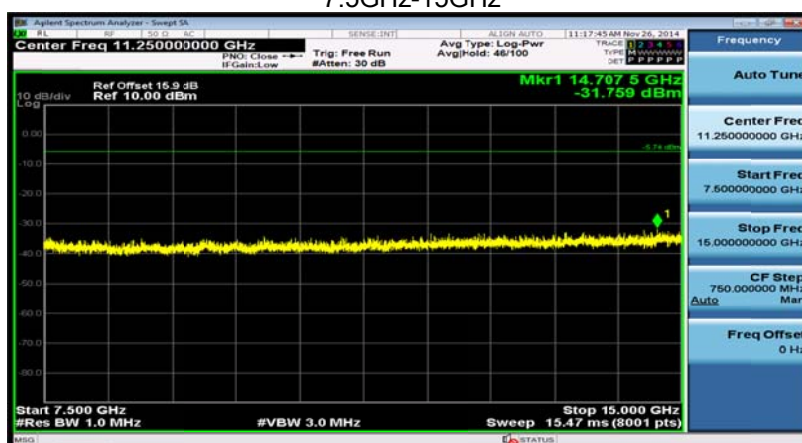
1GHz-2.4GHz



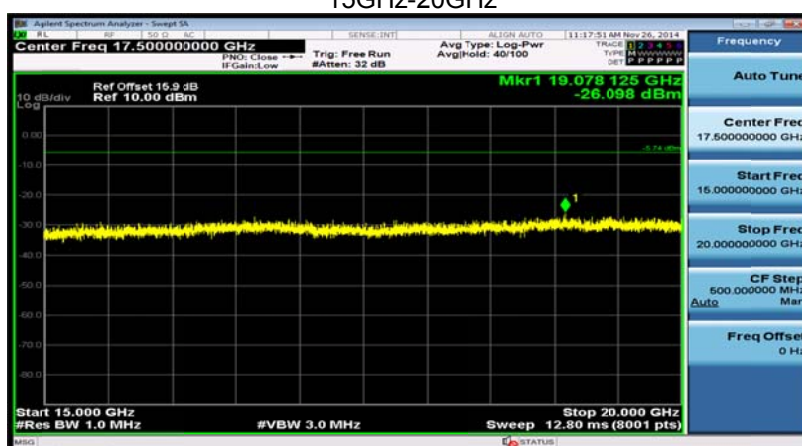
2.4835GHz-7.5GHz



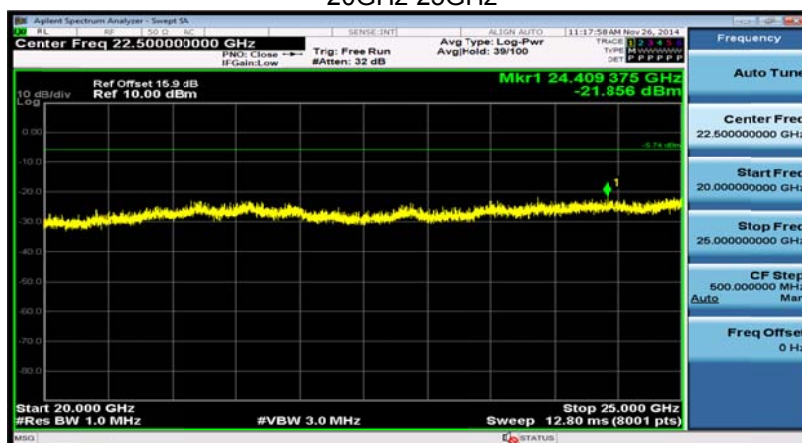
7.5GHz-15GHz



15GHz-20GHz



20GHz-25GHz



7.2 Spurious Radiated Emissions

Date of test : November 24, 2014

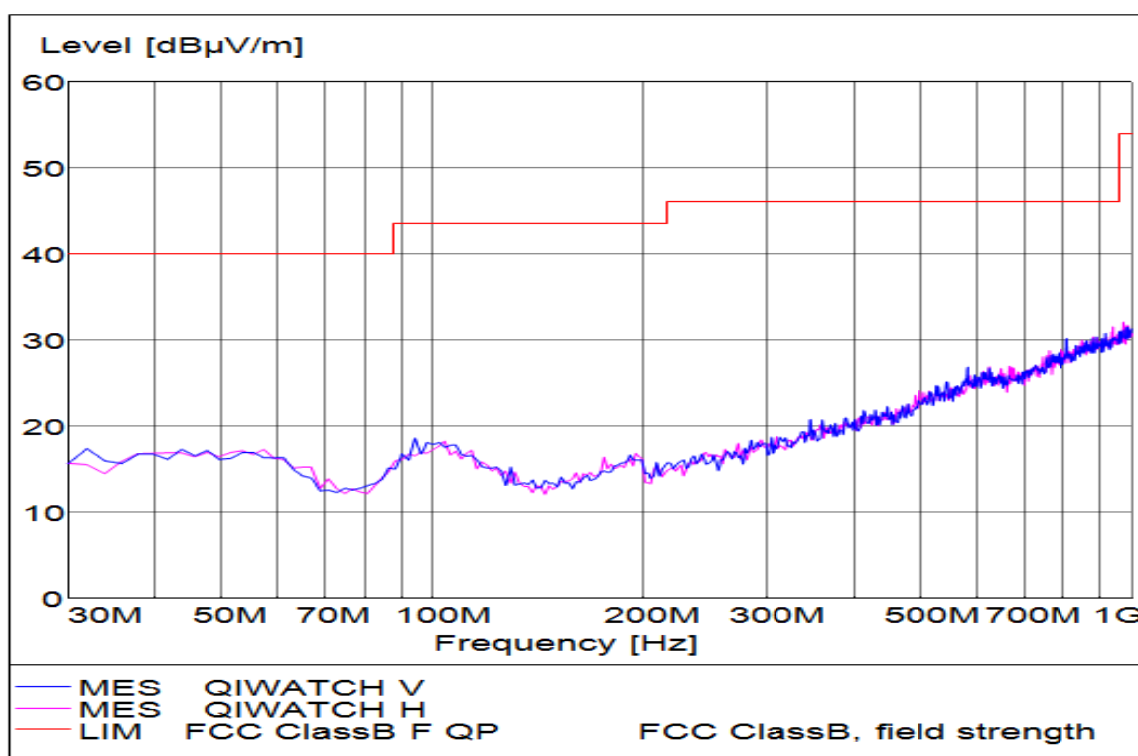
Test requirement : FCC §15.205, §15.209 & §15.247(d)

Test method : Radiated

Operating mode : Transmit mode

Frequency channel : 2480MHz(worst case)

Remarks : 9kHz-1GHz



Remark: 1. All three channels (2042MHz, 2440MHz and 2480MHz) were performed test, and the 2440MHz was the worst case.

2. No emissions can be detected between 9 kHz and 30 MHz.

Date of test : November 24, 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	50.40	-5.4	45.00	74.0	-29.00	peak	H
4804.000	46.68	-5.4	41.28	54.0	-12.72	Average	H
7206.000	59.35	-2.7	56.65	74.0	-17.35	peak	H
7206.000	53.14	-2.7	50.44	54.0	-3.56	Average	H
4804.000	49.50	-5.4	44.10	74.00	-29.90	peak	V
4804.000	47.75	-5.4	42.35	54.00	-11.65	Average	V
7206.000	58.36	-2.7	55.66	74.00	-17.35	peak	V
7206.000	53.08	-2.7	50.38	54.00	-3.62	Average	V

Date of test : November 24, 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	52.90	-5.4	47.50	74.00	-26.50	peak	H
4880.000	49.21	-5.4	43.81	54.00	-10.19	Average	H
7320.000	56.62	-2.5	54.12	74.00	-17.35	peak	H
7320.000	51.86	-2.5	49.36	54.00	-4.64	Average	H
4880.000	51.10	-5.4	45.70	74.00	-28.3	peak	V
4880.000	46.68	-5.4	41.28	54.00	-12.72	Average	V
7320.000	57.84	-2.5	55.34	74.00	-17.35	peak	V
7320.000	52.79	-2.5	50.29	54.00	-3.71	Average	V

Date of test : November 24, 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	55.45	-5.4	50.05	74.00	-23.95	peak	H
4960.000	52.65	-5.4	47.25	54.00	-6.75	Average	H
7440.000	54.53	-2.1	52.43	74.00	-17.35	peak	H
7440.000	51.23	-2.1	49.13	54.00	-4.87	Average	H
4960.000	50.20	-5.4	44.80	74.00	-29.2	peak	V
4960.000	46.60	-5.4	41.20	54.00	-12.8	Average	V
7440.000	55.55	-2.1	53.45	74.00	-17.35	peak	V
7440.000	51.06	-2.1	48.96	54.00	-5.04	Average	V

7.3 6dB & 99% Bandwidth

Date of test : November 26, 2014

Test requirement : FCC §15.247(a)(2)

Test method : Conducted

Operating mode : Transmit mode

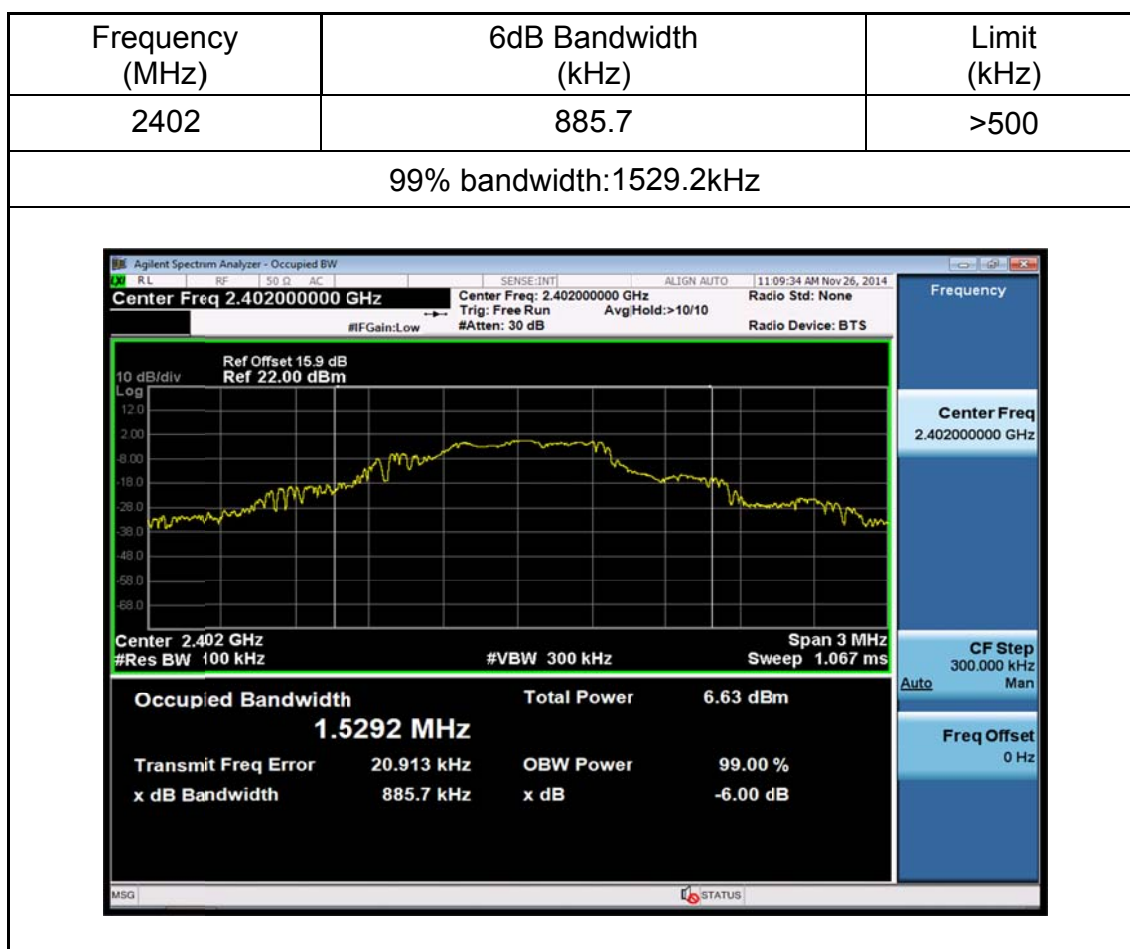
Frequency channel : 2402MHz

Remarks : NIL

Test Result

☒ Passed

☐ Not Passed



Date of test : November 26, 2014

Test requirement : FCC §15.247(a)(2)

Test method : Conducted

Operating mode : Transmit mode

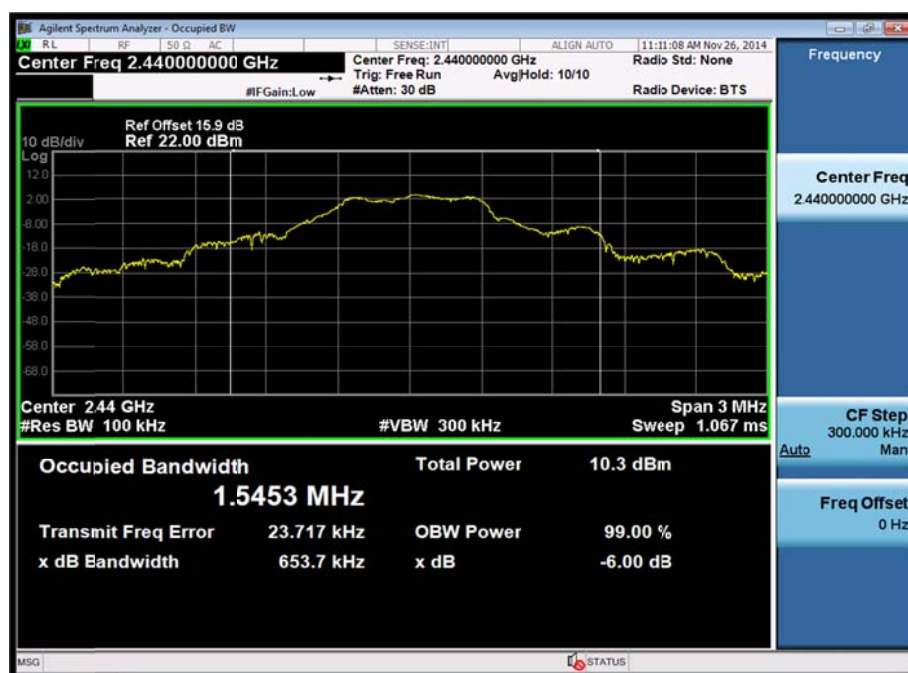
Frequency channel : 2440MHz

Remarks : NIL

Test Result	
☒	Passed
☐	Not Passed

Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)
2440	653.7	>500

99% bandwidth: 1545.3kHz



Date of test : November 26, 2014

Test requirement : FCC §15.247(a)(2)

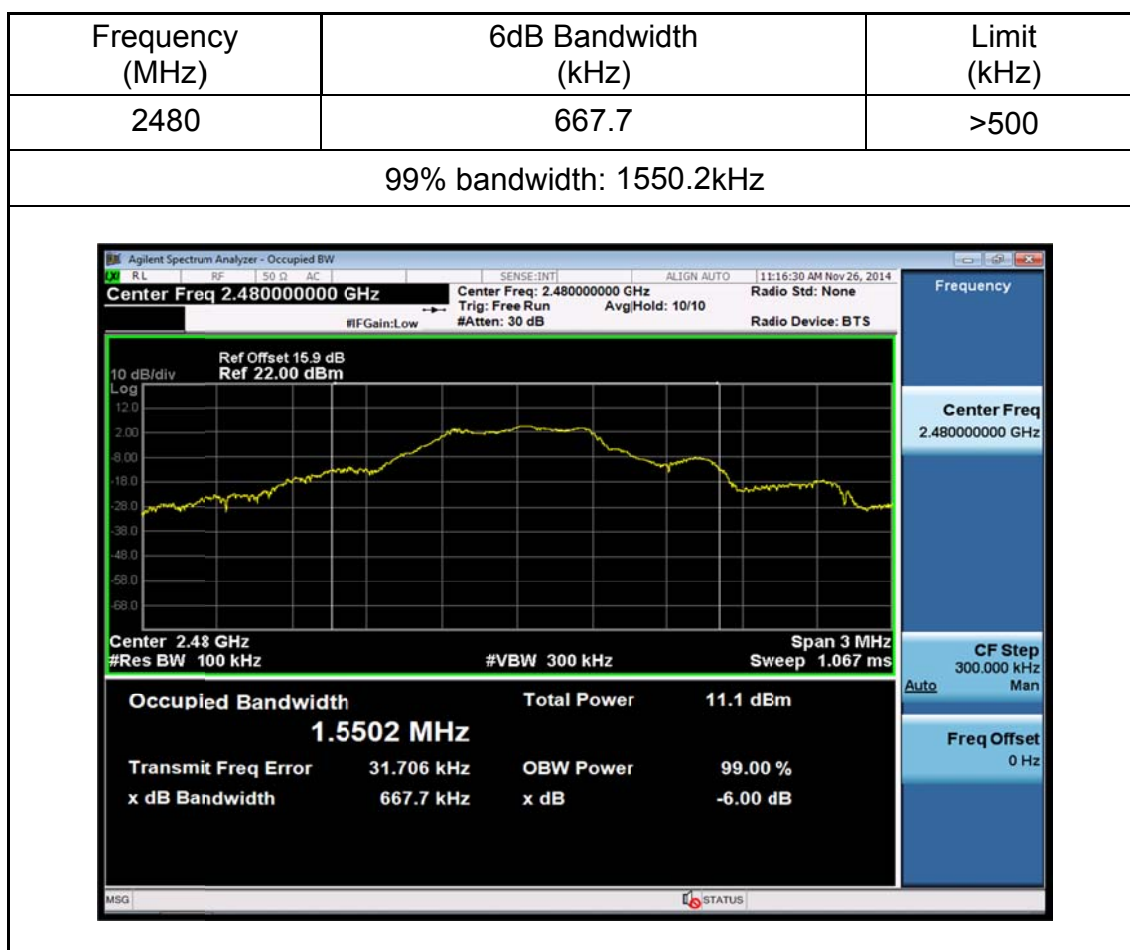
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks : NIL

Test Result	
☒	Passed
☐	Not Passed



7.4 Peak Output Power Measurements

Date of test : November 26, 2014

Test requirement : FCC §15.247(b)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2402MHz

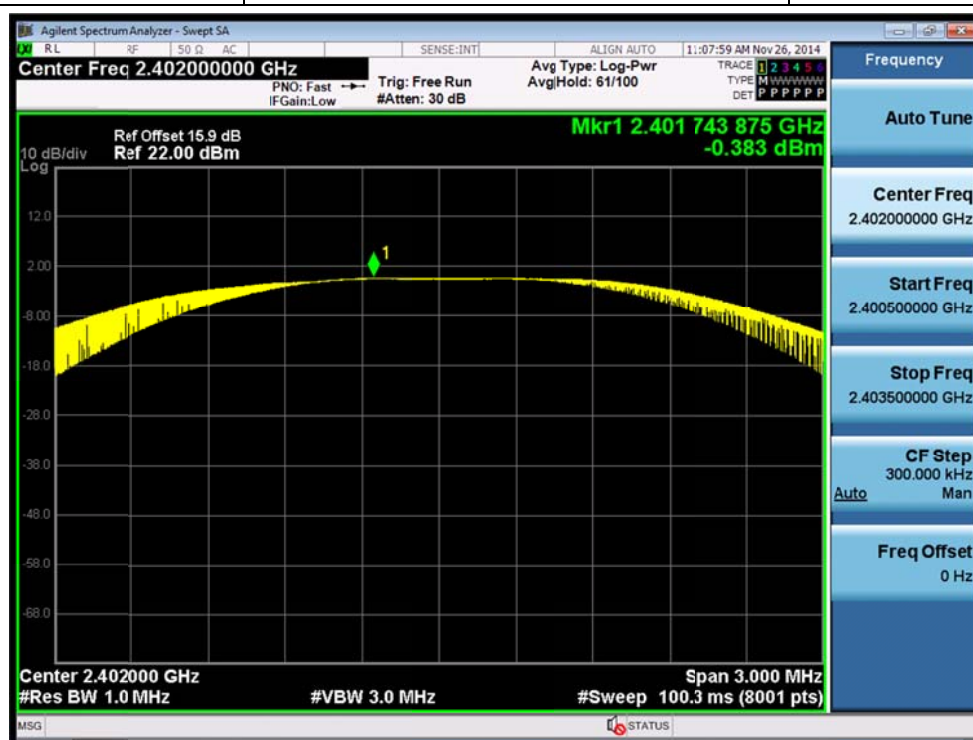
Remarks :

Test Result

☒ Passed

☐ Not Passed

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2402	-0.383	30



Date of test : November 26, 2014

Test requirement : FCC §15.247(b)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

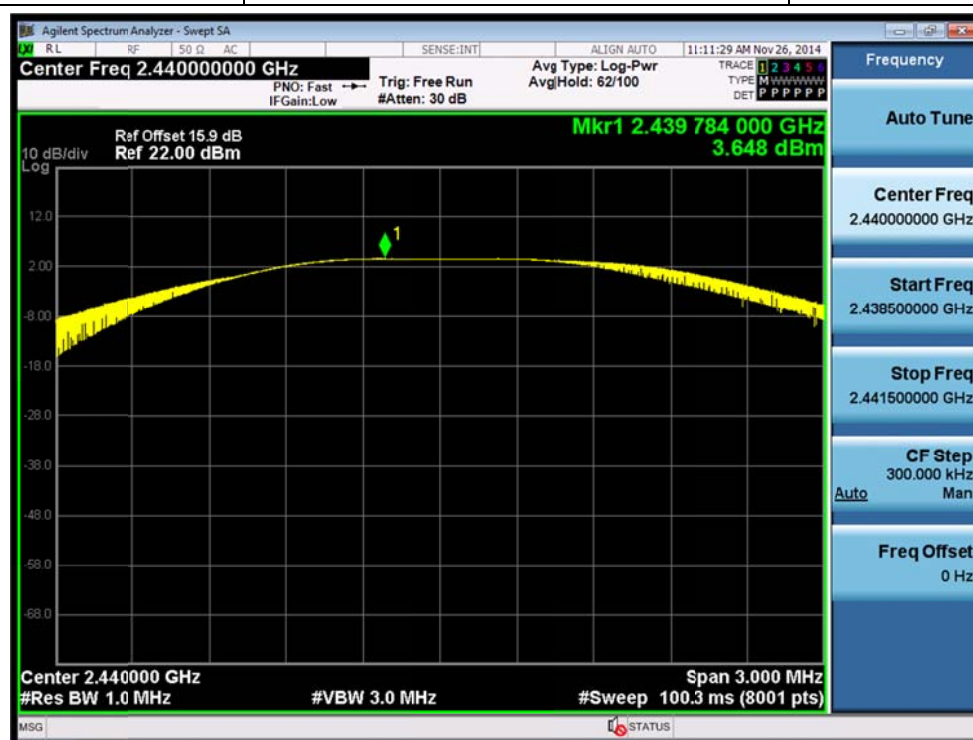
Remarks :

Test Result

☒ Passed

☐ Not Passed

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2440	3.648	30



Date of test : November 26, 2014

Test requirement : FCC §15.247(b)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

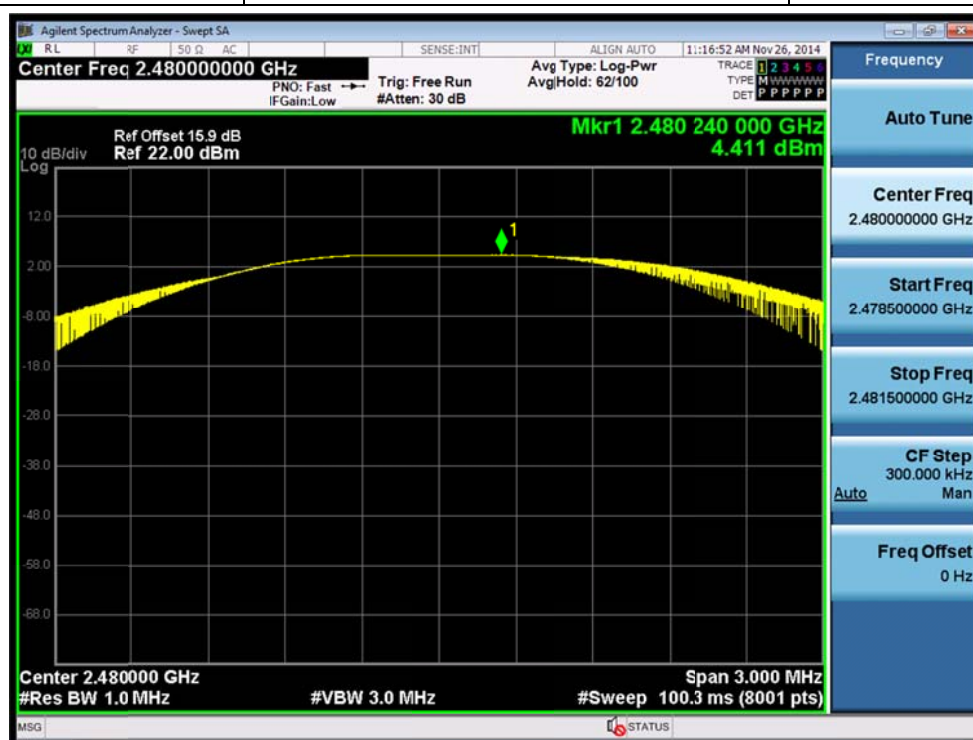
Remarks :

Test Result

☒ Passed

☐ Not Passed

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2480	4.411	30



7.5 100 kHz Bandwidth of Band Edges

Date of test : November 26, 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	37.876	>20



Date of test : November 26, 2014

Test requirement : FCC §15.247(d)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

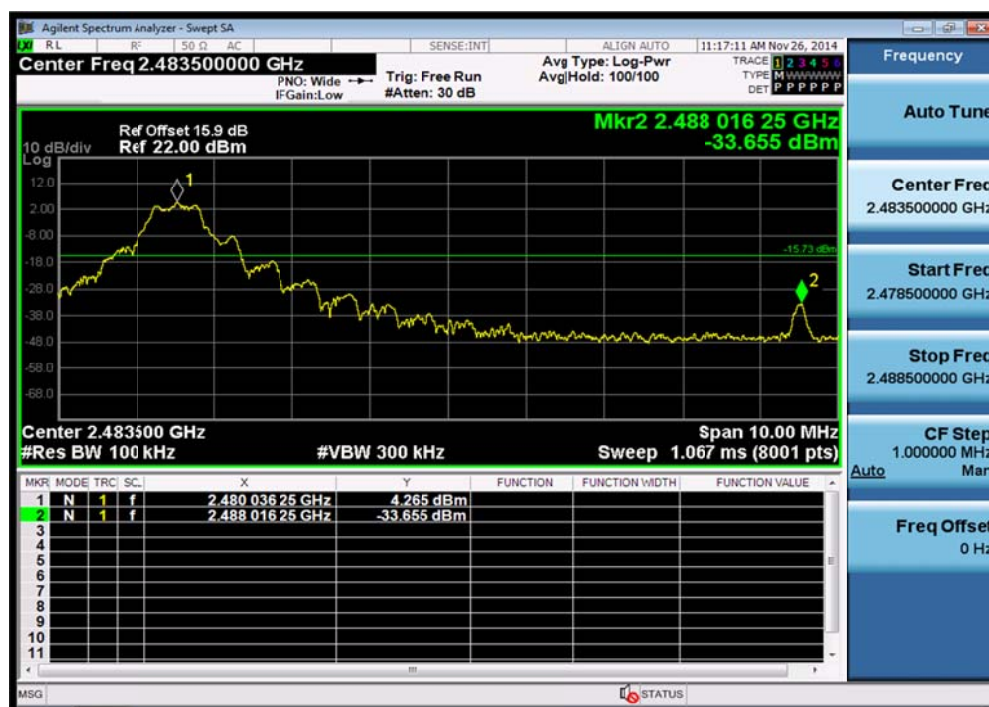
Remarks : Conducted

Test Result

☒ Passed

☐ Not Passed

Frequency (MHz)	Delta Peak to Band Emission (dB)	Limit (dB)
2480	37.920	>20



Date of test : July 29, 2014

Test requirement : FCC §15.247(d)

Test method : Radiated

Operating mode : Transmit mode

Frequency channel : 2402MHz&2480MHz

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed

Channel	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2402MHz	2489.7	26.91	74.00	-47.09	peak	H
	2489.7	35.03	74.00	-38.97	peak	V
2480MHz	2483.5	46.80	74.00	-27.20	peak	H
	2483.5	46.50	74.00	-27.50	peak	V

7.6 Power Spectral Density

Date of test : July 22, 2014

Test requirement : FCC §15.247(e)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2402MHz

Remarks :

Test Result

☒ Passed

☐ Not Passed



Date of test : July 22, 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	-10.817	<8



Date of test : July 22, 2014

Test requirement : FCC §15.247(e)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed



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 copper antenna. And the maximum Gain of this antenna is 0.0 dBi.

8. Test Equipment List

DESCRIPTION	Type No.	Serial No.	Calibrated date	Calibrated until
Antenna	VULB9163	9163 330	2014.02.25	2015.02.24
Antenna	3117	00066577	2014.04.02	2015.04.01
Antenna	3160-09	00118388	2014.09.06	2015.09.05
Loop Antenna	6512	29604	2014.09.25	2015.09.24
Spectrum Analyzer	N9020A	MY53420615	2014.05.12	2015.05.11
Spectrum Analyzer	FSP 40	100378	2013.12.23	2014.12.22
EMI Test Receiver	ESCI	100701	2014.08.04	2015.08.03
Spectrum Analyzer	FSV40	100903	2014.01.27	2015.01.26
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	2014.11.22	2015.11.21
EMI Test Receiver	ESI26	SB3436	2014.01.20	2015.01.19
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

9. 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