FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

PowerLogic Tag Display

MODEL NUMBER: PLTDISP

PROJECT NUMBER: 4789447349

REPORT NUMBER: 4789447349-1

FCC ID: 2AH7L-PLTDISP

IC ID: 21522-PLTDISP

ISSUE DATE: May. 15, 2020

Prepared for

Schneider Electric Industries SAS

Prepared by

UL-CCIC COMPANY LIMITED
No. 2, Chengwan Road, Suzhou Industrial Park, People's Republic of China
Tel: +86 512-6808 6400
Fax: +86 512-6808 4099
Website: www.ul.com

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	05/15/2020	Initial Issue	

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Schneider Electric Industries SAS
Address:	35 Rue Joseph Monier 92500 Rueil-Malmaison, France

Manufacturer Information

Company Name:	Schneider Electric Industries SAS
Address:	35 Rue Joseph Monier 92500 Rueil-Malmaison, France

Factory Information

Company Name:	Enics Electronics (Suzhou) Ltd
Address:	7# Building, Xinhang Industrial Park Huangpujiang Rd New & Hi-tech Industrial Development Zone Changshu Suzhou Jiangsu 215500 CHINA

EUT Description

Product Name	PowerLogic Tag Display
Model Name	PLTDISP
Sample Number	3003800
Data of Receipt Sample	Apr. 9, 2020
Date Tested	Apr. 9, 2020~ May. 13, 2020

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 ISSUE 2	PASS

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6dB Bandwidth and 99% Occupied Bandwidth	FCC Part 15.247 (a) (2) RSS-247 Clause 5.2 (a) ISED RSS-Gen Clause 6.7	Complied
2	Peak Conducted Output Power	FCC Part 15.247 (b) (3) RSS-247 Clause 5.4 (d)	Complied
3	Power Spectral Density	FCC Part 15.247 (e) RSS-247 Clause 5.2 (b)	Complied
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d) RSS-247 Clause 5.5	Complied
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9	Complied
6	Conducted Emission Test For AC Power Port	FCC Part 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC Part 15.203 RSS-GEN Clause 6.8	Complied
Remark: 1) The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C and ISED RSS-247 ISSUE 2> when <Accuracy Method>			

Prepared By:

Jason Yang

Jason Yang
Engineer

Reviewed By:

Tom Tang

Tom Tang
Engineer Project Associate

Authorized By:

Chris Zhong

Chris Zhong
Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4829.01)** **UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.** **FCC (FCC Designation No.: CN1247)** **UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.** **IC (IC Designation No.: 25056)** **UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.**

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.00dB
Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	3.31dB
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	3.31dB
Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	3.83dB (1GHz-18Gz)
	4.13dB (18GHz-26.5Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	PowerLogic Tag Display	
Model Name	PLTDISP	
Product Description	Operation Frequency	2405 MHz ~ 2480 MHz
	Modulation Technology	Data Rate
	Modulation Type	O-QPSK
Sample Type:	Fixed production	
Antenna Type:	PCB Anteenna	
Antenna Gain:	2dBi	
	Remark: This data is provided by customer and our lab isn't responsible for this data	
Test Power Grade:	4(manufacturer declare)	
Test Software of EUT:	EMC Zigbee Radio Test Tool v1.5.2 (manufacturer declare)	
Power Supply:	AC120V	

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Antenna	Mode	Frequency (MHz)	Channel Number	Max EIRP (dBm)
2405-2480	1	ZigBee	2405-2480	11-26	4.17

5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	15	2425	19	2445	23	2465
12	2410	16	2430	20	2450	24	2470
13	2415	17	2435	21	2455	25	2475
14	2420	18	2440	22	2460	26	2480

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
ZIGBEE	CH 11, CH 19, CH 26	2405MHz, 2445MHz, 2480MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software Version		N/A		
Modulation Type	Transmit Antenna Number	EMC Zigbee Radio Test Tool v1.5.2		
		LCH	MCH	HCH
O-QPSK	1	4	4	4

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	Built-in(internal antenna)	2.0

Test Mode	Transmit and Receive Mode	Description
ZigBee	☒1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

5.7. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage:	VL	N/A
	VN	AC 120V
	VH	N/A

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	Lenovo	X240	Supply by Customer
2	Fixed Frequency Board	NA	NA	Supply by Customer

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	NA	NA	NA	NA	N/A

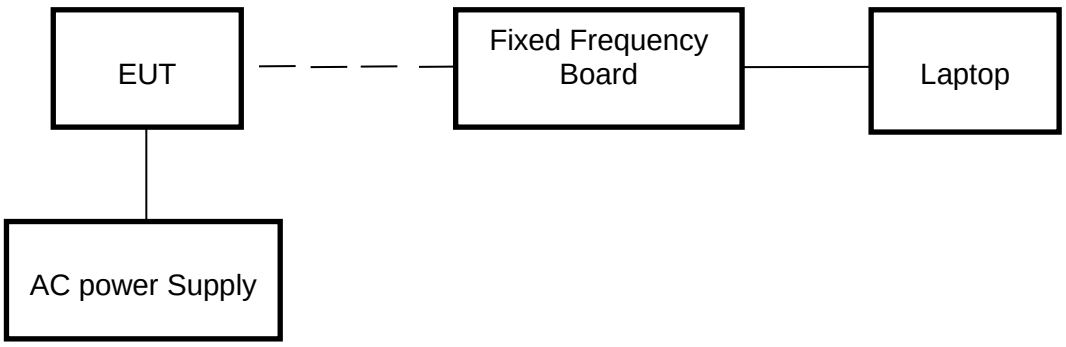
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	NA	NA	NA	NA

TEST SETUP

The EUT can work in an engineer mode with a software through a table PC.

SETUP DIAGRAM FOR TESTS



5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	126700	2019-12-12	2020-12-07	2021-12-06
☑	Two-Line V-Network	R&S	ENV216	126701	2019-12-12	2020-12-07	2021-12-06
☑	Artificial Mains Networks	R&S	ENY81	126711	2019-12-12	2020-12-07	2021-12-06
Software							
Used	Description			Manufacturer	Name	Version	
☑	Test Software for Conducted disturbance			R&S	EMC32	Ver. 9.25	
Radiated Emissions (Instrument**)**							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	MY57110128	2018-05-30	2019-05-29	2020-05-28
☑	EMI test receiver	R&S	ESR26	1267603	2018-12-13	2019-12-22	2020-12-21
☑	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	513-265	2018-06-17	2019-06-16	2020-06-15
☑	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	126704	N/A	2019-01-28	2022-01-27
☑	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2019-01-26	2020-01-26	2021-01-25
☑	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-02-06	2020-02-05	2021-02-04
☑	Receiver Antenna (26.5GHz-40GHz)	TOYO	HAP 26-40W	00000012	2018-07-25	2019-07-23	2020-07-22
☑	Pre-amplification (To 1GHz)	R&S	SCU-03D	134666	2019-02-06	2020-02-05	2021-02-04
☑	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G18-50	14140-13467	2019-03-18	2020-03-17	2021-03-16
☑	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	134668	2019-02-06	2020-02-05	2021-02-04
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	1	2018-05-30	2019-05-29	2020-05-28
☑	Highpass Filter	Wainwright	WHKX10-2700-3000-18000-40SS	2	2018-05-30	2019-05-29	2020-05-28
Software							
Used	Description			Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance			Tonscend	JS32	V1.0	
Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9010B	MY57110128	2018-05-30	2019-05-29	2020-05-28
☑	Power Meter	Keysight	U2021XA	MY57110002	2018-06-13	2019-06-12	2020-06-11

6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth/99% Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Peak Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.1.3
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.6
6	Band-edge	KDB 558074 D01 15.247 Meas Guidance v05r02	8.7
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	6.2

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

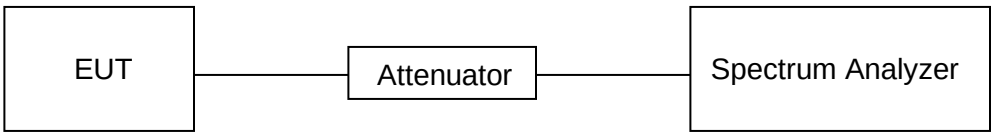
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC120V

RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)	Final Setting VBW (Hz)
Zigbee	100	100	1	100	0	0.01	10

Note: 1) Duty Cycle Correction Factor=10log(1/x).
2) Where: x is Duty Cycle (Linear)
3) Where: T is On Time (transmit duration)

ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

7.2. 6 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C, ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2) ISED RSS-247 5.2 (a)	6 dB Bandwidth	≥ 500KHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99% Occupied Bandwidth	For reporting purposes only	2400-2483.5

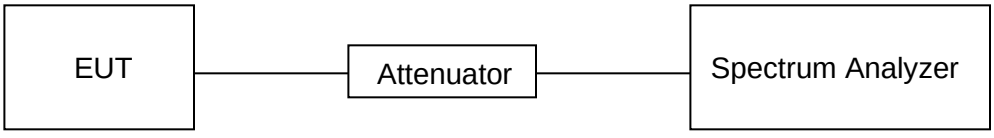
TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyzer and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6dB Bandwidth :100kHz For 99% Occupied Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : ≥3 × RBW For 99% Occupied Bandwidth : ≥3×RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



RESULTS

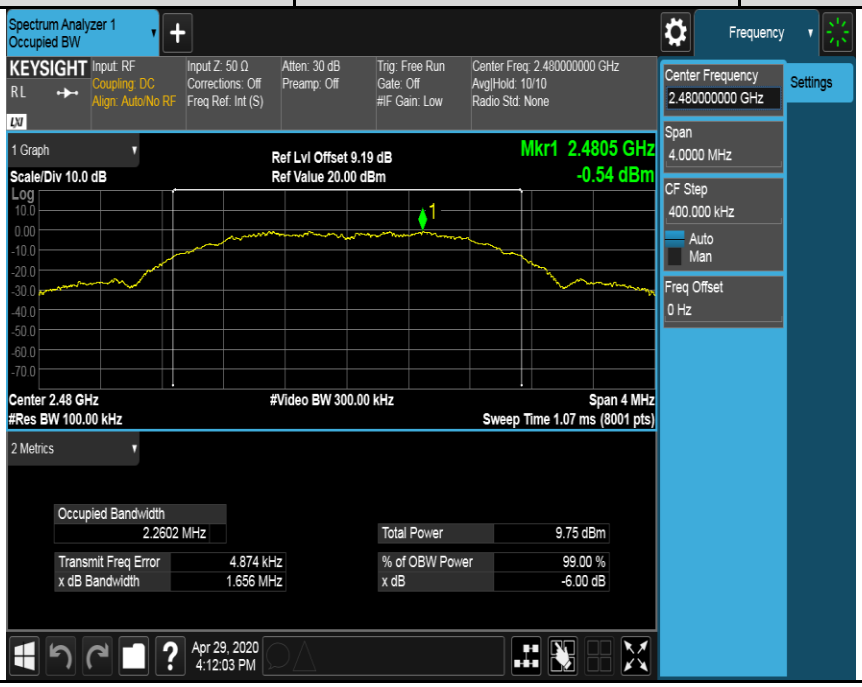
Test Mode	Test Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Result
Zigbee	LCH	1.636	2.268	Pass
	MCH	1.692	2.260	Pass
	HCH	1.656	2.260	Pass

Test Graphs

Test Mode	Test Channel	Verdict
Zigbee	LCH	PASS

Test Mode	Test Channel	Verdict
Zigbee	MCH	PASS

Test Mode	Test Channel	Verdict
Zigbee	HCH	PASS



7.3. CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) Subpart C, ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3) ISED RSS-247 5.4 (d)	Output Power	1 watt or 30dBm	2400-2483.5

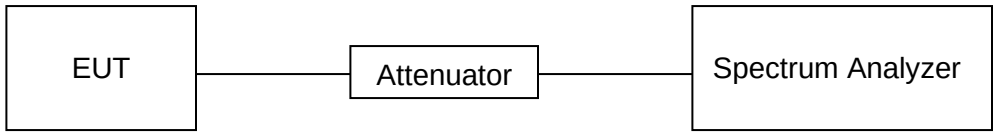
TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure the power of each channel.
Peak Detector used for Peak result.

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC120V

TEST SETUP

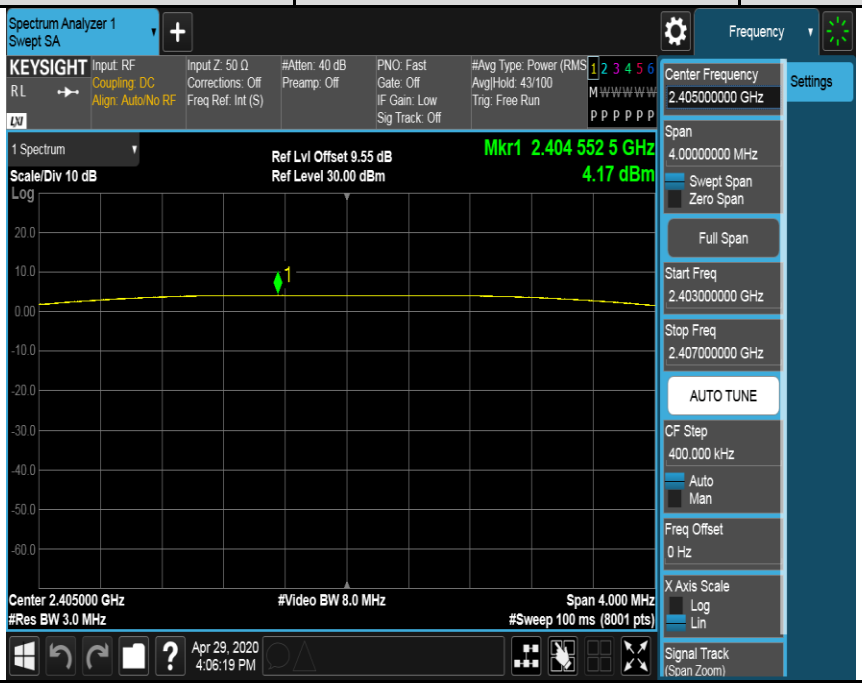


RESULTS

Test Mode	Test Channel	Maximum Peak Conducted Output Power(dBm)	LIMIT
			dBm
Zigbee	LCH	4.17	30
	MCH	4.11	30
	HCH	3.78	30

Test Graphs

Test Mode	Test Channel	Verdict
Zigbee	LCH	PASS



Test Mode	Test Channel	Verdict
Zigbee	MCH	PASS

Test Mode	Test Channel	Verdict
Zigbee	HCH	PASS

7.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C, ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e) ISED RSS-247 5.2 (b)	Power Spectral Density	8 dBm/3 kHz	2400-2483.5

TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

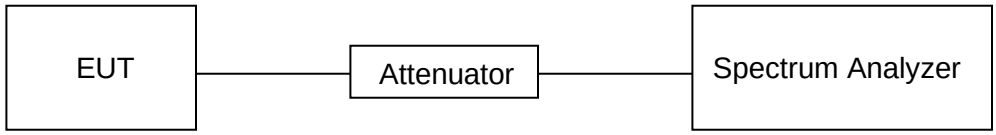
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC120V

TEST SETUP



RESULTS

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/3kHz)	Result
Zigbee	LCH	-11.83	Pass
	MCH	-11.14	Pass
	HCH	-12.83	Pass

Test Graphs:

Test Mode	Test Channel	Verdict
Zigbee	LCH	PASS

Test Mode	Test Channel	Verdict
Zigbee	MCH	PASS

Test Mode	Test Channel	Verdict
Zigbee	HCH	PASS

7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) Subpart C, ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d) ISED RSS-247 5.5	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

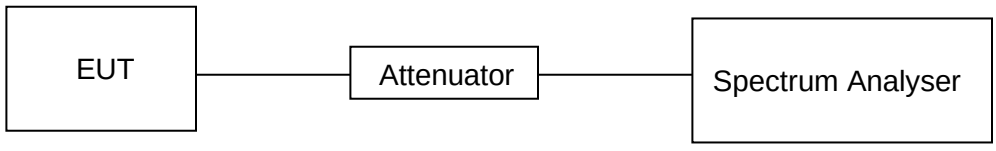
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level**.**

TEST SETUP



TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC120V

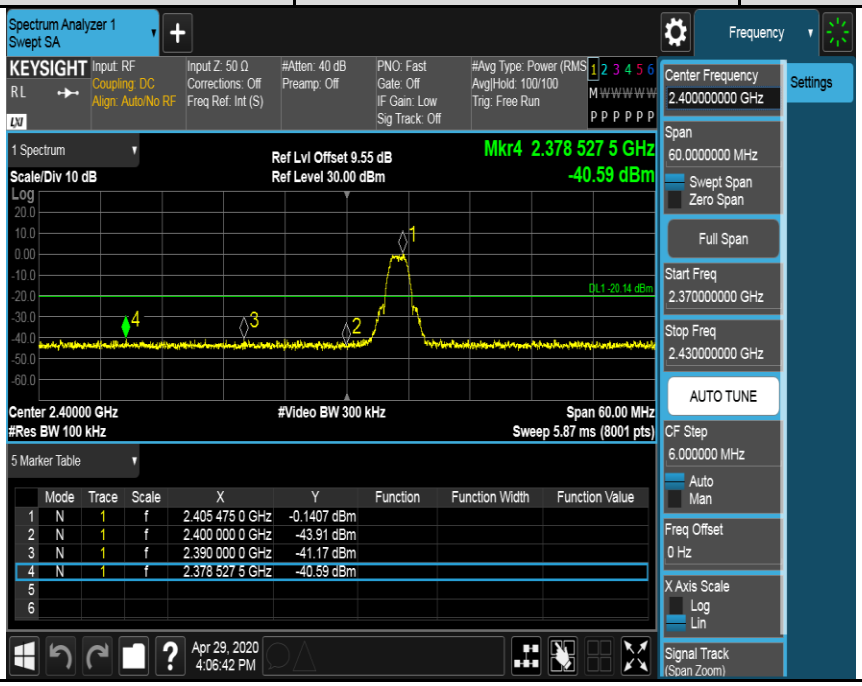
Part I :Conducted Bandedge

RESULTS TABLE

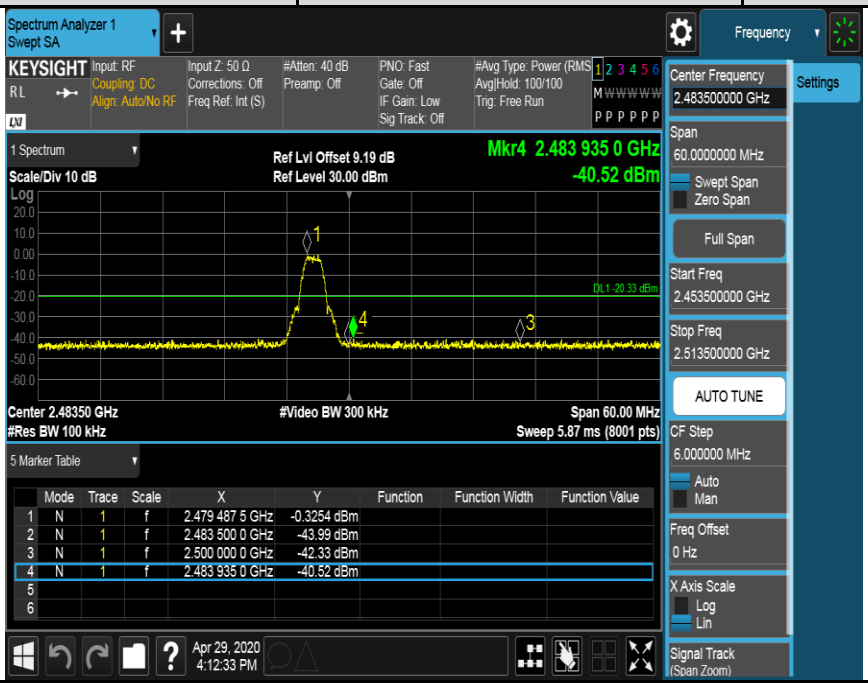
Test Mode	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
Zigbee	LCH	-0.141	-40.592	-20.14	PASS
	HCH	-0.325	-40.525	-20.33	PASS

TEST GRAPHS

Test Mode	Test Channel	Verdict
Zigbee	LCH	PASS



Test Mode	Test Channel	Verdict
Zigbee	HCH	PASS



Part II :Conducted Emission

Test Result Table

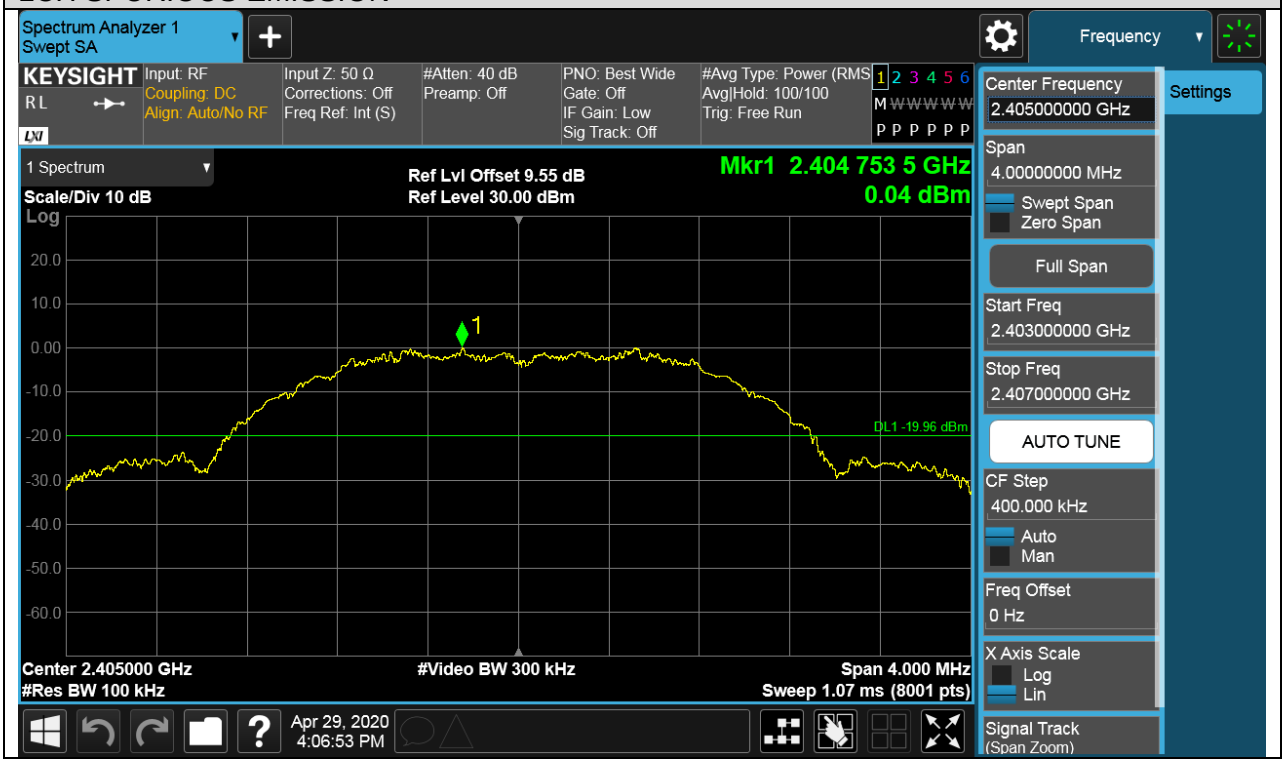
Test Mode	Channel	Pref(dBm)	Puw(dBm)	Verdict
Zigbee	LCH	0.04	<Limit	PASS
	MCH	-0.12	<Limit	PASS
	HCH	-0.44	<Limit	PASS

Test Plots

Test Mode	Channel	Verdict
Zigbee	LCH	PASS

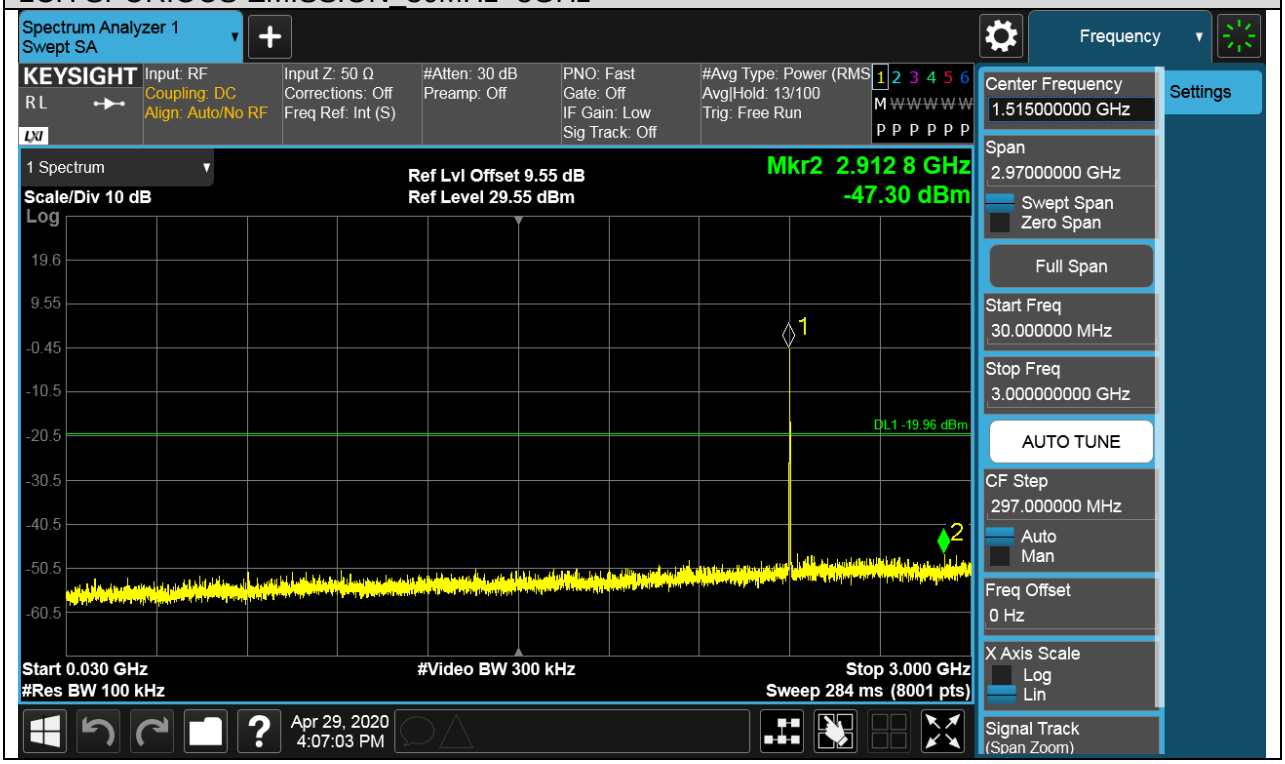
Pref test Plot

LCH SPURIOUS EMISSION

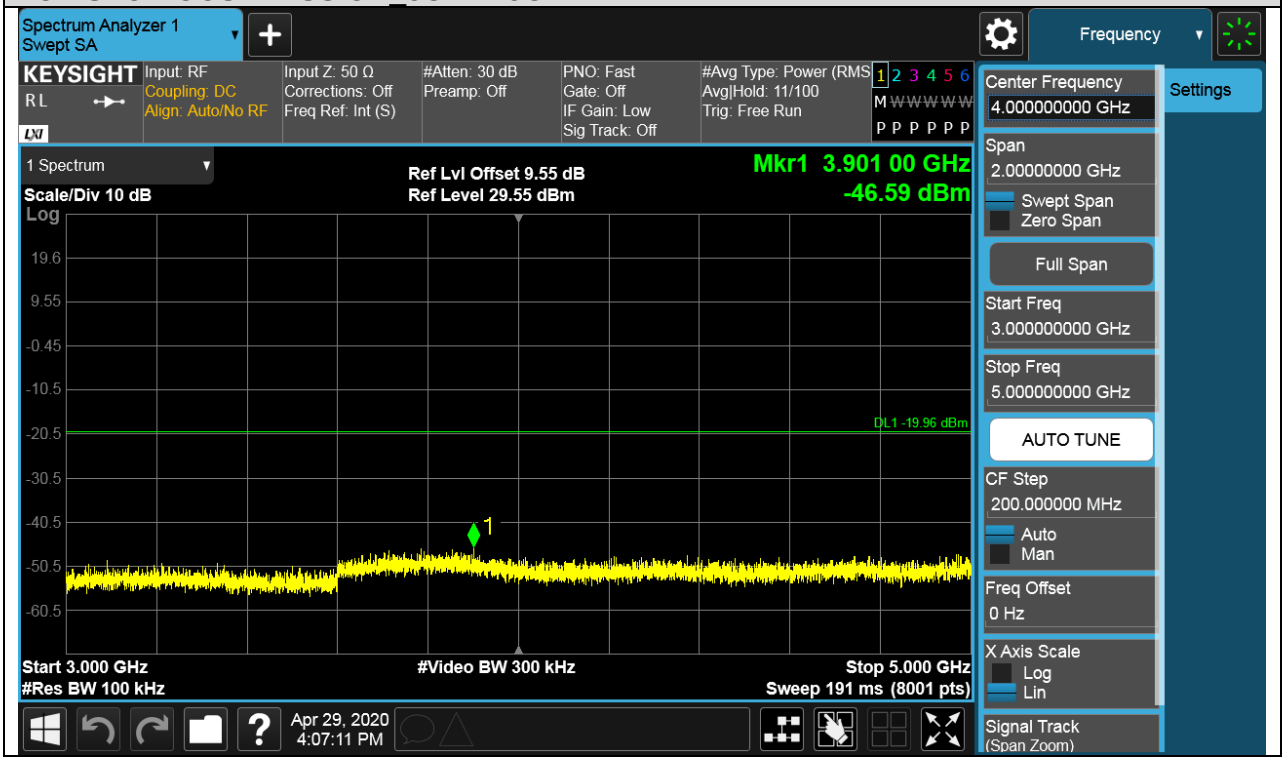


Puw test Plot

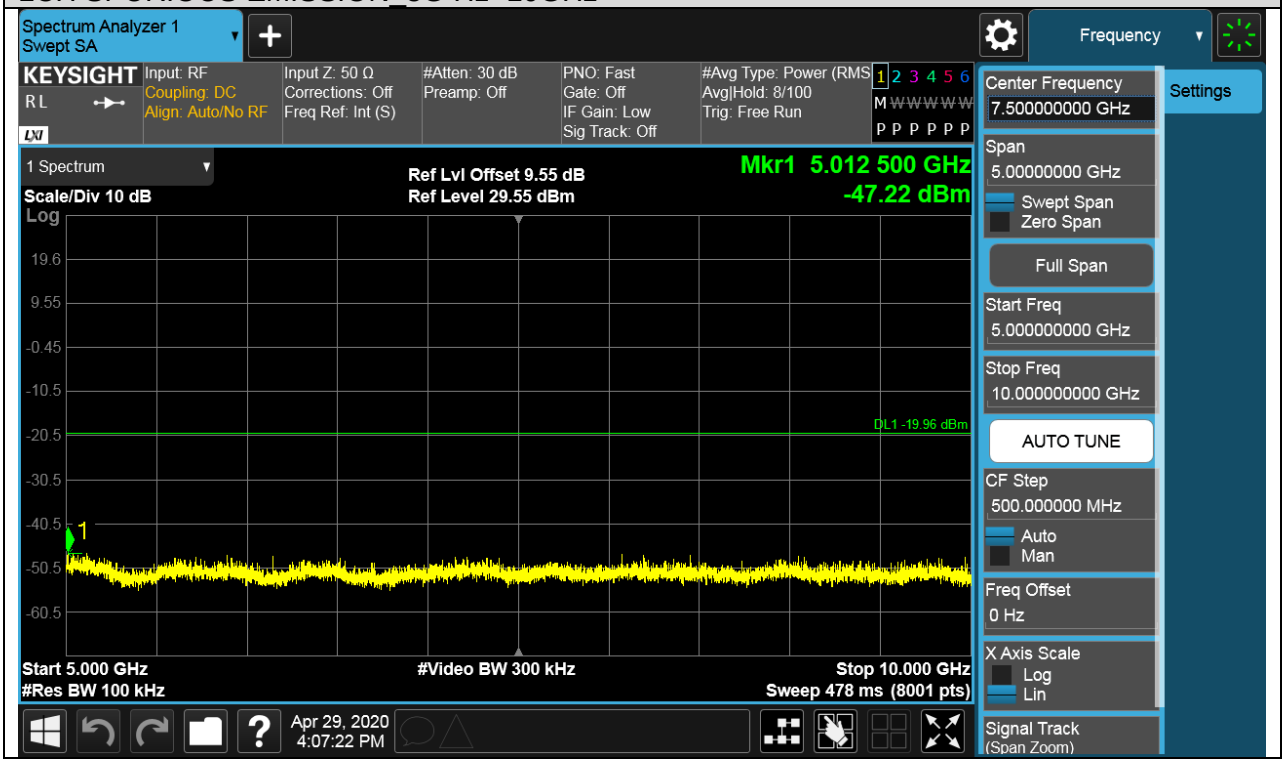
LCH SPURIOUS EMISSION_30MHz~3GHz



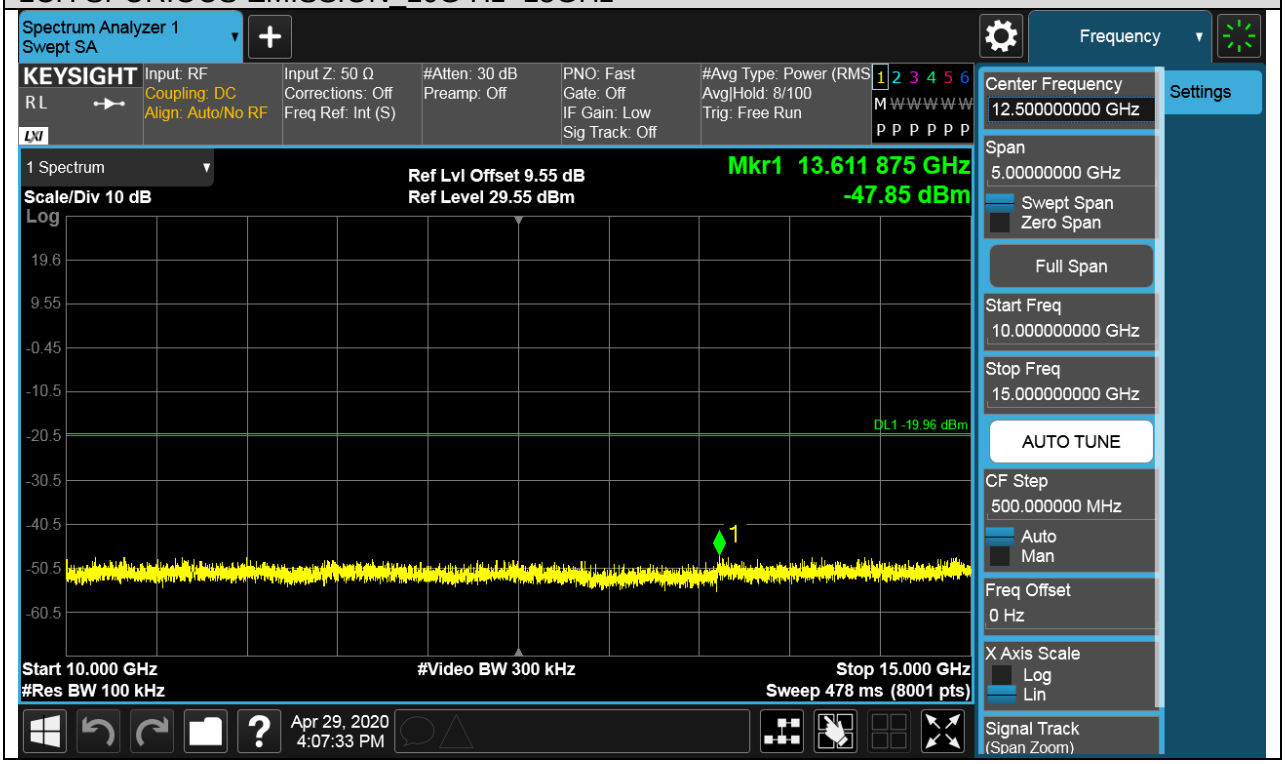
LCH SPURIOUS EMISSION_3G Hz~5GHz



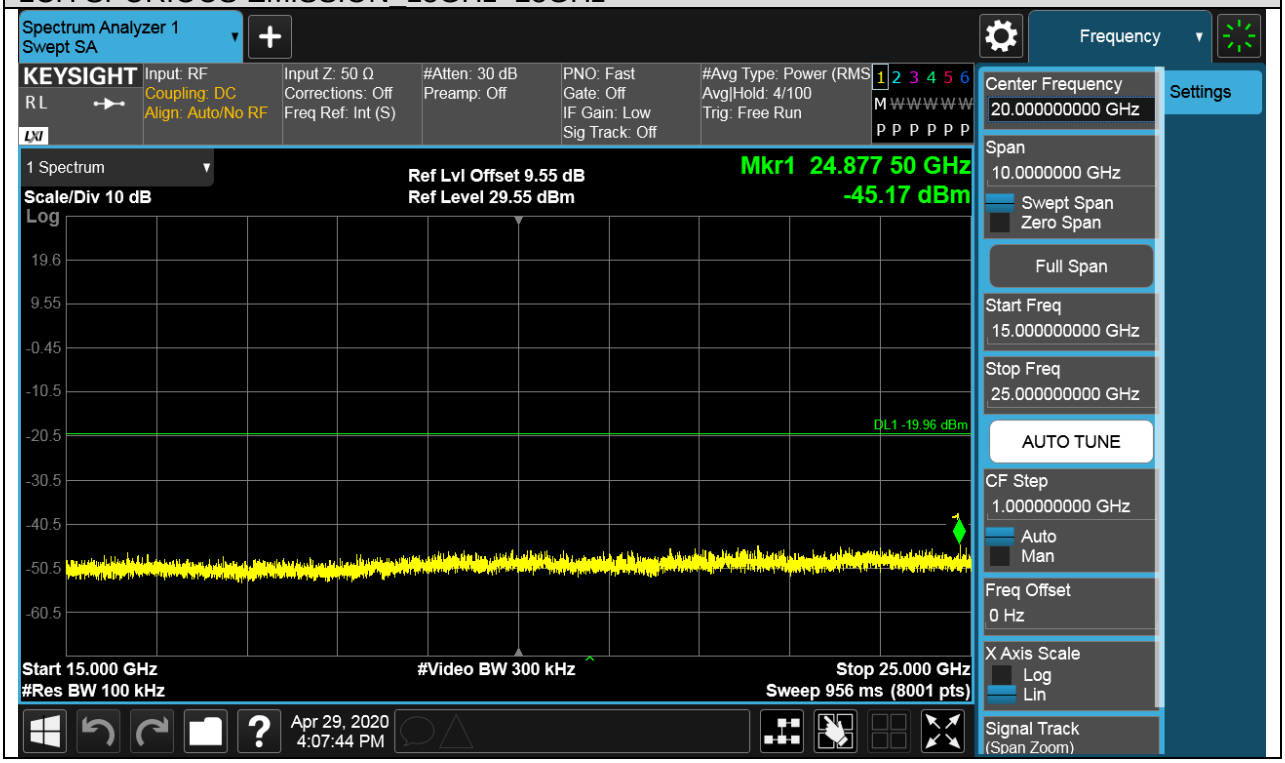
LCH SPURIOUS EMISSION_5G Hz~10GHz



LCH SPURIOUS EMISSION_10G Hz~15GHz



LCH SPURIOUS EMISSION_15GHz~25GHz



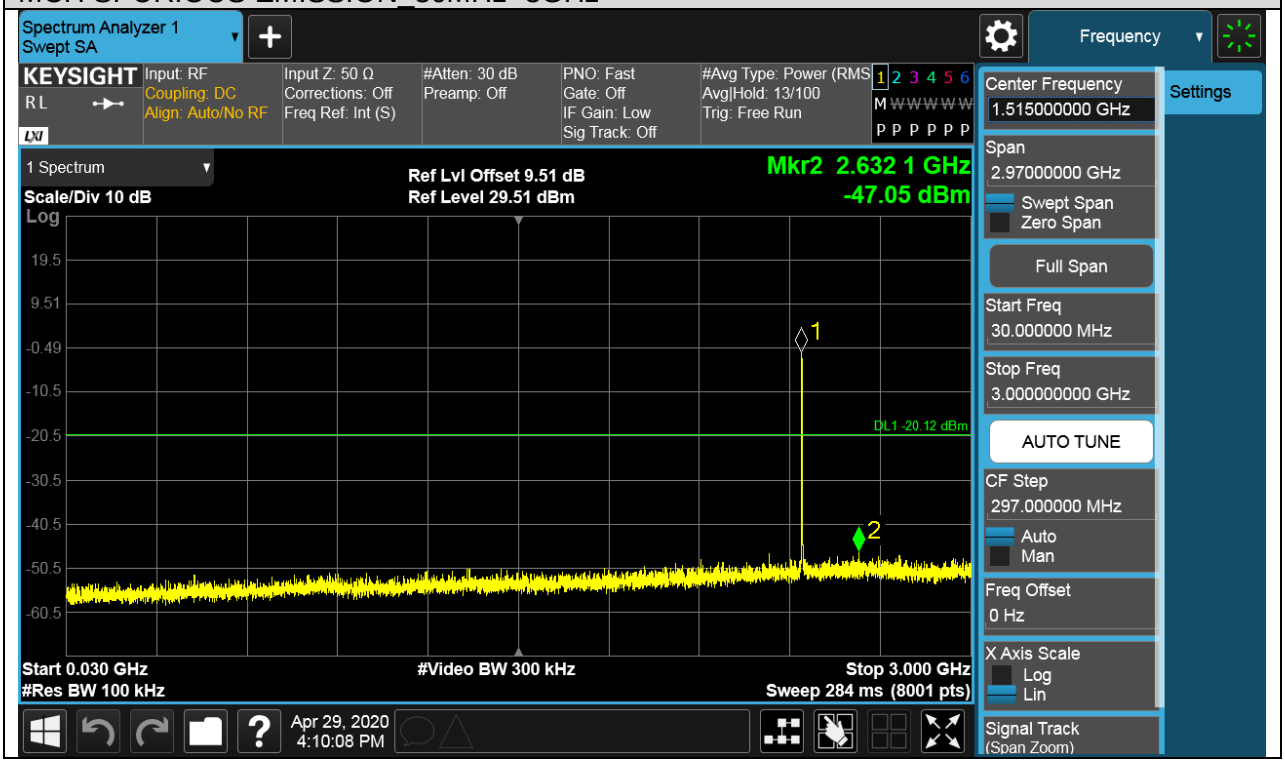
Test Mode	Channel	Verdict
Zigbee	MCH	PASS

Pref test Plot

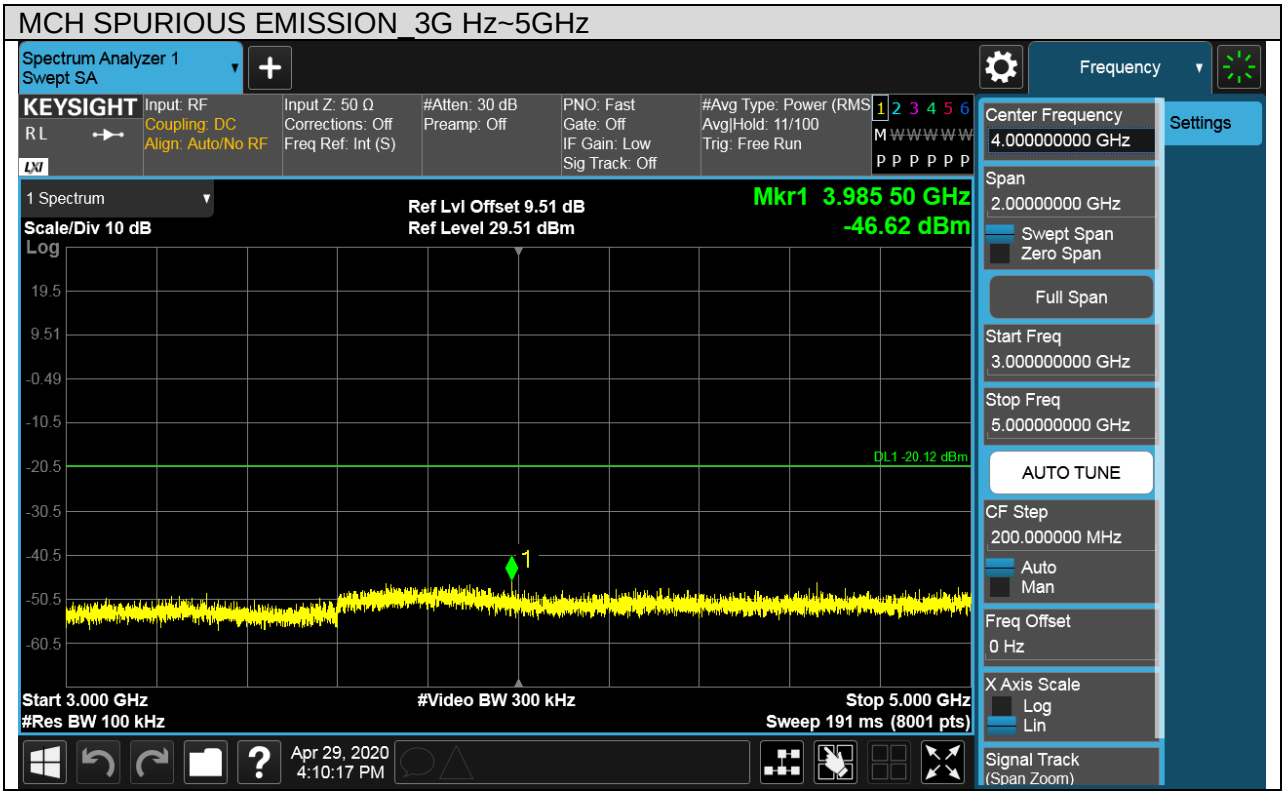
MCH SPURIOUS EMISSION

Puw test Plot

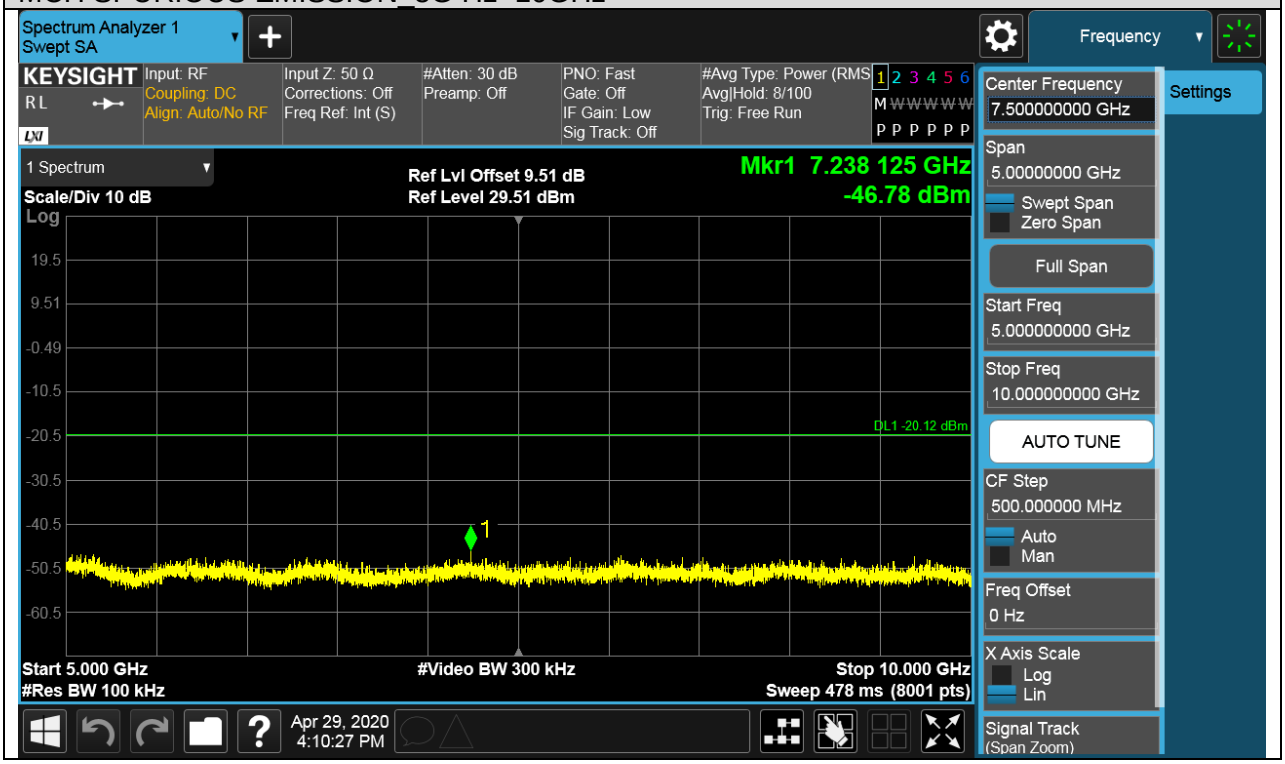
MCH SPURIOUS EMISSION_30MHz~3GHz



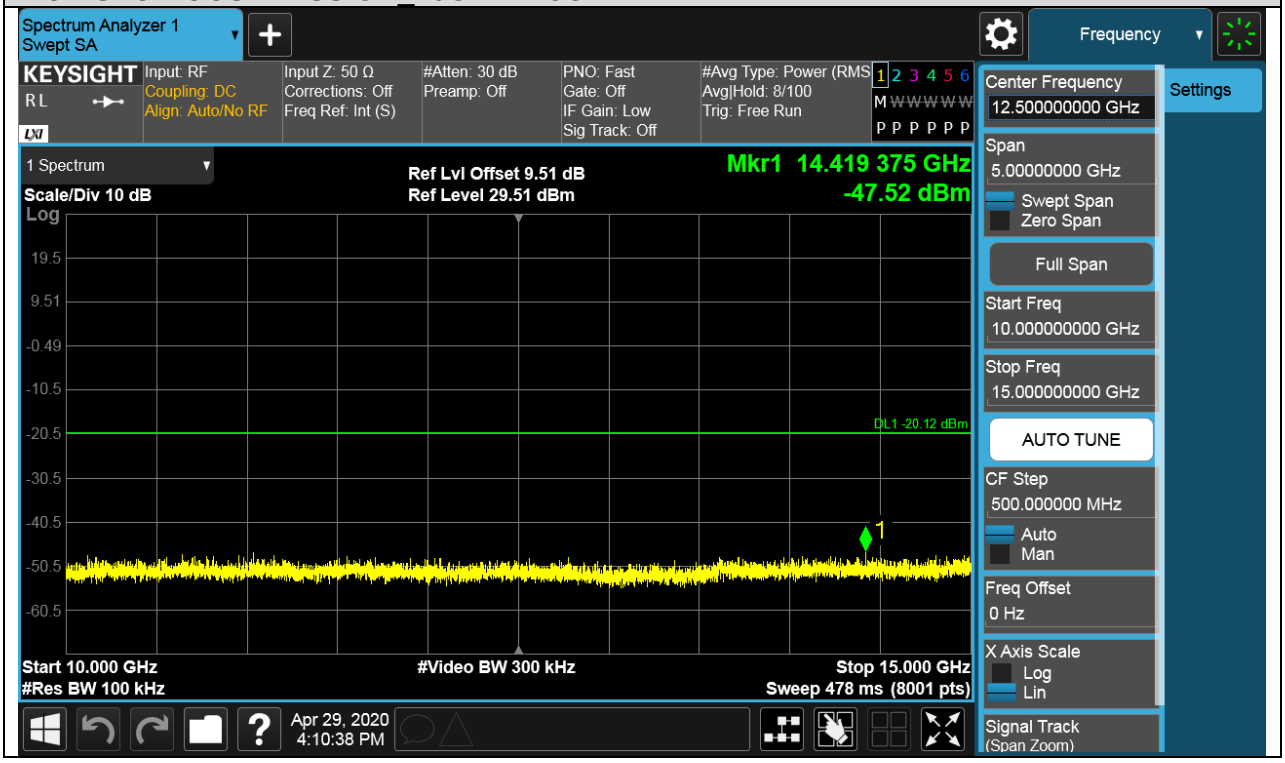
MCH SPURIOUS EMISSION_3G Hz~5GHz



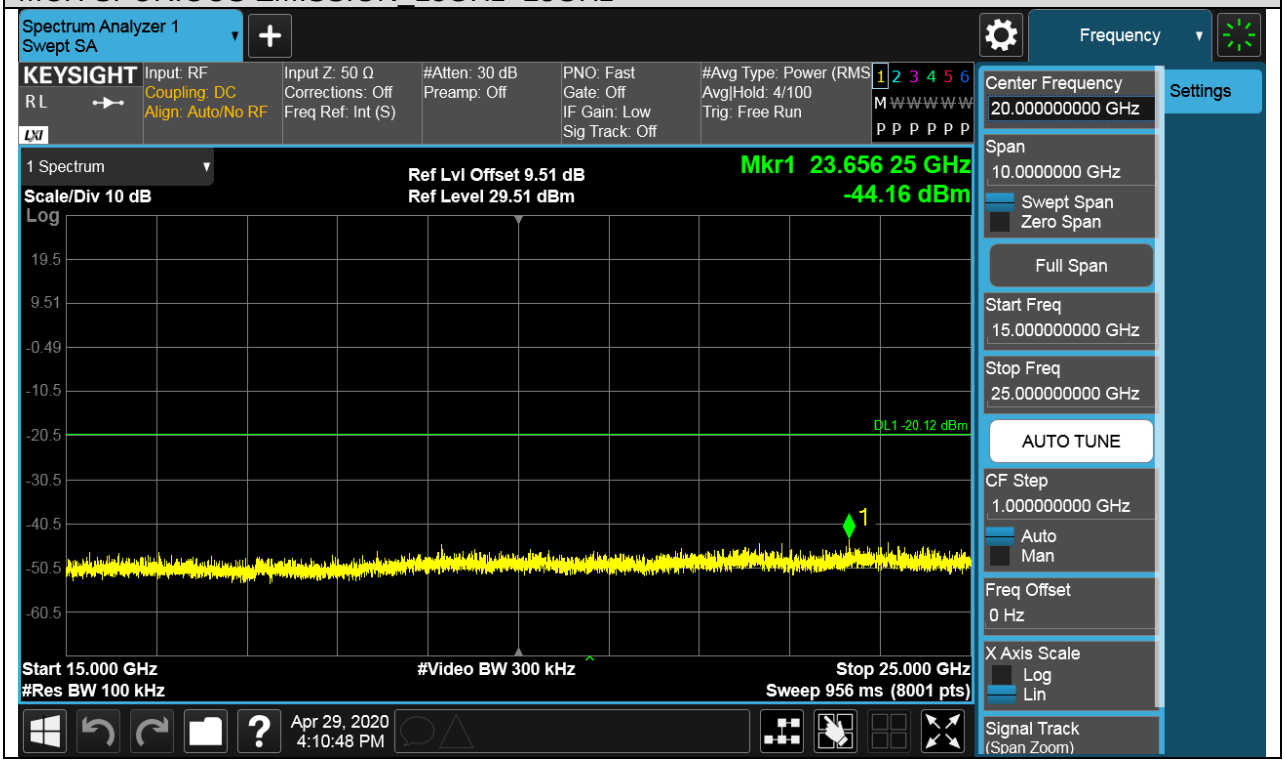
MCH SPURIOUS EMISSION_5G Hz~10GHz



MCH SPURIOUS EMISSION_10G Hz~15GHz



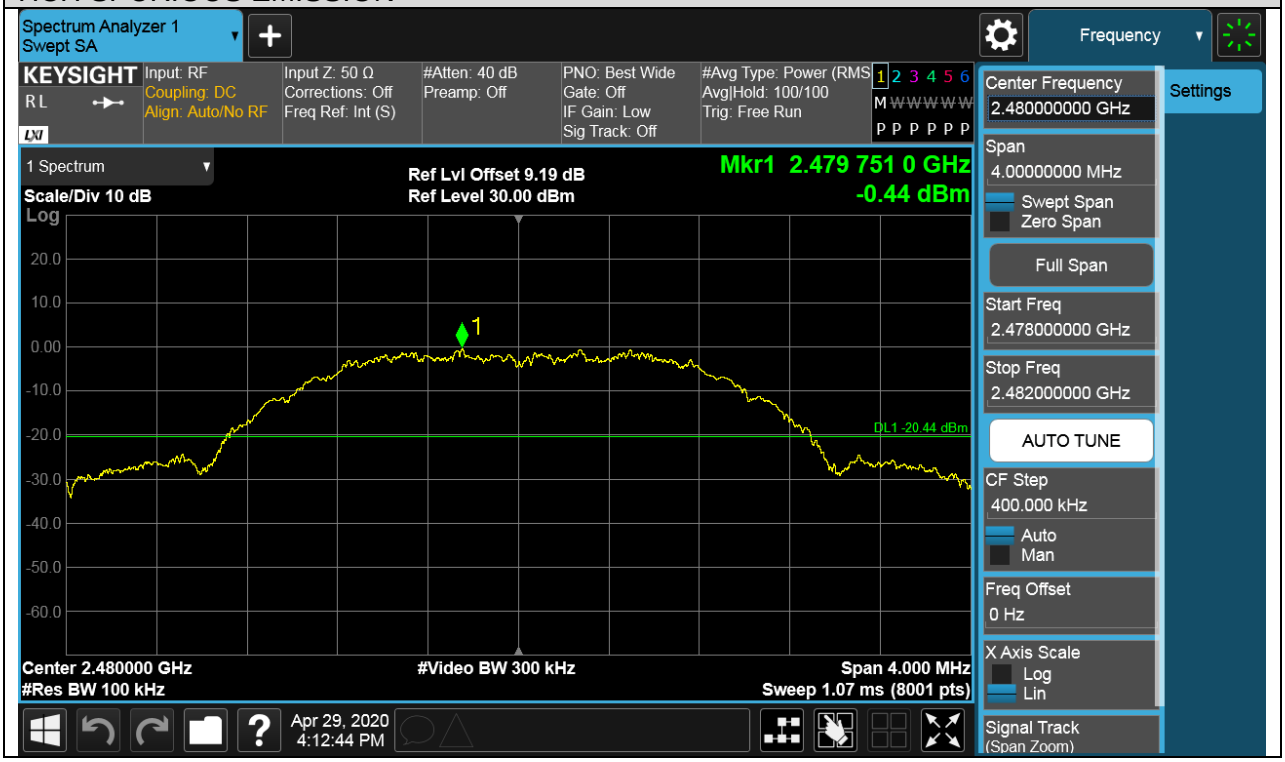
MCH SPURIOUS EMISSION_15GHz~25GHz



Test Mode	Channel	Verdict
Zigbee	HCH	PASS

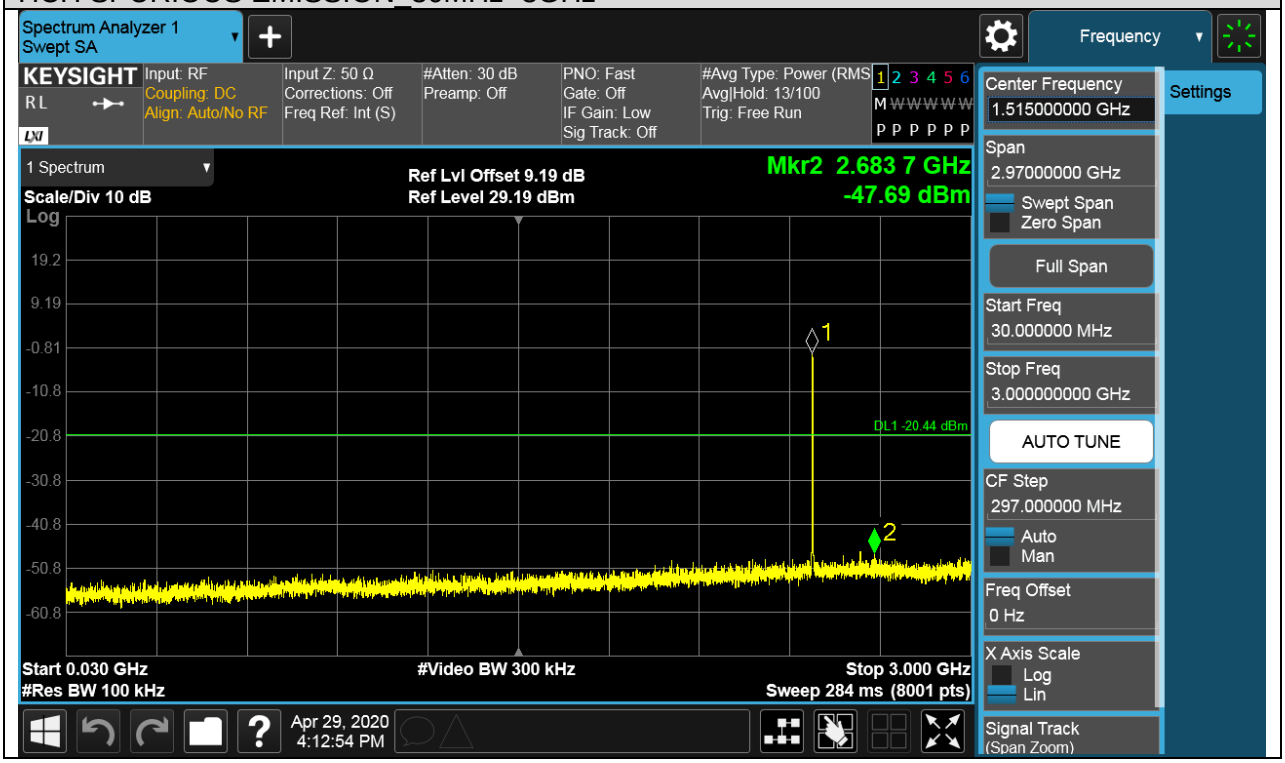
Pref test Plot

HCH SPURIOUS EMISSION

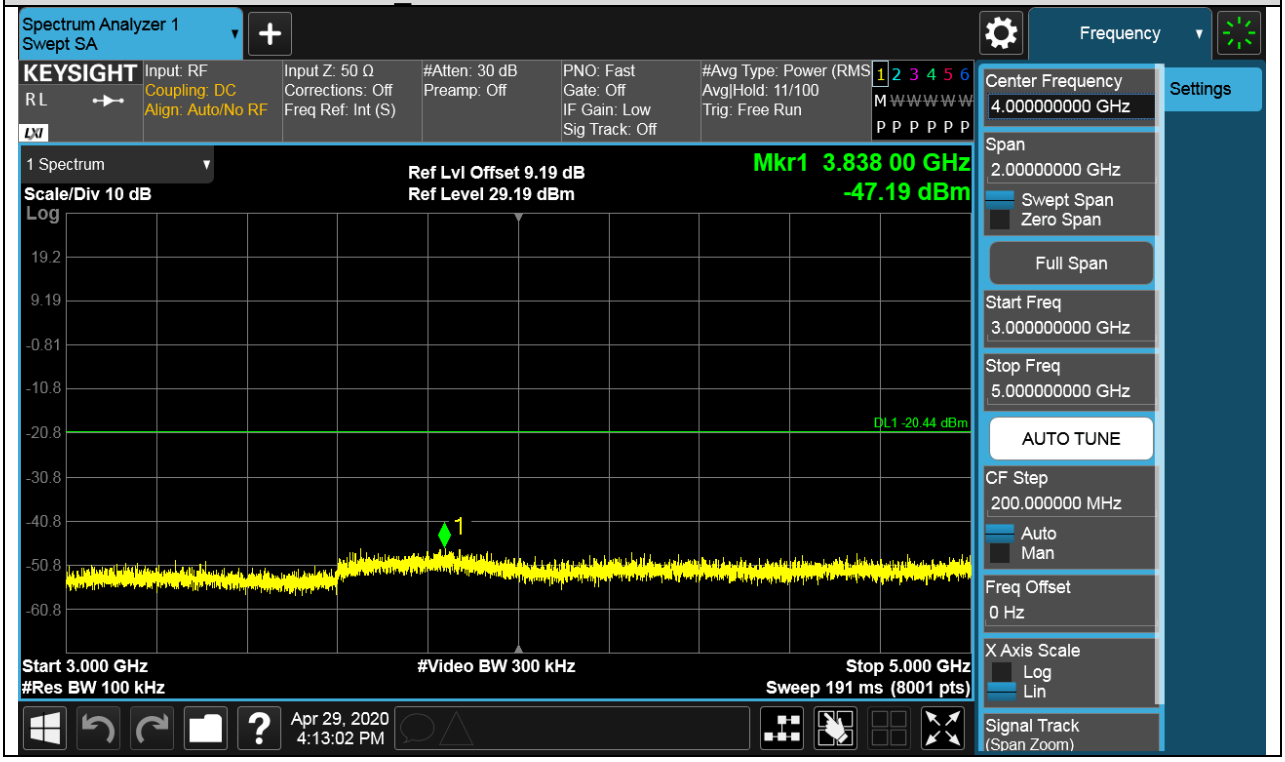


Puw test Plot

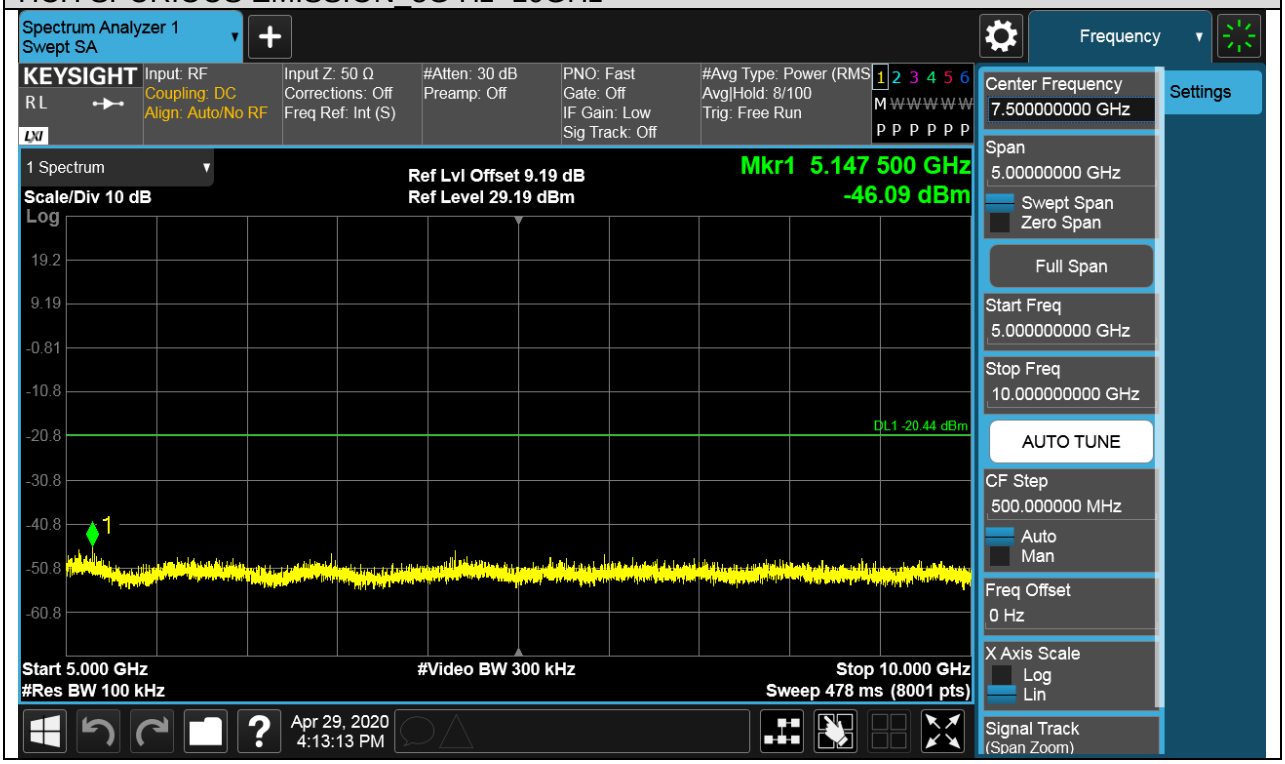
HCH SPURIOUS EMISSION_30MHz~3GHz



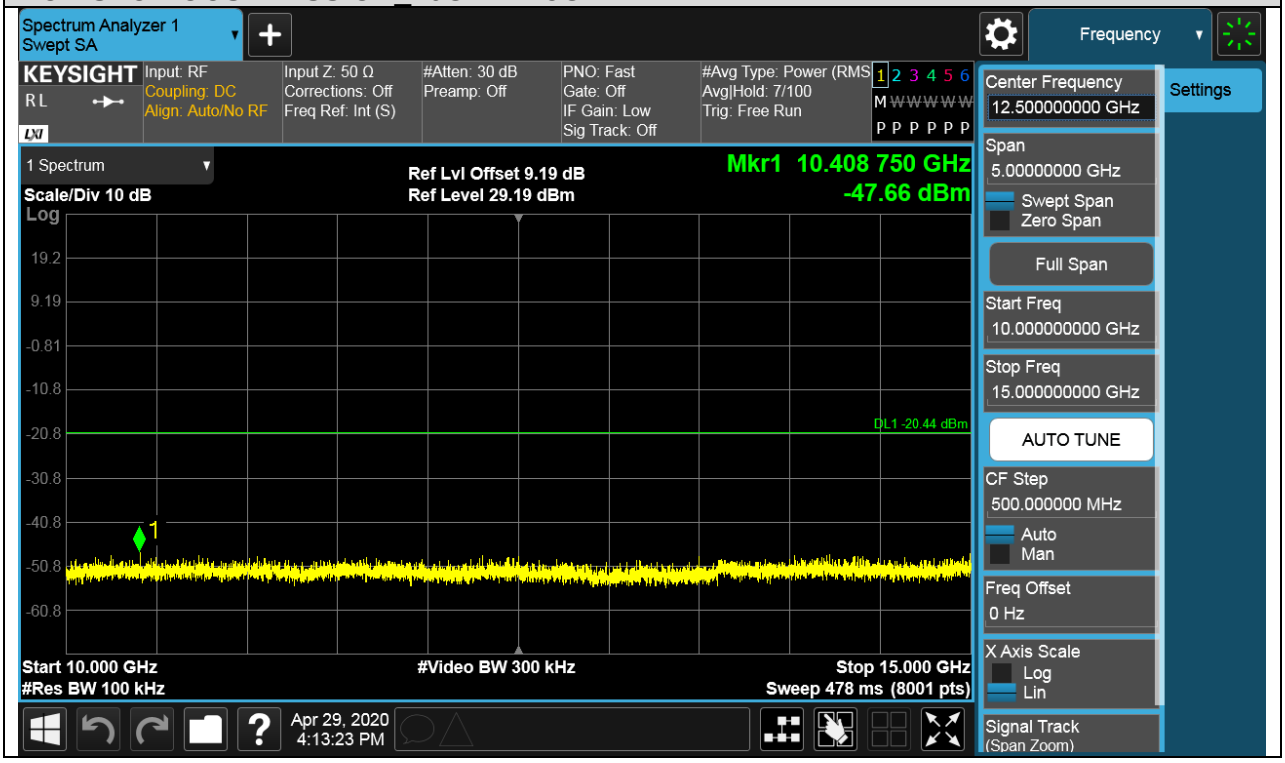
HCH SPURIOUS EMISSION_3G Hz~5GHz



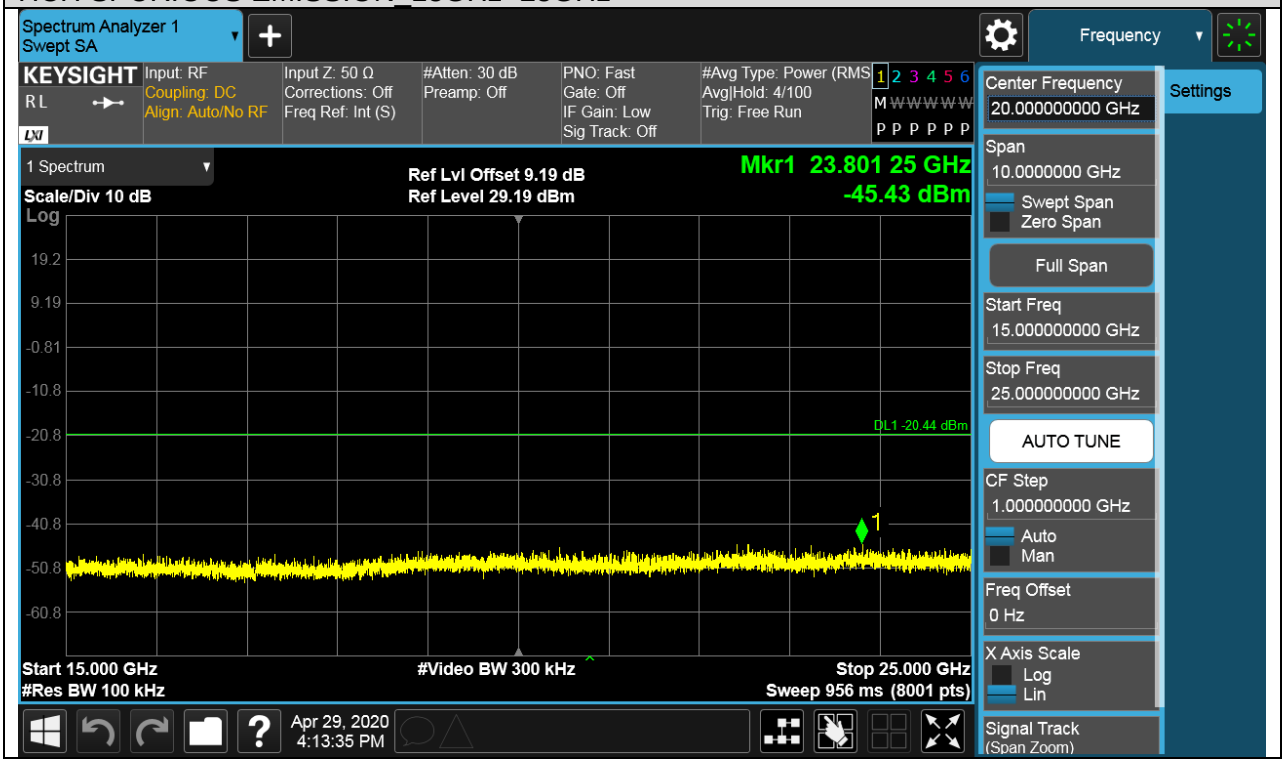
HCH SPURIOUS EMISSION_5G Hz~10GHz



HCH SPURIOUS EMISSION_10G Hz~15GHz



HCH SPURIOUS EMISSION_15GHz~25GHz



7.6. RADIATED TEST RESULTS

7.6.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to ISED RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

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
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

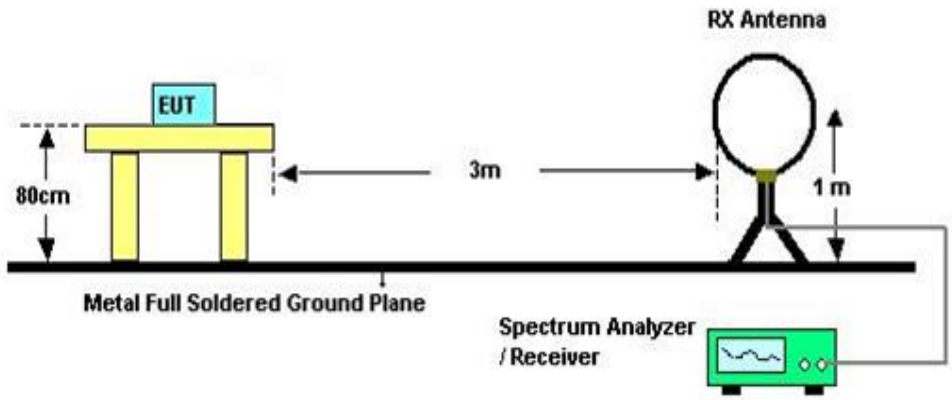
IC Restricted bands please refer to ISED RSS-GEN Clause 8.10
Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

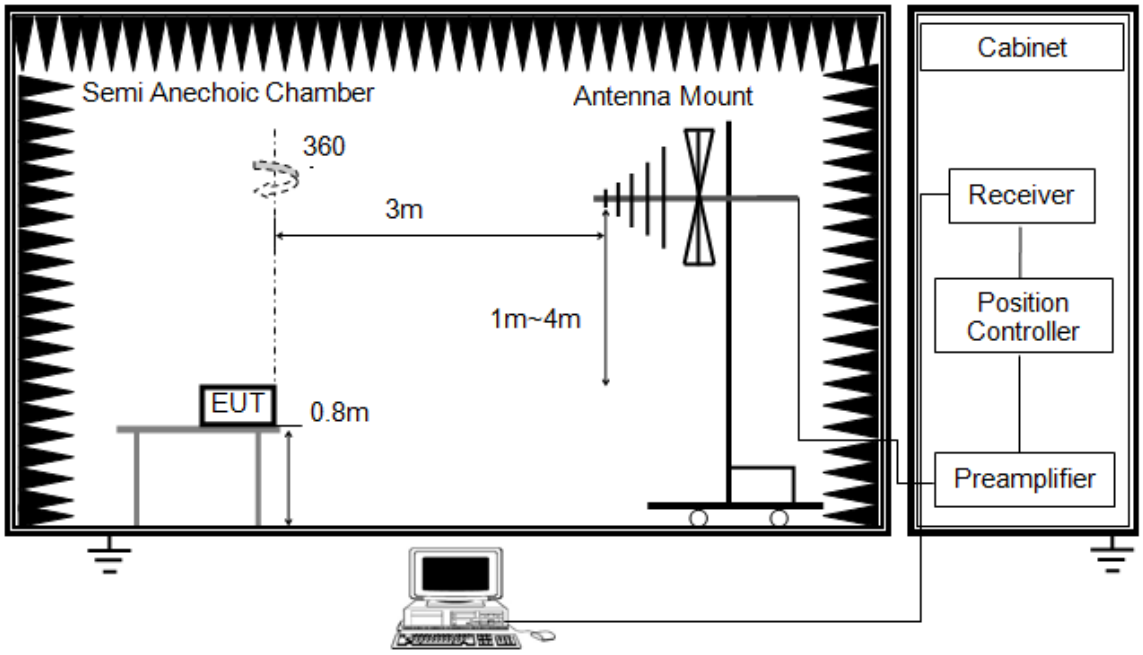
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G



The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

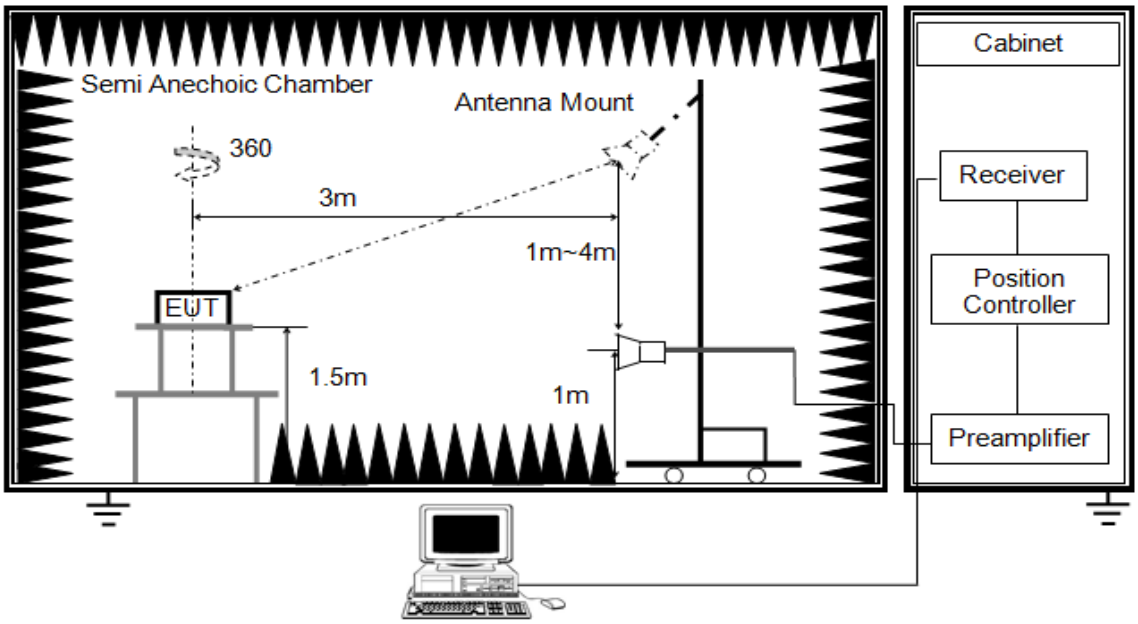
3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

6. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G



The setting of the spectrum analyser

RBW	1M
VBW	PEAK:3M AVG: See note6
Sweep	Auto
Detector	Peak/Average(Refer to section 7.1)
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5m above ground.

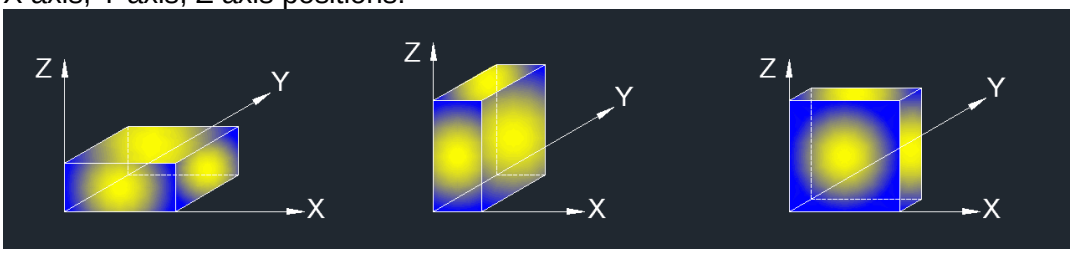
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with set VBW ≤RBW/100, but not less than 10Hz video bandwidth with peak detector， max hold to be run for at least 50 traces for average measurements.

8. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:



Note : For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (Z axis) data recorded in the report.

7.6.2. TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

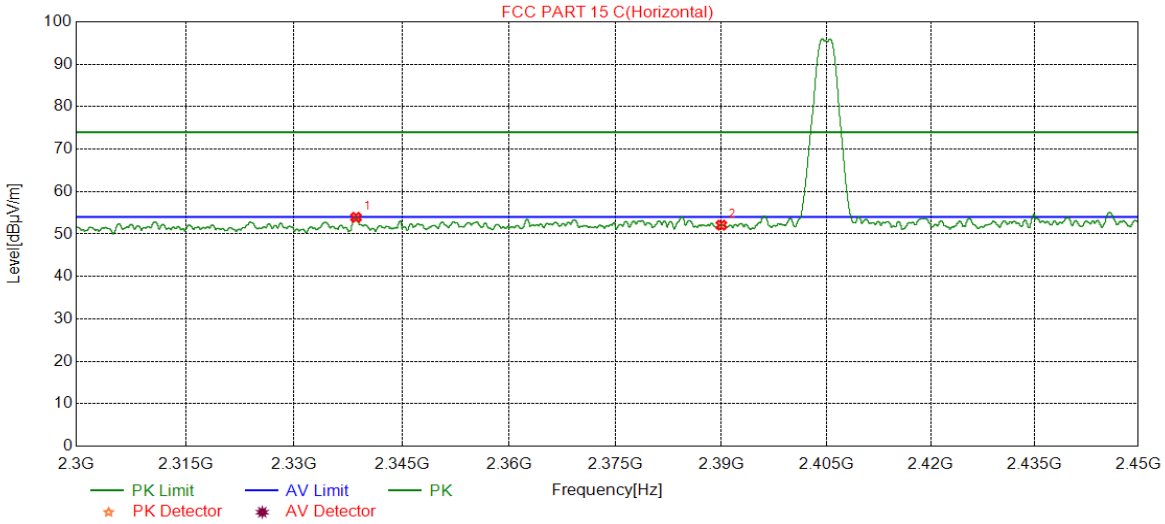
7.6.3. RESTRICTED BANDEDGE

Test Result Table

Test Mode	Channel	Puw(dBm)	Verdict
Zigbee	LCH	<Limit	PASS
	HCH	<Limit	PASS

Test Graphs:

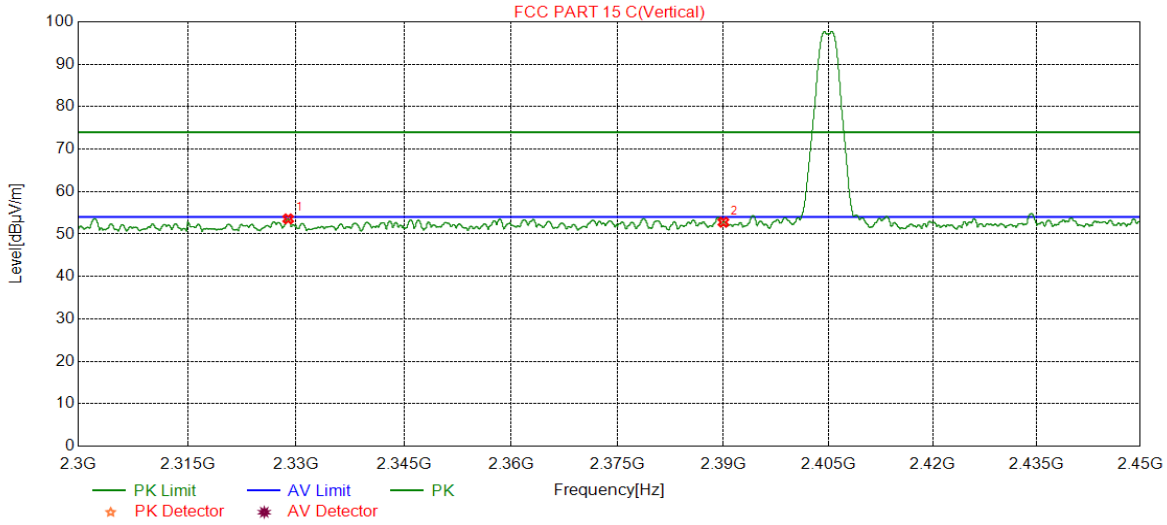
Test Mode	Channel	Polarization	Verdict
Zigbee	LCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2338.5923	40.66	13.26	53.92	74.00	-20.08	peak
2	2390.0000	38.33	13.75	52.08	74.00	-21.92	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

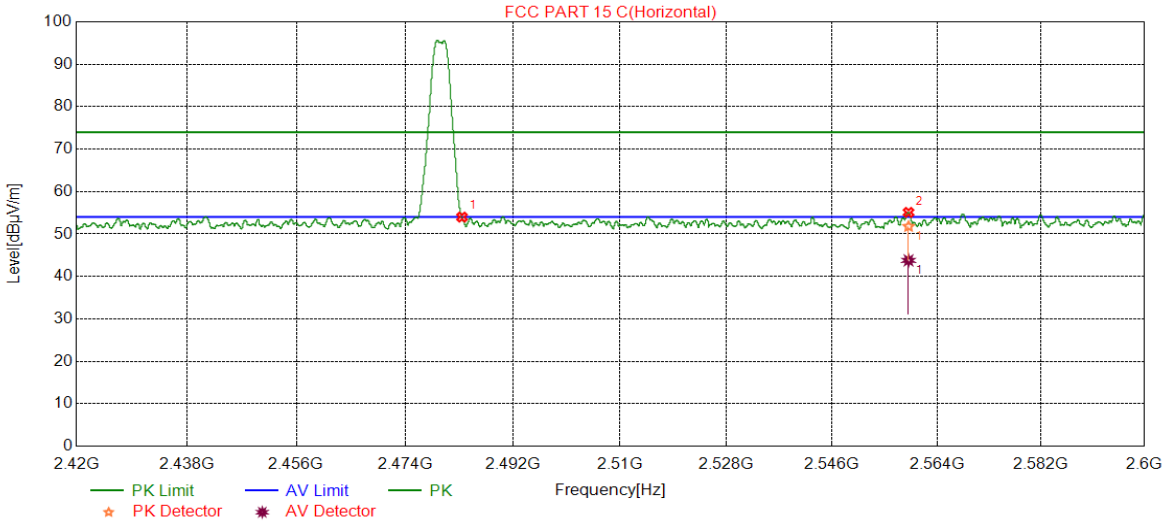
Test Mode	Channel	Polarization	Verdict
Zigbee	LCH	Vertical	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2328.8974	40.44	13.12	53.56	74.00	-20.44	peak
2	2390.0000	39.02	13.75	52.77	74.00	-21.23	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

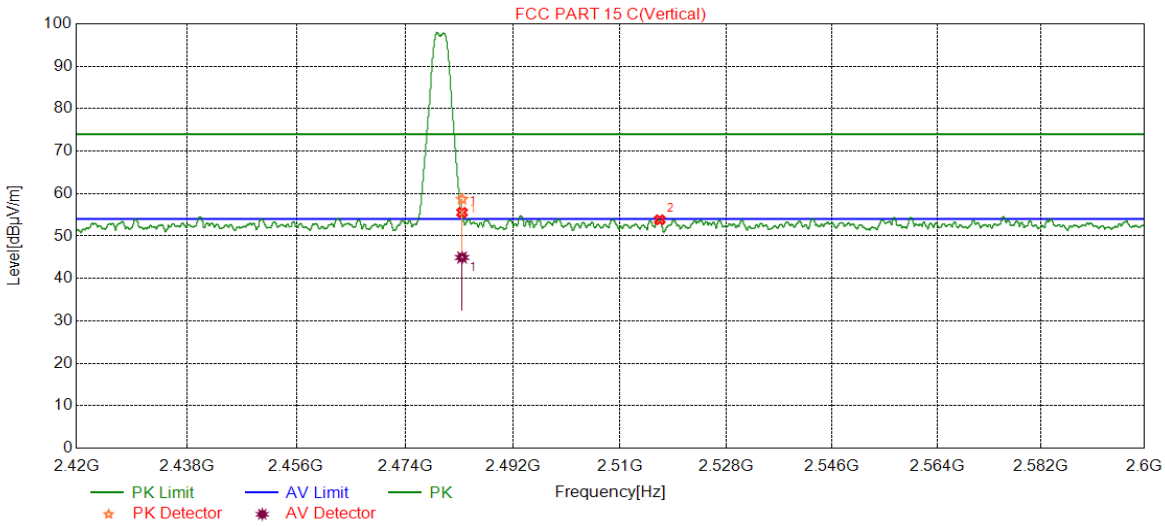
Test Mode	Channel	Polarization	Verdict
Zigbee	HCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.5000	40.47	13.51	53.98	74.00	-20.02	peak
2	2559.0999	41.10	13.99	55.09	74.00	-18.91	peak
		29.79	13.99	43.78	54.00	-10.22	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Test Mode	Channel	Polarization	Verdict
Zigbee	HCH	Vertical	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.5000	42.03	13.51	55.54	74.00	-18.46	peak
		31.43	13.50	44.93	54.00	-9.07	average
2	2516.7057	40.05	13.76	53.81	74.00	-20.19	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

7.6.4. SPURIOUS EMISSIONS

Test Result Table:
1) For 1GHz~18GHz

Test Mode	Channel	Puw(dBm)	Verdict
Zigbee	LCH	<Limit	PASS
	MCH	<Limit	PASS
	HCH	<Limit	PASS

2) For 9KHz~30MHz

Test Mode	Channel	Puw(dBm)	Verdict
Zigbee	LCH	<Limit	PASS

Remark:
1) Through pre-testing all test channels, but only the data of the worst case is included in this test report.

3) For 30MHz~1GHz

Test Mode	Channel	Puw(dBm)	Verdict
Zigbee	LCH	<Limit	PASS

Remark:
1) Through pre-testing all test channels, but only the data of the worst case is included in this test report.

4) For 18GHz~26.5GHz

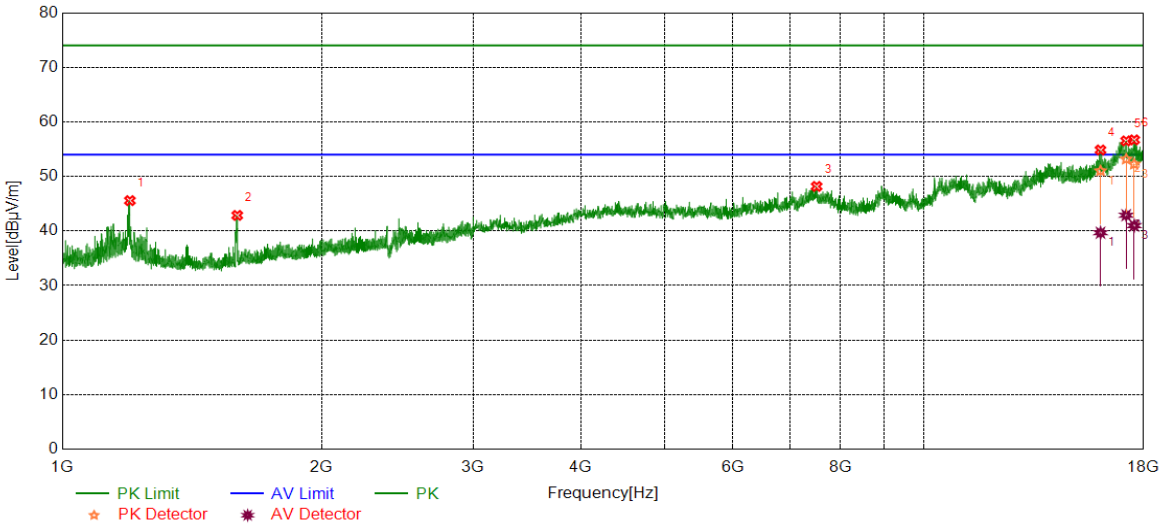
Test Mode	Channel	Puw(dBm)	Verdict
Zigbee	LCH	<Limit	PASS

Remark:
1) Through pre-testing all test channels, but only the data of the worst case is included in this test report.

Part I: 1GHz~18GHz

HARMONICS AND SPURIOUS EMISSIONS

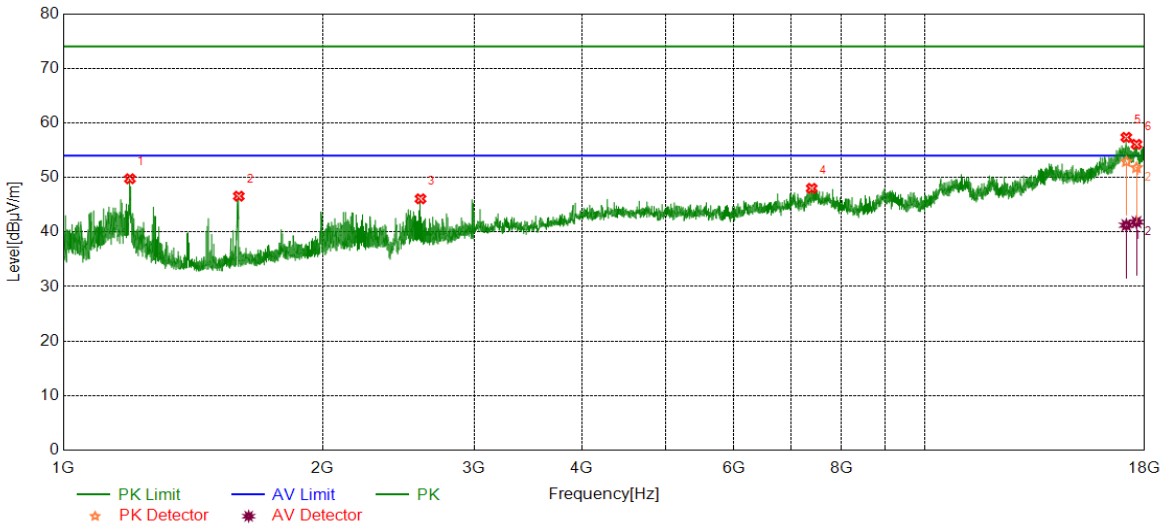
Test Mode	Channel	Polarization	Verdict
Zigbee	LCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1198.2748	51.11	-5.54	45.57	74.00	-28.43	peak
2	1596.5746	48.12	-5.26	42.86	74.00	-31.14	peak
3	7511.8140	39.04	9.13	48.17	74.00	-25.83	peak
4	16040.3800	38.91	15.94	54.85	74.00	-19.15	peak
		23.74	15.94	39.68	54.00	-14.32	average
5	17178.6473	37.91	18.61	56.52	74.00	-17.48	peak
		24.28	18.61	42.89	54.00	-11.11	average
6	17551.8190	38.27	18.44	56.71	74.00	-17.29	peak
		22.54	18.44	40.98	54.00	-13.02	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. Confirm that the test have added the Band Reject Filter losses during the testing. Proper operation of the transmitter prior to adding the filter to the measurement chain. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

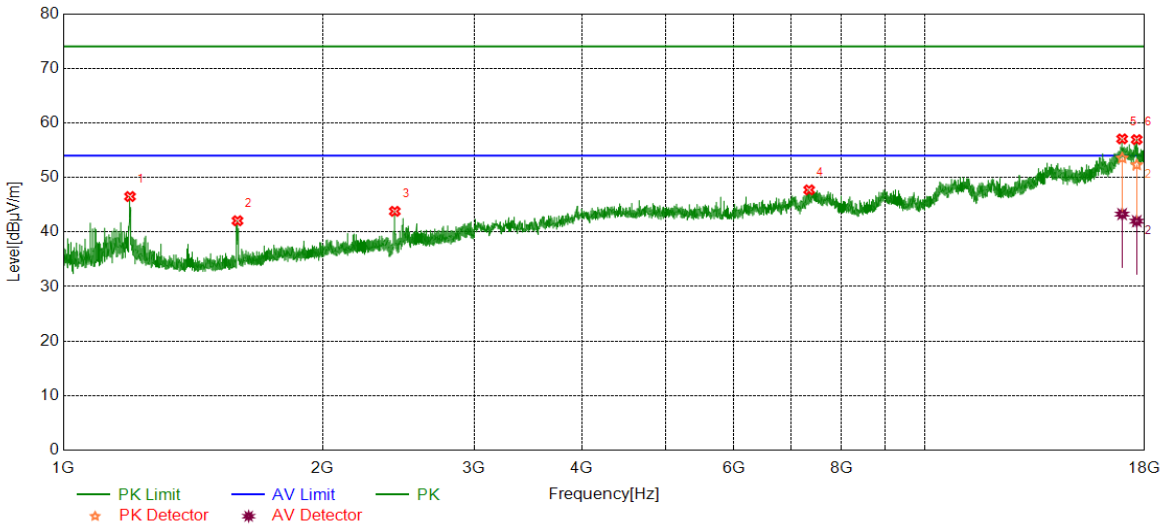
Test Mode	Channel	Polarization	Verdict
Zigbee	LCH	Vertical	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1195.2744	55.31	-5.55	49.76	74.00	-24.24	peak
2	1598.8249	51.77	-5.20	46.57	74.00	-27.43	peak
3	2598.6998	46.78	-0.70	46.08	74.00	-27.92	peak
4	7393.6742	39.18	8.82	48.00	74.00	-26.00	peak
5	17139.2674	38.78	18.57	57.35	74.00	-16.65	peak
		22.67	18.57	41.24	54.00	-12.76	average
6	17613.7017	37.36	18.71	56.07	74.00	-17.93	peak
		23.11	18.71	41.82	54.00	-12.18	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. Confirm that the test have added the Band Reject Filter losses during the testing. Proper operation of the transmitter prior to adding the filter to the measurement chain. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

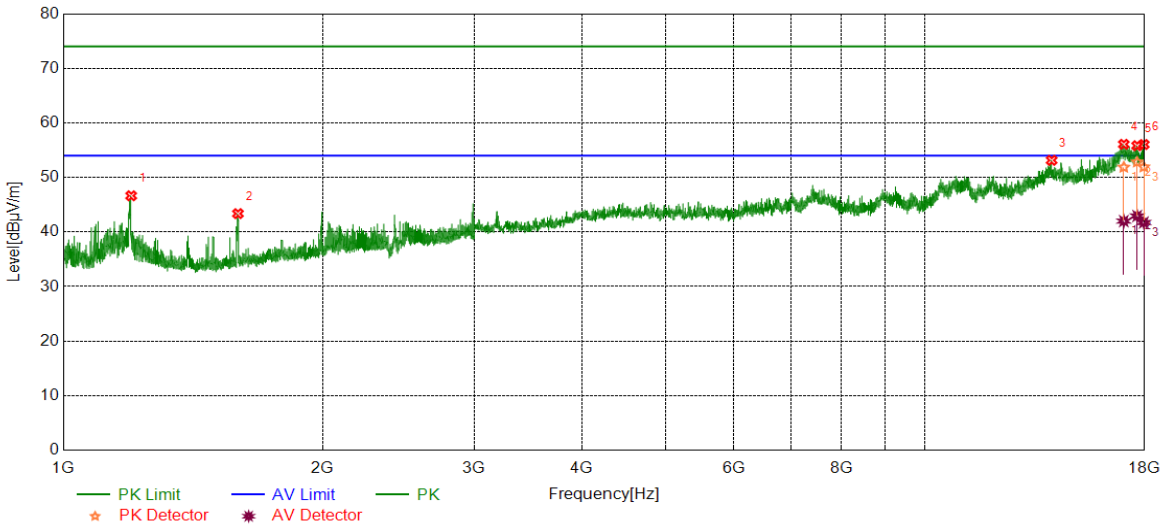
Test Mode	Channel	Polarization	Verdict
Zigbee	MCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1195.5244	52.04	-5.54	46.50	74.00	-27.50	peak
2	1593.3242	47.41	-5.35	42.06	74.00	-31.94	peak
3	2426.1783	44.94	-1.15	43.79	74.00	-30.21	peak
4	7343.0429	39.07	8.65	47.72	74.00	-26.28	peak
5	16949.8687	37.84	19.23	57.07	74.00	-16.93	peak
		24.05	19.23	43.28	54.00	-10.72	average
6	17623.0779	38.18	18.76	56.94	74.00	-17.06	peak
		23.23	18.76	41.99	54.00	-12.01	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. Confirm that the test have added the Band Reject Filter losses during the testing. Proper operation of the transmitter prior to adding the filter to the measurement chain. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

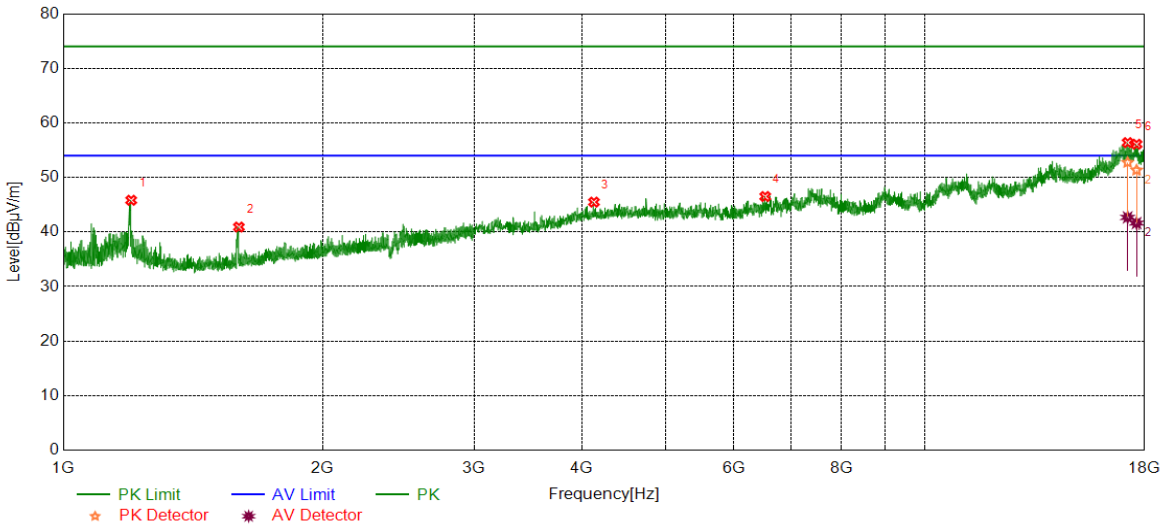
Test Mode	Channel	Polarization	Verdict
Zigbee	MCH	Vertical	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1199.2749	52.18	-5.54	46.64	74.00	-27.36	peak
2	1595.3244	48.67	-5.30	43.37	74.00	-30.63	peak
3	14039.5049	37.62	15.52	53.14	74.00	-20.86	peak
4	17024.8781	36.70	19.38	56.08	74.00	-17.92	peak
		22.62	19.38	42.00	54.00	-12.00	average
5	17645.5807	37.14	18.68	55.82	74.00	-18.18	peak
		24.26	18.68	42.94	54.00	-11.06	average
6	17960.6201	37.55	18.49	56.04	74.00	-17.96	peak
		23.25	18.49	41.74	54.00	-12.26	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. Confirm that the test have added the Band Reject Filter losses during the testing. Proper operation of the transmitter prior to adding the filter to the measurement chain. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

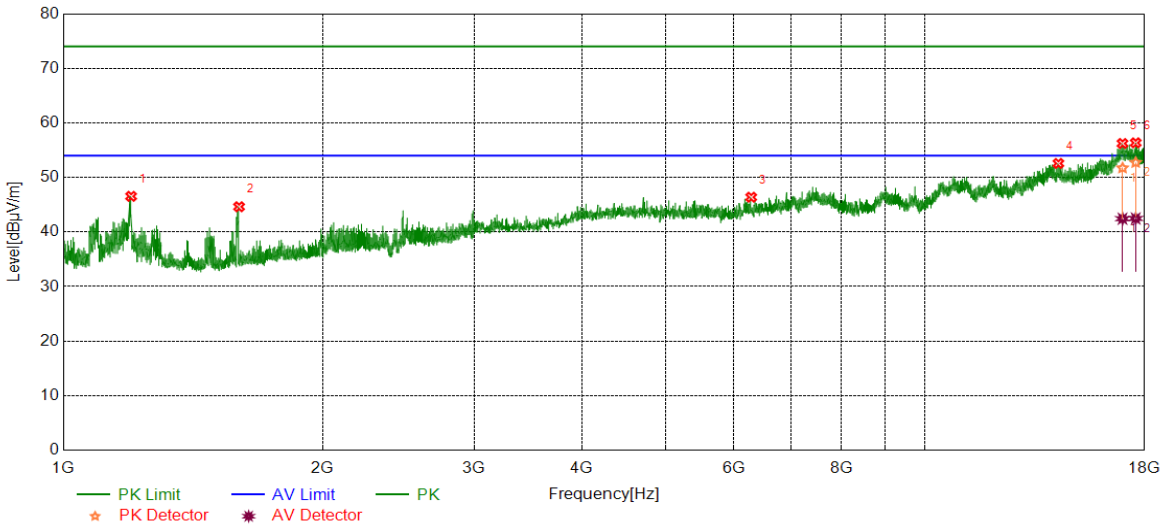
Test Mode	Channel	Polarization	Verdict
Zigbee	HCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1199.2749	51.36	-5.54	45.82	74.00	-28.18	peak
2	1599.3249	46.10	-5.19	40.91	74.00	-33.09	peak
3	4130.7663	41.13	4.35	45.48	74.00	-28.52	peak
4	6529.1911	38.99	7.52	46.51	74.00	-27.49	peak
5	17201.1501	37.71	18.68	56.39	74.00	-17.61	peak
		24.00	18.68	42.68	54.00	-11.32	average
6	17617.4522	37.38	18.71	56.09	74.00	-17.91	peak
		22.93	18.71	41.64	54.00	-12.36	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. Confirm that the test have added the Band Reject Filter losses during the testing. Proper operation of the transmitter prior to adding the filter to the measurement chain. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Test Mode	Channel	Polarization	Verdict
Zigbee	HCH	Vertical	PASS



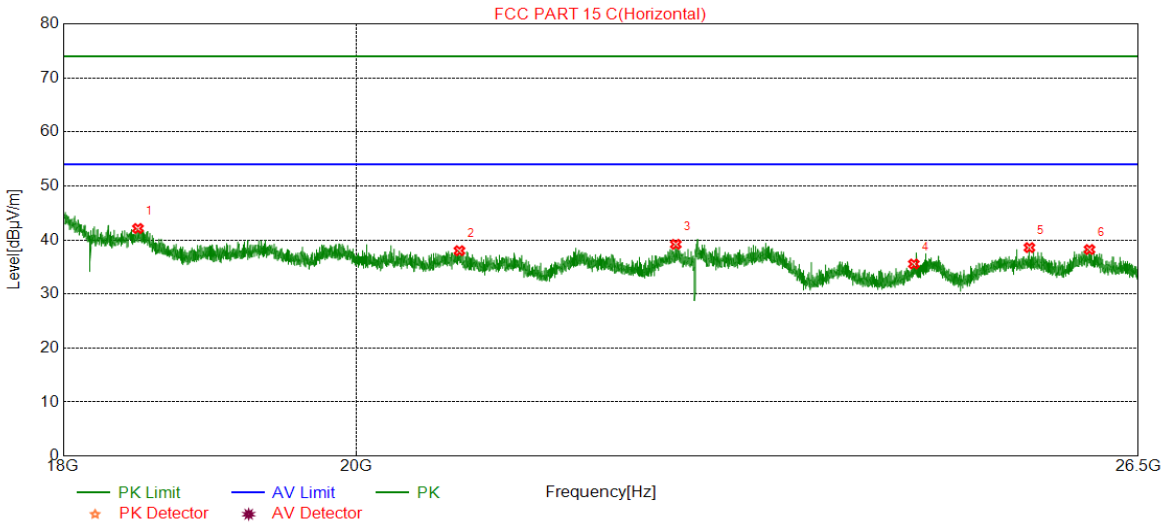
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	1199.0249	52.08	-5.54	46.54	74.00	-27.46	peak
2	1600.0750	49.80	-5.17	44.63	74.00	-29.37	peak
3	6289.1611	39.78	6.60	46.38	74.00	-27.62	peak
4	14294.5368	37.39	15.18	52.57	74.00	-21.43	peak
5	16966.7458	36.38	19.85	56.23	74.00	-17.77	peak
		22.59	19.85	42.44	54.00	-11.56	average
6	17576.1970	37.33	19.02	56.35	74.00	-17.65	peak
		23.46	19.02	42.48	54.00	-11.52	average

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector.
5. Confirm that the test have added the Band Reject Filter losses during the testing. Proper operation of the transmitter prior to adding the filter to the measurement chain. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Part II: 18GHz~26.5GHz

SPURIOUS EMISSIONS 18GHz TO 26.5GHz (WORST-CASE CONFIGURATION)

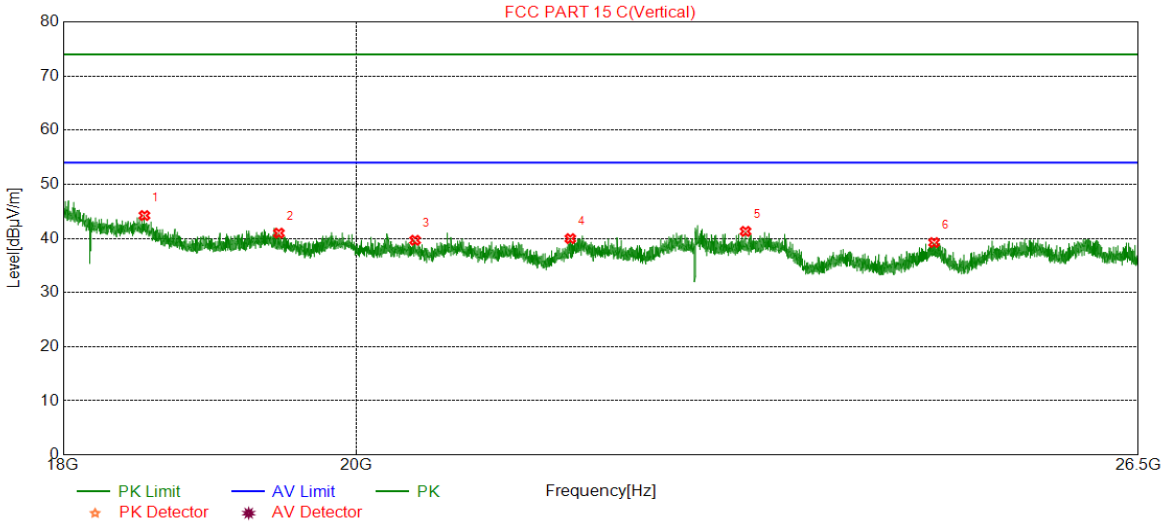
Test Mode	Channel	Polarization	Verdict
Zigbee	LCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	18490.4991	43.06	-0.94	42.12	74.00	-31.88	peak
2	20758.5259	38.88	-0.88	38.00	74.00	-36.00	peak
3	22439.1439	38.47	0.72	39.19	74.00	-34.81	peak
4	24446.1946	36.20	-0.65	35.55	74.00	-38.45	peak
5	25484.1484	37.76	0.82	38.58	74.00	-35.42	peak
6	26040.9541	36.64	1.59	38.23	74.00	-35.77	peak

Note: 1.If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Test Mode	Channel	Polarization	Verdict
Zigbee	MCH	Vertical	PASS



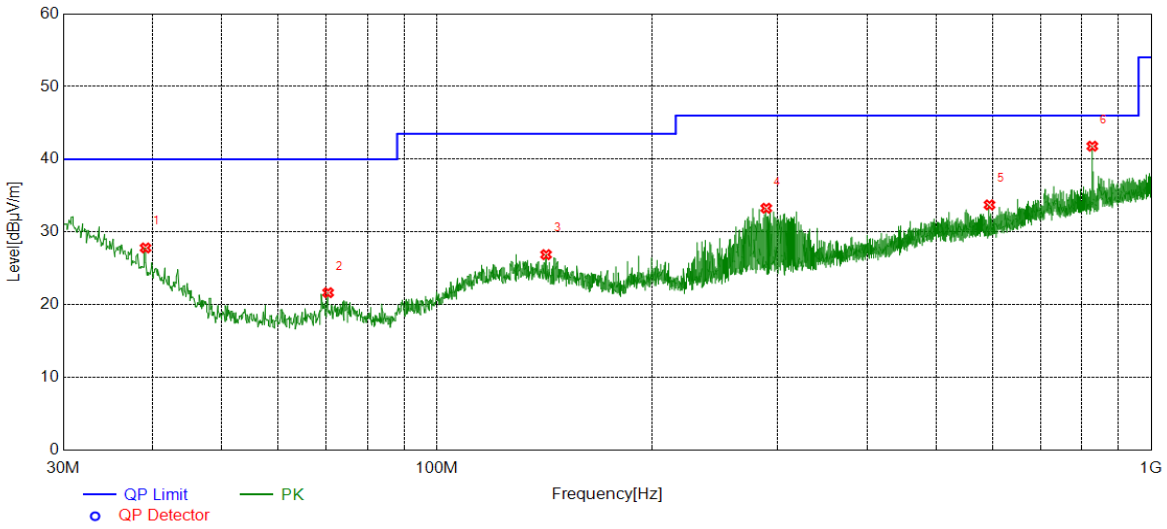
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	18533.8534	45.17	-0.95	44.22	74.00	-29.78	peak
2	19452.7953	41.73	-0.76	40.97	74.00	-33.03	peak
3	20429.5430	40.32	-0.67	39.65	74.00	-34.35	peak
4	21603.5104	40.33	-0.37	39.96	74.00	-34.04	peak
5	23009.5510	40.09	1.21	41.30	74.00	-32.70	peak
6	24624.7125	39.64	-0.41	39.23	74.00	-34.77	peak

Note: 1.If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Part III: 30MHz~1GHz

SPURIOUS EMISSIONS 30M TO 1GHHz (WORST-CASE CONFIGURATION)

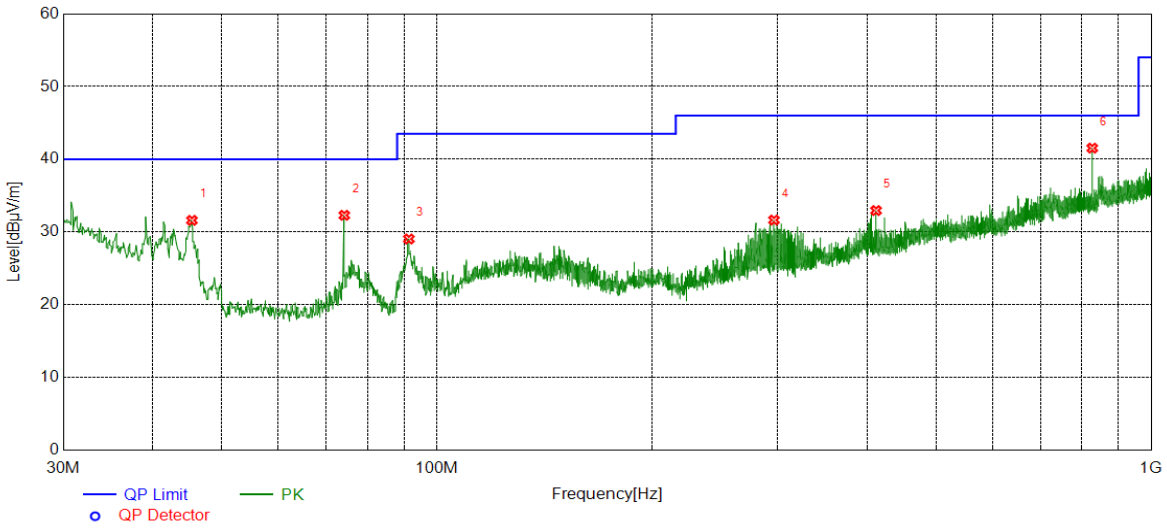
Test Mode	Channel	Polarization	Verdict
Zigbee	MCH	Horizontal	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	39.1189	6.47	21.34	27.81	40.00	-12.19	peak
2	70.4530	6.73	14.93	21.66	40.00	-18.34	peak
3	142.2402	6.81	20.08	26.89	43.50	-16.61	peak
4	289.2099	12.48	20.79	33.27	46.00	-12.73	peak
5	593.8204	7.16	26.57	33.73	46.00	-12.27	peak
6	827.1287	11.83	29.97	41.80	46.00	-4.20	peak

Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.

Test Mode	Channel	Polarization	Verdict
Zigbee	MCH	Vertical	PASS



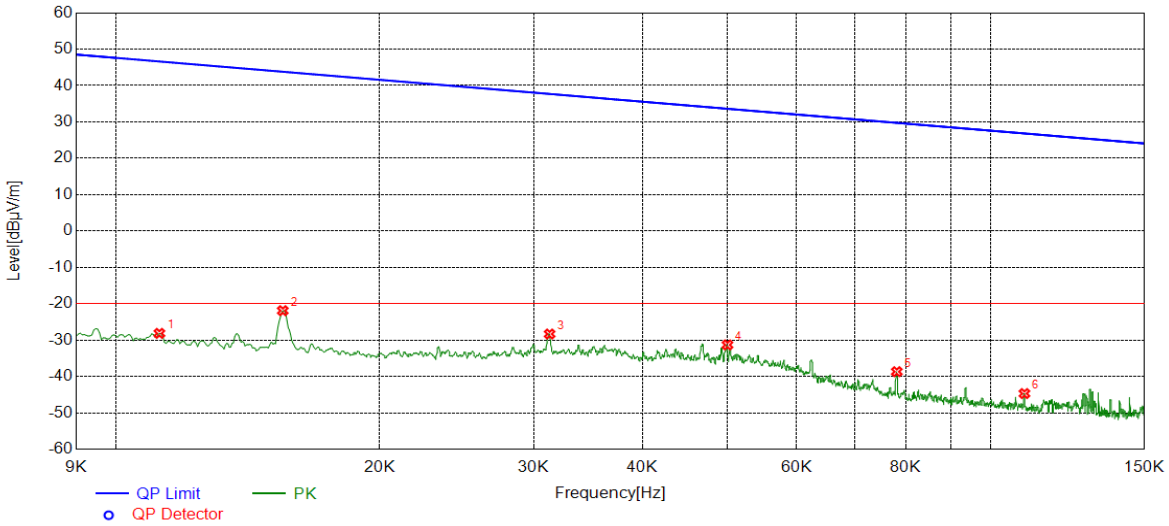
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	45.4245	14.12	17.48	31.60	40.00	-8.40	peak
2	74.2364	17.53	14.77	32.30	40.00	-7.70	peak
3	91.4071	14.08	14.96	29.04	43.50	-14.46	peak
4	296.4856	10.85	20.79	31.64	46.00	-14.36	peak
5	412.0242	9.44	23.51	32.95	46.00	-13.05	peak
6	827.0317	11.56	29.97	41.53	46.00	-4.47	peak

Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
3. Measurement = Reading Level + Correct Factor.

Part IV: 9KHz~30MHz

SPURIOUS EMISSIONS Below 30MHz (WORST CASE CONFIGURATION-FACE ON)

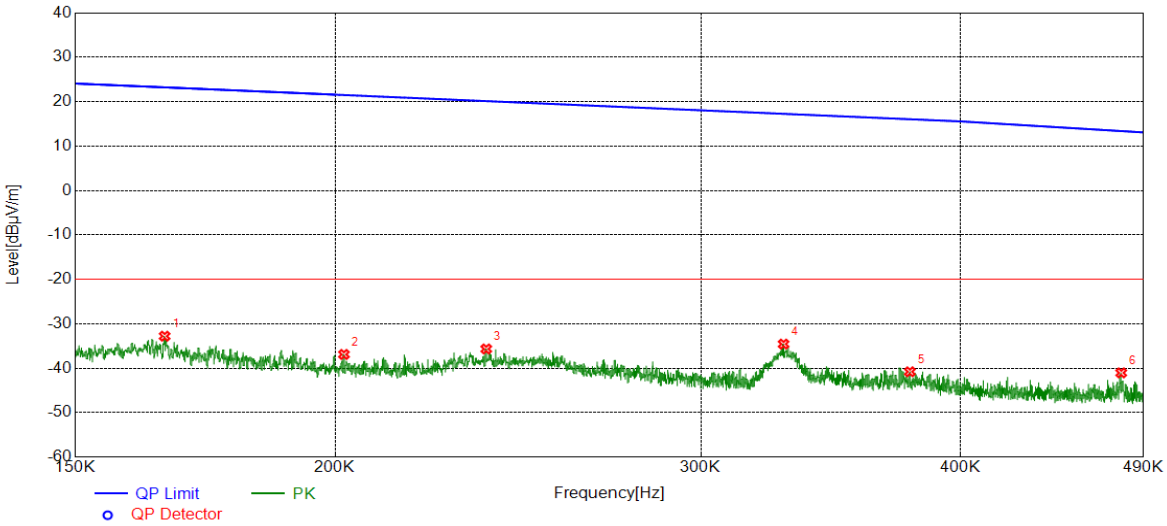
Test Mode	Channel	Frequency Range	Verdict
Zigbee	MCH	9KHz~150KHz	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.0112	32.85	-61.00	-28.15	46.61	-74.76	peak
2	0.0155	38.96	-60.87	-21.91	43.77	-65.68	peak
3	0.0313	32.49	-60.81	-28.32	37.70	-66.02	peak
4	0.0500	29.62	-60.94	-31.32	33.63	-64.95	peak
5	0.0781	22.57	-61.25	-38.68	29.75	-68.43	peak
6	0.1093	16.05	-60.75	-44.70	26.83	-71.53	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Result 300m= Result 3m-80 dBuV/m
3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
4. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report
5. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

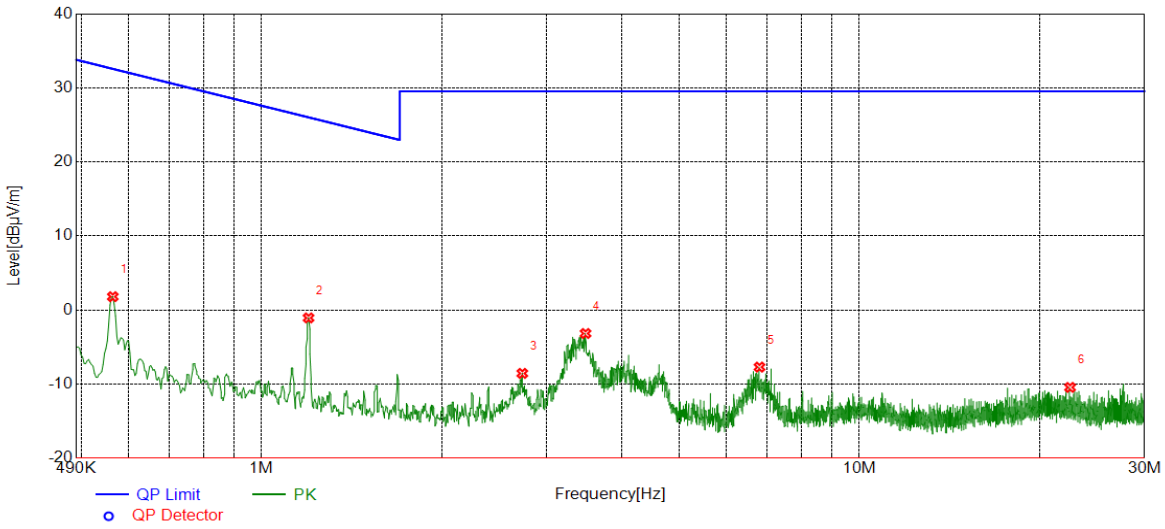
Test Mode	Channel	Frequency Range	Verdict
Zigbee	MCH	150KHz~490KHz	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.1656	28.38	-61.16	-32.78	23.22	-56.00	peak
2	0.2020	24.08	-60.97	-36.89	21.49	-58.38	peak
3	0.2365	25.14	-60.80	-35.66	20.12	-55.78	peak
4	0.3288	26.10	-60.66	-34.56	17.26	-51.82	peak
5	0.3782	19.83	-60.62	-40.79	16.05	-56.84	peak
6	0.4780	19.50	-60.54	-41.04	13.38	-54.42	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Result 300m= Result 3m-80 dBuV/m
3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
4. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report
5. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Test Mode	Channel	Frequency Range	Verdict
Zigbee	MCH	490KHz~30MHz	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.5638	22.34	-20.54	1.80	32.58	-30.78	peak
2	1.1983	19.20	-20.27	-1.07	26.03	-27.10	peak
3	2.7300	11.79	-20.35	-8.56	29.54	-38.10	peak
4	3.4826	17.04	-20.21	-3.17	29.54	-32.71	peak
5	6.8058	11.97	-19.68	-7.71	29.54	-37.25	peak
6	22.5126	7.14	-17.59	-10.45	29.54	-39.99	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Result 30m= Result 3m-40 dBuV/m
3. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
4. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report
5. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Note: All constructions and test modes and channels have been tested, only the worst data record in the report.

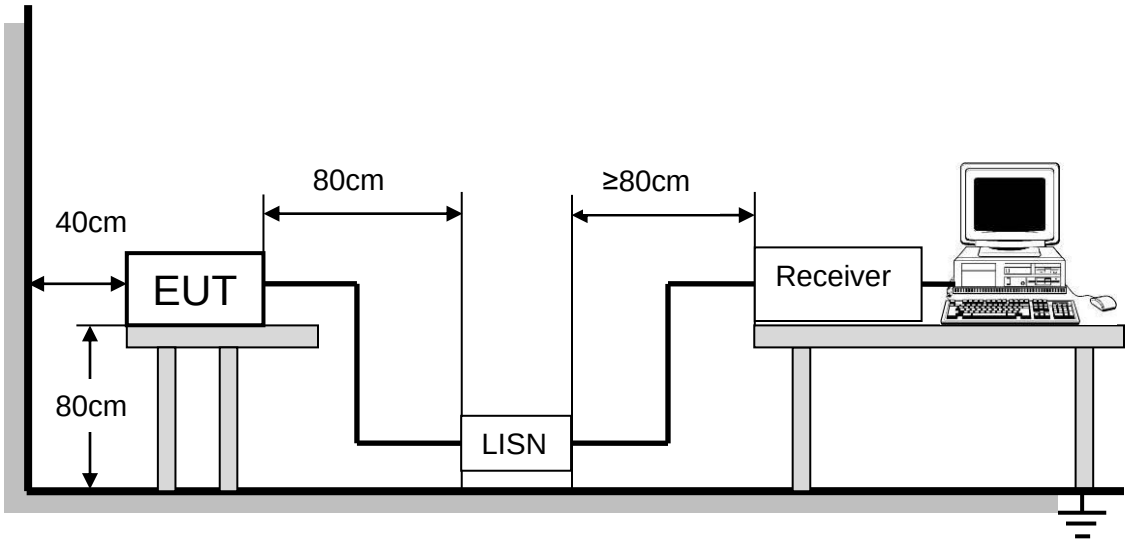
8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE

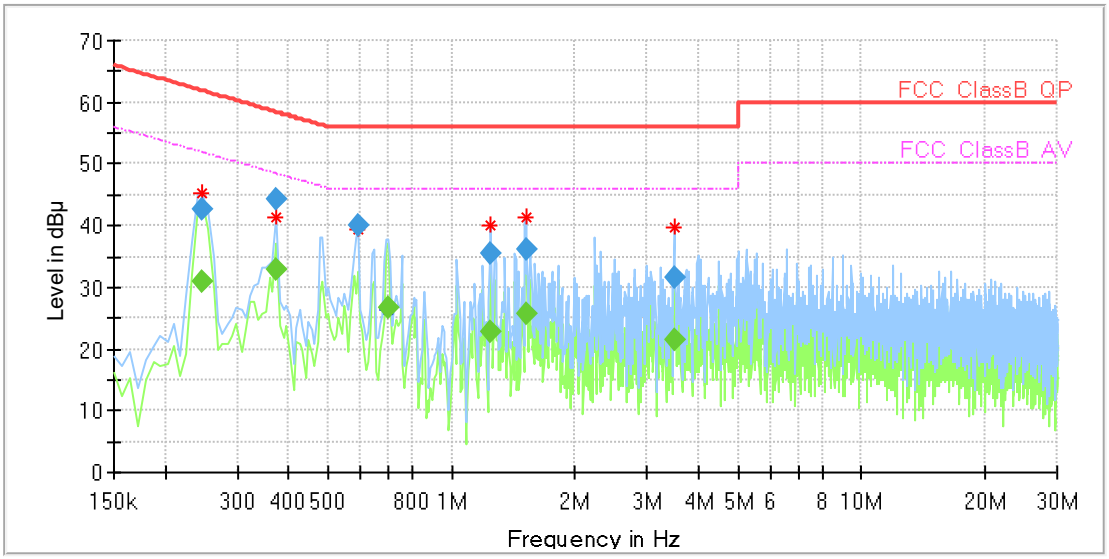


The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST RESULTS (WORST CASE CONFIGURATION)

For L Line:

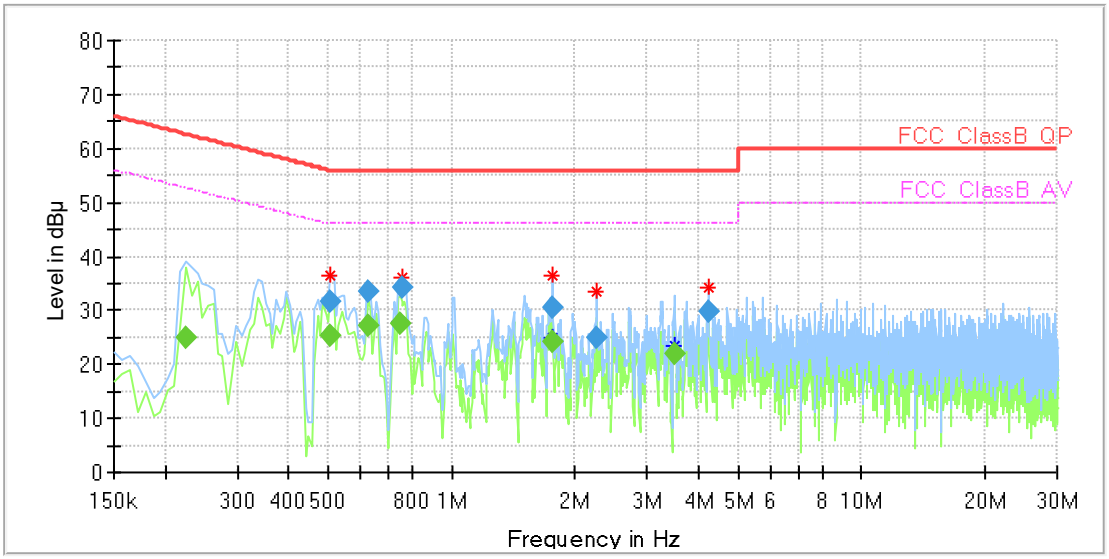


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.247013	---	30.95	51.86	20.90	1000.0	9.000	L1	OFF	9.5
0.247013	42.50	---	61.86	19.36	1000.0	9.000	L1	OFF	9.5
0.373875	---	32.86	48.41	15.55	1000.0	9.000	L1	OFF	9.7
0.373875	44.29	---	58.41	14.12	1000.0	9.000	L1	OFF	9.7
0.590288	40.07	---	56.00	15.93	1000.0	9.000	L1	OFF	9.7
0.702225	---	26.55	46.00	19.45	1000.0	9.000	L1	OFF	9.6
1.246988	35.56	---	56.00	20.44	1000.0	9.000	L1	OFF	9.5
1.246988	---	22.90	46.00	23.10	1000.0	9.000	L1	OFF	9.5
1.515638	36.26	---	56.00	19.74	1000.0	9.000	L1	OFF	9.6
1.515638	---	25.65	46.00	20.35	1000.0	9.000	L1	OFF	9.6
3.485738	---	21.51	46.00	24.49	1000.0	9.000	L1	OFF	9.8
3.485738	31.73	---	56.00	24.27	1000.0	9.000	L1	OFF	9.8

Note: 1. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
3. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.
4. The extension cord/outlet strip was calibrated with the LISN as required by ANSI C63.10:2013 Clause 6.2.2.
5. Pre-testing all test channels, and find the LCH which is the worst case, so only the worst case is included in this test report.

For N Line:



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.224625	---	25.02	52.65	27.63	1000.0	9.000	N	OFF	9.6
0.508200	---	25.31	46.00	20.69	1000.0	9.000	N	OFF	9.6
0.508200	31.79	---	56.00	24.21	1000.0	9.000	N	OFF	9.6
0.627600	33.51	---	56.00	22.49	1000.0	9.000	N	OFF	9.6
0.627600	---	27.21	46.00	18.79	1000.0	9.000	N	OFF	9.6
0.747000	---	27.41	46.00	18.59	1000.0	9.000	N	OFF	9.5
0.754463	34.06	---	56.00	21.94	1000.0	9.000	N	OFF	9.5
1.761900	30.56	---	56.00	25.44	1000.0	9.000	N	OFF	9.6
1.761900	---	24.27	46.00	21.73	1000.0	9.000	N	OFF	9.6
2.254425	25.11	---	56.00	30.89	1000.0	9.000	N	OFF	9.6
3.493200	---	22.00	46.00	24.00	1000.0	9.000	N	OFF	9.6
4.246913	29.81	---	56.00	26.19	1000.0	9.000	N	OFF	9.6

Note: 1. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
3. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.
4. The extension cord/outlet strip was calibrated with the LISN as required by ANSI C63.10:2013 Clause 6.2.2.
5. Pre-testing all test channels, and find the LCH which is the worst case, so only the worst case is included in this test report.

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §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.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi

END OF REPORT