RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.247**
Product name	**Photocontroller**
Brand Name	**CIMCON**
Model No.	**iSLC3500-C**
Test Result	**Pass**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:

Kevin Tsai
Deputy Manager

Tested by:

Dally Hong
Engineer

Revision History

Rev.	Issue Date	Revisions	Revised By
00	April 23, 2019	Initial Issue	Allison Chen

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	CIMCON Lighting, Inc. 35 Crosby Drive,Bedford, MA 01730, USA
Manufacturer	CIMCON Lighting, Inc. 35 Crosby Drive,Bedford, MA 01730, USA
Equipment	Photocontroller
Model No.	iSLC3500-C
Model Discrepancy	N/A
Trade Name	CIMCON
Received Date	March 4, 2019
Date of Test	March 13 ~ April 16, 2019
Output Power(W)	Zigbee: 0.6397
Power Operation	120Vac, 60Hz
Channel List	

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	902.4	22	911.2	44	920
1	902.8	23	911.6	45	920.4
2	903.2	24	912	46	920.8
3	903.6	25	912.4	47	921.2
4	904	26	912.8	48	921.6
5	904.4	27	913.2	49	922
6	904.8	28	913.6	50	922.4
7	905.2	29	914	51	922.8
8	905.6	30	914.4	52	923.2
9	906	31	914.8	53	923.6
10	906.4	32	915.2	54	924
11	906.8	33	915.6	55	924.4
12	907.2	34	916	56	924.8
13	907.6	35	916.4	57	925.2
14	908	36	916.8	58	925.6
15	908.4	37	917.2	59	926
16	908.8	38	917.6	60	926.4
17	909.2	39	918	61	926.8
18	909.6	40	918.4	62	927.2
19	910	41	918.8	63	927.6
20	910.4	42	919.2		
21	910.8	43	919.6		

1.2 EUT CHANNEL INFORMATION

Frequency Range	Zigbee: 902.4 ~ 927.6MHz
Modulation Type	Zigbee: FHSS
Number of channel	64 Channels

Remark:
Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 test channels

Number of frequencies to be tested		
Frequency range in which device operates	**Number of frequencies**	**Location in frequency range of operation**
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☐ PIFA ☐ PCB ☐ Dipole ☐ Coils ☒ Monopole
Antenna Gain	2 dBi
Antenna connector	SMA Male RP

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

***Remark**:*
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	Dally Hong	-
Radiation	Dally Hong	-
RF Conducted	Dally Hong	-

***Remark:** The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.*

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Power Meter	Anritsu	ML2495A	1149001	02/12/2019	02/11/2020
Power Seneor	Anritsu	MA2491A	030982	02/12/2019	02/11/2020
Signal Analyzer	R&S	FSV 40	101073	09/27/2018	09/26/2019

Wugu 966 Chamber A					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/26/2019	02/25/2020
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	02/26/2019	02/25/2020
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

Conducted Emission Room # B					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
CABLE	EMCI	CFD300-NL	CERF	06/29/2018	06/28/2019
EMI Test Receiver	R&S	ESCI	100064	07/24/2018	07/23/2019
LISN	SCHWARZBECK	NSLK 8127	8127-541	01/31/2019	01/30/2020
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2019	02/12/2020
Software	EZ-EMC(CCS-3A1-CE)				

Remark: *Each piece of equipment is scheduled for calibration once a year.*

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	NB(L)	Toshiba	PORTEGE R30-A	N/A	PD97260H

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247.

2. TEST SUMMERY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	5.1	AC Conducted Emission	Pass
15.247(a)(1)	5.2	20 dB Bandwidth	Pass
-	5.2	Occupied Bandwidth (99%)	-
15.247(b)(2)	5.3	Output Power Measurement	Pass
15.247(a)(1)	5.4	Frequency Separation	Pass
15.247(a)(1)(i)	5.5	Number of Hopping	Pass
15.247(d)	5.6	Conducted Band Edge	Pass
15.247(d)	5.6	Conducted Emission	Pass
15.247(a)(1)(i)	5.7	Time of Occupancy	Pass
15.247(d)	5.8	Radiation Band Edge	Pass
15.247(d)	5.8	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	902.4 MHz ~ 927.6 MHz
Test Channel Frequencies	1.Lowest Channel : 902.4MHz 2.Middle Channel : 915.2MHz 3.Highest Channel : 927.6MHz

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	**AC Power line conducted emission for line and neutral**
Power supply Mode	**120Vac / 60Hz**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**

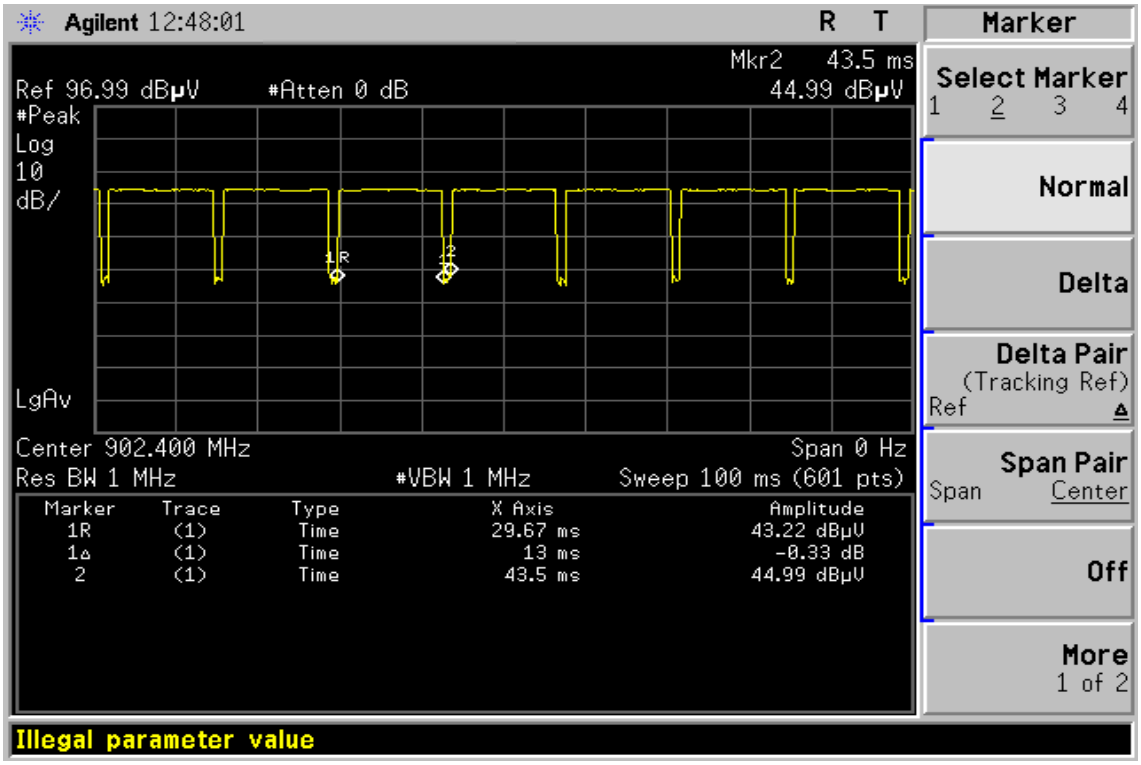
Radiated Emission Measurement Above 1G	
Test Condition	**Band edge, Emission for Unwanted and Fundamental**
Power supply Mode	**120Vac / 60Hz**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**
Worst Position	**☐ Placed in fixed position.** **☒ Placed in fixed position at X-Plane (E2-Plane)** **☐ Placed in fixed position at Y-Plane (E1-Plane)** **☐ Placed in fixed position at Z-Plane (H-Plane)**
Worst Polarity	**☐ Horizontal ☒ Vertical**

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**120Vac / 60Hz**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case(X-Plane and Vertical) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

4. EUT DUTY CYCLE

Duty Cycle			
Configuration	TX ON (ms)	TX ALL (ms)	Duty Cycle (%)
Zigbee	16.6700	30.5000	54.66%



5. TEST RESULT

5.1 AC POWER LINE CONDUCTED EMISSION

5.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

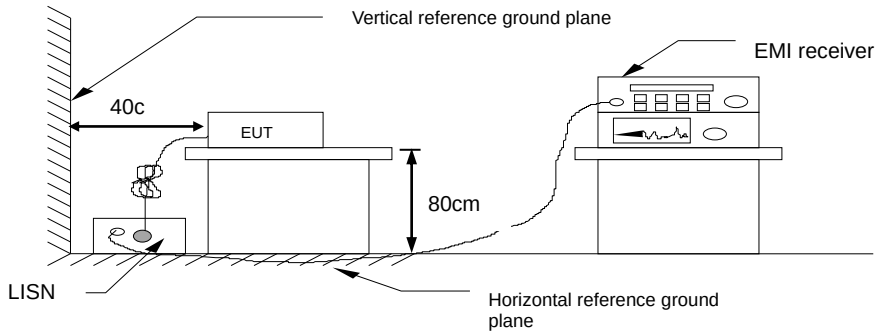
* Decreases with the logarithm of the frequency.

5.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

5.1.3 Test Setup

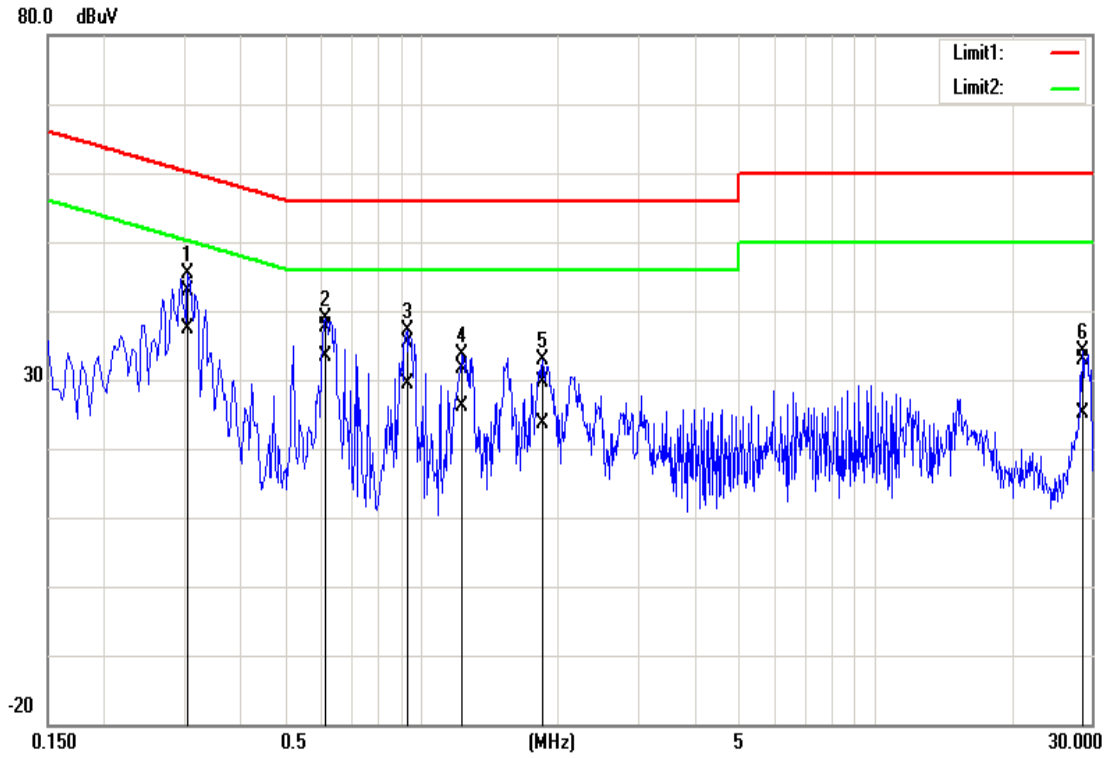


5.1.4 Test Result

PASS

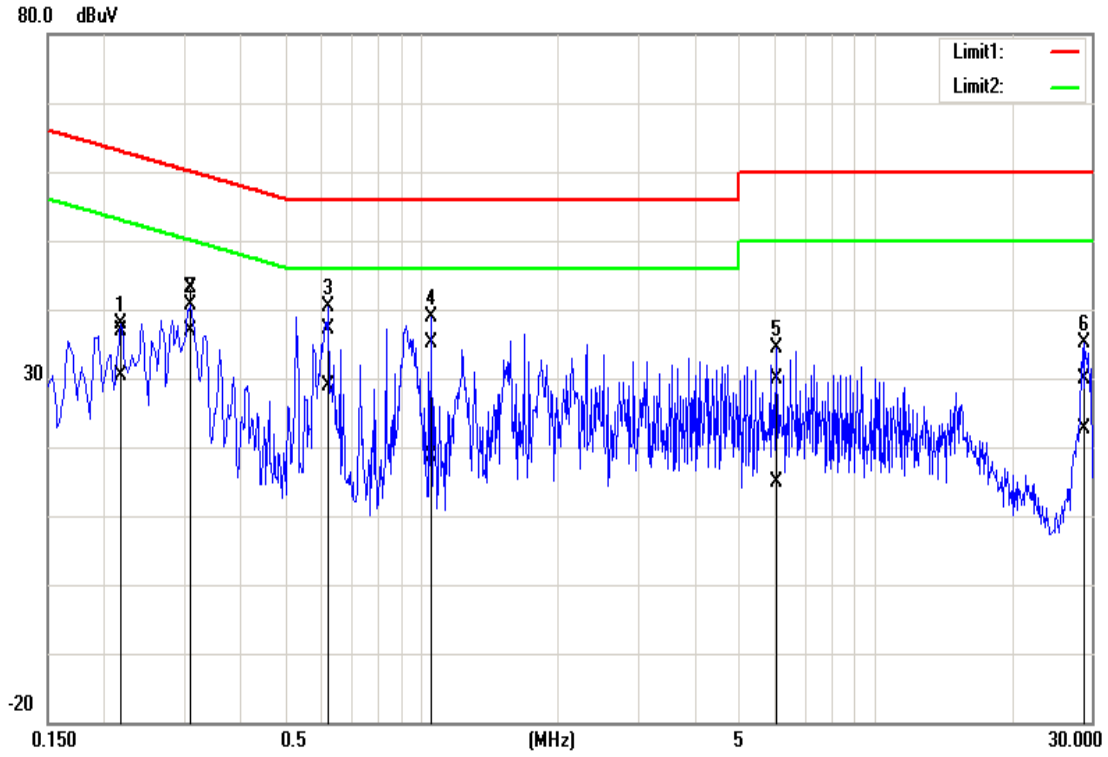
Test Data

Test Mode	Mode 1	Temp/Hum	24(℃)/ 50%RH
Test Voltage	120Vac / 60Hz	Test Date	March 13, 2019
Phase	Line	Test Engineer	Dally Hong



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.3060	42.66	37.13	0.16	42.82	37.29	60.08	50.08	-17.26	-12.79	Pass
0.6140	37.50	33.25	0.16	37.66	33.41	56.00	46.00	-18.34	-12.59	Pass
0.9300	35.30	29.26	0.18	35.48	29.44	56.00	46.00	-20.52	-16.56	Pass
1.2340	31.51	25.91	0.19	31.70	26.10	56.00	46.00	-24.30	-19.90	Pass
1.8540	29.31	23.31	0.22	29.53	23.53	56.00	46.00	-26.47	-22.47	Pass
28.7420	31.97	24.07	0.95	32.92	25.02	60.00	50.00	-27.08	-24.98	Pass

Test Mode	Mode 1	Temp/Hum	24(℃)/ 50%RH
Test Voltage	120Vac / 60Hz	Test Date	March 13, 2019
Phase	Neutral	Test Engineer	Dally Hong



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.2180	36.67	30.31	0.10	36.77	30.41	62.89	52.89	-26.12	-22.48	Pass
0.3100	43.06	36.76	0.11	43.17	36.87	59.97	49.97	-16.80	-13.10	Pass
0.6260	37.11	28.66	0.11	37.22	28.77	56.00	46.00	-18.78	-17.23	Pass
1.0500	35.11	18.40	0.13	35.24	18.53	56.00	46.00	-20.76	-27.47	Pass
6.0860	29.73	14.59	0.27	30.00	14.86	60.00	50.00	-30.00	-35.14	Pass
29.0460	29.09	21.91	0.73	29.82	22.64	60.00	50.00	-30.18	-27.36	Pass

5.2 20dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

5.2.1 Test Limit

According to §15.247(a) (1),

20 dB Bandwidth ：

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

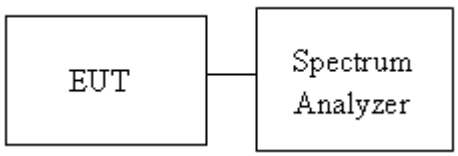
Occupied Bandwidth(99%) ：For reporting purposes only.

5.2.2 Test Procedure

Test method Refer as Section 8.1 and ANSI C63.10: 2013 clause 7.8.7,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW =30kHz, VBW = 100kHz and Detector = Peak, to measurement 20dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth.
5. Measure and record the result of 20 dB Bandwidth and 99% Bandwidth. in the test report.

5.2.3 Test Setup



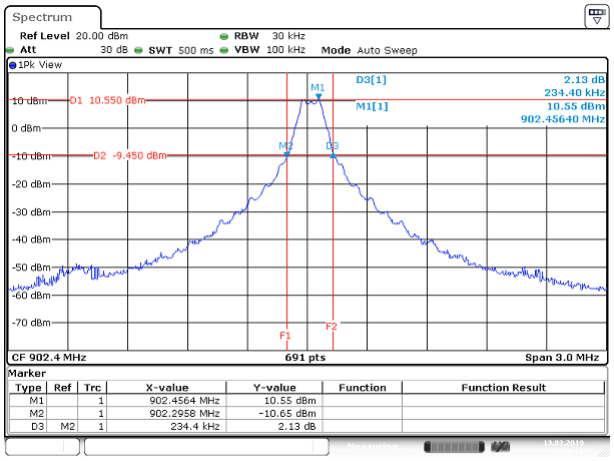
5.2.4 Test Result

Test mode: 902.4 MHz ~ 927.6 MHz			
Channel	**Frequency (MHz)**	**OBW(99%) (MHz)**	**20dB BW (MHz)**
Low	902.4	0.2127	0.2344
Mid	915.2	0.2083	0.2388
High	927.6	0.2127	0.2431

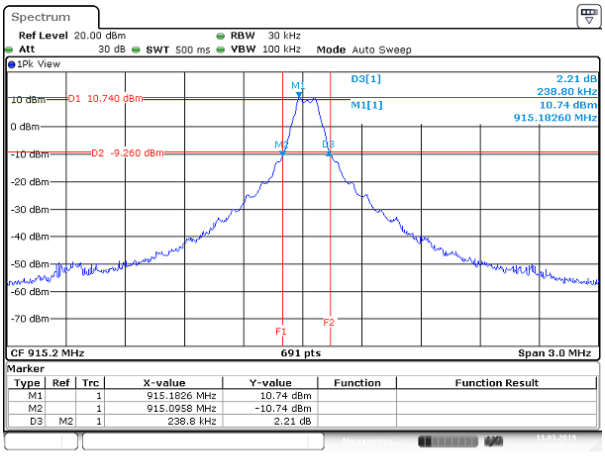
Test Data

20 dB Bandwidth

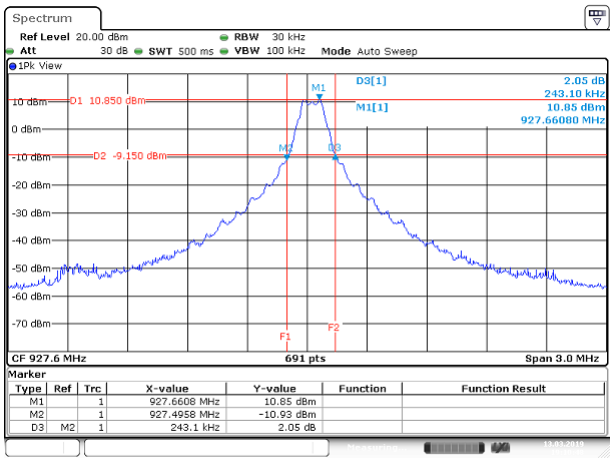
Low CH



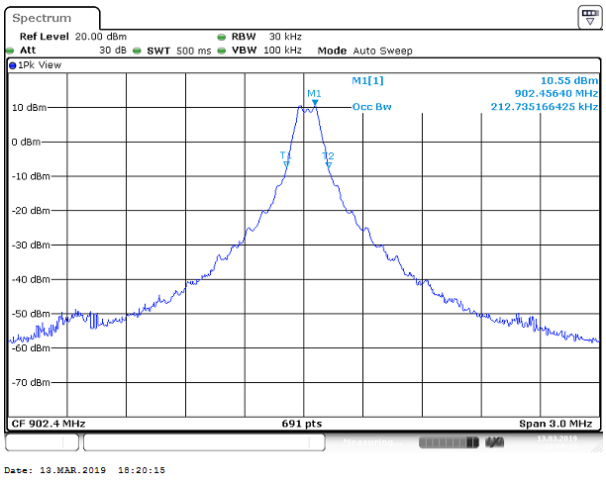
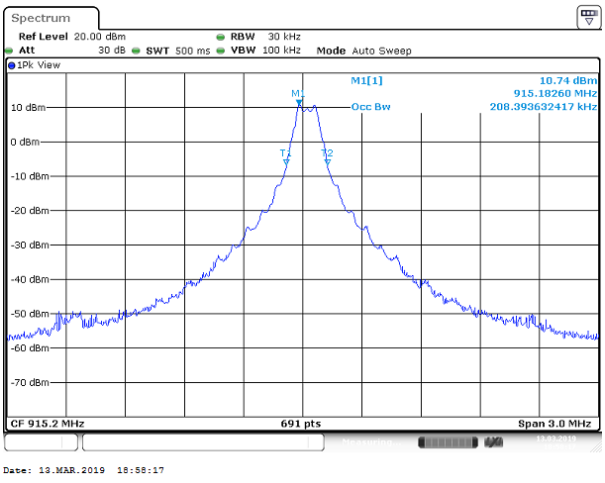
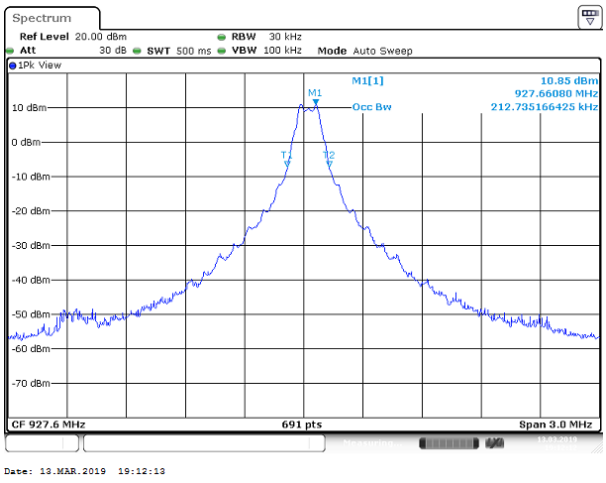
Mid CH



High CH



99% Bandwidth

Low CH	Mid CH
	
High CH	
	

5.3 OUTPUT POWER MEASUREMENT

5.3.1 Test Limit

According to §15.247(b)(2).

Peak output power：

FCC

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

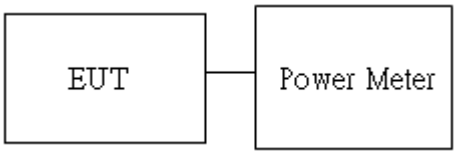
Limit	☒ Antenna not exceed 6 dBi：30dBm ☐ Antenna with DG greater than 6 dBi：24dBm [Limit = 30 – (DG – 6)]

Average output power：For reporting purposes only.

5.3.2 Test Procedure

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

5.3.3 Test Setup



5.3.4 Test Result

Peak output power：

Zigbee						
Config.	CH	Freq. (MHz)	Power Setting	PK Power (dBm)	PK Power (W)	Limit (dBm)
Zigbee	0	902.4	30	27.98	0.6281	30
	32	915.2	30	28.06	0.6397	
	63	927.6	30	28.04	0.6368	

Average output power：

Zigbee				
Config.	CH	Power Setting	Freq. (MHz)	AV Power (dBm)
Zigbee	0	30	902.4	27.92
	32	30	915.2	28.03
	63	30	927.6	28.03

5.4 FREQUENCY SEPARATION

5.4.1 Test Limit

According to §15.247(a)(1),

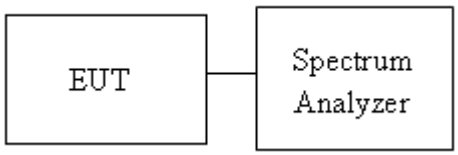
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Limit	> two-thirds of the 20 dB bandwidth

5.4.2 Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. EUT RF output port connected to the SA by RF cable.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto. Max hold, mark 3 peaks of hopping channel and record the 3 peaks frequency

5.4.3 Test Setup

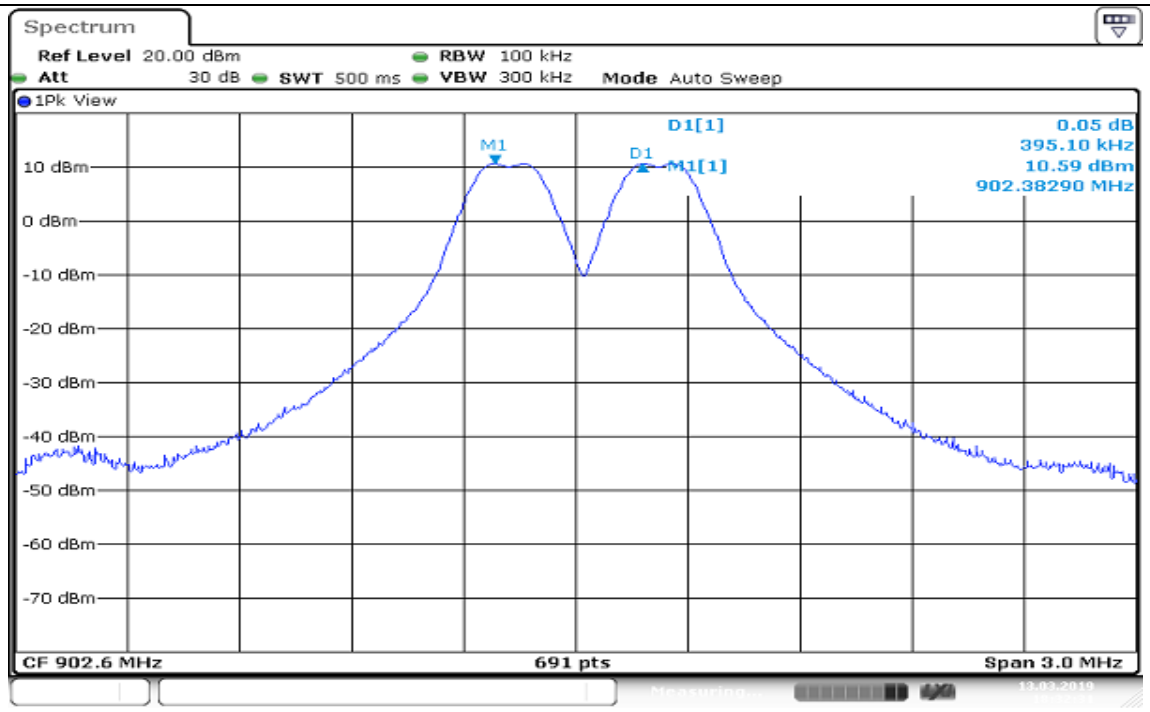


5.4.4 Test Result

Test mode: 902.4 MHz ~ 927.6 MHz				
Channel	**Frequency (MHz)**	**Channel Separation (MHz)**	**Channel Separation Limits (MHz)**	**Result**
Low	902.4	0.3951	0.156	PASS
Mid	915.2	0.4038	0.159	PASS
High	927.6	0.4038	0.162	PASS

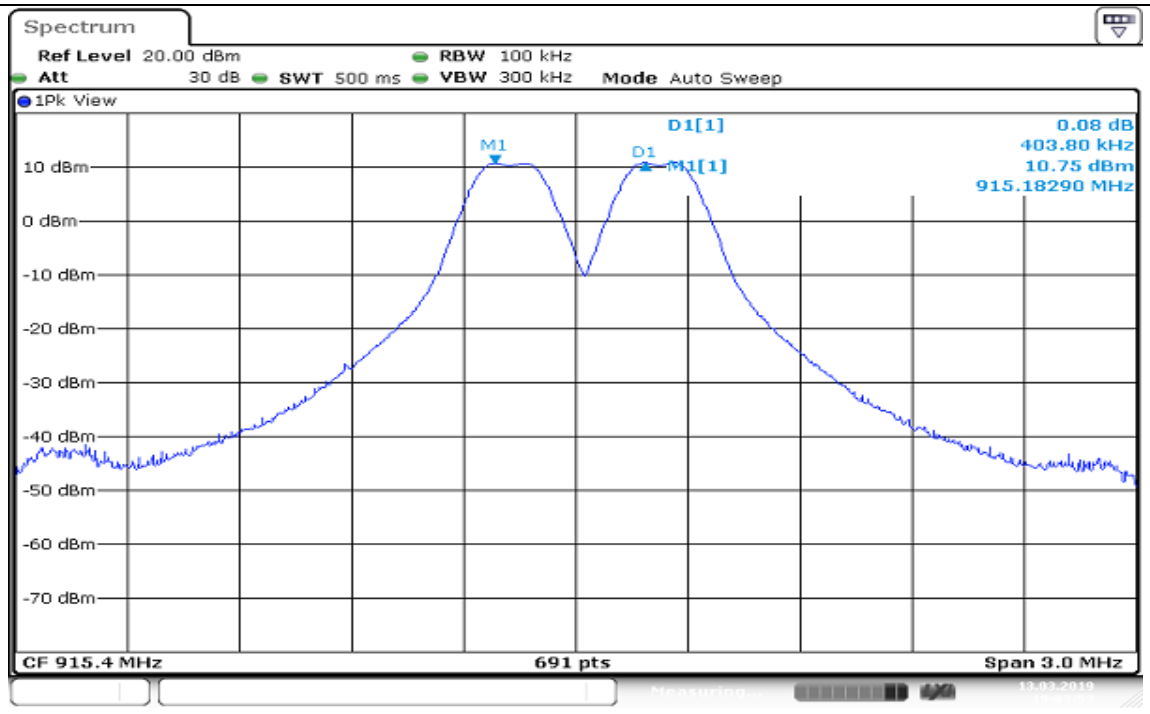
Test Data

902.4 MHz



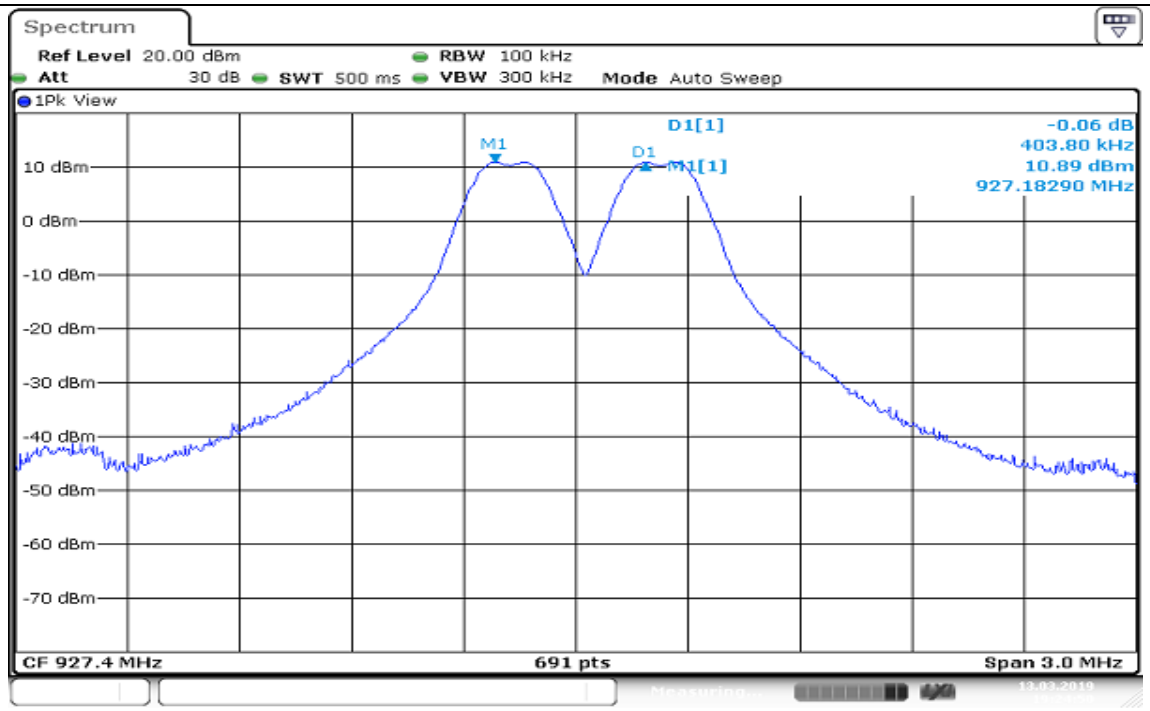
Date: 13.MAR.2019 18:32:31

915.2 MHz



Date: 13.MAR.2019 19:03:54

927.6 MHz



5.5 NUMBER OF HOPPING

5.5.1 Test Limit

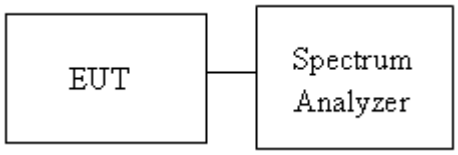
According to §15.247(a)(1)(i)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

5.5.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 7.8.3
1. Place the EUT on the table and set it in transmitting mode.
2. EUT RF output port connected to the SA by RF cable.
3. Set spectrum analyzer Start Freq. = 902.0 MHz, Stop Freq. = 928.0 MHz, RBW =100KHz, VBW = 300KHz.
4. Max hold, view and count how many channel in the band.

5.5.3 Test Setup

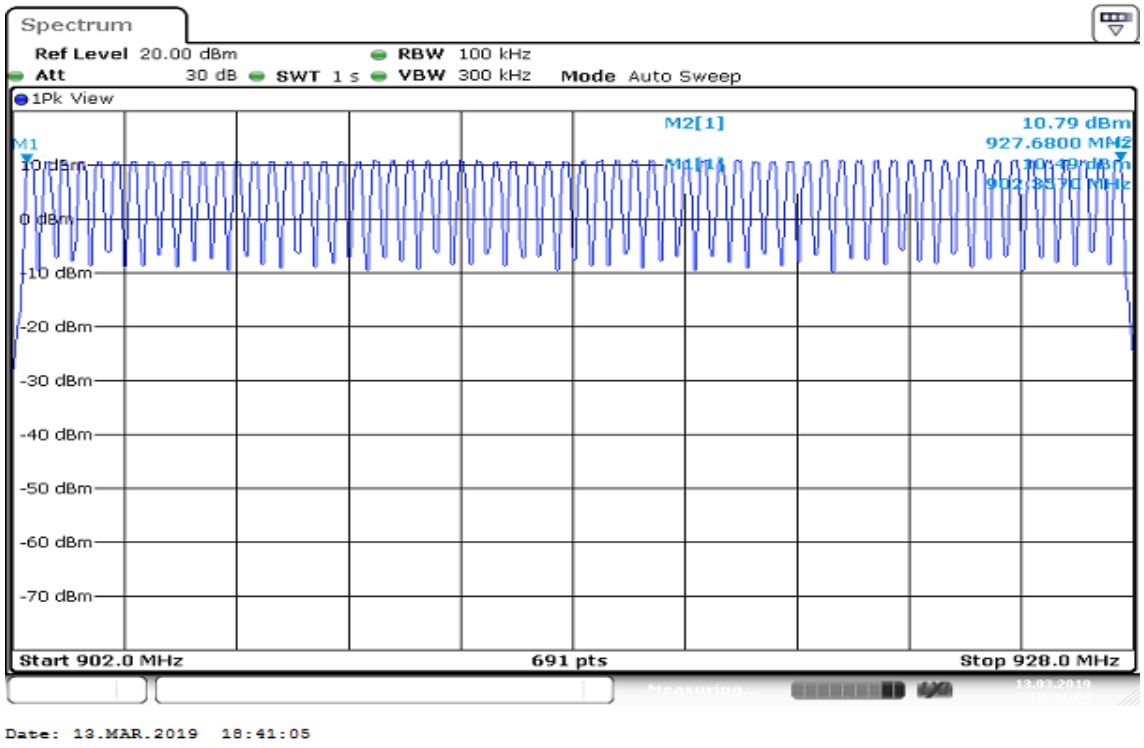


5.5.4 Test Result

Number of Hopping				
Mode	**Frequency (MHz)**	**Hopping Channel Number**	**Hopping Channel Number Limits**	**Result**
FHSS	902.4-927.6	64	50	Pass

Test Data

Number of Hopping



5.6 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

5.6.1 Test Limit

According to §15.247(d),

Limit	-20 dBc

.

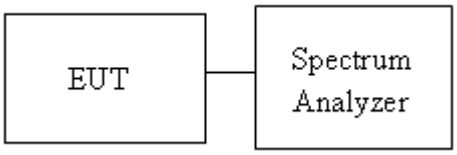
5.6.2 Test Procedure

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.

2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.

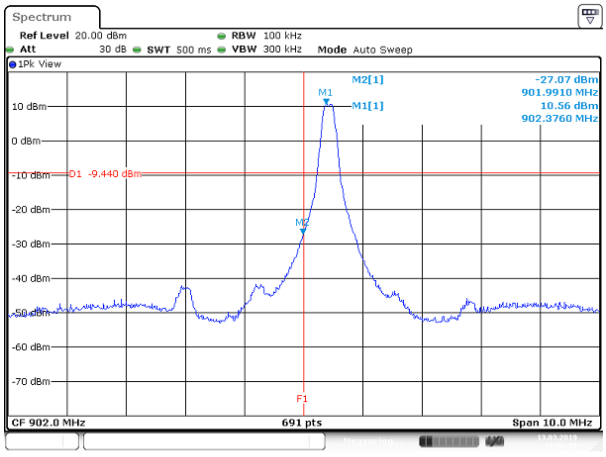
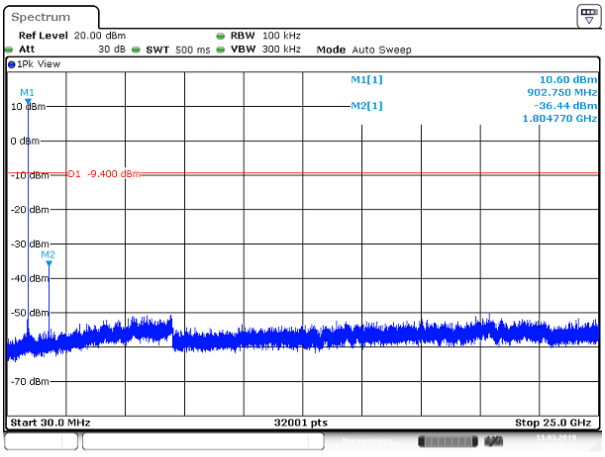
3. The Band Edge at 902.0MHz and 928.0MHz are investigated with normal hopping mode.

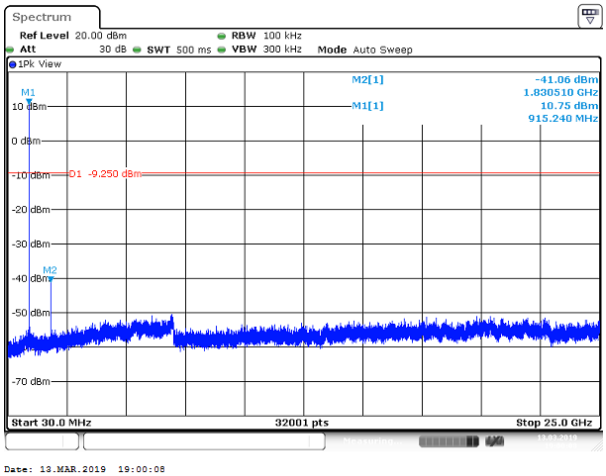
5.6.3 Test Setup



5.6.4 Test Result

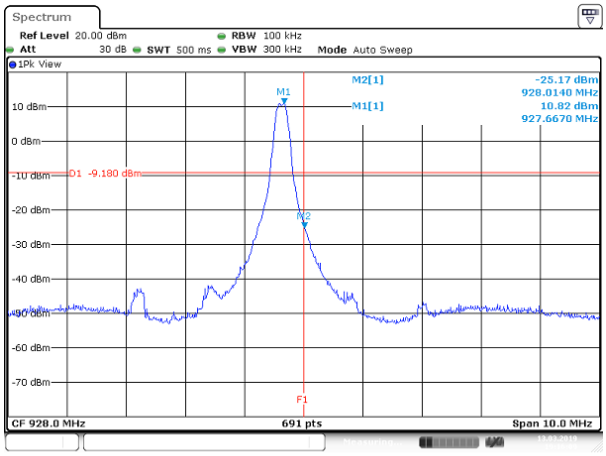
Test Data

Low CH	
Band Edge	**Spurious Emission 30MHz-25GHz**
	

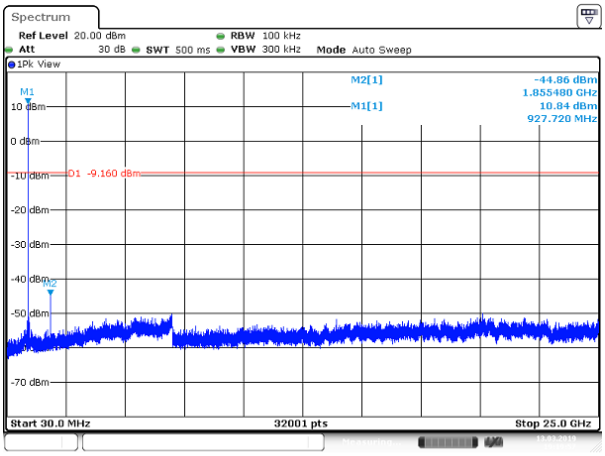
Mid CH
Spurious Emission 30MHz-25GHz


High CH

Band Edge

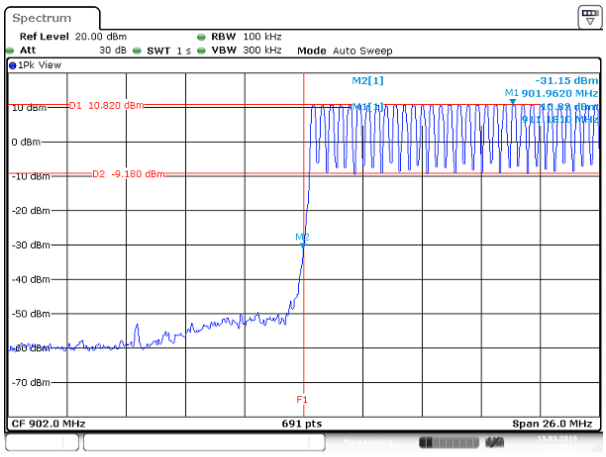


Spurious Emission 30MHz-25GHz

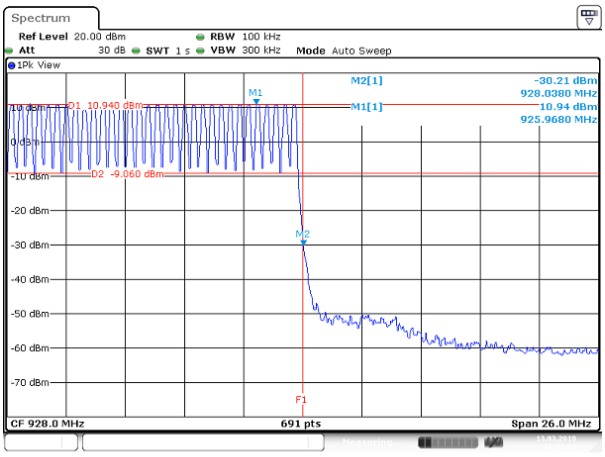


Hopping mode

Low Band Edge



High Band Edge



5.7 TIME OF OCCUPANCY (DWELL TIME)

5.7.1 Test Limit

According to §15.247(a)(1)(i),

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

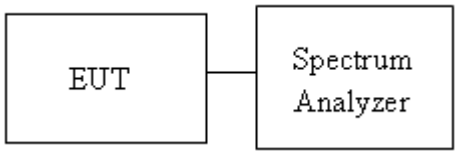
5.7.2 Test Procedure

1. EUT RF output port connected to the SA by RF cable.

2. Set center frequency of spectrum analyzer = operating frequency.

3. Set the spectrum analyzer as RBW, VBW=1MHz, Sweep = 1 ms

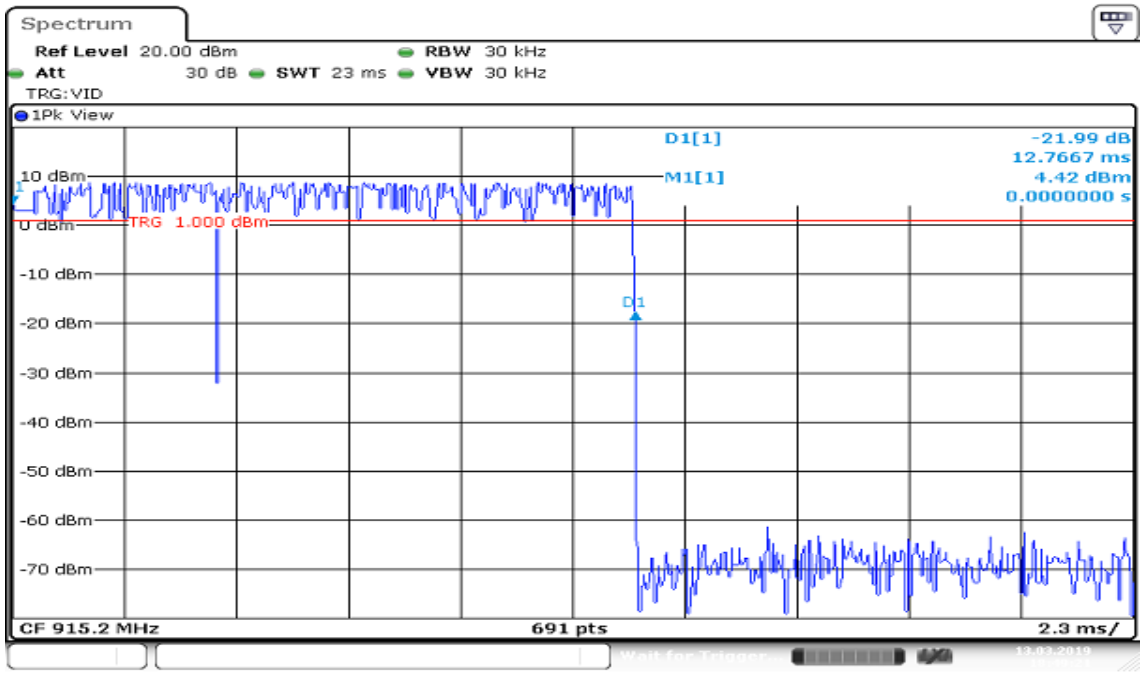
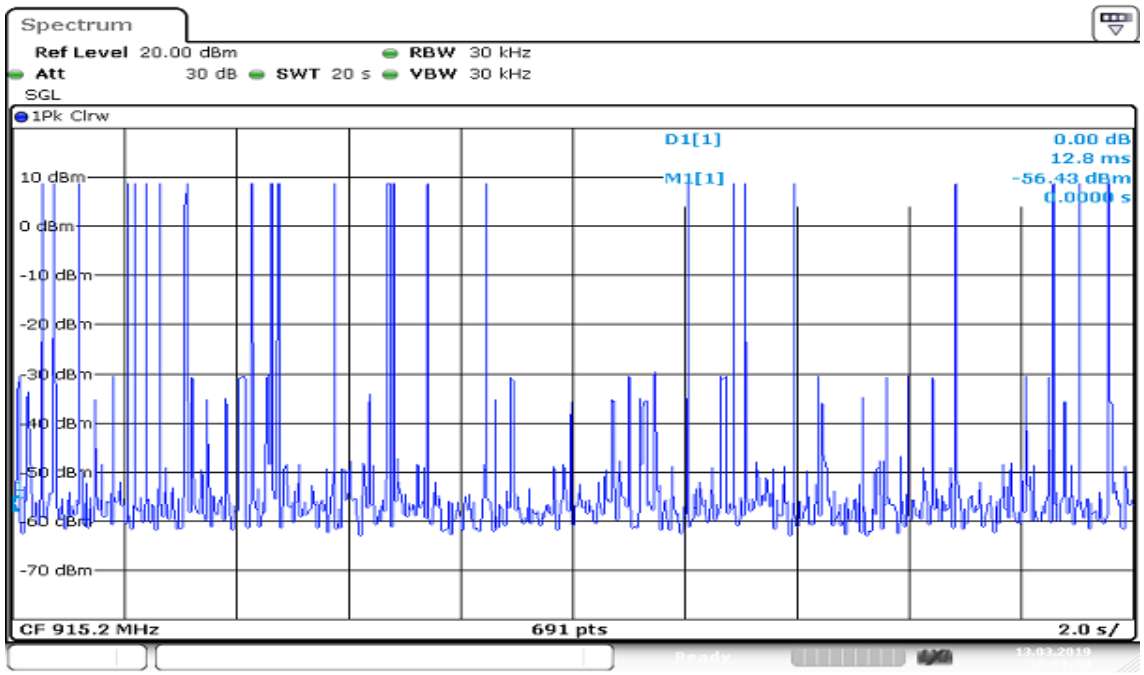
5.7.3 Test Setup



5.7.4 Test Result

Time of Occupancy (Dwell Time)						
Mode	**Frequency (MHz)**	**Pulse Time Per Hopping (ms)**	**Minimum Number of Hopping Freq.**	**Average time of occupancy (s)**	**Dwell Time Limits (s)**	**Result**
FHSS	915.2	12.7667	24	0.306401	0.4	Pass

Test Data

Time of Occupancy (Dwell Time)



5.8 RADIATION BANDEDGE AND SPURIOUS EMISSION

5.8.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Remark:
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

5.8.2 Test Procedure

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.

3. Span shall wide enough to full capture the emission measured. The SA from 9kHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

4. The SA setting following：

(1) Below 1G：RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2) Above 1G：

(2.1) For Peak measurement：RBW = 1MHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2.2) For Average measurement：RBW = 1MHz, VBW

˙If Duty Cycle ≥ 98%, VBW=10Hz.

˙If Duty Cycle < 98%, VBW≥1/T.

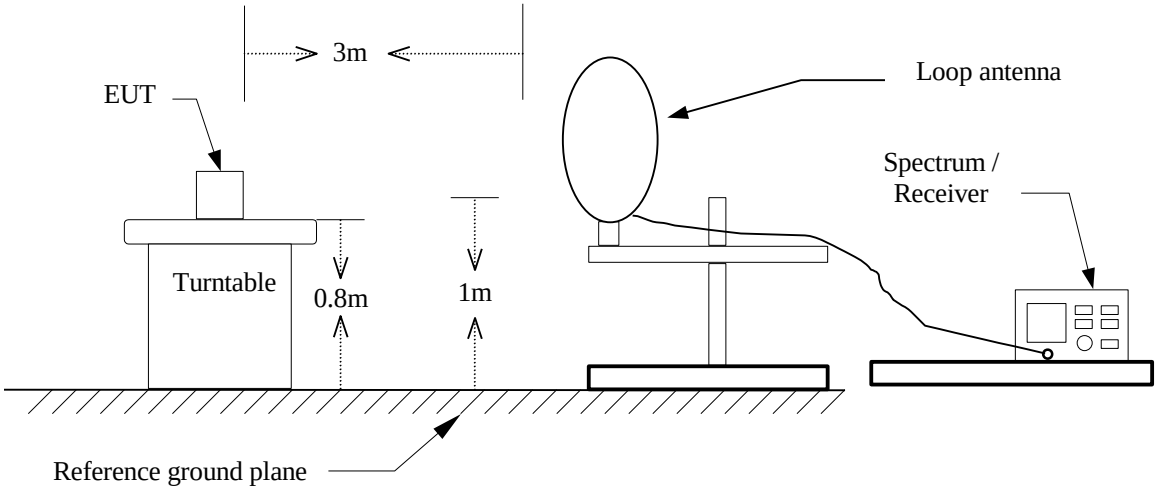
Configuration	Duty Cycle (%)	T(ms)	1/T (kHz)	VBW Setting
Zigbee	56.44%	16.6700	0.060	62Hz

Remark:

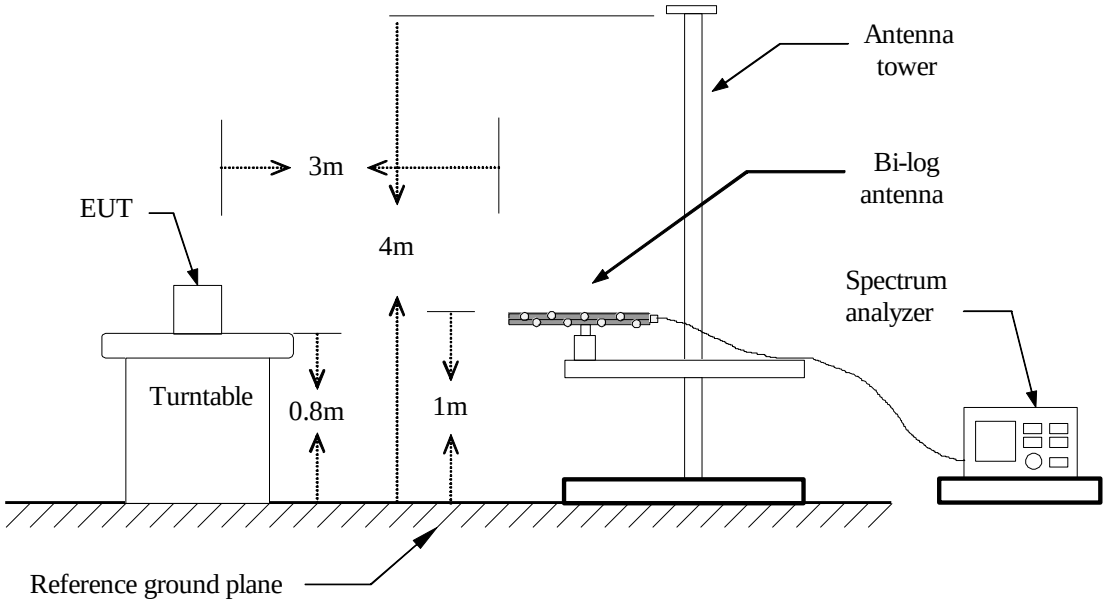
1. *Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.*
2. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).*

5.8.3 Test Setup

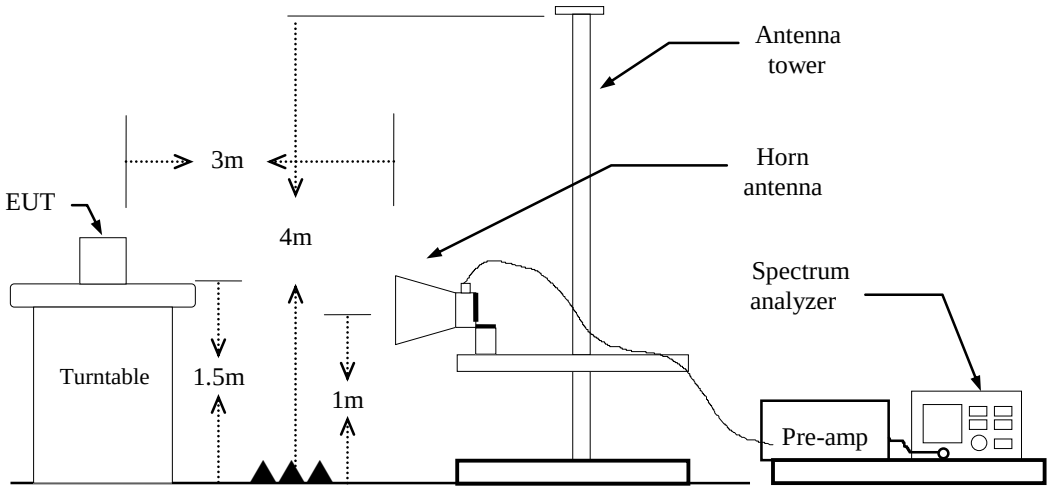
9kHz ~ 30MHz



30MHz ~ 1GHz



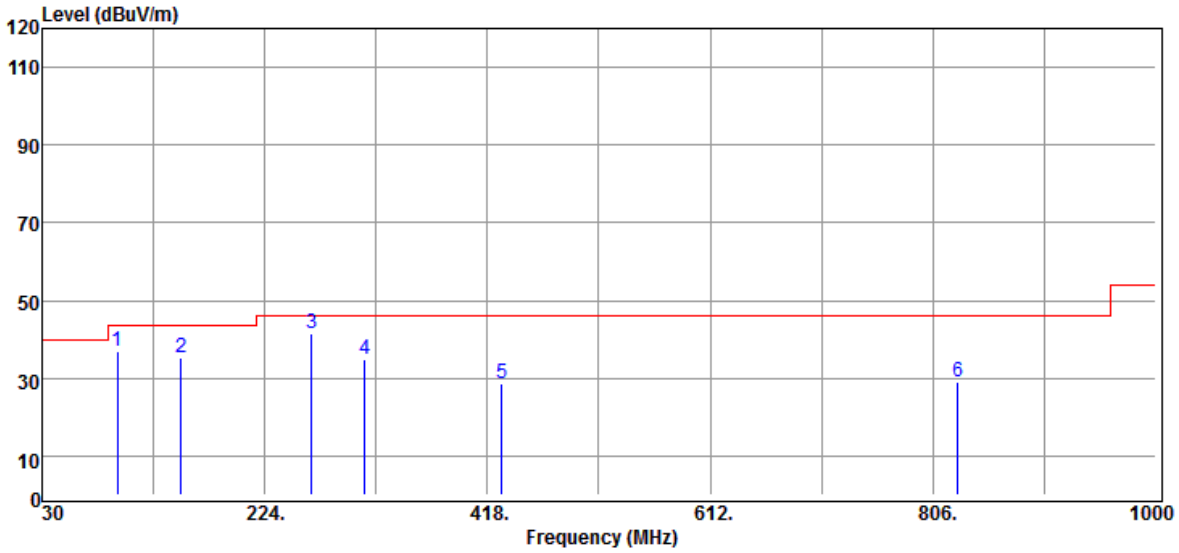
Above 1 GHz



5.8.4 Test Result

Below 1G Test Data

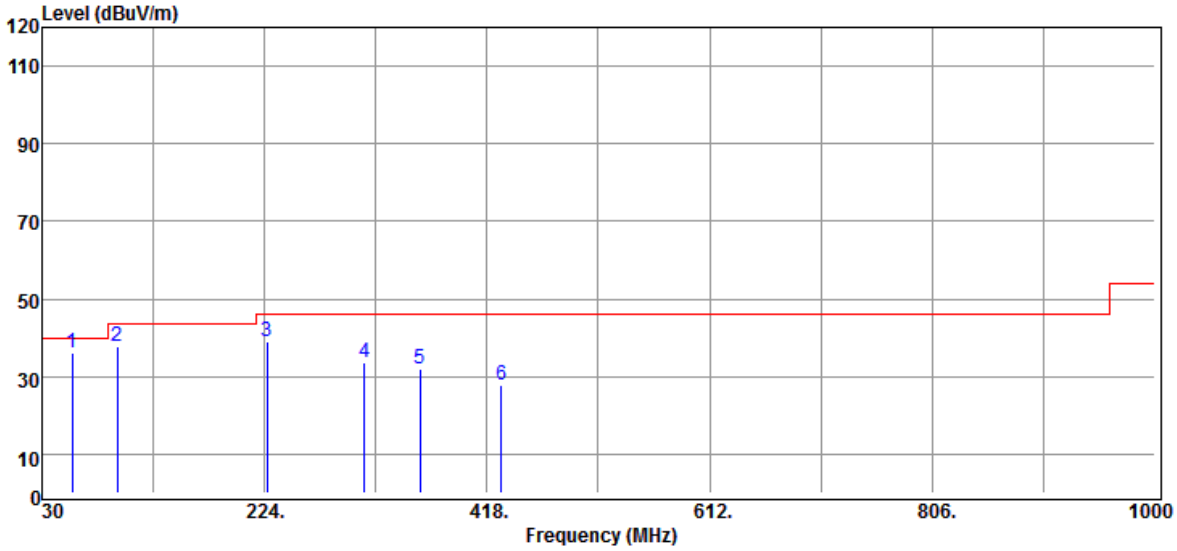
Test Mode:	Zigbee Mode-Low CH	Temp/Hum	20(℃)/ 61%RH
Test Item	30MHz-1GHz	Test Date	April 16, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak	Test Voltage	120Vac / 60Hz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
95.96	50.93	-13.95	36.98	43.50	-6.52	Peak
151.25	45.04	-9.90	35.14	43.50	-8.36	Peak
264.74	50.49	-8.95	41.54	46.00	-4.46	Peak
311.30	42.68	-7.86	34.82	46.00	-11.18	Peak
430.61	33.18	-4.47	28.71	46.00	-17.29	Peak
827.34	25.62	3.25	28.87	46.00	-17.13	Peak

Note: *No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)*

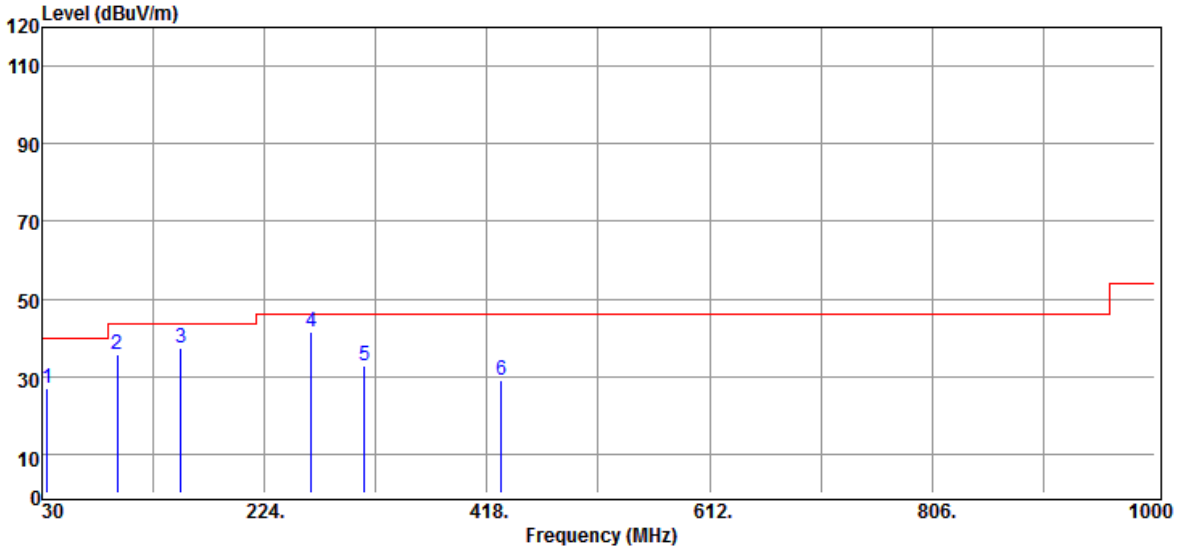
Test Mode:	Zigbee Mode-Low CH	Temp/Hum	20(℃)/ 61%RH
Test Item	30MHz-1GHz	Test Date	April 16, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak	Test Voltage	120Vac / 60Hz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
56.19	51.89	-15.96	35.93	40.00	-4.07	Peak
95.96	51.70	-13.95	37.75	43.50	-5.75	Peak
225.94	50.00	-11.07	38.93	46.00	-7.07	Peak
311.30	41.58	-7.86	33.72	46.00	-12.28	Peak
359.80	38.43	-6.59	31.84	46.00	-14.16	Peak
430.61	32.46	-4.47	27.99	46.00	-18.01	Peak

Note: *No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)*

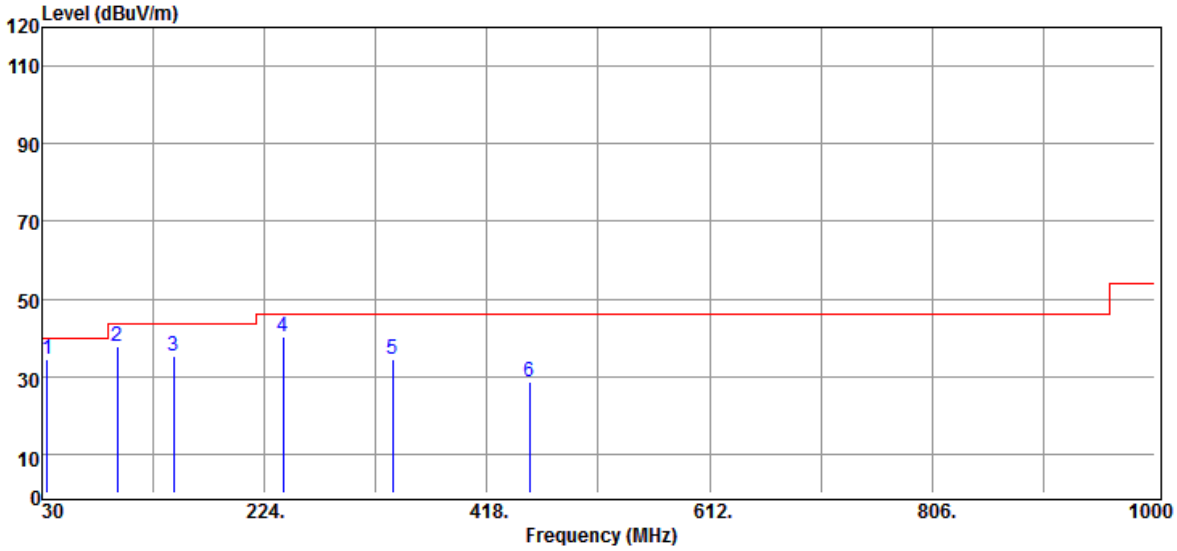
Test Mode:	Zigbee Mode-Mid CH	Temp/Hum	20(℃)/ 61%RH
Test Item	30MHz-1GHz	Test Date	April 16, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak	Test Voltage	120Vac / 60Hz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
34.85	32.69	-5.52	27.17	40.00	-12.83	Peak
95.96	49.81	-13.95	35.86	43.50	-7.64	Peak
151.25	47.16	-9.90	37.26	43.50	-6.24	Peak
264.74	50.41	-8.95	41.46	46.00	-4.54	Peak
311.30	40.82	-7.86	32.96	46.00	-13.04	Peak
430.61	33.46	-4.47	28.99	46.00	-17.01	Peak

Note: *No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)*

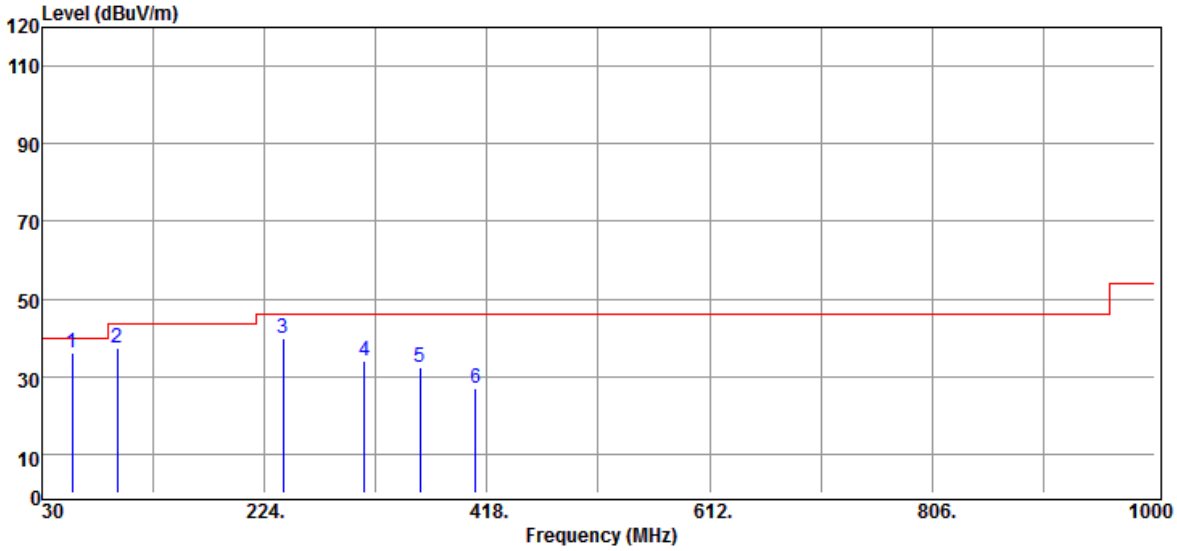
Test Mode:	Zigbee Mode-Mid CH	Temp/Hum	20(℃)/ 61%RH
Test Item	30MHz-1GHz	Test Date	April 16, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak	Test Voltage	120Vac / 60Hz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
34.85	40.14	-5.52	34.62	40.00	-5.38	Peak
95.96	51.57	-13.95	37.62	43.50	-5.88	Peak
144.46	45.15	-9.92	35.23	43.50	-8.27	Peak
240.49	50.47	-10.25	40.22	46.00	-5.78	Peak
335.55	41.69	-7.18	34.51	46.00	-11.49	Peak
454.86	32.45	-3.79	28.66	46.00	-17.34	Peak

Note: *No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)*

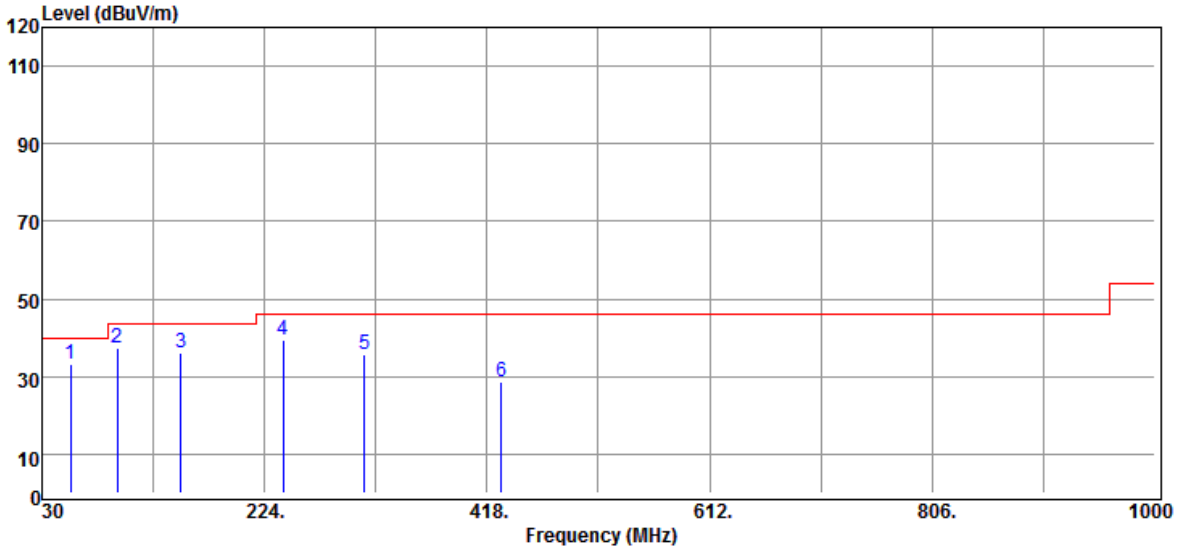
Test Mode:	Zigbee Mode-High CH	Temp/Hum	20(℃)/ 61%RH
Test Item	30MHz-1GHz	Test Date	April 16, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak	Test Voltage	120Vac / 60Hz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
56.19	51.95	-15.96	35.99	40.00	-4.01	Peak
95.96	51.25	-13.95	37.30	43.50	-6.20	Peak
240.49	50.04	-10.25	39.79	46.00	-6.21	Peak
311.30	41.76	-7.86	33.90	46.00	-12.10	Peak
359.80	38.84	-6.59	32.25	46.00	-13.75	Peak
408.30	32.16	-5.29	26.87	46.00	-19.13	Peak

Note: *No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)*

Test Mode:	Zigbee Mode-High CH	Temp/Hum	20(℃)/ 61%RH
Test Item	30MHz-1GHz	Test Date	April 16, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak	Test Voltage	120Vac / 60Hz

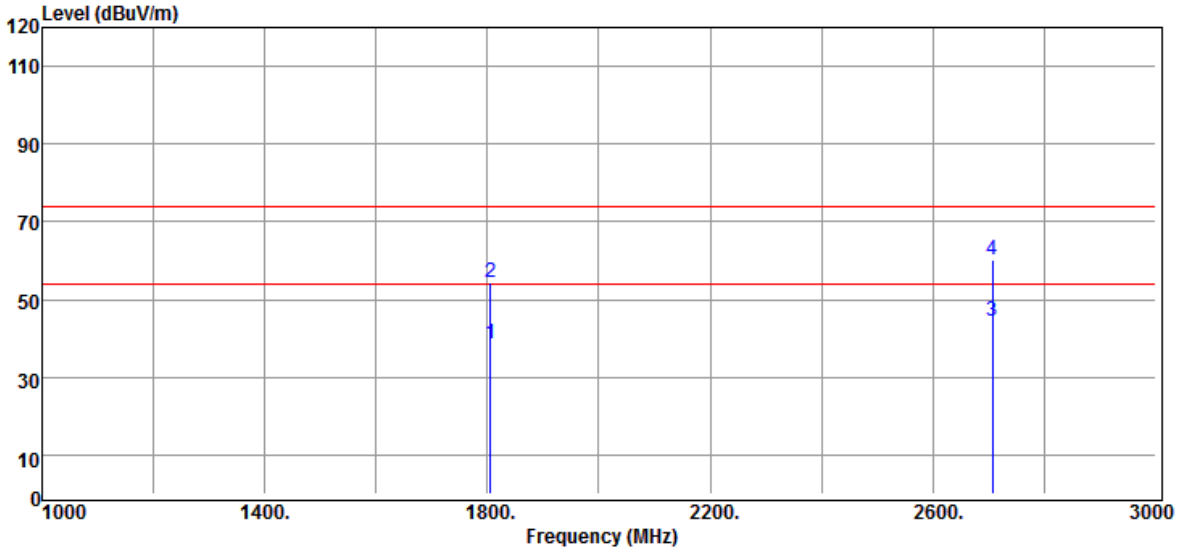


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
55.22	49.15	-16.00	33.15	40.00	-6.85	Peak
95.96	51.50	-13.95	37.55	43.50	-5.95	Peak
151.25	46.09	-9.90	36.19	43.50	-7.31	Peak
240.49	49.74	-10.25	39.49	46.00	-6.51	Peak
311.30	43.51	-7.86	35.65	46.00	-10.35	Peak
430.61	33.11	-4.47	28.64	46.00	-17.36	Peak

Note: *No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)*

Above 1G Test Data (1G ~ 3G)

Test Mode:	Low CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	March 19, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

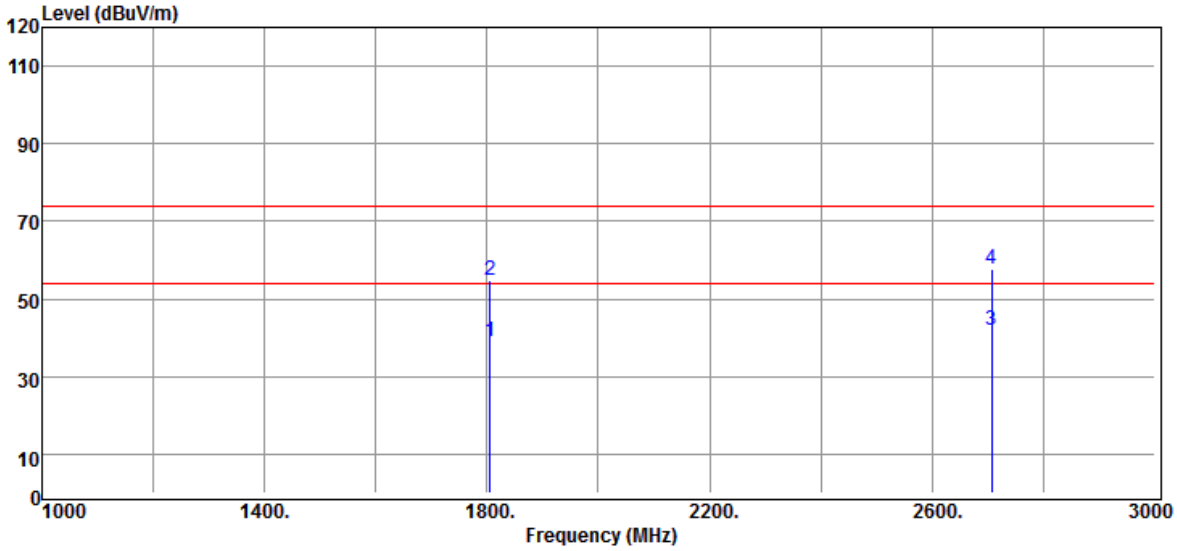


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1804.80	-	-15.56	38.72	54.00	-15.28	Peak
1804.80	64.94	-10.66	54.28	74.00	-19.72	Average
2707.20	-	-15.56	44.46	54.00	-9.54	Peak
2707.20	67.89	-7.87	60.02	74.00	-13.98	Average
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	Low CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	March 19, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

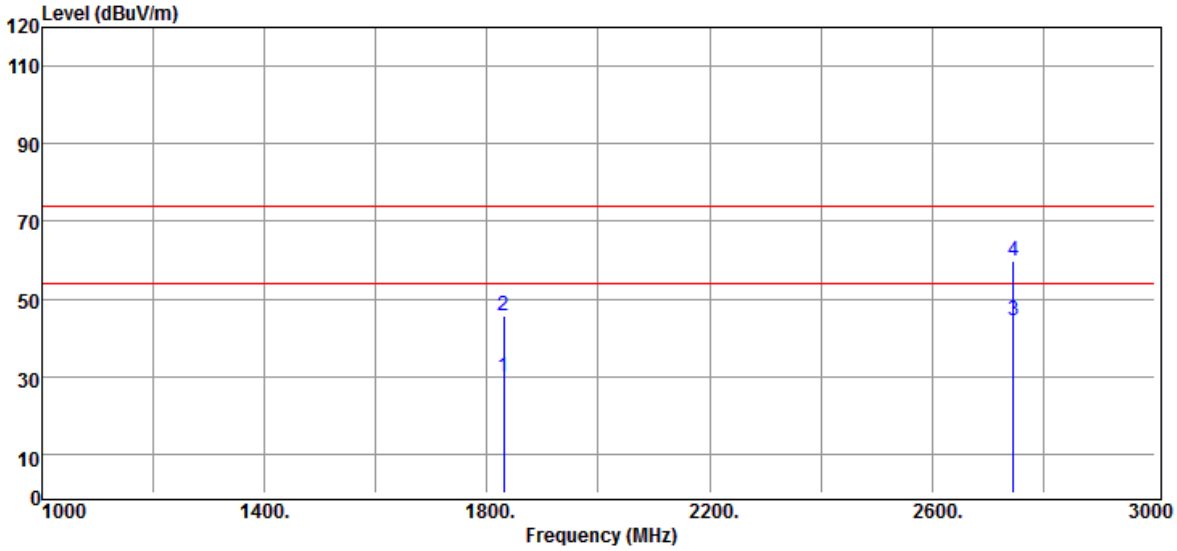


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1804.80	-	-15.56	39.17	54.00	-14.83	Average
1804.80	65.39	-10.66	54.73	74.00	-19.27	Peak
2707.20	-	-15.56	42.09	54.00	-11.91	Average
2707.20	65.52	-7.87	57.65	74.00	-16.35	Peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	Mid CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	March 19, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

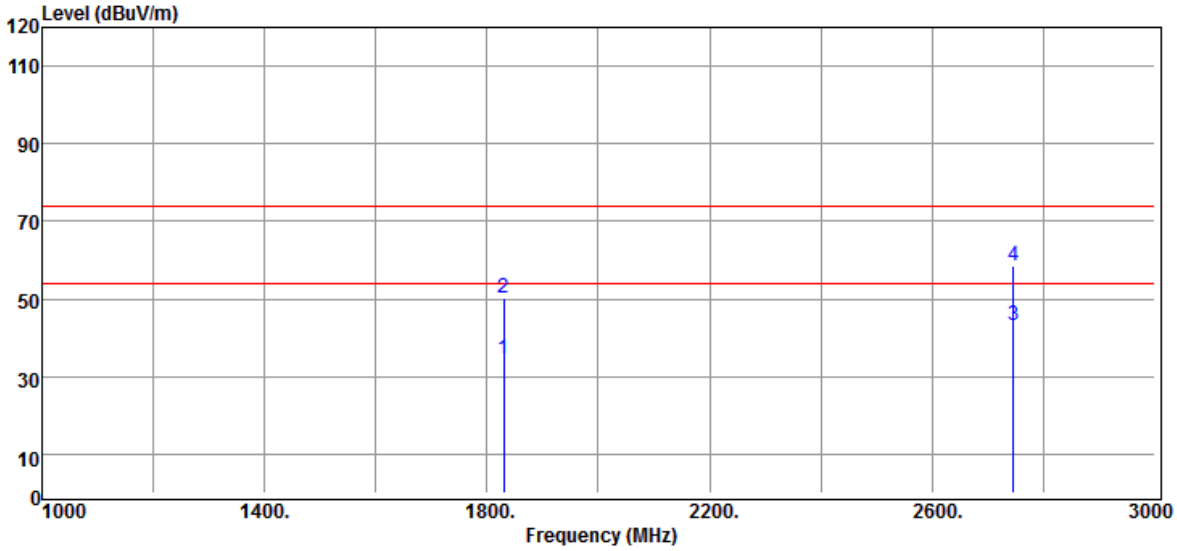


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1830.40	-	-15.56	29.91	54.00	-24.09	Average
1830.40	56.11	-10.64	45.47	74.00	-28.53	Peak
2745.60	-	-15.56	44.39	54.00	-9.61	Average
2745.60	67.90	-7.95	59.95	74.00	-14.05	Peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	Mid CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	March 19, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

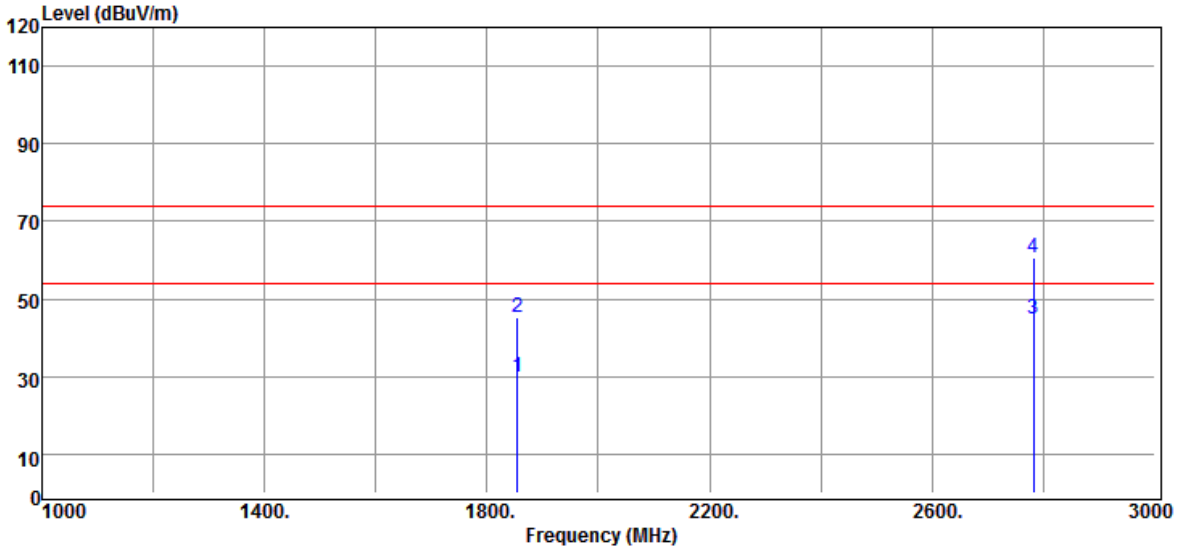


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1830.40	-	-15.56	34.60	54.00	-19.40	Average
1830.40	60.80	-10.64	50.16	74.00	-23.84	Peak
2745.60	-	-15.56	43.06	54.00	-10.94	Average
2745.60	66.57	-7.95	58.62	74.00	-15.38	Peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	High CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	March 19, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

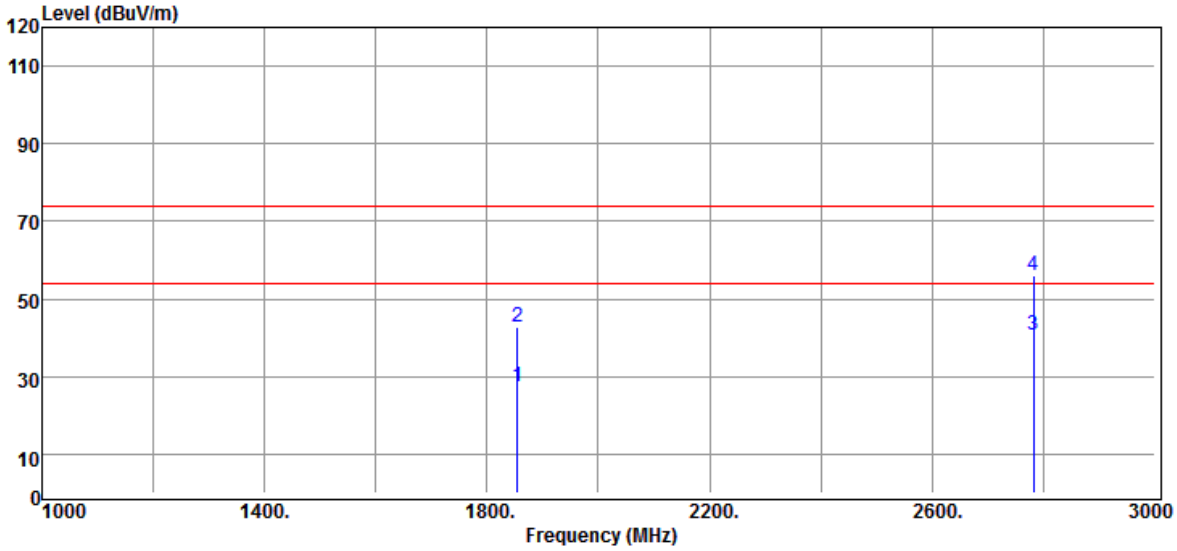


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1855.20	-	-15.56	29.77	54.00	-24.23	Average
1855.20	55.92	-10.59	45.33	74.00	-28.67	Peak
2782.80	-	-15.56	45.01	54.00	-8.99	Average
2782.80	68.85	-8.28	60.57	74.00	-13.43	Peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	High CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	March 19, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz



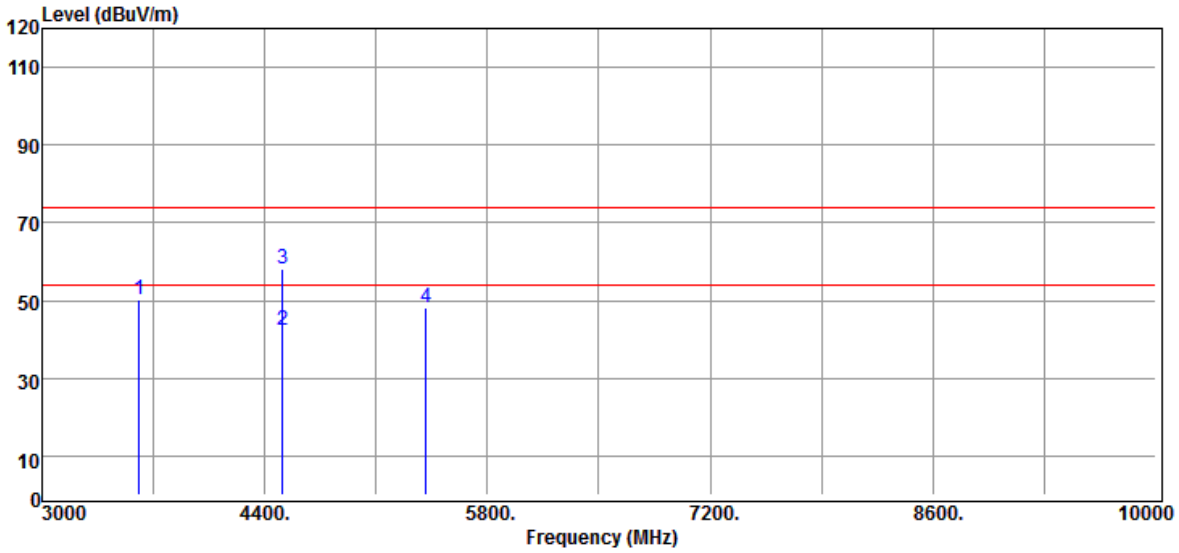
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1855.20	-	-15.56	27.35	54.00	-26.65	Average
1855.20	53.50	-10.59	42.91	74.00	-31.09	Peak
2782.80	-	-15.56	40.54	54.00	-13.46	Average
2782.80	64.38	-8.28	56.10	74.00	-17.90	Peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Above 1G Test Data (3G ~ 10G)

Test Mode:	Low CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	April 16, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

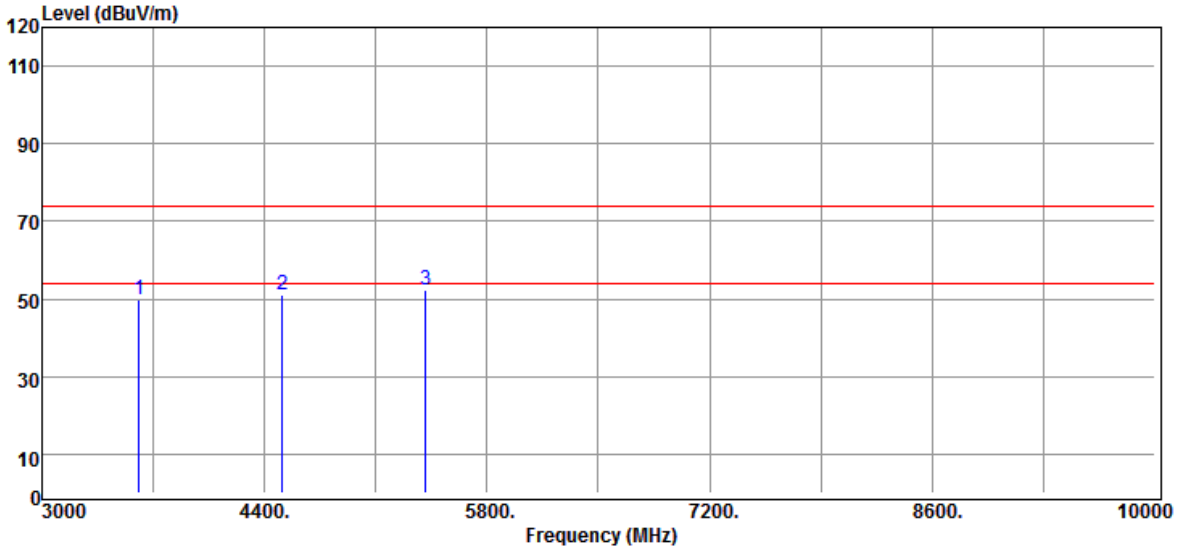


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
3609.60	56.25	-6.15	50.10	74.00	-23.90	Peak
4512.00	-	-15.56	42.42	54.00	-11.58	Average
4512.00	62.88	-4.90	57.98	74.00	-16.02	Peak
5414.40	51.72	-3.60	48.12	74.00	-25.88	Peak
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Test Mode:	Low CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	April 16, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

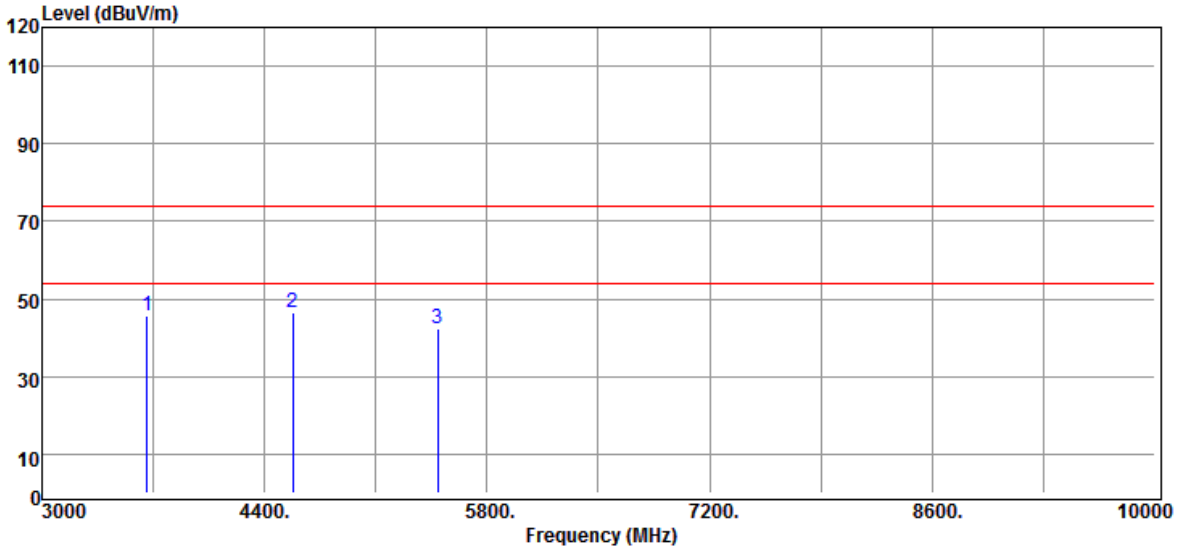


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
3609.60	56.13	-6.15	49.98	74.00	-24.02	Peak
4512.00	56.00	-4.90	51.10	74.00	-22.90	Peak
5414.40	56.04	-3.60	52.44	74.00	-21.56	Peak
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Test Mode:	Mid CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	April 16, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

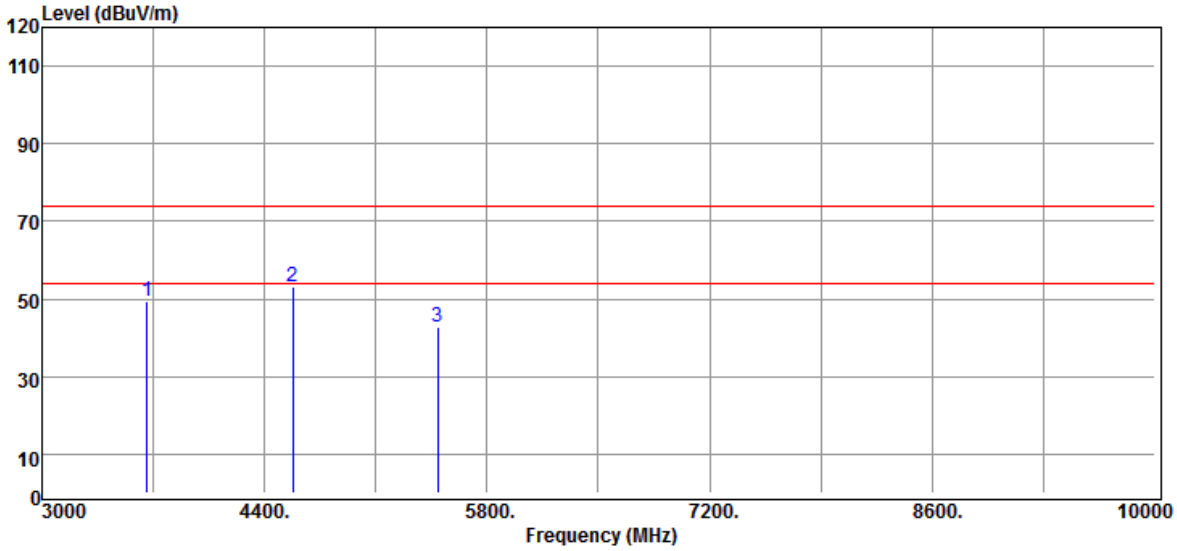


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
3660.80	50.04	-4.47	45.57	74.00	-28.43	Peak
4576.00	51.39	-4.92	46.47	74.00	-27.53	Peak
5491.20	46.31	-3.97	42.34	74.00	-31.66	Peak
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Test Mode:	Mid CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	April 16, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

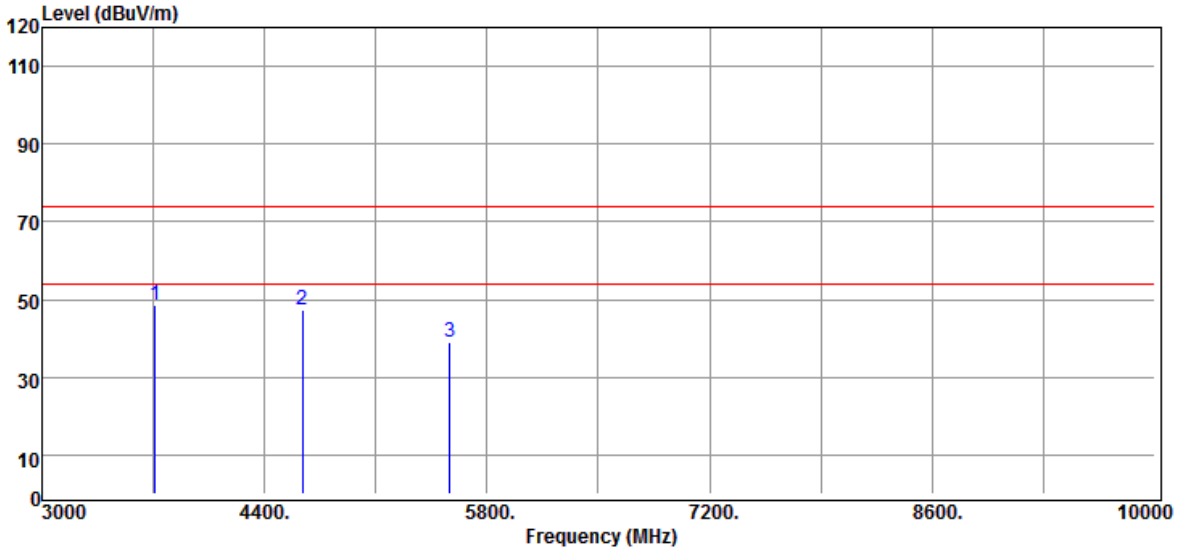


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
3660.80	53.77	-4.47	49.30	74.00	-24.70	Peak
4576.00	57.89	-4.92	52.97	74.00	-21.03	Peak
5491.20	46.63	-3.97	42.66	74.00	-31.34	Peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*

Test Mode:	High CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	April 16, 2019
Polarize	Vertical	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz

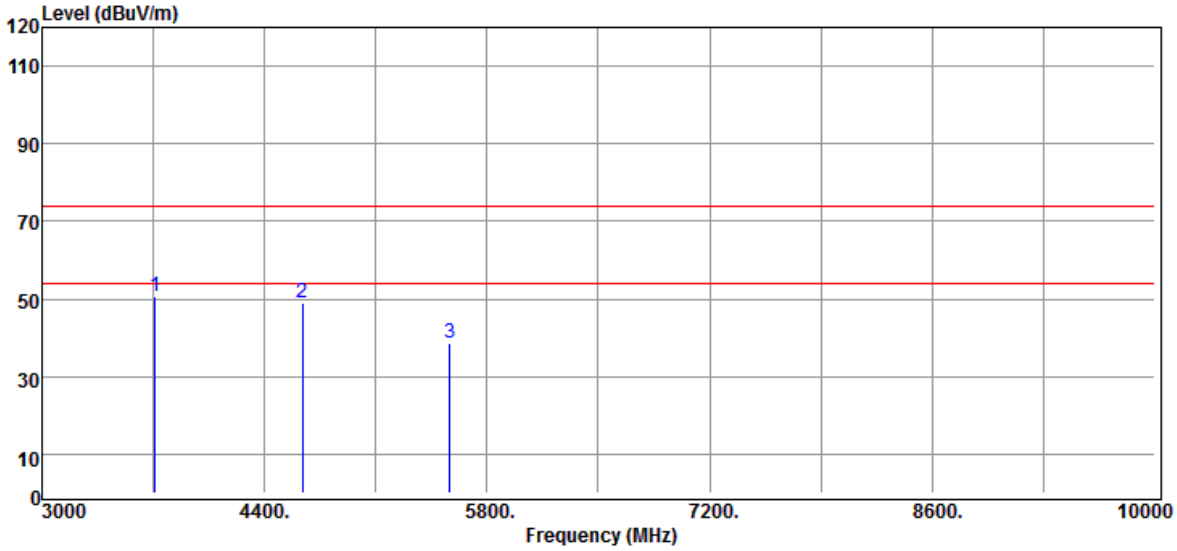


Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
3710.40	50.02	-1.51	48.51	74.00	-25.49	Peak
4638.00	52.17	-4.99	47.18	74.00	-26.82	Peak
5565.60	42.06	-3.14	38.92	74.00	-35.08	Peak
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Test Mode:	High CH	Temp/Hum	20(℃)/ 61%RH
Test Item	Harmonic	Test Date	April 16, 2019
Polarize	Horizontal	Test Engineer	Dally Hong
Detector	Peak and Average	Test Voltage	120Vac / 60Hz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
3710.40	52.06	-1.51	50.55	74.00	-23.45	Peak
4638.00	54.13	-4.99	49.14	74.00	-24.86	Peak
5565.60	41.62	-3.14	38.48	74.00	-35.52	Peak
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

--End of Test Report--