

FCC PART 15.249
EMI MEASUREMENT AND TEST REPORT
For
Saber Lda.
ZI Maia I, Sec IX, Arm 231, 4470-440 Maia Portugal

FCC ID:2AEG31311

m2p1311

This Report Concerns: Original Report	Equipment Type: Corky bricks with Bluetooth function
Test Engineer:	Lisa Chen 
Report No.:	BSL20150407-1
Receive EUT Date/Test Date:	April 01, 2015/ April 01 - April 07, 2015
Reviewed By:	Mike moo 
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1. GENERAL INFORMATION

1.1. Report information

- 1.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BSL approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BSL in any way guarantees the later performance of the product/equipment.
- 1.1.2. The sample/s mentioned in this report is/are supplied by Applicant, BSL therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 1.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BSL, unless the applicant has authorized BSL in writing to do so.

Test Facility -

The test site used to collect the radiated data is located on the address of BSL Testing Co.,LTD.

(FCC Registered Test Site Number: 191509) on
NO. 24, ZH Park, Nantou, Shenzhen, 518000 China
The Test Site is constructed and calibrated to meet the FCC requirements.

1.2. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	+/-1.25dB
2	RF Power, Conducted	+/-0.20dB
3	Spurious emissions, conducted	+/-0.33dB
4	All emissions, radiated (<1G)	+/-3.47dB
5	All emissions, radiated (>1G)	+/-3.82dB
6	Temperature	+/-0.5°CdB
7	Humidity	+/-2%

2. PRODUCT DESCRIPTION

2.1. EUT Description

Description : Corky bricks with Bluetooth function
 Applicant : Saber Lda.
 ZI Maia I, Sec IX, Arm 231, 4470-440 Maia Portugal
 Manufacturer : KYTO Fitness Technology Co. LTD
 No. 3, 1st Langjihu Road, Shijing Industrial Zone, Dongcheng District, Dongguan city, Guangdong province, China
 Model Number : m2p1311
 Modulation type : GFSK
 Antenna gain : 0dBi
 BT : 4.0 BLE
 Antenna type : PCB Antenna
 Frequency : 2402-2480MHz
 Number of Channels : 40 Channels
 Power Supply : DC 3.7V
 Hardware version : 1.3
 Software version : 1.3
 Serial Number : 20150407

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	15	2430	29	2458
2	2404	16	2432	30	2460
3	2406	17	2434	31	2462
4	2408	18	2436	32	2464
5	2410	19	2438	33	2466
6	2412	20	2440	34	2468
7	2414	21	2442	35	2470
8	2416	22	2444	36	2472
9	2418	23	2446	37	2474
10	2420	24	2448	38	2476
11	2422	25	2450	39	2478
12	2424	26	2452	40	2480
13	2426	27	2454	\	\
14	2428	28	2456	\	\

2.2. Block Diagram of EUT Configuration

Conducted Emission



Radiated Emission



Figure 1 EUT Setup

2.3. Support Equipment List

Name	Model No	S/N	Manufacturer	Used (Y/N)
Power adapter	FJ-SW0501000UU	-	ITE	Y

2.4. Test Conditions

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-25
Humidity (%RH)	25-75	50-63
Barometric pressure (mbar)	860-1060	950-1000

Note:

The corky brick can be assembled to 3 different types: car, tricycle and raft. And after pretest, only the measurement data of worst case(car) is recorded in the test report.

3. TEST RESULTS SUMMARY

FCC 15 Subpart C, Paragraph 15.249:2013

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	Compliant
Section 15.249(a)	The fundamental field strength and the harmonics	Compliant
Section 15.209 Section 15.249(d)	Radiated Emission	Compliant
Section 15.249(d)	Band Edge	Compliant
Section 15.203	Antenna Requirement	Compliant
Section 15.249	20dB Bandwidth	Compliant

Remark: "N/A" means "Not applicable".

Statement: All testing was performed using the test procedures found in ANSI C63.4-2003.

Modifications

No modification was made.

4. TEST EQUIPMENT USED

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL	SERIAL NO.	DATE OF CAL.	CAL. INTEGRAL
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	Aug. 23 2014	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCI3	BSL001	Sep. 28 2014	1 Year
BiConiLog Antenna	Rohde & Schwarz	HL562 (30MHz—3GHz)	BSL009	Sep. 28 2014	1 Year
Double -ridged waveguide horn	Rohde & Schwarz	BBHA9120D (1—18GHz)	BSL008	Aug. 27 2014	1 Year
Horn Antenna	AHS	SAS-574 (18GHz—40GHz)	BSL072	Dec. 28 2014	1 Year
Cable	PUTIANLE	BSL045	BSL045	Aug. 27 2014	1 Year
Cable	PUTIANLE	BSL046	BSL046	Aug. 27 2014	1 Year
Cable	PUTIANLE	BSL047	BSL047	Aug. 27 2014	1 Year
Amplifier(100kHz-40 GHz)	R&S	SMR40	BSL007	Sep. 28 2014	1 Year
Band filter	Amindeon	82346	BSL049	Aug. 27 2014	1 Year
Active Loop Antenna	Schwarzbeck	FMZB1519 (9 kHz - 30 MHz)	BSL011	Sep. 28 2014	1 Year
Coaxial Switch	YUANFANG	TA218B	BSL004	Aug. 27 2014	1 Year
Spectrum analyzer	Rohde & Schwarz	FSP40	BSL049	Sep. 28 2014	1 Year
Shielding Room	zhongyu Electron	7.0(L)x3.0(W)x3.0(H)	BSL085	Sep. 28 2014	1 Year
EMI Test Receiver	R&S	ESPI	BSL002	Sep. 28 2014	1 Year
10dB Pulse Limita	R&S	BSL003	BSL003	Sep. 28 2014	1 Year
Coaxial Switch	PUTIANLE	TA218B	BSL004	Aug. 27 2014	1 Year
LISN	Rohde & Schwarz	ESH3-Y5	BSL005	Sep. 28 2014	1 Year
Coaxial Cable	PUTIANLE	BSL048	BSL048	Aug. 27 2014	1 Year
EMI TEST SOFTWARE	AUDIX	E3	N/A	N/A	N/A

the conducted 20dB BANDWIDTH measurements RF cable, NO antenna connector, Soldered to the transmitter part:



5. ANTENNA REQUIREMENT

5.1. 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.

5.2. Antenna Connected Construction

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The antenna used for this product is a PCB Antenna. The antenna is permanently attached. Refer to the product photo.

5.3. Result

Compliance

6. CONDUCTED POWER LINE TEST

6.1. Test Equipment

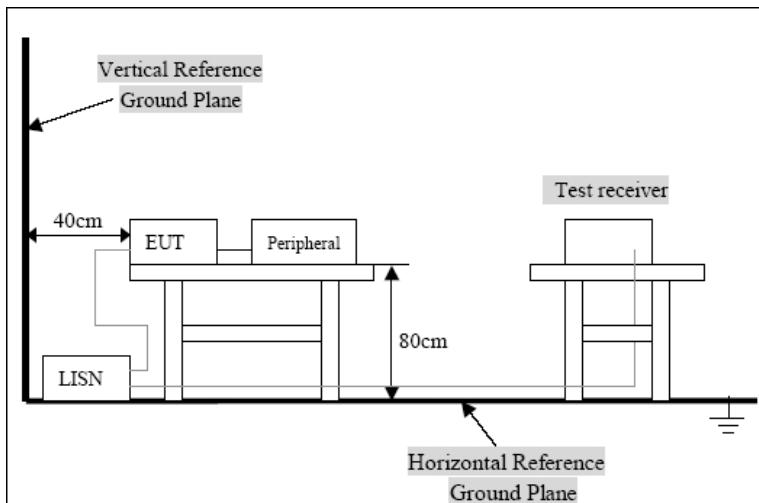
Please refer to section 4 this report.

6.2. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.).This provides a 50ohm/50uh coupling impedance for the measuring equipment.The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uh coupling impedance with 50ohm termination.

Both sides of A.C. Line are checked for maximum conducted interference.In order to find the maximum emission,the relative positions of equipment and all of the interface cables must be changed according to ASIN C63.4:2003 on conducted measurement .Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

6.3. Test Setup



For the actual test configuration,Please refer to the related items-Photos of testing

6.4. Conducted Power line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency Range (MHZ)	Class A QP/AV	Class B QP/AV
0.15-0.5	79/66	65-56/56-46
0.5-5.0	73/60	56-46
5.0-3.0	73/60	60-50

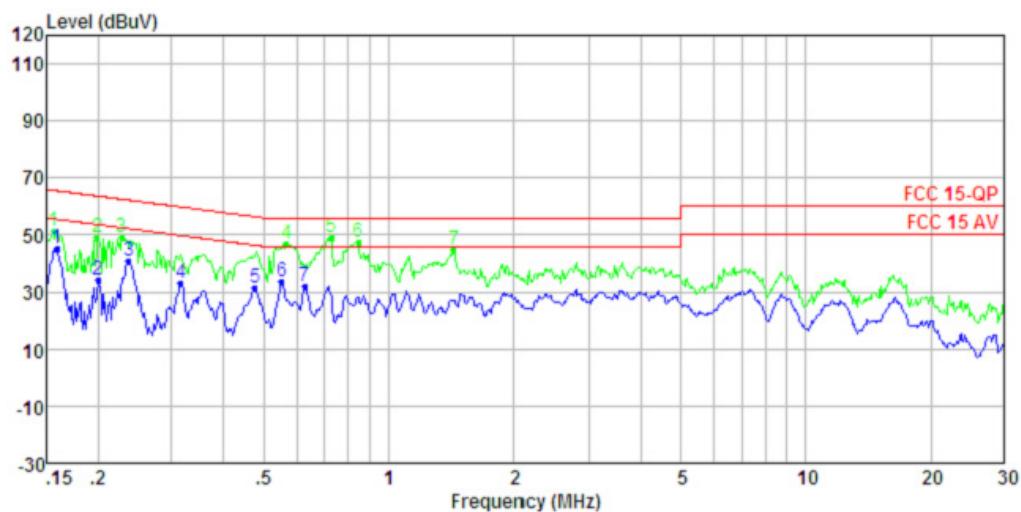
Note: In the above table, the tighter limit applies at the band edges.

6.5. Conducted Power Line Test Result

Pass

2440MHz Transmitting(Worst case mode)

power test voltage:AC 120V/60Hz



Condition:

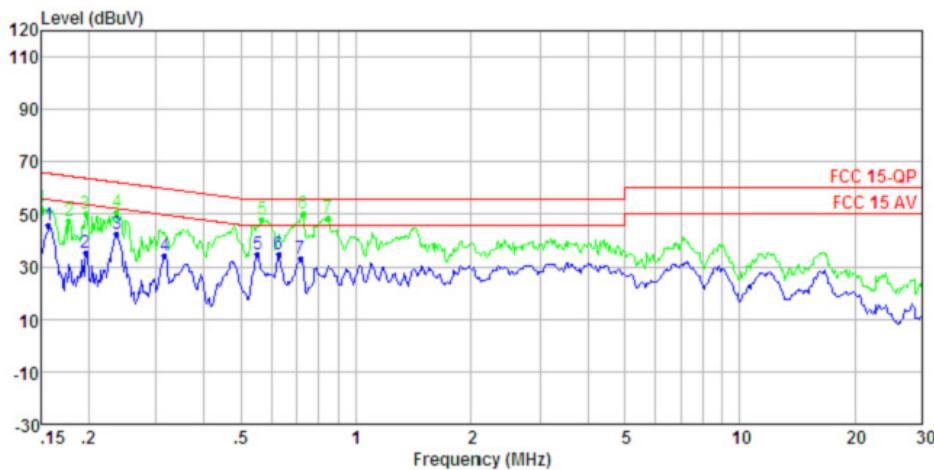
: RBW:9.000KHz VBW:30.000KHz

Freq MHz	Level dBuV	Line Limit dBuV	Over Limit dB	Remark		Pol/Phase
				Limit	Over	
1	0.159	45.0	55.5	-10.5	Average	LINE
2	0.200	34.0	53.6	-19.6	Average	LINE
3	0.237	40.9	52.2	-11.3	Average	LINE
4	0.317	33.2	49.8	-16.6	Average	LINE
5 Max	0.476	31.3	46.4	-15.1	Average	LINE
6	0.552	33.8	46.0	-12.2	Average	LINE
7	0.627	32.2	46.0	-13.8	Average	LINE

Condition:

: RBW:9.000KHz VBW:30.000KHz

Freq MHz	Level dBuV	Line Limit dBuV	Over Limit dB	Remark		Pol/Phase
				Limit	Over	
1	0.156	51.6	65.6	-14.0	QP	LINE
2	0.199	48.9	63.7	-14.8	QP	LINE
3	0.228	49.2	62.5	-13.3	QP	LINE
4	0.567	46.8	56.0	-9.2	QP	LINE
5 Max	0.727	48.9	56.0	-7.1	QP	LINE
6	0.844	47.6	56.0	-8.4	QP	LINE
7	1.433	44.7	56.0	-11.3	QP	LINE



Condition:

: RBW:9.000KHz VBW:30.000KHz

Freq MHz	Level dBuV	Limit		Over Limit	Remark	Pol/Phase
		Line	dB			
1	0.157	46.1	55.6	-9.5	Average	NEUTRAL
2	0.197	35.5	53.8	-18.3	Average	NEUTRAL
3	0.237	42.4	52.2	-9.8	Average	NEUTRAL
4	0.317	34.0	49.8	-15.8	Average	NEUTRAL
5	0.552	34.8	46.0	-11.2	Average	NEUTRAL
6 Max	0.627	34.6	46.0	-11.4	Average	NEUTRAL
7	0.716	32.8	46.0	-13.2	Average	NEUTRAL

Condition:

: RBW:9.000KHz VBW:30.000KHz

Freq MHz	Level dBuV	Limit		Over Limit	Remark	Pol/Phase
		Line	dB			
1	0.150	52.3	66.0	-13.7	QP	NEUTRAL
2	0.178	47.5	64.6	-17.1	QP	NEUTRAL
3	0.197	50.4	63.8	-13.4	QP	NEUTRAL
4	0.237	51.1	62.2	-11.1	QP	NEUTRAL
5	0.567	48.1	56.0	-7.9	QP	NEUTRAL
6 Max	0.727	50.2	56.0	-5.8	QP	NEUTRAL
7	0.844	48.4	56.0	-7.6	QP	NEUTRAL

7. RADIATED EMISSION TEST

7.1. Test Equipment

Please refer to section 4 this report.

7.2. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level.

Calibrated Loop antenna is used as receiving antenna for frequencies below 30MHz, Calibrated Bilog antenna is used as receiving antenna for frequencies between 30 MHz and 1 GHz, Calibrated Horn antenna is used as receiving antenna for frequencies above 1000MHz. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

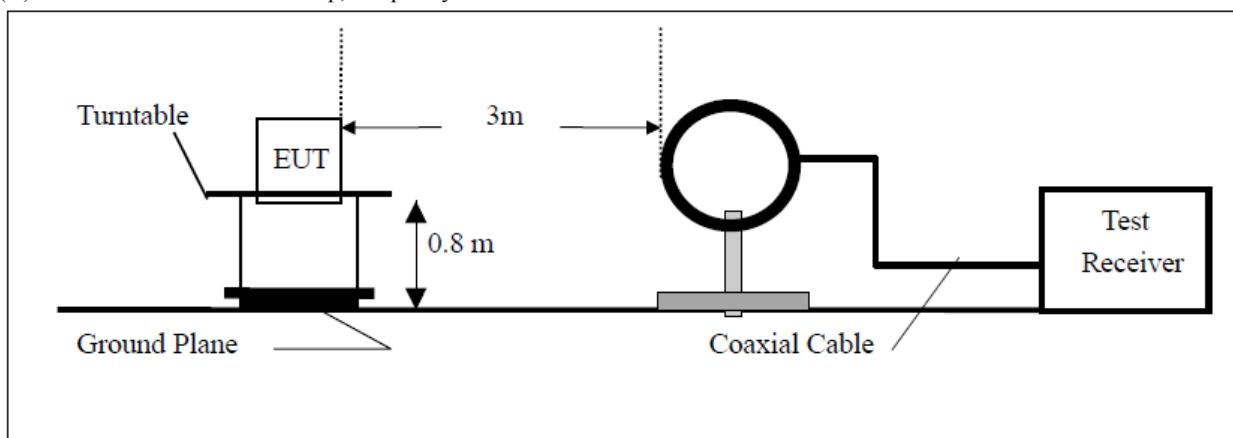
The bandwidth of test receiver is set at 9kHz in below 30MHz, and set at 120kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9kHz to 25GHz is checked.

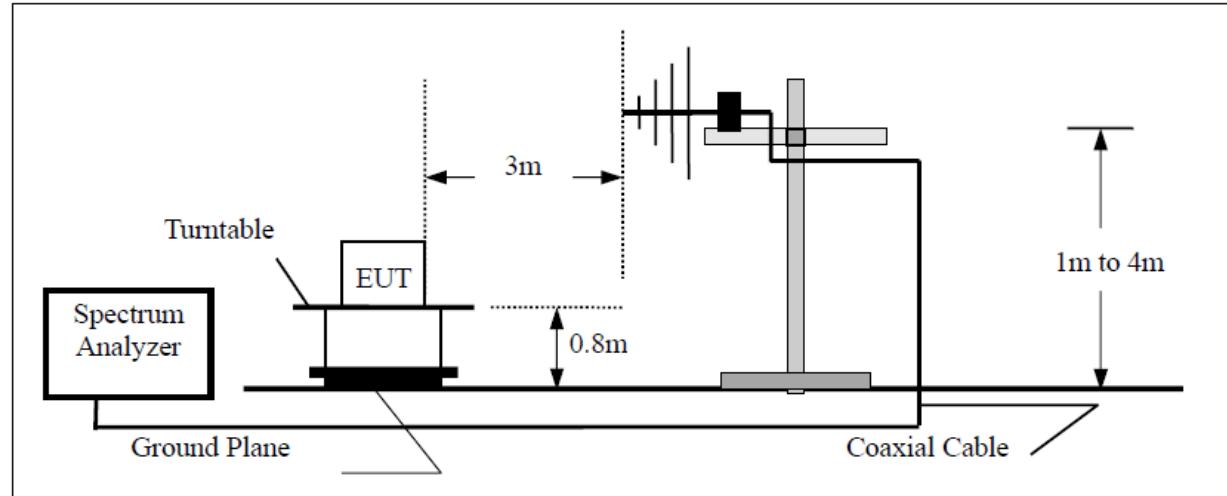
The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Peak detector and Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

7.3. Radiated Test Setup

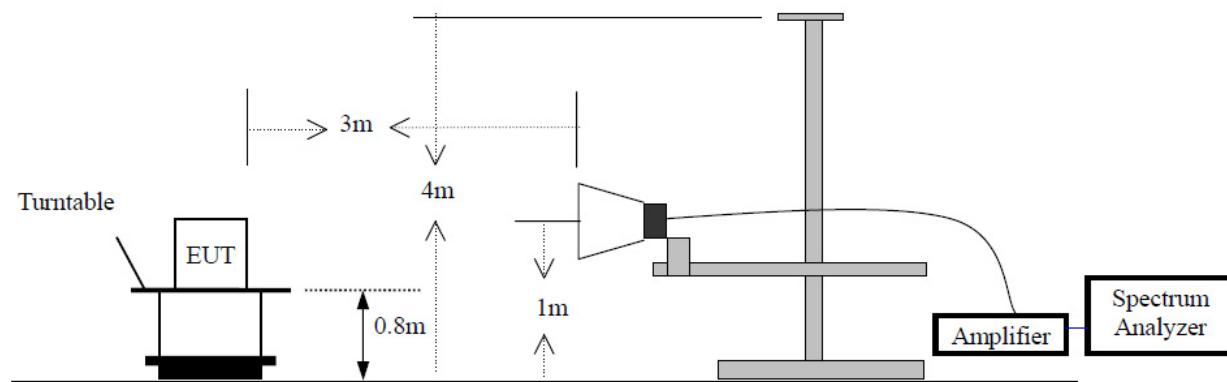
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



7.4. Radiated Emission Limit

All emission from a digital device,including any network of conductors and apparatus connected thereto,shall not exceed the level of field strength specified below :

A. Fundamental and Harmonics Radiated Emissions 15.249(a) Limit

Fundamental Frequency (MHz)	Field as strength of Fundamental(3m)			Field as strength of Harmonics(3m)		
	mV/m	dBuV/m		uV/m	dBuV/m	
902-928	50	94(QP)	114(Peak)	500	54(AV)	74(Peak)
2400-2483.5	50	94(AV)	114(Peak)	500	54(AV)	74(Peak)

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(3) The emission limit in this paragraph os based on measurement instrumentation employing an average detector.Measurement using instrumentation with a peak detector function,corresponding to 20dB above the maximum permitted average limit.

B. Spurious Radiated Emissions.

Frequency (MHz)	Limit				The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dB μ V/m)	Measurement distance (m)		
0.009 - 0.490	2400/F(kHz)	/	300		
0.490 - 1.705	24000/F(kHz)	/	30		
1.705-30	30	29.5	30		
30 - 88	100	40	3		
88 - 216	150	43.5	3		
216 - 960	200	46	3		
Above 960	500	54	3		

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

(2) In the Above Table,the tighter limit applies at the band edges.

(3) Distancne refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

7.5. Radiated Emission Test Result

Pass

A. Fundamental Radiated Emissions Data

CH Low

Freq. (MHz)	Read Level (dBuV) AV/PK	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission (dBuV/m) AV/PK	HORIZ/ VERT	Limits (dBuV/m) AV/PK	Margin (dB)
2402	78.82/88.55	27.47	5.42	30.17	81.54/91.27	VERT	94/114	-12.46/-22.73
2402	80.93/90.44	27.47	5.42	30.17	83.65/93.16	HORIZ	94/114	-10.35/-20.84

CH Middle

Freq. (MHz)	Read Level (dBuV) AV/PK	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission (dBuV/m) AV/PK	HORIZ/ VERT	Limits (dBuV/m) AV/PK	Margin (dB)
2440	79.98/89.05	27.40	5.40	30.15	82.63/91.7	VERT	94/114	-11.37/-22.3
2440	81.16/90.66	27.40	5.40	30.15	83.81/93.31	HORIZ	94/114	-10.19/-20.69

CH High

Freq. (MHz)	Read Level (dBuV) AV/PK	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission (dBuV/m) AV/PK	HORIZ/ VERT	Limits (dBuV/m) AV/PK	Margin (dB)
2480	78.68/87.78	27.50	5.46	29.98	81.66/90.76	VERT	94/114	-12.34/-23.24
2480	80.62/89.73	27.50	5.46	29.98	83.6/92.71	HORIZ	94/114	-10.4/-21.29

Remark:

Final Emission = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

B. General Radiated Emissions Data

For below 9kHz-30MHz Spurious

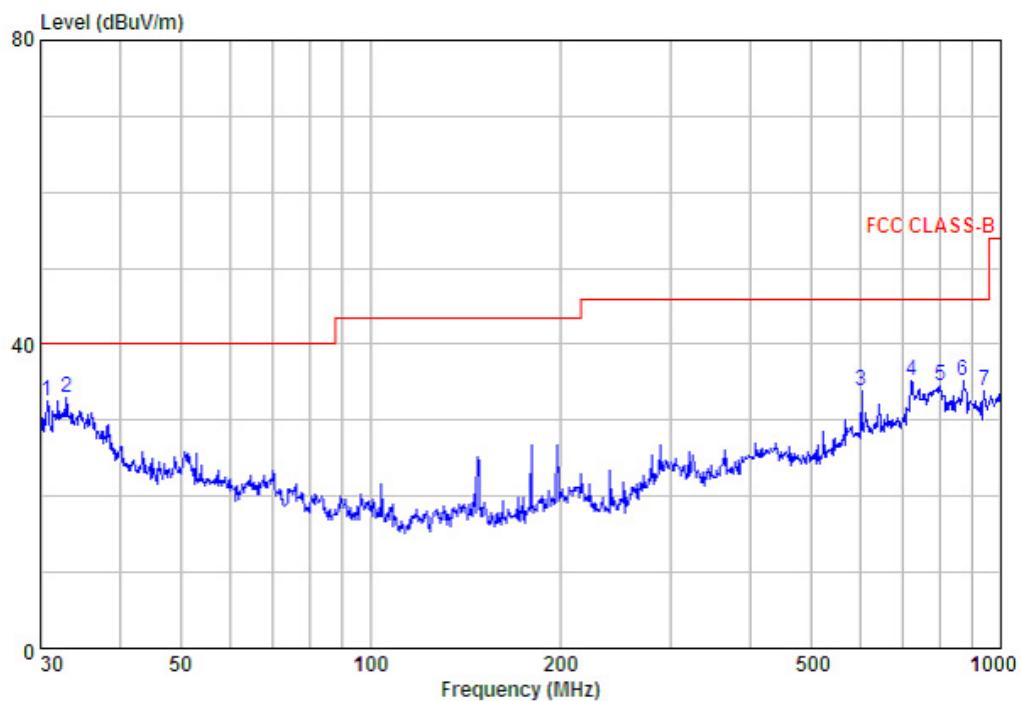
Freq. (MHz)	Emission(dBuV/m) PK / AV	Limits(dBuV/m) PK / AV	Margin (dB)
-	-	-	-
-	-	-	-

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

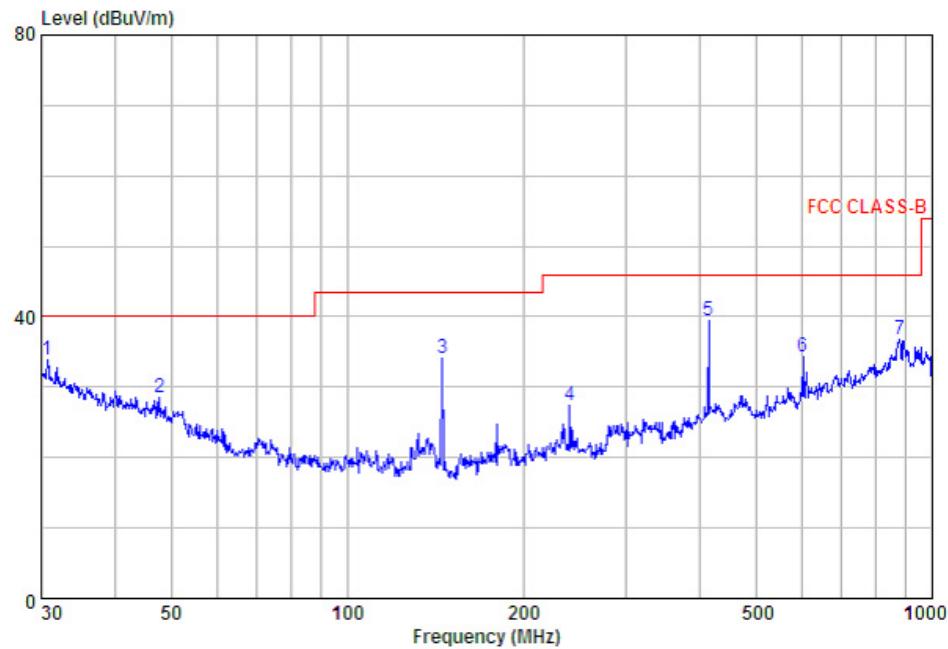
For 30M-1000MHz Spurious

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

2440MHz Transmitting(Worst case mode)

Condition : FCC CLASS-B 3m HORIZONTAL
 : RBW:120.000KHz VBW:300.000KHz SWT:Auto

Freq	Limit		Over	Remark	Pol/Phase
	Line	Level			
MHz	dBuV/m	dBuV/m	dB		
1	30.745	40.0	32.6	-7.4 QP	HORIZONTAL
2 max	32.979	40.0	33.0	-7.0 QP	HORIZONTAL
3	601.427	46.0	33.8	-12.2 QP	HORIZONTAL
4	721.726	46.0	35.2	-10.8 QP	HORIZONTAL
5	801.786	46.0	34.4	-11.6 QP	HORIZONTAL
6	872.183	46.0	35.2	-10.8 QP	HORIZONTAL
7	942.131	46.0	33.9	-12.1 QP	HORIZONTAL



Condition : FCC CLASS-B 3m VERTICAL
: RBW:120.000KHz VBW:300.000KHz SWT:Auto

Freq	Limit		Over	Remark	Pol/Phase
	Line	Level			
MHz	dBuV/m	dBuV/m	dB		
1 max	30.745	40.0	33.9	-6.1 QP	VERTICAL
2	47.826	40.0	28.6	-11.4 QP	VERTICAL
3	145.351	43.5	34.1	-9.4 QP	VERTICAL
4	239.987	46.0	27.5	-18.5 QP	VERTICAL
5	414.722	46.0	39.5	-6.5 QP	VERTICAL
6	601.427	46.0	34.3	-11.7 QP	VERTICAL
7	878.322	46.0	36.9	-9.1 QP	VERTICAL

For 1000MHz-25000MHz Spurious

CH Low

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
4804	37.27/47.2	VERT	54.0/74.0	-16.73/-26.8
7206	41.23/51.2		54.0/74.0	-12.77/-22.8
9608	39.22/49.22		54.0/74.0	-14.78/-24.78
4804	36.14/47.81	HORIZ	54.0/74.0	-17.86/-26.19
7206	43.68/53.68		54.0/74.0	-10.32/-20.32
9608	45.17/55.17		54.0/74.0	-8.83/-18.83

CH Middle

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
4880	32.17/42.25	VERT	54.0/74.0	-21.83/-31.75
7320	38.06/48.01		54.0/74.0	-15.94/-25.99
9760	36.99/47.02		54.0/74.0	-17.01/-26.98
4880	32.25/42.28	HORIZ	54.0/74.0	-21.75/-31.72
7320	40.32/50.32		54.0/74.0	-13.68/-23.68
9760	45.06/55.05		54.0/74.0	-8.94/-18.95

CH High

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
4960	35.27/45.31	VERT	54.0/74.0	-18.73/-28.69
7440	39.14/49.14		54.0/74.0	-14.86/-24.86
9920	40.18/50.27		54.0/74.0	-13.82/-23.73
4960	34.54/44.54	HORIZ	54.0/74.0	-19.46/-29.46
7440	39.23/49.24		54.0/74.0	-14.77/-24.76
9920	41.23/51.32		54.0/74.0	-12.77/-22.68

Note:

1. The average measurement was not performed when the peak measured data under the limit of average detection.
2. Emissions attenuated more than 20 dB below the permissible value are not reported.

8. BAND EDGE

8.1. Test Equipment

Please refer to Section 4 this report.

8.2. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement. The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz respectively.

8.3. Band Edge FCC 15.249(d) Limit

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 Section 15.209, whichever is the lesser attenuation.

8.4. Band Edge Test Result

Pass

ALL of the restriction bands were tested, and only the data of worst case was exhibited.

CH Low

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
2390	44.93/52.72	VERT	54.0/74.0	-9.07/-21.28
2400	50.2/59.62		54.0/74.0	-3.8/-14.38
2390	45.66/54.73		54.0/74.0	-8.34/-19.27
2400	47.89/60.84	HORIZ	54.0/74.0	-6.11/-13.16

CH High

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
2483.5	44.66/55.99	VERT	54.0/74.0	-9.34/-18.01
2500.00	41.69/51.58		54.0/74.0	-12.31/-22.42
2483.5	46.02/56.58		54.0/74.0	-7.98/-17.42
2500.00	42.58/50.73	HORIZ	54.0/74.0	-11.42/-23.27

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

9. 20-DB BANDWIDTH

9.1. Test Equipment

Please refer to Section 4 this report.

9.2. Test Procedure

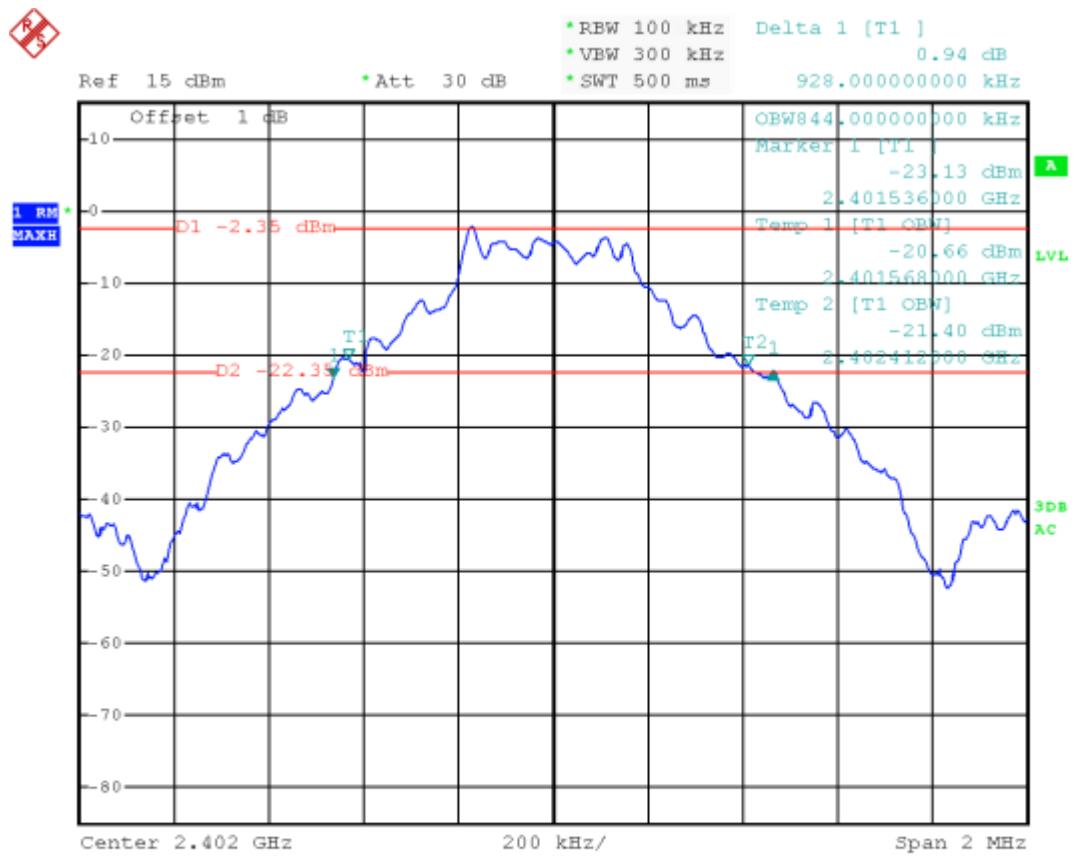
1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=100 KHz, VBW=300 KHz, Sweep=500ms.
4. Mark the peak frequency and -20dB (upper and lower) frequency.

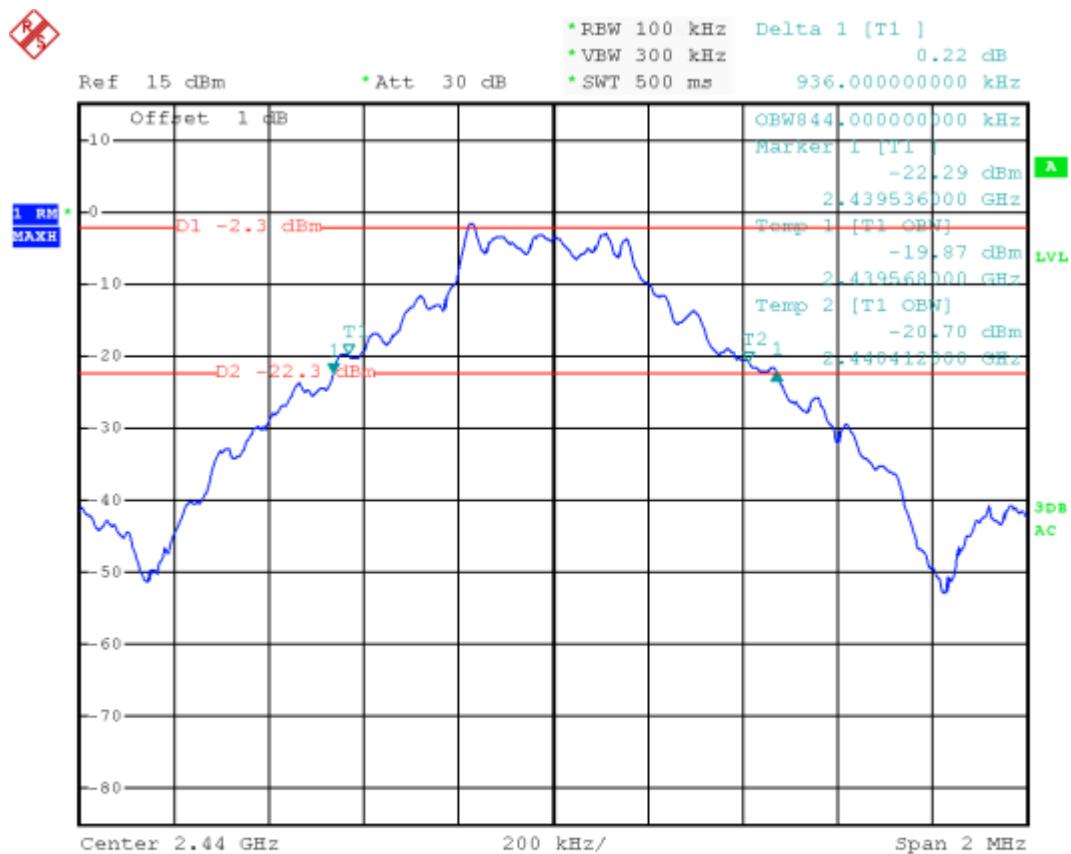
9.3. Limit

Please refer section 15.249

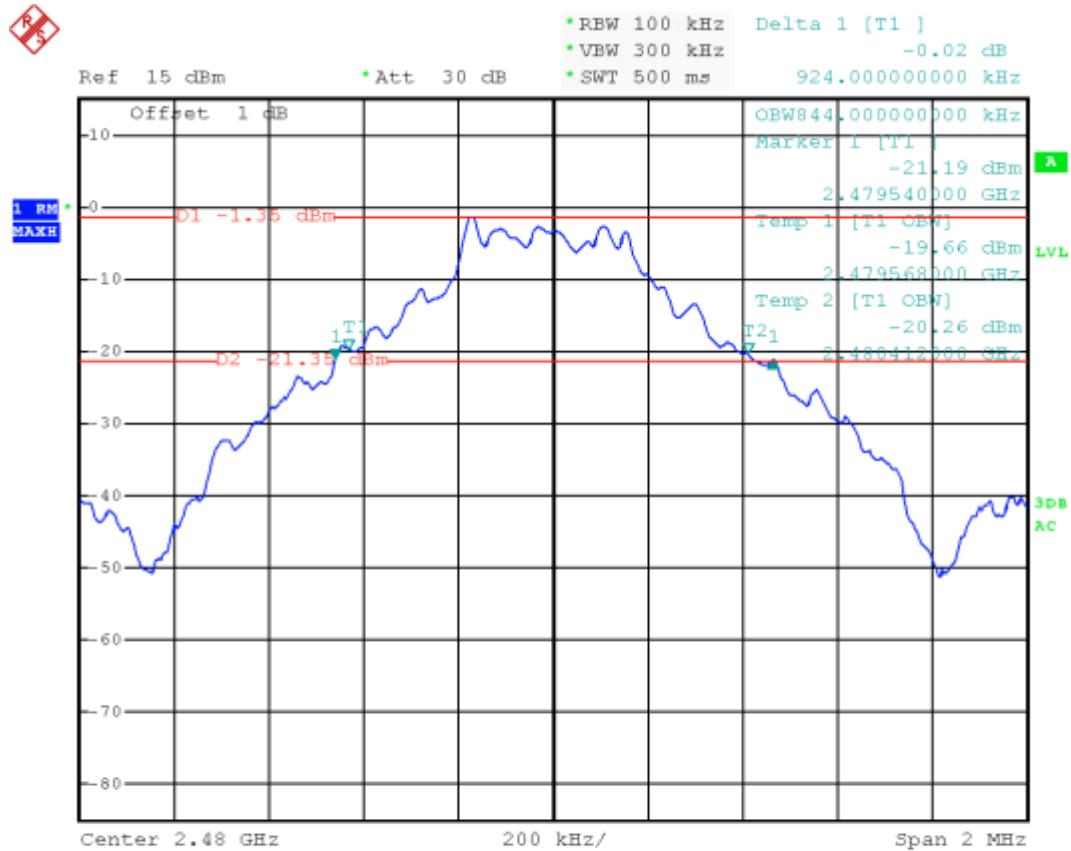
9.4. Test Result /Plots

Limit	Channel Frequency (MHz)	20dB Bandwidth (MHz)
/	2402	0.928
/	2440	0.936
/	2480	0.924





RS



End Of The Report