

FCC - TEST REPORT

Report Number : **60.790.16.014.01R01** Date of Issue : February 20, 2016

Model : **HRMBLEM**

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 Enterprise Ltd

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

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

Total pages including Appendices : 44

TÜV SÜD HONG KONG LTD. is a subcontractor to TÜV SÜD Product Service GmbH according to the principles outlined in ISO 17025. TÜV SÜD HONG KONG LTD. reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD HONG KONG LTD. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD HONG KONG LTD. issued reports. This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.

1 Table of Contents

1 Table of Contents.....	2
2 Description of Equipment Under Test	3
3 Summary of Test Standards	4
4 Details about the Test Laboratory	5
4.1 Test Equipment Site List	6
4.2 Measurement System Uncertainty	7
5 Summary of Test Results.....	8
6 General Remarks	9
7 Emission Test Results	10
7.1 Spurious Radiated Emission	10
7.2 6dB & 99% Bandwidth	16
7.3 Peak Output Power.....	22
7.4 Spurious Emissions at Antenna Terminals.....	25
7.5 100kHz Bandwidth of band edges.....	28
7.6 Power Spectral Density.....	34
7.7 Antenna Requirement.....	37
8 Appendix A - Photographs of EUT	38
9 Appendix B - Setup Photographs of EUT.....	42
10 Appendix C - General Product Information	44

2 Description of Equipment Under Test

Description of the Equipment Under Test

Product:	Heart Rate Transmitter
Model no.:	HRMBLEM
FCC ID:	O4GHRMABM
Rating:	3.0VDC (1 x 3.0VDC size "CR2032" batteries)
Frequency:	2402MHz-2480MHz
Antenna gain:	0 dBi
Number of operated channel:	40
Modulation:	GFSK

3 Summary of Test Standards

Test Standards
FCC Part 15 Subpart C 10-1-14 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators

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 Certification and Testing (China) Co., Ltd. Shenzhen Branch
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

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

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	28-33	☒	☐	☐
FCC Title 47 Part 15.247(e) Power Spectral Density	34-36	☒	☐	☐
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	37	☒	☐	☐

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.

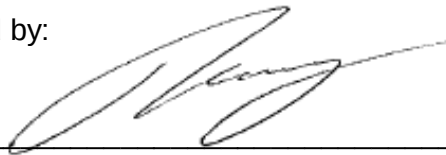
Sample Received Date: January 28, 2016

Testing Start Date: January 29, 2016

Testing End Date: February 16, 2016

- TÜV SÜD HONG KONG LTD. -

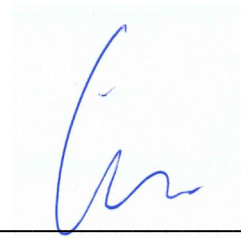
Reviewed by:



TSENG Chi Kit
EMC Project Engineer



Prepared by:



CHAN Kwong Ngai
EMC Test Engineer

7 Emission Test Results

7.1 Spurious Radiated Emission

EUT: HRMBLEM
 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 dB μ V/m	Limit dB μ V/m	Margin dB	Detector
50.348	15.48	40	-24.52	Quasi Peak
94.190	12.01	43.5	-31.49	Quasi Peak
279.256	16.55	46	-29.45	Quasi Peak
854.987	24.73	46	-21.27	Quasi Peak
4789.615	59.51	74	-14.49	Peak
4789.615	45.82	54	-8.18	Average
7208.846	63.21	74	-10.79	Peak
7206.000	47.54	54	-6.46	Average

Spurious Radiated Emission

EUT: HRMBLEM
 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 dB μ V/m	Limit dB μ V/m	Margin dB	Detector
50.042	15.21	40	-24.89	Quasi Peak
102.160	16.20	43.5	-27.30	Quasi Peak
279.865	16.89	46	-29.11	Quasi Peak
725.000	21.03	46	-24.97	Quasi Peak
4789.615	53.51	74	-20.49	Peak
4789.615	40.38	54	-13.62	Average
7208.846	62.55	74	-11.45	Peak
7208.846	47.11	54	-6.89	Average

Spurious Radiated Emission

EUT: HRMBLEM
 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
50.348	15.48	40	-24.52	Quasi Peak
94.190	12.01	43.5	-31.49	Quasi Peak
279.256	16.55	46	-29.45	Quasi Peak
854.987	24.73	46	-21.27	Quasi Peak
4881.923	57.93	74	-16.07	Peak
4881.923	44.62	54	-9.38	Average
7322.125	60.14	74	-13.86	Peak
7322.125	41.20	54	-12.80	Average

Spurious Radiated Emission

EUT: HRMBLEM
 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 dB μ V/m	Limit dB μ V/m	Margin dB	Detector
50.042	15.21	40	-24.89	Quasi Peak
102.160	16.20	43.5	-27.30	Quasi Peak
279.865	16.89	46	-29.11	Quasi Peak
725.000	21.03	46	-24.97	Quasi Peak
4881.923	50.73	74	-23.27	Peak
4881.923	40.22	54	-13.78	Average
7322.125	61.22	74	-12.78	Peak
7322.125	42.03	54	-11.97	Average

Spurious Radiated Emission

EUT: HRMBLEM
 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 dB μ V/m	Limit dB μ V/m	Margin dB	Detector
50.348	15.48	40	-24.52	Quasi Peak
94.190	12.01	43.5	-31.49	Quasi Peak
279.256	16.55	46	-29.45	Quasi Peak
854.987	24.73	46	-21.27	Quasi Peak
4954.615	58.61	74	-15.39	Peak
4954.615	44.42	54	-9.58	Average
7388.125	60.10	74	-13.90	Peak
7388.125	41.03	54	-12.97	Average

Spurious Radiated Emission

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

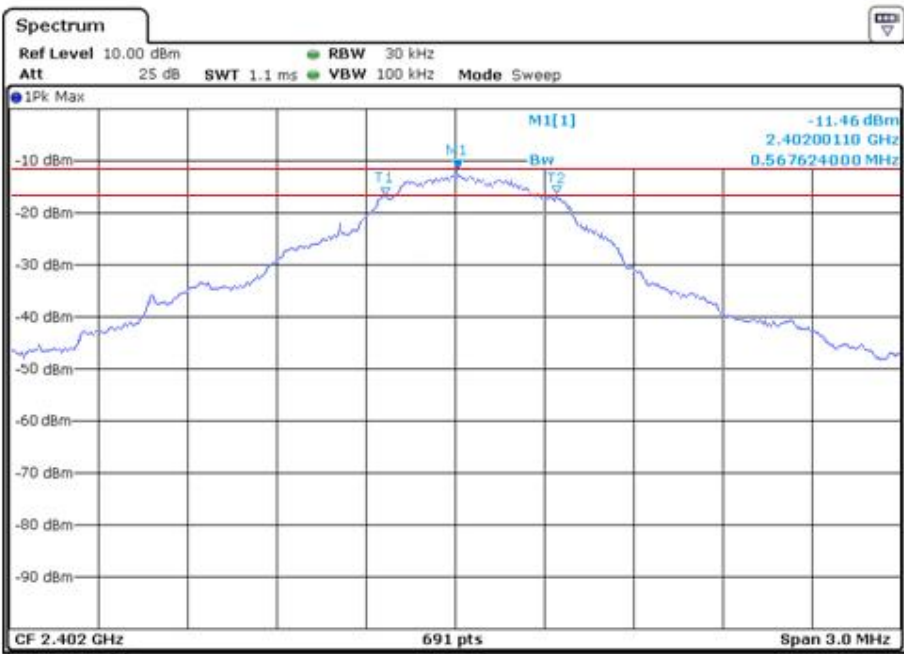
Test Result	
☒	Passed
☐	Not Passed

Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector
50.042	15.21	40	-24.89	Quasi Peak
102.160	16.20	43.5	-27.30	Quasi Peak
279.865	16.89	46	-29.11	Quasi Peak
725.000	21.03	46	-24.97	Quasi Peak
4954.615	58.92	74	-15.08	Peak
4954.615	44.53	54	-9.47	Average
7388.125	60.11	74	-13.89	Peak
7388.125	41.05	54	-12.95	Average

7.2 6dB & 99% Bandwidth

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

Test Result	
☒	Passed
☐	Not Passed

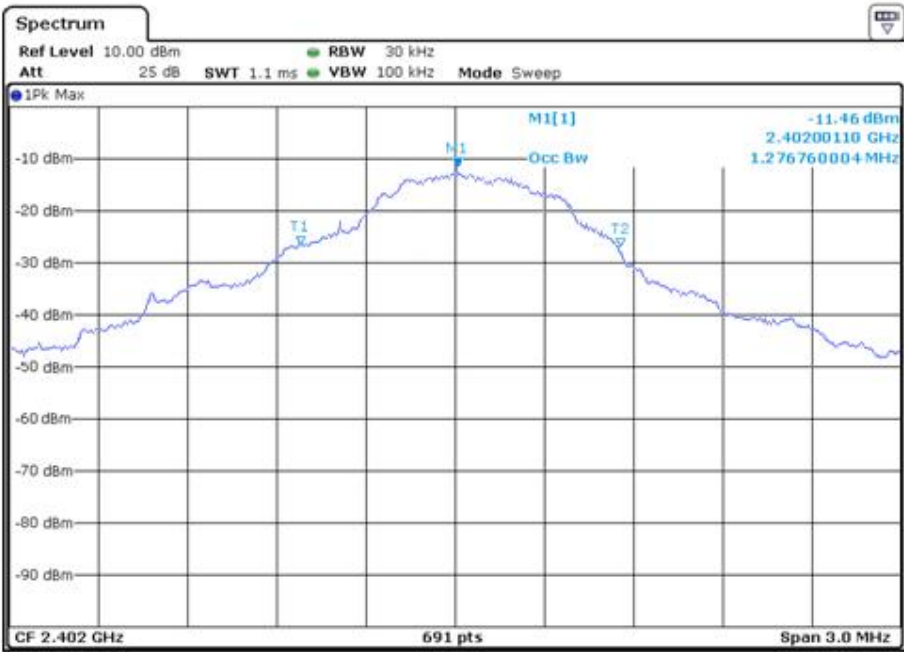


6dB bandwidth	Limit
567.624 kHz	> 500 kHz

6dB & 99% Bandwidth

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

Test Result
☒ Passed
☐ Not Passed

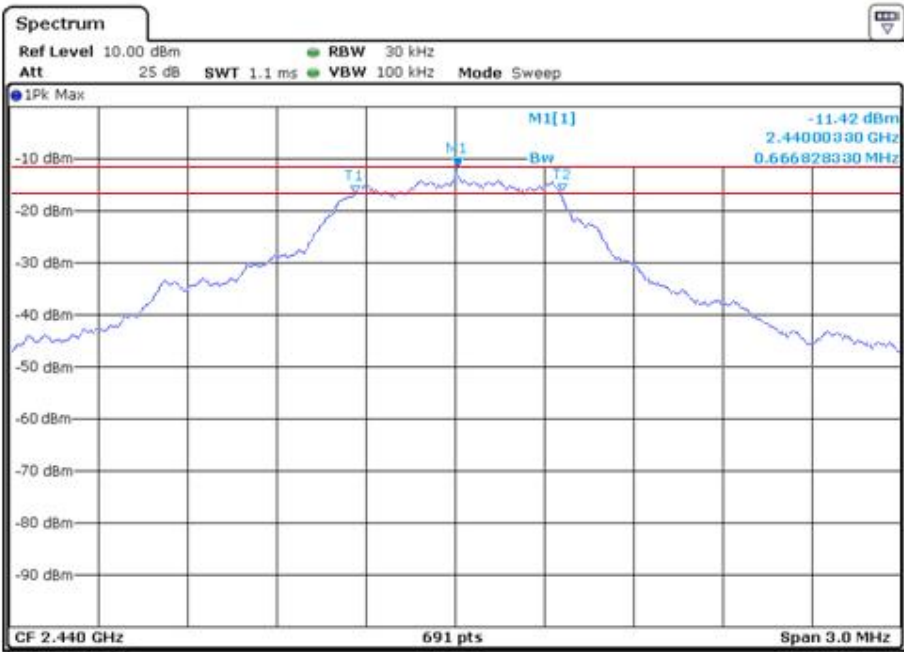


99% bandwidth
1276.760 kHz

6dB & 99% Bandwidth

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

Test Result
☒ Passed
☐ Not Passed

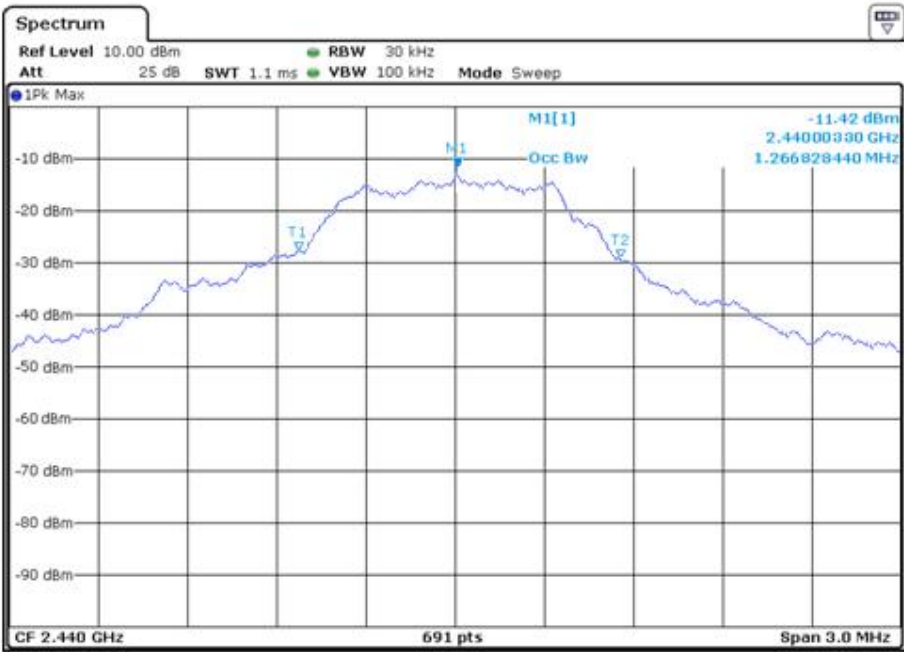


6dB bandwidth	Limit
666.828 kHz	> 500 kHz

6dB & 99% Bandwidth

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

Test Result	
☒	Passed
☐	Not Passed

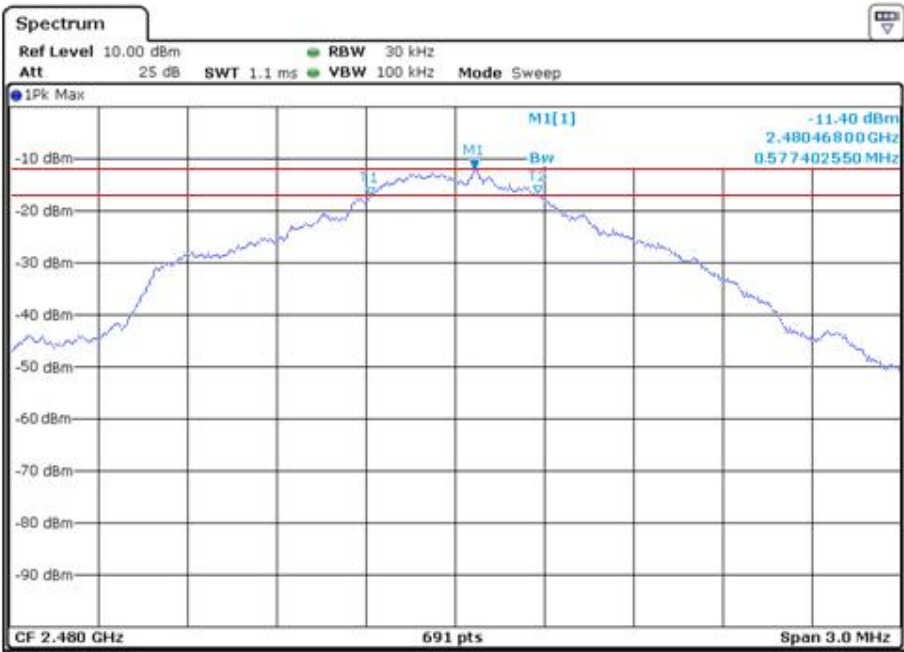


99% bandwidth
1266.828 kHz

6dB & 99% Bandwidth

EUT: HRMBLEM
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
577.402 kHz	> 500 kHz

6dB & 99% Bandwidth

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

Test Result	
☒	Passed
☐	Not Passed



99% bandwidth
1224.402 kHz

7.3 Peak Output Power

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

Test Result	
☒	Passed
☐	Not Passed

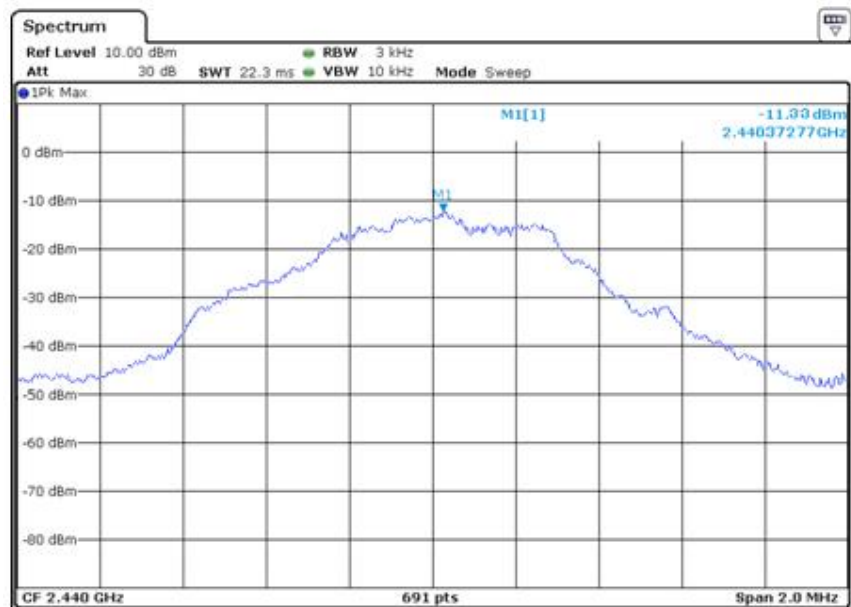


Conducted Output Power	Limit
-11.25 dBm	< 30dBm

Peak Output Power

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

Test Result
☒ Passed
☐ Not Passed

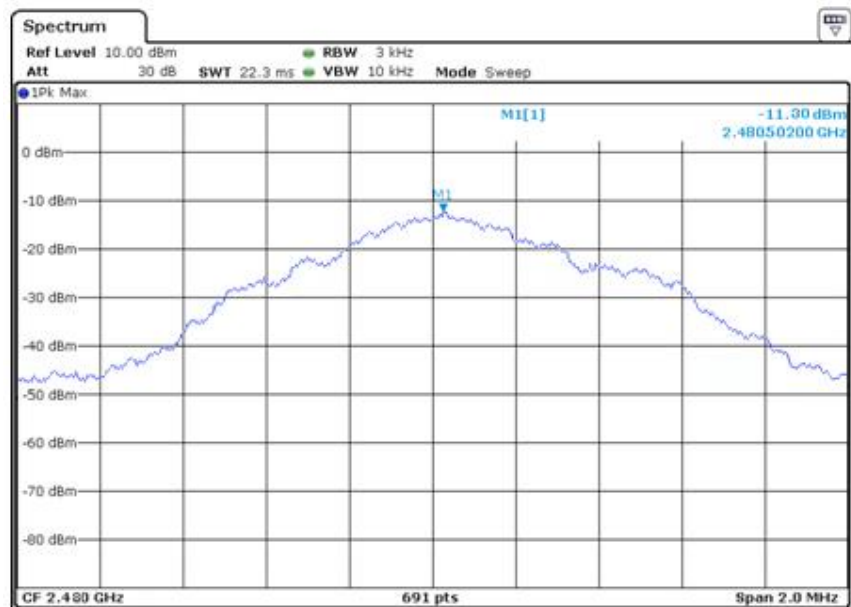


Conducted Output Power	Limit
-11.33 dBm	< 30dBm

Peak Output Power

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

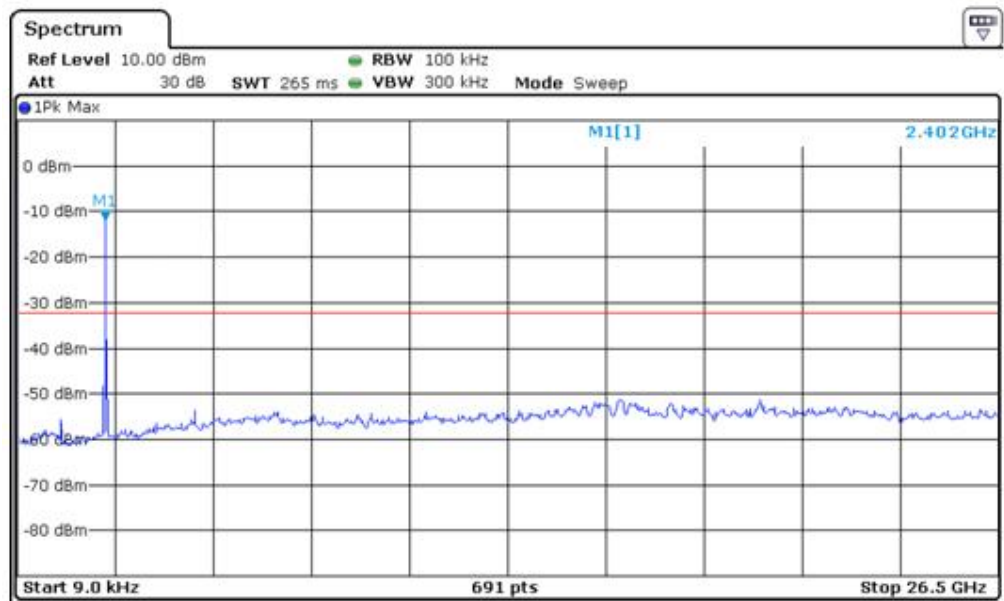
Test Result
☒ Passed
☐ Not Passed



Conducted Output Power	Limit
-11.30 dBm	< 30dBm

7.4 Spurious Emissions at Antenna Terminals

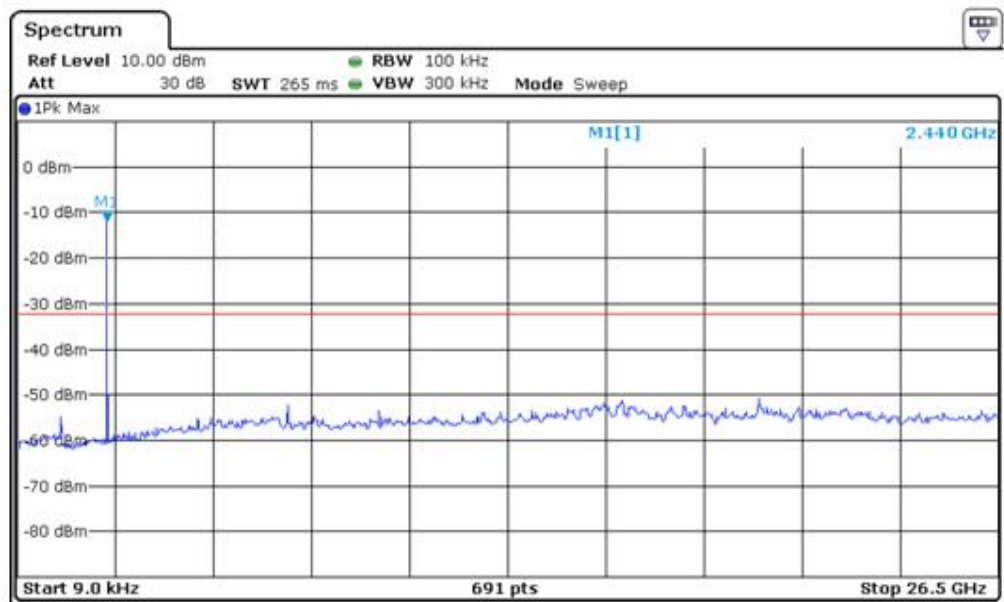
EUT:	HRMBLEM	Test Result ☒ Passed ☐ Not Passed
Op Condition:	Operated, TX Mode (2402MHz)	
Test Specification:	FCC2.1051 & 15.247(d)	
Comment:	3.0VDC	
Remark:	9kHz to 26.5GHz	



Spurious Emissions at Antenna Terminals

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

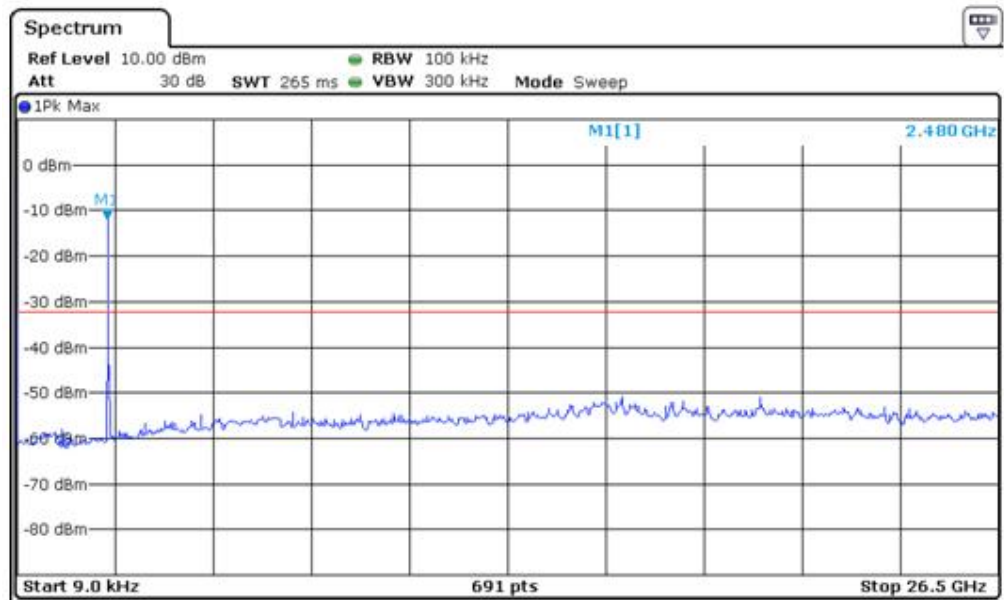
Test Result	
☒	Passed
☐	Not Passed



Spurious Emissions at Antenna Terminals

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

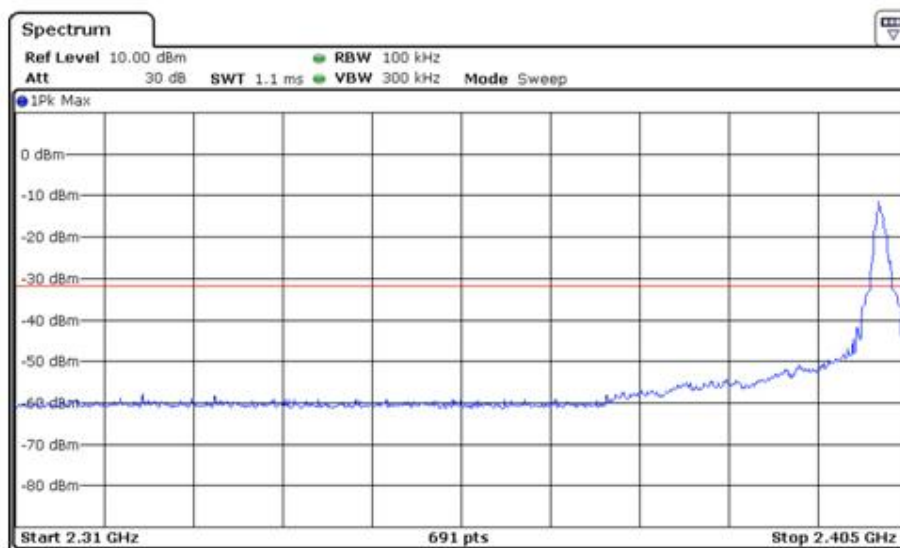
Test Result	
☒	Passed
☐	Not Passed



7.5 100kHz Bandwidth of band edges

EUT: HRMBLEM
 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	-11.30 dBm
2.390 GHz	-50.42 dBm

Band edges	Limit
39.12 dB	> 20dB

100kHz Bandwidth of band edges

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

Test Result
☒ Passed
☐ Not Passed

Band	Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector
Low	2390.000	45.03	74	-28.97	Peak
Low	2390.000	30.58	54	-23.42	Average

100kHz Bandwidth of band edges

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

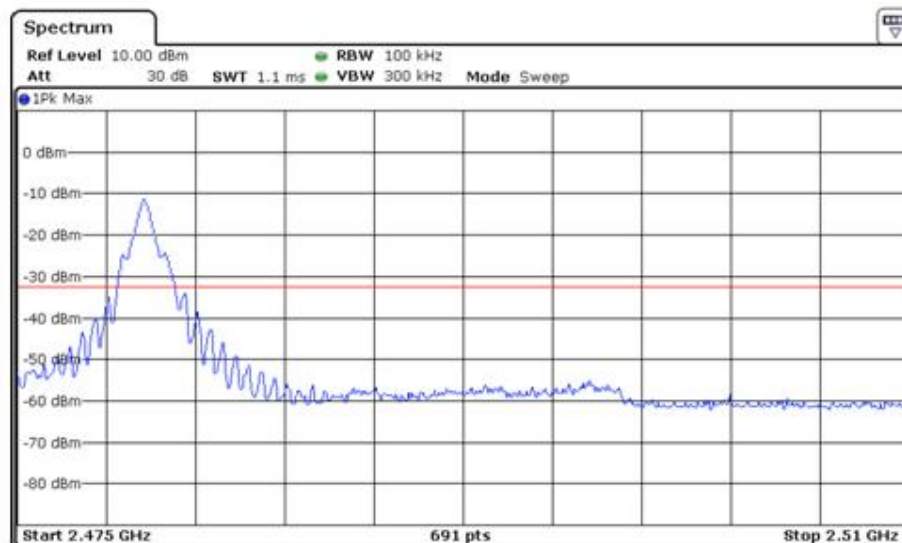
Test Result
☒ Passed
☐ Not Passed

Band	Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Detector
Low	2390.000	44.01	74	-29.99	Peak
Low	2390.000	30.33	54	-23.67	Average

100kHz Bandwidth of band edges

EUT: HRMBLEM
 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	-11.30 dBm
2.4835 GHz	-50.62 dBm

Band edges	Limit
-39.32 dB	> 20dB

100kHz Bandwidth of band edges

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

Test Result	
☒	Passed
☐	Not Passed

Band	Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector
High	2483.500	44.98	74	-29.02	Peak
High	2483.500	31.43	54	-22.57	Average

100kHz Bandwidth of band edges

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

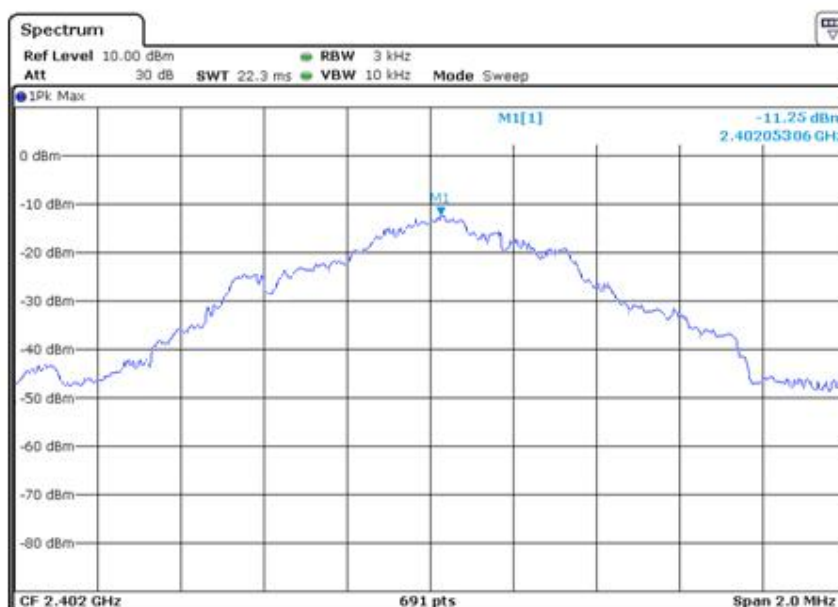
Test Result	
☒	Passed
☐	Not Passed

Band	Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector
High	2483.500	44.53	74	-29.47	Peak
High	2483.500	31.26	54	-22.74	Average

7.6 Power Spectral Density

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

Test Result	
☒	Passed
☐	Not Passed

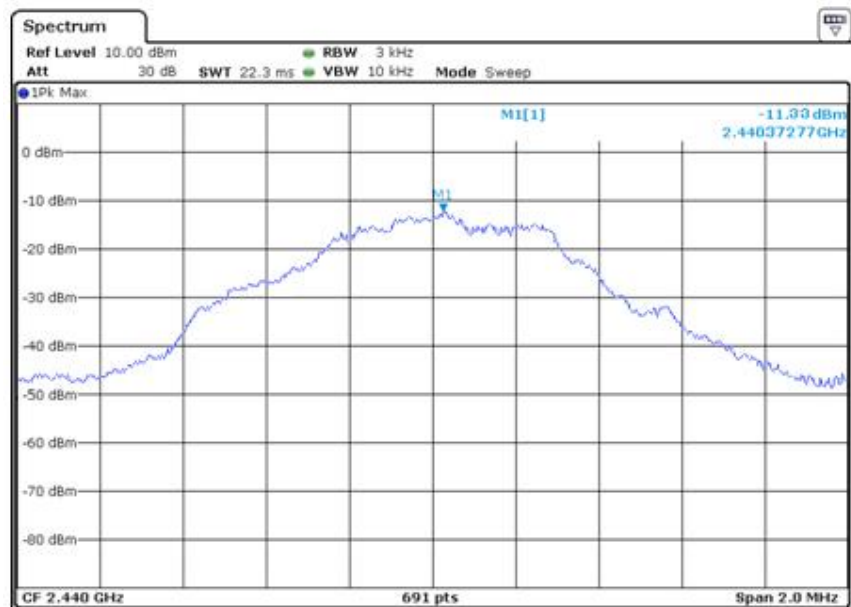


Frequency	PSD	Result
2402MHz	-11.25 dBm / 3kHz	< 8 dBm / 3 kHz

Power Spectral Density

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

Test Result
☒ Passed
☐ Not Passed

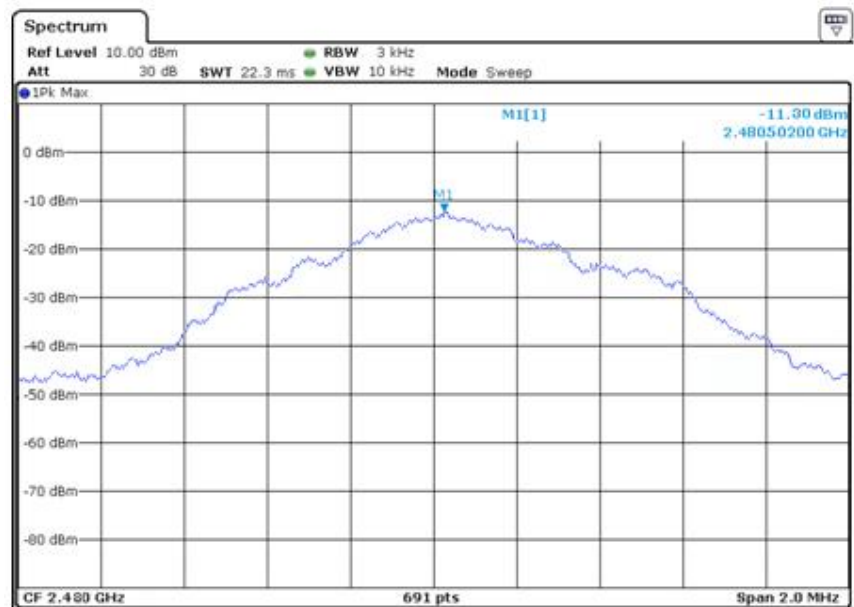


Frequency	PSD	Result
2440MHz	-11.33 dBm / 3kHz	< 8 dBm / 3 kHz

Power Spectral Density

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

Test Result
☒ Passed
☐ Not Passed



Frequency	PSD	Result
2480MHz	-11.30 dBm / 3kHz	< 8 dBm / 3 kHz

7.7 Antenna Requirement

EUT: HRMBLEM
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 0 dBi.

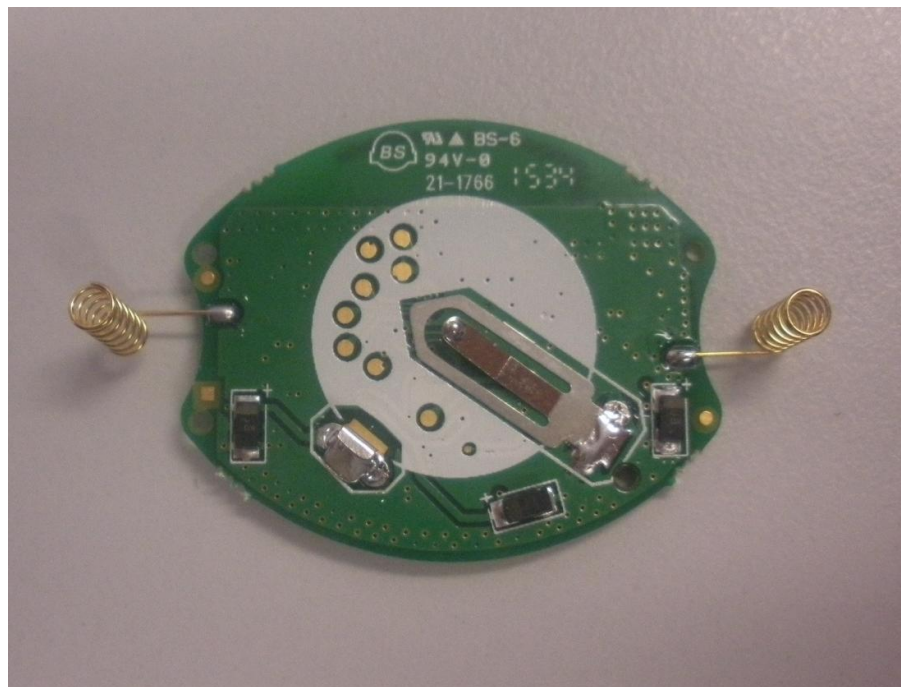
8 Appendix A - Photographs of EUT



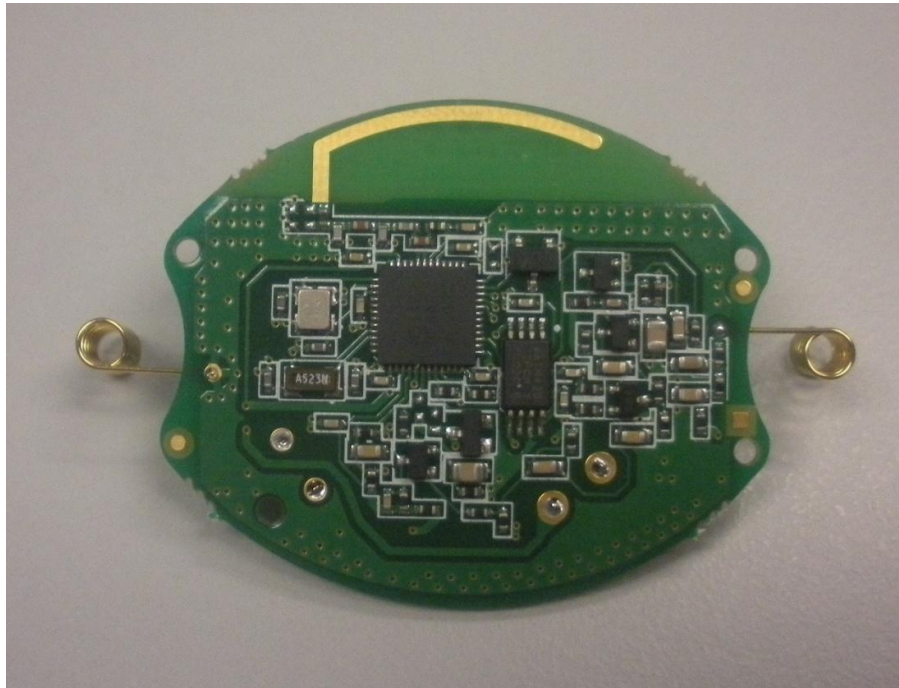
Appendix A



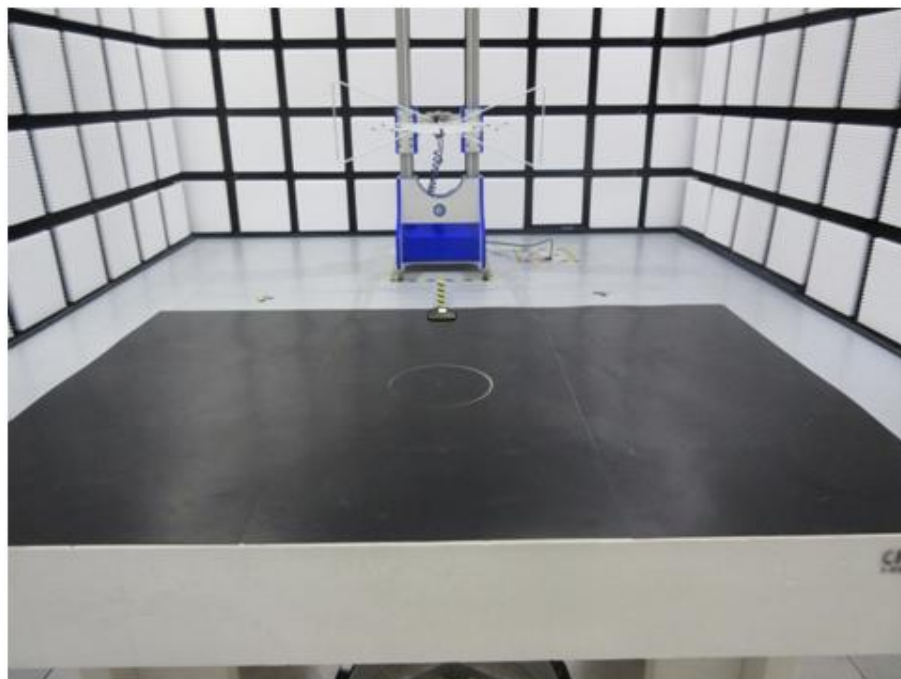
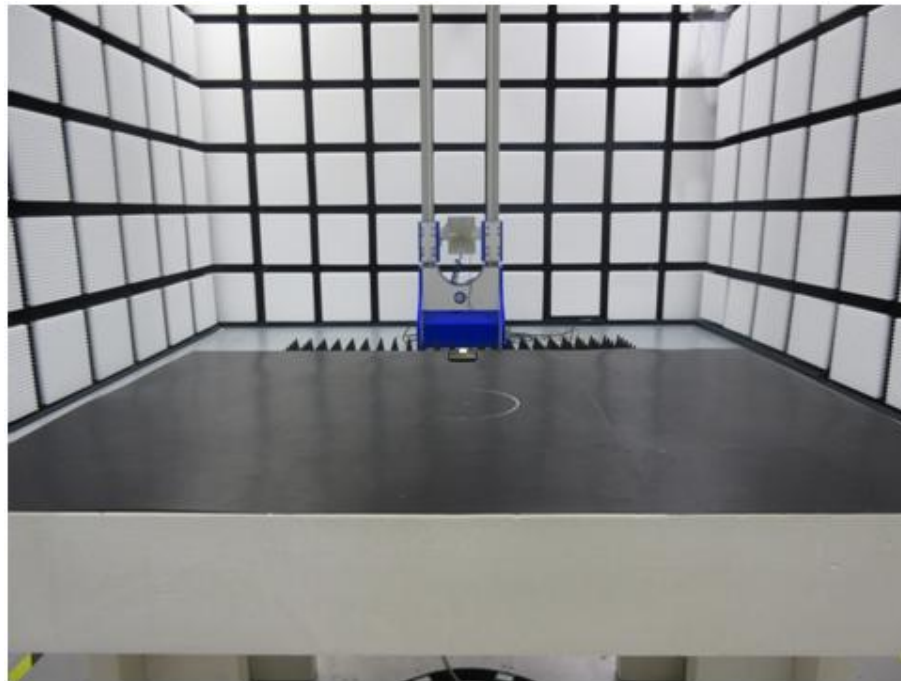
Appendix A



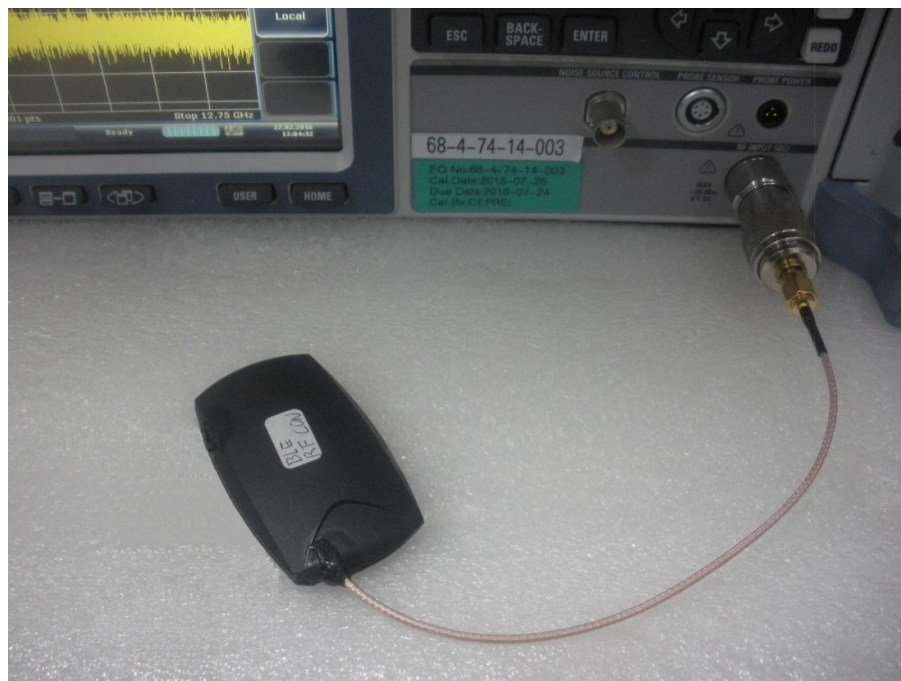
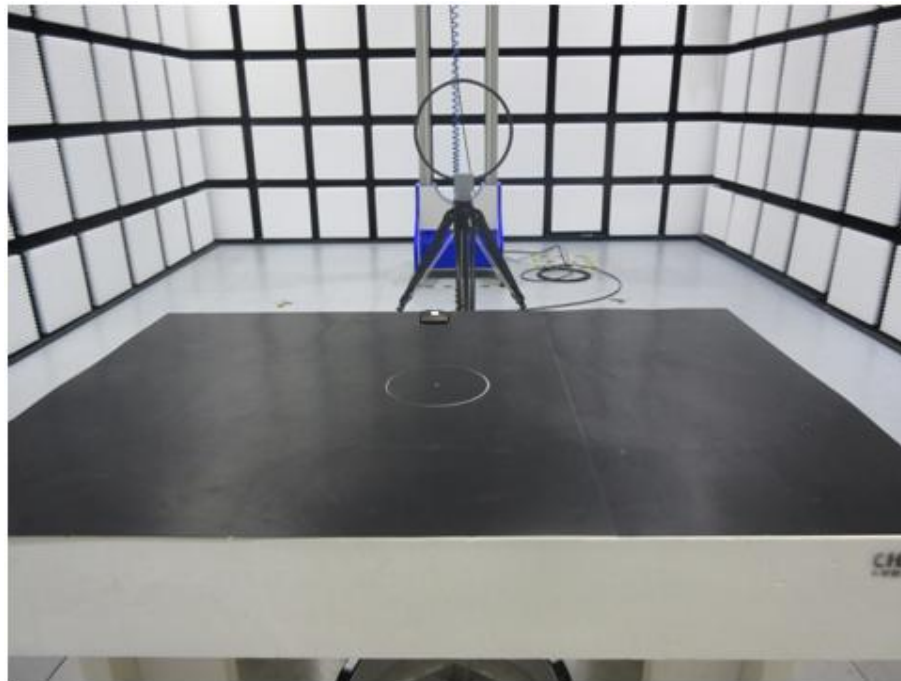
Appendix A



9 Appendix B - Setup Photographs of EUT



Appendix B



10 Appendix C - General Product Information

Radiofrequency radiation exposure evaluation

According to KDB 447498 D01v06 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 2.402GHz = 0.0749 mW EIRP

Power at 2.440GHz = 0.0736 mW EIRP

Power at 2.480GHz = 0.0741 mW EIRP

$[(0.0749 \text{ mW}) / (5 \text{ mm})] \cdot [\text{sqrt}(2.402 \text{ GHz})] = 0.02321$ which is ≤ 3.0 for 1-g SAR.

$[(0.0736 \text{ mW}) / (5 \text{ mm})] \cdot [\text{sqrt}(2.440 \text{ GHz})] = 0.02299$ which is ≤ 3.0 for 1-g SAR.

$[(0.0741 \text{ mW}) / (5 \text{ mm})] \cdot [\text{sqrt}(2.480 \text{ GHz})] = 0.02333$ 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 < 50 mm. (Manufacturer specified the separation distance is: less than 5mm)

>> The power of EUT measured is:

- For 2402MHz: $0.0749\text{mW} = 10 \log(0.0749) \text{ dBm} \sim -11.25\text{dBm}$
- For 2440MHz: $0.0736\text{mW} = 10 \log(0.0736) \text{ dBm} \sim -11.33\text{dBm}$
- For 2480MHz: $0.0741\text{mW} = 10 \log(0.0741) \text{ dBm} \sim -11.30\text{dBm}$