China

FCC - TEST REPORT

Report Number	:	60.790.15.022.01R01	Date of Issue	: September 21, 2015
Model	:	VBLE		
Product Type	:	HEART RATE MONITOR STRAP-ON		
Applicant	:	4iiii Innovations Inc.		
Address	:	228 RIVER AVE. COCHRANE, AB CANADA		
Production Facility	:	Kendy Electronics Co. Ltd.		
Address	:	Xin Si Huang Tang Village, Hengli Town, Dongguan City, Guangdong, China		
Test Result	:	■Positive ☐Negative		
Total pages including Appendices	:	41		

1 Table of Contents

TÜV SÜD HONG KONG LTD.
3/F, West Wing, Lakeside 2, 10 Science Park West Avenue, Science Park, Shatin, HK.
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2 Description of Equipment Under Test

Description of the Equipment Under Test

Product:	HEART RATE MONITOR STRAP-ON
Model no.:	VBLE
FCC ID:	ZZNVBLE
Rating:	3.0VDC (1 x 3.0VDC size “CR2032“ batteries)
Frequency:	2402MHz-2480MHz
Antenna gain:	-1.0 dBi
Number of operated channel:	40
Modulation:	GFSK

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3 Summary of Test Standards

Test Standards
FCC Part 15 Subpart C 10-1-13 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators

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4 Details about the Test Laboratory

Site 1

Company name: TÜV SÜD Hong Kong Ltd.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin, Hong Kong

Site 2

Company name: TÜV SÜD China Ltd.
Building 12&13 Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2,
Shenzhen 518052, P.R.China
FCC Registration Number: 502708

Emission Tests	
Test Item	Test Site
FCC Part 15 Subpart C	
FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission	Site 2
FCC Title 47 Part 15.207 Conduct Emission	NIL
FCC Title 47 Part 15.247(a)(2) 6dB & 99% Bandwidth	Site 2
FCC Title 47 Part 15.247(b) Peak Output Power	Site 2
FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals	Site 2
FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges	Site 2
FCC Title 47 Part 15.247(e) Power Spectral Density	Site 2
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	Site 2

4.1 Test Equipment Site List

Radiated emission Test – Site 3

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	17-Aug-16
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	17-Aug-17
Horn Antenna	Rohde & Schwarz	HF907	102294	17-Aug-17
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	17-Aug-16
3m Semi-anechoic chamber	TDK	9X6X6	----	29-May-19

6dB & 99% Bandwidth, Peak Output Power, Spurious Emissions at Antenna Terminals, 100kHz Bandwidth of band edges, Power Spectral Density – Site 3

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100A	108272	17-Aug-16
Signal Analyzer	Rohde & Schwarz	FSV40	101030	17-Aug-16
Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	17-Aug-16
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	17-Aug-16

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4.2 Measurement System Uncertainty

Measurement System Uncertainty Emissions

System Measurement Uncertainty	
Items	**Extended Uncertainty**
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.54dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.83dB; Vertical: 4.91dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-25000MHz	Horizontal: 4.89dB; Vertical: 4.88dB;
Uncertainty for Conducted RF test	2.04dB

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5 Summary of Test Results

Emission Tests				
FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission	10-15	☒	☐	☐
FCC Title 47 Part 15.207 Conduct Emission	NIL	☐	☐	☒
FCC Title 47 Part 15.247(a)(2) 6dB & 99% Bandwidth	16-21	☒	☐	☐
FCC Title 47 Part 15.247(b) Peak Output Power	22-24	☒	☐	☐
FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals	25-27	☒	☐	☐
FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges	28-31	☒	☐	☐
FCC Title 47 Part 15.247(e) Power Spectral Density	32-34	☒	☐	☐
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	35	☒	☐	☐

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6 General Remarks

Remarks

NIL

SUMMARY:

- All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

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

Sample Received Date: August 21, 2015

Testing Start Date: August 24, 2015

Testing End Date: September 4, 2015

- TÜV SÜD HONG KONG LTD. -

Reviewed by: Prepared by:

TSENG Chi Kit	CHAN Kwong Ngai
EMC Project Engineer	EMC Test Engineer

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7 Emission Test Results

7.1 Spurious Radiated Emission

EUT: VBLE
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.205, 15.209 & 15.247(d) Antenna: Horizontal
Comment: 3.0VDC
Remark: 9kHz to 25GHz

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
49.885	17.71	40	-22.29	Quasi Peak
93.103	10.21	43.5	-33.29	Quasi Peak
281.661	19.92	46	-26.08	Quasi Peak
847.925	26.36	46	-19.64	Quasi Peak
2174.333	37.86	74	-36.14	Peak
2174.333	35.54	54	-18.46	Average
2792.416	41.07	74	-32.93	Peak
4804.375	56.81	74	-17.19	Peak
4804.375	36.54	54	-17.46	Average
7254.375	39.84	74	-34.16	Peak
4804.375	37.92	54	-16.08	Average

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Spurious Radiated Emission

EUT: VBLE
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.205, 15.209 & 15.247(d) Antenna: Vertical
Comment: 3.0VDC
Remark: 9kHz to 25GHz

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
48.807	13.13	40	-26.87	Quasi Peak
103.073	15.46	43.5	-28.04	Quasi Peak
279.559	17.66	46	-28.34	Quasi Peak
700.000	20.64	46	-25.36	Quasi Peak
1584.500	37.02	74	-36.98	Peak
1584.500	35.13	54	-18.87	Average
2726.083	39.22	74	-34.78	Peak
4804.375	57.79	74	-16.21	Peak
4804.375	35.62	54	-18.38	Average
7206.250	41.54	74	-32.46	Peak
7206.250	37.73	54	-16.27	Average

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Spurious Radiated Emission

EUT: VBLE
Op Condition: Operated, TX Mode (2440MHz)
Test Specification: FCC15.205, 15.209 & 15.247(d) Antenna: Horizontal
Comment: 3.0VDC
Remark: 9kHz to 25GHz

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
49.885	17.71	40	-22.29	Quasi Peak
93.103	10.21	43.5	-33.29	Quasi Peak
281.661	19.92	46	-26.08	Quasi Peak
847.925	26.36	46	-19.64	Quasi Peak
2016.916	37.32	74	36.68	Peak
2016.916	35.12	54	-18.88	Average
2883.083	39.28	74	-34.72	Peak
4880.000	56.39	74	-17.61	Peak
4880.000	35.64	54	-18.36	Average
7318.125	41.33	74	-32.64	Peak
7318.125	37.86	54	-16.14	Average

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Spurious Radiated Emission

EUT: VBLE
Op Condition: Operated, TX Mode (2440MHz)
Test Specification: FCC15.205, 15.209 & 15.247(d) Antenna: Vertical
Comment: 3.0VDC
Remark: 9kHz to 25GHz

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
48.807	13.13	40	-26.87	Quasi Peak
103.073	15.46	43.5	-28.04	Quasi Peak
279.559	17.66	46	-28.34	Quasi Peak
700.000	20.64	46	-25.36	Quasi Peak
1584.083	36.25	74	-37.75	Peak
1584.083	34.98	54	-19.02	Average
2808.750	39.47	54	-14.53	Peak
4880.000	55.49	74	-18.51	Peak
4800.000	37.22	54	-16.78	Average
7311.875	41.51	74	-32.49	Peak
7311.875	39.03	54	-14.97	Average

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Spurious Radiated Emission

EUT:	VBLE
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC15.205, 15.209 & 15.247(d) Antenna: Horizontal
Comment:	3.0VDC
Remark:	9kHz to 25GHz

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
49.885	17.71	40	-22.29	Quasi Peak
93.103	10.21	43.5	-33.29	Quasi Peak
281.661	19.92	46	-26.08	Quasi Peak
847.925	26.36	46	-19.64	Quasi Peak
1926.500	36.46	74	-37.54	Peak
1926.500	34.44	54	-19.56	Average
2814.583	39.62	74	-34.38	Peak
4960.000	54.72	74	-19.28	Peak
4960.000	37.56	54	-16.44	Average
7419.375	42.07	74	-31.93	Peak
7419.375	39.45	54	-14.55	Average

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Spurious Radiated Emission

EUT: VBLE
Op Condition: Operated, TX Mode (2480MHz)
Test Specification: FCC15.205, 15.209 & 15.247(d) Antenna: Vertical
Comment: 3.0VDC
Remark: 9kHz to 25GHz

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
48.807	13.13	40	-26.87	Quasi Peak
103.073	15.46	43.5	-28.04	Quasi Peak
279.559	17.66	46	-28.34	Quasi Peak
700.000	20.64	46	-25.36	Quasi Peak
1584.333	36.07	74	-37.93	Peak
1584.333	34.03	54	-19.97	Average
2970.916	40.72	74	-33.28	Peak
4960.000	53.12	74	-20.88	Peak
4960.000	36.98	54	-17.02	Average
7445.000	41.40	74	-32.60	Peak
7445.000	39.11	54	-14.89	Average

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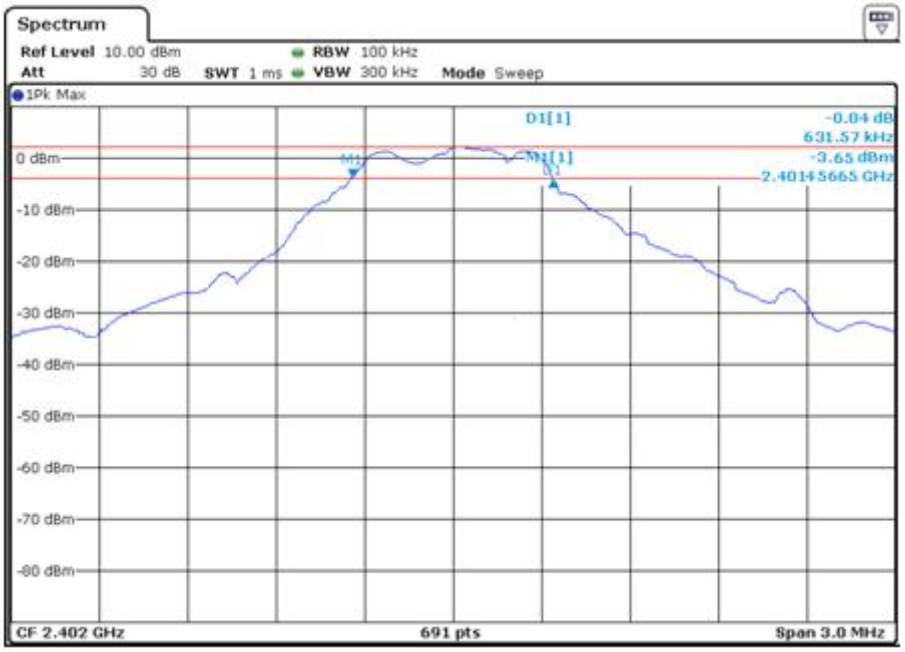
7.2 6dB & 99% Bandwidth

EUT:	VBLE
Op Condition:	Operated, TX Mode (2402MHz)
Test Specification:	FCC15.247(a)(2), 6dB Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



6dB bandwidth	Limit
631.57 kHz	> 500 kHz

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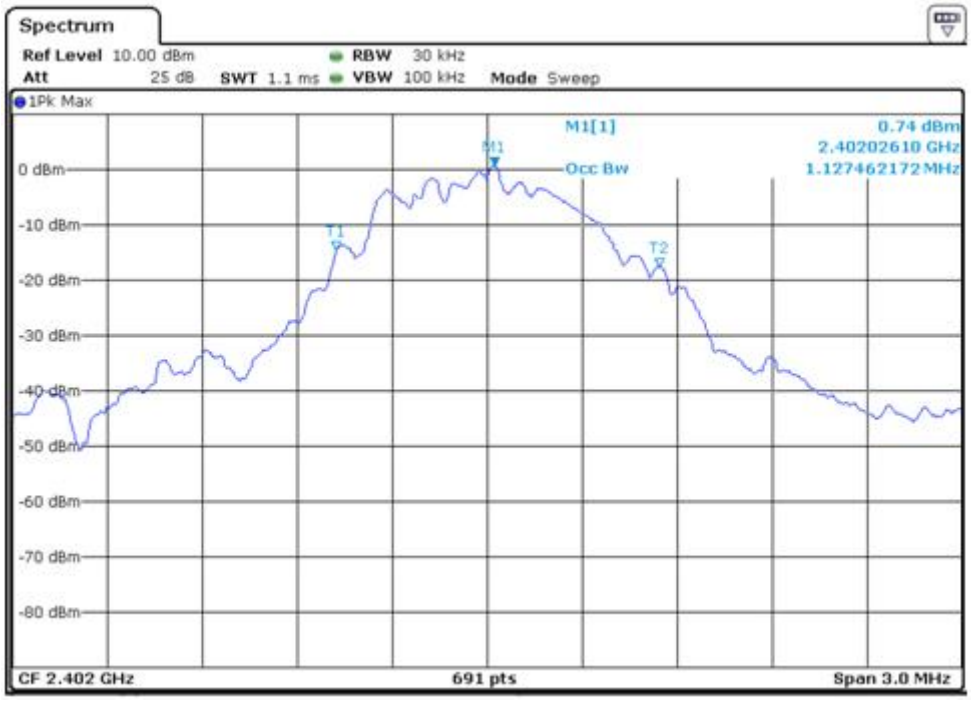
6dB & 99% Bandwidth

EUT:	VBLE
Op Condition:	Operated, TX Mode (2402MHz)
Test Specification:	FCC15.247(a)(2), 99% Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



99% bandwidth
1127.462 kHz

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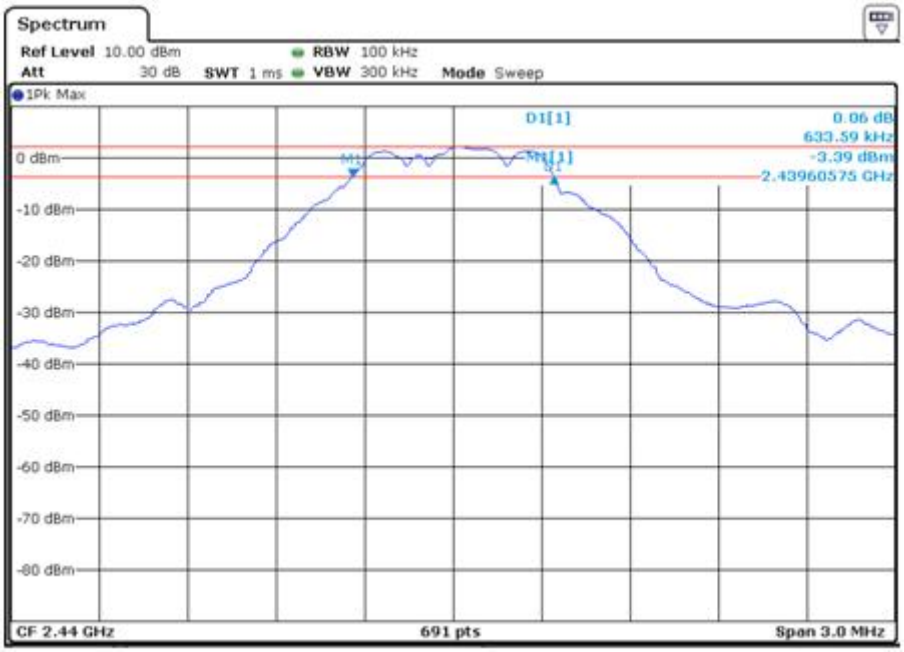
6dB & 99% Bandwidth

EUT:	VBLE
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC15.247(a)(2), 6dB Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



6dB bandwidth	Limit
633.59 kHz	> 500 kHz

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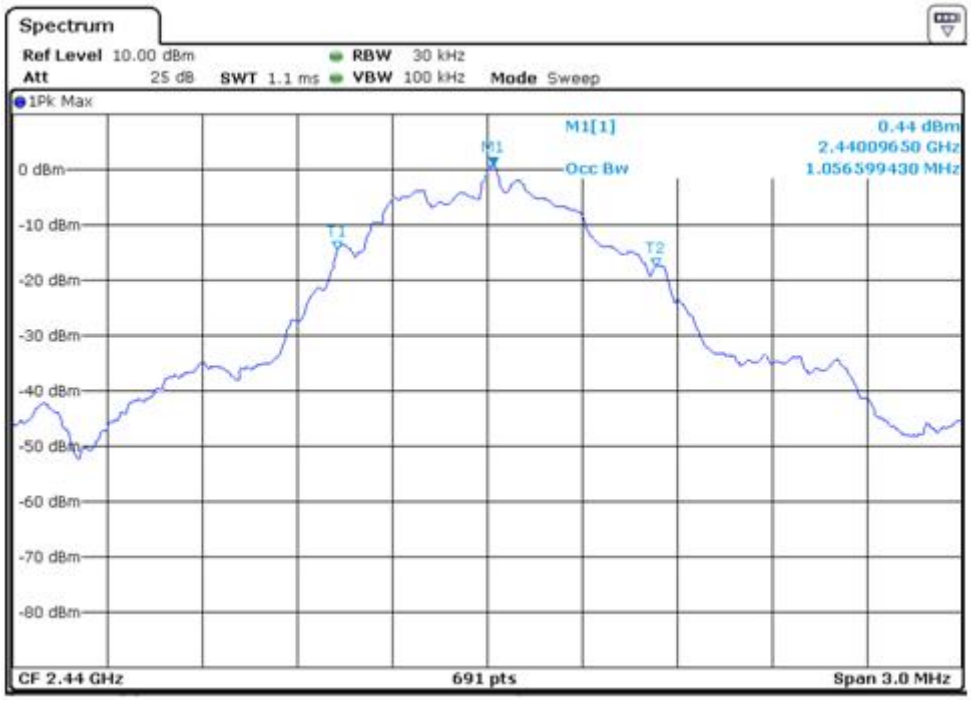
6dB & 99% Bandwidth

EUT:	VBLE
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC15.247(a)(2), 99% Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



99% bandwidth
1056.599 kHz

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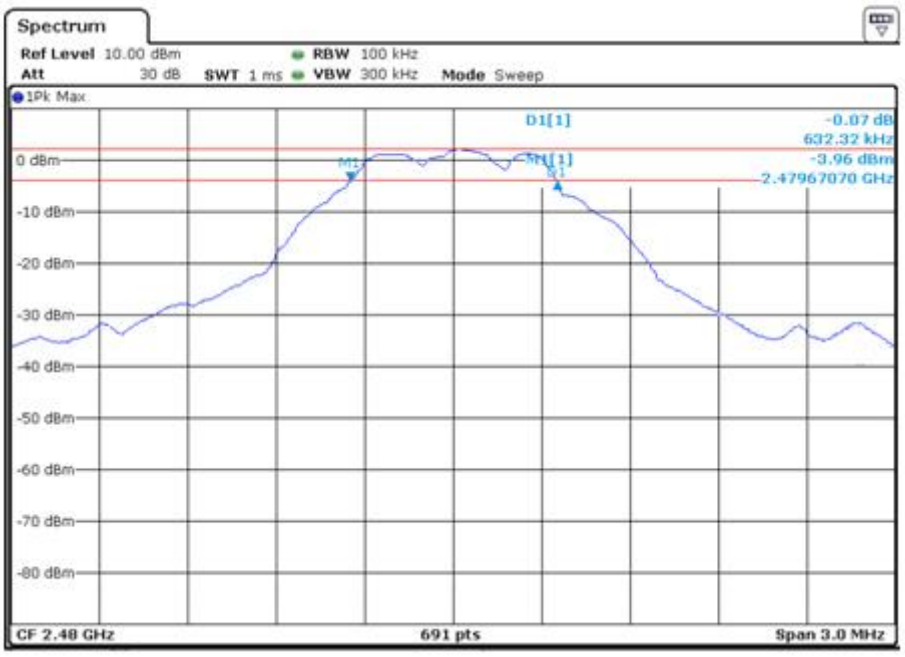
6dB & 99% Bandwidth

EUT:	VBLE
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC15.247(a)(2), 6dB Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



6dB bandwidth	Limit
632.32 kHz	> 500 kHz

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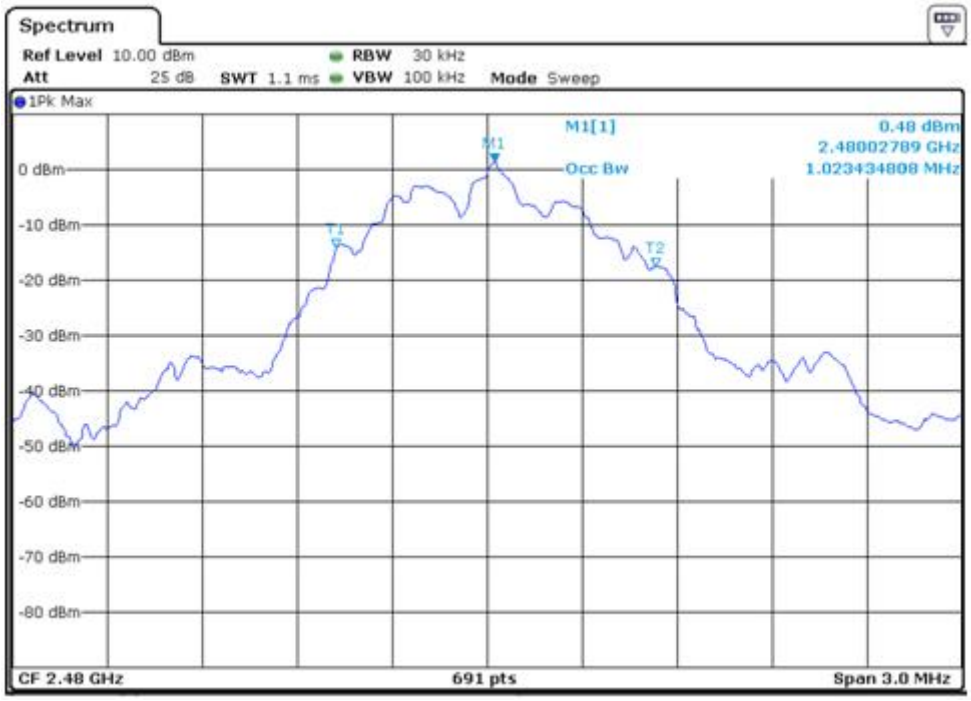
6dB & 99% Bandwidth

EUT:	VBLE
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC15.247(a)(2), 99% Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



99% bandwidth
1023.434 kHz

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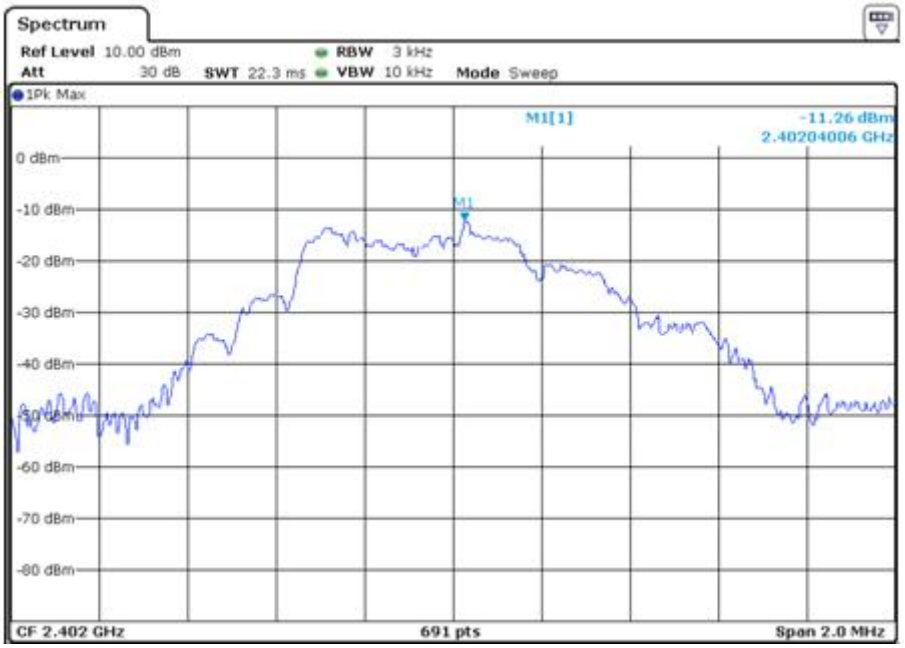
7.3 Peak Output Power

EUT: VBLE
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.247(b)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed



Conducted Output Power	Limit
-11.26 dBm	< 30dBm

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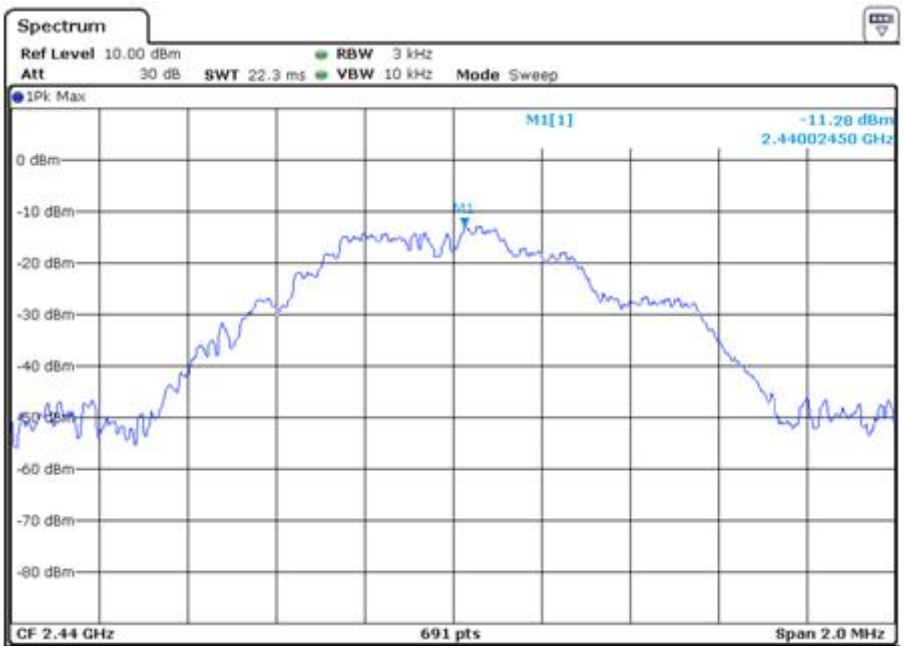
Peak Output Power

EUT:	VBLE
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC15.247(b)
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



Conducted Output Power	Limit
-11.28 dBm	< 30dBm

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Peak Output Power

EUT: VBLE
Op Condition: Operated, TX Mode (2480MHz)
Test Specification: FCC15.247(b)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Conducted Output Power	Limit
-11.49 dBm	< 30dBm

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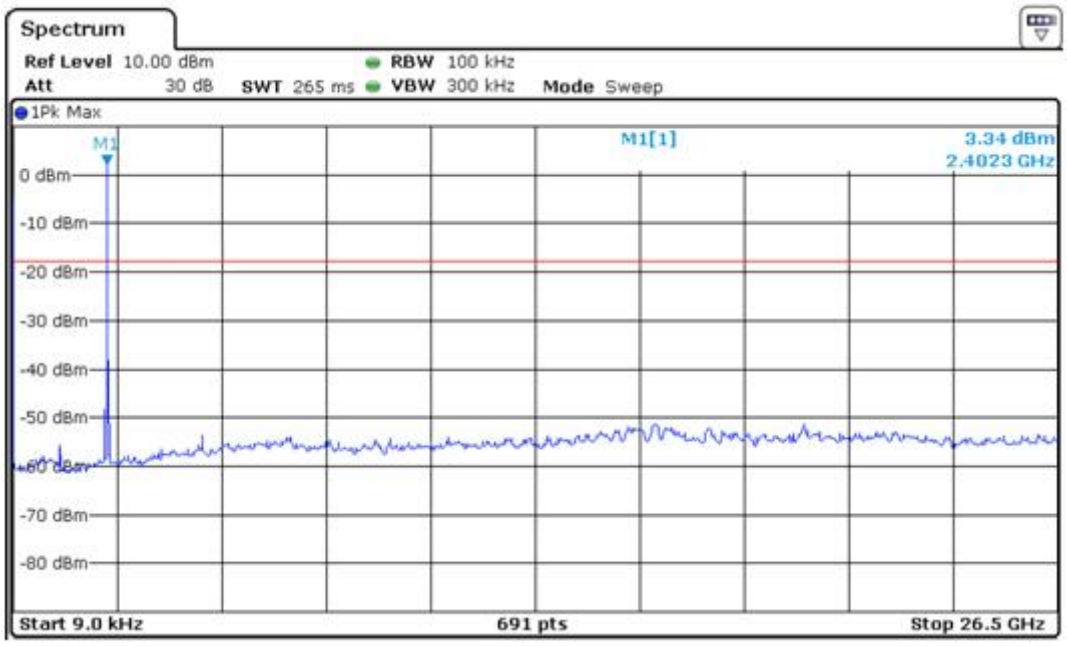
7.4 Spurious Emissions at Antenna Terminals

EUT:	VBLE
Op Condition:	Operated, TX Mode (2402MHz)
Test Specification:	FCC2.1051 & 15.247(d)
Comment:	3.0VDC
Remark:	9kHz to 26.5GHz

Test Result
☒ Passed
☐ Not Passed



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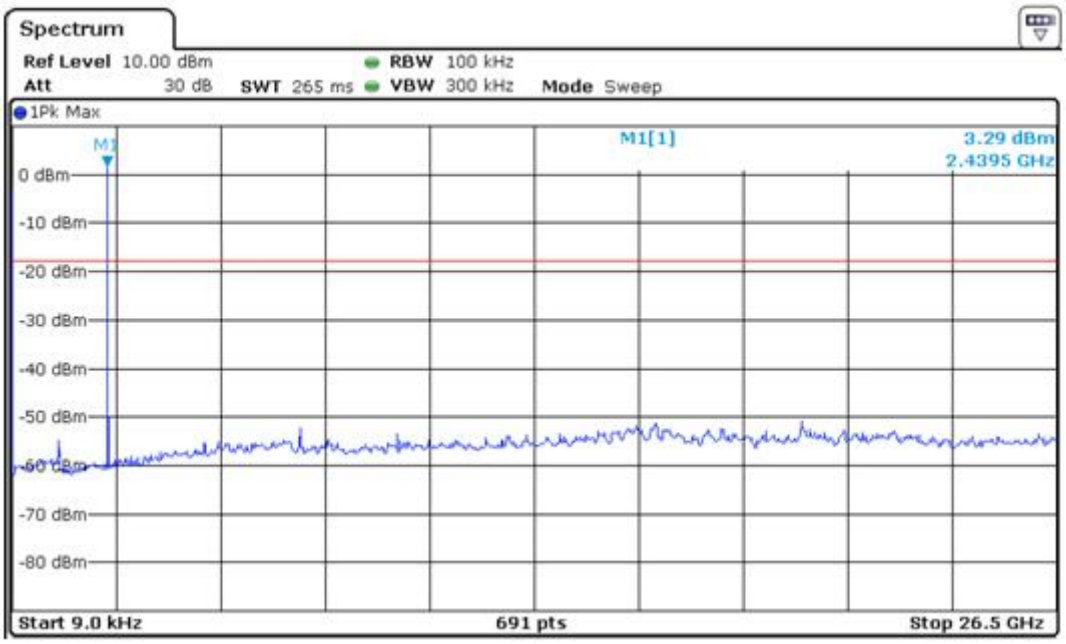
Spurious Emissions at Antenna Terminals

EUT:	VBLE
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC2.1051 & 15.247(d)
Comment:	3.0VDC
Remark:	9kHz to 26.5GHz

Test Result
☒ Passed
☐ Not Passed



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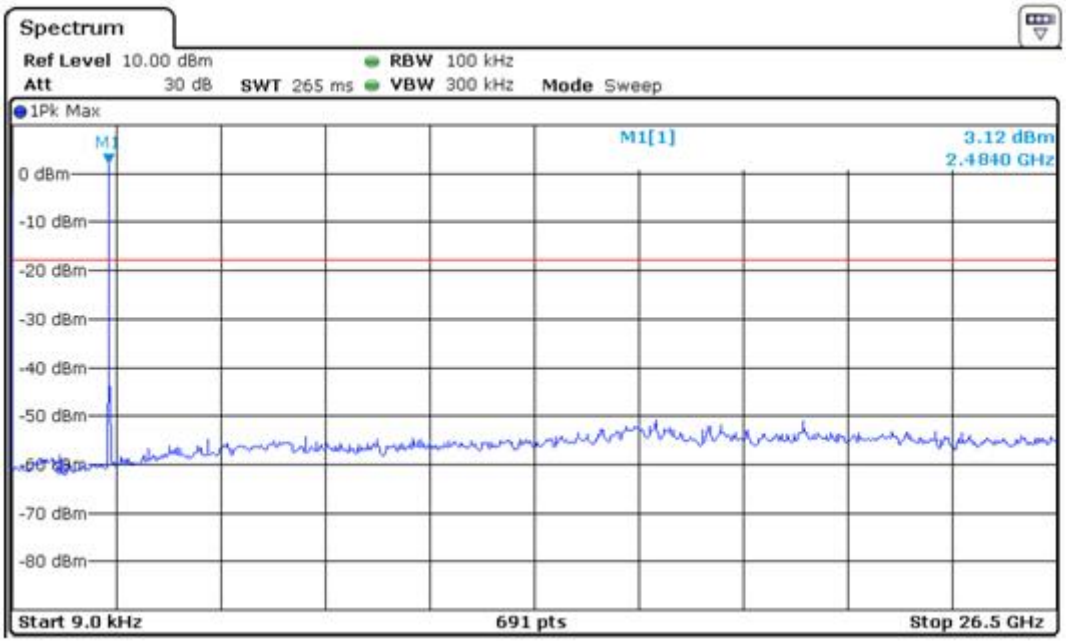
Spurious Emissions at Antenna Terminals

EUT:	VBLE
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC2.1051 & 15.247(d)
Comment:	3.0VDC
Remark:	9kHz to 26.5GHz

Test Result
☒ Passed
☐ Not Passed



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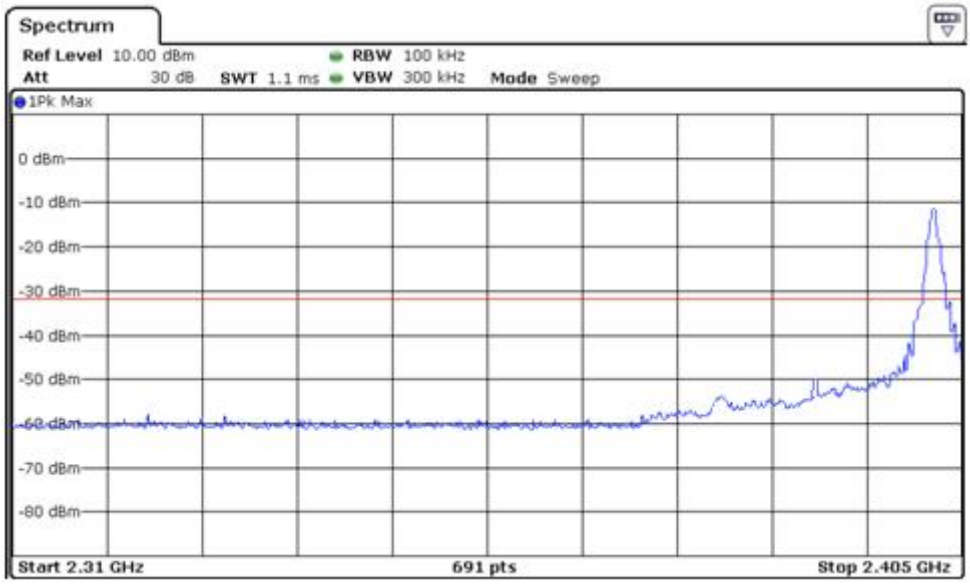
7.5 100kHz Bandwidth of band edges

EUT:	VBLE
Op Condition:	Operated, TX Mode (2402MHz)
Test Specification:	FCC15.247(d), Conducted
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



Frequency	Result
2.402 GHz	-11.44 dBm
2.390 GHz	-50.68 dBm

Band edges	Limit
39.24 dB	> 20dB

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Tel: +852-2776 1323 Fax: +852-2776 1206

100kHz Bandwidth of band edges

EUT: VBLE
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.247(d), Radiated
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
2439.000	45.58	74	28.42	Peak
2439.000	31.43	54	22.57	Average

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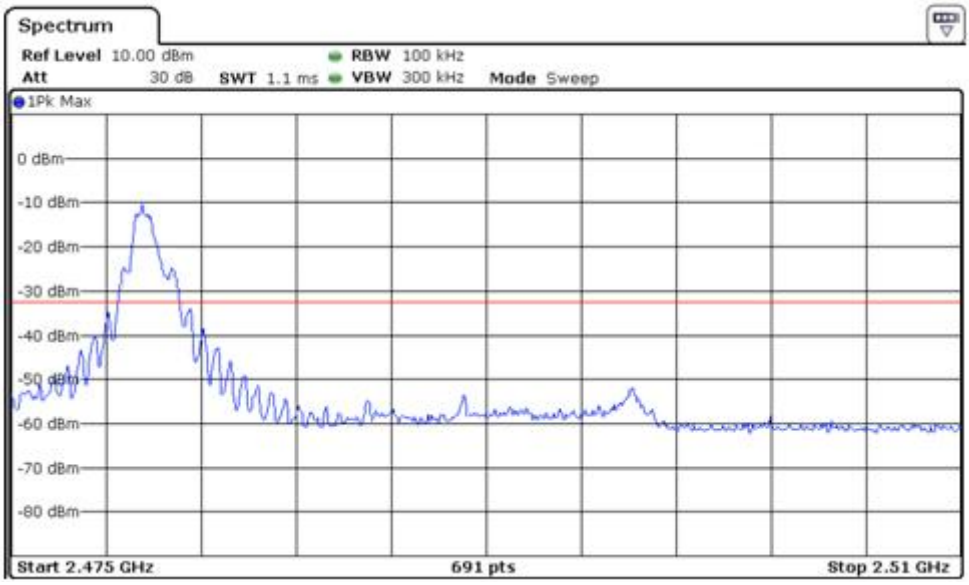
100kHz Bandwidth of band edges

EUT:	VBLE
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC15.247(d), Conducted
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



Frequency	Result
2.480 GHz	-10.93 dBm
2.4835 GHz	-50.46 dBm

Band edges	Limit
39.53 dB	> 20dB

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100kHz Bandwidth of band edges

EUT: VBLE
Op Condition: Operated, TX Mode (2480MHz)
Test Specification: FCC15.247(d), Radiated
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Detector
2483.500	45.12	74	-28.88	Peak
2483.500	31.26	54	-22.74	Average

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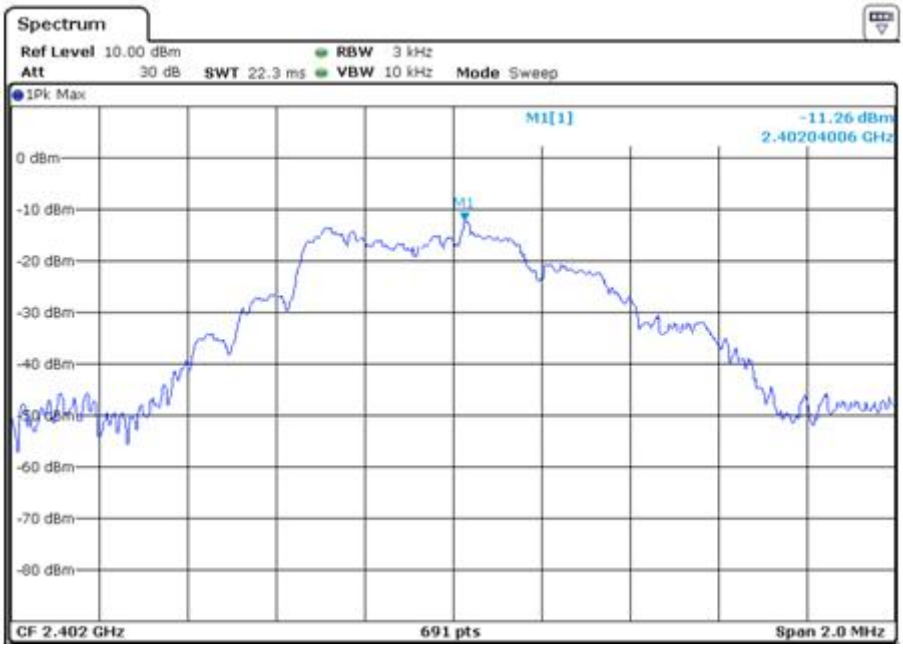
7.6 Power Spectral Density

EUT: VBLE
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.247(e)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed



Frequency	PSD	Result
2.402GHz	-11.26 dBm / 3kHz	< 8 dBm / 3 kHz

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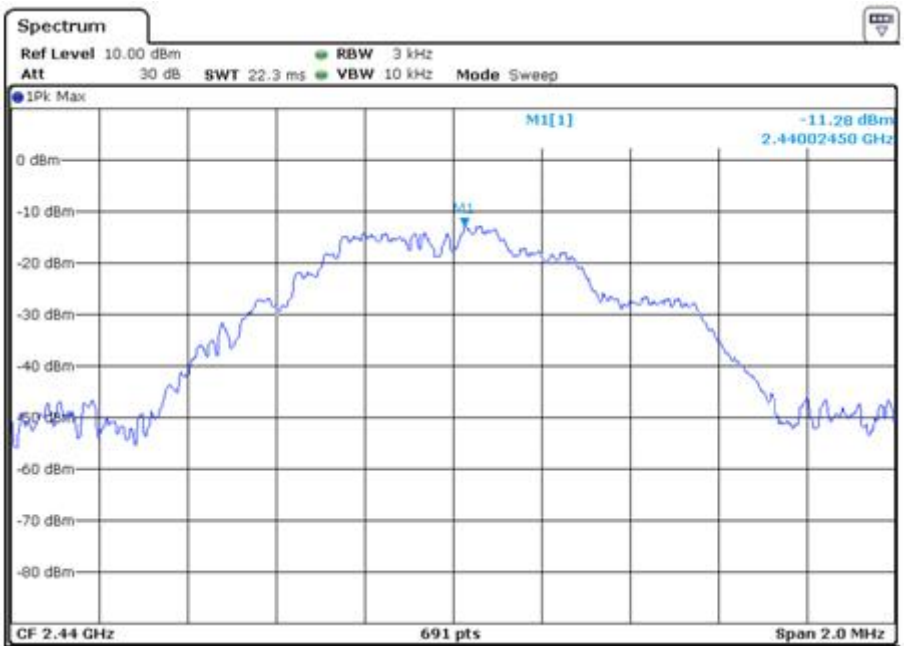
Power Spectral Density

EUT: VBLE
Op Condition: Operated, TX Mode (2440MHz)
Test Specification: FCC15.247(e)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed



Frequency	PSD	Result
2.440GHz	-11.28 dBm / 3kHz	< 8 dBm / 3 kHz

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Power Spectral Density

EUT: VBLE
Op Condition: Operated, TX Mode (2480MHz)
Test Specification: FCC15.247(e)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Frequency	PSD	Result
2.480GHz	-11.49 dBm / 3kHz	< 8 dBm / 3 kHz

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7.7 Antenna Requirement

EUT:	VBLE
Op Condition:	Operated, TX Mode
Test Specification:	FCC15.203 & 15.247(b)
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed

Limit

For intentional device, according to FCC Title 47 Part 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 FCC Title 47 Part 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 6 dBi.

Antenna Connector Construction

The antenna used in this product is PCB antenna, and the maximum gain of this antenna is -1.0 dBi.

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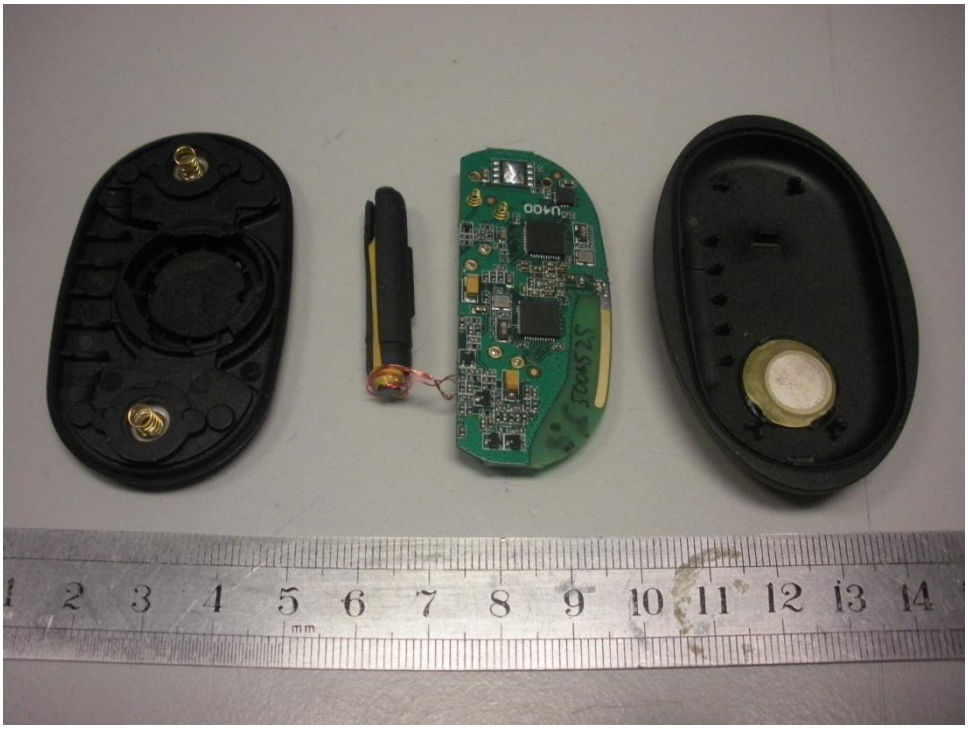
8 Appendix A - Photographs of EUT

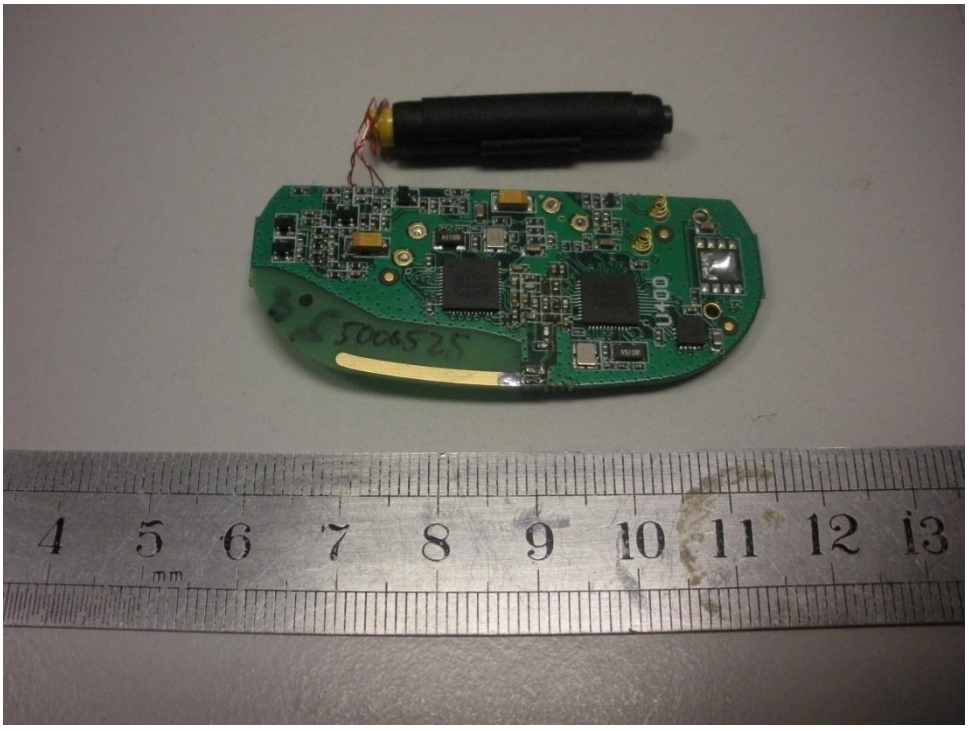
China

Appendix A



China

Appendix A



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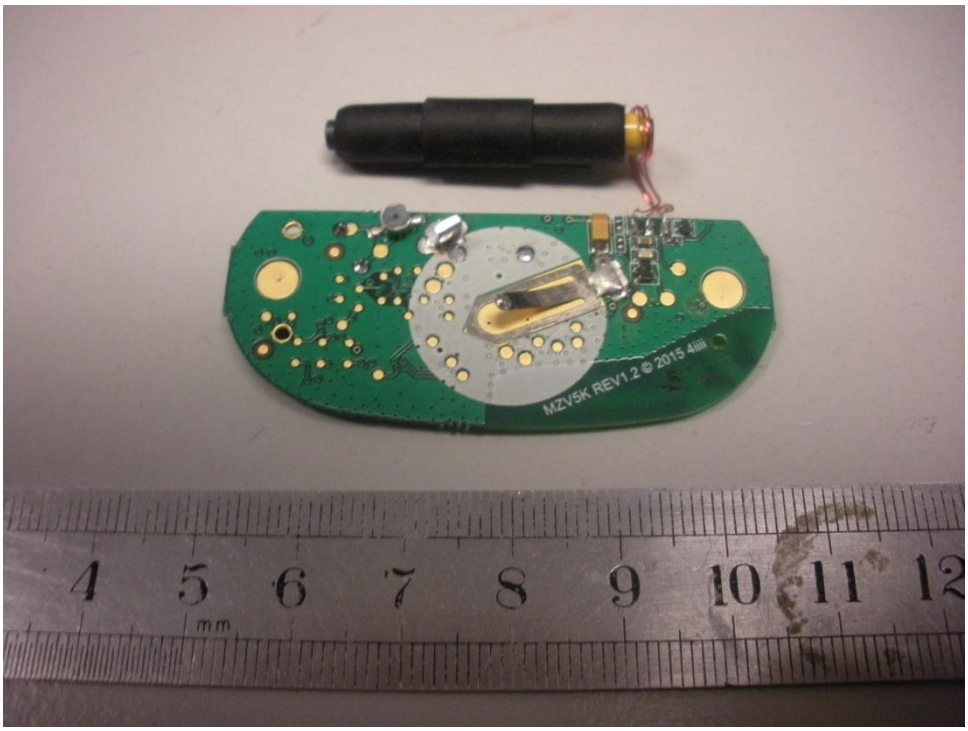
Appendix A



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9 Appendix B - Setup Photographs of EUT

Radiated Emission

**6dB & 99% Bandwidth, Peak Output Power,
Spurious Emissions at Antenna Terminals,
100kHz Bandwidth of band edges, Power Spectral Density**

10 Appendix C - General Product Information

Radiofrequency radiation exposure evaluation

According to KDB 447498 D01v05r02 section 4.3.1,

>> The 1-g SAR test exclusion thresholds, for 100MHz to 6GHz, at test separation distances ≤ 50 mm are determined by:

Power at 2402MHz = 0.0959 mW EIRP
Power at 2440MHz = 0.0895 mW EIRP
Power at 2480MHz = 0.0909 mW EIRP

[(0.0959 mW) / (5 mm)] · [sqrt (2.402 GHz)] = 0.0297 which is ≤ 3.0 for 1-g SAR.
[(0.0895 mW) / (5 mm)] · [sqrt (2.440 GHz)] = 0.0279 which is ≤ 3.0 for 1-g SAR.
[(0.0909 mW) / (5 mm)] · [sqrt (2.480 GHz)] = 0.0286 which is ≤ 3.0 for 1-g SAR.

Therefore the device is exempt from stand-alone SAR test requirements.

>> The fundamental frequency of the EUT is 2402MHz-2480MHz, the test separation distance is < 50mm. (Manufacturer specification distance is <5mm)

>> The power of EUT measured is:

- For 2402MHz: 0.0959mW = 10 log (0.0959) dBm ~ -10.18dBm
- For 2440MHz: 0.0895mW = 10 log (0.0895) dBm ~ -10.48dBm
- For 2480MHz: 0.0909mW = 10 log (0.0909) dBm ~ -10.41dBm

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