



NCC RADIO TEST REPORT

Equipment : 雙頻無線接入點
Brand Name : UBIQUITI
Model Name : UAP-XG
Applicant : 香港商優比快科技有限公司台灣分公司
臺北市信義區松仁路 107 號 12 樓
Manufacturer : Ubiquiti Networks, Inc.
685 Third Avenue, 27th Floor New York, New York
10017 USA
Standard : LP0002 Section 3.10.1 (2018-01-10)

The product was received on May 02, 2017, and testing was started from Sep. 06, 2017 and completed on Aug. 06, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013, NCC LP0002 (Jan. 10, 2018), KDB558074 D01 v05r02 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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


Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB Ver1.0



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2.1	2.3	AC Power Line Conducted Emissions	PASS	-
2.2	3.10.1.2	Maximum Conducted Output Power	PASS	-
2.3	3.10.1.6	Power Spectral Density	PASS	-
2.4	3.10.1.6	6dB Spectrum Bandwidth	PASS	-
2.5	3.10.1.5	Radiated Emissions	PASS	-
2.6	3.10.1.5	Band Edge Emissions	PASS	-
2.7	3.10.1.4	Antenna Requirements	PASS	-
Note: Reference to Sporton Project No.: 661623-08.				

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang

1. General Information

1.1. Product Details

Items	Description
Power Type	From PoE
Modulation	DSSS
Data Rate (Mbps)	GFSK: 1
Frequency Range	2402 ~ 2480MHz
Channel Number	40 (37 hopping + 3 advertising channel)
Channel Bandwidth (99%)	1.02 MHz
Maximum Conducted Output Power	8.64 dBm
Carrier Frequencies	Please refer to section 1.4
Antenna	Please refer to section 1.3

1.2. Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
PoE	UBIQUITI	GP-C500-120G	INPUT: 100-240V~50/60Hz MAX 1.5A (1,5A) OUTPUT: 50V, 1.2A(1,2A)
Other			
Equipment Name	Brand Name	Model Name	Remark
Power cord*1	UBIQUITI	CH-1902+CH-1106	Non-Shielded, 0.6m
Installing of Package *1			
Mounting Plate*1			
Ceiling Backing Plate*1			

1.3. Table for Filed Antenna

For 2.4GHz function

Ant.	Port	Brand	Model Name	Antenna Type	Connector	2.4GHz
						Gain (dBi)
1	1	-	-	PIFA Antenna	N/A	6
2	2	-	-	PIFA Antenna	N/A	6
3	3	-	-	PIFA Antenna	N/A	6
4	4	-	-	PIFA Antenna	N/A	6

For 5GHz function

Band 1~2

Ant.	Port	Brand	Model Name	Antenna Type	Connector	5GHz
						Gain (dBi)
5	1	-	-	PIFA Antenna	N/A	8
6	2	-	-	PIFA Antenna	N/A	8
7	3	-	-	PIFA Antenna	N/A	8
8	4	-	-	PIFA Antenna	N/A	8

For 5GHz function

Band 1~2

Ant.	Port	Brand	Model Name	Antenna Type	Connector	5GHz
						Gain (dBi)
9	1	-	-	PIFA Antenna	N/A	8
10	2	-	-	PIFA Antenna	N/A	8
11	3	-	-	PIFA Antenna	N/A	8
12	4	-	-	PIFA Antenna	N/A	8

For Bluetooth function

Ant.	Port	Brand	Model Name	Antenna Type	Connector	TX/RX Gain (dBi)
13	1	-	-	PIFA Antenna	N/A	1

For RX scan radio function

Ant.	Port	Brand	Model Name	Antenna Type	Connector	RX Gain (dBi)	
						2.4GHz	5GHz
14	1	-	-	PIFA Antenna	N/A	4	4

Note: The above information was declared by manufacturer.

For 2.4GHz WLAN function
For IEEE 802.11b/g/n/ac mode (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For 5GHz WLAN function
For IEEE 802.11a/n/ac mode (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For Bluetooth function: The module has one chain only.

Port 1 can be used as transmitting/receiving antenna.

Port 1 could transmit/receive simultaneously.

For RX scan radio function:

The module has one Port only.

Only Port 1 can be used as receiving antenna.

1.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	0	2402 MHz	20	2442 MHz
	1	2404 MHz	:	:
	2	2406 MHz	37	2476 MHz
	:	:	38	2478 MHz
	18	2438 MHz	39	2480 MHz
	19	2440 MHz	-	-



1.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Port
AC Power Line Conducted Emissions	Intentional-CTX	-	-	-
	Unintentional-CRX	-	-	-
Maximum Conducted Output Power Power Spectral Density	GFSK	1 Mbps	0/19/39	1
6dB Spectrum Bandwidth	GFSK	1 Mbps	0/19/39	1
Radiated Emissions 9kHz~1GHz	Intentional-CTX	-	-	-
	Unintentional-CRX	-	-	-
Radiated Emissions Unintentional 1GHz~5 th Harmonic	Unintentional-CRX	-	-	-
Radiated Emissions Intentional 1GHz~10 th Harmonic	GFSK	1 Mbps	0/19/39	1
Band Edge Emissions	GFSK	1 Mbps	0/19/39	1

The following test modes were performed for all tests:

For Conducted Emission test:

Intentional-CTX

Mode 1. EUT + CTX 2.4GHz

Mode 2. EUT + CTX 5GHz

Mode 3. EUT + CTX Bluetooth

Mode 3 is the worst case, so it was selected to record in this test report.

Unintentional-CRX

Mode 1. EUT + CRX 2.4GHz

Mode 2. EUT + CRX 5GHz

Mode 3. EUT + CRX Bluetooth

Mode 4. EUT + RX Scan Radio 2.4GHz

Mode 5. EUT + RX Scan Radio 5GHz

Mode 2 is the worst case, so it was selected to record in this test report.

**For Radiated Emission test****For 2.4GHz**

The EUT was performed at Y axis and Z axis position. for Radiated Emission intentional above 1GHz, The worst case was found at Y axis, thus the measurement will follow this same test configuration.

For Bluetooth

The EUT was performed at Y axis and Z axis position. for Radiated Emission intentional above 1GHz, The worst case was found at Y axis, thus the measurement will follow this same test configuration.

For RX Scan Radio

The EUT was performed at X axis, Y axis and Z axis position.

The worst case was found at Z axis for Emissions in Radiated Emission Unintentional above 1GHz, thus the measurement for Unintentional below 1GHz will follow this same test configuration.

For 5GHz

The EUT was performed at Y axis and Z axis position. for Radiated Emission intentional above 1GHz, The worst case was found at Z axis, thus the measurement will follow this same test configuration.

<Below 1GHz>**Intentional-CTX**

Mode 1. EUT + CTX 2.4GHz in Y axis

Mode 2. EUT + CTX 5GHz in Z axis

Mode 3. EUT + EUT + CTX Bluetooth in Y axis

Mode 3 is the worst case, so it was selected to record in this test report.

Unintentional-CRX

Mode 1. EUT + CRX 2.4GHz in Y axis

Mode 2. EUT + CRX 5GHz in Z axis

Mode 3. EUT + CRX Bluetooth in Y axis

Mode 4. EUT + RX Scan Radio 2.4GHz in Z axis

Mode 5. EUT + RX Scan Radio 5GHz in Z axis

Mode 2 is the worst case, so it was selected to record in this test report.

<Unintentional 1GHz~5th Harmonic>**Unintentional-CRX**

Mode 1. EUT + CRX 2.4GHz in Y axis

Mode 2. EUT + CRX 5GHz in Z axis

Mode 3. EUT + CRX Bluetooth in Y axis

Mode 4. EUT + RX Scan Radio 2.4GHz in Y axis

Mode 5. EUT + RX Scan Radio 2.4GHz in Z axis

Mode 6. EUT + RX Scan Radio 5GHz in Y axis

Mode 7. EUT + RX Scan Radio 5GHz in Z axis

Mode 1 is the worst case, so it was selected to record in this test report.

<Intentional 1GHz~10th Harmonic>

Intentional-CTX

The EUT was performed at Y axis and Z axis position. The worst case was found at Y axis, thus the measurement will follow this same test configuration.

Mode 1. EUT + Bluetooth in Y axis

1.6. Table for Testing Locations

Test Site Location				
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.			
TEL:	886-3-656-9065			
FAX:	886-3-656-9085			
Test Site No.	Site Category	Location	FCC Designation No.	IC File No.
03CH01-CB (Above 1GHz: Intentional 1GHz~10 th – CTX)	SAC	Hsin Chu	TW0006	IC 4086B
03CH05-CB (Below 1GHz: Intentional-CTX)	SAC	Hsin Chu	TW0006	IC 4086B
03CH03-CB (Below 1GHz: Unintentional-CRX / Unintentional 1GHz~5 th – CRX)	SAC	Hsin Chu	TW0006	IC 4086B
CO01-CB	Conduction	Hsin Chu	TW0006	IC 4086B
TH01-CB	OVEN Room	Hsin Chu	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

1.7. Table for Supporting Units

For Test Site No: CO01-CB (Intentional-CTX / Unintentional-CRX)

No.	Support Unit	Brand	Model	FCC ID
A	LAN NB	DELL	E6430	N/A

For Test Site No: 03CH05-CB (Below 1GHz: Intentional-CTX)

No.	Support Unit	Brand	Model	FCC ID
A	NB	DELL	E4300	N/A

For Test Site No: 03CH03-CB (Below 1GHz: Intentional-CTX / Unintentional-CRX /

Above 1GHz: Unintentional 1GHz~5th – CRX)

No.	Support Unit	Brand	Model	FCC ID
A	NB	DELL	E4300	N/A

For Test Site No: 03CH01-CB (Above 1GHz: Intentional 1GHz~10th – CTX)

No.	Support Unit	Brand	Model	FCC ID
A	NB	DELL	E4300	N/A

For Test Site No: TH01-CB

No.	Support Unit	Brand	Model	FCC ID
A	NB	DELL	E4300	N/A



1.8. Table for Parameters of Test Software Setting

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters:

Test Software Version	Tera Term		
Frequency	2402 MHz	2440 MHz	2480 MHz
Power Parameters	8	8	8

1.9. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

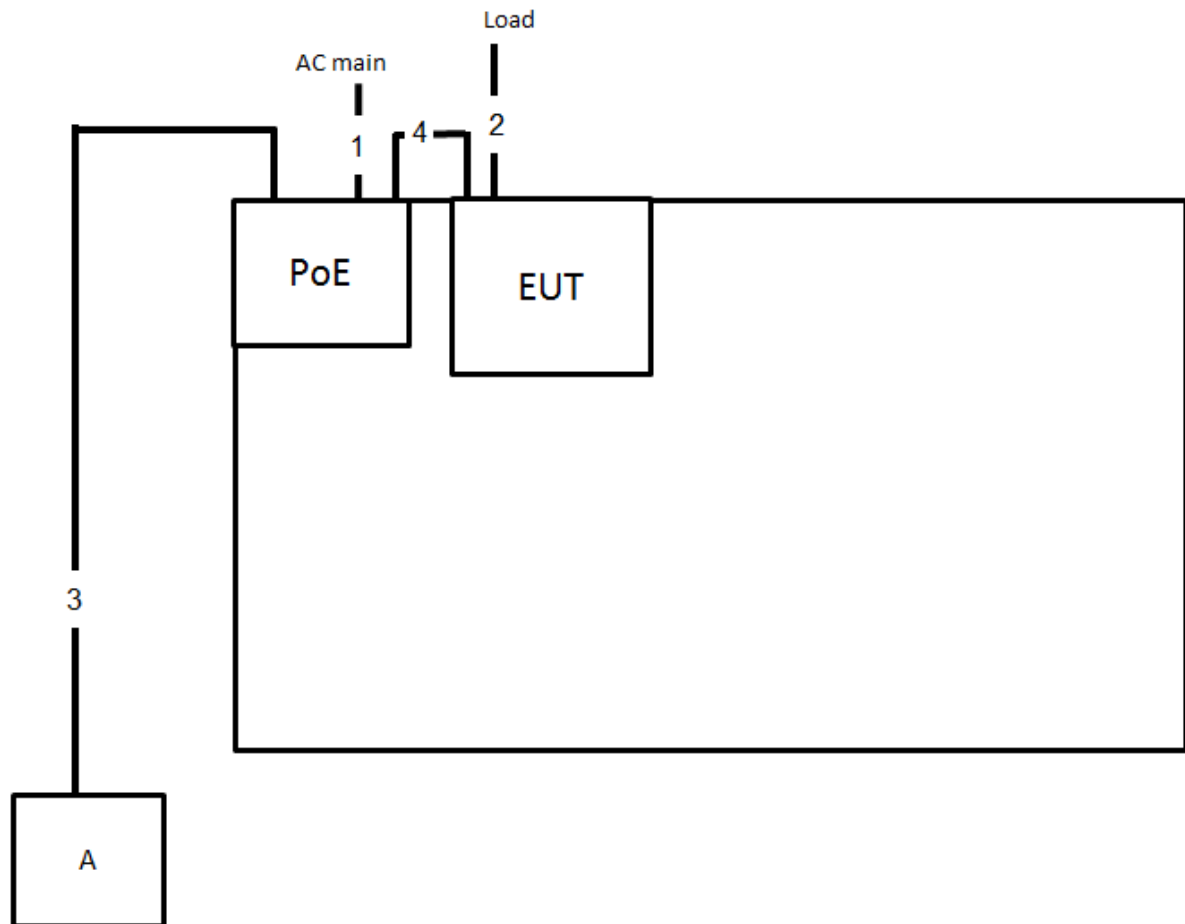
1.10. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
GFSK	0.386	0.642	60.16%	2.21	2.59

1.11. Test Configurations

1.11.1. AC Power Line Conduction Emissions Test Configuration

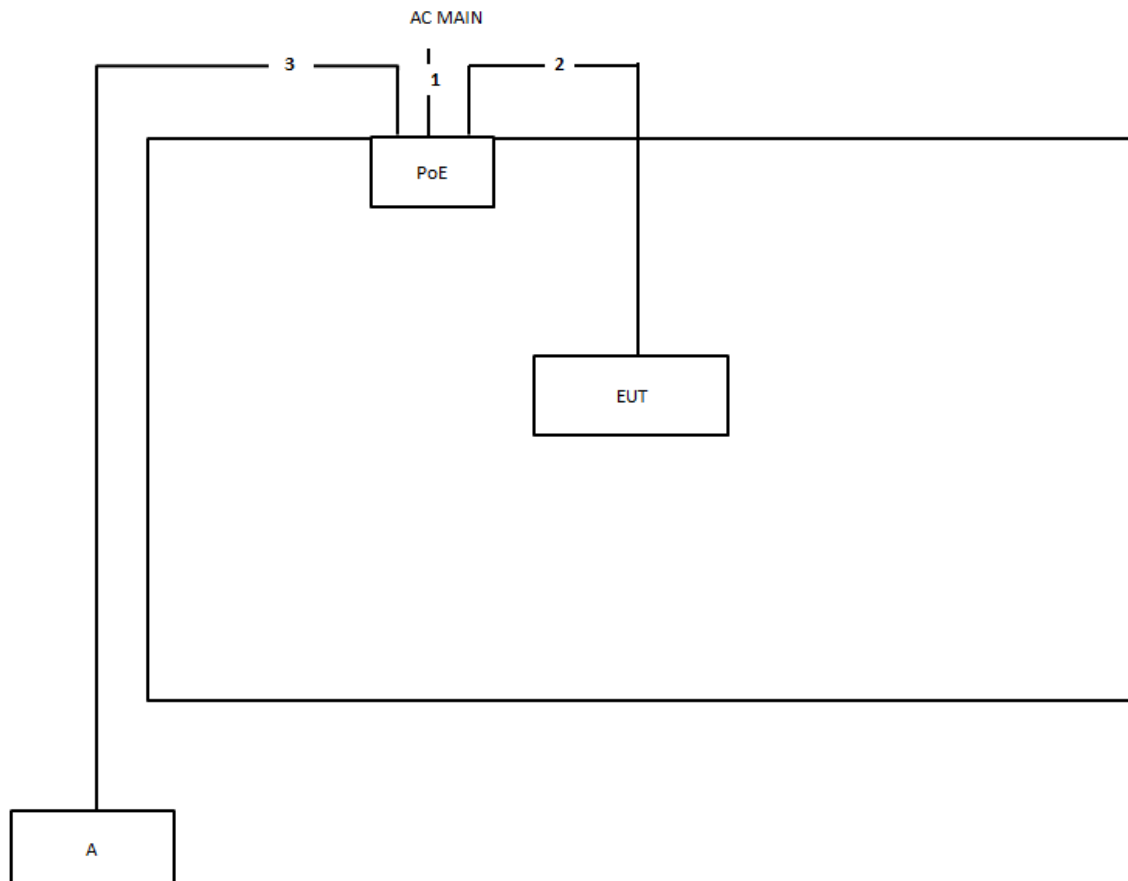
**Test Setup Diagram – AC Line Conducted Emission Test
(Intentional-CTX / Unintentional-CRX)**



Item	Connection	Shielded	Length	Brand	Model No.
1	Power cable	No	0.6m	-	-
2	RJ-45 cable	No	1.5m	Powersync	CLN5GBR9020
3	RJ-45 cable	No	10m	-	-
4	RJ-45 cable	No	1.5m	Powersync	CLN5GBR9020

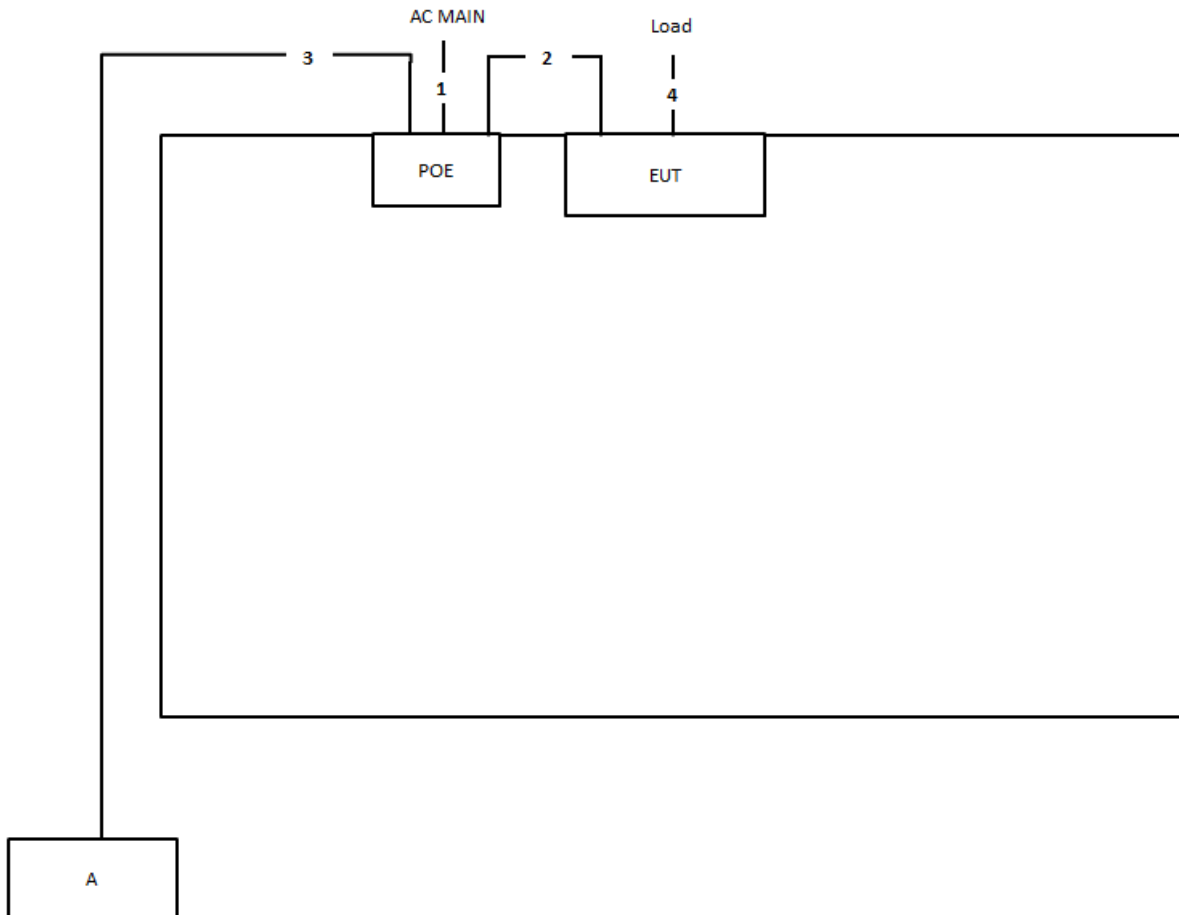
1.11.2. Radiation Emissions Test Configuration

Test Setup Diagram - Radiated Test (Below 1GHz: Intentional-CTX)

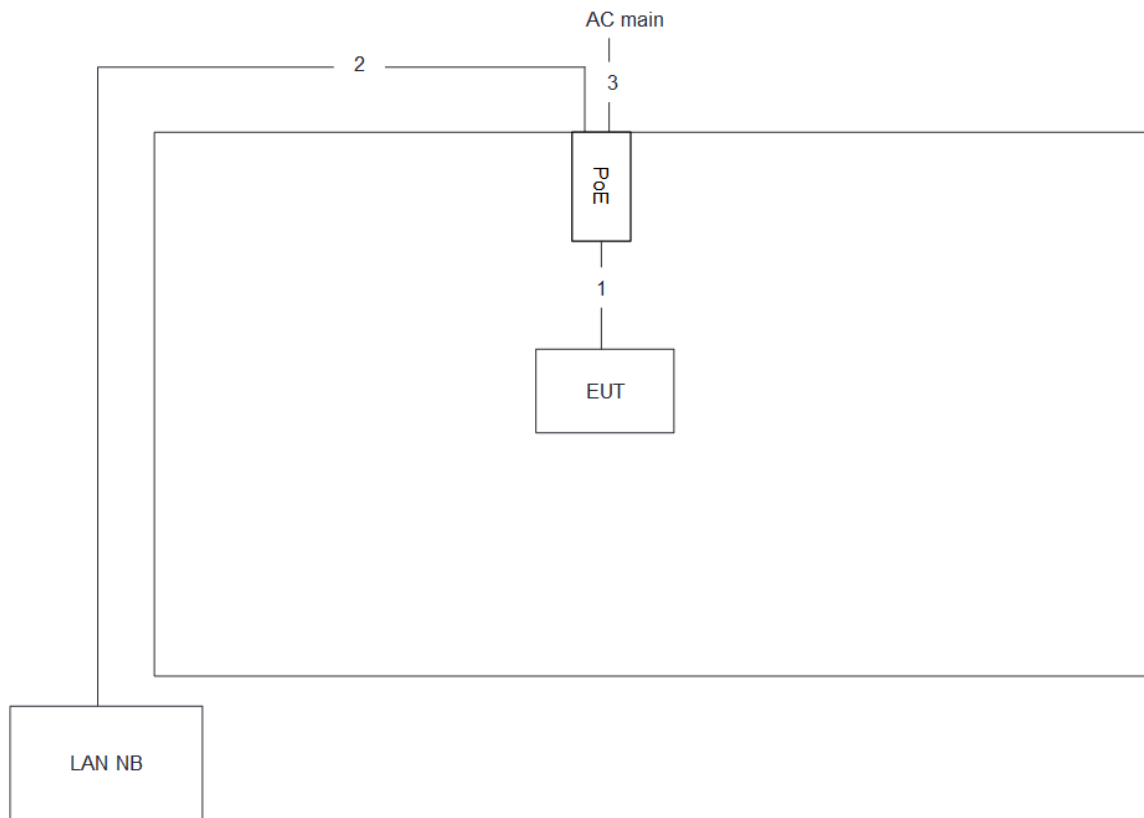


Item	Connection	Shielded	Length	Brand	Model No.
1	Power cable	No	0.6m	-	-
2	RJ-45 cable	No	1.5m	PowerSync	C65B10FL
3	RJ-45 cable	No	10m	-	-

Test Setup Diagram - Radiated Test
(Below 1GHz: Unintentional-CRX / Above 1GHz: Unintentional 1GHz~5th-CRX)



Item	Connection	Shielded	Length	Brand	Model No.
1	Power cable	No	0.6m	-	-
2	RJ-45 cable	No	1.5m	PowerSync	C65B10FL
3	RJ-45 cable	No	10m	-	-
4	RJ-45 cable	No	1..5m	PowerSync	C65B10FL

Test Setup Diagram - Radiated Test (Above 1GHz: Intentional 1GHz~10th-CTX)


Item	Connection	Shielded	Length	Brand	Model No.
1	RJ-45 cable	No	1.5m	PowerSync	C65B10FL
2	RJ-45 cable	No	10m	-	-
3	Power cable	No	0.6m	-	-

2. Test Result

2.1. AC Power Line Conducted Emissions Measurement

2.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

2.1.2. Measuring Instruments and Setting

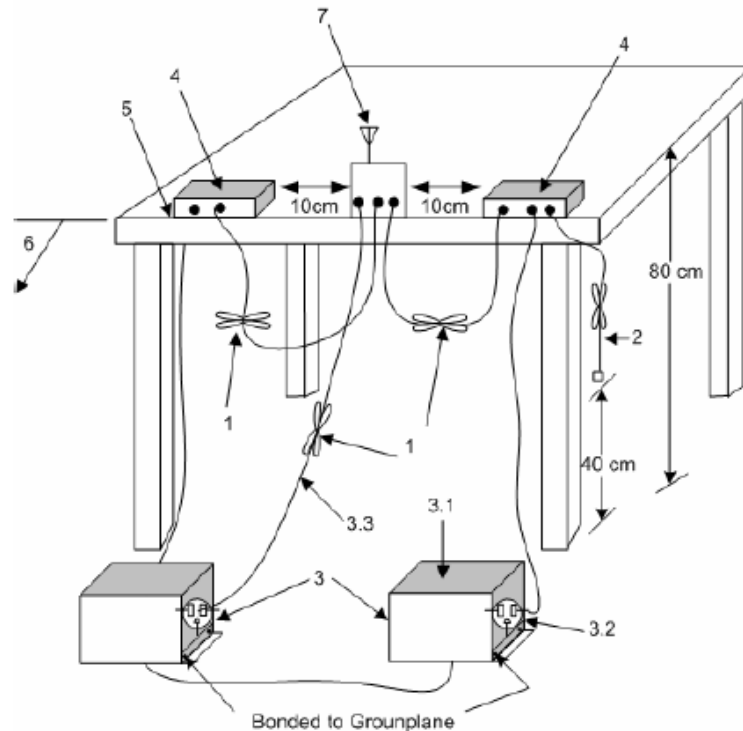
Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

2.1.3. Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013 clause 6.2 for AC power-line conducted emissions.

2.1.4. Test Setup Layout

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.

3.1—All other equipment powered from additional LISN(s).

3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.

3.3—LISN at least 80 cm from nearest part of EUT chassis.

4—Non-EUT components of EUT system being tested.

5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.

6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

2.1.5. Test Deviation

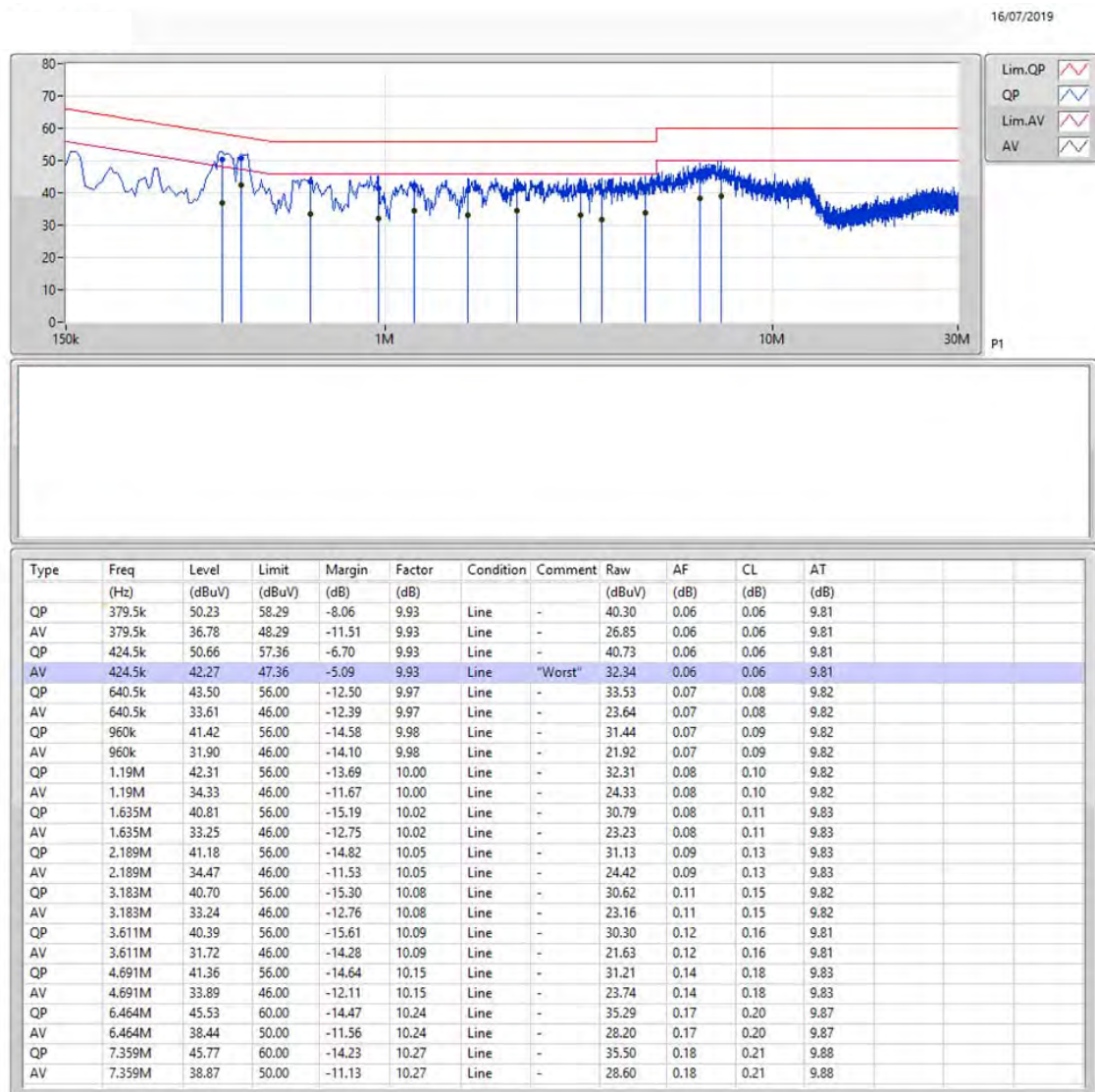
There is no deviation with the original standard.

2.1.6. EUT Operation during Test

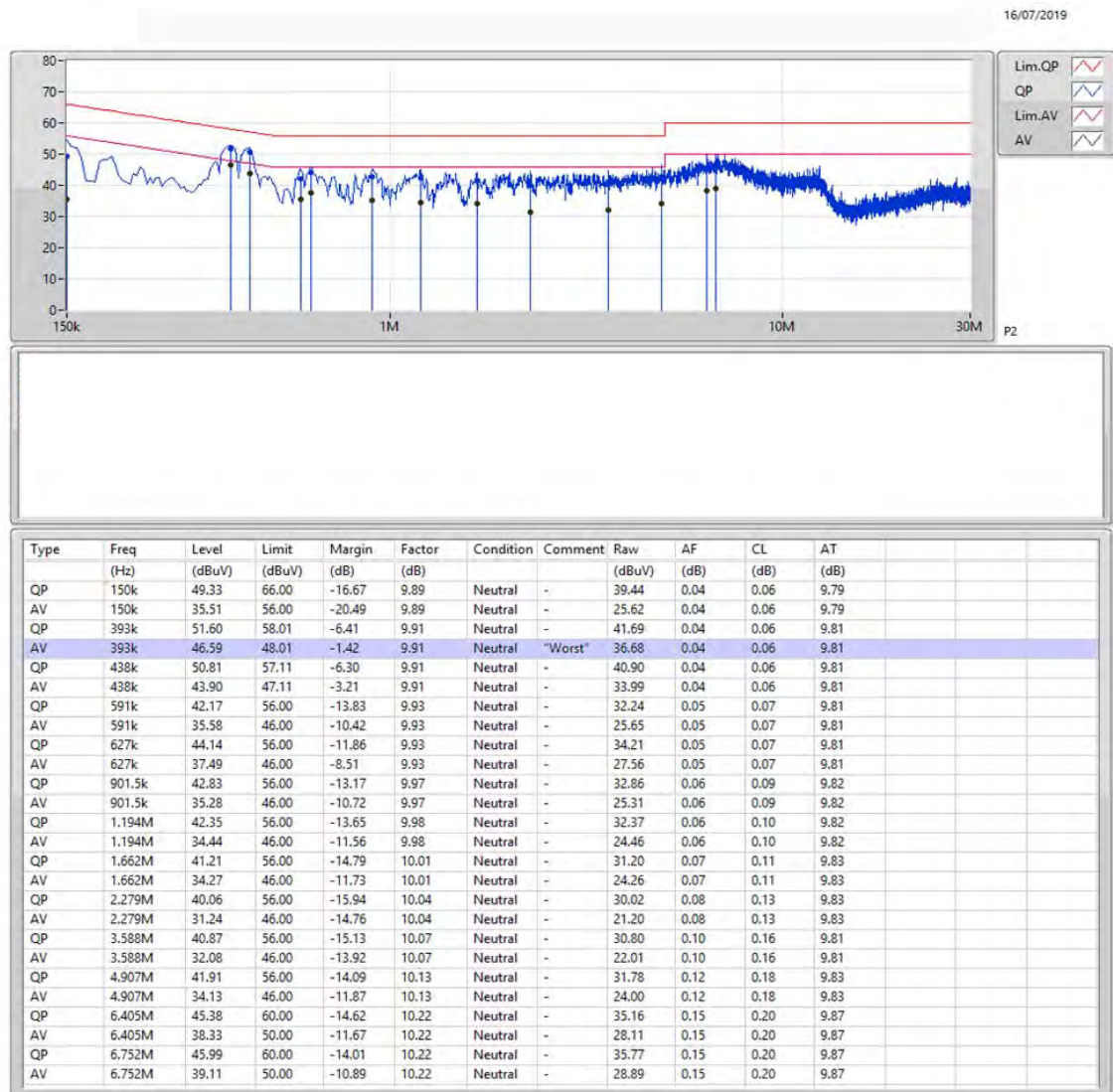
The EUT was placed on the test table and programmed in normal function.

2.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23.9-24.3°C	Humidity	58.1-59.2 %
Test Engineer	Max Lin	Phase	Line
Configuration	Intentional-CTX	Test Mode	Mode 3



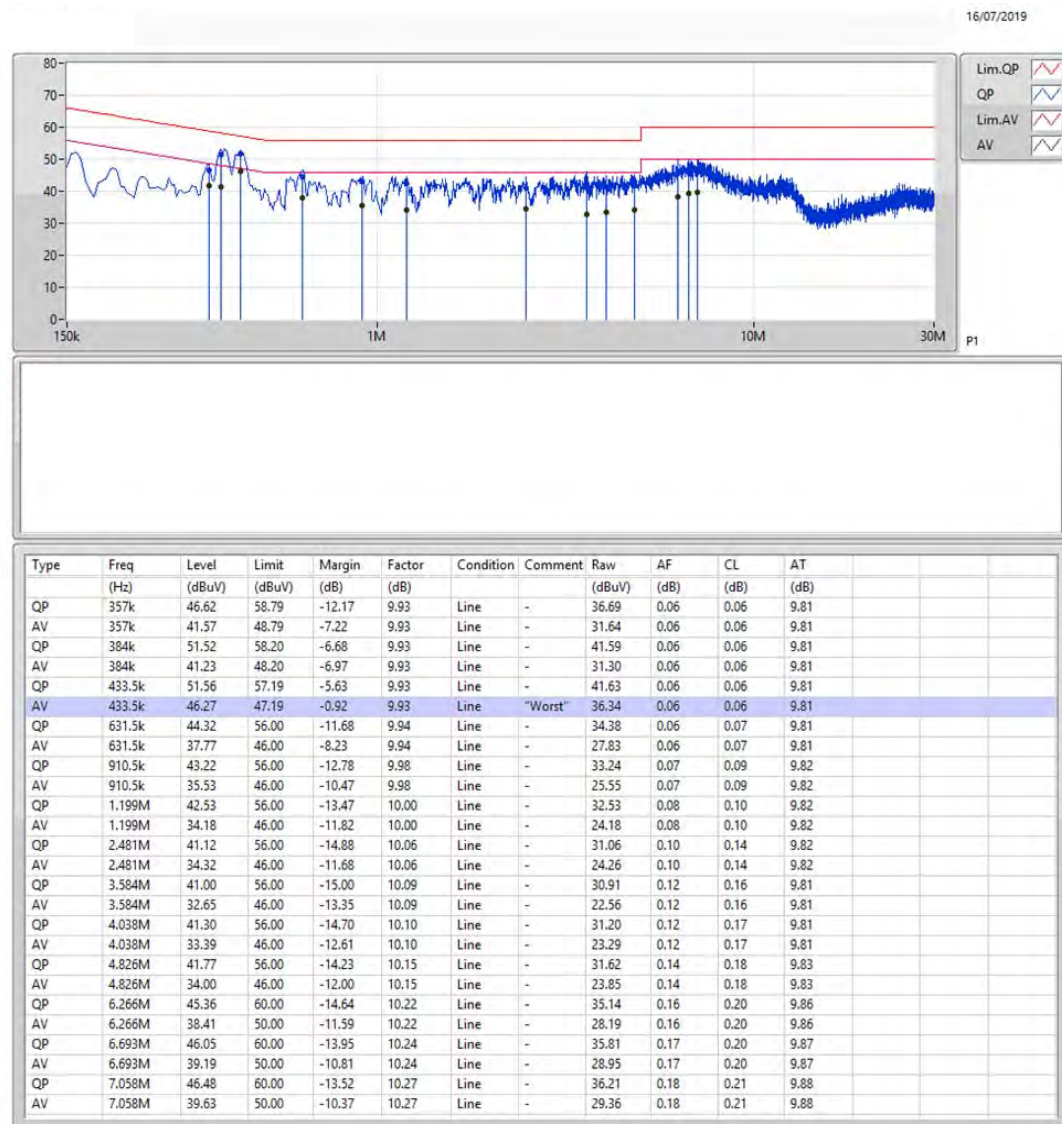
Temperature	23.9-24.3°C	Humidity	58.1-59.2 %
Test Engineer	Max Lin	Phase	Neutral
Configuration	Intentional-CTX	Test Mode	Mode 3



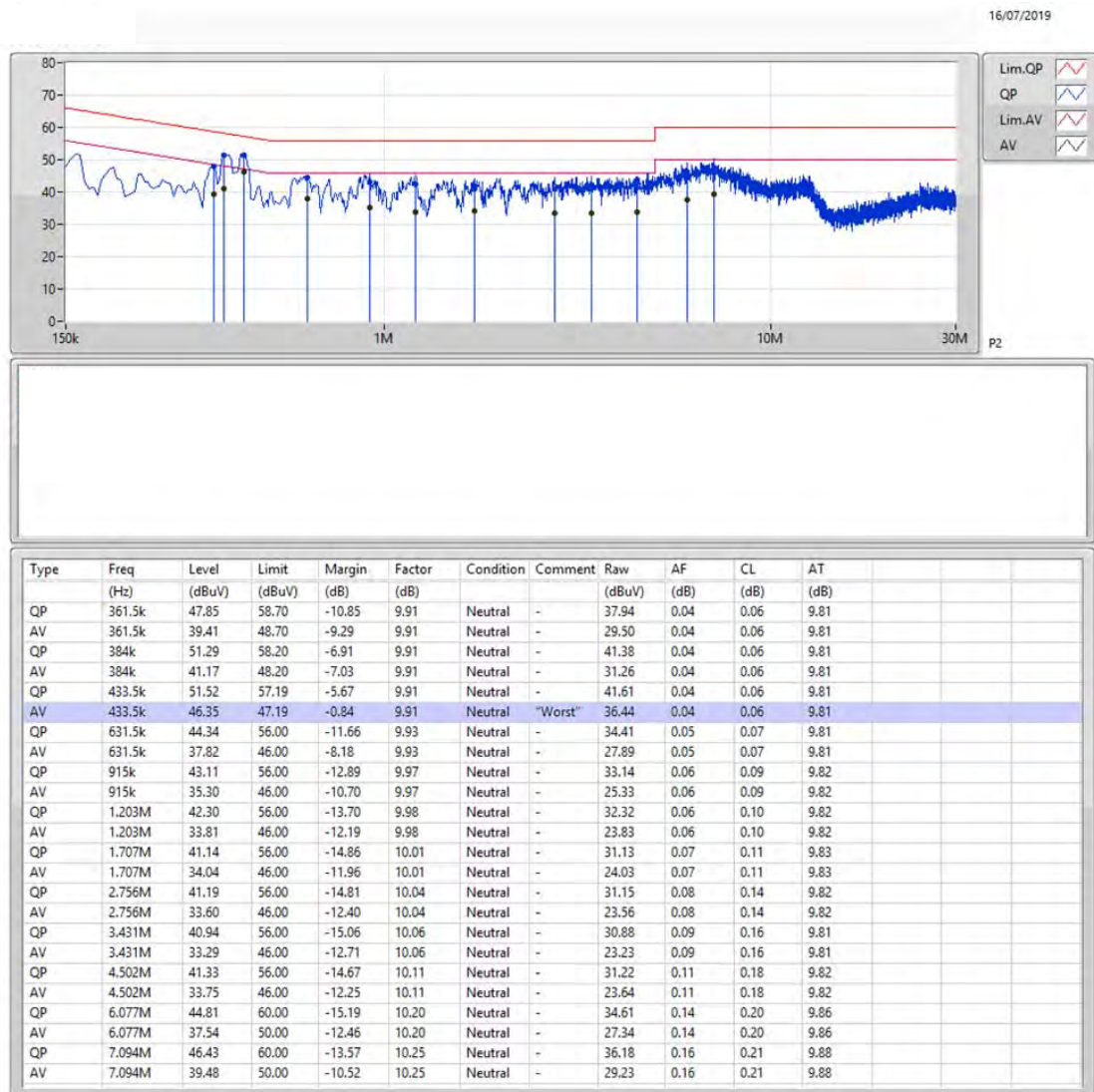
Note: Level = Read Level + LISN Factor + Cable Loss.



Temperature	23.9-24.3°C	Humidity	58.1-59.2 %
Test Engineer	Max Lin	Phase	Line
Configuration	Unintentional-CRX	Test Mode	Mode 2



Temperature	23.9-24.3°C	Humidity	58.1-59.2 %
Test Engineer	Max Lin	Phase	Neutral
Configuration	Unintentional-CRX	Test Mode	Mode 2



Note: Level = Read Level + LISN Factor + Cable Loss.

2.2. Maximum Conducted Output Power Measurement

2.2.1. Limit

The limit for output power is 30dBm.

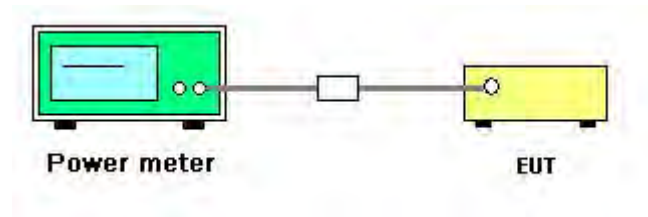
2.2.2. Measuring Instruments and Setting

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	Average

2.2.3. Test Procedures

Test Method	
Maximum Peak Conducted Output Power	
☐	Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).
☐	Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
Maximum Conducted Output Power	
[duty cycle ≥ 98% or external video / power trigger]	
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
duty cycle < 98% and average over on/off periods with duty factor	
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A. (alternative)
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
☐	Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A. (alternative)
Measurement using a power meter (PM)	
☒	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
☐	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using an gate RF average power meter).
For conducted measurement.	
If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.	
If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$	

2.2.4. Test Setup Layout



2.2.5. Test Deviation

There is no deviation with the original standard.

2.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

**2.2.7. Test Result of Maximum Conducted Output Power**

Temperature	23.4°C	Humidity	62%
Test Engineer	Ron Huang	Configurations	GFSK
Test Date	Sep. 06, 2017 ~ Sep. 20, 2017		

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
0	2402 MHz	5.97	30.00	PASS
19	2440 MHz	7.91	30.00	PASS
39	2480 MHz	8.64	30.00	PASS

2.3. Power Spectral Density Measurement

2.3.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

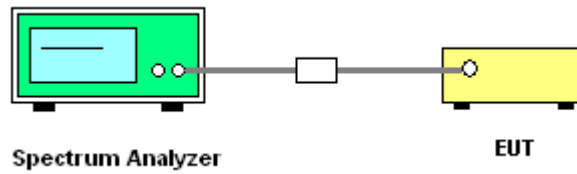
2.3.2. Measuring Instruments and Setting

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	5-30 % greater than the DTS channel bandwidth.
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100\text{kHz}$
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

2.3.3. Test Procedures

Test Method	
Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).	
☒	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.2 Method PKPSD.
[duty cycle $\geq$ 98% or external video / power trigger]	
☐	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.3 Method AVGPSD-1.
☐	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.5 Method AVGPSD-2.
☐	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.7 Method AVGPSD-3.
duty cycle < 98% and average over on/off periods with duty factor	
☐	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.4 Method AVGPSD-1A. (alternative).
☐	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.6 Method AVGPSD-2A. (alternative)
☐	Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10.8 Method AVGPSD-3A. (alternative)
For conducted measurement.	
If The EUT supports multiple transmit chains using options given below:	
☒	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
☐	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
☐	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

2.3.4. Test Setup Layout



2.3.5. Test Deviation

There is no deviation with the original standard.

2.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

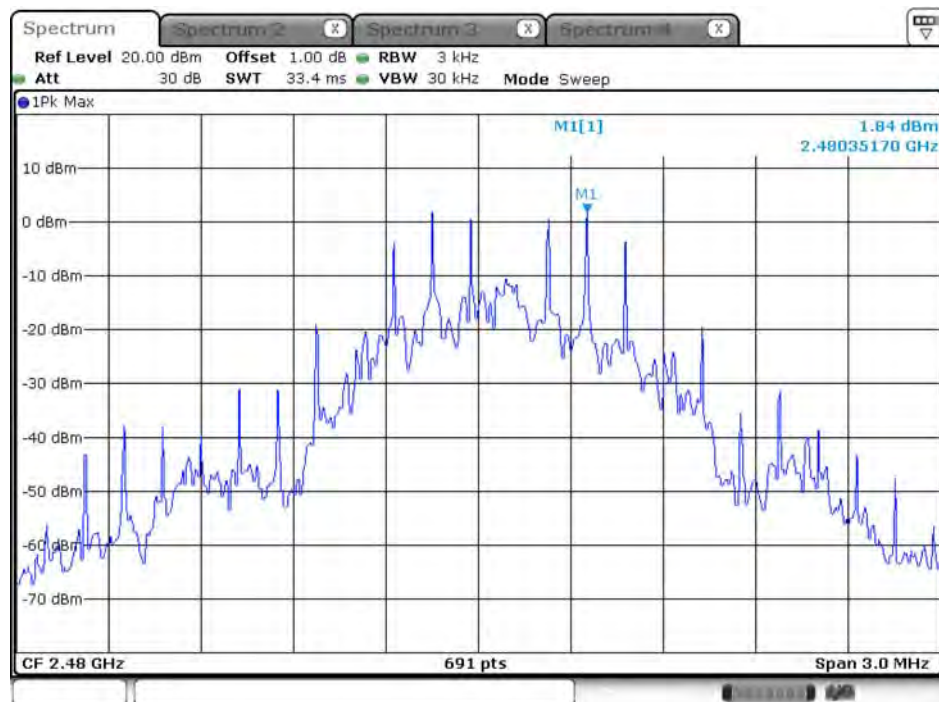
2.3.7. Test Result of Power Spectral Density

Temperature	23.4°C	Humidity	62%
Test Engineer	Ron Huang	Configurations	GFSK

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
0	2402 MHz	-0.90	8.00	PASS
19	2440 MHz	0.95	8.00	PASS
39	2480 MHz	1.84	8.00	PASS

Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.

Power Density Plot on Configuration Bluetooth / 2480 MHz


2.4. 6dB Spectrum Bandwidth Measurement

2.4.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

2.4.2. Measuring Instruments and Setting

6dB Spectrum Bandwidth	
Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth	
Spectrum Parameters	Setting
Span	1.5 times to 5.0 times the OBW
RBW	1 % to 5 % of the OBW
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold

2.4.3. Test Procedures

Test Method	
For the emission bandwidth shall be measured using one of the options below:	
☒	Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.
☐	Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.
☐	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.



2.4.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

This test setup layout is the same as that shown in section 2.5.4.

2.4.5. Test Deviation

There is no deviation with the original standard.

2.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

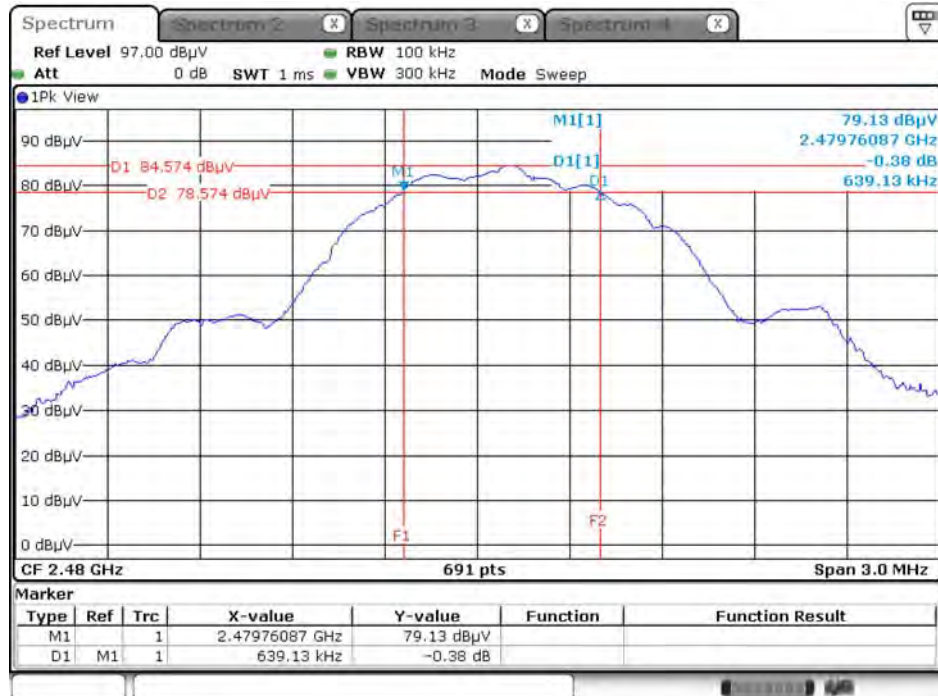
**2.4.7. Test Result of 6dB Spectrum Bandwidth**

Temperature	23.4°C	Humidity	62%
Test Engineer	Ron Huang	Configurations	GFSK

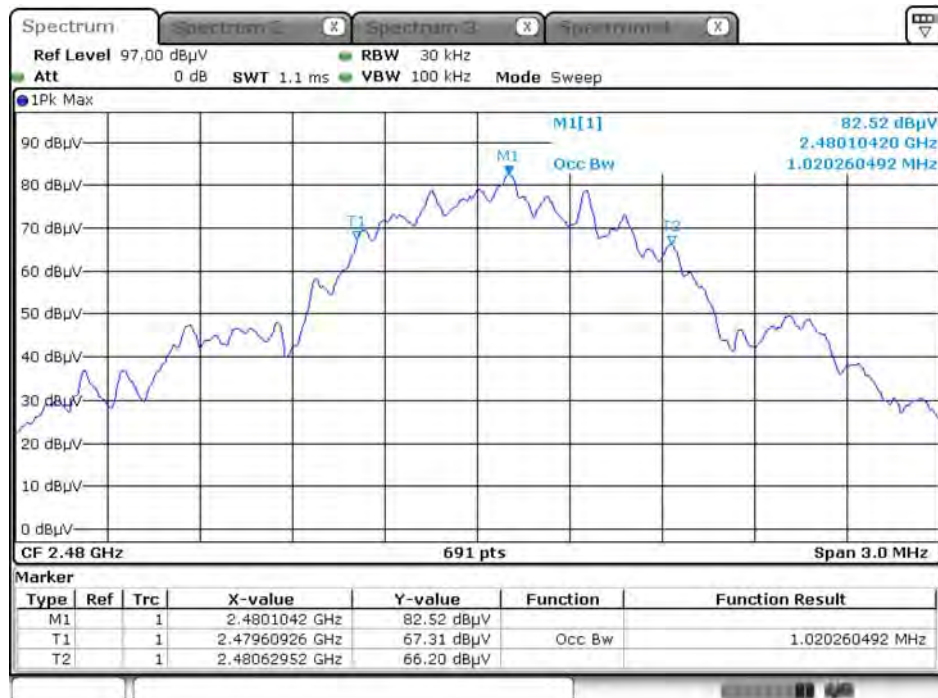
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
0	2402 MHz	0.639	1.02	500	PASS
19	2440 MHz	0.643	1.02	500	PASS
39	2480 MHz	0.639	1.02	500	PASS

Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration Bluetooth / 2480 MHz


Date: 15.SEP.2017 03:32:40

99% Occupied Bandwidth Plot on Configuration Bluetooth / 2480 MHz


Date: 15.SEP.2017 03:44:50

2.5. Radiated Emissions Measurement

2.5.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 2.7, then the 2.8 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

2.5.2. Measuring Instruments and Setting

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

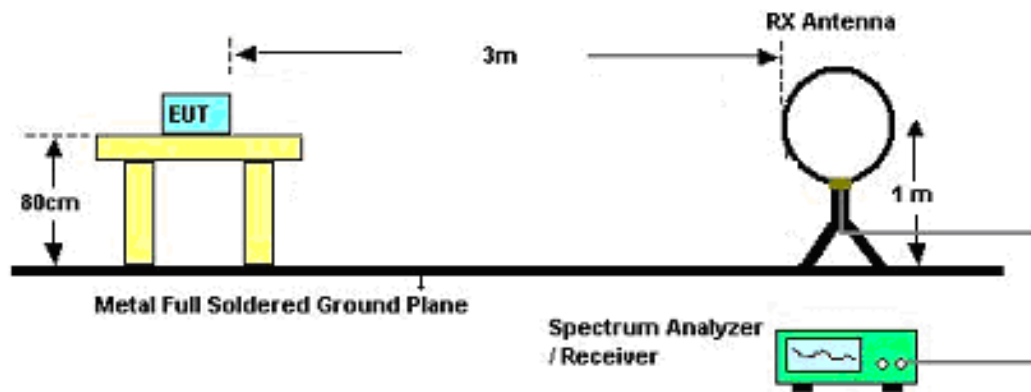
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

2.5.3. Test Procedures

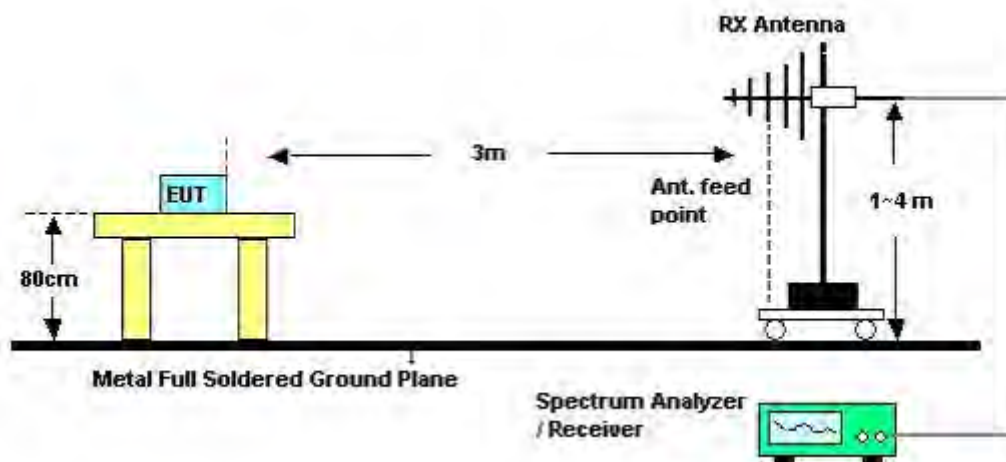
Test Method	
The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
For the transmitter unwanted emissions shall be measured using following options below:	
Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.	☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle $\geq 98\%$).
	☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
	☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW $\geq 1/T$).
	☐ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
	☐ Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
	☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
For the transmitter band-edge emissions shall be measured using following options below:	
Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.
	Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB
For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.	

2.5.4. Test Setup Layout

**Radiated - Emissions in Restricted Frequency Bands
For Intentional – CTX
9kHz ~30MHz**

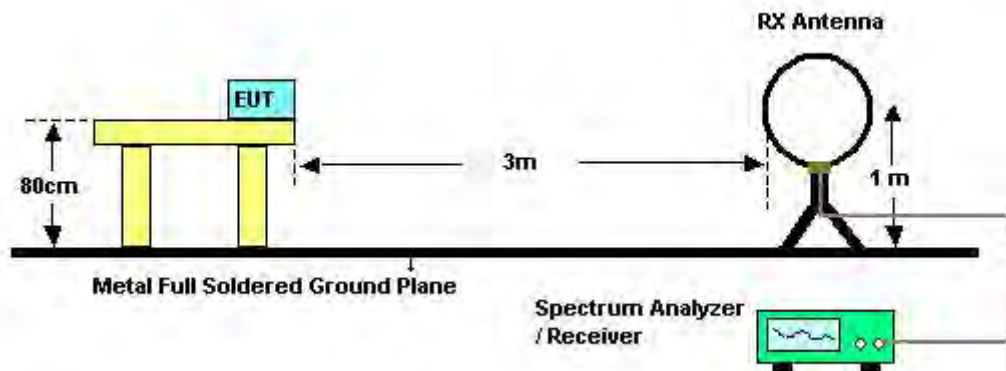


30MHz~1GHz

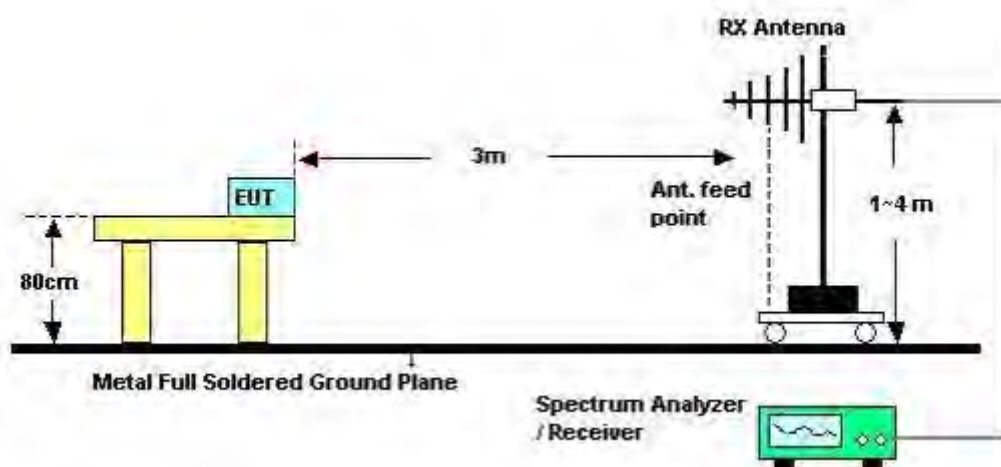


**Radiated - Emissions in Restricted Frequency Bands
For Unintentional – CRX**

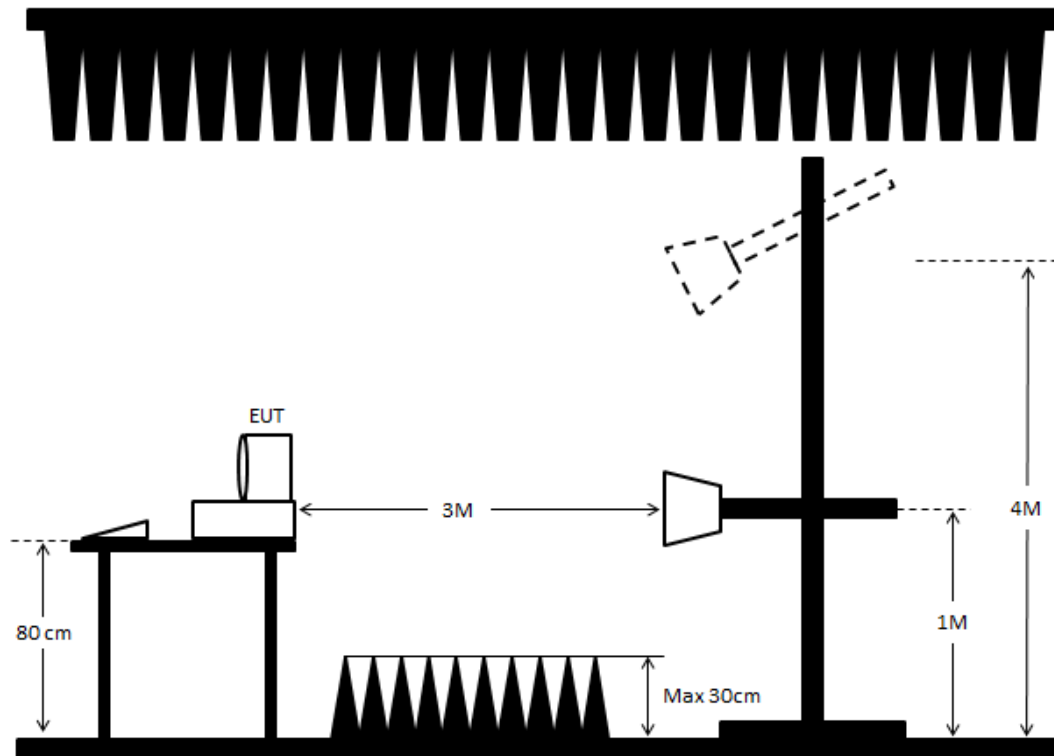
9kHz ~30MHz



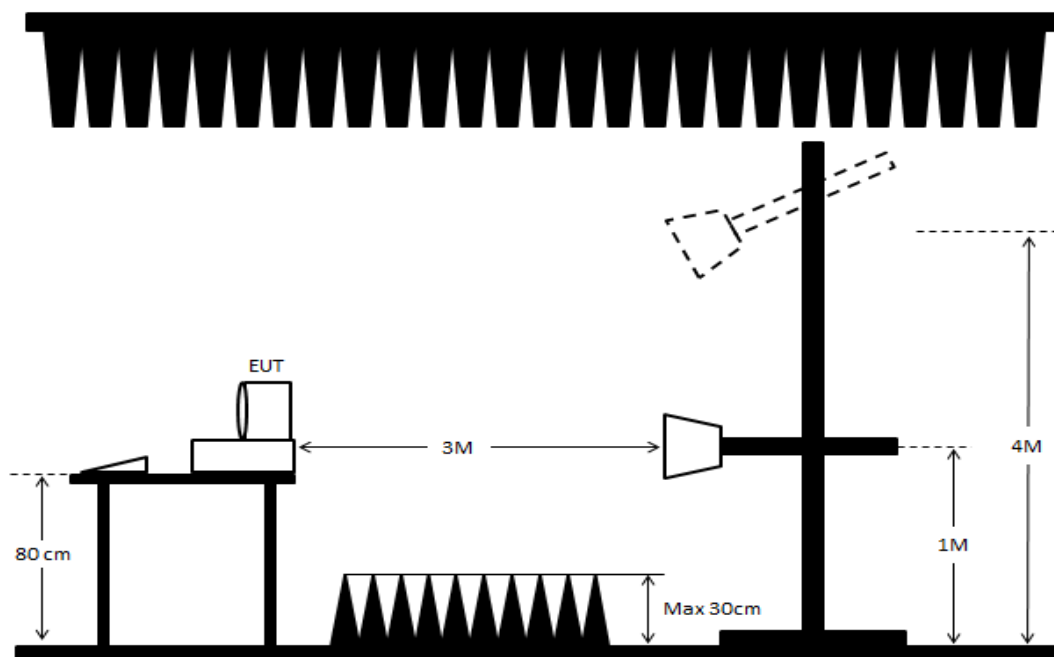
30MHz~1GHz

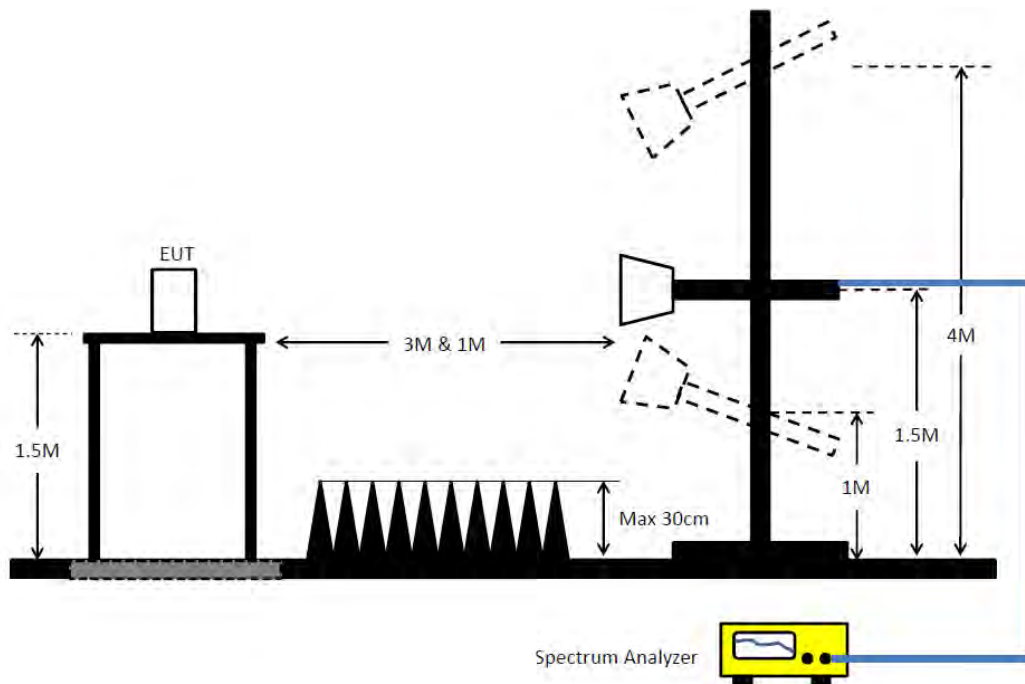


For Unintentional 1GHz~5th Harmonic – CRX (1,000~18,000 MHz)



For Unintentional 1GHz~5th Harmonic – CRX (18,000~30,000 MHz)



For Intentional 1GHz~10th Harmonic – CTX

2.5.5. Test Deviation

There is no deviation with the original standard.

2.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.5.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	24.3-26.1°C	Humidity	63-69 %
Test Engineer	Cola Fan	Test Date	Jul. 01, 2019~Aug. 03, 2019
Configurations	Intentional-CTX		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

Temperature	26.4-27.1°C	Humidity	61-66 %
Test Engineer	Cola Fan	Test Date	Jul. 04, 2019~Aug. 06, 2019
Configurations	Unintentional-CRX		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

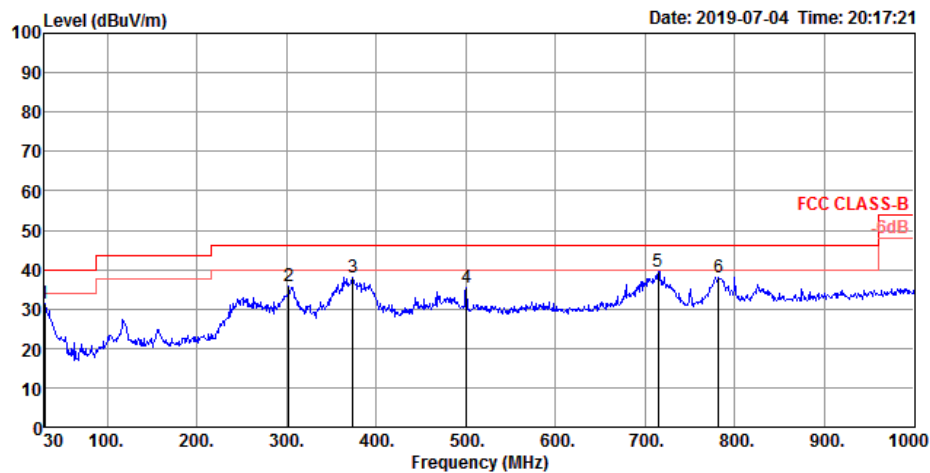
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

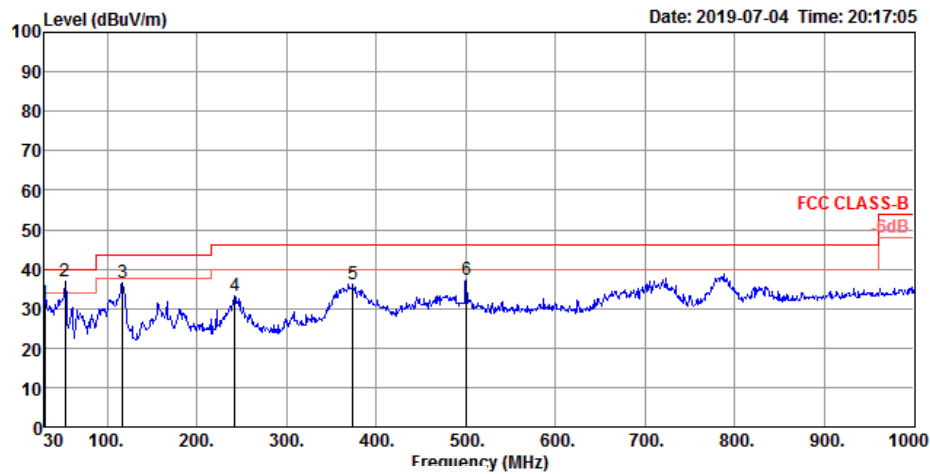
Limit line = specific limits (dBuV) + distance extrapolation factor.

2.5.8. Results of Radiated Emissions (30MHz~1GHz)

Temperature	24.3-26.1°C	Humidity	63-69 %
Test Engineer	Cola Fan	Configurations	Intentional-CTX
Test Mode	Mode 3		

Horizontal


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	cm	deg	
1	30.00	31.28	40.00	-8.72	36.49	0.67	25.70	31.58	100	176 Peak	HORIZONTAL
2	302.57	35.85	46.00	-10.15	45.84	2.23	19.86	32.08	125	22 Peak	HORIZONTAL
3	374.35	38.06	46.00	-7.94	45.87	2.51	21.85	32.17	125	168 Peak	HORIZONTAL
4	500.45	35.52	46.00	-10.48	41.23	2.94	23.83	32.48	100	352 Peak	HORIZONTAL
5	714.82	39.62	46.00	-6.38	42.77	3.51	25.78	32.44	100	307 Peak	HORIZONTAL
6	781.75	37.95	46.00	-8.05	40.05	3.69	26.53	32.32	100	293 Peak	HORIZONTAL

Vertical


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	31.53	40.00	-8.47	36.74	0.67	25.70	31.58	100	285	Peak	VERTICAL
2	53.28	36.91	40.00	-3.09	53.73	0.92	14.04	31.78	100	360	Peak	VERTICAL
3	117.30	36.49	43.50	-7.01	48.29	1.40	18.58	31.78	100	127	Peak	VERTICAL
4	242.43	33.11	46.00	-12.89	44.84	1.99	18.30	32.02	100	349	Peak	VERTICAL
5	374.35	36.22	46.00	-9.78	44.03	2.51	21.85	32.17	200	30	Peak	VERTICAL
6	500.45	37.39	46.00	-8.61	43.10	2.94	23.83	32.48	125	347	Peak	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

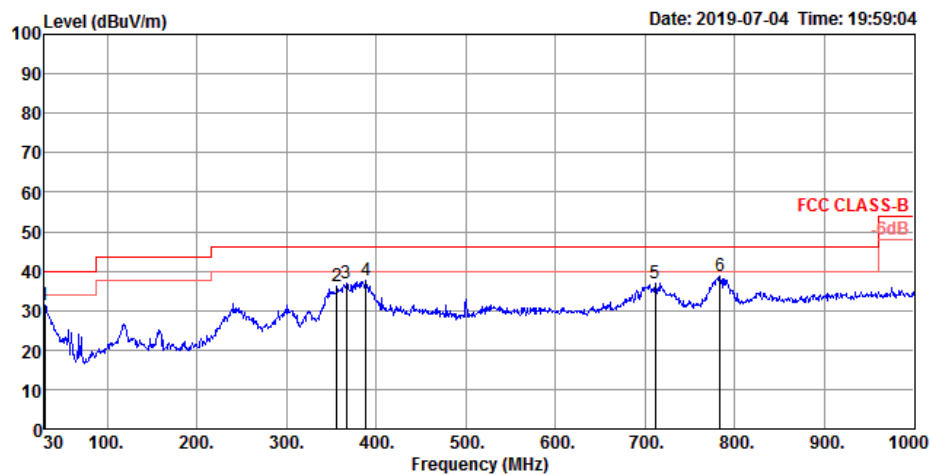
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

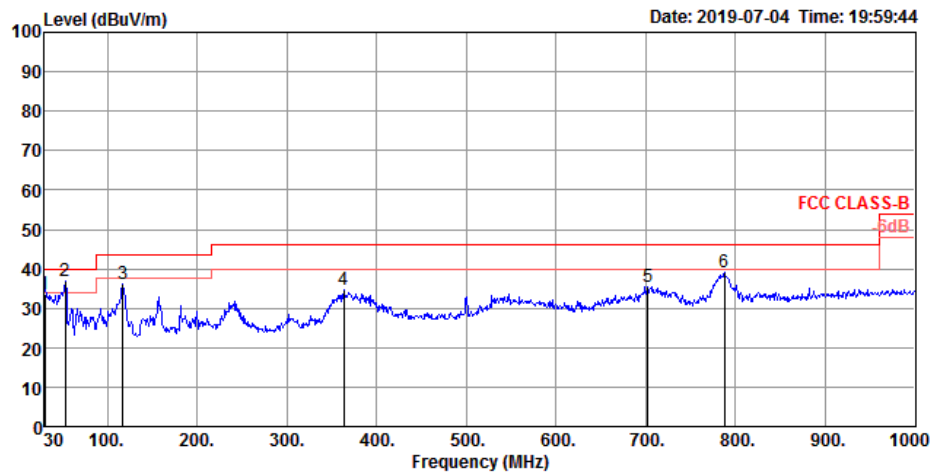


Temperature	26.4-27.1°C	Humidity	61-66 %
Test Engineer	Cola Fan	Configurations	Unintentional-CRX
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	31.47	40.00	-8.53	36.68	0.67	25.70	31.58	125	252 Peak	HORIZONTAL
2	355.92	36.32	46.00	-9.68	44.66	2.47	21.34	32.15	100	193 Peak	HORIZONTAL
3	366.59	37.01	46.00	-8.99	45.03	2.50	21.64	32.16	100	173 Peak	HORIZONTAL
4	388.90	37.72	46.00	-8.28	45.13	2.54	22.23	32.18	100	180 Peak	HORIZONTAL
5	710.94	36.92	46.00	-9.08	40.12	3.50	25.75	32.45	100	307 Peak	HORIZONTAL
6	783.69	38.93	46.00	-7.07	41.03	3.69	26.53	32.32	100	316 Peak	HORIZONTAL

**Vertical**

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	33.57	40.00	-6.43	38.78	0.67	25.70	31.58	100	167 QP	VERTICAL
2	53.28	36.89	40.00	-3.11	53.71	0.92	14.04	31.78	100	360 Peak	VERTICAL
3	117.30	36.04	43.50	-7.46	47.84	1.40	18.58	31.78	100	127 Peak	VERTICAL
4	363.68	34.62	46.00	-11.38	42.70	2.49	21.58	32.15	200	207 Peak	VERTICAL
5	702.21	35.60	46.00	-10.40	38.99	3.46	25.63	32.48	100	355 Peak	VERTICAL
6	787.57	38.94	46.00	-7.06	40.96	3.70	26.59	32.31	125	215 Peak	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

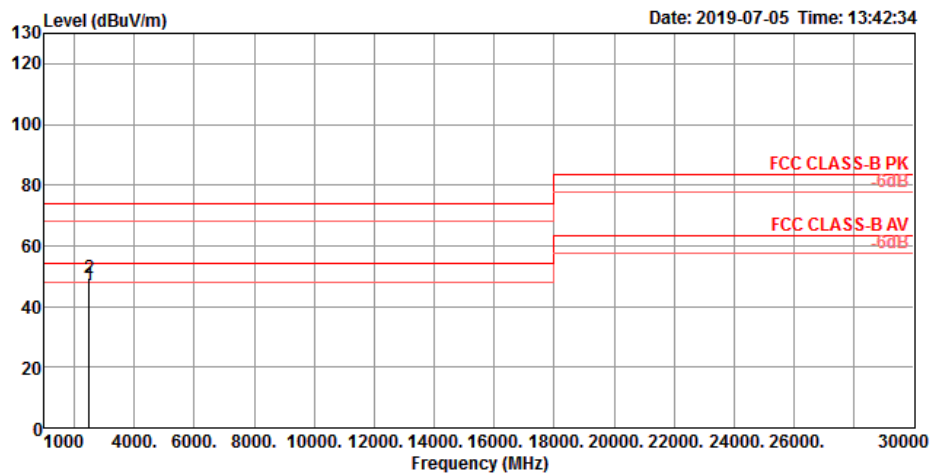
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



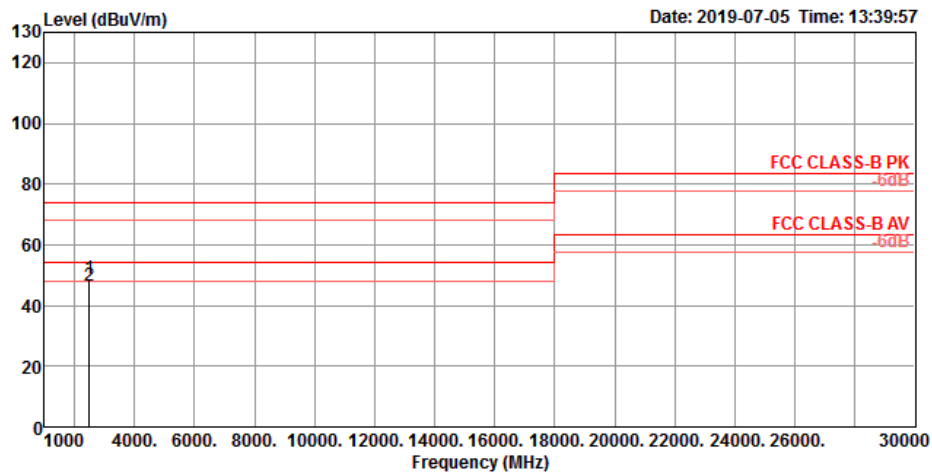
2.5.9. Results for Radiated Emissions (Unintentional 1GHz~5th – CRX)

Temperature	26.4-27.1°C	Humidity	61-66 %
Test Engineer	Cola Fan	Configurations	Unintentional-CRX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2499.98	46.98	54.00	-7.02	52.19	4.00	27.40	36.61	175	333	Average
2	2499.98	49.21	74.00	-24.79	54.42	4.00	27.40	36.61	175	333	Peak

**Vertical**

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2499.97	48.72	74.00	-25.28	53.93	4.00	27.40	36.61	102	304 Peak	VERTICAL
2	2499.98	46.61	54.00	-7.39	51.82	4.00	27.40	36.61	102	304 Average	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

**2.5.10. Results for Radiated Emissions (Intentional 1GHz~10th – CTX)**

Temperature	22°C	Humidity	54%
Test Engineer	Welson Chen, Jay Luo	Configurations	Channel 0
Test Date	Sep. 06, 2017 ~ Sep. 21, 2017		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4802.55	48.61	74.00	-25.39	42.08	8.49	31.10	33.06	186	162	Peak	HORIZONTAL
2	4804.75	34.96	54.00	-19.04	28.43	8.49	31.10	33.06	186	162	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.18	47.99	74.00	-26.01	41.46	8.49	31.10	33.06	244	19	Peak	VERTICAL
2	4804.88	35.15	54.00	-18.85	28.62	8.49	31.10	33.06	244	19	Average	VERTICAL



Temperature	22°C	Humidity	54%
Test Engineer	Welson Chen, Jay Luo	Configurations	Channel 19
Test Date	Sep. 06, 2017 ~ Sep. 21, 2017		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4879.24	48.39	74.00	-25.61	41.67	8.54	31.21	33.03	152	328	Peak	HORIZONTAL
2	4880.01	36.04	54.00	-17.96	29.32	8.54	31.21	33.03	152	328	Average	HORIZONTAL
3	7319.63	46.87	54.00	-7.13	33.80	10.32	36.27	33.52	182	68	Average	HORIZONTAL
4	7320.30	58.84	74.00	-15.16	45.77	10.32	36.27	33.52	182	68	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4878.58	36.06	54.00	-17.94	29.34	8.54	31.21	33.03	162	222	Average	VERTICAL
2	4879.59	48.74	74.00	-25.26	42.02	8.54	31.21	33.03	162	222	Peak	VERTICAL
3	7319.56	43.95	54.00	-10.05	30.88	10.32	36.27	33.52	125	76	Average	VERTICAL
4	7320.20	56.50	74.00	-17.50	43.43	10.32	36.27	33.52	125	76	Peak	VERTICAL



Temperature	22°C	Humidity	54%
Test Engineer	Welson Chen, Jay Luo	Configurations	Channel 39
Test Date	Sep. 06, 2017 ~ Sep. 21, 2017		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4958.90	49.24	74.00	-24.76	42.29	8.61	31.33	32.99	161	247	Peak	HORIZONTAL
2	4959.38	35.90	54.00	-18.10	28.95	8.61	31.33	32.99	161	247	Average	HORIZONTAL
3	7439.66	43.71	54.00	-10.29	30.37	10.41	36.54	33.61	147	59	Average	HORIZONTAL
4	7441.17	56.56	74.00	-17.44	43.22	10.41	36.54	33.61	147	59	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4958.67	36.01	54.00	-17.99	29.06	8.61	31.33	32.99	216	144	Average	VERTICAL
2	4960.98	48.16	74.00	-25.84	41.21	8.61	31.33	32.99	216	144	Peak	VERTICAL
3	7439.63	42.98	54.00	-11.02	29.64	10.41	36.54	33.61	149	284	Average	VERTICAL
4	7440.80	56.11	74.00	-17.89	42.77	10.41	36.54	33.61	149	284	Peak	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

2.6. Emissions Measurement

2.6.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 2.7, then the 2.8 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

2.6.2. Measuring Instruments and Setting

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (30dBc in any 100 kHz bandwidth emission)	100 kHz / 300 kHz for Peak



2.6.3. Test Procedures

Test Method	
The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
For the transmitter unwanted emissions shall be measured using following options below:	
	Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.
	☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle $\geq 98\%$).
	☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
	☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW $\geq 1/T$).
	☐ Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
	☐ Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
	☒ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
For the transmitter band-edge emissions shall be measured using following options below:	
	Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.
	Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB
	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.



2.6.4. Test Setup Layout

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 2.5.4.

For Radiated Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 2.5.4.

2.6.5. Test Deviation

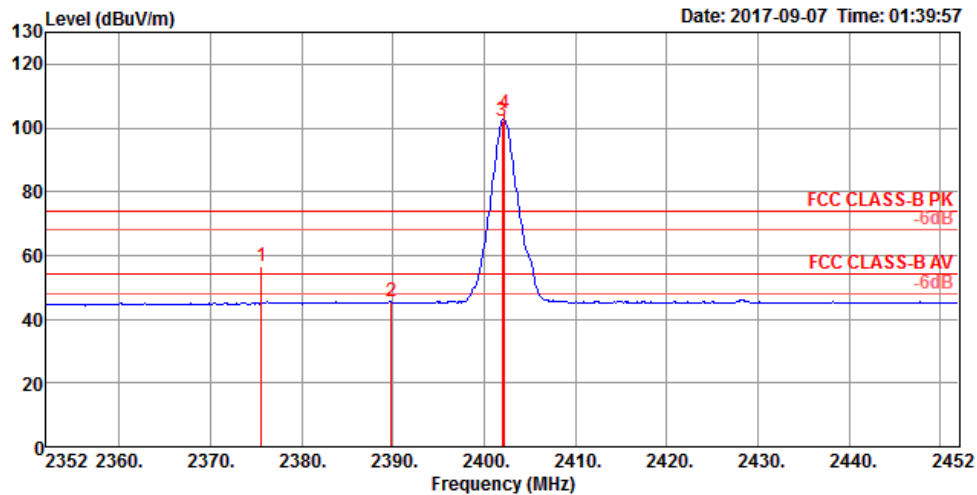
There is no deviation with the original standard.

2.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

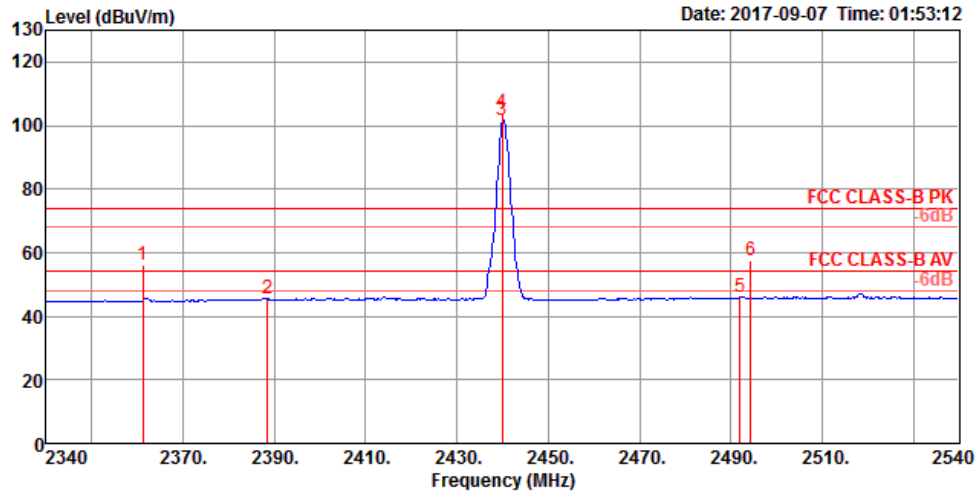
2.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	22°C	Humidity	54%
Test Engineer	Welson Chen, Jay Luo	Configurations	Channel 0, 19, 39
Test Date	Sep. 06, 2017 ~ Sep. 21, 2017		

Channel 0


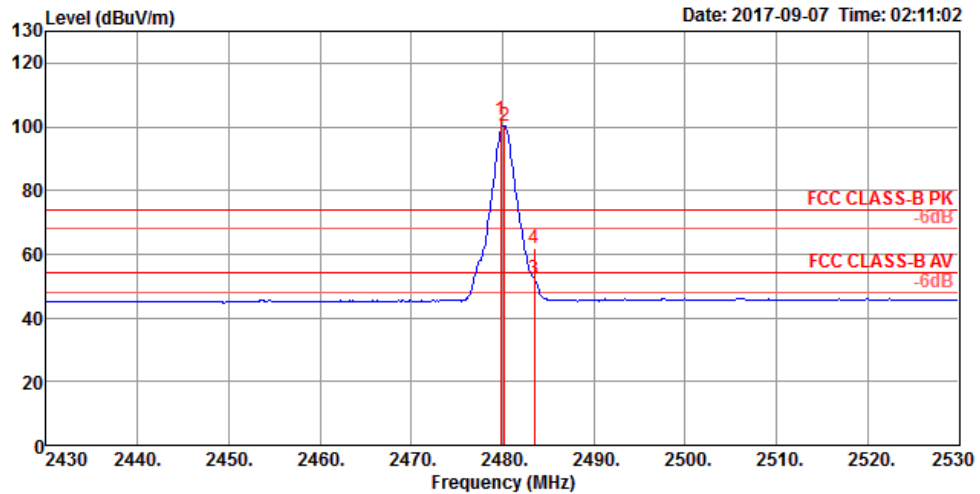
	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2375.60	56.49	74.00	-17.51	24.17	5.32	27.00	0.00	179	308 Peak	HORIZONTAL
2	2389.80	45.36	54.00	-8.64	13.00	5.33	27.03	0.00	179	308 Average	HORIZONTAL
3	2402.00	102.40			69.99	5.35	27.06	0.00	179	308 Average	HORIZONTAL
4	2402.20	104.36			71.95	5.35	27.06	0.00	179	308 Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 19


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2361.20	56.01	74.00	-17.99	23.75	5.30	26.96	0.00	178	306 Peak	HORIZONTAL
2	2388.40	45.70	54.00	-8.30	13.34	5.33	27.03	0.00	178	306 Average	HORIZONTAL
3	2440.00	101.72			69.16	5.40	27.16	0.00	178	306 Average	HORIZONTAL
4	2440.00	103.90			71.34	5.40	27.16	0.00	178	306 Peak	HORIZONTAL
5	2492.00	46.21	54.00	-7.79	13.47	5.46	27.28	0.00	178	306 Average	HORIZONTAL
6	2494.40	57.37	74.00	-16.63	24.63	5.46	27.28	0.00	178	306 Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2440 MHz.

**Channel 39**

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2479.80	102.26			69.57	5.44	27.25	0.00	149	312	Peak
2	2480.20	100.43			67.74	5.44	27.25	0.00	149	312	Average
3	2483.50	52.15	54.00	-1.85	19.43	5.45	27.27	0.00	149	312	Average
4	2483.50	62.08	74.00	-11.92	29.36	5.45	27.27	0.00	149	312	Peak

Item 1, 2 are the fundamental frequency at 2480 MHz.

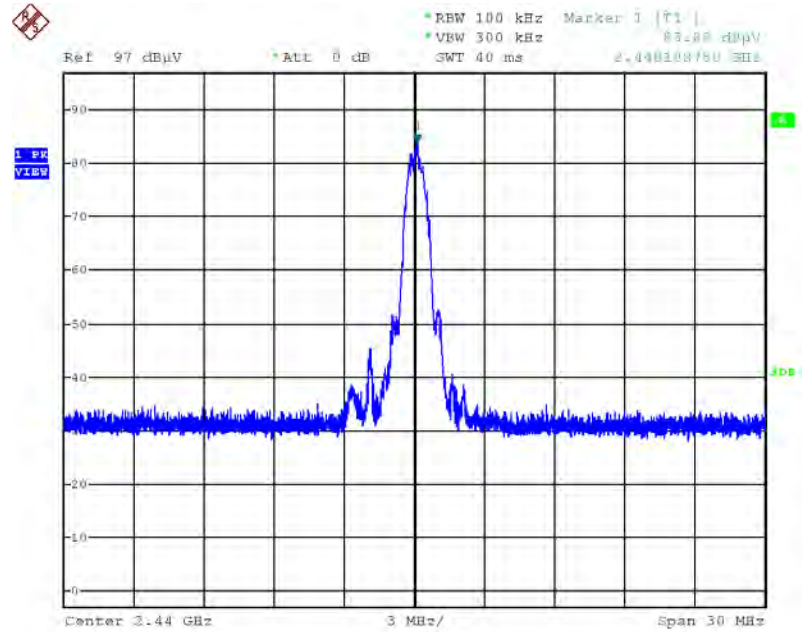
Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

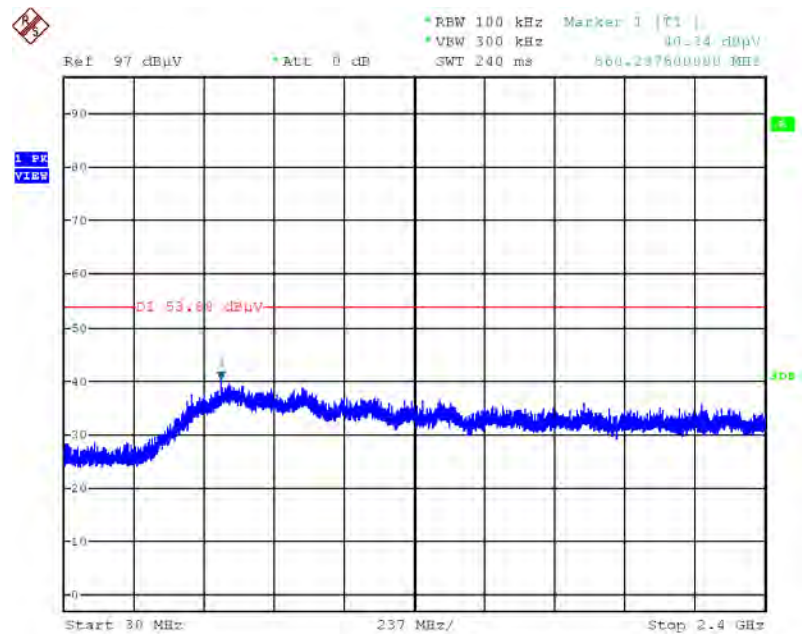
For Emission not in Restricted Band

Plot on Configuration / Reference Level

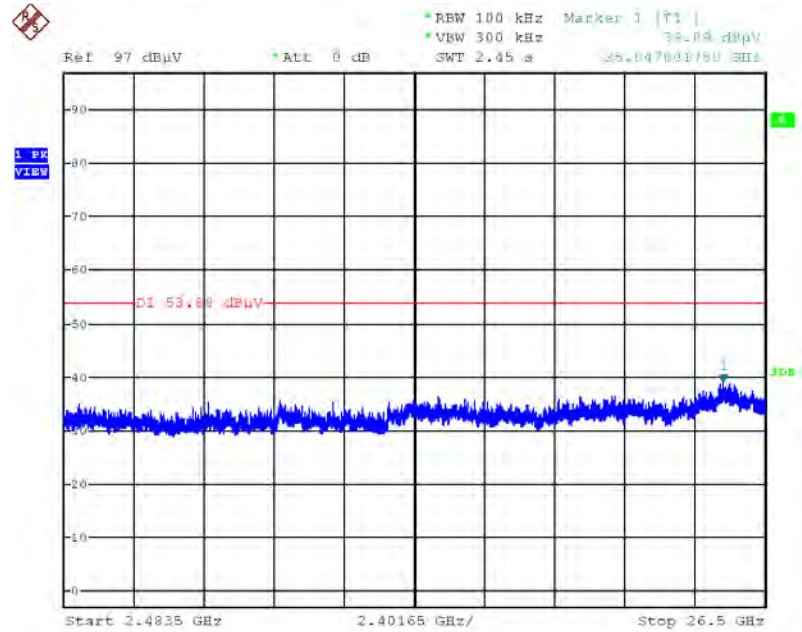


Date: 7-SEP-2017 02:31:37

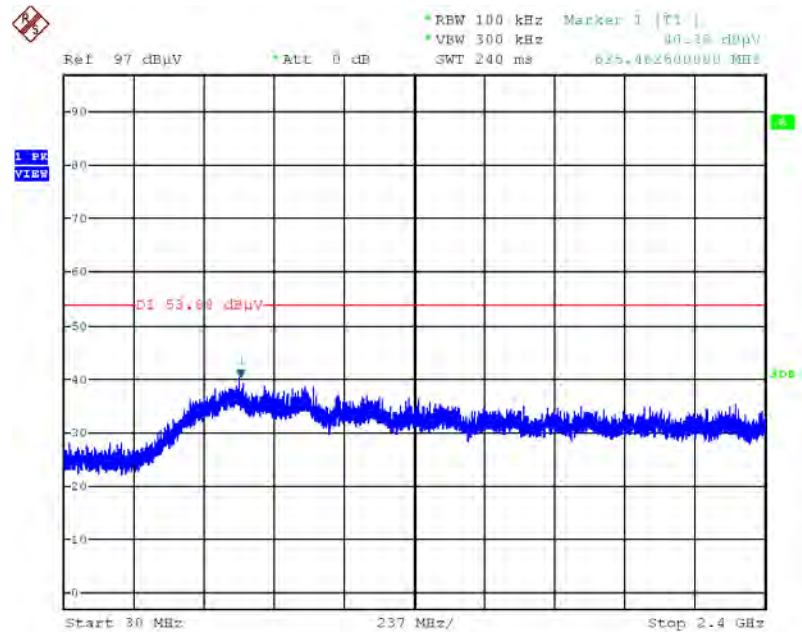
Plot on Configuration For Bluetooth 4.0 / Channel 0 / 30MHz~2400MHz (down 30dBc)



Date: 7-SEP-2017 02:33:53

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 2483.5MHz~26500MHz (down 30dBc)


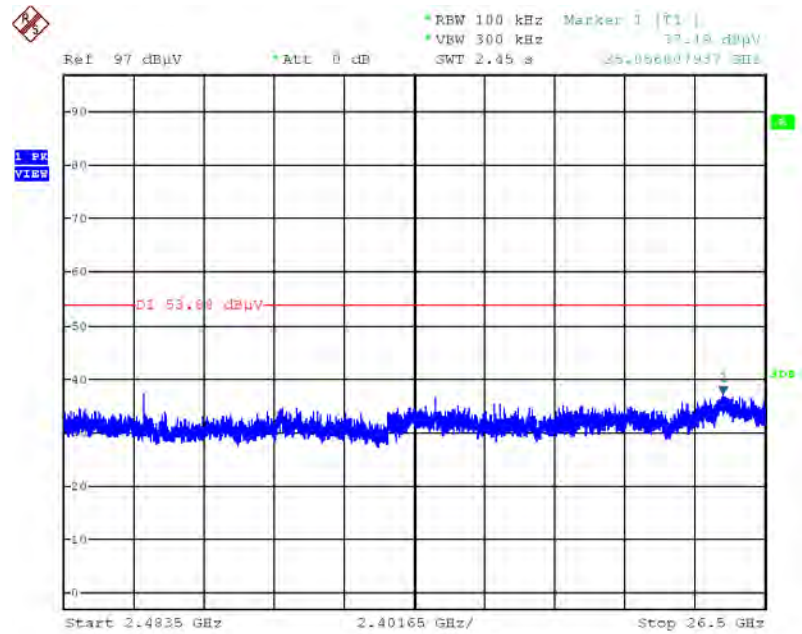
Date: 7-SEP-2017 15:47:25

Plot on Configuration For Bluetooth 4.0 / Channel 39 / 30MHz~2400MHz (down 30dBc)


Date: 7-SEP-2017 02:36:01



Plot on Configuration For Bluetooth 4.0 / Channel 39 / 2483.5MHz~26500MHz (down 30dBc)



Date: 7-SEP-2017 15:49:42



2.7. Antenna Requirements

2.7.1. Limit

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.

2.7.2. Antenna Connector Construction

Please refer to section 1.3 in this test report; antenna connector complied with the requirements.

3. List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 28, 2019	Jan. 29, 2020	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 24, 2018	Dec. 23, 2019	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Jan. 11, 2019	Jan. 10, 2020	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 21, 2019	May 20, 2020	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESE & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 28, 2019	Mar. 27, 2020	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	May 02, 2019	May 01, 2020	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Jan. 31, 2019	Jan. 30, 2020	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	LOW Cable-04+23	30MHz~1GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH05-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH03-CB)
Bilog Antenna with 6 dB attenuator	Schaffner	CBL6112B & N-6-06	2928 & AT-N0607	20MHz ~ 2GHz	Jan. 02, 2019	Jan. 01, 2020	Radiation (03CH03-CB)
Horn Antenna	ETS-Lindgren	3115	6821	750MHz~18GHz	Jan. 24, 2019	Jan. 23, 2020	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 27, 2019	Jun. 26, 2020	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8447D	2944A10259	9kHz ~ 1.3GHz	Jan. 16, 2019	Jan. 15, 2020	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Dec. 20, 2018	Dec. 19, 2019	Radiation (03CH03-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH03-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP-40	100019	9kHz ~ 40GHz	Jun. 19, 2019	Jun. 18, 2020	Radiation (03CH03-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH03-CB)
RF Cable-low	Woken	RG402	Low Cable-02+27	25MHz ~ 1GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH03-CB)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-20+27	1GHz ~ 18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-27	1GHz ~ 18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 16, 2017	Jan. 15, 2018	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Jul. 09, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 22, 2016	Nov. 21, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 26, 2016	Dec. 25, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz ~ 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz ~ 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz ~ 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz ~ 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz ~ 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 22, 2016	Nov. 21, 2017	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

* Calibration Interval of instruments listed above is two years.

N.C.R. means Non-Calibration required.

4. Measurement Uncertainty

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Intentional-CTX		
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Unintentional-CRX		
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Power Density Measurement	1.27 dB	Confidence levels of 95%
Bandwidth Measurement	9.74 x10 ⁻⁸	Confidence levels of 95%