

FCC/IC – Test report

Report Number : **60/790.14.016.01** Date of Issue: 10 July 2014

Model : **HRMDUAL**

Product Type : **Heart rate transmitter**

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 : **28**

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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 Zhongjian Nanfang Testing Co.,Ltd
1st Floor, Block No.2, Laodong Industrial Zone,
Xixiang Road Baoan District, Shenzhen, China
Test Firm FCC Registration number:817957
Test Firm IC Registration number: 10106A

3. Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Heart rate transmitter
Model no.:	HRMDUAL
Serial number:	NIL
Options and accessories:	NIL
FCC ID:	O4GHRMBA
IC:	7666A-HRMBA
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 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. 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.Battery operate 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: O4GHRMBA complies with the FCC Part 15, Subpart C Rules.

This submittal(s) (test report) is intended for IC: 7666A- HRMBA, 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: 12 June 2014

Testing Start Date: 17 June 2014

Testing End Date: 22 June 2014

- TÜV SÜD HONG KONG LTD. -

Reviewed by:


Edmond FUNG



Prepared by:


CHAN Kwong Ngai

7. Emission Test Results

7.1 Spurious Emissions at Antenna Terminals

Date of test : 18 June 2014

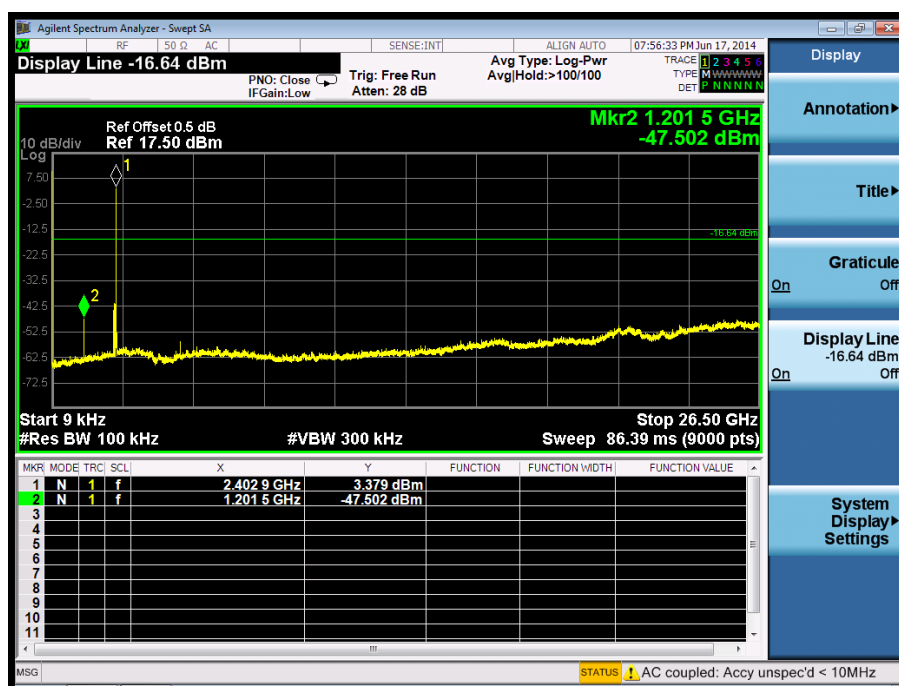
Test requirement : FCC §2.1051 & §15.247(d)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2402MHz

Remarks : 9KHz-25GHz



Date of test : 18 June 2014

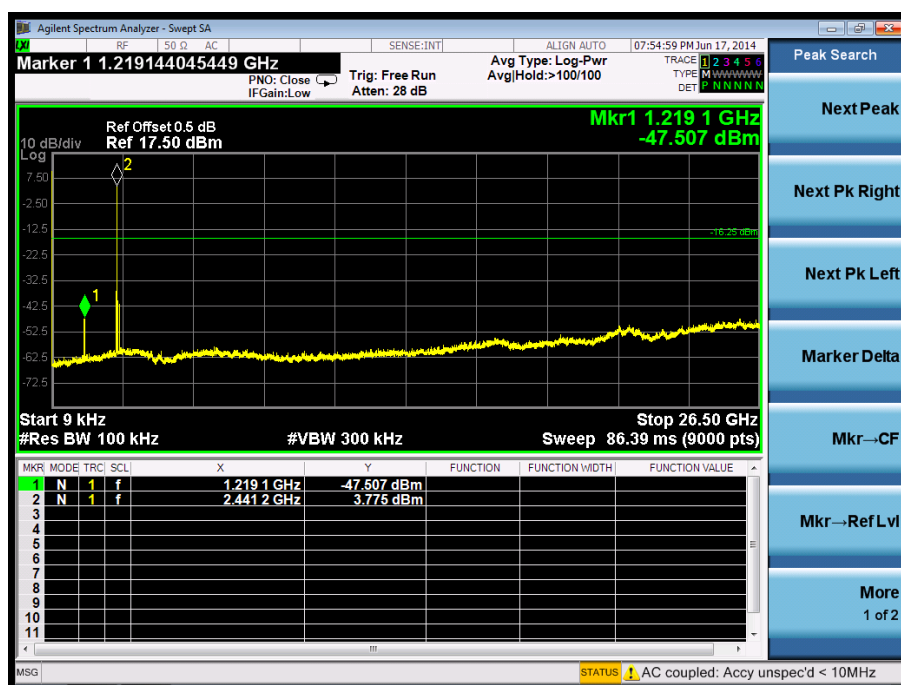
Test requirement : FCC §2.1051 & §15.247(d)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks : 9KHz-25GHz



Date of test : 18 June 2014

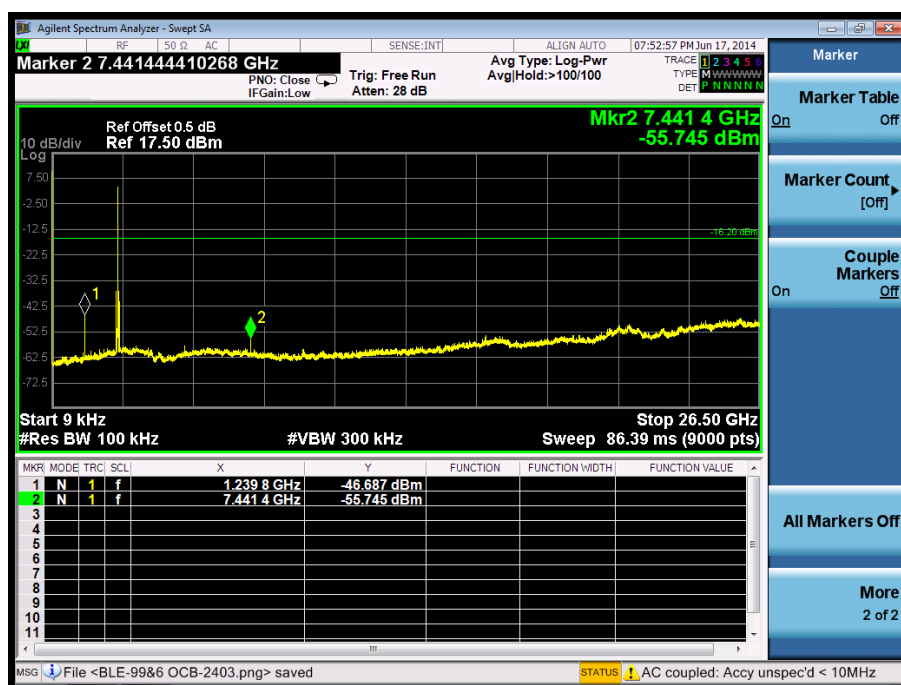
Test requirement : FCC §2.1051 & §15.247(d)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks : 9KHz-25GHz



7.2 Spurious Radiated Emissions

Date of test : 18 June 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

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
33.328	29.57	-17.19	12.38	40.00	-27.62	QP	H
39.162	29.17	-16.06	13.11	40.00	-26.89	QP	H
51.662	28.88	-16.01	12.87	40.00	-27.13	QP	H
104.536	29.96	-15.77	14.19	43.50	-29.31	QP	H
107.888	29.70	-16.00	13.70	43.50	-29.80	QP	H
313.276	32.44	-13.42	19.02	46.00	-26.98	QP	H
33.680	32.53	-17.18	15.35	40.00	-24.65	QP	V
58.613	31.17	-16.31	14.86	40.00	-25.14	QP	V
90.855	29.77	-16.59	13.18	43.50	-30.32	QP	V
105.272	31.35	-15.80	15.55	43.50	-27.95	QP	V
111.738	32.38	-16.44	15.94	43.50	-27.56	QP	V
277.094	30.75	-14.20	16.55	46.00	-29.45	QP	V

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

Date of test : 18 June 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
4433.263	48.57	-1.71	46.86	74.00	-27.14	peak	H
4433.263	40.12	-1.71	38.41	54.00	-15.59	Average	H
8637.084	47.64	8.98	56.62	74.00	-17.38	peak	H
8637.084	39.56	8.98	48.54	54.00	-5.46	Average	H
3943.392	48.86	-3.59	45.27	74.00	-28.73	peak	V
3943.392	40.35	-3.59	36.76	54.00	-17.24	Average	V
7891.717	47.35	7.22	54.57	74.00	-19.43	peak	V
7891.717	39.74	7.22	46.96	54.00	-7.04	Average	V

Bandedge

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2400	67.25	1.9	69.15	74.00	-4.85	peak	H
2400	46.08	1.9	47.98	54.00	-6.02	Average	H
2400	65.62	1.9	67.52	74.00	-6.48	peak	V
2400	46.46	1.9	48.36	54.00	-5.64	Average	V

Date of test : 18 June 2014
 Test requirement : FCC §15.205, §15.209 & §15.247(d)
 Test method : Radiated
 Operating mode : Transmit mode
 Frequency channel : 2441MHz
 Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4472.552	48.57	0.79	49.36	74.00	-24.64	peak	H
4472.552	35.96	0.79	36.75	54.00	-17.25	Average	H
7681.386	45.38	6.85	52.23	74.00	-21.77	peak	H
7681.386	40.73	6.85	47.58	54.00	-6.42	Average	H
3943.317	55.77	-3.59	52.18	74.00	-21.82	peak	V
3943.317	42.85	-3.59	39.26	54.00	-14.74	Average	V
8845.953	47.36	8.48	55.84	74.00	-18.16	peak	V
8845.953	37.77	8.48	46.25	54.00	-7.75	Average	V

Date of test : 18 June 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
5060.693	48.12	1.12	49.24	74.00	-24.76	peak	H
5060.693	40.29	1.12	41.41	54.00	-12.59	Average	H
9111.353	47.64	9.68	57.32	74.00	-16.68	peak	H
9111.353	38.60	9.68	48.28	54.00	-5.72	Average	H
4267.178	47.16	-2.42	44.74	74.00	-29.26	peak	V
4267.178	39.17	-2.42	36.75	54.00	-17.25	Average	V
8441.459	47.05	8.21	55.26	74.00	-18.74	peak	V
8441.459	38.41	8.21	46.62	54.00	-7.38	Average	V

Bandedge

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.5	61.29	-4.04	57.25	74.00	-16.75	peak	H
2483.5	45.22	-4.04	41.18	54.00	-12.82	Average	H
2483.5	59.89	-4.04	55.85	74.00	-18.15	peak	V
2483.5	45.37	-4.04	41.33	54.00	-12.67	Average	V

7.3 6dB & 99% Bandwidth

Date of test : 19 June 2014

Test requirement : FCC §15.247(a)(2)

Test method : Conducted

Operating mode : Transmit mode

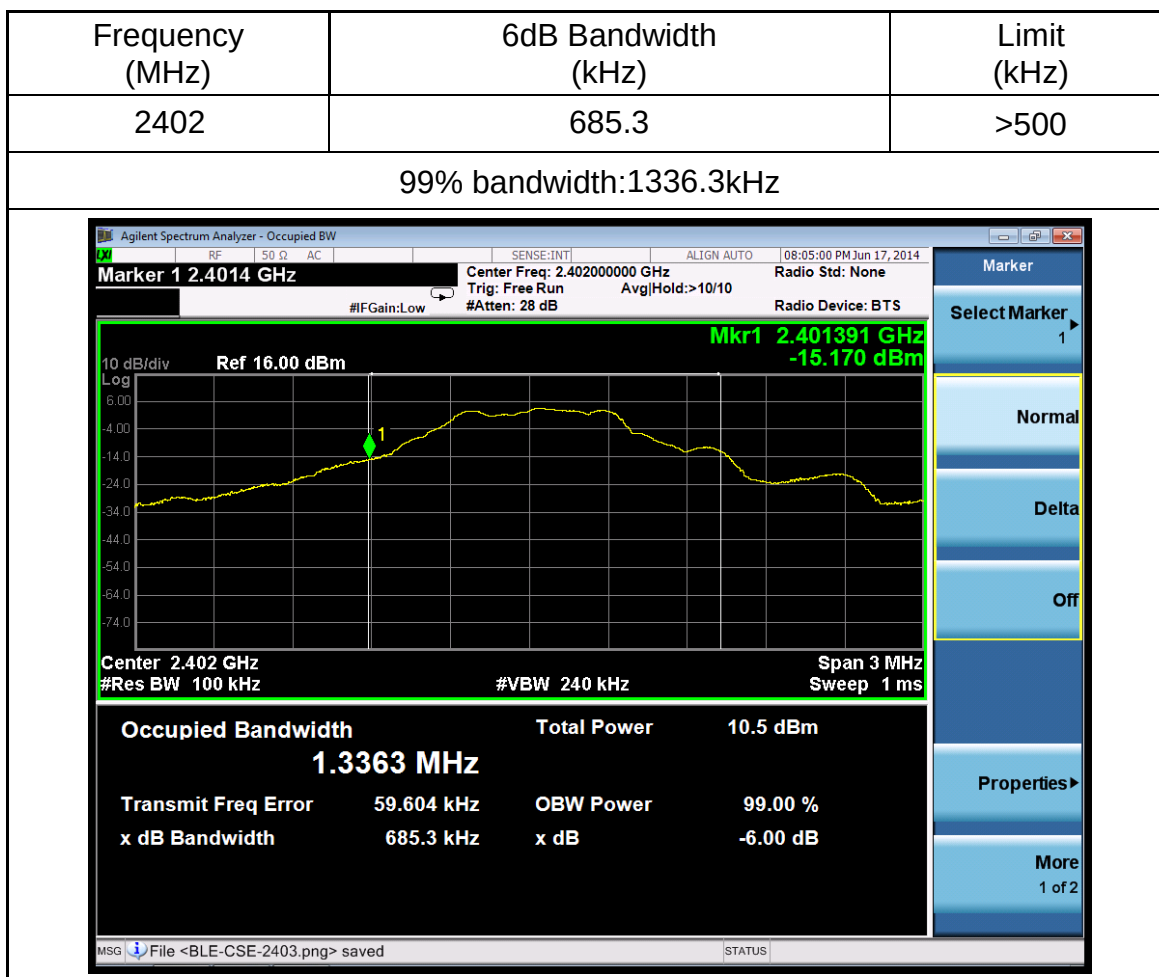
Frequency channel : 2402MHz

Remarks : NIL

Test Result

☒ Passed

☐ Not Passed



Date of test : 19 June 2014

Test requirement : FCC §15.247(a)(2)

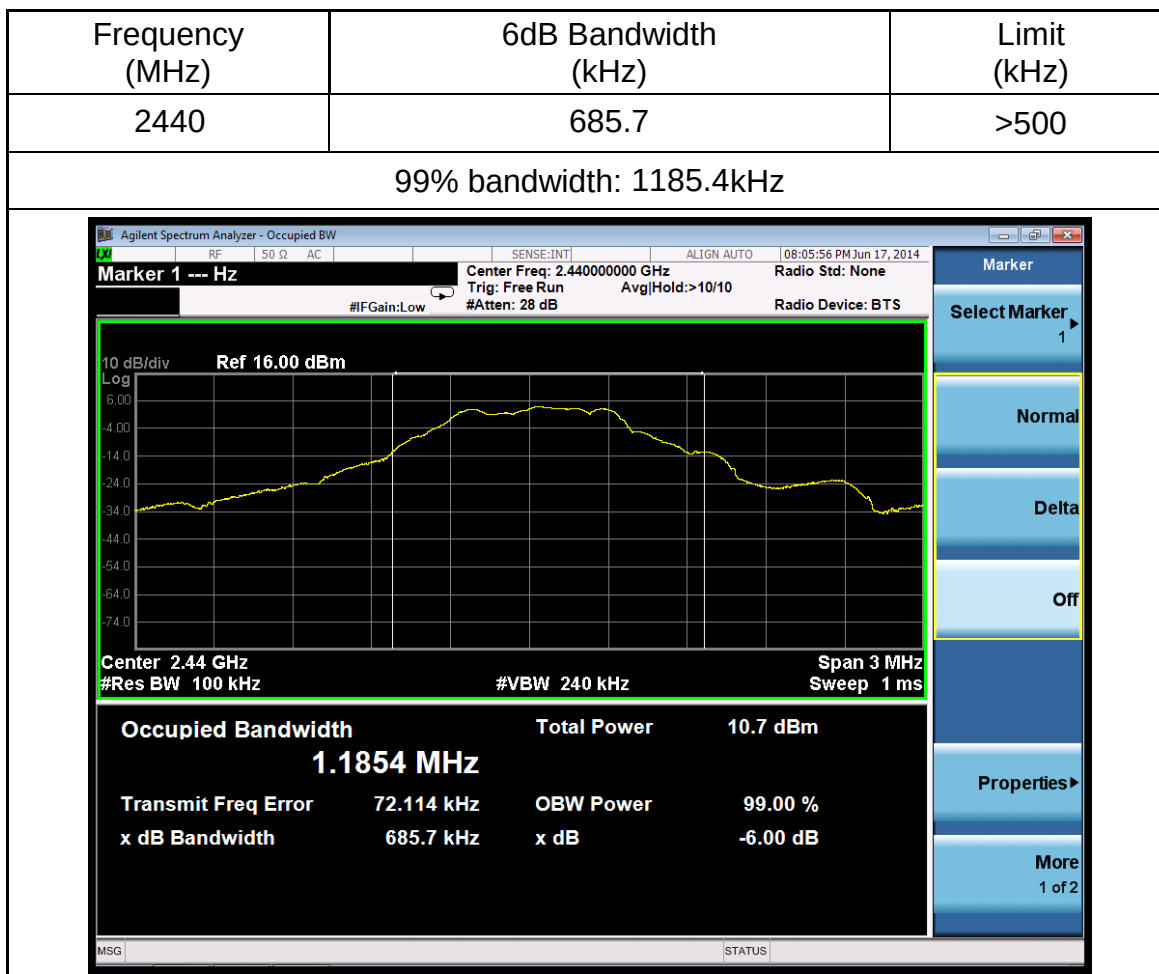
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks : NIL

Test Result	
☒	Passed
☐	Not Passed



Date of test : 19 June 2014

Test requirement : FCC §15.247(a)(2)

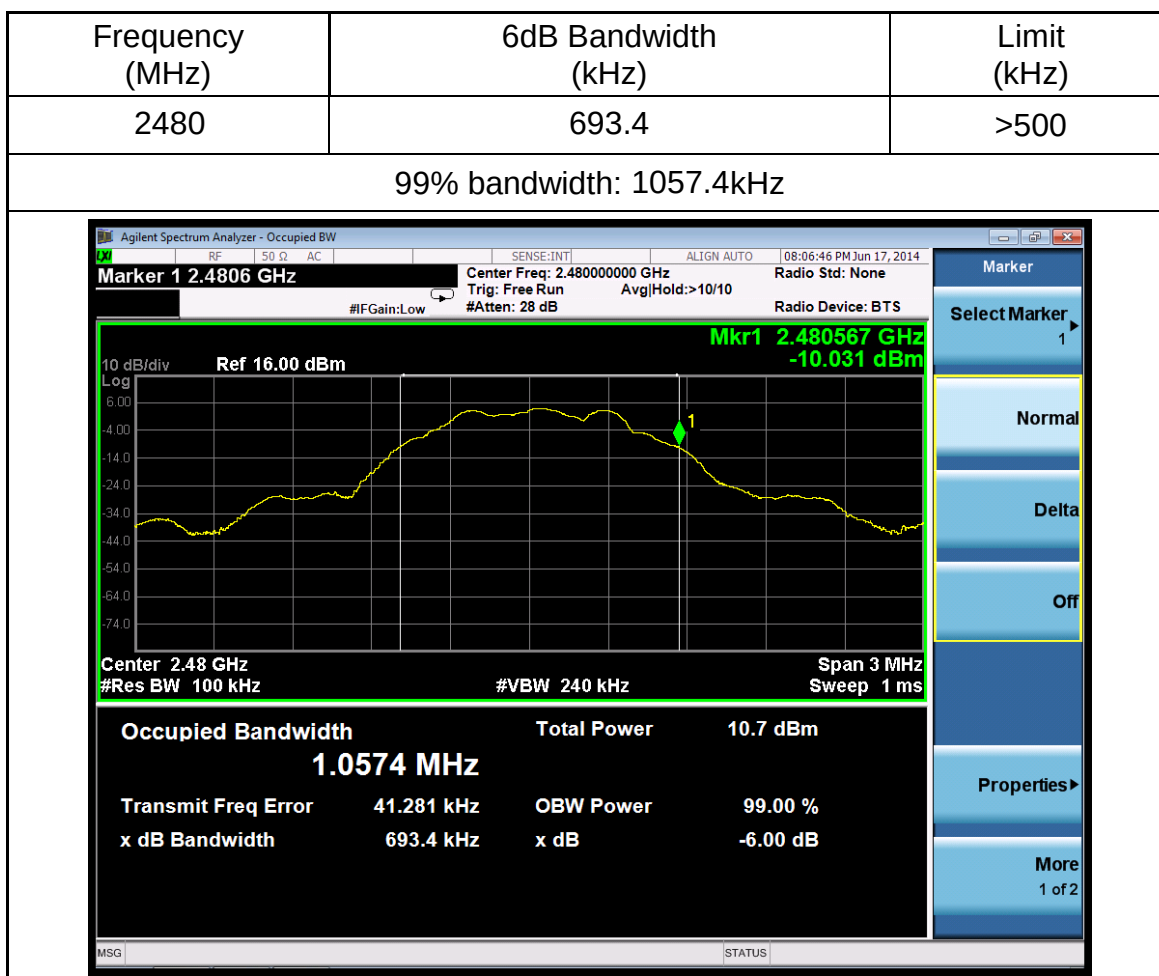
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks : NIL

Test Result	
☒	Passed
☐	Not Passed



7.4 Peak Output Power Measurements

Date of test : 19 June 2014

Test requirement : FCC §15.247(b)

Test method : Conducted

Operating mode : Transmit mode

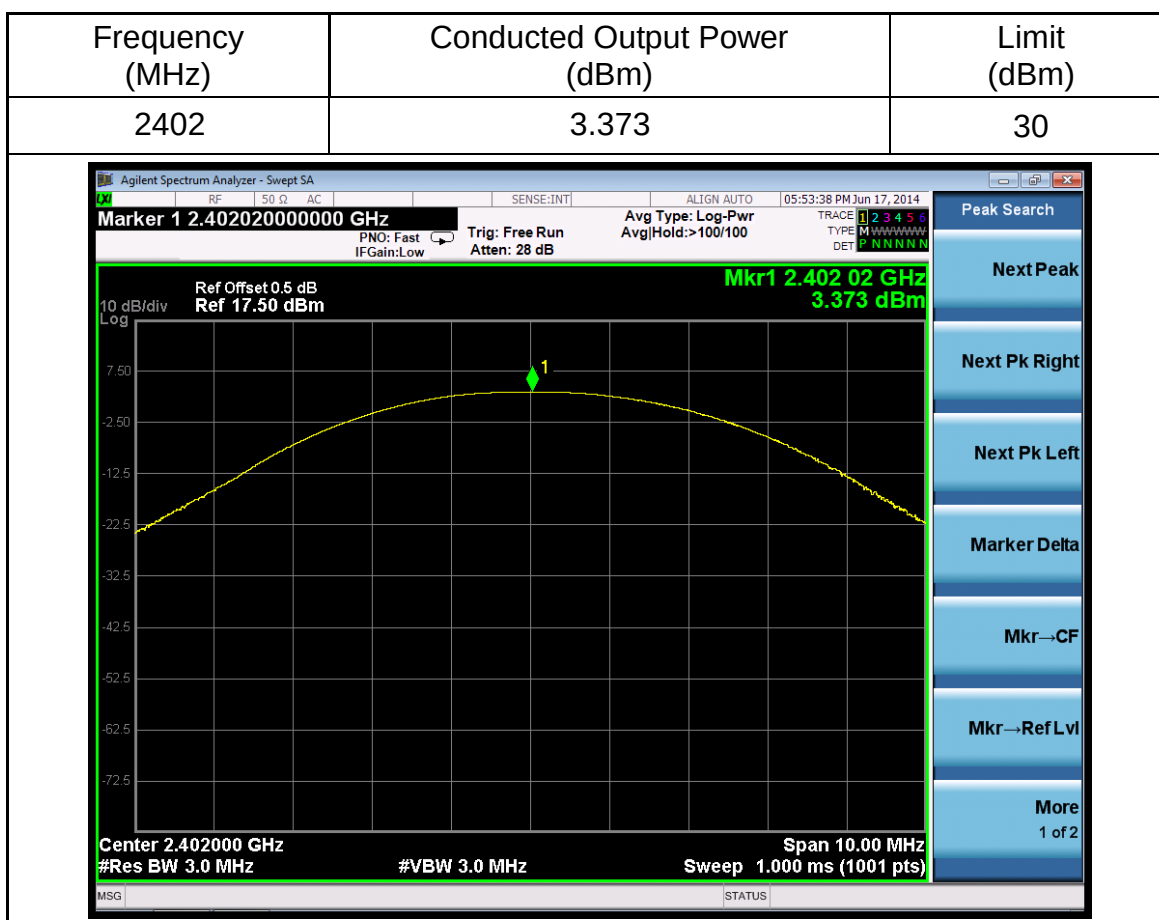
Frequency channel : 2402MHz

Remarks :

Test Result

☒ Passed

☐ Not Passed



Date of test : 19 June 2014

Test requirement : FCC §15.247(b)

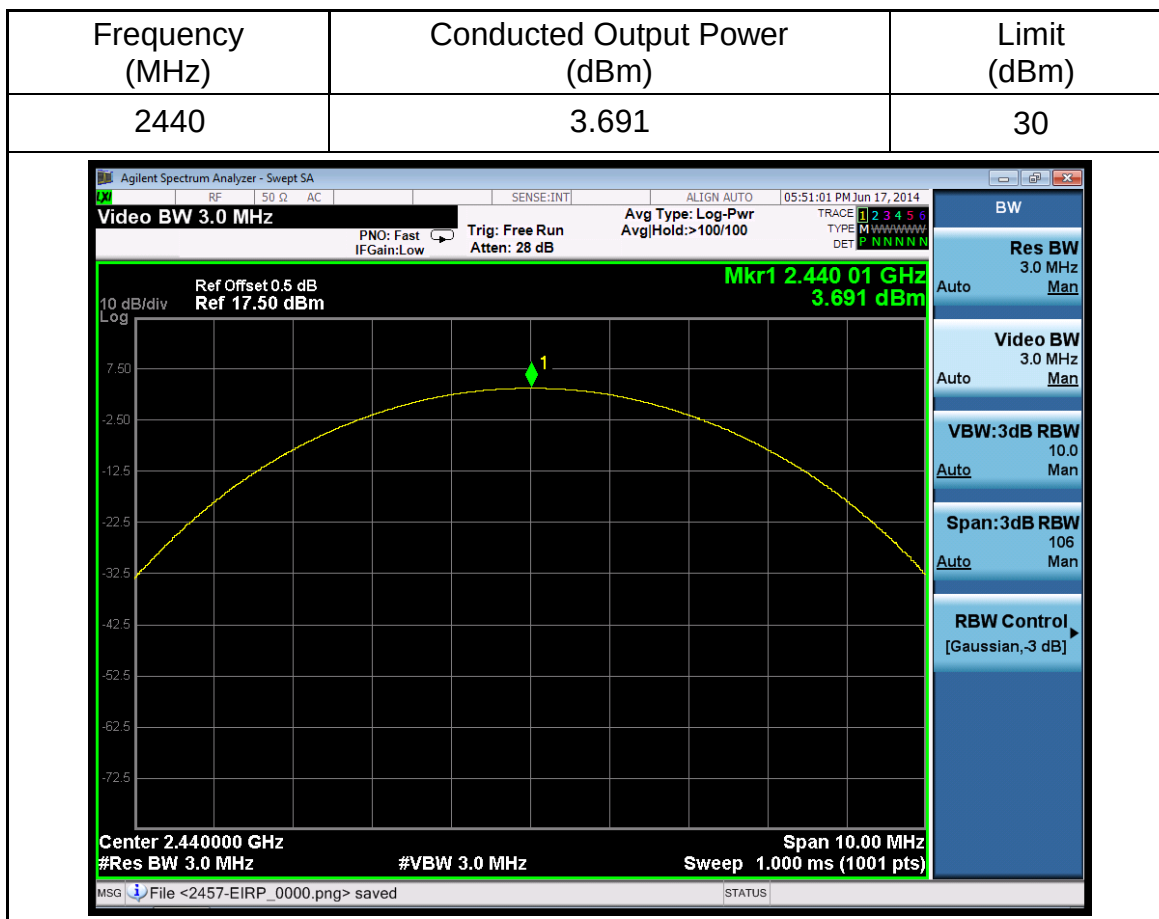
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed



Date of test : 19 June 2014

Test requirement : FCC §15.247(b)

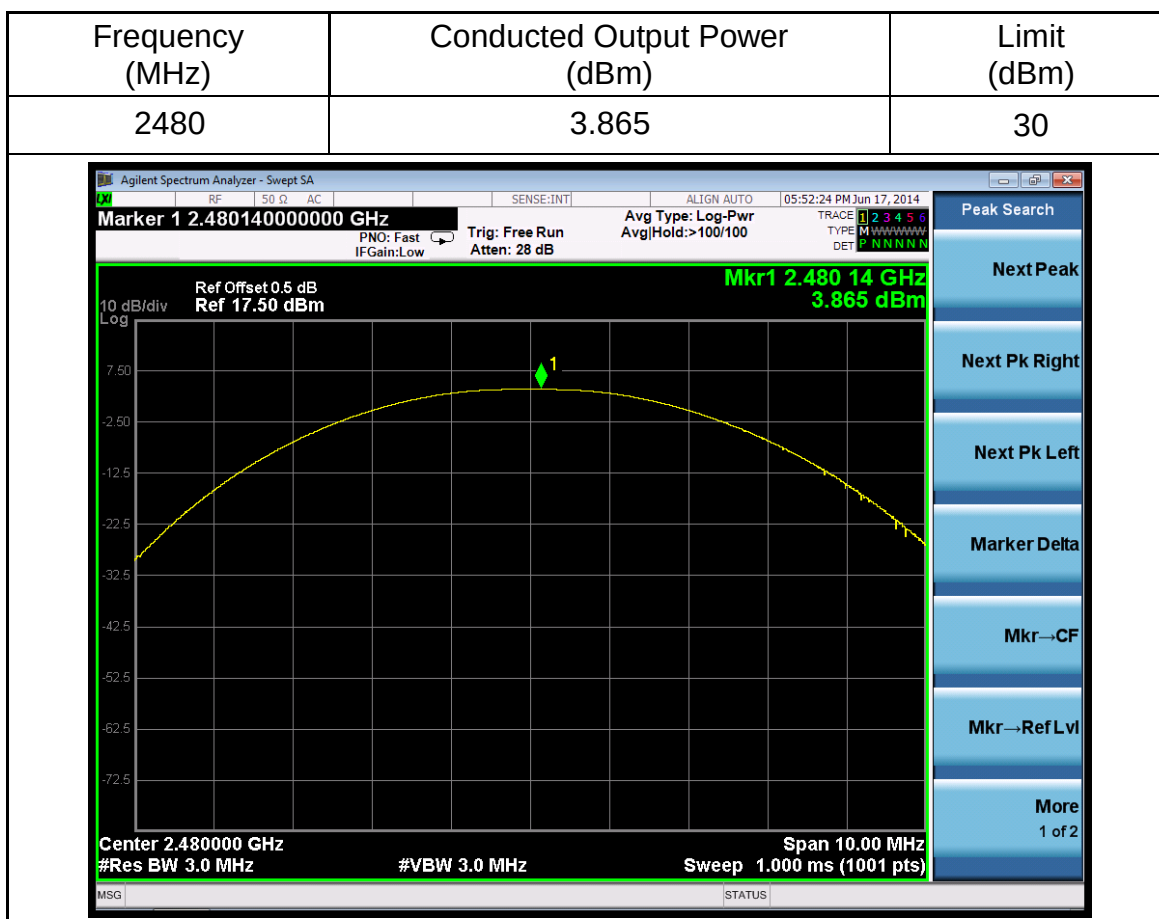
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed



7.5 100 kHz Bandwidth of Band Edges

Date of test : 19 June 2014

Test requirement : FCC §15.247(d)

Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2402MHz

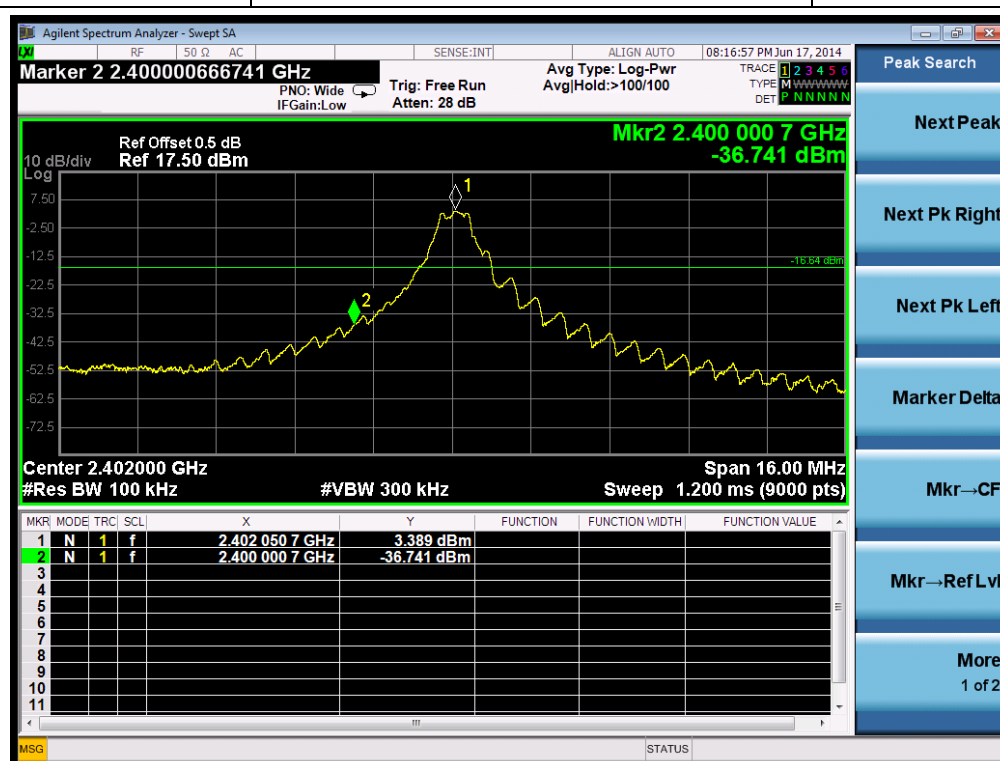
Remarks :

Test Result

☒ Passed

☐ Not Passed

Frequency (MHz)	Delta Peak to Band Emission (dB)	Limit (dB)
2402	40.13	>20



Date of test : 19 June 2014

Test requirement : FCC §15.247(d)

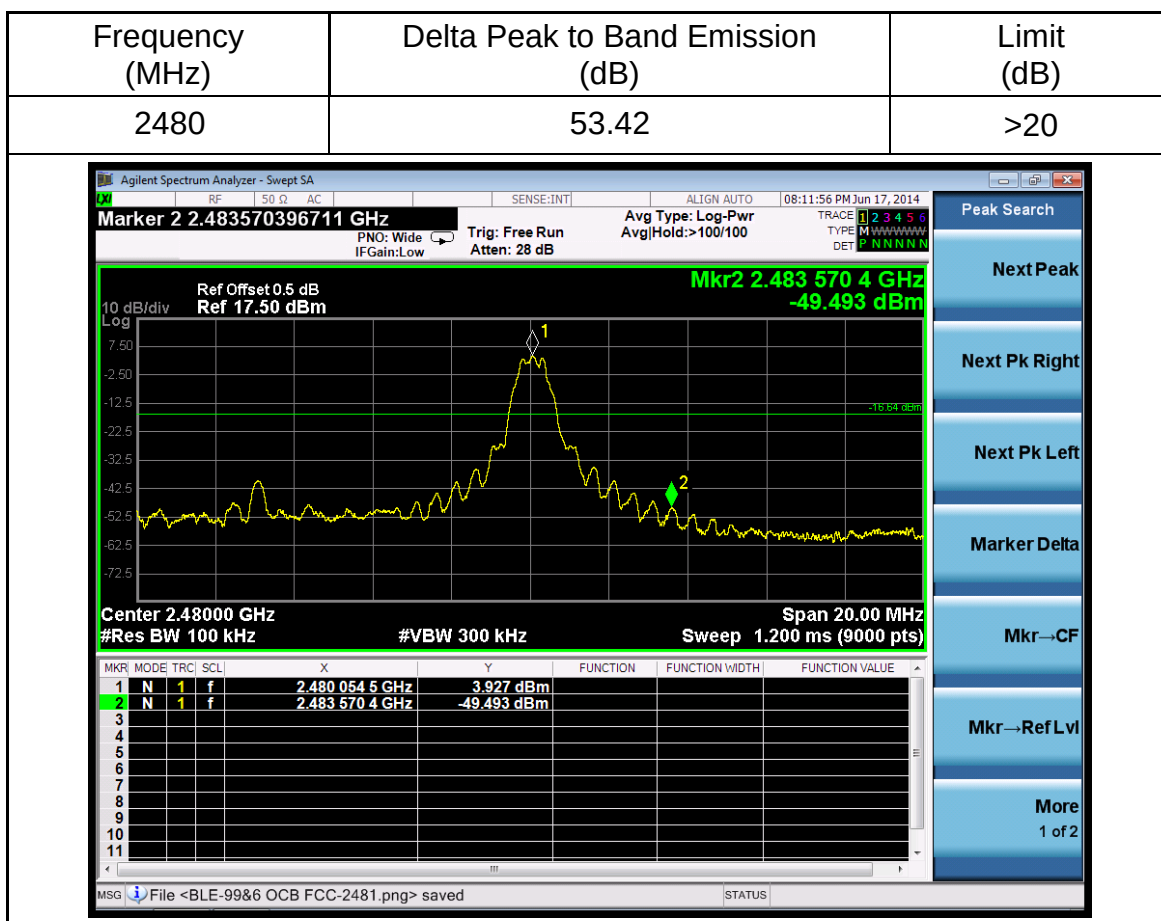
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2480MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed



7.6 Power Spectral Density

Date of test : 19 June 2014

Test requirement : FCC §15.247(e)

Test method : Conducted

Operating mode : Transmit mode

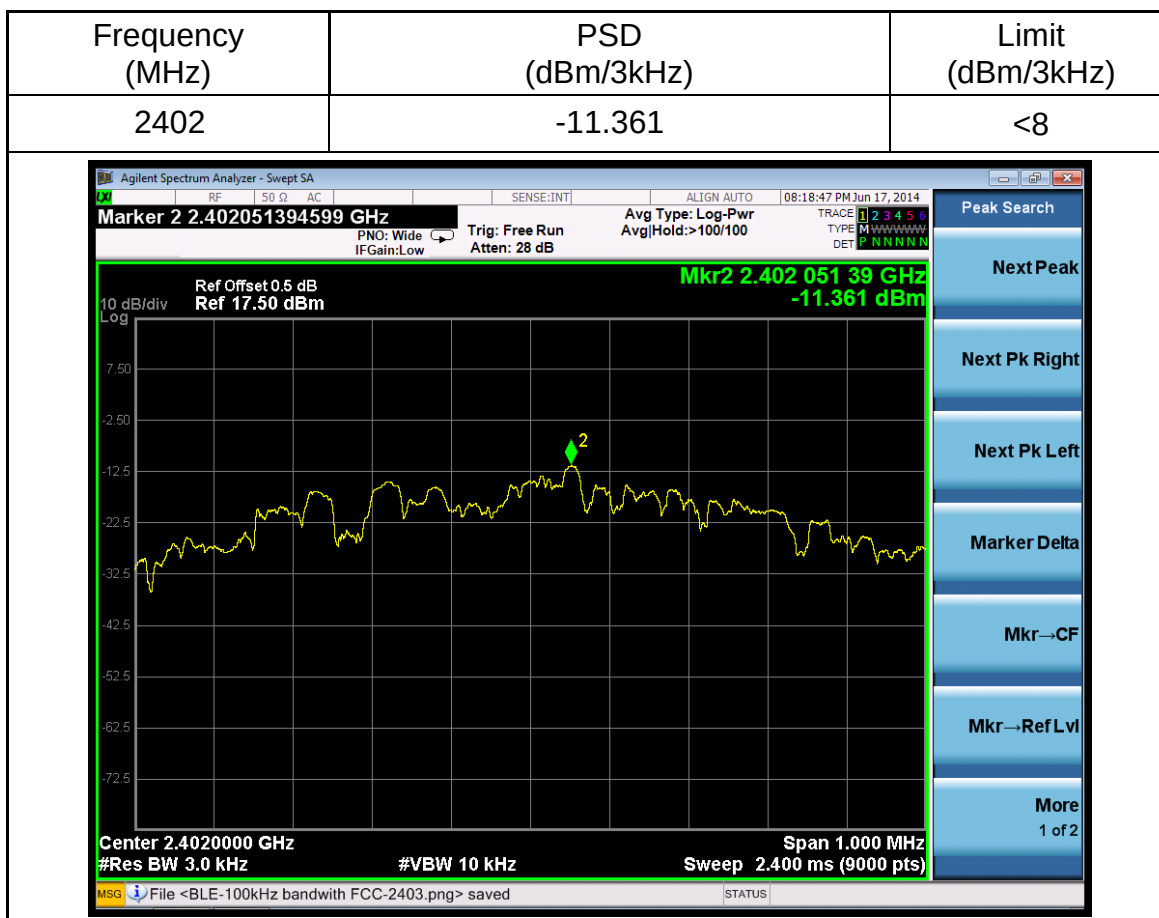
Frequency channel : 2402MHz

Remarks :

Test Result

☒ Passed

☐ Not Passed



Date of test : 19 June 2014

Test requirement : FCC §15.247(e)

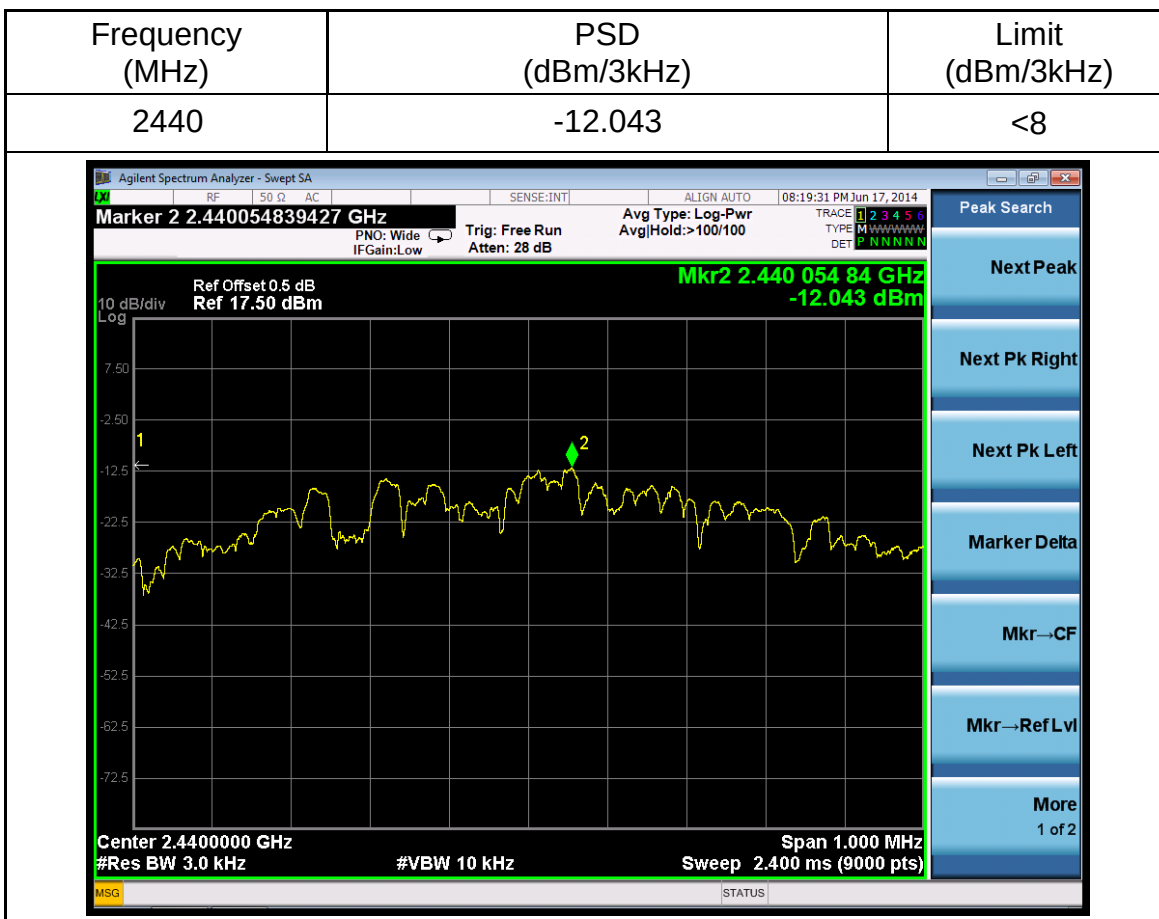
Test method : Conducted

Operating mode : Transmit mode

Frequency channel : 2440MHz

Remarks :

Test Result	
☒	Passed
☐	Not Passed



Test Result
☒ Passed
☐ Not Passed

Agilent Spectrum Analyzer - Swept SA

Marker 2 2.480046838538 GHz

PNO: Wide IFGain: Low

Trig: Free Run Atten: 28 dB

Avg Type: Log-Pwr AvgHold: >100/100

ALIGN AUTO 08:20:49 PM Jun 17, 2014

TRACE 1 2 3 4 5 6

TYPE M W W W W W W W

DET P N N N N N

10 dB/div Log

Ref Offset 0.5 dB Ref 17.50 dBm

Mkr2 2.480 046 84 GHz -10.066 dBm

Center 2.4800000 GHz Span 1.000 MHz

#Res BW 3.0 kHz #VBW 10 kHz Sweep 2.400 ms (9000 pts)

MSG STATUS

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

Mkr→Ref Lvl

More 1 of 2

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.

8. Test Equipment List

Radiated Emission Test

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	2013.09.06	2014.09.05
Loop Antenna	6512	29604	2013.09.25	2014.09.24
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	2013.08.04	2014.08.03
Spectrum Analyzer	FSV40	100903	2014.01.27	2015.01.26
Agilent	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

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