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

CERTIFICATION TEST REPORT

For

Element Outlet

MODEL NUMBER: E1C-NB6

FCC ID: 2AGN8-E1CNB6
IC: 20888-E1CNB6

REPORT NUMBER: 4788140260-5

ISSUE DATE: Dec. 10, 2017

Prepared for

Sengled Co., Ltd.
Room 201/15, Building 1, No.498, Guoshoujing Road, Pilot Free Trade Zone,
Shanghai City, P.R. China

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	12/10/2017	Initial Issue	

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Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6db DTS Bandwidth and Occupied Bandwidth	FCC 15.247 (a) (2) IC RSS-247 Clause 5.2 (a) RSS-Gen Clause 6.6	Complied
2	Peak Conducted Power	FCC 15.247 (b) (3) IC RSS-247 Clause 5.4 (e)	Complied
3	Power Spectral Density	FCC 15.247 (e) IC RSS-247 Clause 5.2 (b)	Complied
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) IC RSS-247 Clause 5.5	Complied
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 IC RSS-247 Clause 5.5 IC RSS-GEN Clause 8.9	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Sengled Co., Ltd.
Address:	Room 201/15, Building 1, No.498, Guoshoujing Road, Pilot Free Trade Zone, Shanghai City, P.R. China

Manufacturer Information

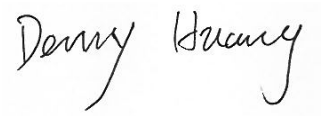
Company Name:	Sengled Co., Ltd.
Address:	Room 201/15, Building 1, No.498, Guoshoujing Road, Pilot Free Trade Zone, Shanghai City, P.R. China

EUT Description

Product Name	Element Outlet
Brand Name	N/A
Model Name	E1C-NB6
Test Model Number	1271817-004
Date Tested	Oct. 31, 2017 ~ Dec. 09, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
INDUSTRY CANADA RSS-247 Issue 2	PASS
INDUSTRY CANADA RSS-GEN Issue 4	PASS

Tested By:



Denny Huang
Engineer Project Associate

Check By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo

Laboratory Manage

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 DTS Meas Guidance v04, FCC KDB 414788 D01 Radiated Test Site v01, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.

Note:
1) The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worse case from the open field site.
2) For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OATS.

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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
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.00dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.04dB(1-6GHz)
	5.30dB (6GHz-18Gz)
	5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Element Outlet	
Model Name	E1C-NB6	
Product Description	Operation Frequency	2405 MHz ~ 2475 MHz
	Modulation Technology	Data Rate
	Modulation Type	O-QPSK
Sample Type:	Fixed production	
Test Power Grade:	8(manufacturer declare)	
Test Software of EUT:	SSCOM32 (manufacturer declare)	
Antenna Type:	PCB Antenna	
Antenna Gain	-0.4dBi	
Hardware Version	0x01	
Test Voltage:	AC 120V/60Hz	

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Antenna	Mode	Frequency (MHz)	Channel Number	Max EIRP (dBm)
2405-2475	1	ZigBee	2405-2475	11-25	19.97

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		

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
ZIGBEE	CH 11, CH 18, CH 25	2405MHz, 2440MHz, 2475MHz

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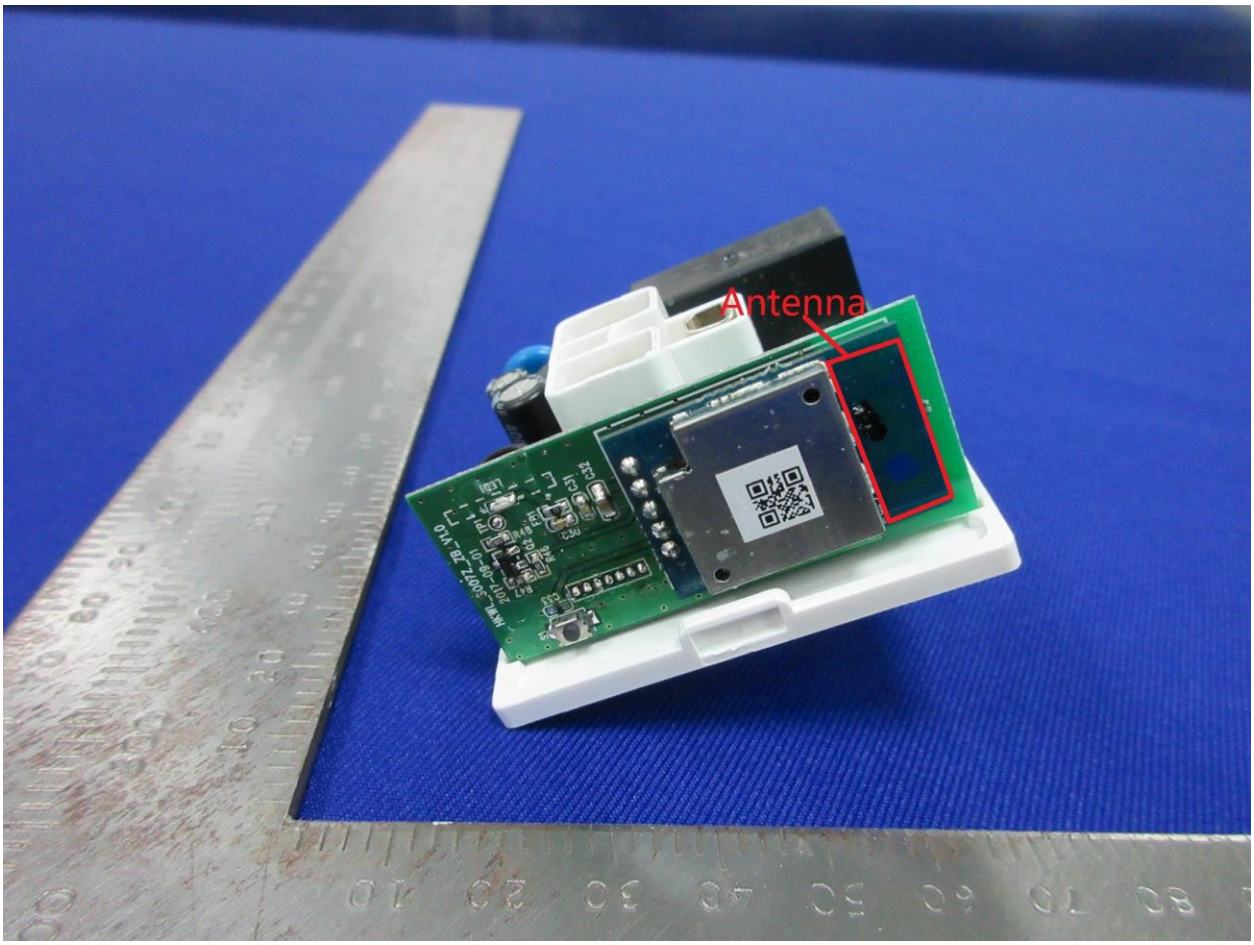
5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software Version		N/A		
Modulation Type	Transmit Antenna Number	SerialDebug.exe		
		LCH	MCH	HCH
O-QPSK	1	8	8	8

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2405-2475	Internal Antenna	-0.4dBi

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



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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

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5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	Laptop	ThinkPad	T410	N/A

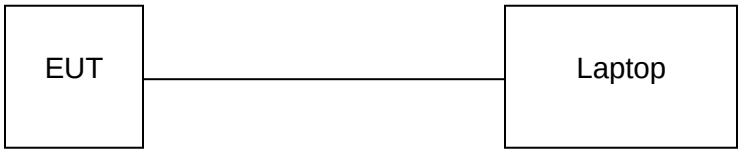
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



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5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions(Instrument**)**						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	101961	Dec.20, 2016	Dec.19, 2017
☑	Two-Line V-Network	R&S	ENV216	101983	Dec.20, 2016	Dec.19, 2017
☑	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Feb.10, 2017	Feb.10, 2018
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Conducted disturbance		UL	Antenna port	Ver. 7.2	
Radiated Emissions(Instrument**)**						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Feb. 24, 2017	Feb. 24, 2018
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
☑	Preamplifier	HP	8447D	2944A09099	Feb. 13, 2017	Feb. 13, 2018
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec. 20, 2016	Dec. 20, 2017
☑	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019
☑	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019
☑	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan. 14, 2017	Jan. 14, 2018
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec. 20, 2016	Dec. 20, 2017
☑	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 26, 2019
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Dec. 20, 2016	Dec. 20, 2017
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance		Farad	EZ-EMC	Ver. UL-3A1	
Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec. 20, 2016	Dec. 20, 2017
☑	Power Meter	Keysight	N9031A	MY55416024	Feb. 13, 2017	Feb. 13, 2018

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☑	Power Sensor	Keysight	N9323A	MY55440013	Feb. 13, 2017	Feb. 13, 2018

6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

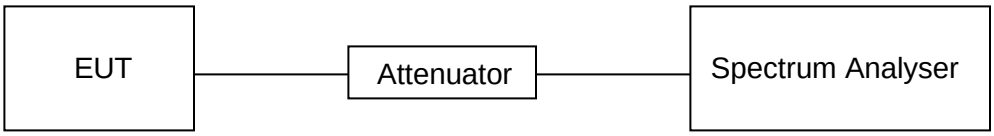
LIMITS

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



RESULTS

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

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

ON TIME AND DUTY CYCLE MID CH

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6.2. 6 dB BANDWIDTH & 99% BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) RSS-247 5.2 (a)	6dB Bandwidth	>= 500KHz	2400-2483.5
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	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	For 6 dB Bandwidth :100K For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : ≥3 × RBW For 99% Bandwidth : approximately 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 and 99% relative to the maximum level measured in the fundamental emission.

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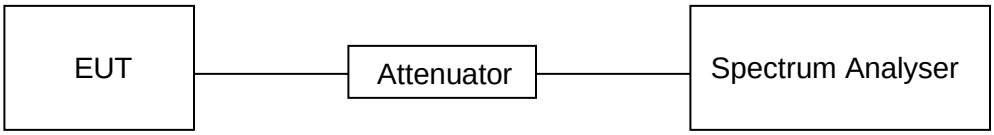
TEST SETUP



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RESULTS

Channel	Frequency (MHz)	6dB bandwidth (MHz)	99% Bandwidth (MHz)	Result
Low	2405	1.582	2.407	Pass
Middle	2440	1.621	2.476	Pass
High	2475	1.636	2.499	Pass

LOW CH

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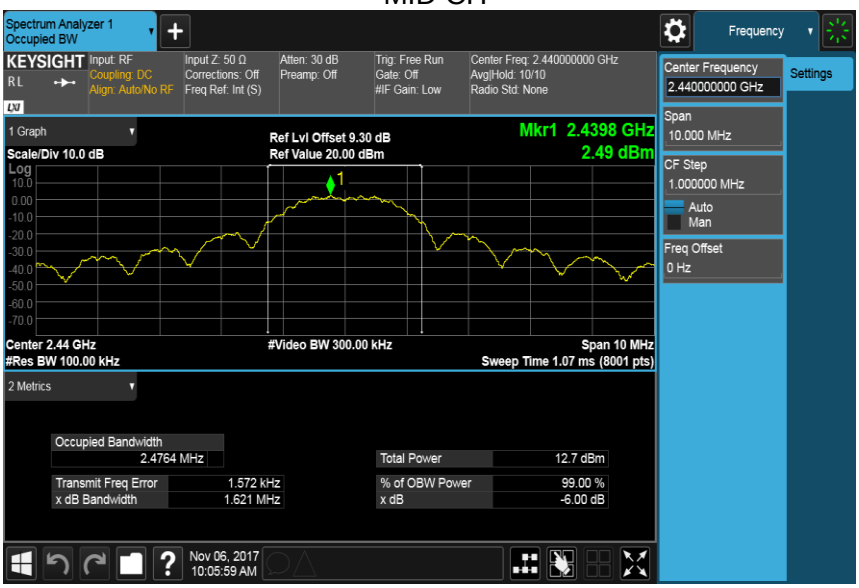
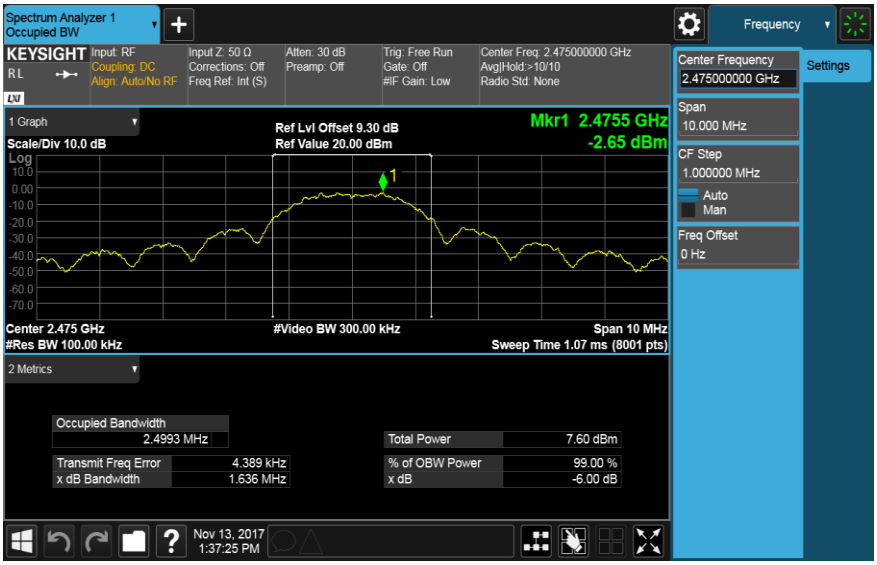
MID CH



HIGH CH



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6.3. PEAK CONDUCTED OUTPUT POWER

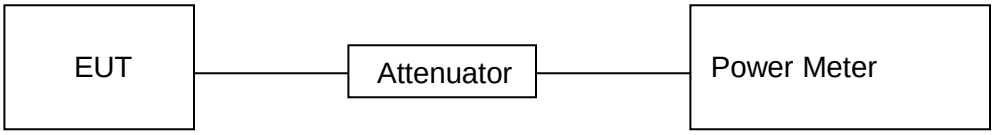
LIMITS

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

TEST PROCEDURE

Refer to FCC KDB 558074

TEST SETUP



RESULTS

Test Channel	Frequency	Maximum Conducted Output Power(PK)	EIRP	LIMIT
	(MHz)	(dBm)	(dBm)	dBm
LCH	2405	6.37	5.97	30
MCH	2440	5.96	5.56	30
HCH	2475	1.22	0.82	30

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6.4. POWER SPECTRAL DENSITY

LIMITS

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

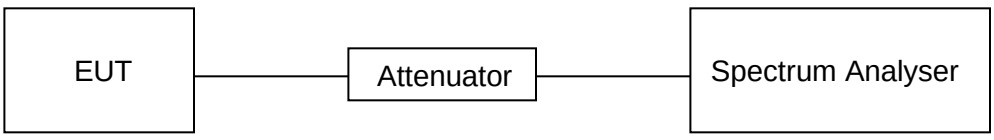
TEST PROCEDURE

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 SETUP



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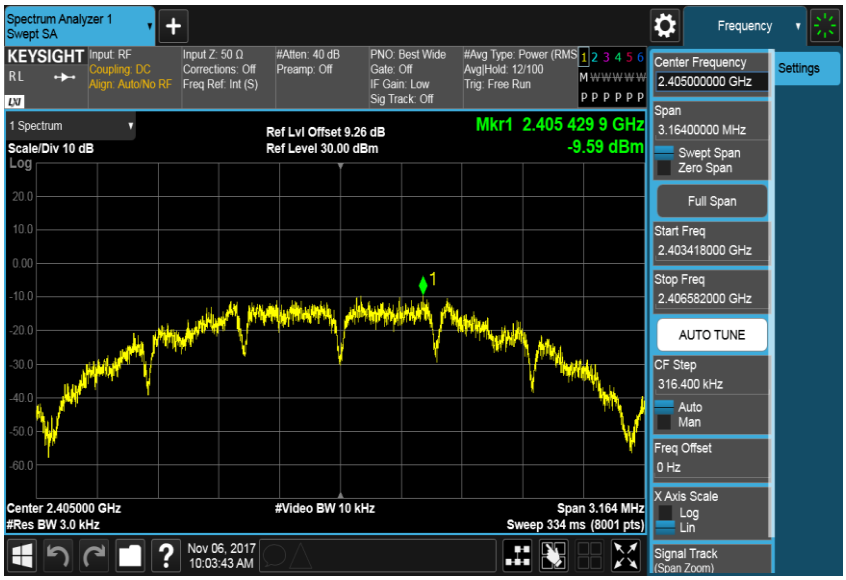
RESULTS

Test Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
LCH	-9.59	8	PASS
MCH	-9.85	8	PASS
HCH	-14.36	8	PASS

PSD LOW CH



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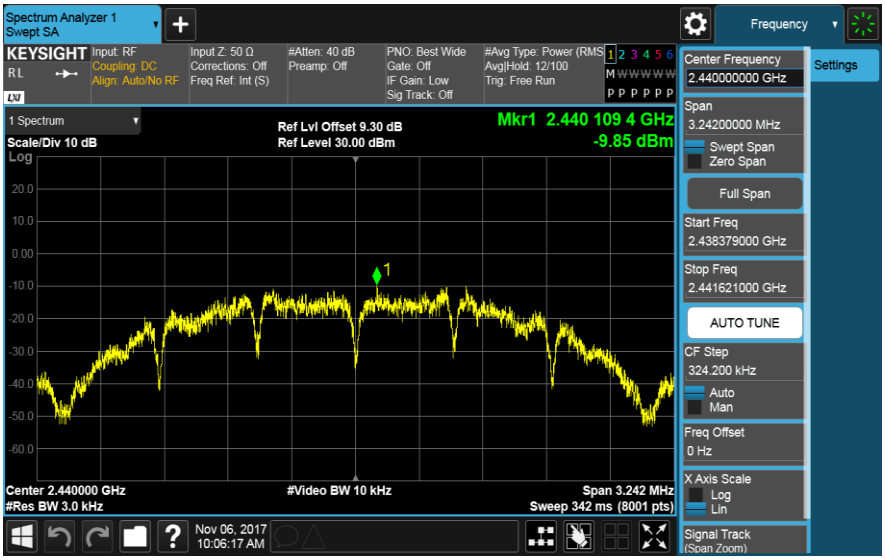
PSD MID CH



PSD HIGH CH

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6.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 2		
Section	Test Item	Limit
FCC §15.247 (d) IC 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

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

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.

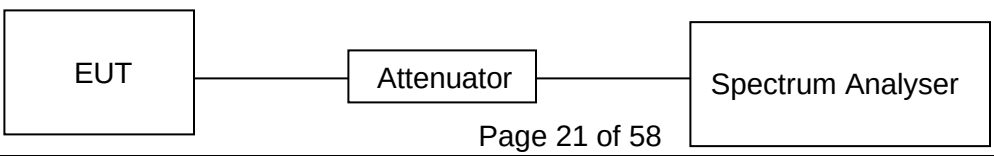
settings:

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



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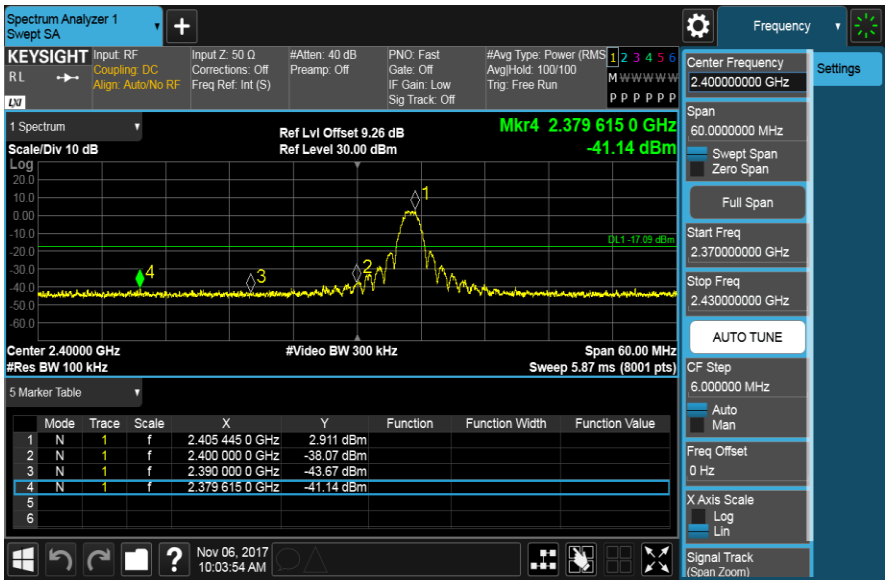
Part I :Conducted Bandedge

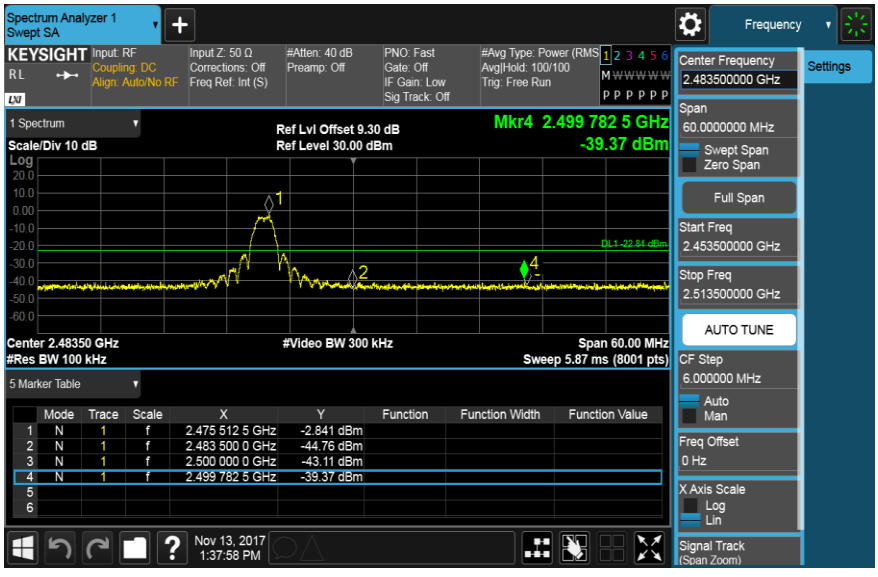
RESULTS TABLE

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit(dBm)	Verdict
Zigbee	LCH	2.91	-38.07	-17.09	PASS
Zigbee	HCH	-2.84	-39.37	-22.84	PASS

LOW CH BANDEDAGE



HIGH CH BANDEDAGE



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Part II :Conducted Emission

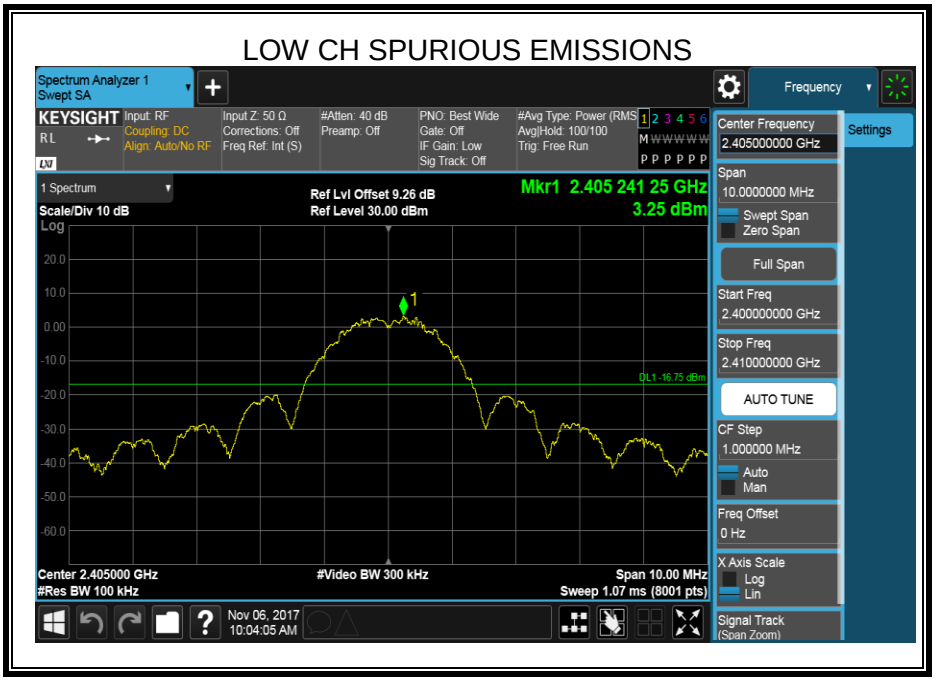
Test Result Table

Test Mode	Channel	Pref(dBm)	Puw(dBm)	Verdict
Zigbee	LCH	3.25	<Limit	PASS
Zigbee	MCH	2.38	<Limit	PASS
Zigbee	HCH	-2.64	<Limit	PASS

Test Plots

Test Mode	Channel	Verdict
Zigbee	LCH	PASS

Pref test Plot



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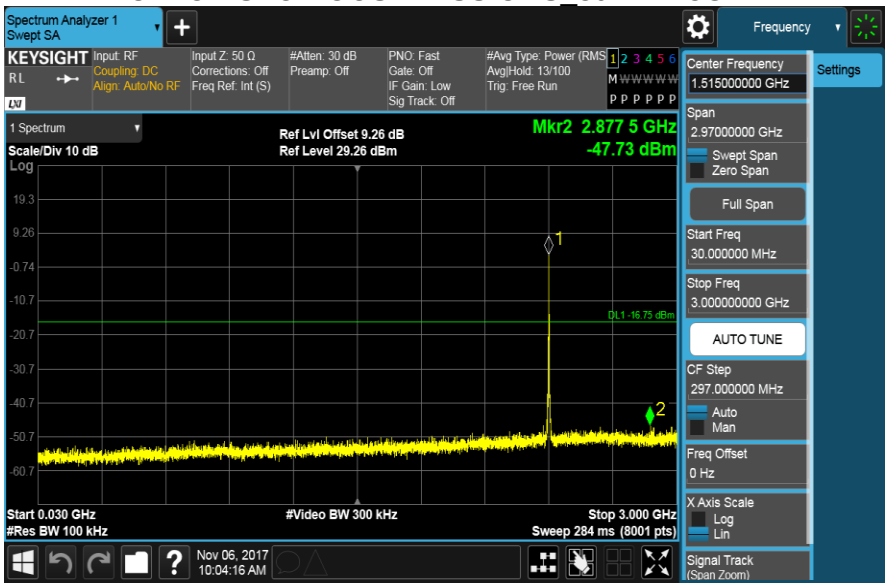
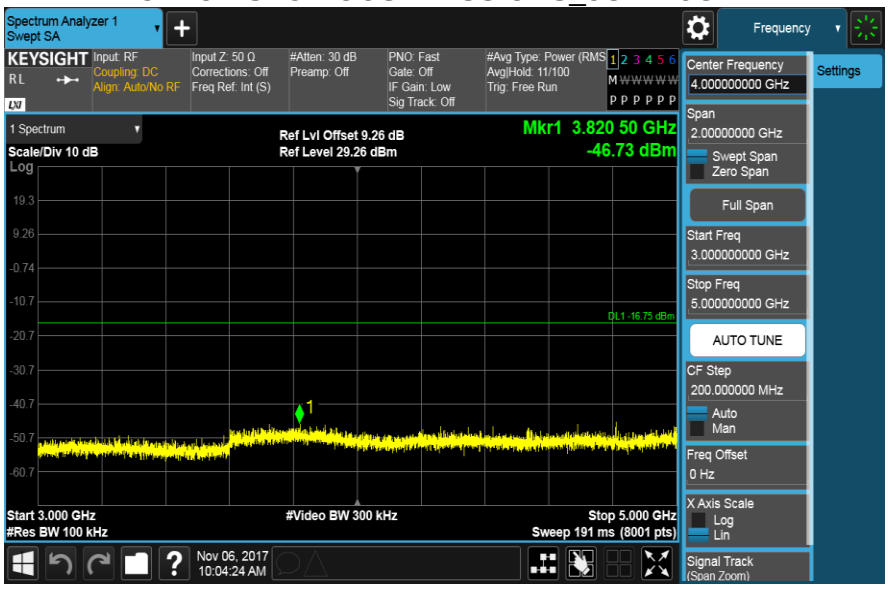
LOW CH SPURIOUS EMISSIONS_30MHz~3GHz



LOW CH SPURIOUS EMISSIONS_3GHz~5GHz



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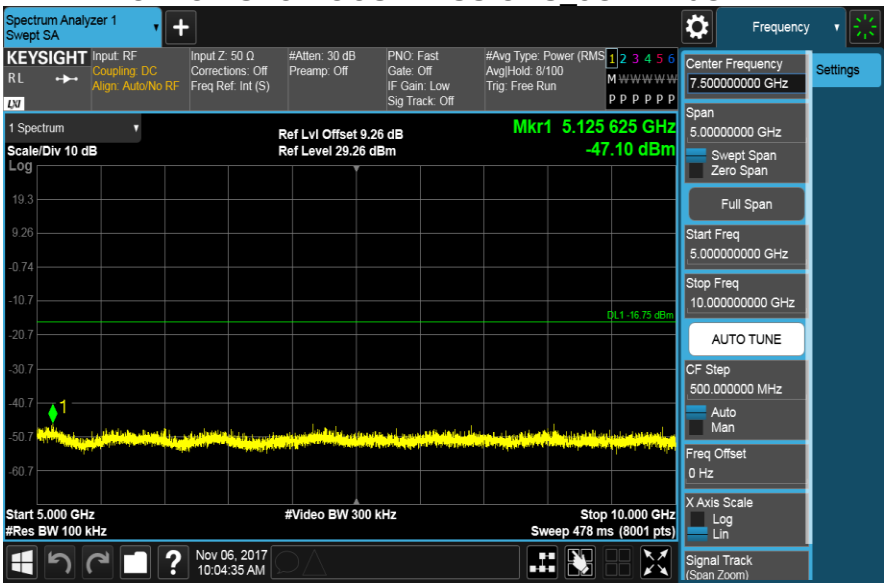
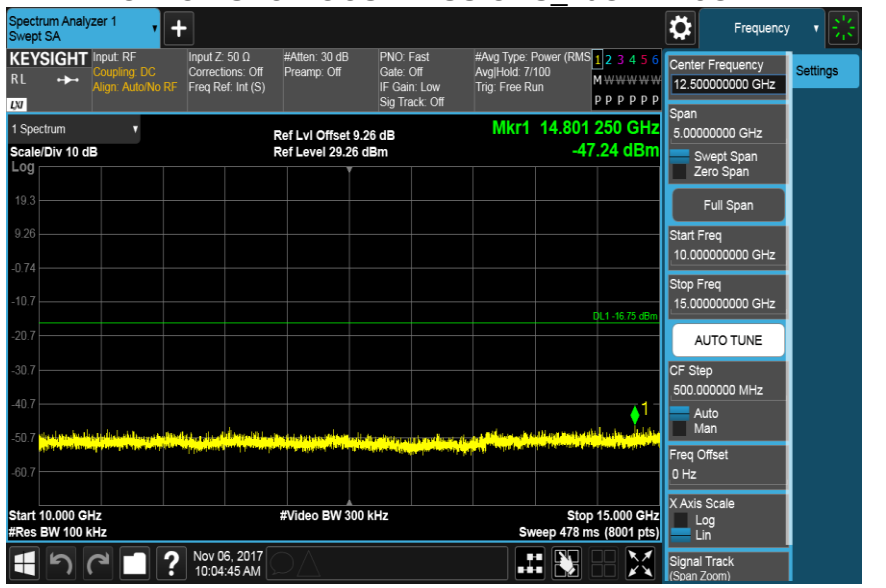
LOW CH SPURIOUS EMISSIONS_5GHz~10GHz



LOW CH SPURIOUS EMISSIONS_10GHz~15GHz



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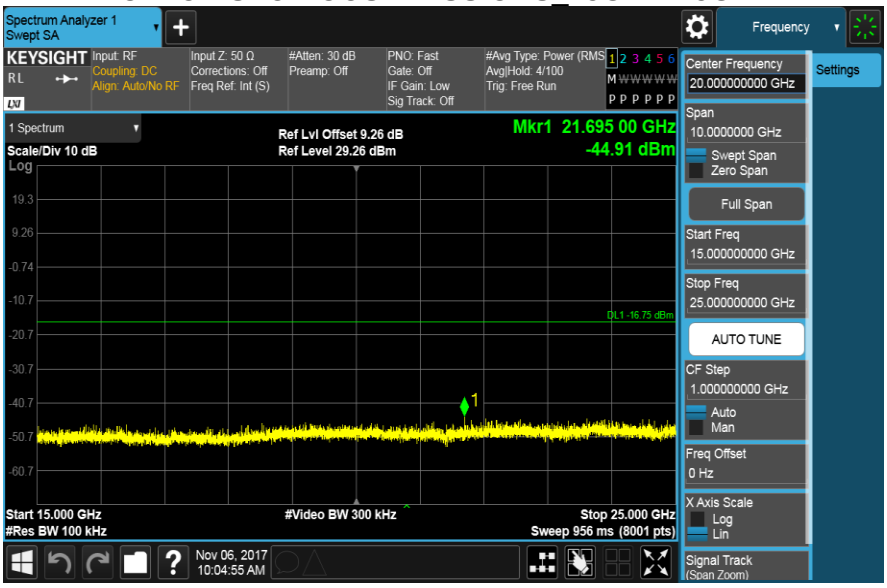
LOW CH SPURIOUS EMISSIONS_15GHz~25GHz



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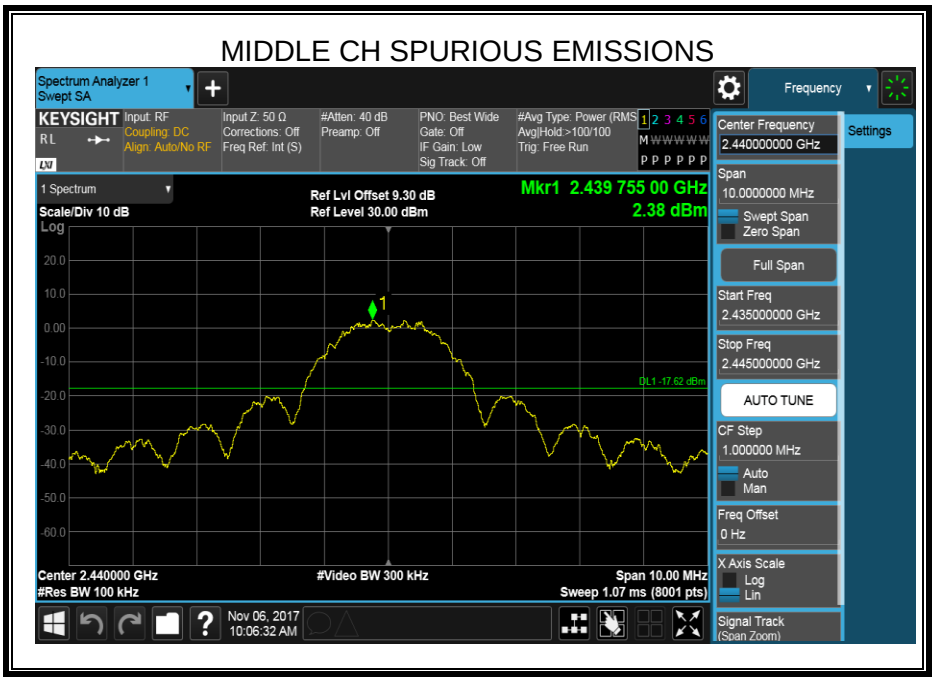
Test Mode	Channel	Verdict
Zigbee	MCH	PASS

Pref test Plot



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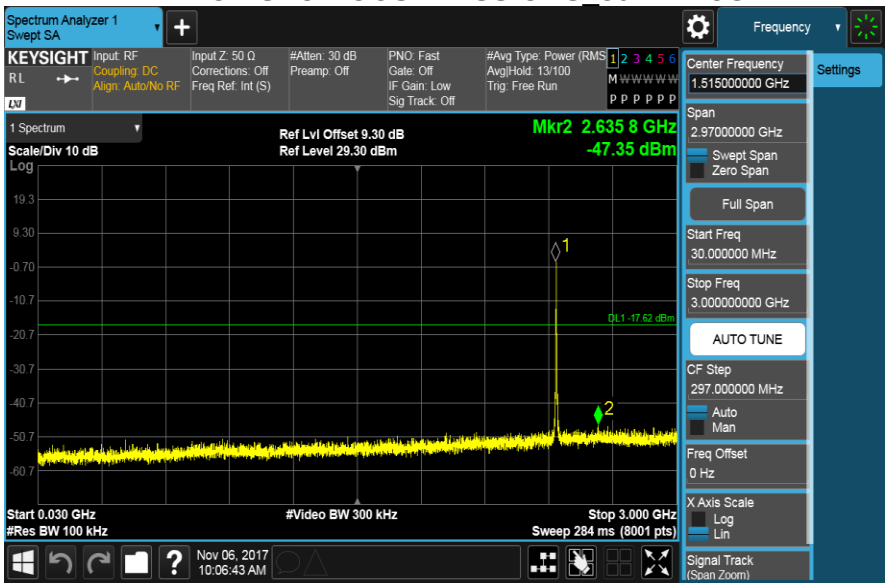
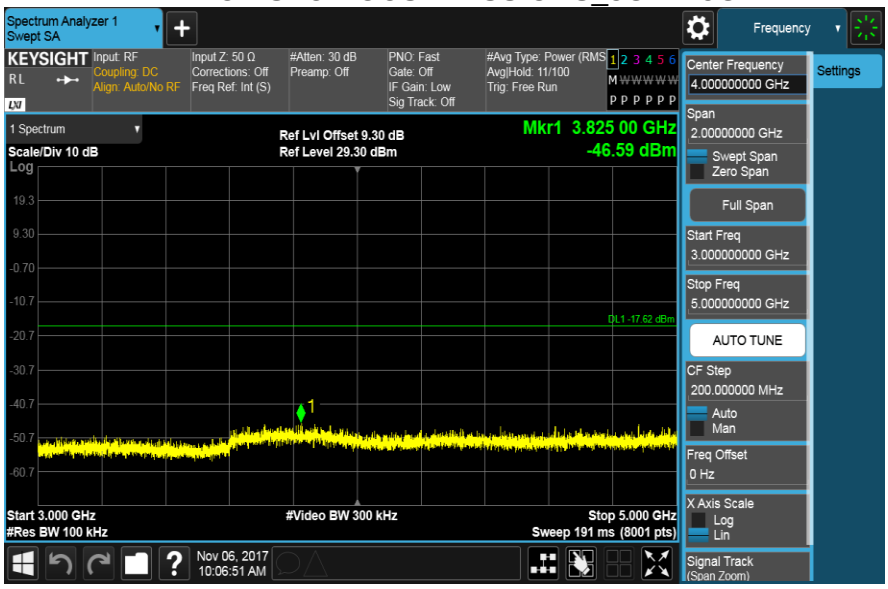
MIDDLE CH SPURIOUS EMISSIONS_30MHz~3GHz



MIDDLE CH SPURIOUS EMISSIONS_3GHz~5GHz



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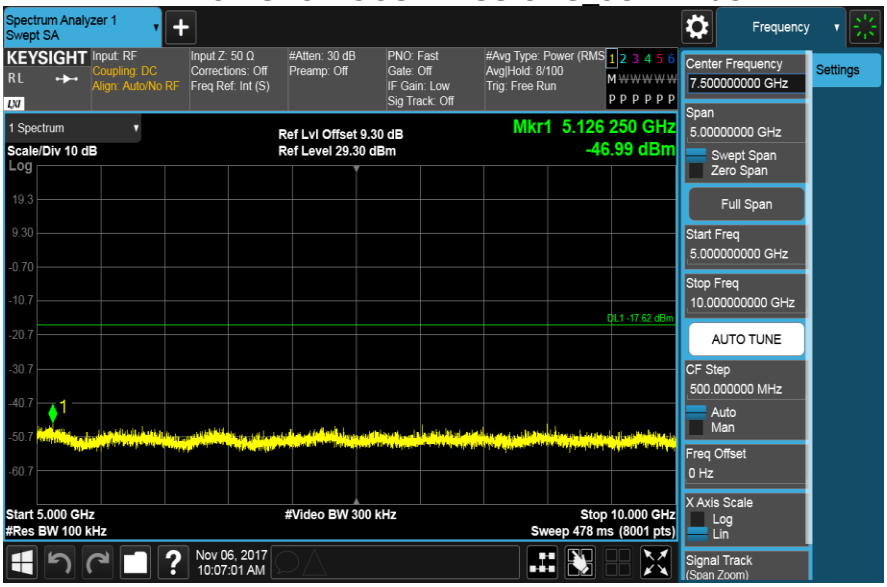
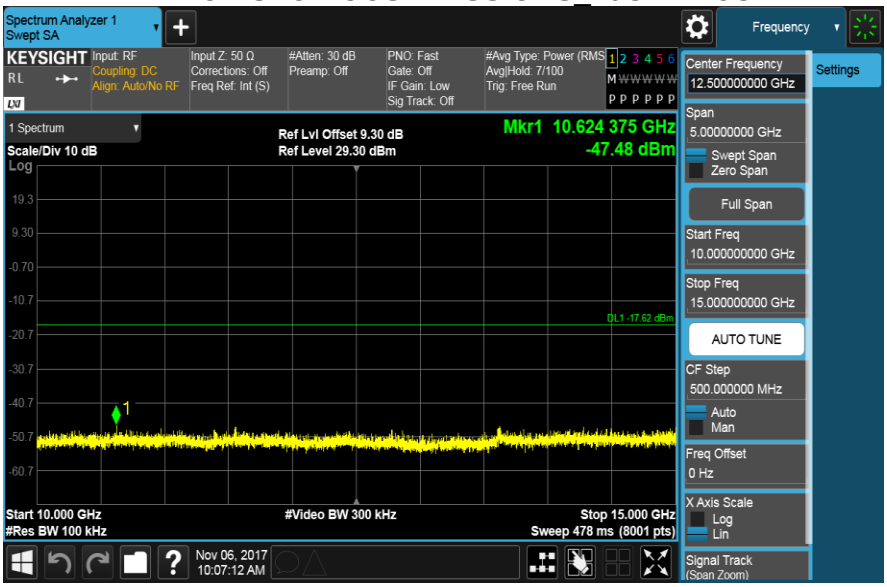
MIDDLE CH SPURIOUS EMISSIONS_5GHz~10GHz



MIDDLE CH SPURIOUS EMISSIONS_10GHz~15GHz



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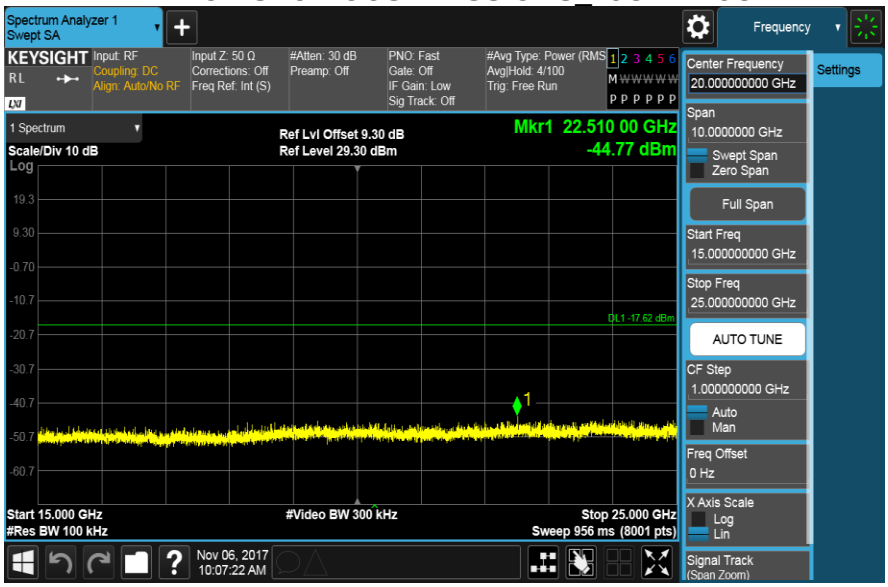
MIDDLE CH SPURIOUS EMISSIONS_15GHz~25GHz



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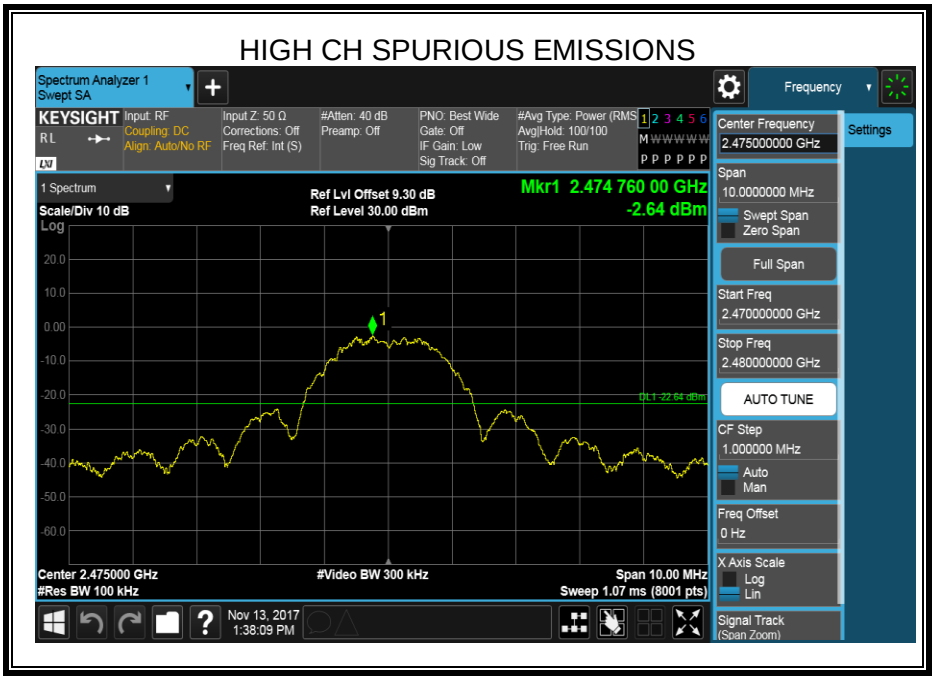
Test Mode	Channel	Verdict
Zigbee	HCH	PASS

Pref test Plot



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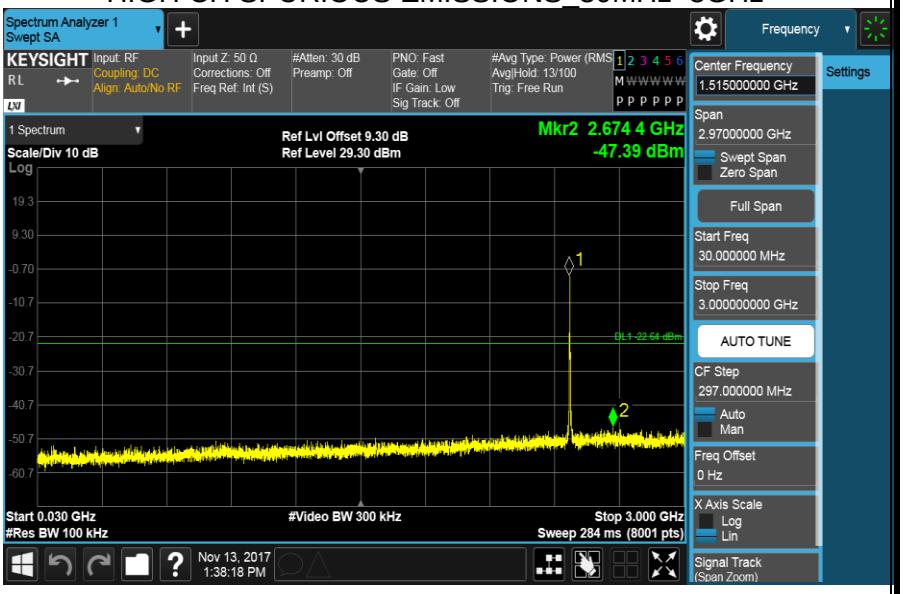
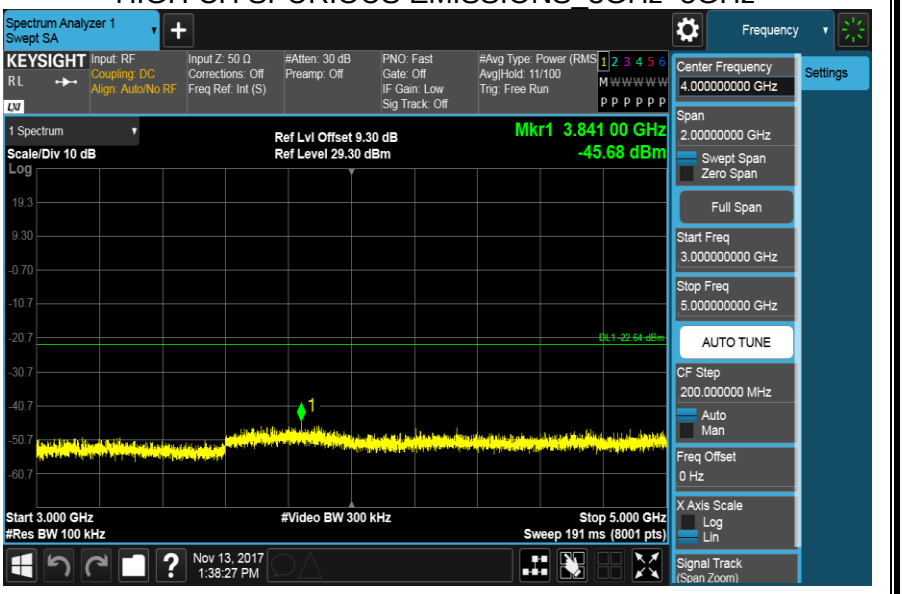
Puw test Plot

HIGH CH SPURIOUS EMISSIONS_30MHz~3GHz



HIGH CH SPURIOUS EMISSIONS_3GHz~5GHz



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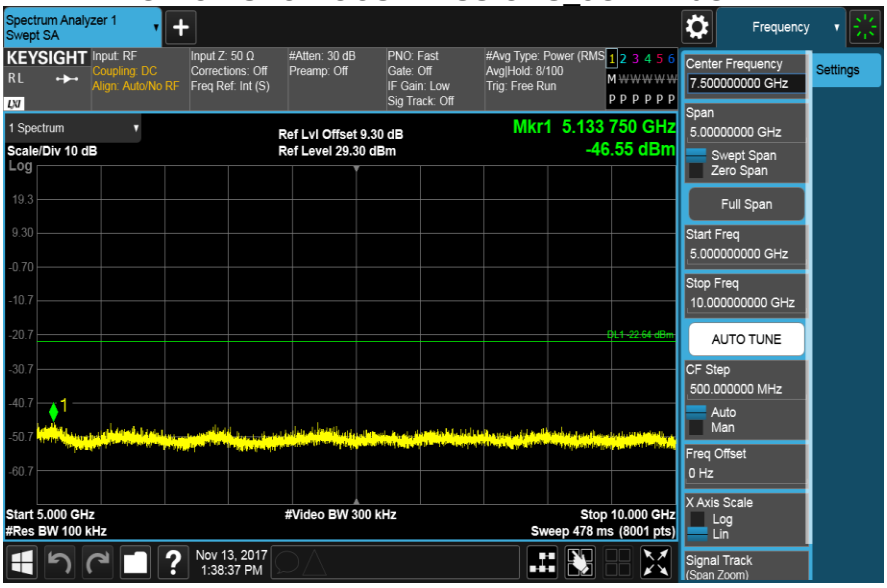
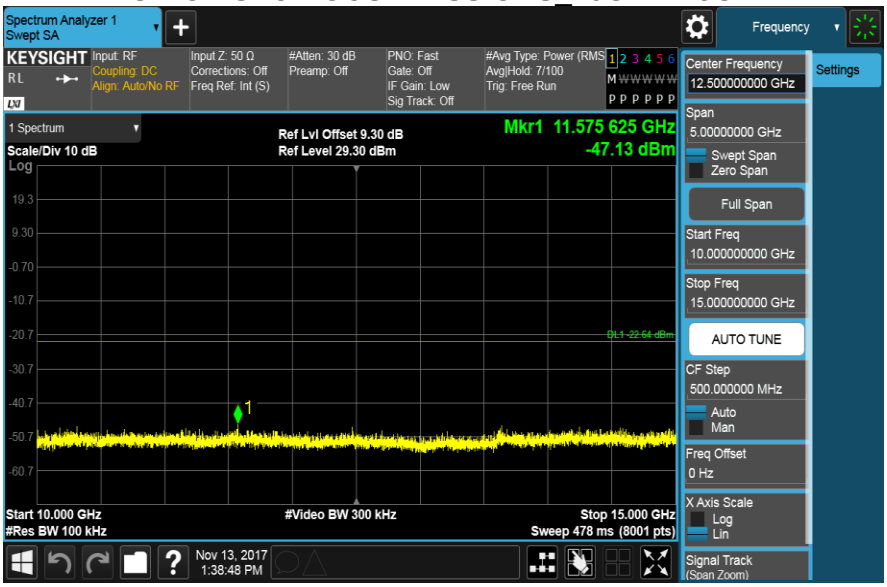
HIGH CH SPURIOUS EMISSIONS_5GHz~10GHz



HIGH CH SPURIOUS EMISSIONS_10GHz~15GHz



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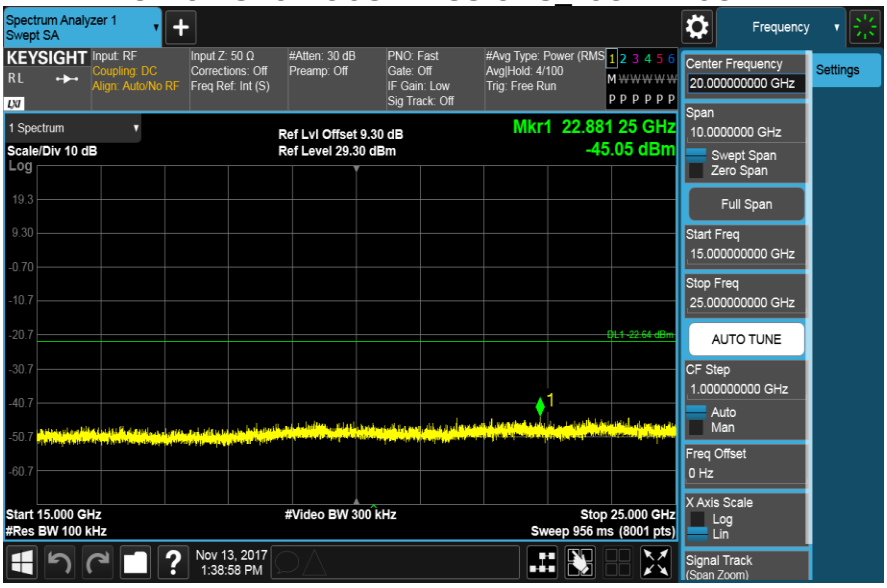
HIGH CH SPURIOUS EMISSIONS_15GHz~25GHz



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7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to FCC KDB 558074

Please refer to IC 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.

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Radiation Disturbance Test Limit for FCC (Above 1G)

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

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

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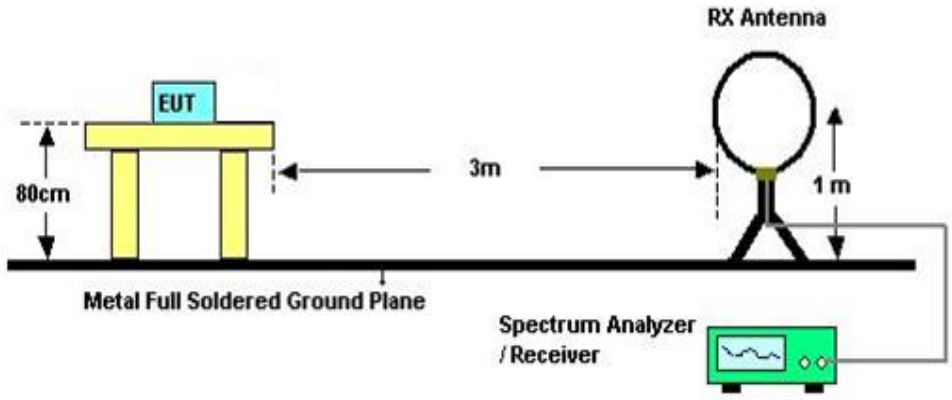
TEST SETUP AND PROCEDURE

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 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. 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

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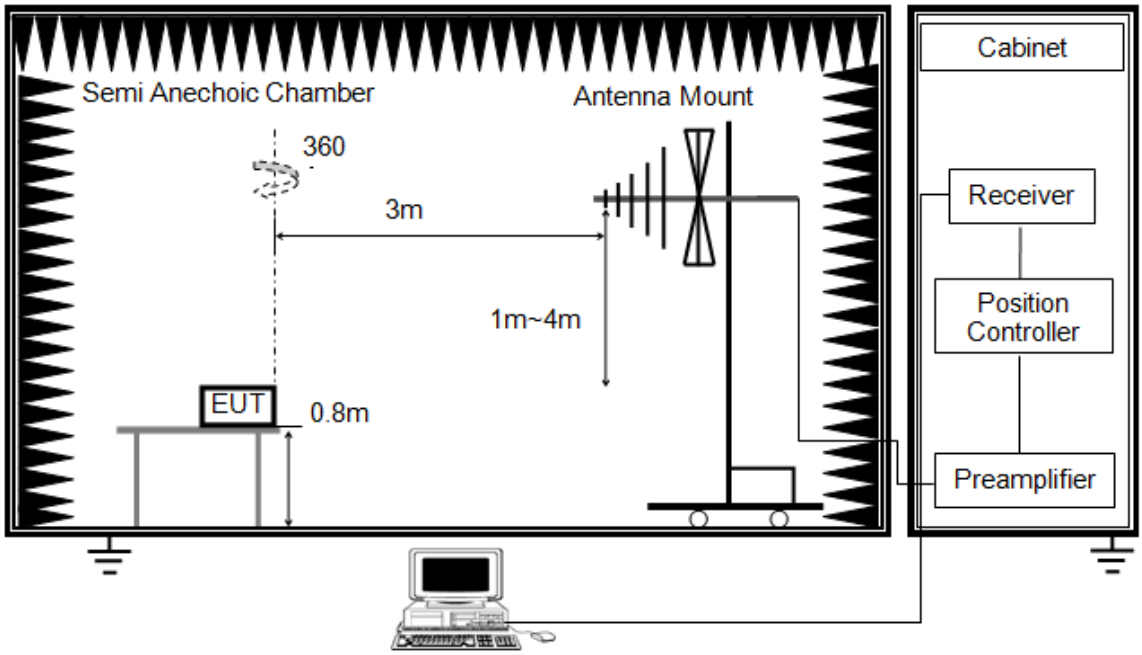

The setting of the spectrum analyser

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)

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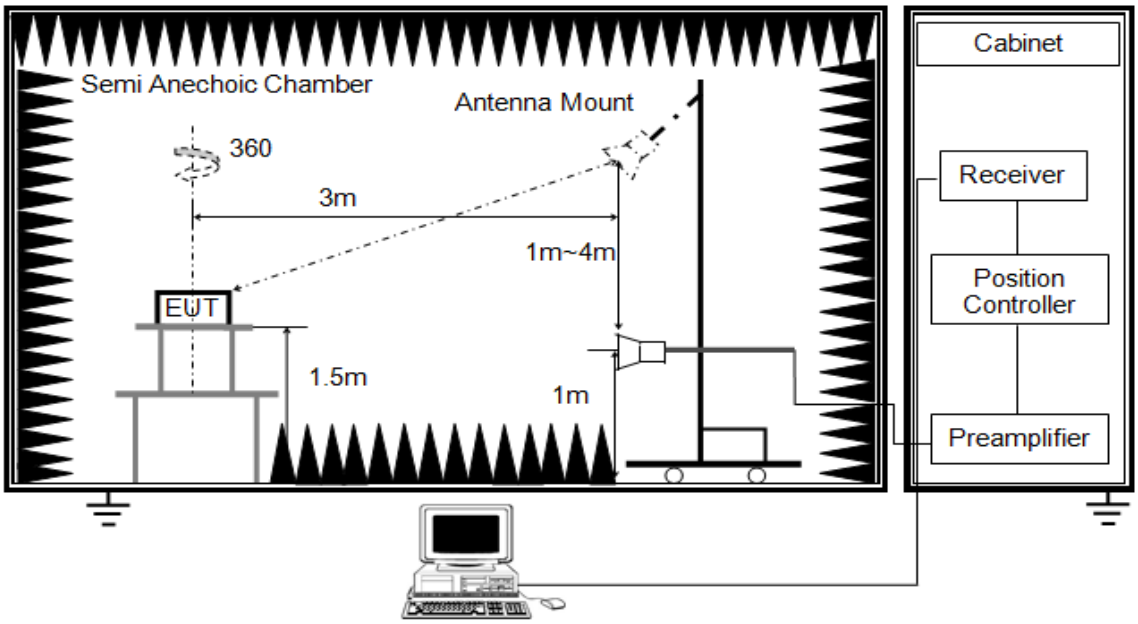

The setting of the spectrum analyser

RBW	1M
VBW	PEAK:3M AVG: See note6
Sweep	Auto
Detector	Peak/Average(10Hz)
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)

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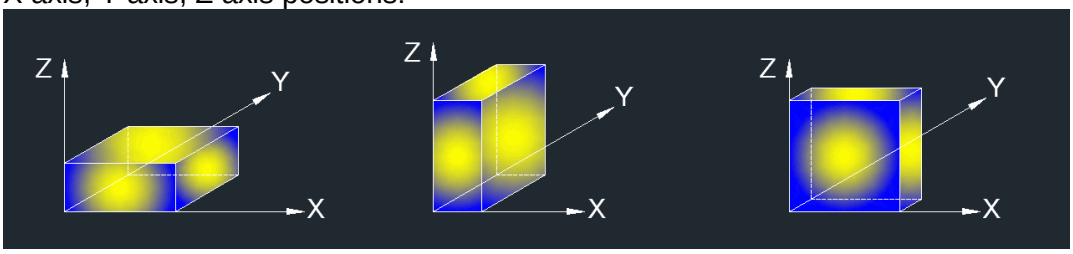
X axis, Y axis, Z axis positions:

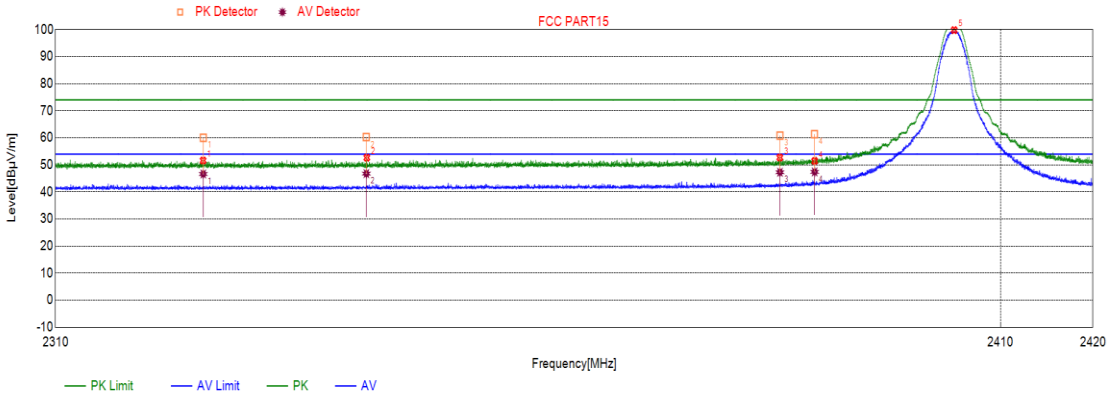


Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.2. RESTRICTED BANDEDGE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

Test Mode:	Low Chanel	Polarization :	Horizontal



No.	Frequency (MHz)	Factor[dB] (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2325.3562	35.94	60.03	74.00	-13.97	peak
	2325.3562	35.94	46.65	54.00	-7.35	average
2	2342.4298	35.99	60.15	74.00	-13.85	peak
	2342.4298	35.99	46.78	54.00	-7.22	average
3	2386.2845	36.18	60.82	74.00	-13.18	peak
	2386.2845	36.18	47.28	54.00	-6.72	average
4	2390.0000	36.22	61.28	74.00	-12.72	peak
	2390.0000	36.22	47.41	54.00	-6.59	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. For average power measurement, set the VBW to Minimum VBW=10 Hz.

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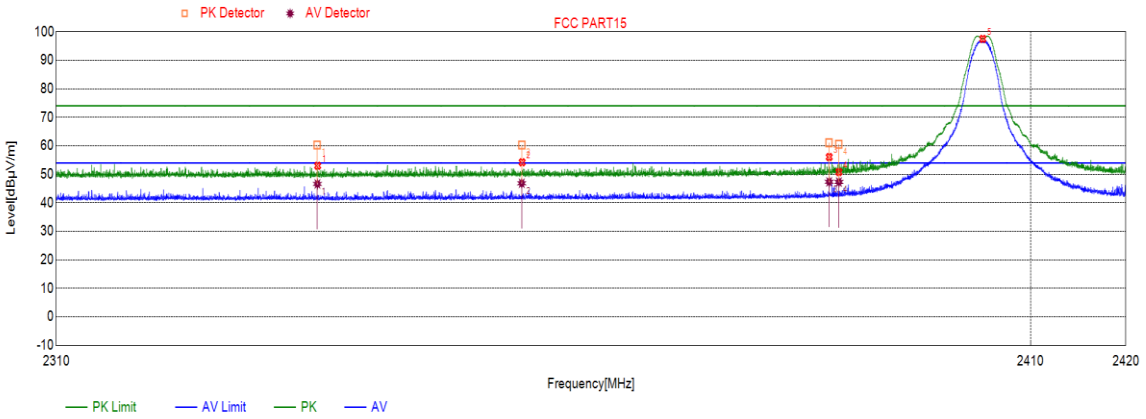
Test Mode:	Low Chanel	Polarization :	Vertical



No.	Frequency (MHz)	Factor[dB] (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2336.3961	35.97	60.32	74.00	-13.68	peak
	2336.3961	35.97	46.64	54.00	-7.36	average
2	2357.2517	36.03	60.34	74.00	-13.66	peak
	2357.2517	36.03	46.88	54.00	-7.12	average
3	2388.9852	36.21	61.17	74.00	-12.83	peak
	2388.9852	36.21	47.37	54.00	-6.63	average
4	2390.0000	36.22	60.54	74.00	-13.46	peak
	2390.0000	36.22	47.31	54.00	-6.69	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. For average power measurement, set the VBW to Minimum VBW=10 Hz.

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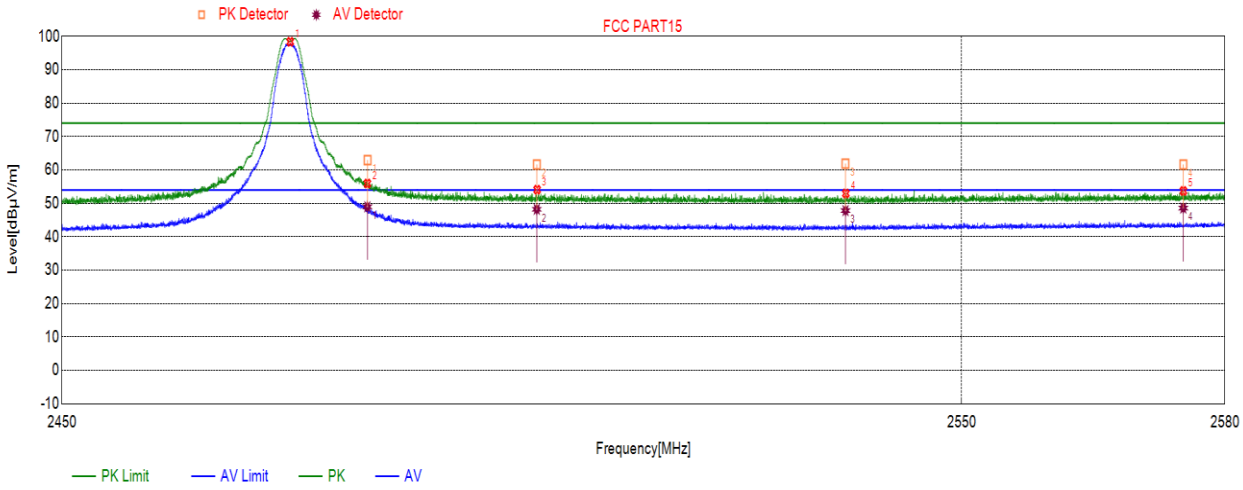
Test Mode:	High Chanel	Polarization :	Horizontal



No.	Frequency (MHz)	Factor[dB] (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5000	36.77	62.93	74.00	-11.07	peak
	2483.5000	36.77	48.97	54.00	-5.03	average
2	2502.2770	36.70	61.70	74.00	-12.30	peak
	2502.2770	36.70	48.22	54.00	-5.78	average
3	2536.8645	36.79	61.90	74.00	-12.10	peak
	2536.8645	36.79	47.83	54.00	-6.17	average
4	2575.2478	36.92	61.68	74.00	-12.32	peak
	2575.2478	36.92	48.59	54.00	-5.41	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. For average power measurement, set the VBW to Minimum VBW=10 Hz.

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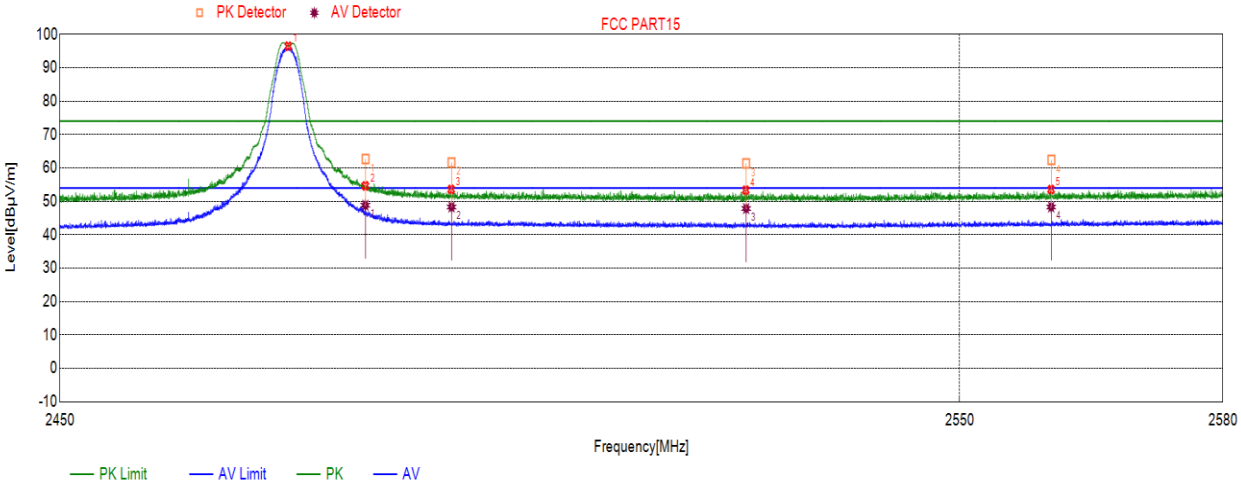
Test Mode:	High Chanel	Polarization :	Vertical



No.	Frequency (MHz)	Factor[dB] (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5000	36.77	62.54	74.00	-11.46	peak
	2483.5000	36.77	48.84	54.00	-5.16	average
2	2493.0374	36.71	61.58	74.00	-12.42	peak
	2493.0374	36.71	48.32	54.00	-5.68	average
3	2525.9079	36.78	61.23	74.00	-12.77	peak
	2525.9079	36.78	47.86	54.00	-6.14	average
4	2560.3929	36.85	62.26	74.00	-11.74	peak
	2560.3929	36.85	48.31	54.00	-5.69	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. For average power measurement, set the VBW to Minimum VBW=10 Hz.

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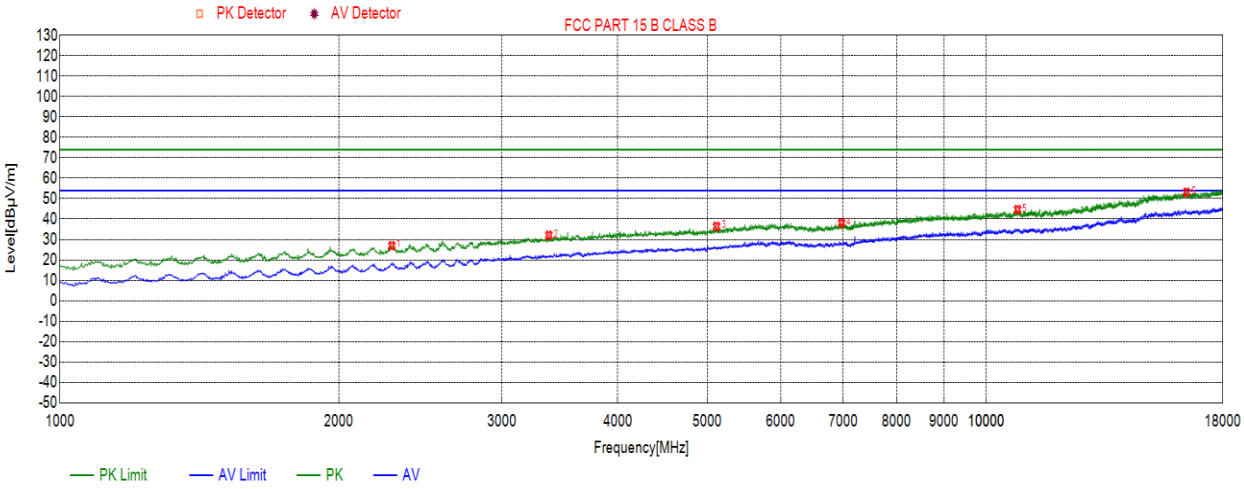
7.3. SPURIOUS EMISSIONS (1GHz~18GHz)

HARMONICS AND SPURIOUS EMISSIONS

Test Mode:	Low Chanel	Polarization :	Horizontal



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	2281.9282	26.92	-13.03	74.00	-47.08	54.00	-27.08	peak
2	3371.7372	32.06	-8.80	74.00	-41.94	54.00	-21.94	peak
3	5114.4114	36.44	-4.07	74.00	-37.56	54.00	-17.56	peak
4	6981.1981	38.09	-0.49	74.00	-35.91	54.00	-15.91	peak
5	10809.9810	44.64	6.79	74.00	-29.36	54.00	-9.36	peak
6	16449.4449	53.12	16.12	74.00	-20.88	54.00	-0.88	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.

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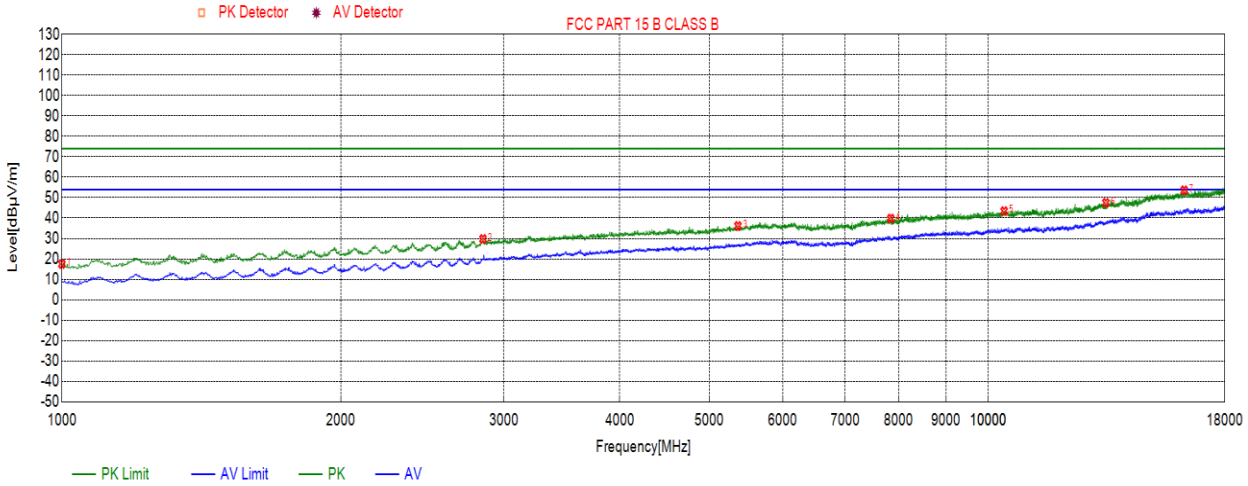
Test Mode:	Low Chanel	Polarization :	Vertical



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1000.0000	17.48	-20.02	74.00	-56.52	54.00	-36.52	peak
2	2848.0848	29.75	-11.04	74.00	-44.25	54.00	-24.25	peak
3	5367.7368	36.14	-3.28	74.00	-37.86	54.00	-17.86	peak
4	7848.2848	39.79	1.32	74.00	-34.21	54.00	-14.21	peak
5	10401.9402	43.41	6.30	74.00	-30.59	54.00	-10.59	peak
6	13394.2394	47.49	10.21	74.00	-26.51	54.00	-6.51	peak
7	16272.6273	53.64	15.94	74.00	-20.36	54.00	-0.36	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.

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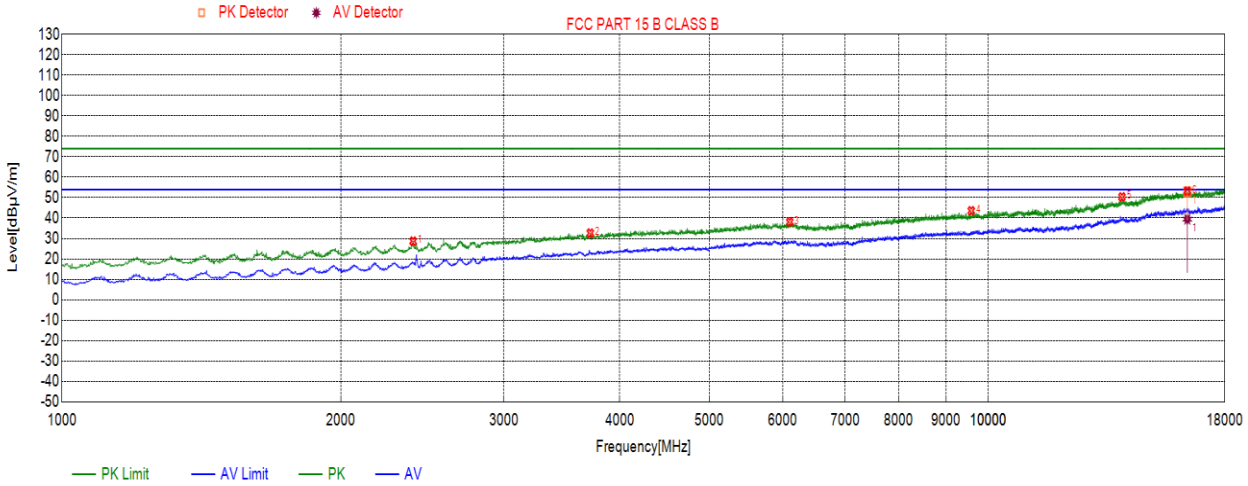
Test Mode:	Middle Chanel		Horizontal



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	2394.1394	28.67	-12.65	74.00	-45.33	54.00	-25.33	peak
2	3718.5719	32.64	-7.52	74.00	-41.36	54.00	-21.36	peak
3	6105.6106	38.09	-1.09	74.00	-35.91	54.00	-15.91	peak
4	9585.8586	43.57	4.43	74.00	-30.43	54.00	-10.43	peak
5	13941.6942	50.36	12.00	74.00	-23.64	54.00	-3.64	peak
6	16400.1400	53.17	16.28	74.00	-20.83	54.00	-0.83	peak
	16400.1400	53.17	16.28	74.00	-20.83	54.00	-14.53	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.

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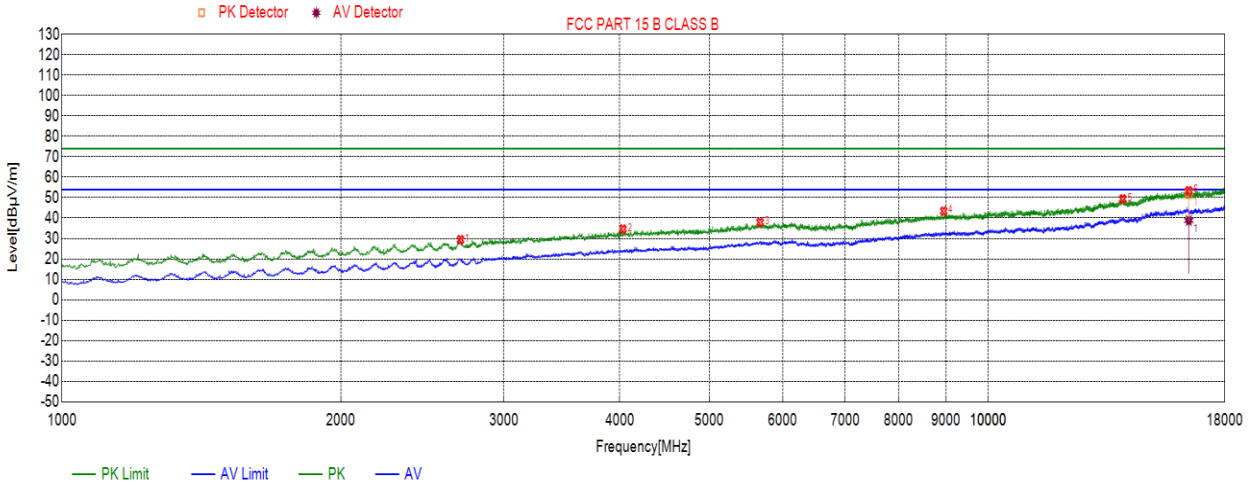
Test Mode:	Middle Chanel	Polarization :	Vertical



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	2693.3693	29.41	-11.18	74.00	-44.59	54.00	-24.59	peak
2	4033.1033	34.58	-6.51	74.00	-39.42	54.00	-19.42	peak
3	5670.3670	37.92	-2.01	74.00	-36.08	54.00	-16.08	peak
4	8951.6952	43.40	3.74	74.00	-30.60	54.00	-10.6	peak
5	13967.1967	49.32	12.15	74.00	-24.68	54.00	-4.68	peak
6	16461.3461	53.39	16.09	74.00	-20.61	54.00	-0.61	peak
	16461.3461	53.39	16.09	74.00	-20.61	54.00	-15.18	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.

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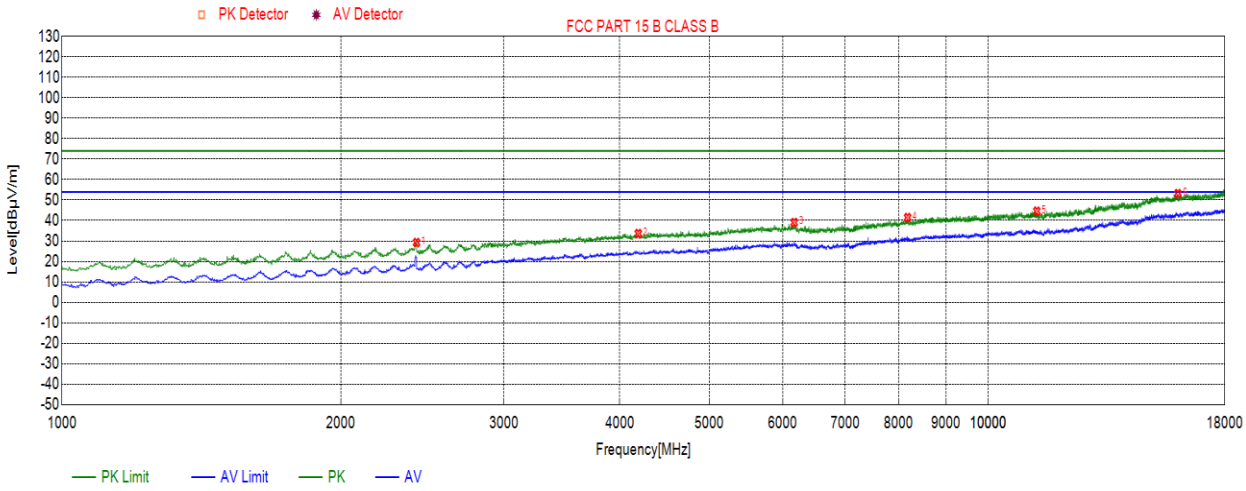
Test Mode:	High Chanel	Polarization :	Horizontal



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	2414.5415	29.23	-12.49	74.00	-44.77	54.00	-24.77	peak
2	4189.5190	33.63	-6.14	74.00	-40.37	54.00	-20.37	peak
3	6173.6174	39.02	-1.13	74.00	-34.98	54.00	-14.98	peak
4	8183.2183	41.45	2.47	74.00	-32.55	54.00	-12.55	peak
5	11280.9281	44.55	7.02	74.00	-29.45	54.00	-9.45	peak
6	16019.3019	53.15	15.47	74.00	-20.85	54.00	-0.85	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.

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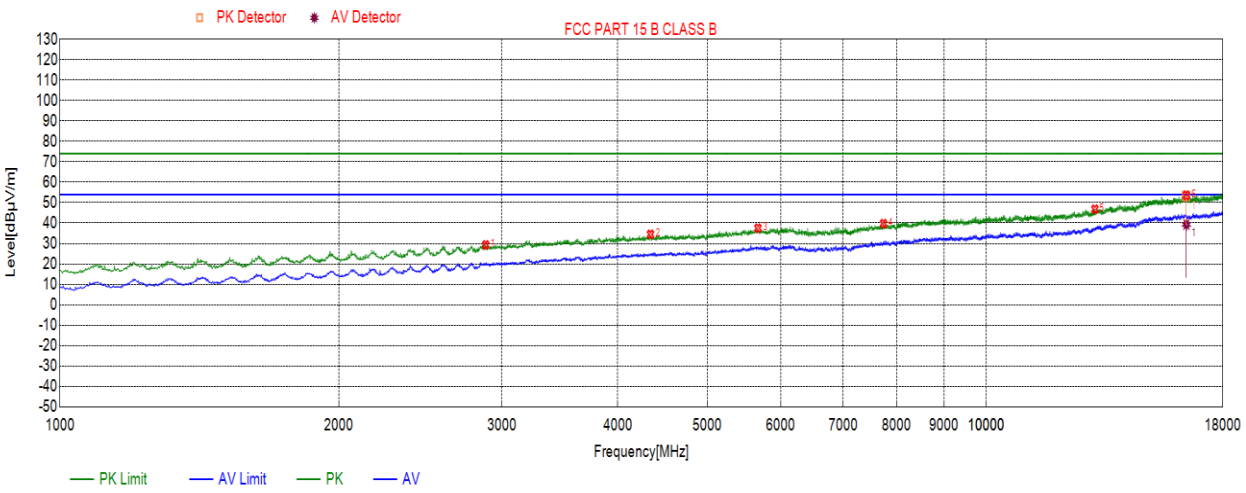
Test Mode:	High Chanel	Polarization :	Vertical



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	2882.0882	29.30	-10.94	74.00	-44.70	54.00	-24.7	peak
2	4340.8341	34.48	-5.77	74.00	-39.52	54.00	-19.52	peak
3	5668.6669	37.49	-2.00	74.00	-36.51	54.00	-16.51	peak
4	7746.2746	39.74	1.37	74.00	-34.26	54.00	-14.26	peak
5	13100.1100	46.83	9.76	74.00	-27.17	54.00	-7.17	peak
6	16444.3444	53.56	16.14	74.00	-20.44	54.00	-0.44	peak
	16444.3444	53.56	16.14	74.00	-20.44	54.00	-14.70	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.

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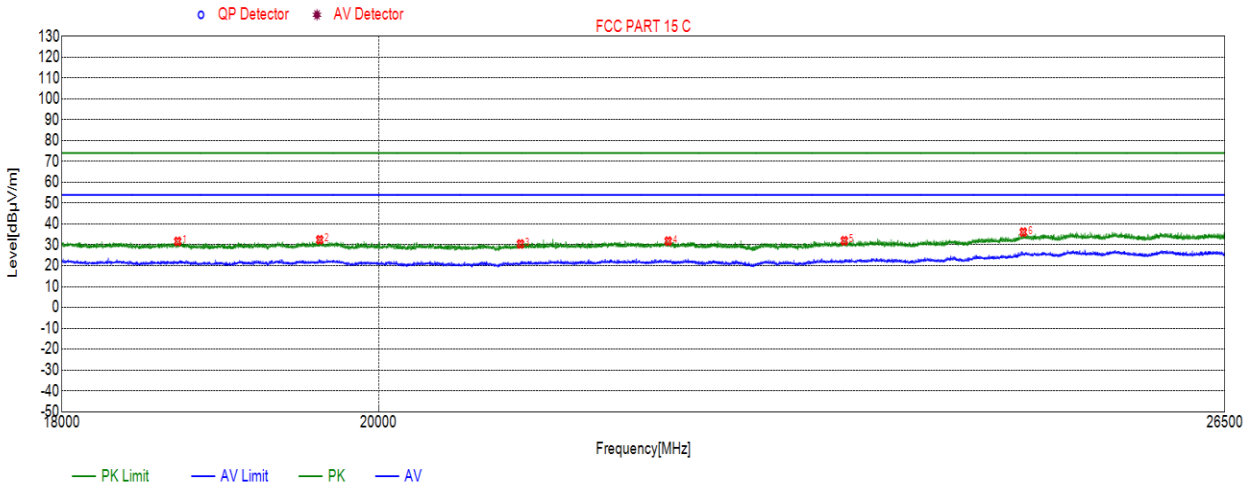
7.4. SPURIOUS EMISSIONS 18G ~ 26GHz

SPURIOUS EMISSIONS 18GHz TO 26GHz (WORST-CASE CONFIGURATION)

Test Mode:	High Channel	Polarization :	Horizontal



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	18707.2707	31.67	-6.35	74.00	-42.33	54.00	-22.33	peak
2	19611.7612	32.44	-5.63	74.00	-41.56	54.00	-21.56	peak
3	20965.9466	30.45	-5.83	74.00	-43.55	54.00	-23.55	peak
4	22021.7522	31.81	-5.43	74.00	-42.19	54.00	-22.19	peak
5	23350.4350	31.98	-5.58	74.00	-42.02	54.00	-22.02	peak
6	24782.8283	36.12	-2.99	74.00	-37.88	54.00	-17.88	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. Pre-testing all test channels, and find the highest channel which is the worst case. So only the data of the highest channel is included in this test report.

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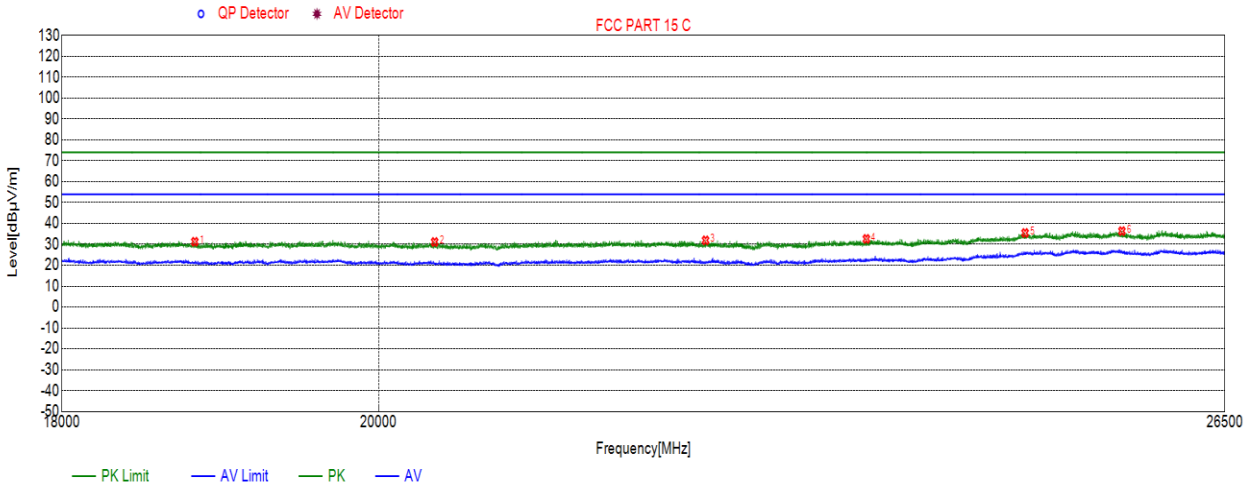
Test Mode:	High Channel	Polarization :	Vertical



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	18813.5314	31.27	-6.38	74.00	-42.73	54.00	-22.73	peak
2	20375.9876	31.14	-6.25	74.00	-42.86	54.00	-22.86	peak
3	22297.1797	31.92	-5.85	74.00	-42.08	54.00	-22.08	peak
4	23522.1522	32.62	-5.29	74.00	-41.38	54.00	-21.38	peak
5	24797.2797	35.46	-2.95	74.00	-38.54	54.00	-18.54	peak
6	25609.1109	36.36	-1.48	74.00	-37.64	54.00	-17.64	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. Pre-testing all test channels, and find the highest channel which is the worst case. So only the data of the highest channel is included in this test report.

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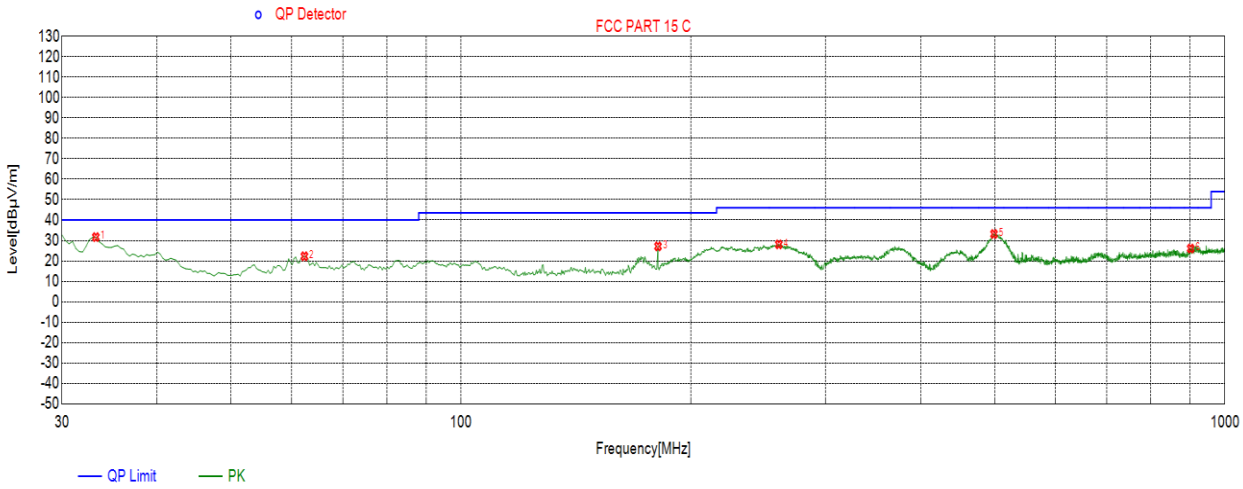
7.5. SPURIOUS EMISSIONS 30M ~ 1GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

Test Mode:	Low Channel	Polarization :	Horizontal



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark
1	33.2344	31.66	-26.42	40.00	-8.34	QP
2	62.3441	22.26	-28.59	40.00	-17.74	QP
3	181.0470	27.12	-24.89	43.50	-16.38	QP
4	260.6135	28.08	-24.93	46.00	-17.92	QP
5	498.6662	33.19	-17.65	46.00	-12.81	QP
6	902.3208	26.06	-11.62	46.00	-19.94	QP

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. Pre-testing all test channels, and find the lowest channel which is the worst case. So only the data of the highest channel is included in this test report.

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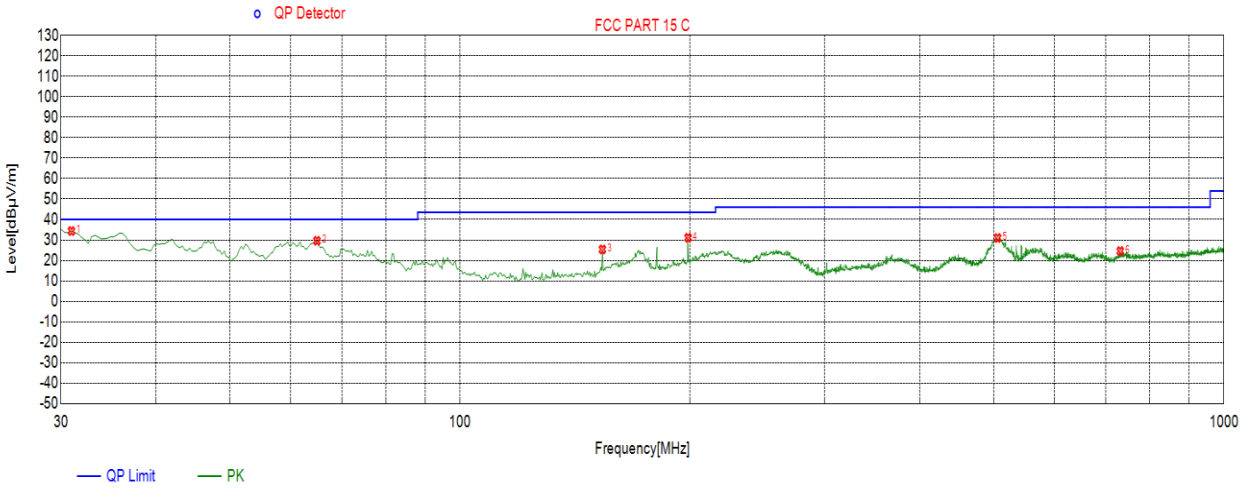
Test Mode:	Low Channel	Polarization :	Vertical



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.9703	34.37	-26.13	40.00	-5.63	QP
2	64.9316	29.60	-28.60	40.00	-10.40	QP
3	153.5545	25.37	-26.02	43.50	-18.13	QP
4	198.8363	31.12	-24.75	43.50	-12.38	QP
5	505.7819	30.97	-17.38	46.00	-15.03	QP
6	731.8673	24.59	-14.58	46.00	-21.41	QP

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. Pre-testing all test channels, and find the lowest channel which is the worst case. So only the data of the highest channel is included in this test report.

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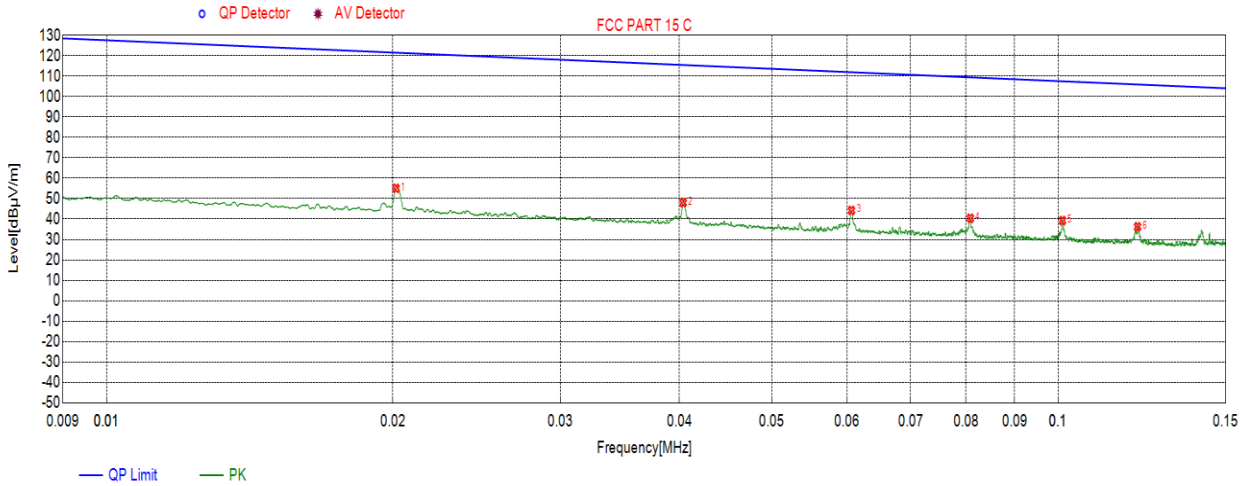
7.6. SPURIOUS EMISSIONS BELOW 30M

SPURIOUS EMISSIONS Below 30MHz (WORST-CASE CONFIGURATION)

Test Mode:	Low Channel	Frequency Range	9KHz~150KHz



No.	Frequency (KHz)	Result (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0202	55.08	19.80	121.48	-66.40	Peak
2	0.0404	48.04	19.73	115.46	-67.42	Peak
3	0.0607	44.24	19.74	111.94	-67.70	Peak
4	0.0809	40.40	19.68	109.43	-69.03	Peak
5	0.1011	39.26	19.31	107.50	-68.24	Peak
6	0.1212	36.24	19.52	105.92	-69.68	Peak

Note:
1. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
2. Pre-testing all test channels, and find the lowest channel which is the worst case. So only the data of the highest channel is included in this test report.

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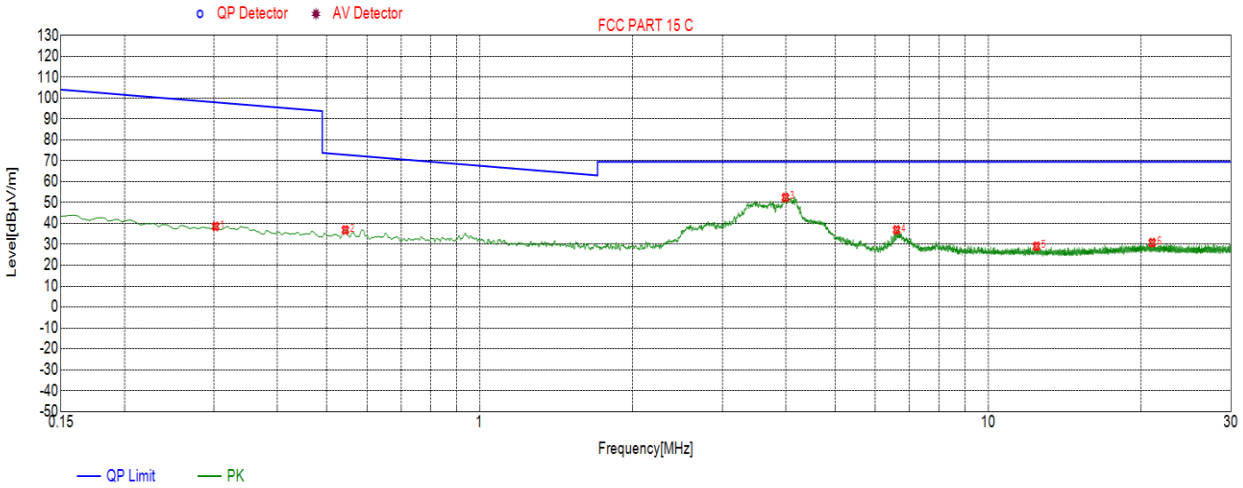
Test Mode:	Low Channel	Frequency Range	150KHz~30MHz



No.	Frequency (MHz)	Result (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.3023	38.58	19.65	97.99	-59.41	Peak
2	0.5441	36.90	19.74	72.89	-35.99	Peak
3	3.9921	52.40	20.18	69.50	-17.10	Peak
4	6.6042	36.90	20.28	69.50	-32.60	Peak
5	12.4464	29.05	20.30	69.50	-40.45	Peak
6	21.0172	30.79	22.21	69.50	-38.71	Peak

Note:
1. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
2. Pre-testing all test channels, and find the lowest channel which is the worst case. So only the data of the highest channel is included in this test report.

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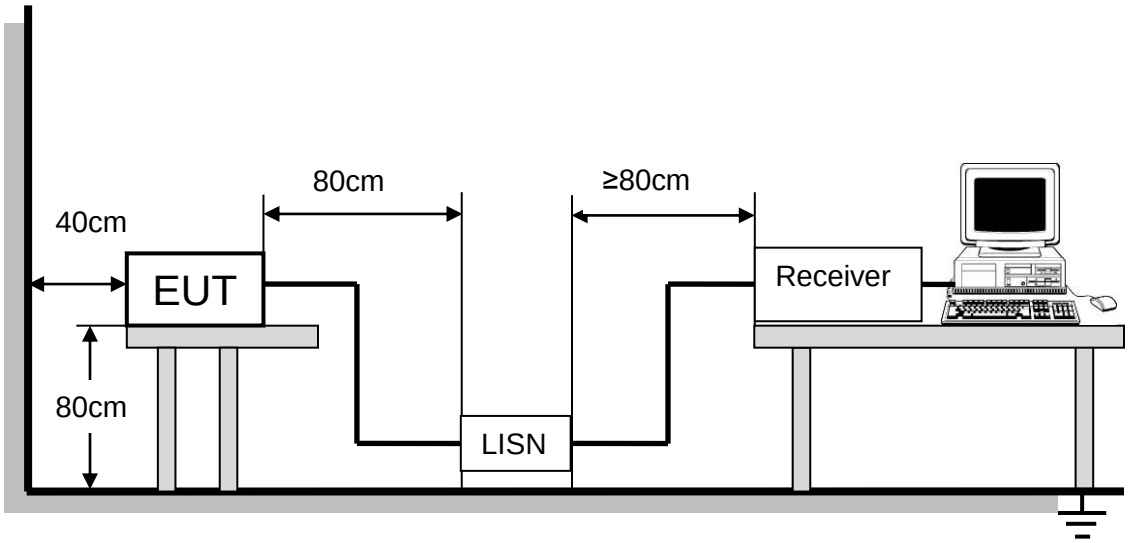
8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	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.

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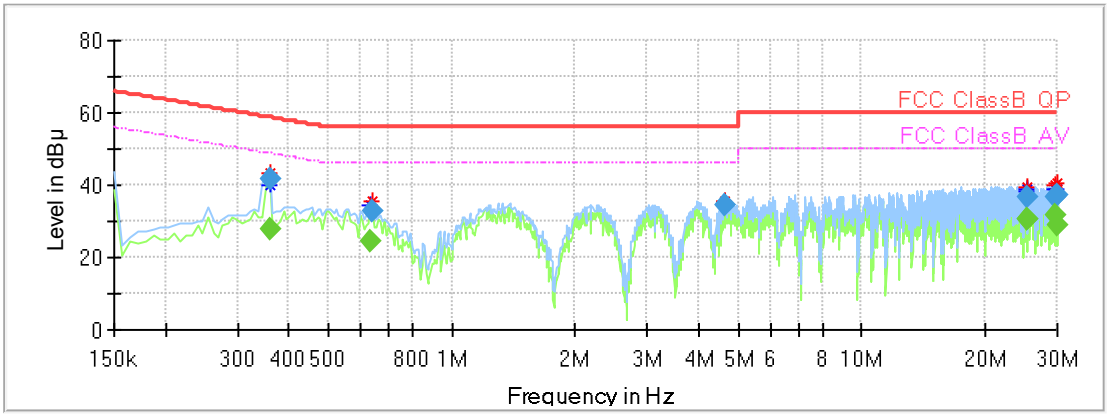
TEST RESULTS



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.358950	---	28.02	48.75	20.73	1000.0	9.000	L1	OFF	9.7
0.358950	41.55	---	58.75	17.20	1000.0	9.000	L1	OFF	9.7
0.635063	---	24.63	46.00	21.37	1000.0	9.000	N	OFF	9.9
0.642525	32.64	---	56.00	23.36	1000.0	9.000	N	OFF	9.9
4.612575	34.20	---	56.00	21.80	1000.0	9.000	L1	OFF	9.8
25.276238	---	30.57	50.00	19.43	1000.0	9.000	L1	OFF	10.3
25.321013	---	30.76	50.00	19.24	1000.0	9.000	L1	OFF	10.3
25.321013	36.65	---	60.00	23.35	1000.0	9.000	L1	OFF	10.3
29.708963	36.90	---	60.00	23.10	1000.0	9.000	L1	OFF	10.4
29.716425	---	31.54	50.00	18.46	1000.0	9.000	L1	OFF	10.4
29.985075	37.30	---	60.00	22.70	1000.0	9.000	L1	OFF	10.6
29.985075	---	29.15	50.00	20.85	1000.0	9.000	L1	OFF	10.6

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.

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.

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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 CONNECTOR

EUT has a Internal antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT

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