

FCC TEST REPORT

**Test report
On Behalf of
SPORTident GmbH
For
SPORTident Active Card
Model No.: SIAC
FCC ID: 2AIOJ-SIAC**

Prepared for : SPORTident GmbH
Markt14, D-99310 Arnstadt, Thuringia, Germany

Prepared By : WST Certification & Testing (HK) Limited
12/F., San Toi Building, 137-139 Connaught Road Central, Hong Kong

Date of Test: May 21, 2016 ~ May 29, 2016

Date of Report: May 30, 2016

Report Number: WST160524109-E

TEST RESULT CERTIFICATION

Applicant's name : SPORTident GmbH

Address : Markt14, D-99310 Arnstadt, Thuringia, Germany

Manufacture's Name : Smart Ease Industrial Limited

Address : Room A03, 2/F, Block A, Pak Fook Industrial Building, 615-617 Tai
Nan West Street, Lai Chi Kok, Kowloon, Hong Kong.

Product description

Trade Mark: SPORTident

Product name : SPORTident Active Card

Model and/or type reference : SIAC

Standards : FCC Rules and Regulations Part 15 Subpart C Section 15.249
ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the WST Certification & Testing (HK) Limited is acknowledged as copyright owner and source of the material. WST Certification & Testing (HK) Limited takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test :

Date (s) of performance of tests : **May 21, 2016 ~ May 29, 2016**

Date of Issue : **May 30, 2016**

Test Result : Pass

Testing Engineer :



(Eric Xie)

Technical Manager :



(Dora Qin)

Authorized Signatory :



(Kait Chen)

Table of Contents	Page
1 . TEST SUMMARY	4
2 . GENERAL INFORMATION	5
2.1 General Description of EUT	5
Operation of EUT during testing	6
2.2 Description of Test Setup	6
2.3 MEASUREMENT INSTRUMENTS LIST	7
3 . CONDUCTED EMISSIONS TEST	9
3.1 Conducted Power Line Emission Limit	9
3.2 Test Setup	9
3.3 Test Procedure	9
3.4 Test Result	9
4 RADIATED EMISSION TEST	10
4.1 Radiation Limit	10
4.2 Test Setup	10
4.3 Test Procedure	11
4.4 Test Result	11
5 BAND EDGE	14
5.1 Limits	14
5.2 Test Procedure	14
5.3 Test Result	14
6 OCCUPIED BANDWIDTH MEASUREMENT	17
6.1 Test Setup	17
6.2 Test Procedure	17
6.3 Measurement Equipment Used	17
6.4 Test Result	17
7 ANTENNA REQUIREMENT	19
8 PHOTOGRAPH OF TEST	20

1. TEST SUMMARY

1.1 Test Procedures And Results

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

1.2 Test Facility

Test Firm : Shenzhen WST Testing Technology Co., Ltd.
Certificated by FCC, Registration No.: 939433

Address : 1F, No.9 Building, TKG Science & Technology Park, Yangtian Rd.,
NO.72 Bao'an Dist., Shenzhen, Guangdong, China. 518101

1.3 Measurement Uncertainty

Measurement Uncertainty	
Conducted Emission Expanded Uncertainty	= 2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	= 3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	= 4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	= 4.06dB, k=2

2. GENERAL INFORMATION

2.1 General Description of EUT

Equipment	SPORTident Active Card
Model Name	SIAC
FCC ID	2AIOJ-SIAC
Model Difference	/
Antenna Type	PCB Antenna
Antenna Gain	1 dBi
Operation frequency	2402-2480MHz
Number of Channels	79 CH
Modulation Type	GFSK
Power Source	DC Voltage
Power Rating	DC 3V form battery
Adapter Model	/

2.1.1 Carrier Frequency of Channels

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402	21	2422	41	2442	61	2462
2	2403	22	2423	42	2443	62	2463
3	2404	23	2424	43	2444	63	2464
4	2405	24	2425	44	2445	64	2465
5	2406	25	2426	45	2446	65	2466
6	2407	26	2427	46	2447	66	2467
7	2408	27	2428	47	2448	67	2468
8	2409	28	2429	48	2449	68	2469
9	2410	29	2430	49	2450	69	2470
10	2411	30	2431	50	2451	70	2471
11	2412	31	2432	51	2452	71	2472
12	2413	32	2433	52	2453	72	2473
13	2414	33	2434	53	2454	73	2474
14	2415	34	2435	54	2455	74	2475
15	2416	35	2436	55	2456	75	2476
16	2417	36	2437	56	2457	76	2477
17	2418	37	2438	57	2458	77	2478
18	2419	38	2439	58	2459	78	2479
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461		

Operation of EUT during testing

Operating Mode

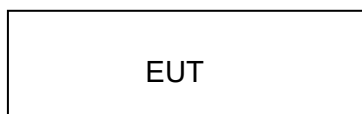
The mode is used: **Transmitting mode**

Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

2.2 Description of Test Setup



2.3 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Receiver	Rohde & Schwarz	ESCI	100627	May 19, 2016	1 Year
2.	LISN	SchwarzBeck	NSLK 8126	8126377	May 19, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2016	1 Year
4.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
5.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	April 19, 2016	1 Year
6.	Trilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	April 17, 2016	1 Year
7.	Pre-amplifier	Compliance Direction	PAP-0203	22008	April 19, 2016	1 Year
8.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
9.	EMI Receiver	Rohde & Schwarz	ESCI	100627	April 19, 2016	1 Year
10.	LISN	SchwarzBeck	NSLK 8126	8126377	April 19, 2016	1 Year
11.	RF Switching Unit	Compliance Direction	RSU-M2	38303	April 19, 2016	1 Year
12.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
13.	EMI Receiver	Rohde & Schwarz	ESCI	100627	April 19, 2016	1 Year
14.	EMI Receiver	Rohde & Schwarz	ESCI	100627	April 19, 2016	1 Year
15.	LISN	SchwarzBeck	NSLK 8126	8126377	April 19, 2016	1 Year
16.	RF Switching Unit	Compliance Direction	RSU-M2	38303	April 19, 2016	1 Year
17.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
18.	Programmable AC Power source	SOPH POWER	PAG-1050	630250	April 26, 2016	1 Year
19.	Harmonic and Flicker Analyzer	LAPLACE	AC2000A	272629	April 26, 2016	1 Year
20.	Harmonic and Flicker Test Software AC 2000A	LAPLACE	N/A	N/A	N/A	N/A
21.	ESD Simulators	KIKUSUI	KES4021	LJ003477	April 26, 2016	1 Year
22.	EFT Generator	EMPEK	EFT-4040B	0430928N	April 26, 2016	1 Year
23.	Shielding Room	ChangZhou ZhongYu	JB88	SEL0166	April 26, 2016	1 Year
24.	Signal Generator 9KHz~2.2GHz	R&S	SML02	SEL0143	April 26, 2016	1 Year
25.	Signal Generator 9KHz~1.1GHz	R&S	SML01	SEL0135	April 26, 2016	1 Year
26.	Power Meter	R&S	NRVS	SEL0144	April 26, 2016	1 Year
27.	RF Level Meter		URV35	SEL0137	April 26, 2016	1 Year
28.	Audio Analyzer	R&S	UPL	SEL0136	April 26, 2016	1 Year
29.	RF-Amplifier 150KHz~150MHz	BONN Elektronik	BSA1515-25	SEL0157	April 26, 2016	1 Year

30.	Stripline Test Cell	Erika Fiedler	VDE0872	SEL0167	April 26, 2016	N/A
31.	TV Test Transmitter	R&S	SFM	SEL0159	April 26, 2016	1 Year
32.	TV Generator PAL	R&S	SGPF	SEL0138	April 26, 2016	1 Year
33.	TV Generator Ntsc	R&S	SGMF	SEL0140	April 26, 2016	1 Year
34.	TV Generator Secam	R&S	SGSF	SEL0139	April 26, 2016	1 Year
35.	TV Test Transmitter 0.3MHz~3300MHz	R&S	SFQ	SEL0142	April 26, 2016	1 Year
36.	MPEG2 Measurement Generator	R&S	DVG	SEL0141	April 26, 2016	1 Year
37.	Spectrum Analyzer	R&S	FSP	SEL0177	April 26, 2016	1 Year
38.	Matching	R&S	RAM	SEL0146	N/A	N/A
39.	Matching	R&S	RAM	SEL0148	N/A	N/A
40.	Absorbing Clamp	R&S	MDS21	SEL0158	April 26, 2016	1 Year
41.	Coupling Set	Erika Fiedler	Rco, Rci, MC, AC, LC	SEL0149	April 26, 2016	N/A
42.	Filters	Erika Fiedler	Sr, LBS	SEL0150	N/A	N/A
43.	Matching Network	Erika Fiedler	MN, T1	SEL0151	N/A	N/A
44.	Fully Anechoic Room	ChangZhou ZhongYu	854	SEL0169	April 26, 2016	1 Year
45.	Signal Generator	R&S	SML03	SEL0068	April 26, 2016	1 Year
46.	RF-Amplifier 30M~1GHz	Amplifier Reasearch	250W1000A	SEL0066	Oct. 24, 2015	1 Year
47.	RF-Amplifier 0.8~3.0GHz	Amplifier Reasearch	60S1G3	SEL0065	Oct. 24, 2015	1 Year
48.	Power Meter	R&S	NRVD	SEL0069	April 26, 2016	1 Year
49.	Power Sensor	R&S	URV5-Z2	SEL0071	April 26, 2016	1 Year
50.	Power Sensor	R&S	URV5-Z2	SEL0072	April 26, 2016	1 Year
51.	Software EMC32	R&S	EMC32-S	SEL0082	N/A	N/A
52.	Log-periodic Antenna	Amplifier Reasearch	AT1080	SEL0073	N/A	N/A
53.	Antenna Tripod	Amplifier Reasearch	TP1000A	SEL0074	N/A	N/A
54.	High Gain Horn Antenna(0.8-5G Hz)	Amplifier Reasearch	AT4002A	SEL0075	N/A	N/A

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

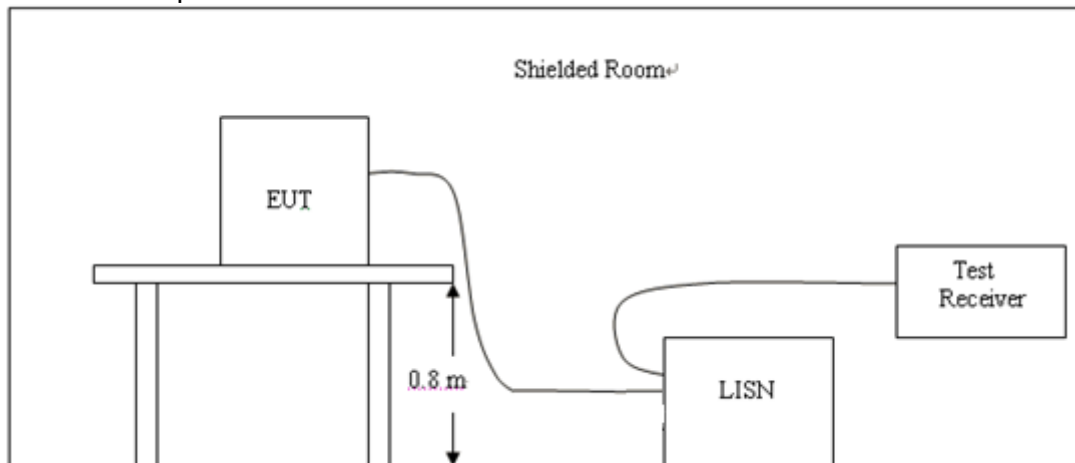
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

3.4 Test Result

N/A (Because the sample have not AC power source ,so the test item result is NA)

4 RADIATED EMISSION TEST

4.1 Radiation Limit

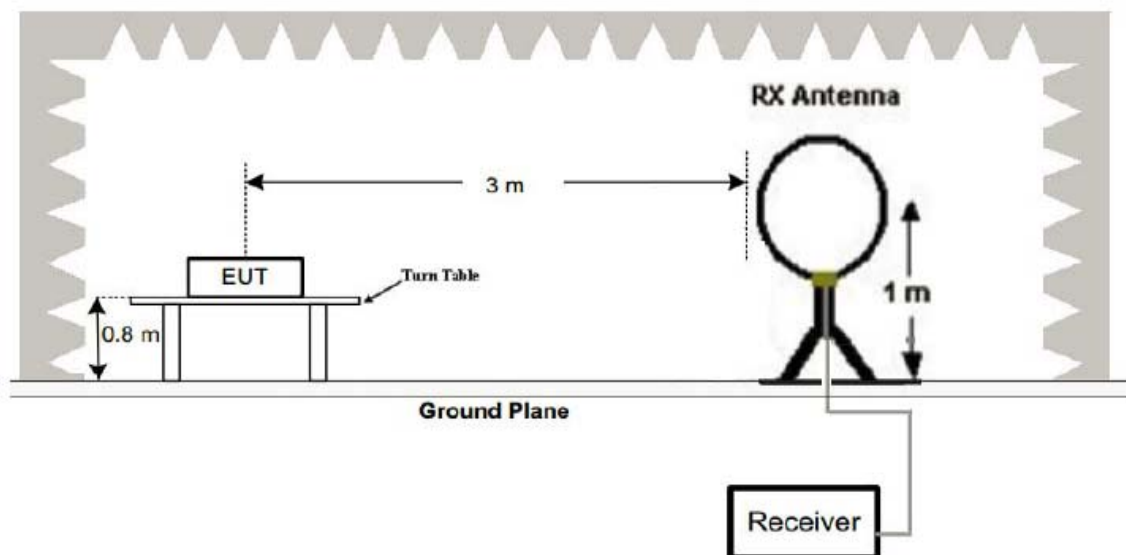
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

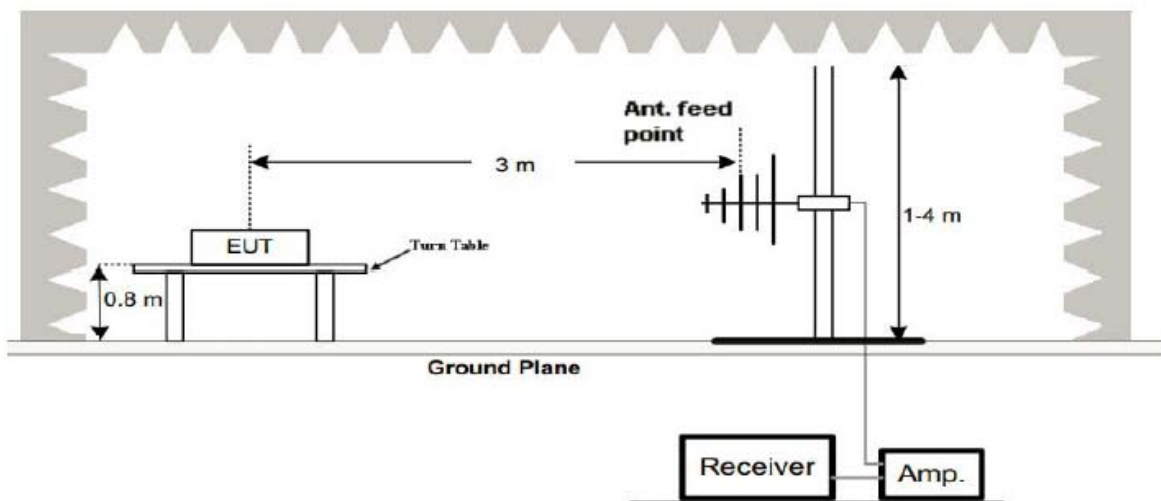
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

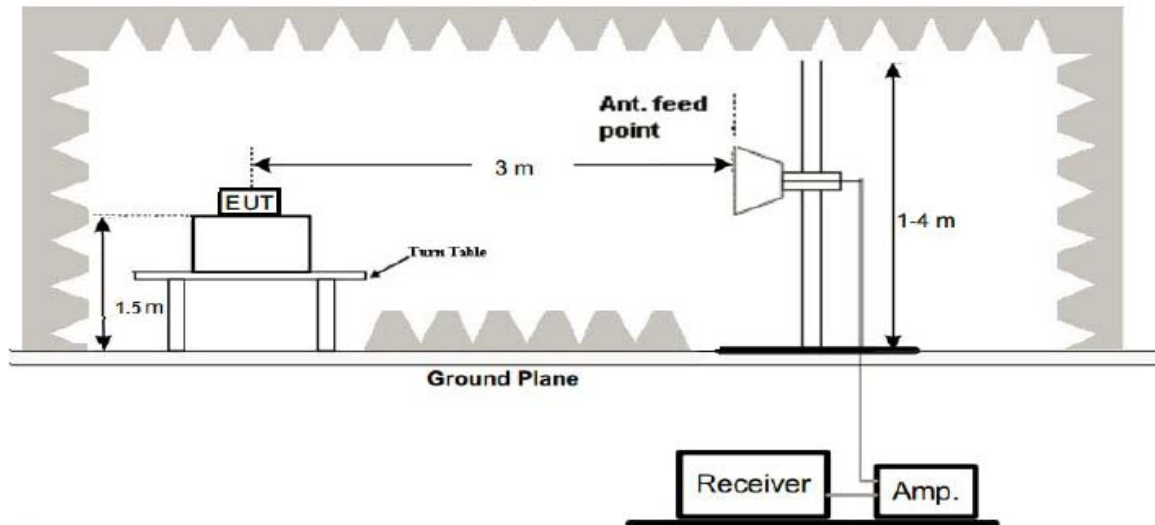
(1) Radiated Emission Test-Up Frequency Below 30MHz



(2) Radiated Emission Test-Up Frequency 30MHz~1GHz



(3) Radiated Emission Test-Up Frequency Above 1GHz



4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:

For battery operated equipment, the equipment tests shall be performed using a new battery.

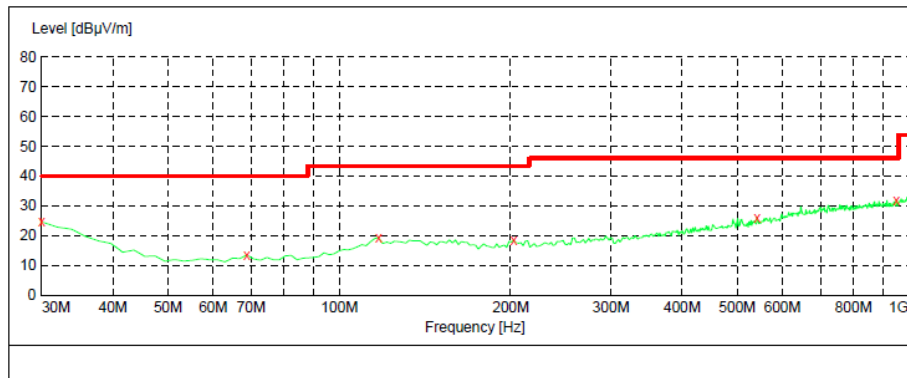
4.4 Test Result

PASS

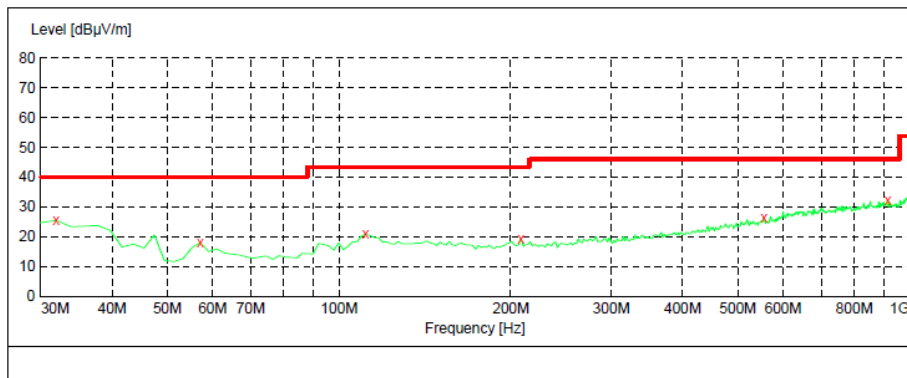
All the test modes completed for test. The worst case of Radiated Emission is CH 2402MHz; the test data of this mode was reported.

Below 1GHz Test Results:

H:



V:



Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Above 1 GHz Test Results:

CH Low (2402MHz)

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
2402	V	Peak	73.93	-3.30	70.63	113.98	-43.35	
2402	H	Peak	67.18	-3.30	63.88	113.98	-50.10	
4804	V	Peak	48.16	3.50	51.66	74.00	-22.34	
4804	H	Peak	39.30	3.50	42.80	74.00	-31.20	
7206	V		---					
7206	H		---					
Others			---					

CH Middle (2441MHz)

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
2441	V	Peak	74.78	-3.40	71.38	113.98	-42.60	
2441	H	Peak	67.84	-3.40	64.44	113.98	-49.54	
4882	V	Peak	47.04	3.70	50.74	74.00	-23.26	
4882	H	Peak	40.22	3.70	43.92	74.00	-30.08	
7323	V		---					
7323	H		---					
Others			---					

CH High (2480MHz)

Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
2480	V	Peak	75.63	-3.30	72.33	113.98	-41.65	
2480	H	Peak	69.61	-3.30	66.31	113.98	-47.67	
4960	V	Peak	48.13	3.90	52.03	74.00	-21.97	
4960	H	Peak	40.98	3.90	44.88	74.00	-29.12	
7440	V		---					
7440	H		---					
Others			---					

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

5 BAND EDGE

5.1 Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

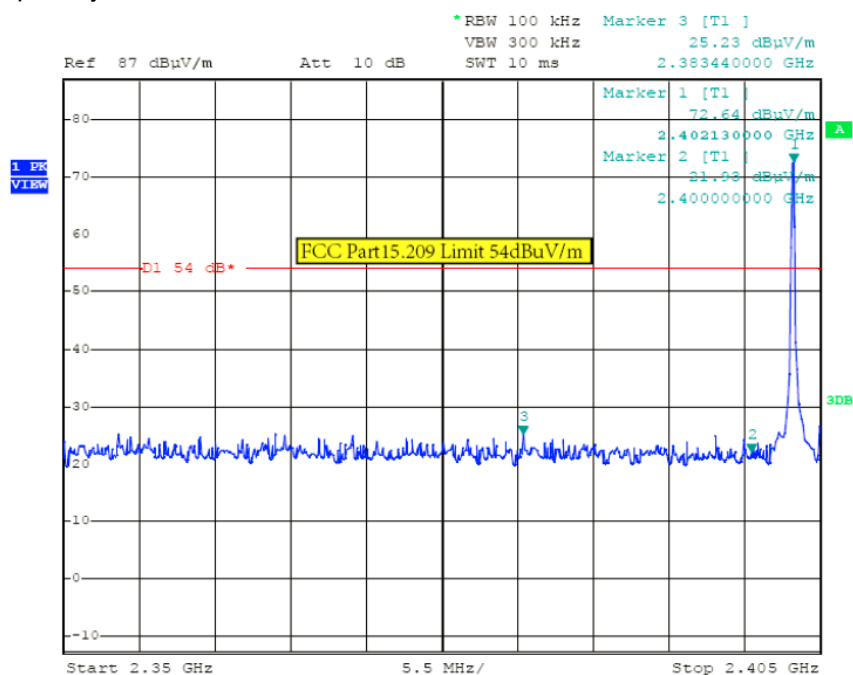
5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBM to 300 KHz, to measure the conducted peak band edge.

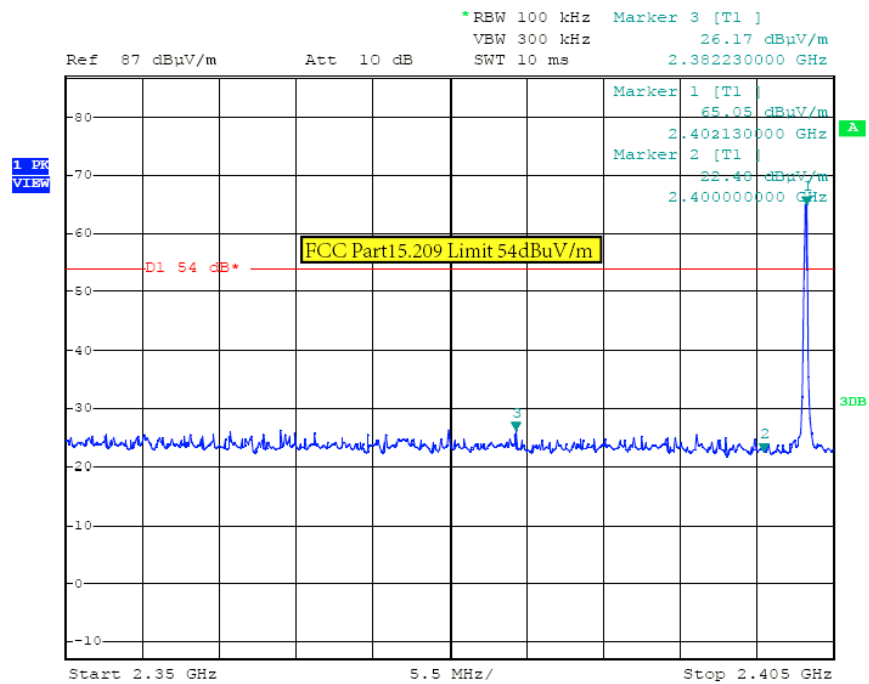
5.3 Test Result

PASS

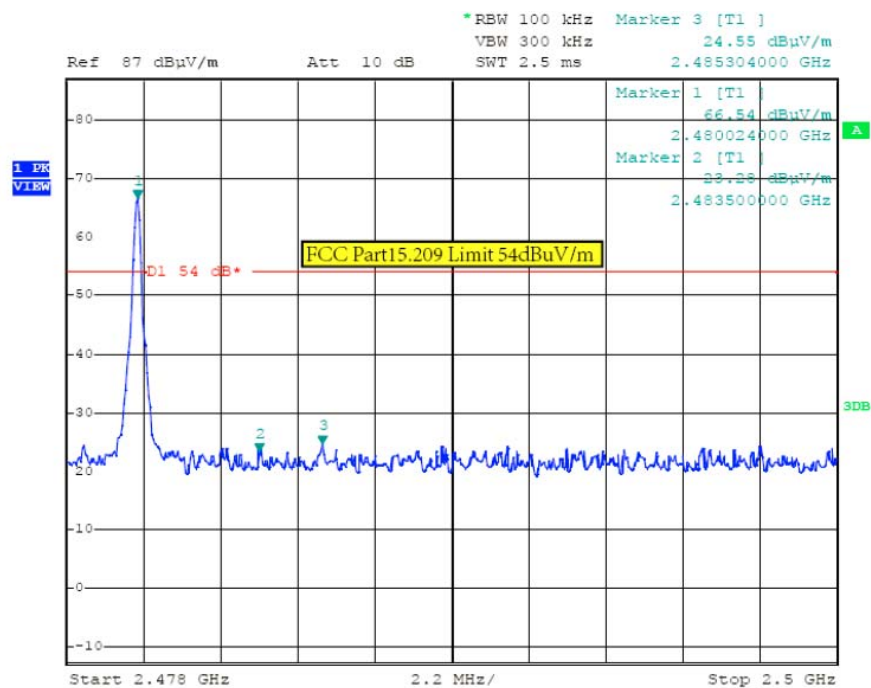
Antenna polarity: H



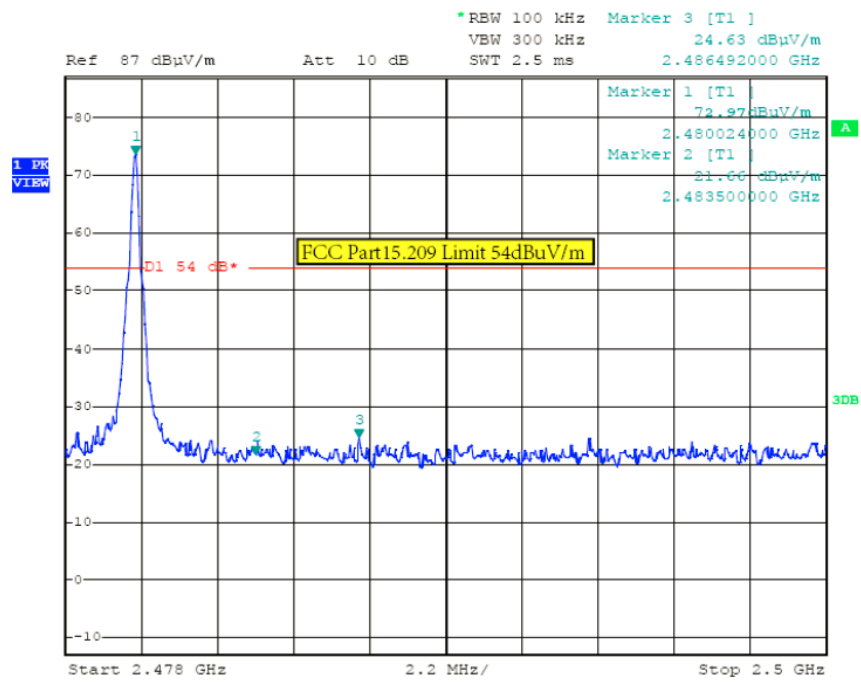
Antenna polarity: V



Antenna polarity: H



Antenna polarity: V



6 OCCUPIED BANDWIDTH MEASUREMENT

6.1 Test Setup

Same as Radiated Emission Measurement

6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as operation in fixed frequency emission.
3. Based on FCC Part15 C Section 15.239(a): RBW= 100KHz. VBW= 300 KHz, Span=1MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

6.3 Measurement Equipment Used

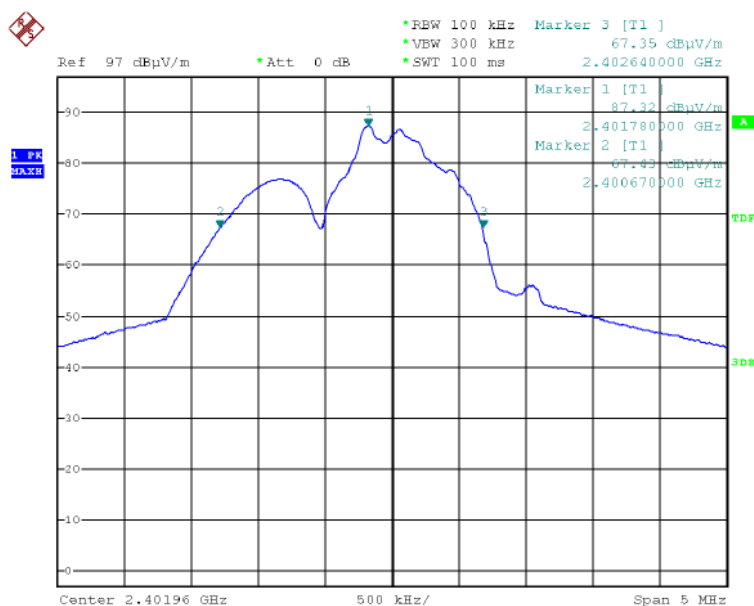
Same as Radiated Emission Measurement

6.4 Test Result

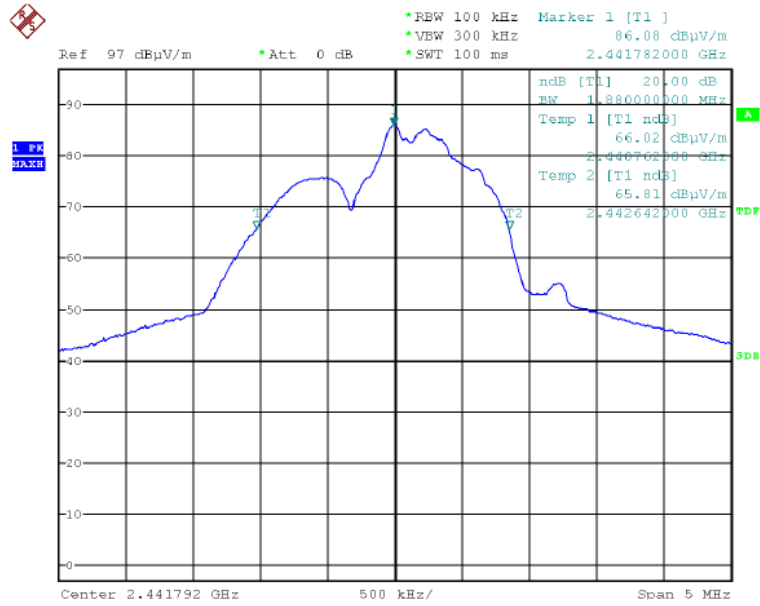
PASS

Channel Frequency (MHz)	20Db Bandwidth(MHz)	Limit
2402	1.97	$\geq 1\text{MHz}$
2441	1.88	$\geq 1\text{MHz}$
2480	1.65	$\geq 1\text{MHz}$

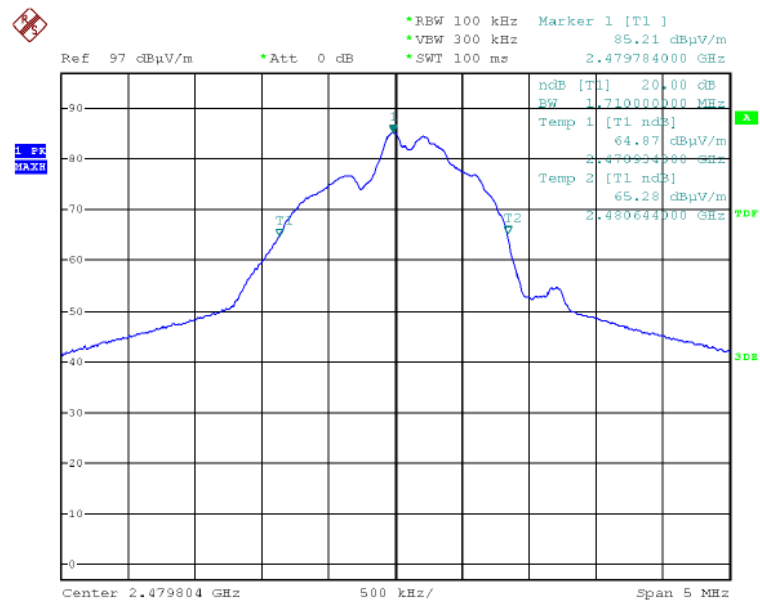
CH: 2402MHz



CH: 2441MHz



CH: 2480MHz



7 ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to FCC 47 CFR Section 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 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

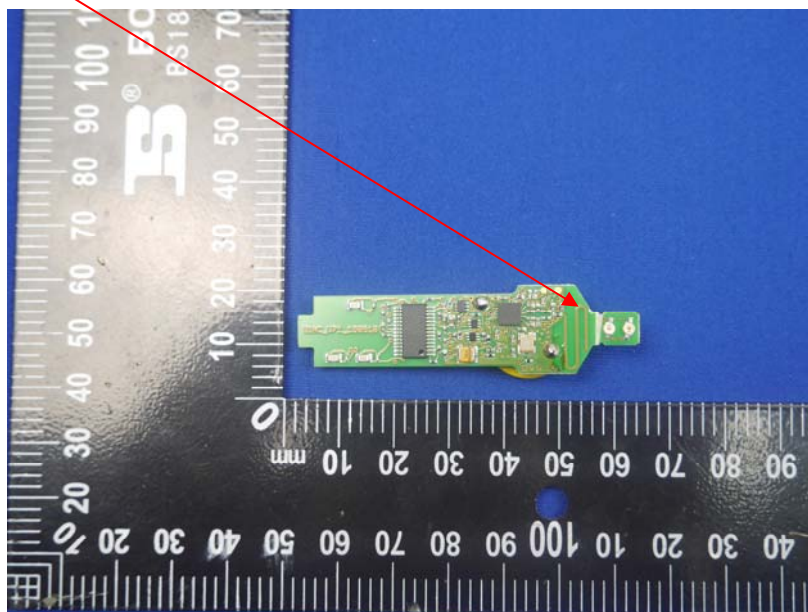
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 1dBi.

ANTENNA



8 PHOTOGRAPH OF TEST

8.1 Radiated Emission

