FCC Test Report

EQUIPMENT	:	Bluetooth Earphone
BRAND NAME	:	Bang & Olufsen
MODEL NAME	:	E8 Earbud R
MARKETING NAME	:	Beoplay E8
FCC ID	:	TTUBEOPLAYE8R
STANDARD	:	FCC Part 15 Subpart C
CLASSIFICATION	:	Low Power Communication Device Transmitter (DXX)
APPLICANT / MANUFACTURER	:	Bang & Olufsen a/s Peter Bangs Vej 15, DK-7600 Struer, Denmark

The product was received on Jun. 27, 2017 and completely tested on Jul. 26, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR762745C	Rev. 01	Initial issue of report	Sep. 07, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049	20dB Bandwidth	-	-	Reporting Only
3.1	-	99% Occupied Bandwidth	-	-	Reporting Only
3.2	15.209	Field Strength of Fundamental Emissions and Radiated Emission	15.209(a)	Pass	Under limit 8.25 dB at 49.170 MHz
3.3	15.203	Antenna Requirements	Non Standard Type	Pass	-

1. General Description

1.1. Applicant

Bang & Olufsen a/s
Peter Bangs Vej 15, DK-7600 Struer, Denmark

1.2. Manufacturer

Bang & Olufsen a/s
Peter Bangs Vej 15, DK-7600 Struer, Denmark

1.3. Feature of Equipment Under Test

Bluetooth and NFMI

Product Specification subjective to this standard	
Sample 1	Main PCB
Sample 2	Second PCB
Antenna Type	Bluetooth: Monopole Antenna NFMI: Coil Antenna

Remark: All test items were performed with Sample 1.

1.4. Modification of EUT

No modifications are made to the EUT during all test items.

1.5. Test Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH03-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.6. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

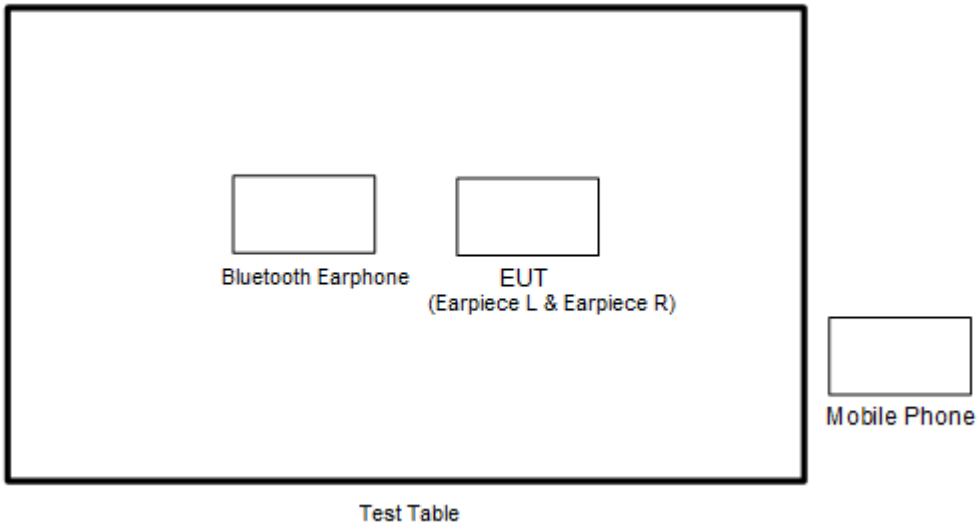
2.1. Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: radiation (9 kHz to the 1000MHz).

Test Items	Function Type
Radiated Emission	Mode 1 : 10.579 MHz Link
Remark: For radiated emission test items, mobile phone use Bluetooth function link with the EUT (right earphone), and EUT use NFMI technology to connect left earphone for music play.	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile Phone	iPhone 5	A1529	BCG-E2694A	N/A	N/A

3. Test Result

3.1. 20dB and 99% Occupied Bandwidth Measurement

3.1.1 Limit of 20dB and 99% Occupied Bandwidth

Reporting only

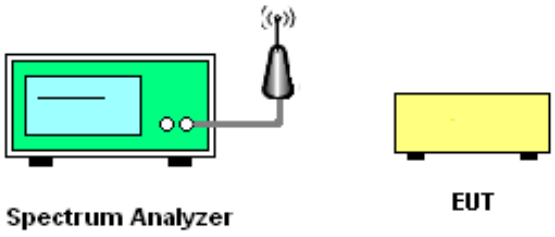
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT in peak Max hold mode.
2. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
3. For Bandwidth measurement, the RBW= 10kHz, and VBW = 30kHz. Sweep = 20ms;
4. Measure and record the results in the test report.

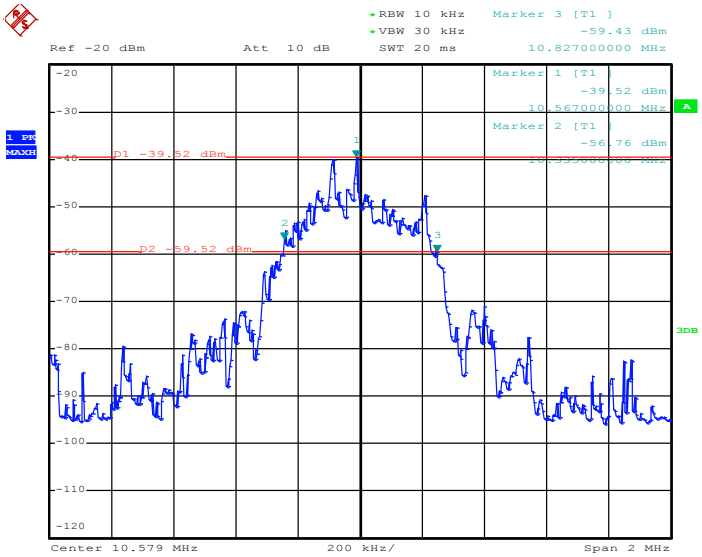
3.1.4 Test Setup



3.1.5 Test Result of 20dB and 99% Bandwidth

Test Engineer :	Bill Kuo	Temperature :	25~26℃
		Relative Humidity :	45~48%

20 dB Bandwidth Plot - L



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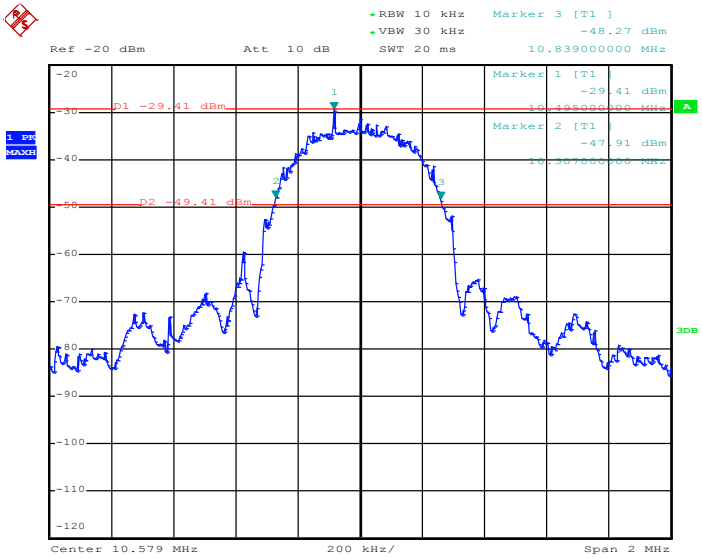
20 dB Bandwidth Plot - R



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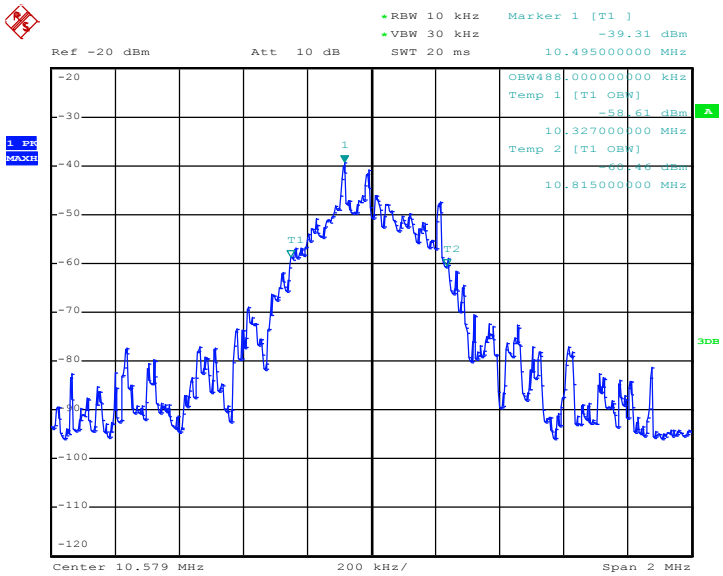
99% Occupied Bandwidth Plot - L



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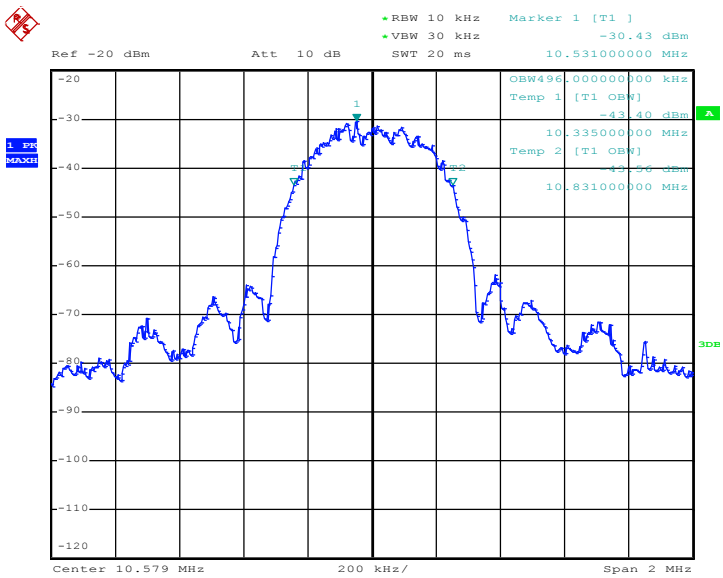
99% Occupied Bandwidth Plot - R



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3.2. Field Strength of Fundamental Emissions and Radiated Emission

3.2.1. Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3. Measuring Instrument Setting

The following table is the setting of receiver.

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.2.4. Test Procedures

<9kHz-30MHz>

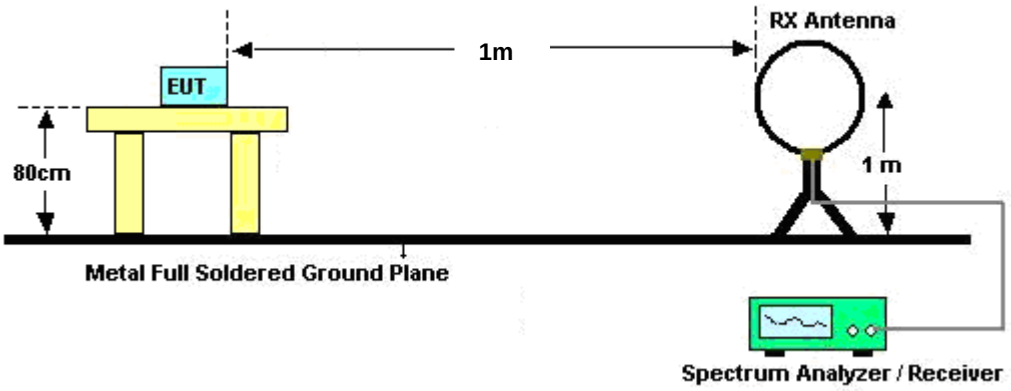
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 1 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

<30MHz-1GHz>

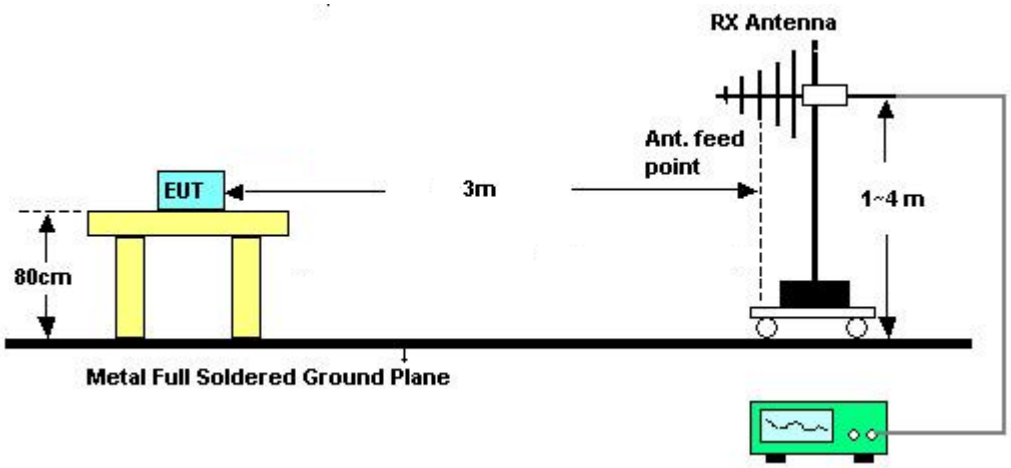
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

3.2.5. Test Setup of Radiated Emission

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.2.6. Test Result of Field Strength of Fundamental Emissions

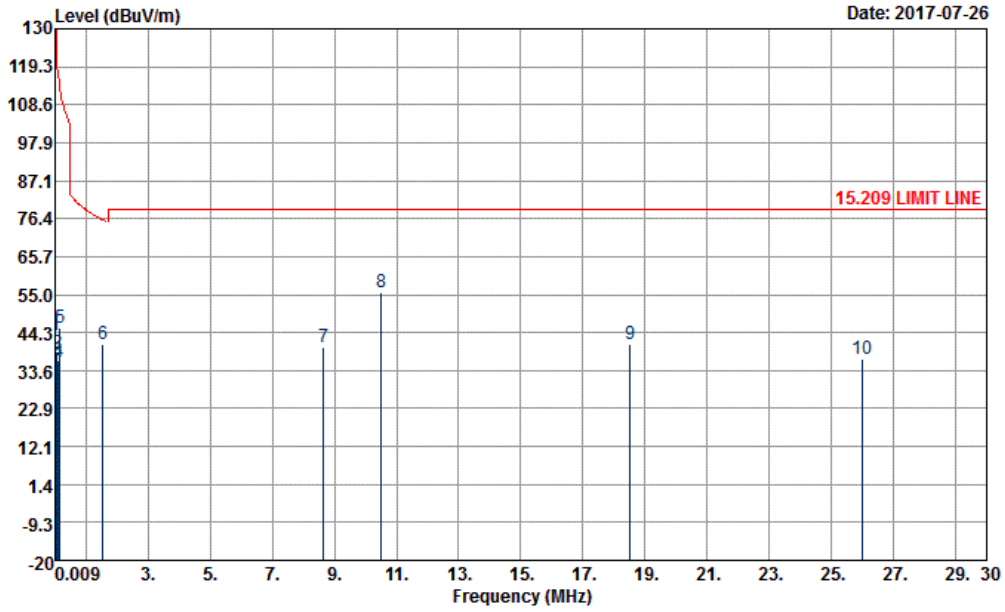
Limit		
Frequency(MHz)	Field strength (dBμV/m)	Measurement distance (m)
1.705 – 30.0	30	30

Recalculation According to ANSI C63.10		
Frequency	Formula	Correction value
10.70 MHz	$FS_{limit} = FS_{max} - 40\log(\frac{d_{nearfield}}{d_{measure}}) - 20\log(\frac{d_{limit}}{d_{nearfield}})$	-42.62

Field Strength of the fundamental		
Frequency	10.50 MHz	
Distance	@1m	@30m
Measured /calculated value (QP measurement)	55.50 dBuV/m	12.88 dBuV/m

3.2.7. Test Result of Radiated Emission (9kHz ~ 30MHz)

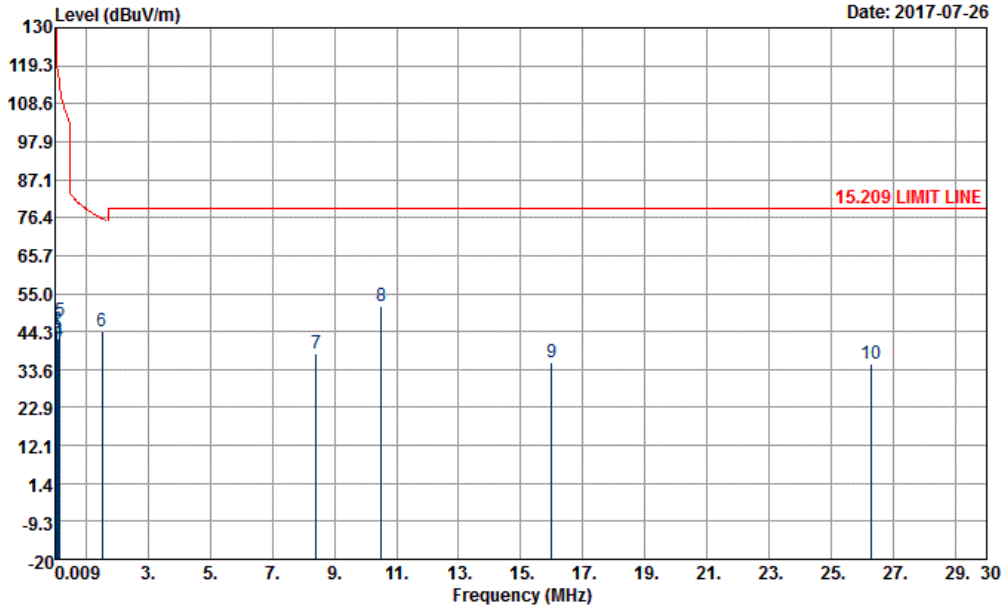
Test Mode :	Mode 1	Temperature :	25~26°C
Test Engineer :	J.C. Liang	Relative Humidity :	53~55%
Test Distance :	1m	Polarization :	Horizontal
Function Type :	10.579 MHz Link		
Remark :	#8 is transmitter's fundamental signal.		



Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 1m LOOP_ANT(H)_1M HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	0.02	43.55	-87.91	131.46	23.50	20.05	0.01	---	---	Average
2	0.06	38.62	-82.61	121.23	18.55	20.06	0.01	---	---	Average
3	0.09	36.45	-81.25	117.70	16.43	20.01	0.01	---	---	QP
4	0.14	36.11	-78.07	114.18	16.10	20.00	0.01	---	---	Average
5	0.15	45.43	-67.98	113.41	25.43	19.99	0.01	---	---	Average
6	1.55	41.12	-34.99	76.11	20.98	20.02	0.12	100	0	QP
7	8.66	40.22	-38.82	79.04	19.95	20.11	0.16	---	---	QP
8	10.50	55.50	-23.54	79.04	35.20	20.12	0.18	---	---	QP
9	18.53	40.83	-38.21	79.04	20.26	20.29	0.28	---	---	QP
10	25.99	36.63	-42.41	79.04	15.88	20.49	0.26	---	---	QP

Test Mode :	Mode 1	**Temperature :**	25~26°C
Test Engineer :	J.C. Liang	**Relative Humidity :**	53~55%
Test Distance :	1m	**Polarization :**	Vertical
Function Type :	10.579 MHz Link		
Remark :	#8 is transmitter's fundamental signal.		

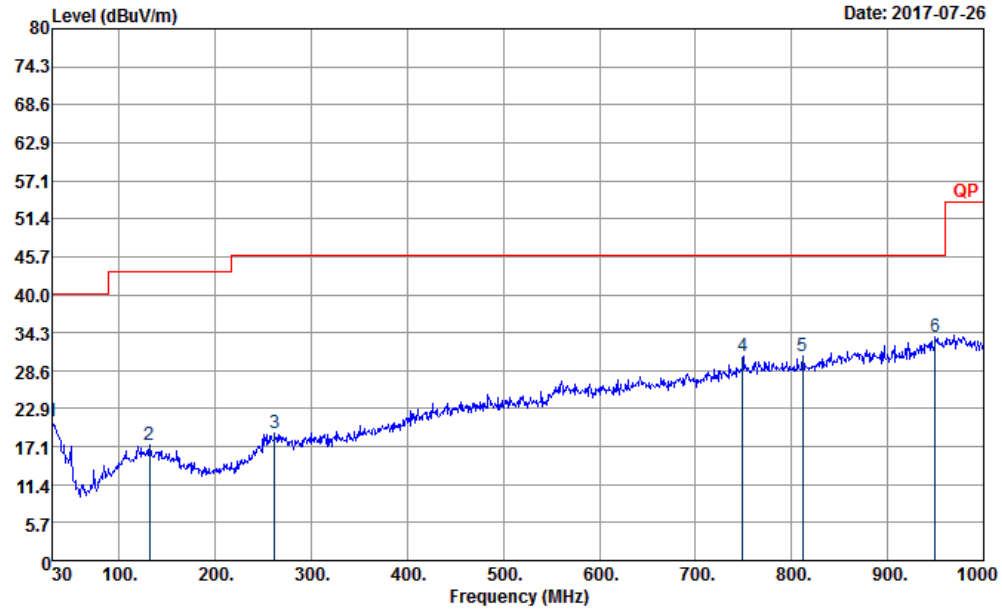


Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 1m LOOP_ANT(V)_1M VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	0.02	44.91	-86.64	131.55	24.86	20.05	0.01	---	---	Average
2	0.06	44.64	-76.59	121.23	24.57	20.06	0.01	---	---	Average
3	0.09	42.31	-75.39	117.70	22.29	20.01	0.01	---	---	QP
4	0.14	41.33	-72.85	114.18	21.32	20.00	0.01	---	---	Average
5	0.16	47.43	-65.79	113.22	27.43	19.99	0.01	---	---	Average
6	1.51	44.21	-32.06	76.27	24.07	20.02	0.12	100	0	QP
7	8.42	38.23	-40.81	79.04	17.96	20.11	0.16	---	---	QP
8	10.50	51.60	-27.44	79.04	31.30	20.12	0.18	---	---	QP
9	16.00	35.45	-43.59	79.04	14.98	20.18	0.29	---	---	QP
10	26.29	35.20	-43.84	79.04	14.48	20.46	0.26	---	---	QP

3.2.8. Test Result of Radiated Emission (30MHz ~ 1000MHz)

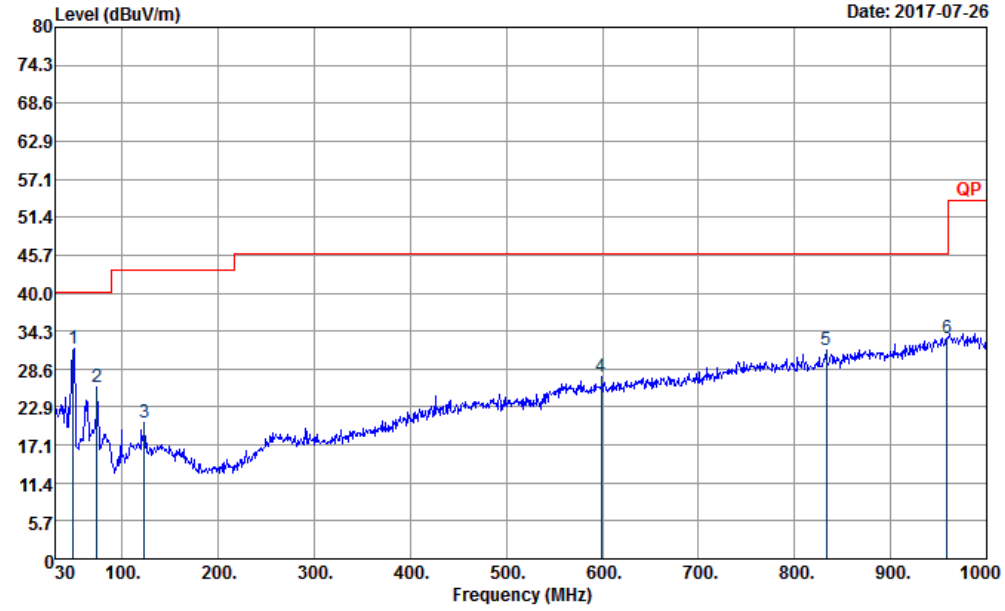
Test Mode :	Mode 1	Temperature :	25~26°C
Test Engineer :	J.C. Liang	Relative Humidity :	53~55%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	10.579 MHz Link		



Site : 03CH11-HY
Condition : QP 3m BI-LOG 6111D-LF_ETC HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.00	21.00	-19.00	40.00	28.29	24.36	0.82	32.50	---	---	Peak
2	131.52	17.34	-26.16	43.50	30.67	17.56	1.51	32.45	---	---	Peak
3	261.93	19.17	-26.83	46.00	29.68	19.70	2.09	32.38	---	---	Peak
4	749.40	30.75	-15.25	46.00	31.38	28.13	3.44	32.33	---	---	Peak
5	811.70	30.85	-15.15	46.00	30.98	28.30	3.53	32.12	---	---	Peak
6	949.60	33.60	-12.40	46.00	30.04	30.77	3.82	31.20	100	0	Peak

Test Mode :	Mode 1	Temperature :	25~26°C
Test Engineer :	J.C. Liang	Relative Humidity :	53~55%
Test Distance :	3m	Polarization :	Vertical
Function Type :	10.579 MHz Link		



Site : 03CH11-HY
Condition : QP 3m BI-LOG 6111D-LF_ETC VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	49.17	31.75	-8.25	40.00	48.68	14.53	1.02	32.49	100	0	Peak
2	73.74	25.85	-14.15	40.00	44.66	12.44	1.22	32.49	---	---	Peak
3	122.88	20.60	-22.90	43.50	34.00	17.51	1.51	32.46	---	---	Peak
4	598.90	27.47	-18.53	46.00	31.10	25.66	3.09	32.46	---	---	Peak
5	832.70	31.47	-14.53	46.00	30.99	28.74	3.60	32.01	---	---	Peak
6	958.70	33.12	-12.88	46.00	29.02	31.14	3.90	31.12	---	---	Peak

3.3. Antenna Requirements

3.3.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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 the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

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 FCC rule.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz~30GHz	Jun. 26, 2017	Jun. 29, 2017	Jun. 25, 2018	Conducted (TH03-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Jul. 26, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-06	35414&AT-N0602	30MHz~1GHz	Oct. 15, 2016	Jul. 26, 2017	Oct. 14, 2017	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Jul. 26, 2017	Oct. 19, 2018	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHz	Oct. 12, 2016	Jul. 26, 2017	Oct. 11, 2017	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jul. 26, 2017	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jul. 26, 2017	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jul. 26, 2017	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 12, 2017	Jul. 26, 2017	Jan. 11, 2018	Radiation (03CH11-HY)

5. Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2