China

FCC - TEST REPORT

Report Number	:	60.790.16.015.01R01	Date of Issue	: March 19, 2016
Model	:	BKM5AB		
Product Type	:	**Bike Speed/Cadence Sensor with ANT+/BLE**		
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		

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2 Description of Equipment Under Test

Description of the Equipment Under Test

Product:	Bike Speed/Cadence Sensor with ANT+/BLE
Model no.:	BKM5AB
FCC ID:	O4GBKM5AB
Rating:	3.0VDC (1 x 3.0VDC size “CR2032“ batteries)
Frequency:	2402MHz-2480MHz
Antenna gain:	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 10-1-14 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.
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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

Site 2:

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

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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: March 14, 2016

Testing Start Date: March 15, 2016

Testing End Date: March 18, 2016

- 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: BKM5AB
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
49.842	15.30	40	-24.70	Quasi Peak
95.167	12.23	43.5	-31.27	Quasi Peak
280.439	15.87	46	-30.13	Quasi Peak
855.762	24.13	46	-21.87	Quasi Peak
4804.218	61.02	74	-12.98	Peak
4804.218	40.51	54	-13.49	Average
7206.512	55.07	74	-18.93	Peak
7206.512	43.12	54	-10.88	Average

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Spurious Radiated Emission

EUT:	BKM5AB
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
50.459	15.24	40	-24.76	Quasi Peak
100.890	16.53	43.5	-26.97	Quasi Peak
280.513	16.77	46	-29.23	Quasi Peak
723.600	20.36	46	-25.64	Quasi Peak
4803.486	56.43	74	-17.57	Peak
4803.486	40.44	54	-13.56	Average
7205.968	54.57	74	-19.43	Peak
7205.968	43.26	54	-10.74	Average

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Spurious Radiated Emission

EUT: BKM5AB
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
49.842	15.30	40	-24.70	Quasi Peak
95.167	12.23	43.5	-31.27	Quasi Peak
280.439	15.87	46	-30.13	Quasi Peak
855.762	24.13	46	-21.87	Quasi Peak
4879.312	56.08	74	-17.92	Peak
4879.312	40.51	54	-13.49	Average

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Spurious Radiated Emission

EUT: BKM5AB
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
50.459	15.24	40	-24.76	Quasi Peak
100.890	16.53	43.5	-26.97	Quasi Peak
280.513	16.77	46	-29.23	Quasi Peak
723.600	20.36	46	-25.64	Quasi Peak
4879.687	52.43	74	-21.57	Peak
4879.687	40.43	54	-13.57	Average

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Spurious Radiated Emission

EUT: BKM5AB
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
49.842	15.30	40	-24.70	Quasi Peak
95.167	12.23	43.5	-31.27	Quasi Peak
280.439	15.87	46	-30.13	Quasi Peak
855.762	24.13	46	-21.87	Quasi Peak
4959.843	54.75	74	-19.25	Peak
4959.843	40.83	54	-13.17	Average

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Spurious Radiated Emission

EUT: BKM5AB
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
50.459	15.24	40	-24.76	Quasi Peak
100.890	16.53	43.5	-26.97	Quasi Peak
280.513	16.77	46	-29.23	Quasi Peak
723.600	20.36	46	-25.64	Quasi Peak
4959.750	53.25	74	-20.75	Peak
4959.750	40.99	54	-13.01	Average

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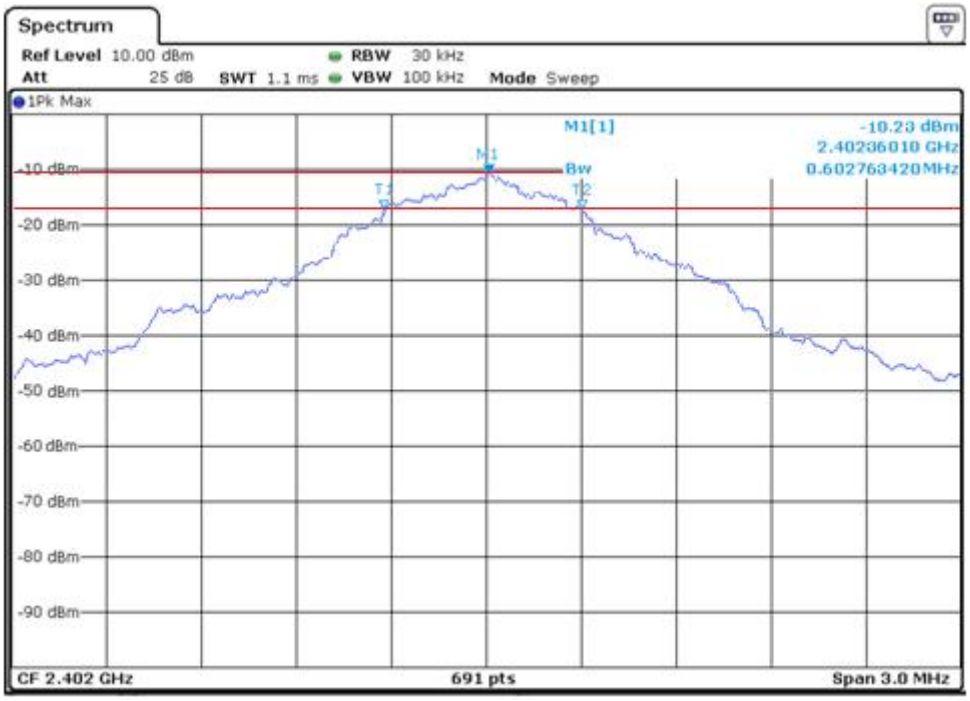
7.2 6dB & 99% Bandwidth

EUT: BKM5AB
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
602.763 kHz	> 500 kHz

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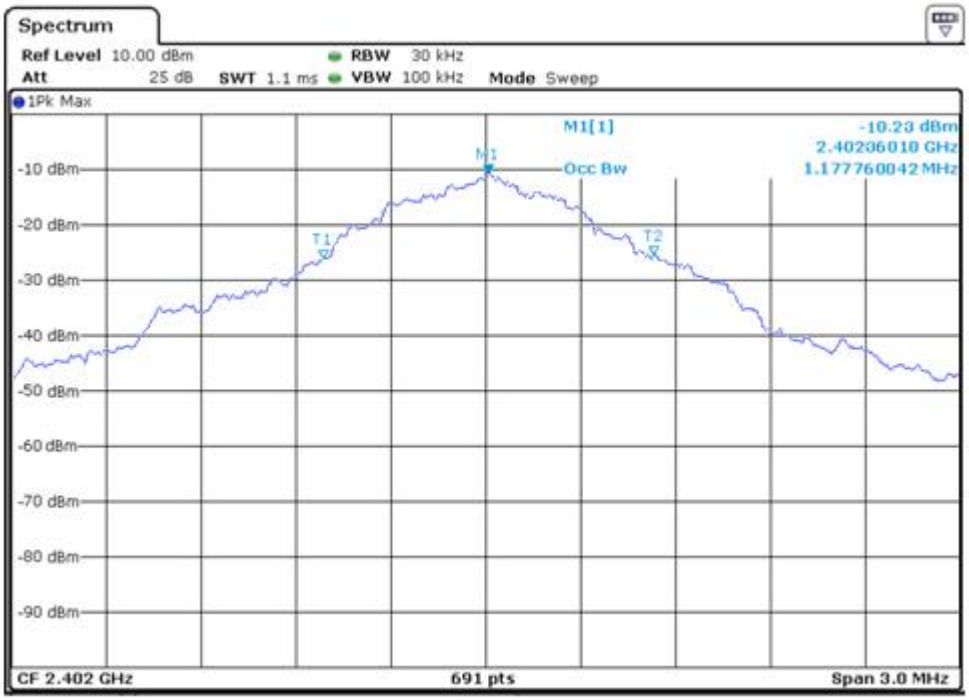
6dB & 99% Bandwidth

EUT:	BKM5AB
Op Condition:	Operated, TX Mode (2402MHz)
Test Specification:	FCC15.247(a)(2), 99% Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



99% bandwidth
1177.760 kHz

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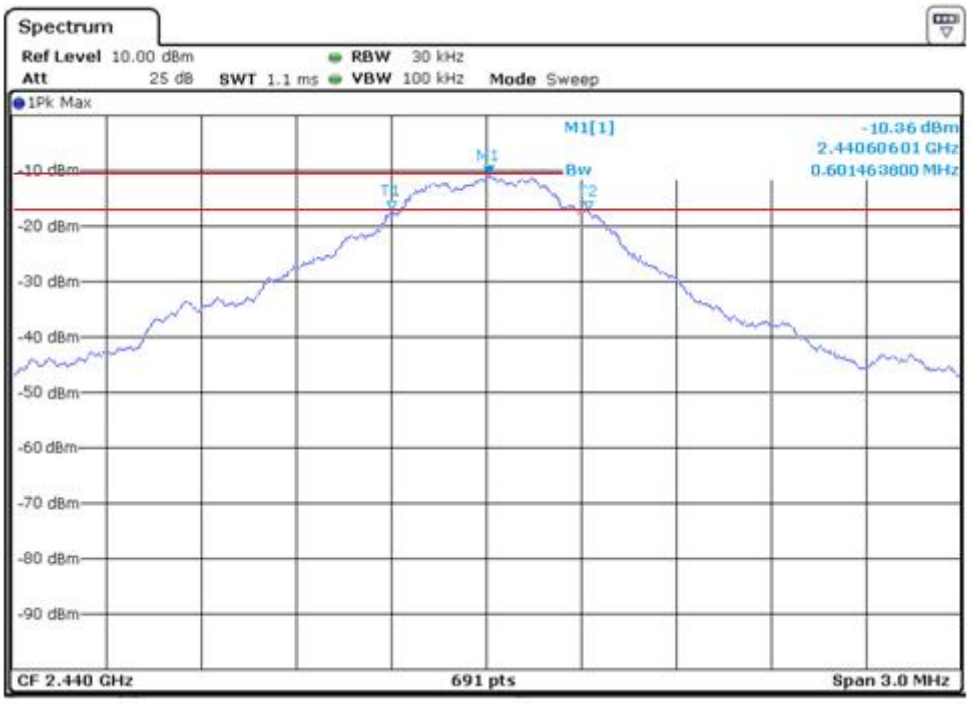
6dB & 99% Bandwidth

EUT:	BKM5AB
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
601.463 kHz	> 500 kHz

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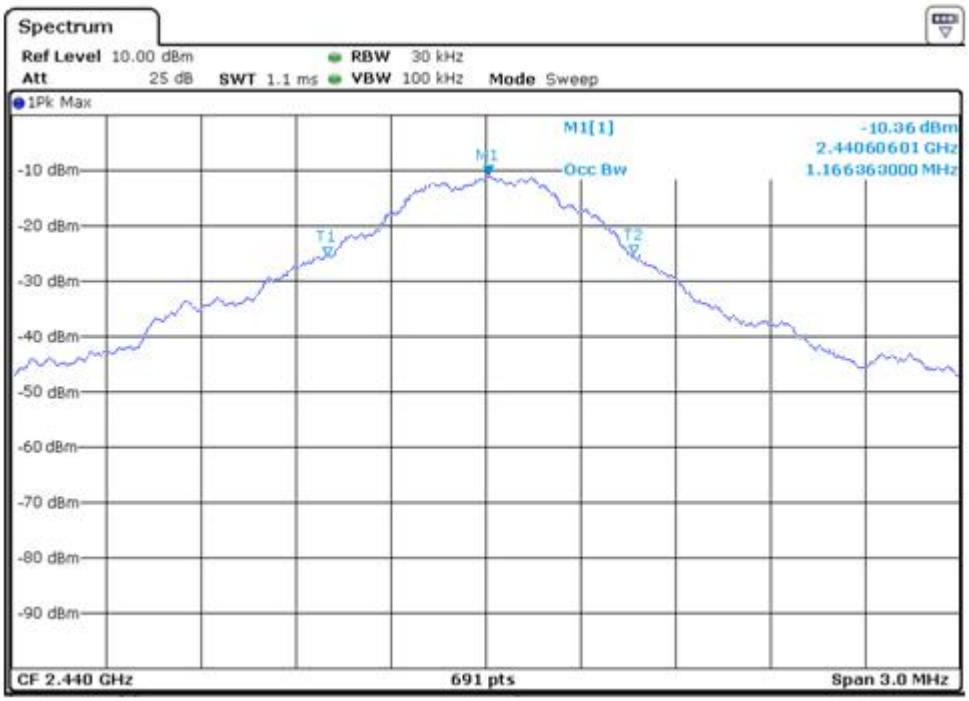
6dB & 99% Bandwidth

EUT:	BKM5AB
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC15.247(a)(2), 99% Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



99% bandwidth
1166.363 kHz

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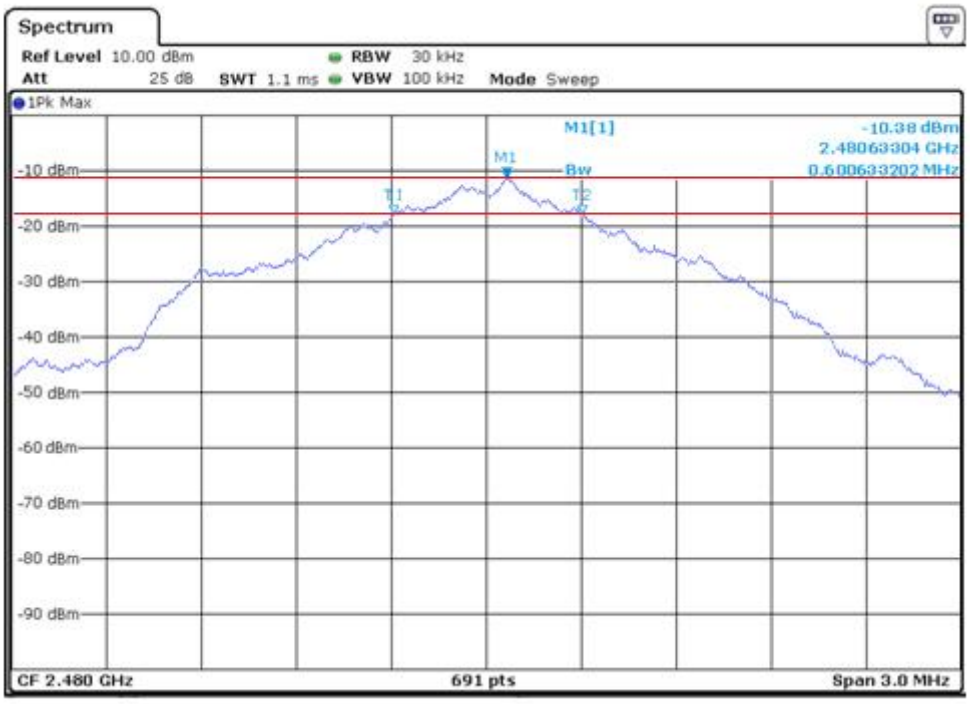
6dB & 99% Bandwidth

EUT:	BKM5AB
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
600.633 kHz	> 500 kHz

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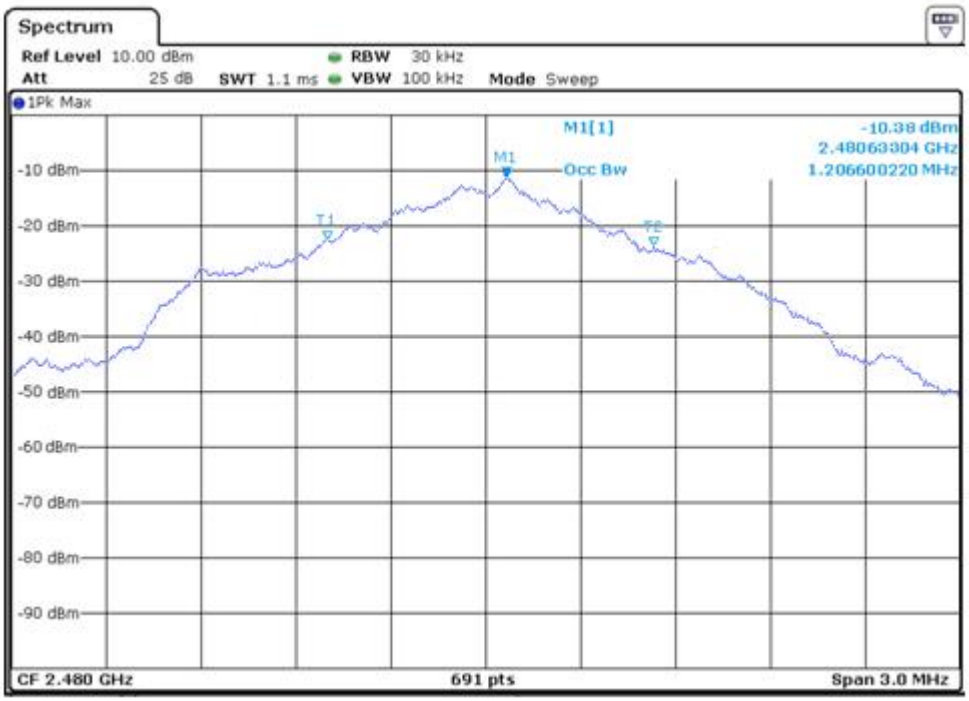
6dB & 99% Bandwidth

EUT:	BKM5AB
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC15.247(a)(2), 99% Bandwidth
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



99% bandwidth
1206.600 kHz

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7.3 Peak Output Power

EUT: BKM5AB
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.247(b)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Conducted Output Power	Limit
-10.23 dBm	< 30dBm

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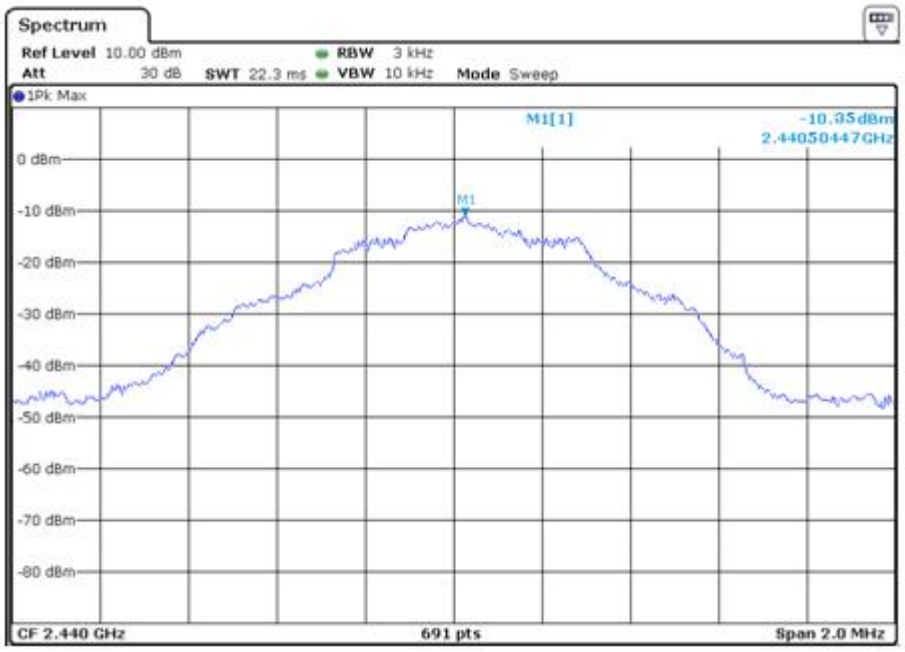
Peak Output Power

EUT:	BKM5AB
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC15.247(b)
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



Conducted Output Power	Limit
-10.35 dBm	< 30dBm

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Peak Output Power

EUT: BKM5AB
Op Condition: Operated, TX Mode (2480MHz)
Test Specification: FCC15.247(b)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Conducted Output Power	Limit
-10.34 dBm	< 30dBm

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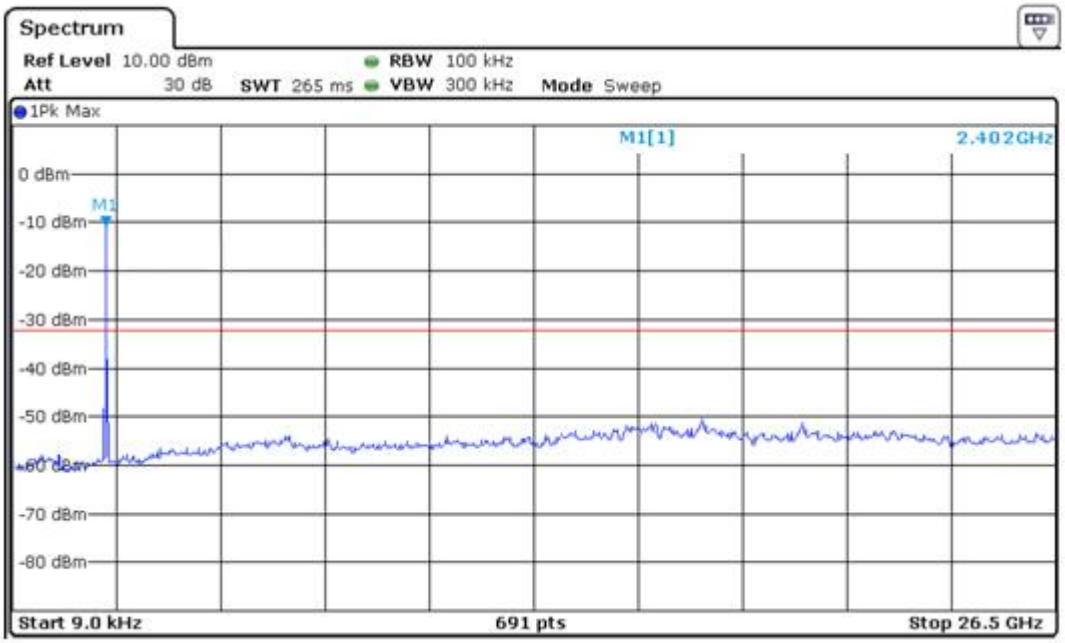
7.4 Spurious Emissions at Antenna Terminals

EUT:	BKM5AB
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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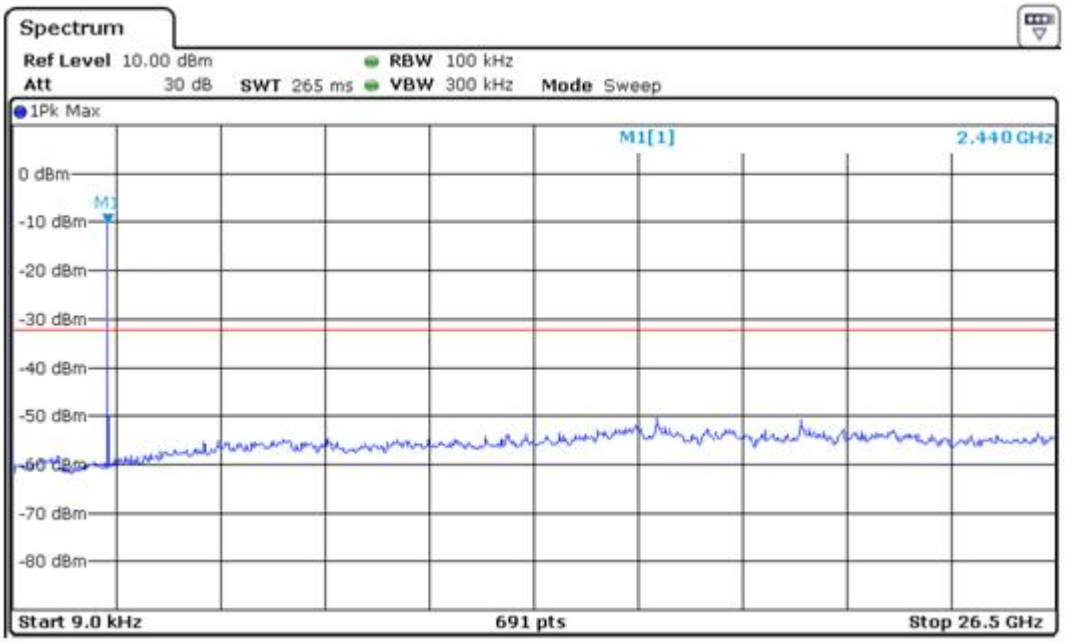
Spurious Emissions at Antenna Terminals

EUT:	BKM5AB
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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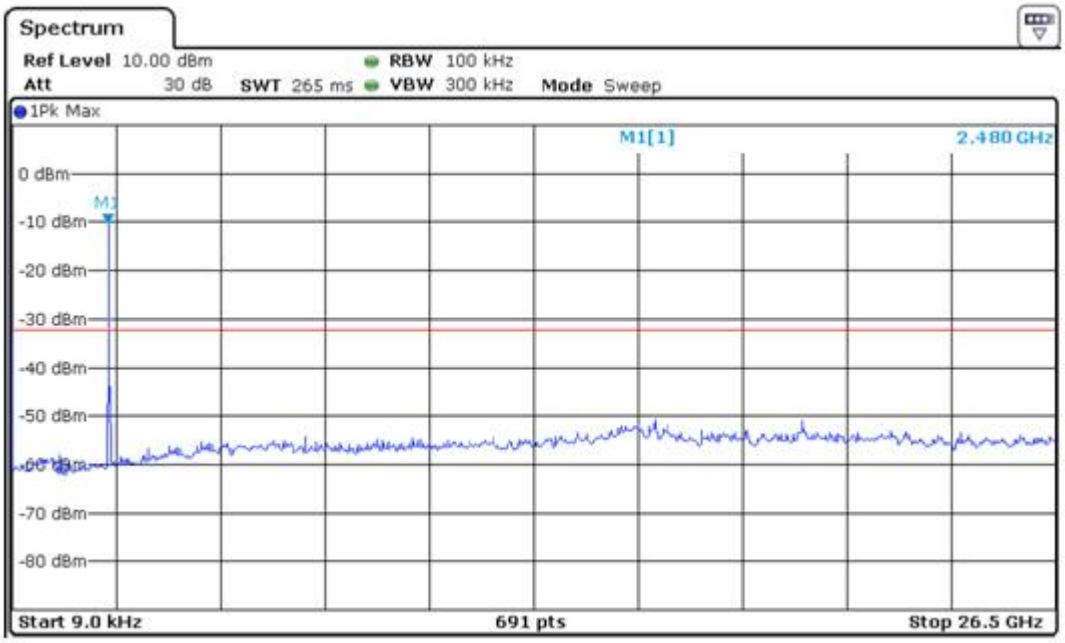
Spurious Emissions at Antenna Terminals

EUT:	BKM5AB
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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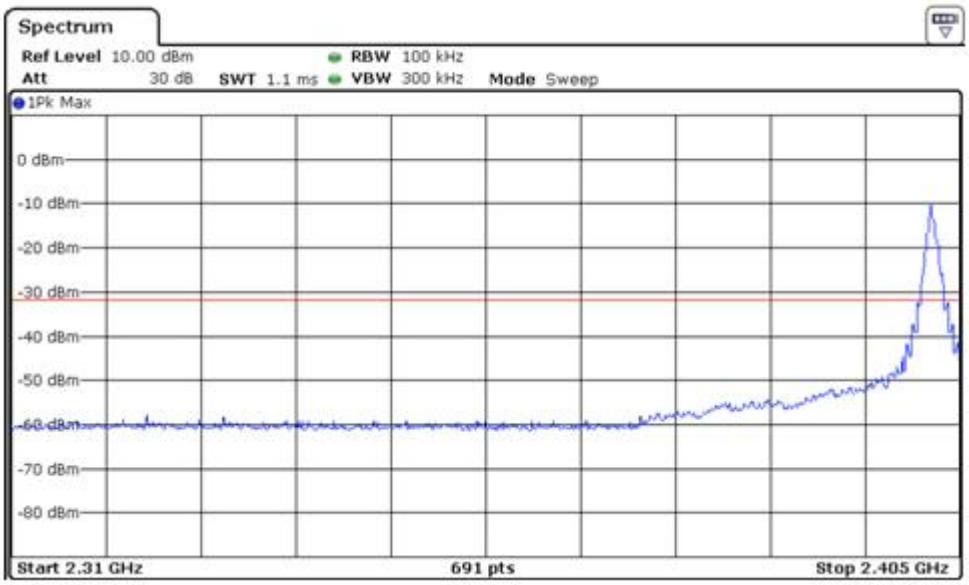
7.5 100kHz Bandwidth of band edges

EUT:	BKM5AB
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	-10.25 dBm
2.390 GHz	-51.13 dBm

Band edges	Limit
-40.88 dB	> 20dB

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100kHz Bandwidth of band edges

EUT: BKM5AB
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 dBµV/m	Limit dBµV/m	Margin dB	Detector
Low	2390.000	42.27	74	-31.73	Peak
Low	2390.000	31.52	54	-22.48	Average

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100kHz Bandwidth of band edges

EUT: BKM5AB
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	41.67	74	-32.33	Peak
Low	2390.000	30.85	54	-23.15	Average

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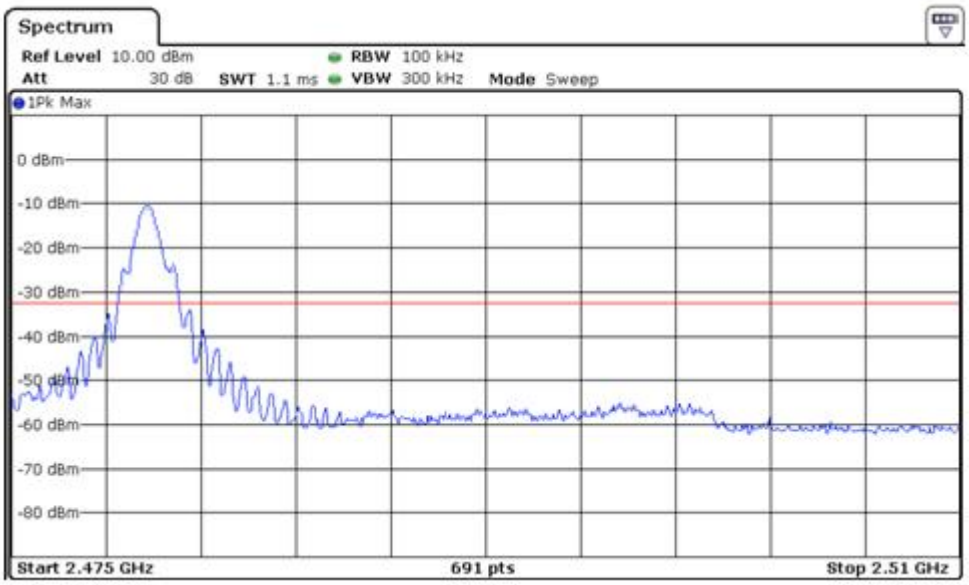
100kHz Bandwidth of band edges

EUT:	BKM5AB
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	-10.38 dBm
2.4835 GHz	-50.43 dBm

Band edges	Limit
-40.05 dB	> 20dB

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100kHz Bandwidth of band edges

EUT:	BKM5AB
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 dBµV/m	Limit dBµV/m	Margin dB	Detector
High	2483.500	45.22	74	-28.78	Peak
High	2483.500	32.03	54	-21.97	Average

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100kHz Bandwidth of band edges

EUT: BKM5AB
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 dBµV/m	Limit dBµV/m	Margin dB	Detector
High	2483.500	44.43	74	-29.57	Peak
High	2483.500	31.55	54	-22.45	Average

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7.6 Power Spectral Density

EUT: BKM5AB
Op Condition: Operated, TX Mode (2402MHz)
Test Specification: FCC15.247(e)
Comment: 3.0VDC

Test Result
☒ Passed
☐ Not Passed

Frequency	PSD	Result
2402MHz	-10.23 dBm / 3kHz	< 8 dBm / 3 kHz

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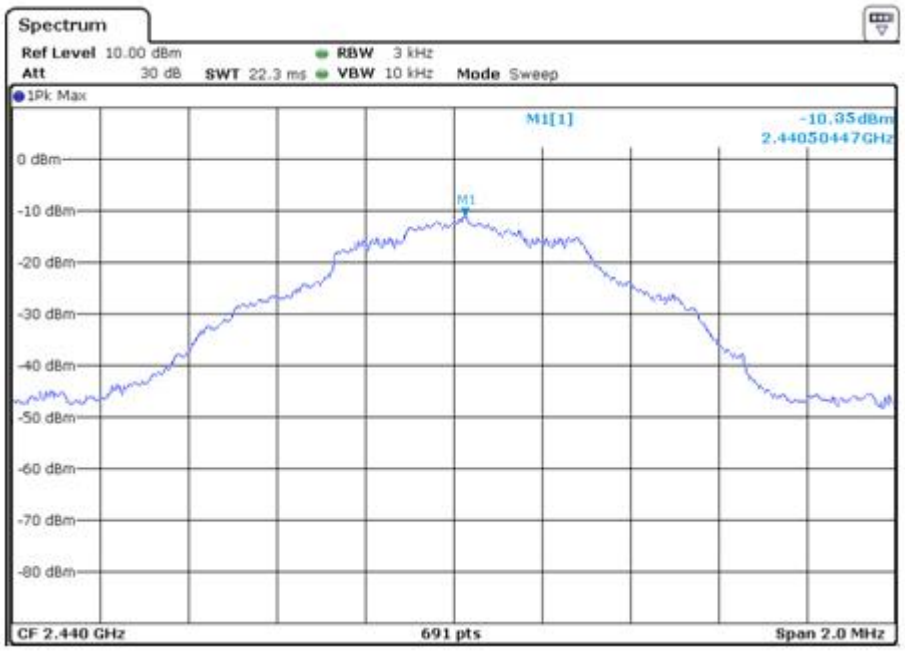
Power Spectral Density

EUT:	BKM5AB
Op Condition:	Operated, TX Mode (2440MHz)
Test Specification:	FCC15.247(e)
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed



Frequency	PSD	Result
2440MHz	-10.35 dBm / 3kHz	< 8 dBm / 3 kHz

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Power Spectral Density

EUT:	BKM5AB
Op Condition:	Operated, TX Mode (2480MHz)
Test Specification:	FCC15.247(e)
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed

Frequency	PSD	Result
2480MHz	-10.34 dBm / 3kHz	< 8 dBm / 3 kHz

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7.7 Antenna Requirement

EUT:	BKM5AB
Op Condition:	Operated, TX Mode
Test Specification:	FCC15.203 & 15.247(b)
Comment:	3.0VDC

Test Result
☒ Passed
☐ Not Passed

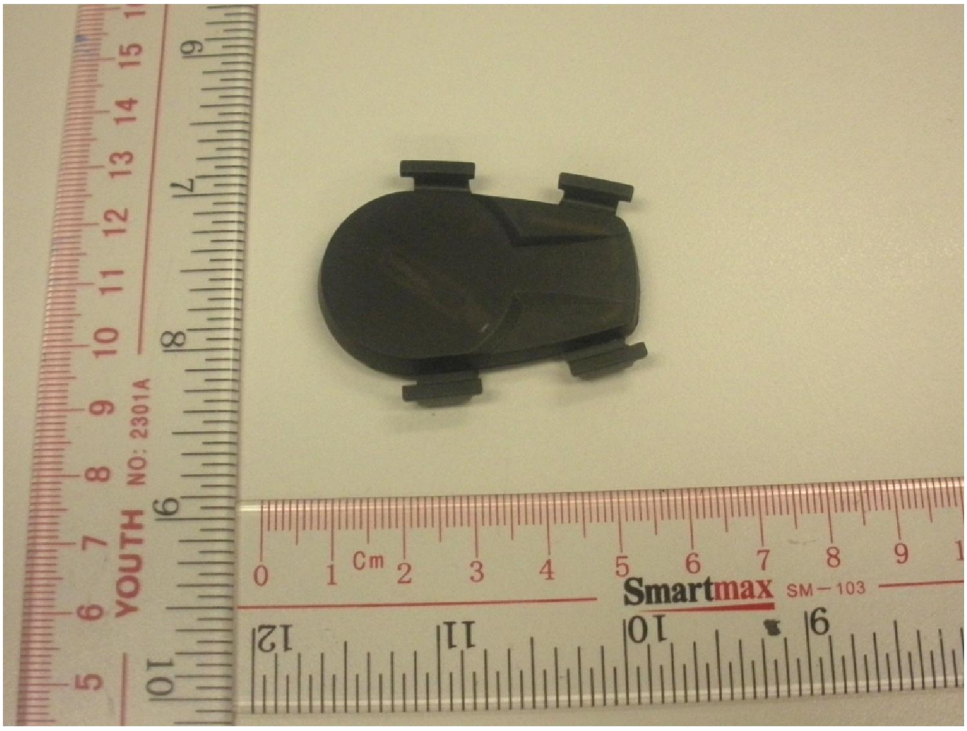
Limit

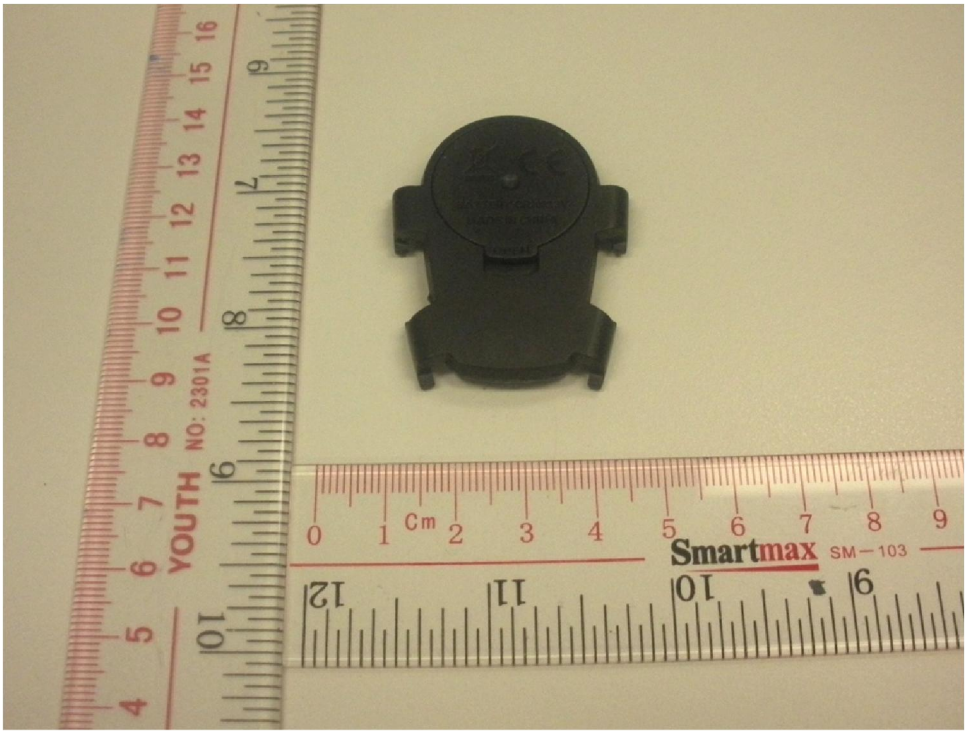
For intentional device, according to FCC Title 47 Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC Title 47 Part 15.247(b), if transmitting antennas of directional gain 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





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Appendix A

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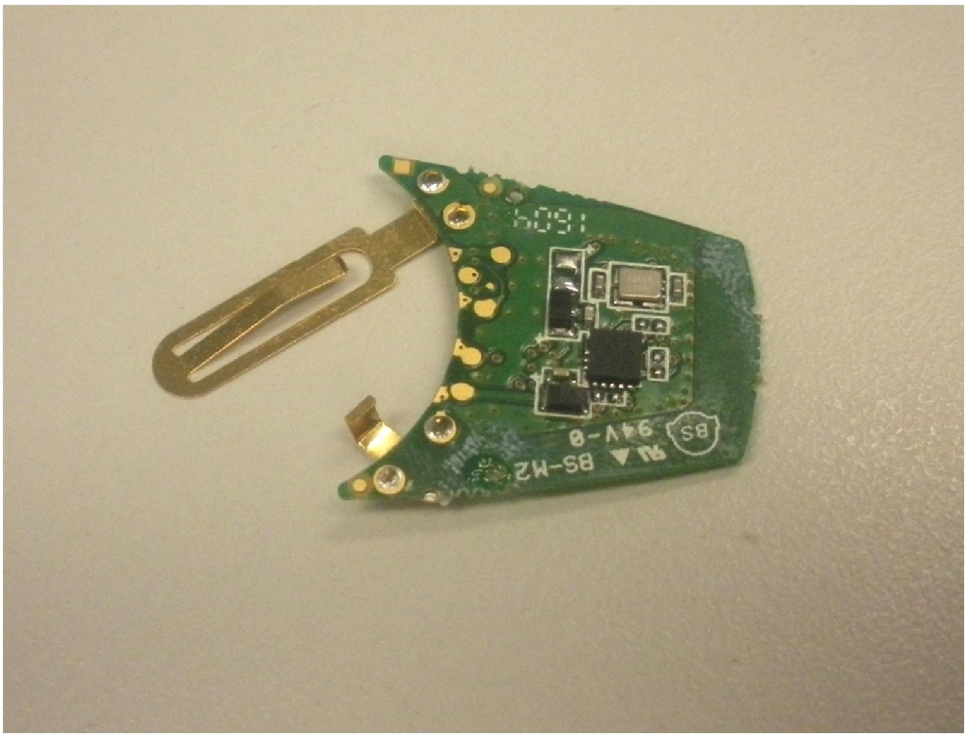
Appendix A



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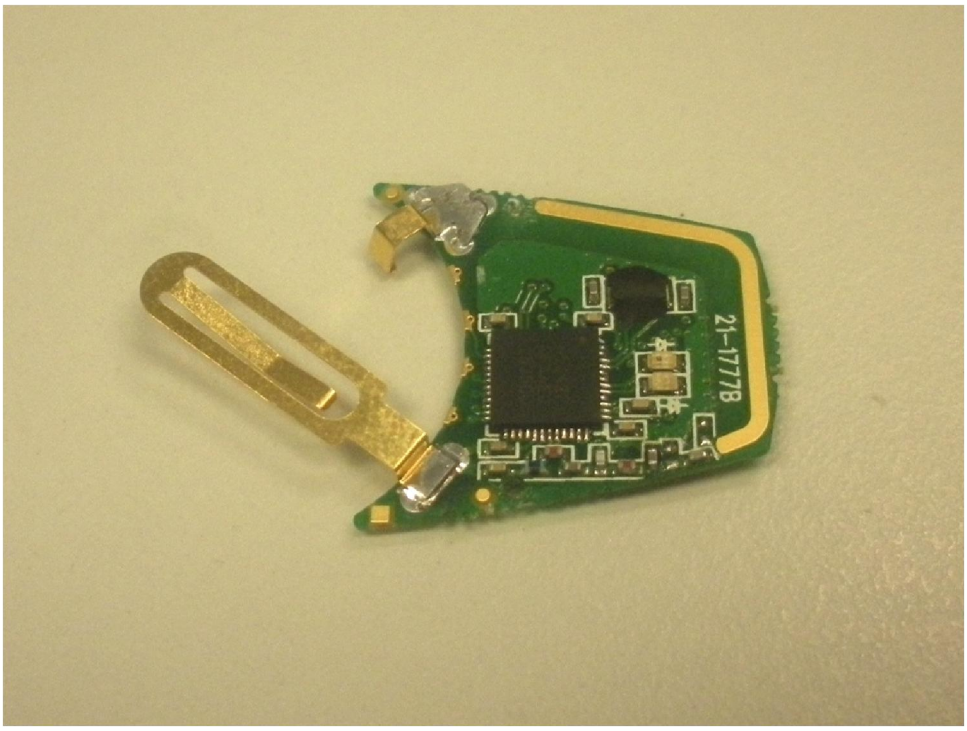
Appendix A



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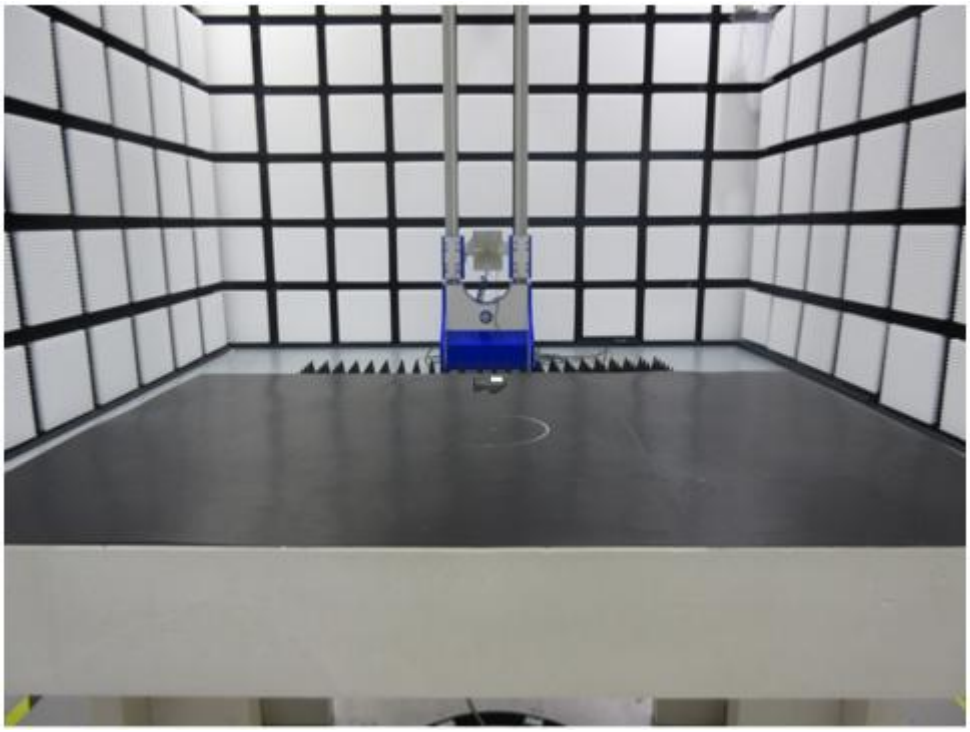
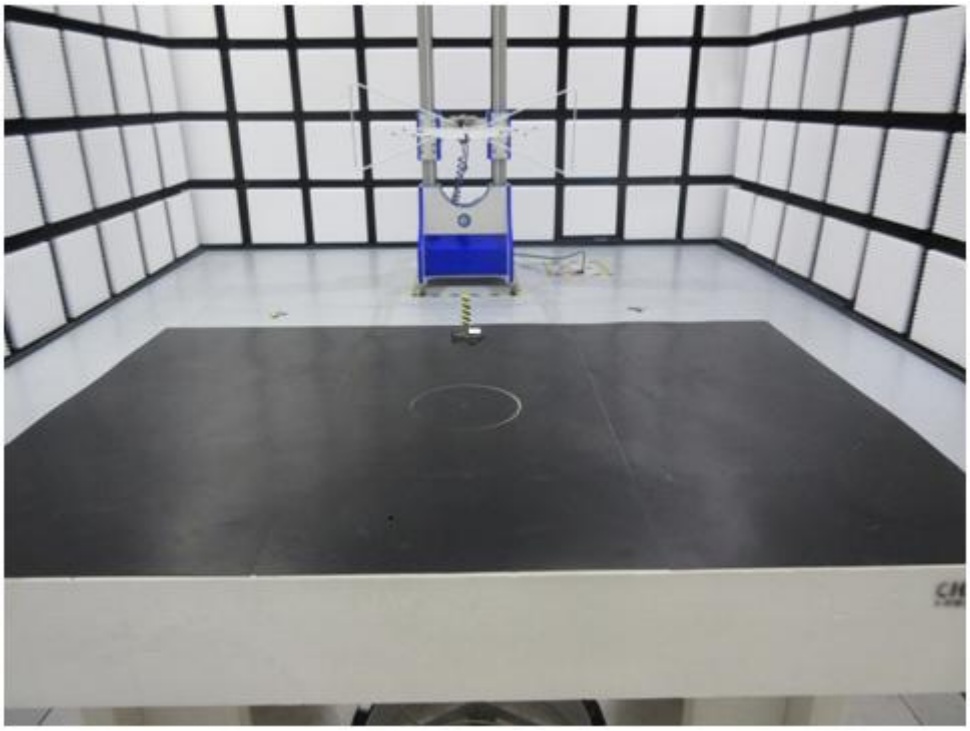
9 Appendix B - Setup Photographs of EUT





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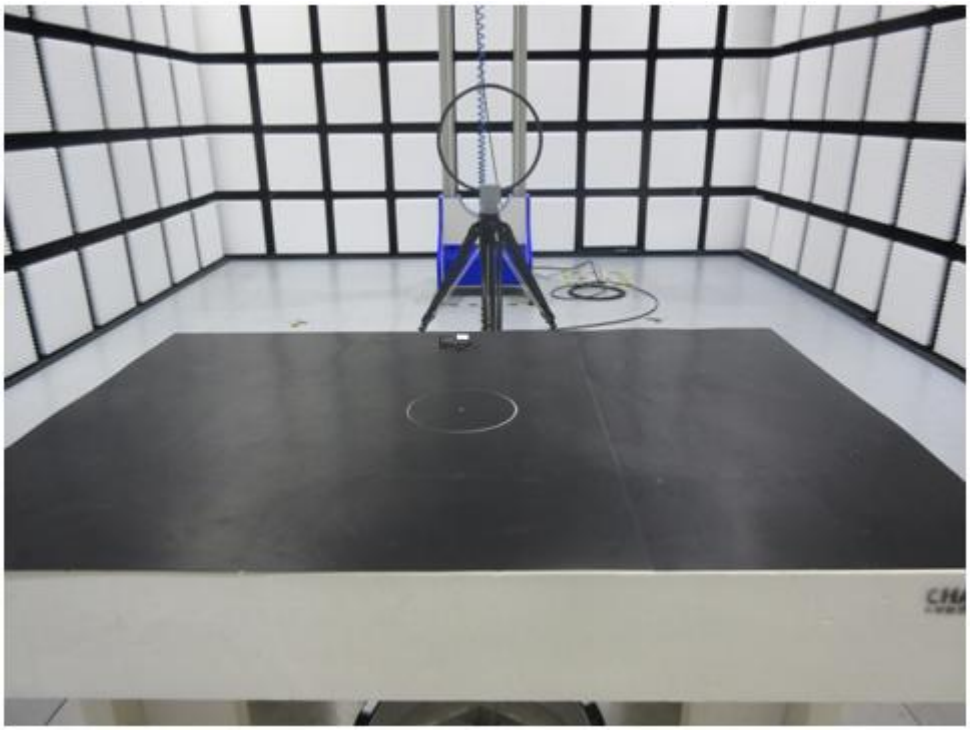
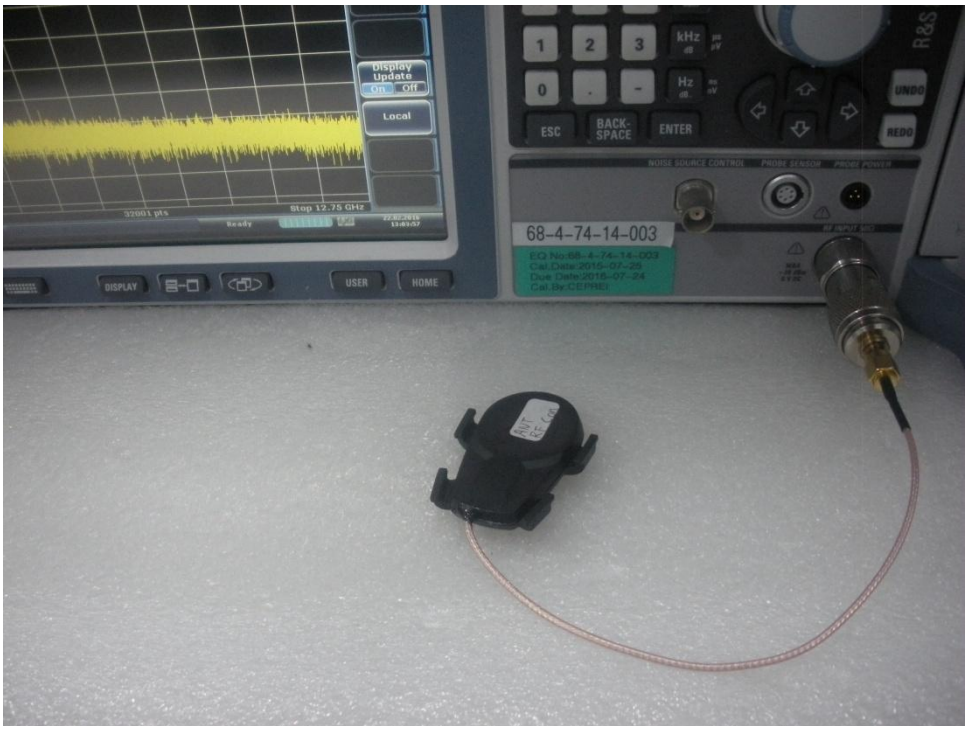
Appendix B





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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 = 0.0948 mW EIRP
Power at 2.440GHz = 0.0922 mW EIRP
Power at 2.480GHz = 0.0924 mW EIRP

[(0.0948 mW) / (20 mm)] · [sqrt (2.402 GHz)] = 0.007346 which is ≤ 3.0 for 1-g SAR.
[(0.0922 mW) / (20 mm)] · [sqrt (2.440 GHz)] = 0.007201 which is ≤ 3.0 for 1-g SAR.
[(0.0924 mW) / (20 mm)] · [sqrt (2.480 GHz)] = 0.007275 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 specified the separation distance is: 20mm)

>> The power of EUT measured is:

- For 2402MHz: 0.0948mW = 10 log (0.0948) dBm ~ -10.23dBm
- For 2440MHz: 0.0922mW = 10 log (0.0922) dBm ~ -10.35dBm
- For 2480MHz: 0.0924mW = 10 log (0.0924) dBm ~ -10.34dBm

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