FCC RF Test Report

For

SHENZHEN GIEC DIGITAL CO., LTD

Test Standards:	Part 15C Subpart C §15.247
Product Description:	all in one
Tested Model:	GK-MWZE501
Additional Model No.:	WGC22T324S, TLGC22T324S
Brand Name:	N/A
FCC ID:	2AHYK09586AIO
Classification	(DTS) Digital Transmission System
Report No.:	GTS201901000080F01
Tested Date:	2019-02-14 to 2019-03-24
Issued Date:	2019-03-24
Prepared By:	
Approved By:	

Global United Technology Services Co., Ltd.

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2019.03.24	Valid	Original Report

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Summary of Test RESULT

FCC Rule	Description	Limit	Result	Remark
15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
-	99% Bandwidth	-	Pass	-
15.247(b)(1)	Peak Output Power	≤ 30dBm	Pass	-
15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 2.71 dB at 158.04 MHz
15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 5.05 dB at 4.926 MHz
15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1. Test Laboratory

1.1 Test facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2.

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

2. General Description

2.1 Applicant

SHENZHEN GIEC DIGITAL CO., LTD
1st&3rd Building，No.26 Puzai Road，Pingdi，Longgang District, Shenzhen, China

2.2 Manufacturer

SHENZHEN GIEC DIGITAL CO., LTD
1st&3rd Building，No.26 Puzai Road，Pingdi，Longgang District, Shenzhen, China

2.3 General Description Of EUT

Product	all in one
Model No.	GK-MWZE501
Additional No.	WGC22T324S, TLGC22T324S
Difference Description	All above models are identical in the same PCB layout, interior structure and electrical circuits. The only differences are the colour and trade mark for commercial purpose.
FCC ID	2AHYK09586AIO
IC ID	N/A
Power Supply	120Vdc (adapter or host equipment)
Modulation Technology	BLE
Modulation Type	GFSK
Operating Frequency	2402MHz~2480MHz
Number Of Channel	40
Max. Output Power	3.726 dBm (0.00236 W)
Antenna Type	FPC Antenna with 2.0±0.5dBi gain
I/O Ports	Refer to user's manual

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.4 Modification of EUT

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

2.5 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- ANSI C63.10-2013
- FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r01

3. Test Configuration of Equipment Under Test

3.1 Descriptions of Test Mode

The transmitter has a maximum peak conducted output power as follows:

Channel	Frequency	Mode	Bluetooth RF Output Power
Ch00	2402MHz	GFSK	3.726
Ch19	2440MHz	GFSK	3.283
Ch39	2480MHz	GFSK	2.585

a. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

b. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

3.2 Test Mode

3.2.1 Antenna Port Conducted Measurement

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 4.0 – LE GFSK
Conducted Test Cases	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz

3.2.2 Radiated Emission Test (Below 1GHz)

	Bluetooth BR 1Mbps GFSK	
Radiated Test Cases	Transmitting+Charging	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.

2. All above modes were tested, but only the worst case test mode was reported .

3.2.3 Radiated Emission Test (Above 1GHz)

	Bluetooth BR 1Mbps GFSK	
Radiated Test Cases	Transmitting+Charging	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.

2. Following channel(s) was (were) selected for the final test as listed above

3.2.4 Power Line Conducted Emission Test:

AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN Link + Earphone + Cable (Charging from Adapter) + SD Card+USB flash disk

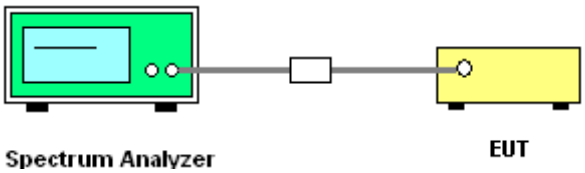
3.3 Support Equipment

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Base Station	R&S	CBT	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-108	PYAHS-107W	N/A	N/A
4.	WLAN AP	D-link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
5.	Micro SD Card	SanDisk	HC I	N/A	N/A	N/A
6.	USB flash disk	kingston	N/A	N/A	N/A	N/A
7.	displayer	DELL	P2317H	N/A	N/A	Unshielded, 1.8 m
8.	HDMI	UGREEN	N/A	N/A	Unshielded,1.5 m	N/A
9.	Notebook	Lenovo	Xiao xin cao 5000	N/A	N/A	shielded cable DC O/P 1.8 m unshielded AC I/P cable1.2 m

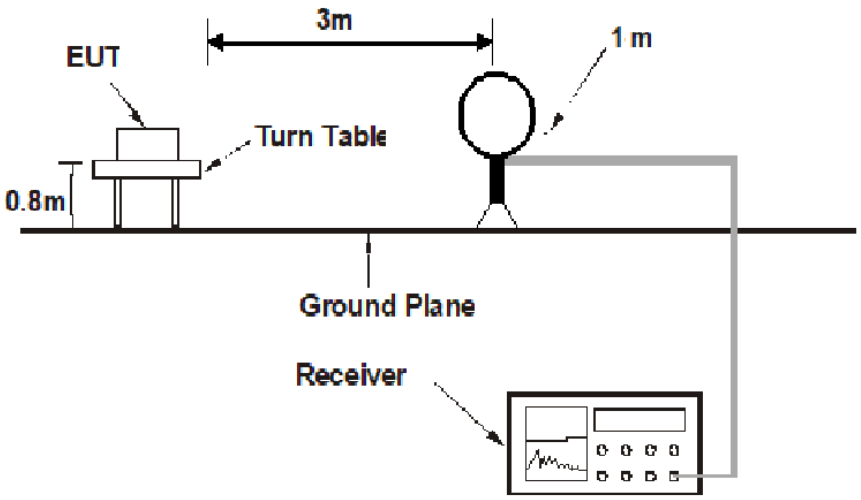
3.4 Test Setup

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

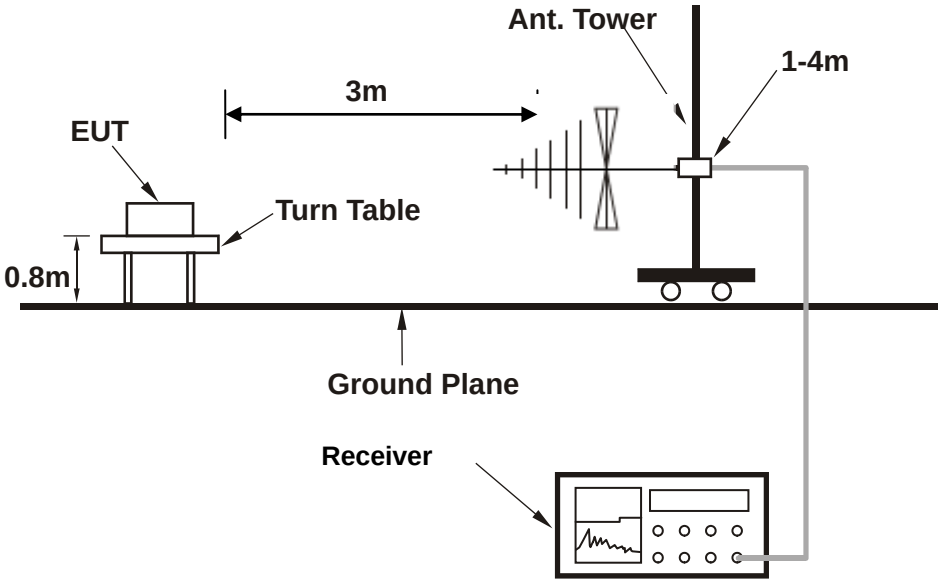
Setup diagram for Conducted Test



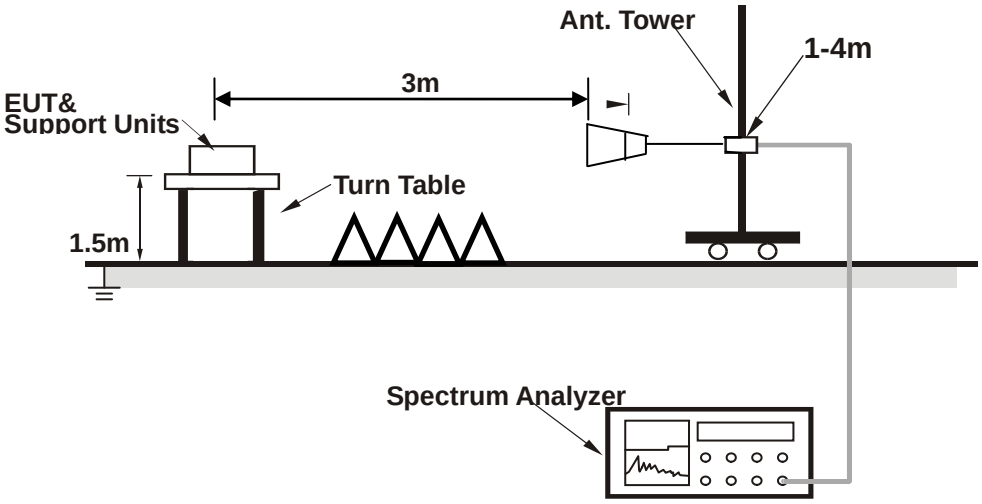
Setup diagram for Raidation(9KHz~30MHz) Test



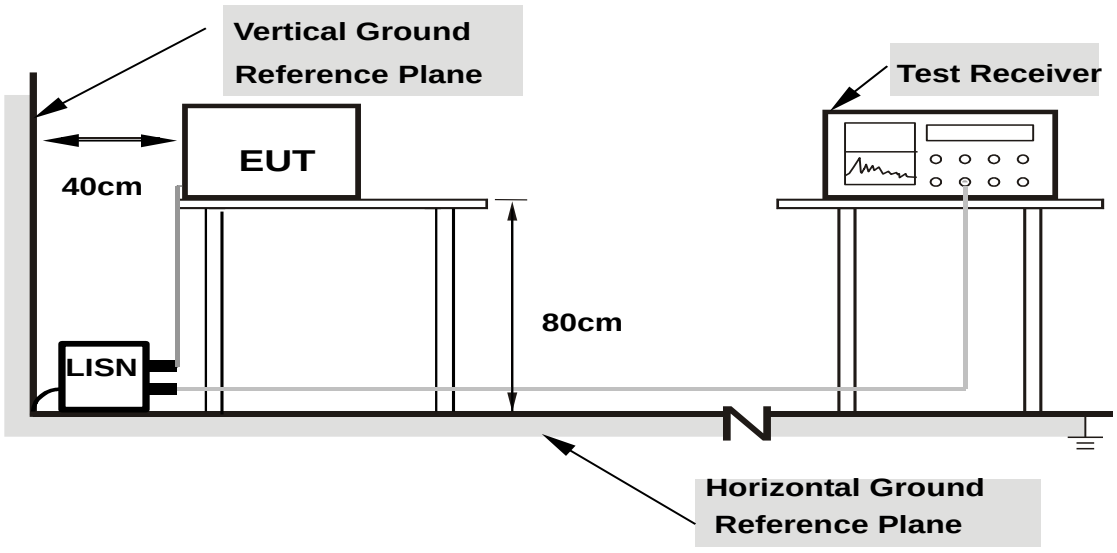
Setup diagram for Raidation(Below 1G) Test



Setup diagram for Raidation(Above1G) Test



Setup diagram for AC Conducted Emission Test



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 5 + 10 = 15 (dB)

4. Test Result

4.1 6dB and 99% Bandwidth Measurement

4.1.1 Limit of 6dB and 99% Bandwidth

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

4.1.2 Test Procedures

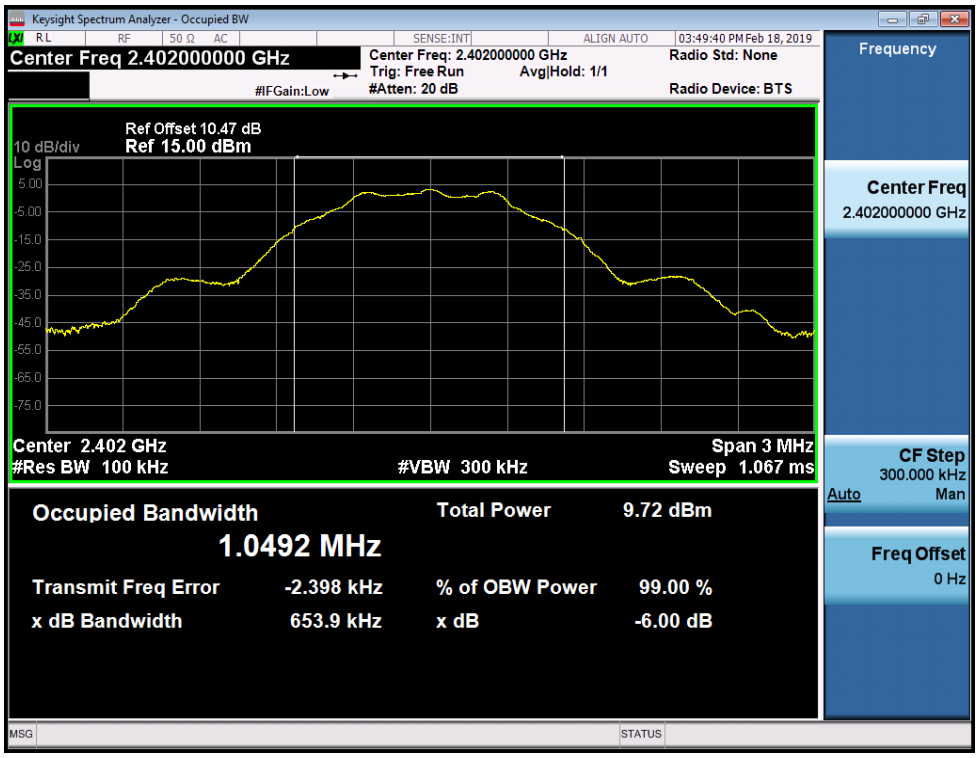
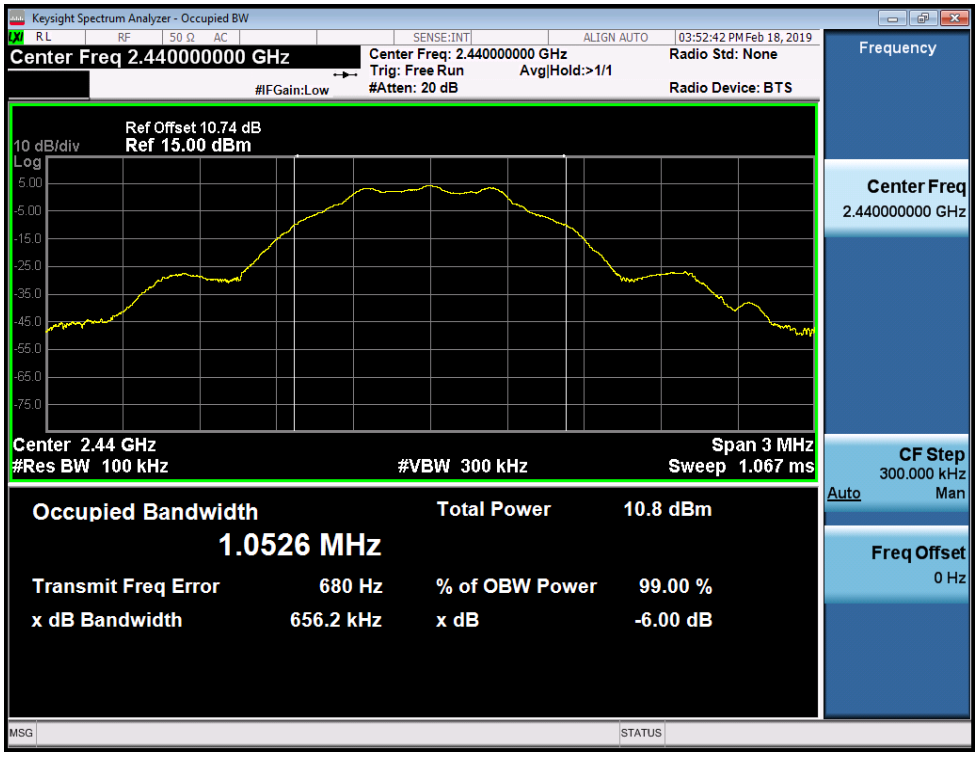
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set to the maximum power setting and enable the EUT transmit continuously
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.

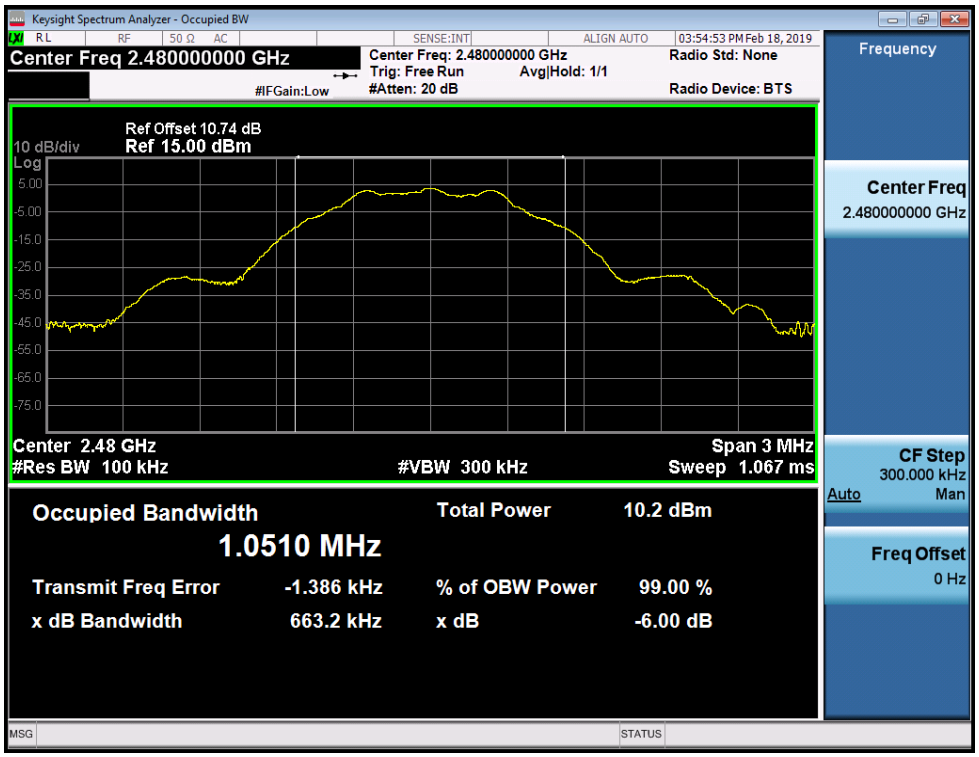
4.1.3 Test Result of 6dB and 99% Bandwidth

Test Mode :	Transmitting	**Temperature :**	24~26℃
Test Engineer :	Damon Zhang	**Relative Humidity :**	50~53%

Data Rate	Modulation	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict
1Mbps	GFSK	LCH	0.6539	1.0492	PASS
1Mbps	GFSK	MCH	0.6562	1.0526	PASS
1Mbps	GFSK	HCH	0.6632	1.0510	PASS

6dB and 99% Bandwidth Plot

Graphs	
LCH	
MCH	

HCH	

Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω
AC
SENSE:INT
ALIGN AUTO
03:54:53 PM Feb 18, 2019
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 1/1
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 10.74 dB
10 dB/div
Ref 15.00 dBm
Log
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1.067 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.0510 MHz
Total Power
10.2 dBm
Transmit Freq Error
-1.386 kHz
% of OBW Power
99.00 %
x dB Bandwidth
663.2 kHz
x dB
-6.00 dB
Freq Offset
0 Hz
MSG
STATUS

4.2 Peak Output Power Measurement

4.2.1 Limit of Peak Output Power

FCC §15.247 (b)(3)

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

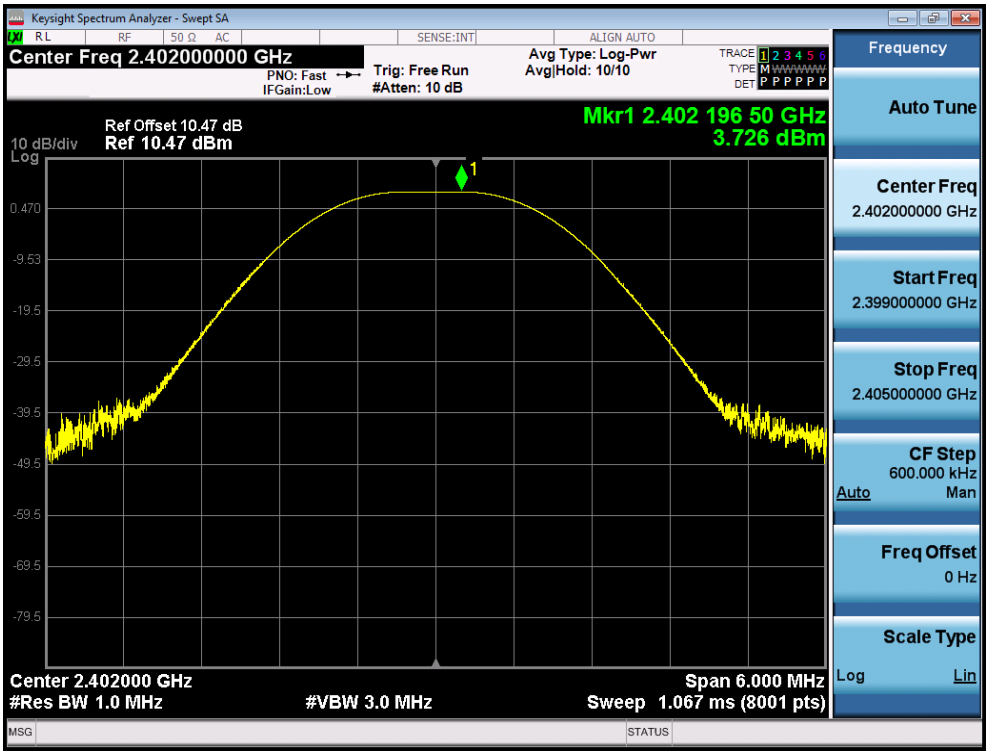
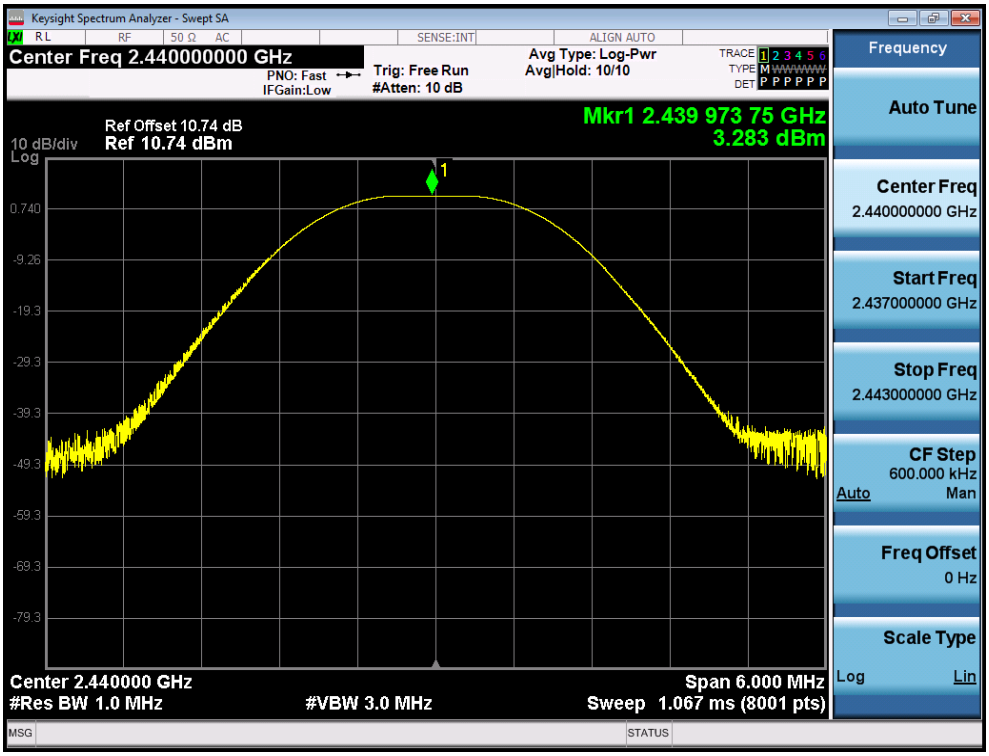
4.2.2 Test Procedures

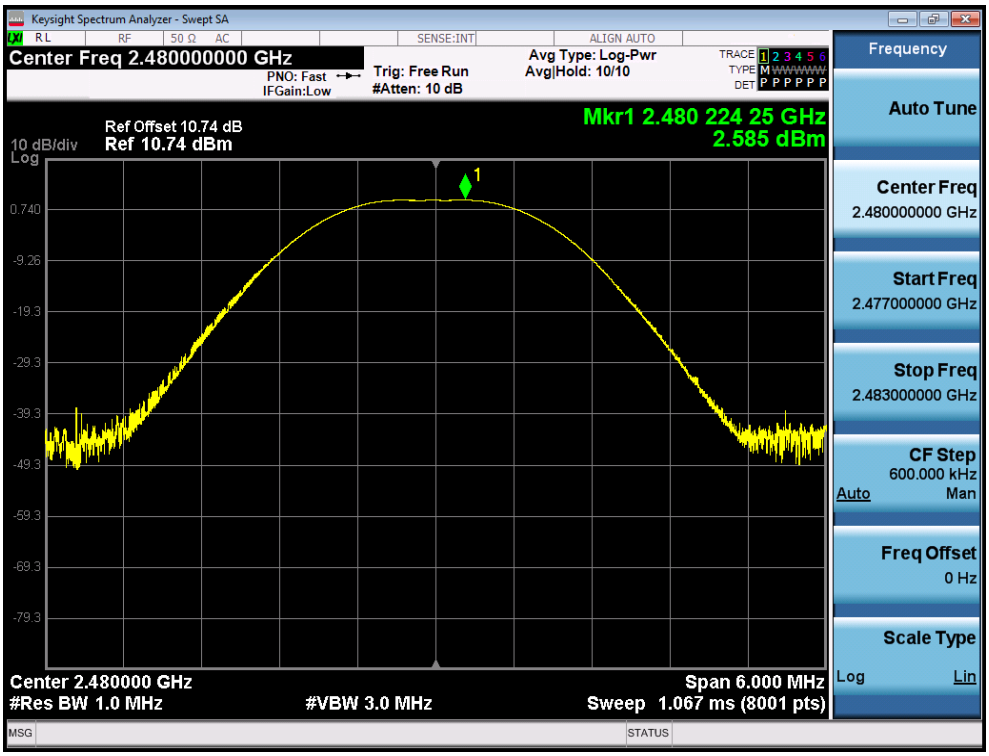
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to spectrum analyzer.
3. Set to the maximum power setting and enable the EUT transmit continuously
4. Set the RBW≥DTS Bandwidth,VBW≥3*RBW,Span≥3*RBW,Detector=Peak,Sweep time=auto couple,Trace mode=max hold.
5. Allow trace to fully stabilize, Use peak marker function to determine the peak amplitude level.
6. Measure the conducted output power

4.2.3 Test Result of Peak Output Power

Test Mode :		Transmitting	**Temperature :**	24~26℃
Test Engineer :		Damon Zhang	**Relative Humidity :**	50~53%
Data Rate	**Modulation**	Channel	**Conduct Peak Power[dBm]**	Verdict
1Mbps	GFSK	LCH	3.726	PASS
1Mbps	GFSK	MCH	3.283	PASS
1Mbps	GFSK	HCH	2.585	PASS

Peak Output Power Plot

Graphs	
LCH	
MCH	

HCH	

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
Ref Offset 10.74 dB
10 dB/div
Log
Ref 10.74 dBm
Mkr1 2.480 224 25 GHz
2.585 dBm
0.740
-9.26
-19.3
-29.3
-39.3
-49.3
-59.3
-69.3
-79.3
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 6.000 MHz
Sweep 1.067 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477000000 GHz
Stop Freq
2.483000000 GHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density

FCC § 15.247(e)

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

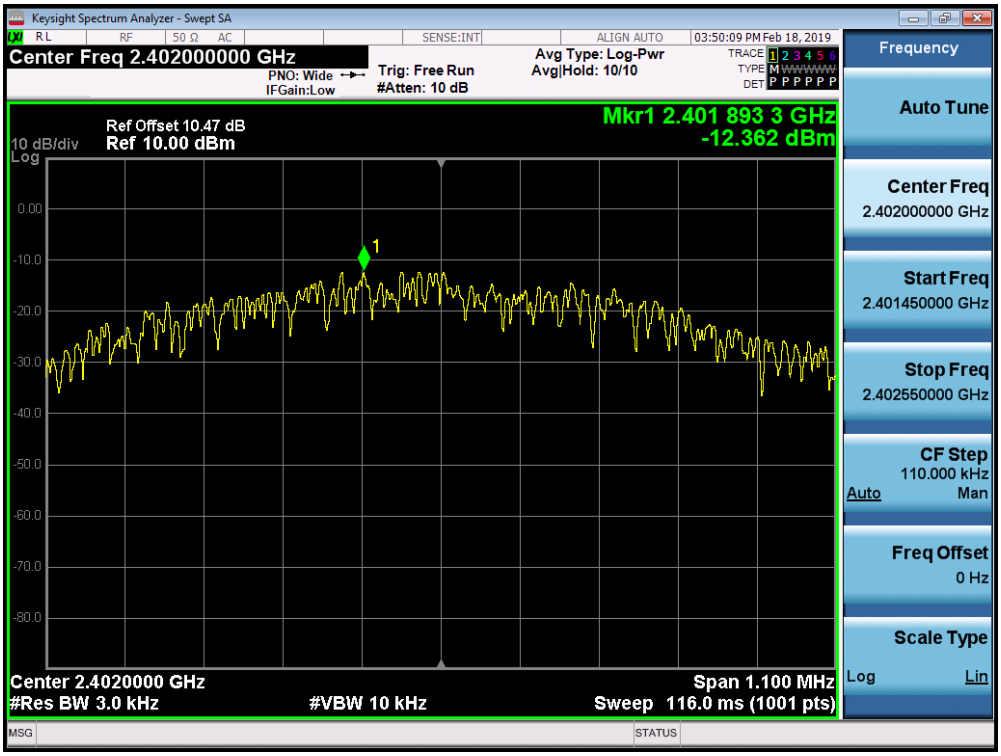
4.3.2 Test Procedure

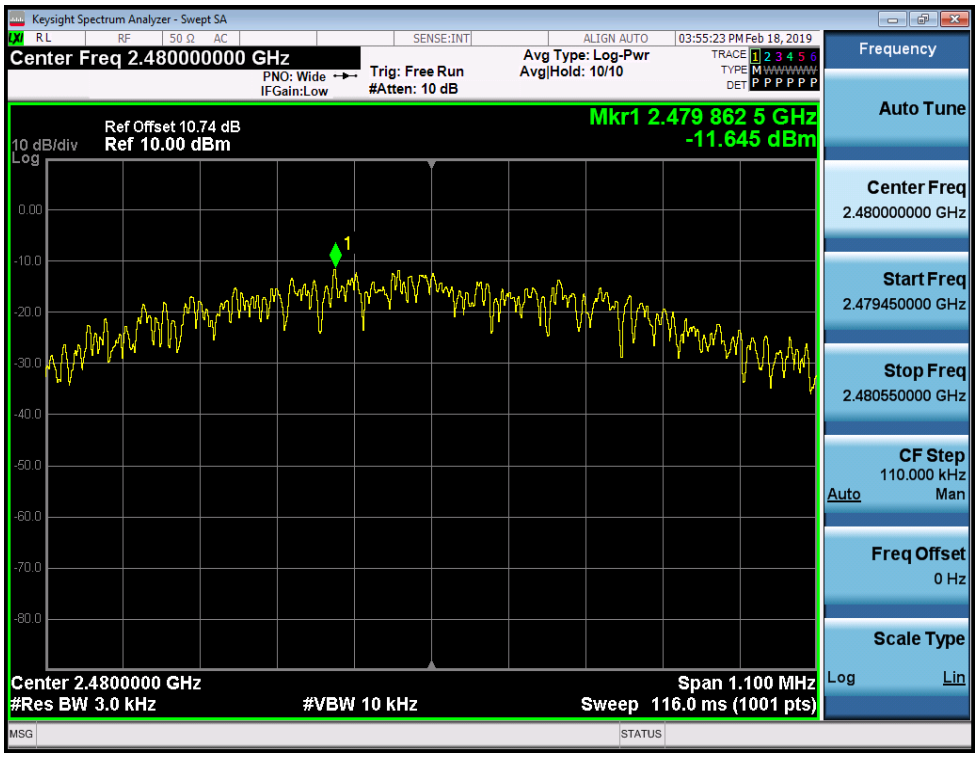
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
4. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
5. Measure and record the results in the test report.
6. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

4.3.3 Test Result of Power Spectral Density

Test Mode :		Transmitting	**Temperature :**	24~26℃
Test Engineer :		Damon Zhang	**Relative Humidity :**	50~53%
Data Rate	**Modulation**	Channel	**PSD [dBm]**	Verdict
1Mbps	GFSK	LCH	-12.362	PASS
1Mbps	GFSK	MCH	-11.468	PASS
1Mbps	GFSK	HCH	-11.645	PASS

Power Spectral Density Plot

Graphs	
LCH	
MCH	

HCH	

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:55:23 PM Feb 18, 2019
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P
Ref Offset 10.74 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.479 862 5 GHz
-11.645 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.100 MHz
Sweep 116.0 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479450000 GHz
Stop Freq
2.480550000 GHz
CF Step
110.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

4.4 Conducted Band Edges and Spurious Emission Measurement

4.4.1 Limit of Conducted Band Edges and Spurious Emission

FCC §15.247 (d)

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

4.4.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

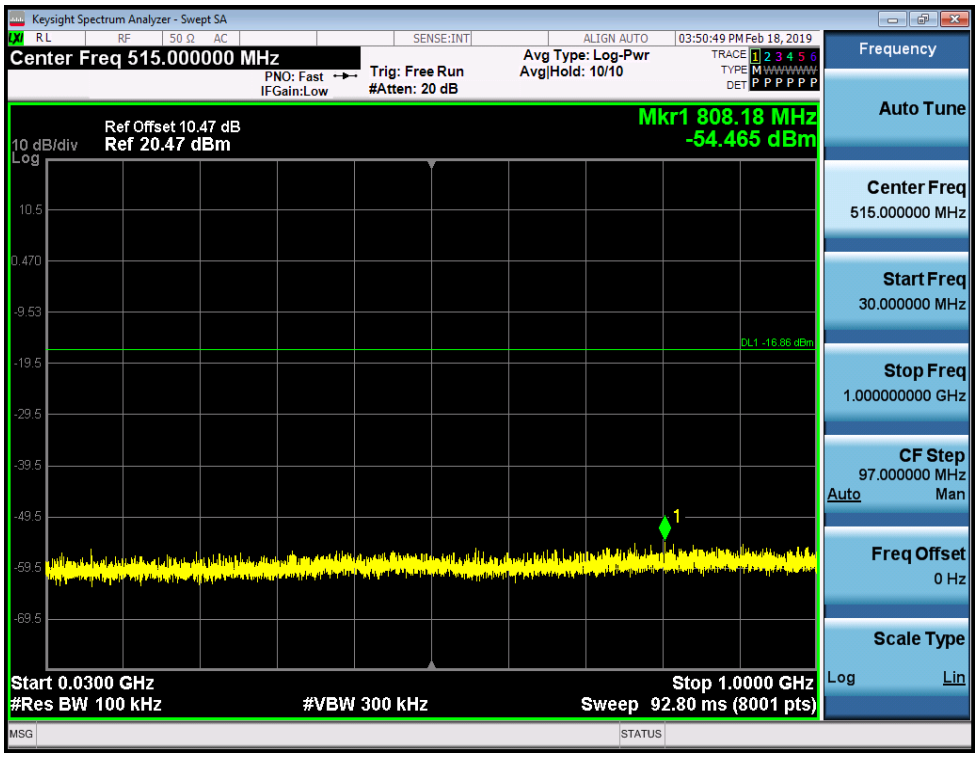
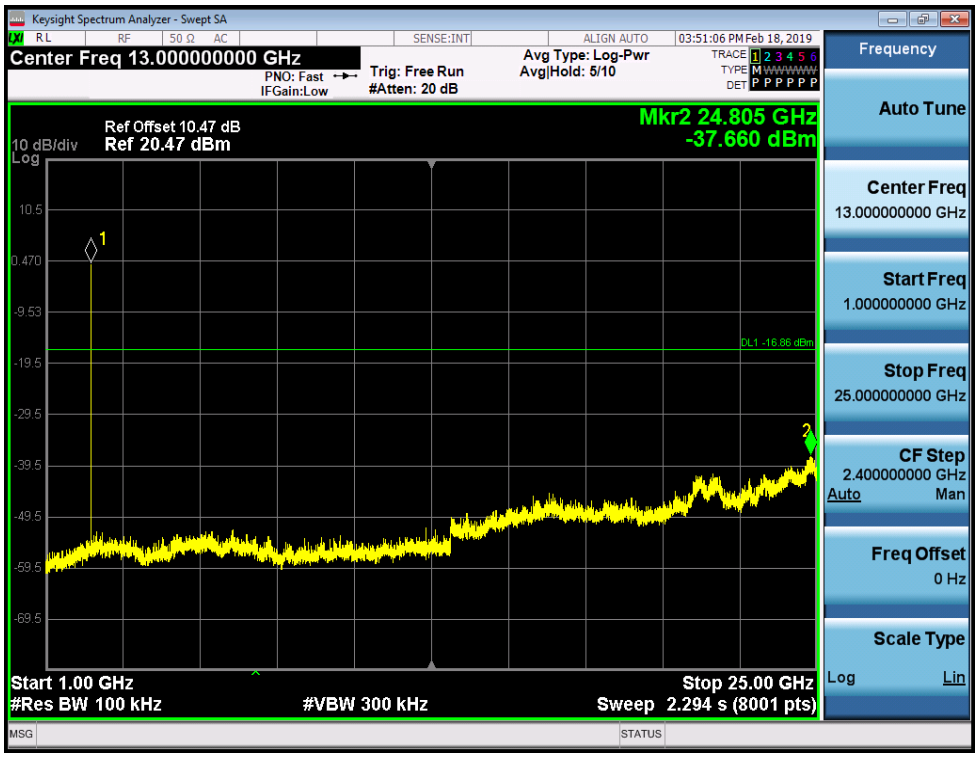
4.4.3 Test Result of Conducted Band Edges and Spurious Emission

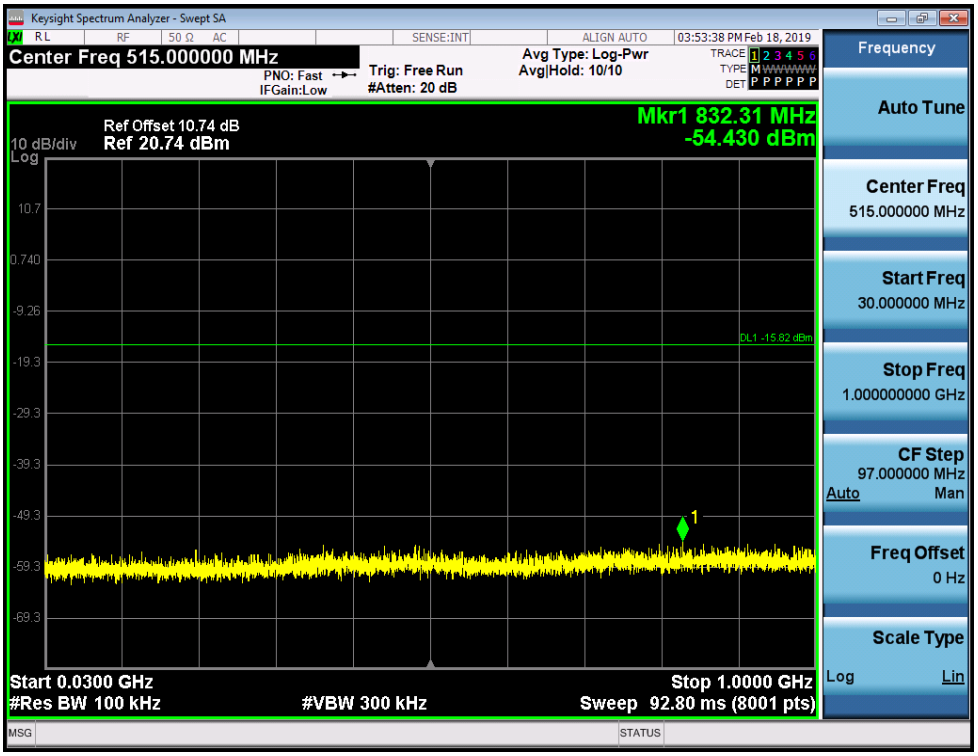
Test Mode :	Transmitting	Temperature :	24~26℃
Test Engineer :	Damon Zhang	Relative Humidity :	50~53%

Data Rate	Modulation	Channel	Pref [dBm]	Puw[dBm]	Verdict
1Mbps	GFSK	LCH	3.139	<Limit	PASS
1Mbps	GFSK	MCH	4.177	<Limit	PASS
1Mbps	GFSK	HCH	3.624	<Limit	PASS

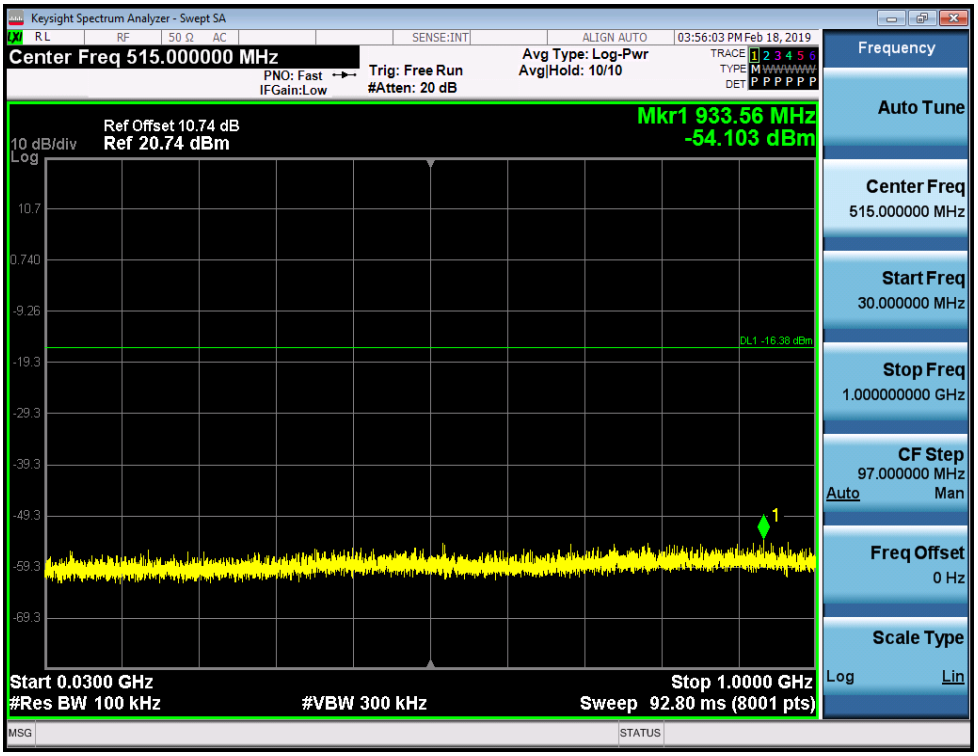
Conducted Band Edges and Spurious Emission Plot

BLE_LCH_Graphs	
Pref/BLE/LCH	

Puw/BLE/LCH	 

BLE_MCH_Graphs	
Pref/BLE/MCH	
Puw/BLE/MCH	


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:53:55 PM Feb 18, 2019
Center Freq 13.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 5/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P
Ref Offset 10.74 dB
10 dB/div
Log
Ref 20.74 dBm
Mkr2 24.859 GHz
-36.705 dBm
10.7
0.740
-9.26
-19.3
-29.3
-39.3
-49.3
-59.3
-69.3
DL1 -15.82 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.294 s (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
13.000000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.400000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

BLE_HCH_Graphs	
Pref/BLE/HCH	
Puw/BLE/HCH	


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:56:20 PM Feb 18, 2019
Center Freq 13.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 5/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P
Ref Offset 10.74 dB
10 dB/div
Log
Ref 20.74 dBm
Mkr2 24.775 GHz
-37.598 dBm
10.7
0.740
-9.26
-19.3
-29.3
-39.3
-49.3
-59.3
-69.3
DL1 -16.38 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.294 s (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
13.000000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
2.400000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

4.5 Radiated Band Edges and Spurious Emission Measurement

4.5.1 Limit of Radiated Band Edges and Spurious Emission

FCC §15.247 (d)

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

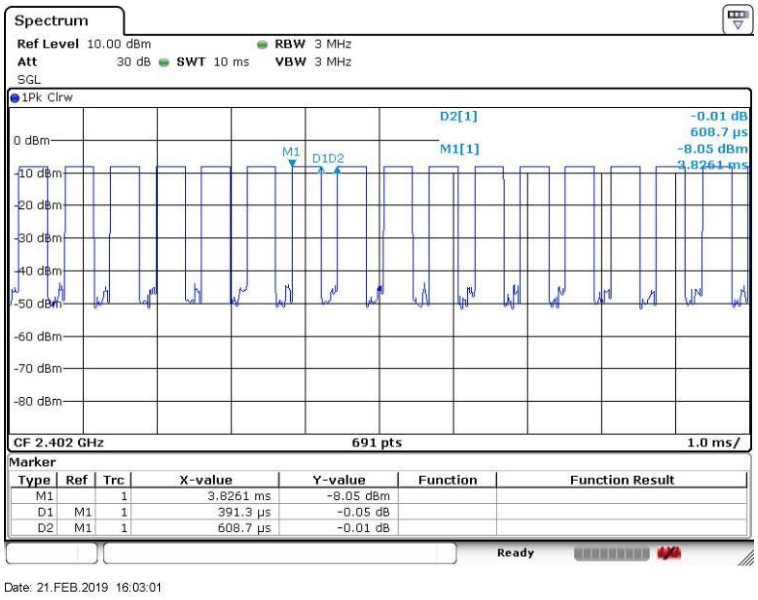
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The frequency range from 9KHz to 10th harmonic (25GHz) are checked, and no any emissions were found from 18GHz to 25GHz, So the radiated emissions from 18GHz to 25GHz were not record.

4.5.2 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The measurement distance is 3 meter.
3. For each suspected emission, 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 to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=120 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement:
   VBW = 10 Hz, when duty cycle is no less than 98 percent.
   VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth 4.0 - LE	64.28	0.3913	2.56	3kHz



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

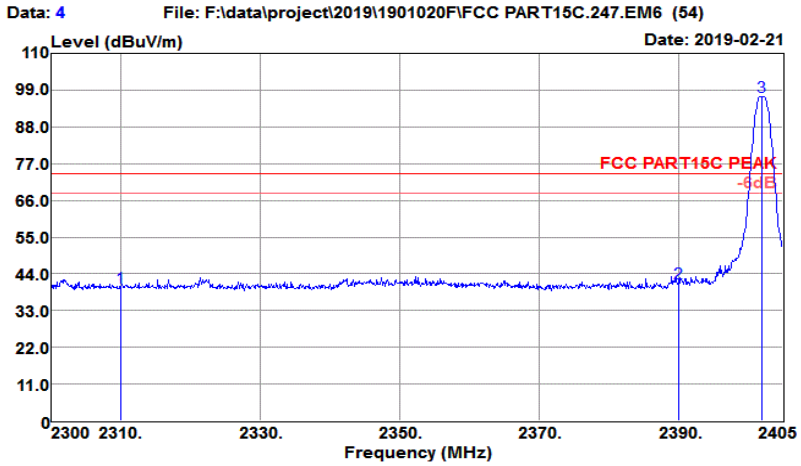
4.5.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

4.5.4 Test Result of Radiated Spurious at Band Edges

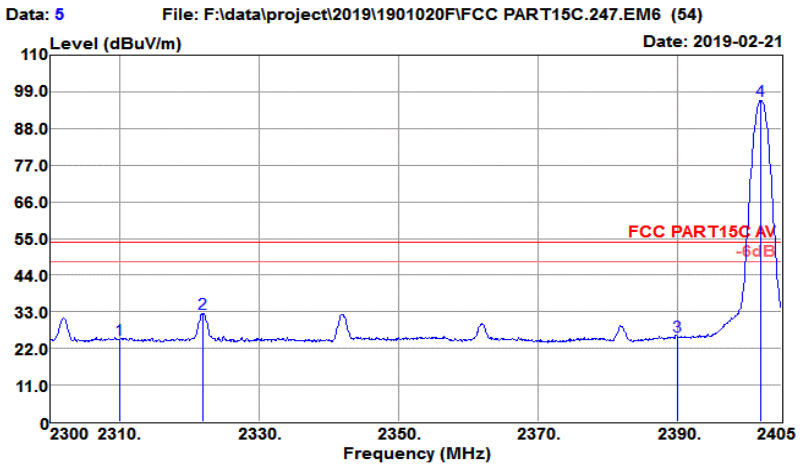
Low Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
2310.000	45.22	26.91	3.56	35.87	39.82	74.00	-34.18	Peak
2390.000	46.64	27.11	3.64	36.08	41.31	74.00	-32.69	Peak
2402.000	102.41	27.15	3.65	36.11	97.10	74.00	23.10	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2310.000	30.00	26.91	3.56	35.87	24.60	54.00	-29.40	Average
2321.945	37.92	26.94	3.57	35.90	32.53	54.00	-21.47	Average
2390.000	30.85	27.11	3.64	36.08	25.52	54.00	-28.48	Average
2402.060	101.81	27.15	3.65	36.11	96.50	54.00	42.50	Average

Low Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		

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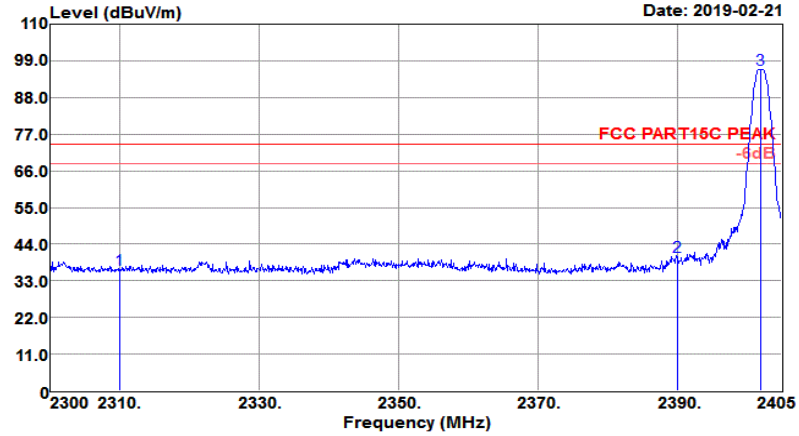
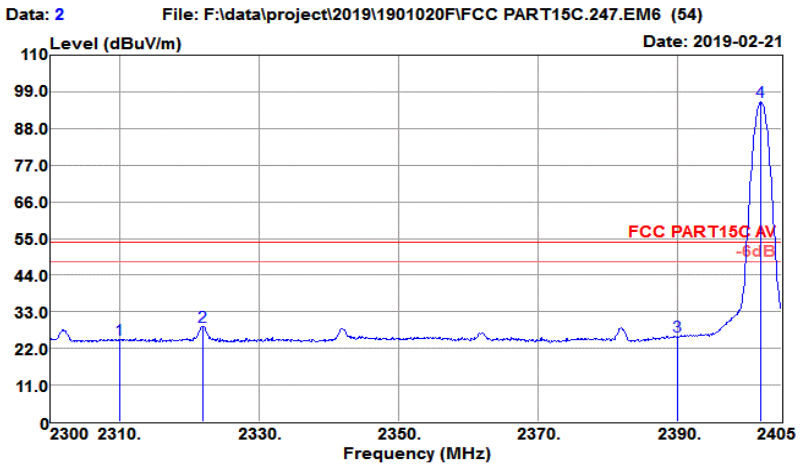


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
2310.000	41.64	26.91	3.56	35.87	36.24	74.00	-37.76	Peak
2390.000	45.55	27.11	3.64	36.08	40.22	74.00	-33.78	Peak
2402.000	101.74	27.15	3.65	36.11	96.43	74.00	22.43	Peak

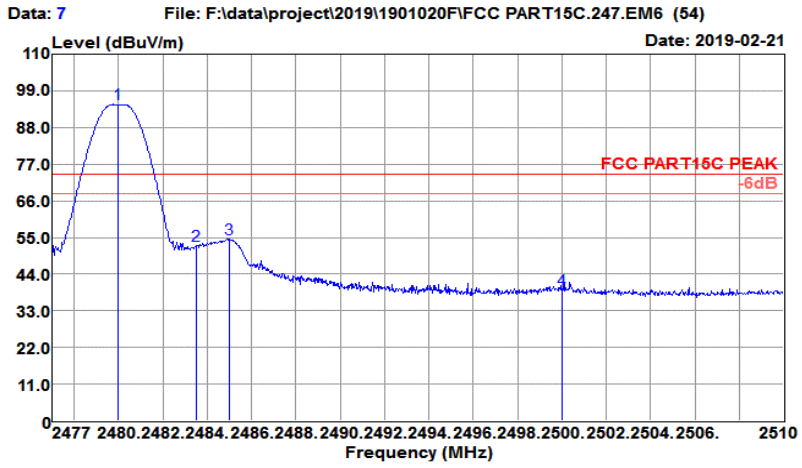
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2310.000	30.13	26.91	3.56	35.87	24.73	54.00	-29.27	Average
2321.945	34.09	26.94	3.57	35.90	28.70	54.00	-25.30	Average
2390.000	30.93	27.11	3.64	36.08	25.60	54.00	-28.40	Average
2402.000	101.23	27.15	3.65	36.11	95.92	54.00	41.92	Average

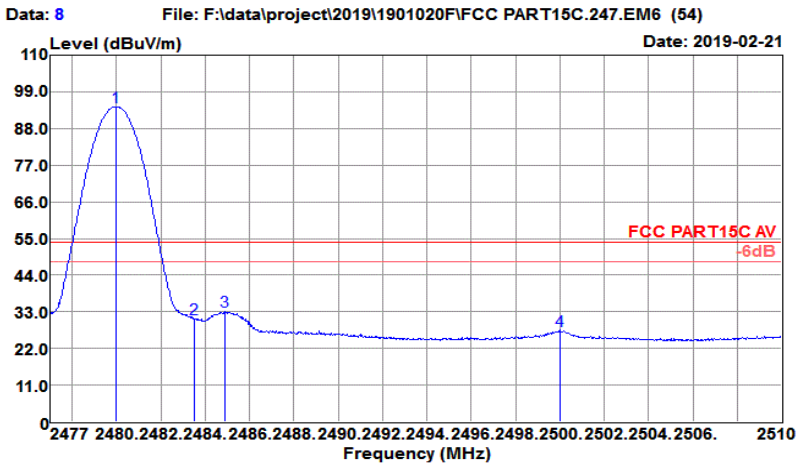
High Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2480.000	100.22	27.35	3.68	36.32	94.93	74.00	20.93	Peak
2483.500	57.92	27.36	3.68	36.33	52.63	74.00	-21.37	Peak
2484.986	59.75	27.36	3.68	36.33	54.46	74.00	-19.54	Peak
2500.000	44.48	27.40	3.68	36.37	39.19	74.00	-34.81	Peak

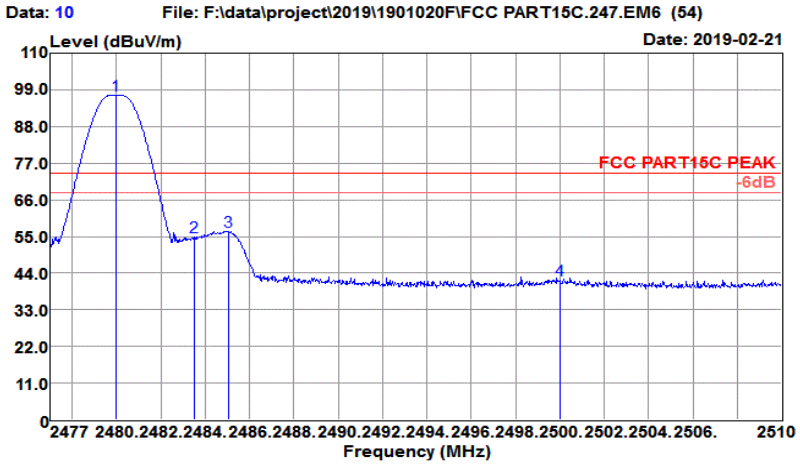
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
2480.000	99.84	27.35	3.68	36.32	94.55	54.00	40.55	Average
2483.500	36.00	27.36	3.68	36.33	30.71	54.00	-23.29	Average
2484.887	38.32	27.36	3.68	36.33	33.03	54.00	-20.97	Average
2500.000	32.64	27.40	3.68	36.37	27.35	54.00	-26.65	Average

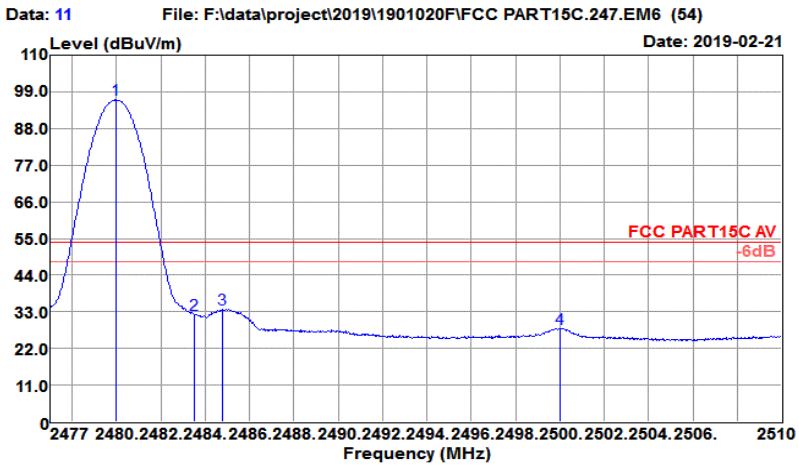
High Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2480.000	102.68	27.35	3.68	36.32	97.39	74.00	23.39	Peak
2483.500	60.06	27.36	3.68	36.33	54.77	74.00	-19.23	Peak
2485.052	61.91	27.36	3.68	36.33	56.62	74.00	-17.38	Peak
2500.000	47.15	27.40	3.68	36.37	41.86	74.00	-32.14	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		

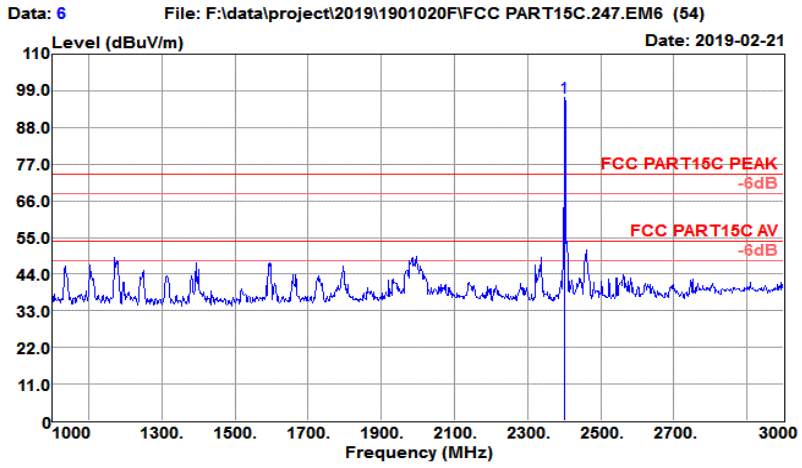


Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2480.000	101.85	27.35	3.68	36.32	96.56	54.00	42.56	Average
2483.500	37.47	27.36	3.68	36.33	32.18	54.00	-21.82	Average
2484.788	39.16	27.36	3.68	36.33	33.87	54.00	-20.13	Average
2500.000	33.33	27.40	3.68	36.37	28.04	54.00	-25.96	Average

4.5.5 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)

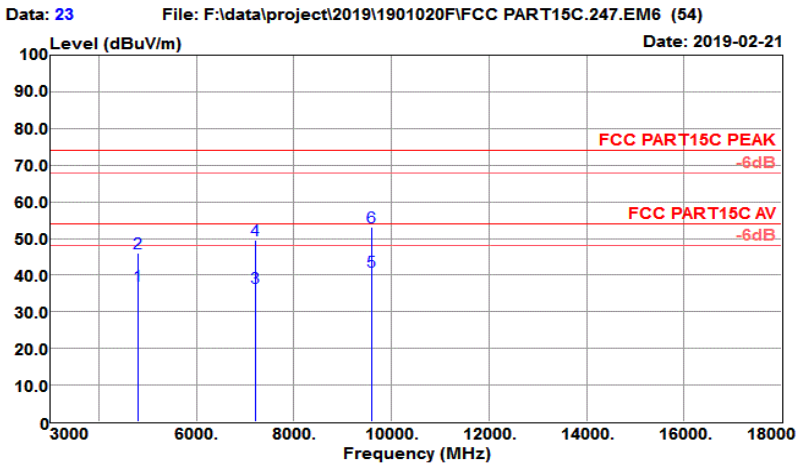
Low Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



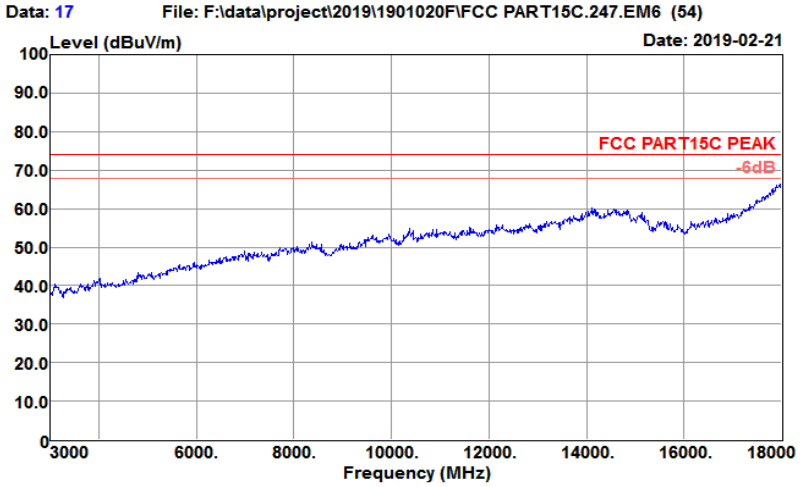
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2402.000	102.31	27.15	3.65	36.11	97.00	74.00	23.00	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
4804.000	36.68	31.23	5.45	36.27	37.09	54.00	-16.91	Average
4804.000	45.66	31.23	5.45	36.27	46.07	74.00	-27.93	Peak
7206.000	28.03	35.87	6.94	34.25	36.59	54.00	-17.41	Average
7206.000	41.06	35.87	6.94	34.25	49.62	74.00	-24.38	Peak
9608.000	29.56	37.79	7.77	34.13	40.99	54.00	-13.01	Average
9608.000	41.56	37.79	7.77	34.13	52.99	74.00	-21.01	Peak

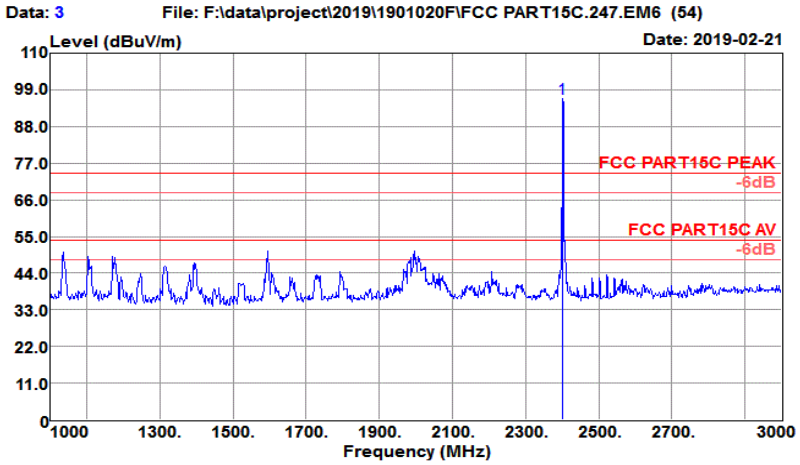
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Note: Emission was scanned up to 25GHz,there is only a base noise above 18GHz, so it is not recorded in the report

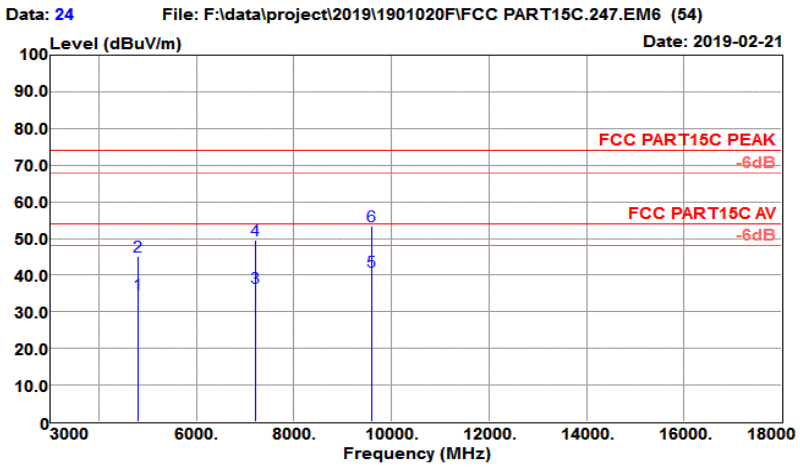
Low Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



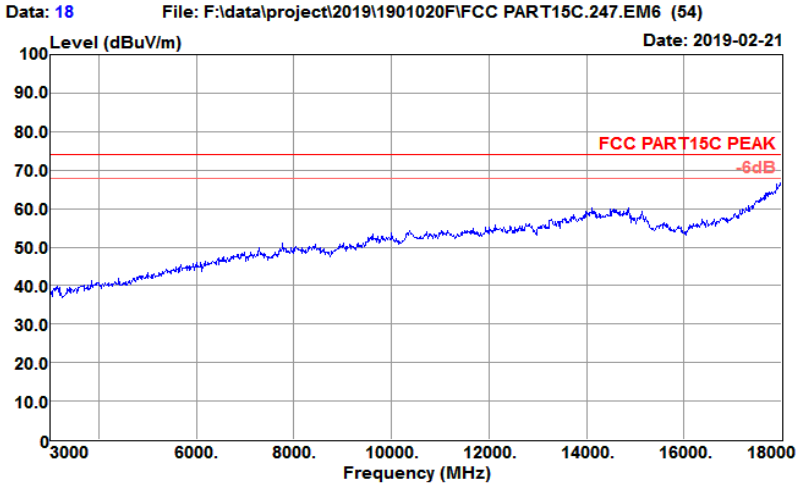
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2402.000	101.85	27.15	3.65	36.11	96.54	74.00	22.54	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
4804.000	34.33	31.23	5.45	36.27	34.74	54.00	-19.26	Average
4804.000	44.82	31.23	5.45	36.27	45.23	74.00	-28.77	Peak
7206.000	28.10	35.87	6.94	34.25	36.66	54.00	-17.34	Average
7206.000	41.08	35.87	6.94	34.25	49.64	74.00	-24.36	Peak
9608.000	29.48	37.79	7.77	34.13	40.91	54.00	-13.09	Average
9608.000	41.84	37.79	7.77	34.13	53.27	74.00	-20.73	Peak

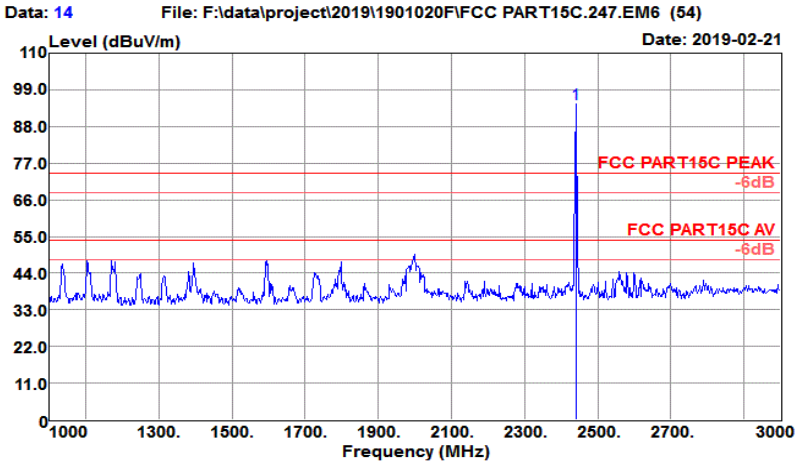
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Note: Emission was scanned up to 25GHz,there is only a base noise above 18GHz, so it is not recorded in the report

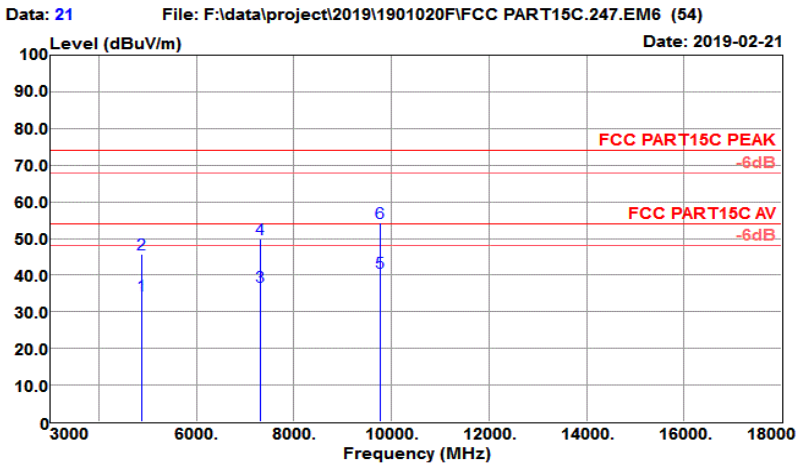
Middle Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH19(2440MHz)		



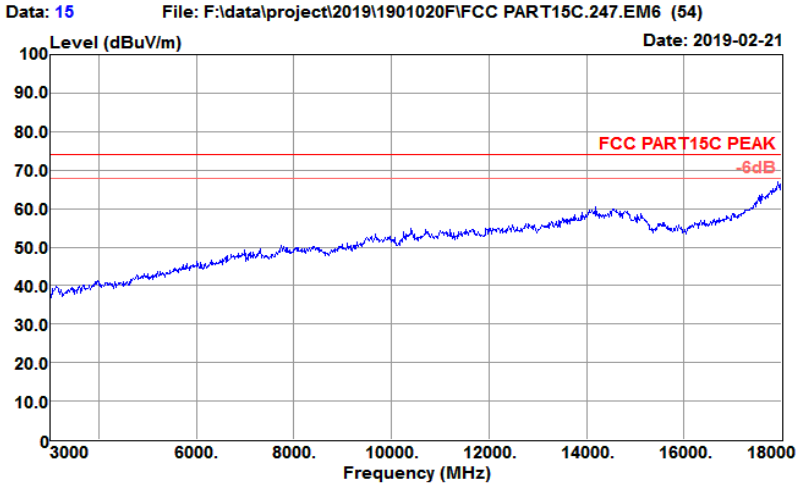
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2440.000	100.16	27.24	3.66	36.21	94.85	74.00	20.85	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH19(2440MHz)		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
4880.000	33.96	31.41	5.41	36.24	34.54	54.00	-19.46	Average
4880.000	45.07	31.41	5.41	36.24	45.65	74.00	-28.35	Peak
7320.000	27.96	36.14	7.27	34.35	37.02	54.00	-16.98	Average
7320.000	40.91	36.14	7.27	34.35	49.97	74.00	-24.03	Peak
9760.000	28.74	38.07	7.98	34.19	40.60	54.00	-13.40	Average
9760.000	42.32	38.07	7.98	34.19	54.18	74.00	-19.82	Peak

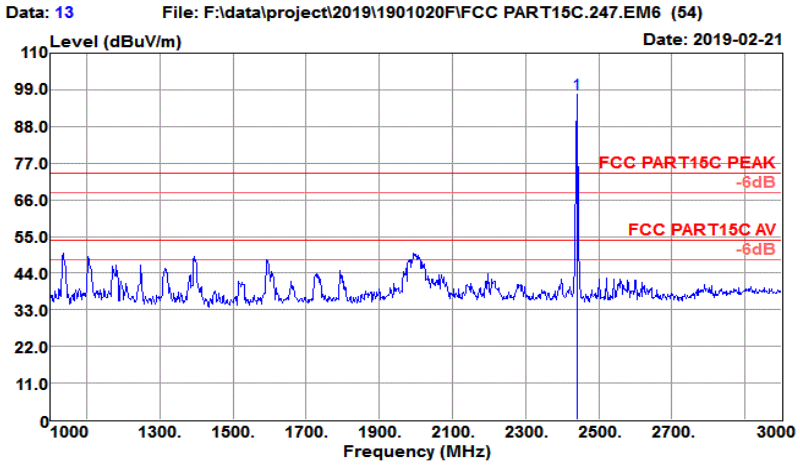
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH19(2440MHz)		



Note: Emission was scanned up to 25GHz,there is only a base noise above 18GHz, so it is not recorded in the report

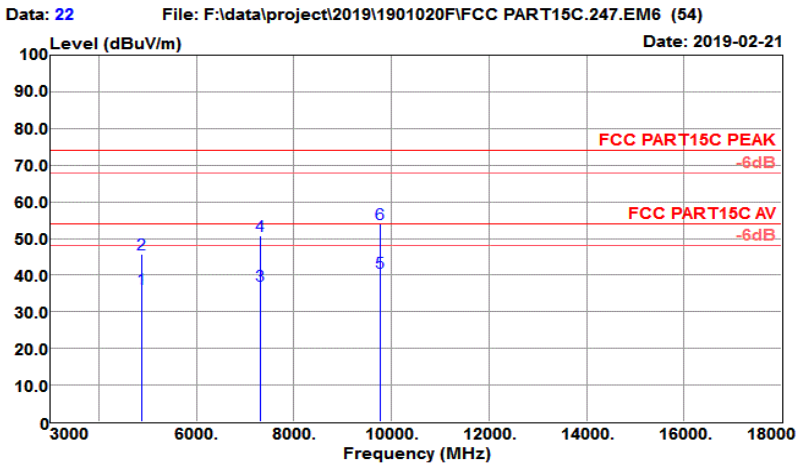
Middle Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH19(2440MHz)		



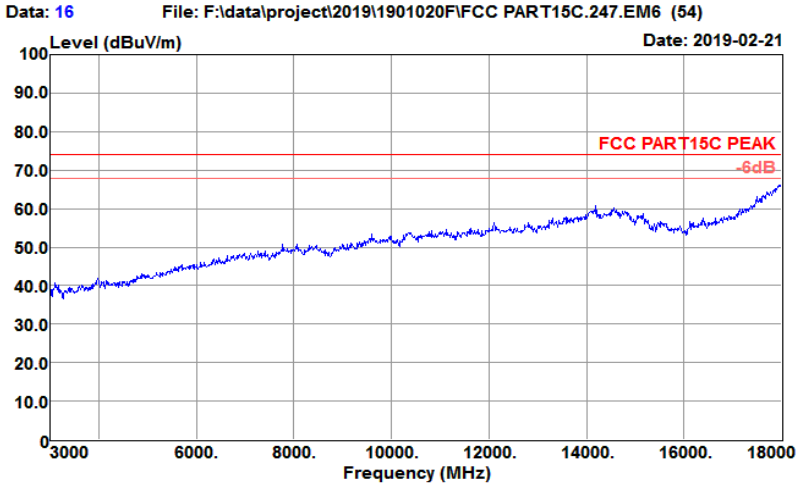
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2440.000	103.14	27.24	3.66	36.21	97.83	74.00	23.83	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH19(2440MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
4880.000	35.66	31.41	5.41	36.24	36.24	54.00	-17.76	Average
4880.000	45.11	31.41	5.41	36.24	45.69	74.00	-28.31	Peak
7320.000	28.14	36.14	7.27	34.35	37.20	54.00	-16.80	Average
7320.000	41.81	36.14	7.27	34.35	50.87	74.00	-23.13	Peak
9760.000	29.00	38.07	7.98	34.19	40.86	54.00	-13.14	Average
9760.000	42.27	38.07	7.98	34.19	54.13	74.00	-19.87	Peak

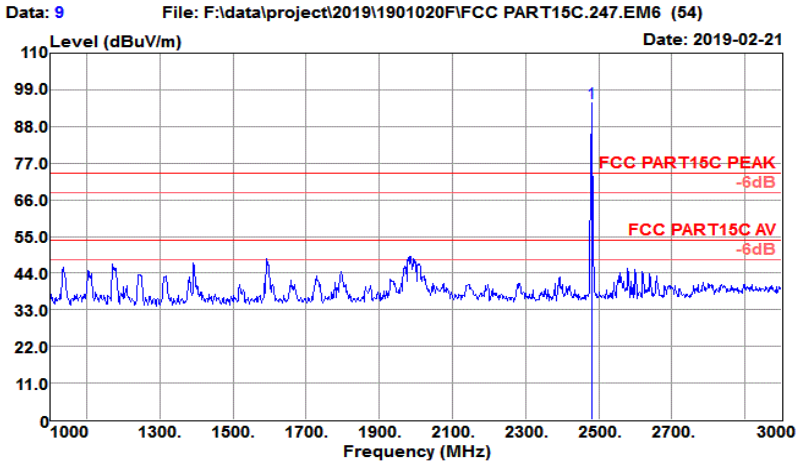
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH19(2440MHz)		



Note: Emission was scanned up to 25GHz,there is only a base noise above 18GHz, so it is not recorded in the report

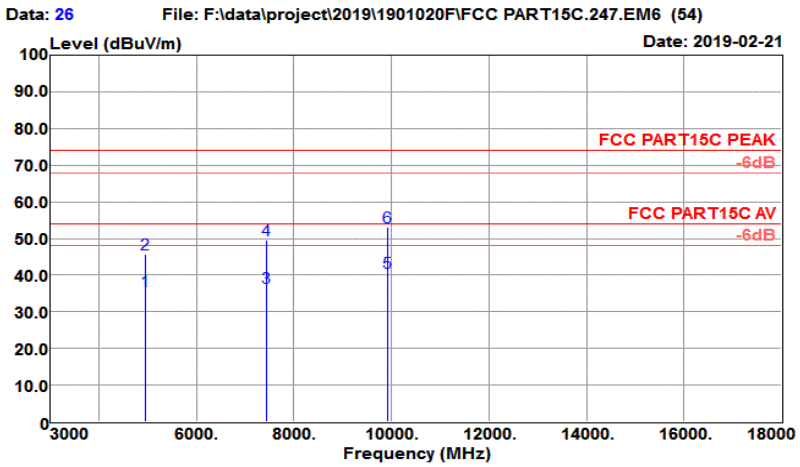
High Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



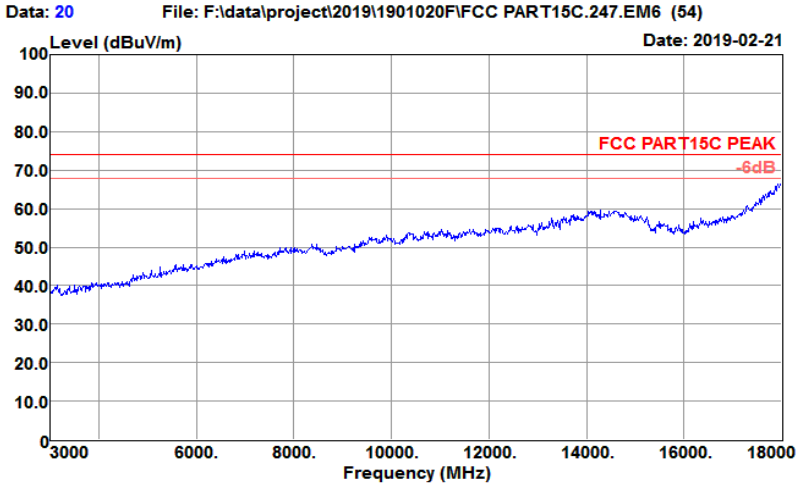
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2480.000	100.40	27.35	3.68	36.32	95.11	74.00	21.11	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
4960.000	34.81	31.60	5.36	36.21	35.56	54.00	-18.44	Average
4960.000	44.95	31.60	5.36	36.21	45.70	74.00	-28.30	Peak
7440.000	27.16	36.41	7.44	34.47	36.54	54.00	-17.46	Average
7440.000	40.34	36.41	7.44	34.47	49.72	74.00	-24.28	Peak
9920.000	28.67	38.36	8.05	34.26	40.82	54.00	-13.18	Average
9920.000	41.08	38.36	8.05	34.26	53.23	74.00	-20.77	Peak

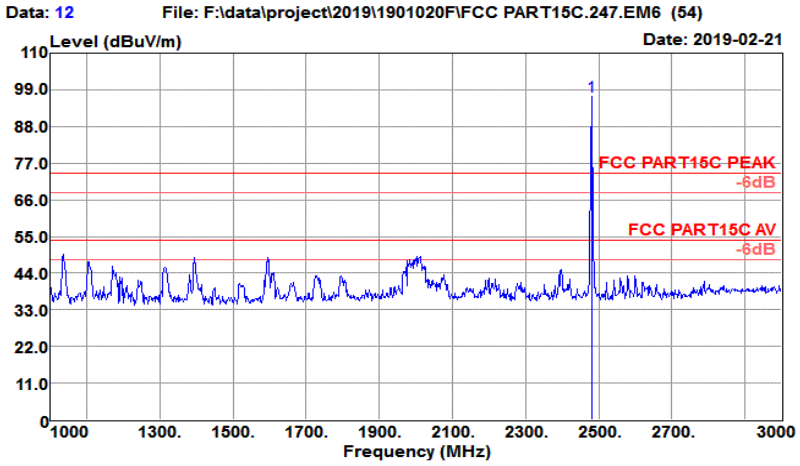
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: HORIZONTAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



Note: Emission was scanned up to 25GHz,there is only a base noise above 18GHz, so it is not recorded in the report

High Channel Vertical:

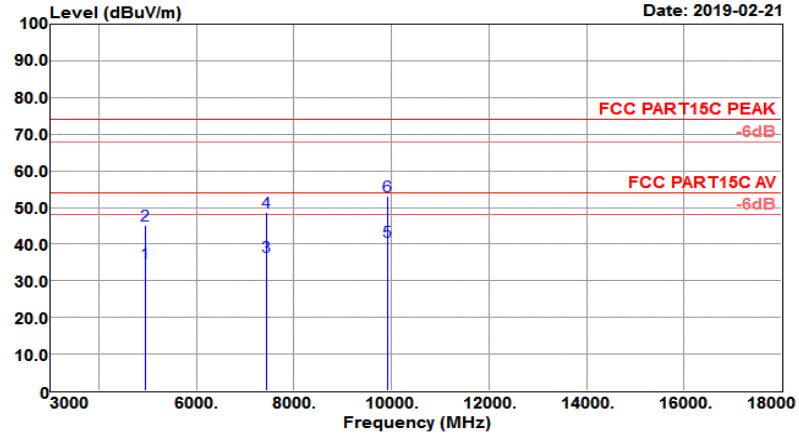
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
2480.000	102.45	27.35	3.68	36.32	97.16	74.00	23.16	Peak

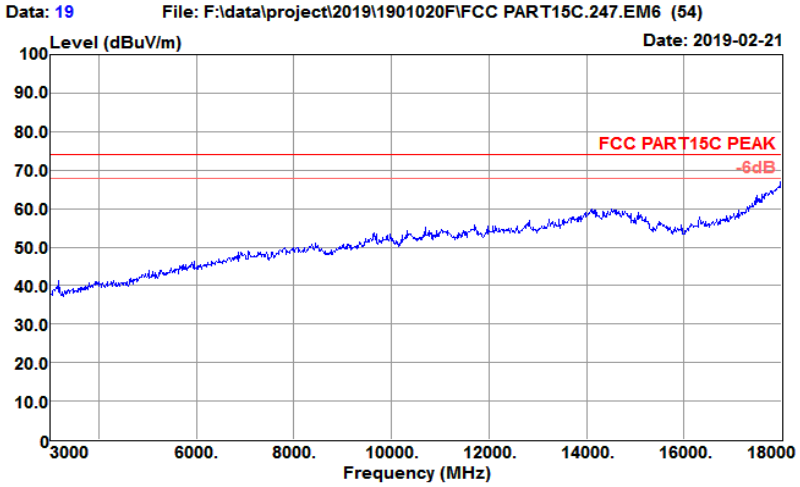
Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		

Data: 25 File: F:\data\project\2019\1901020F\FCC PART15C.247.EM6 (54)



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
4960.000	34.15	31.60	5.36	36.21	34.90	54.00	-19.10	Average
4960.000	44.26	31.60	5.36	36.21	45.01	74.00	-28.99	Peak
7440.000	27.10	36.41	7.44	34.47	36.48	54.00	-17.52	Average
7440.000	39.41	36.41	7.44	34.47	48.79	74.00	-25.21	Peak
9920.000	28.70	38.36	8.05	34.26	40.85	54.00	-13.15	Average
9920.000	41.10	38.36	8.05	34.26	53.25	74.00	-20.75	Peak

Test Site	: 3m Chamber	Temp/Humi	: 17℃/56%
Tested by	: Damon	Power rating	: AC120V/60Hz
Model No.	: GK-MWZE501	Pol/Phase	: VERTICAL
EUT	: all in one		
Test Mode	: Bluetooth 4.2-LE CH39(2480MHz)		

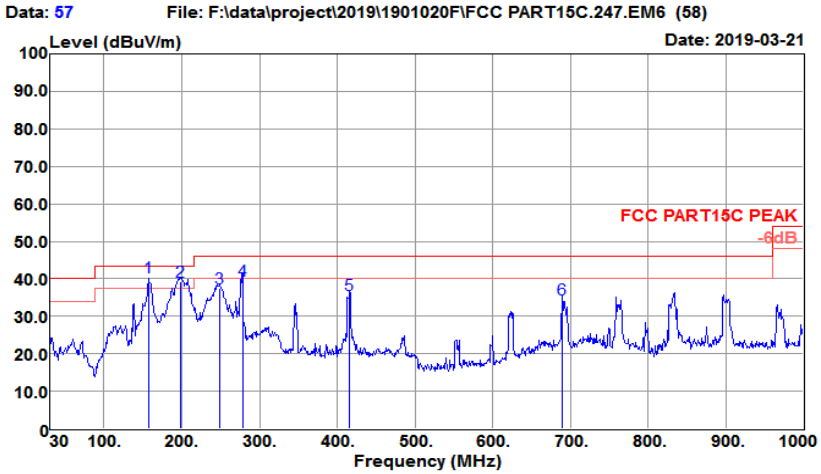


Note: Emission was scanned up to 25GHz,there is only a base noise above 18GHz, so it is not recorded in the report

4.5.6 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Horizontal:

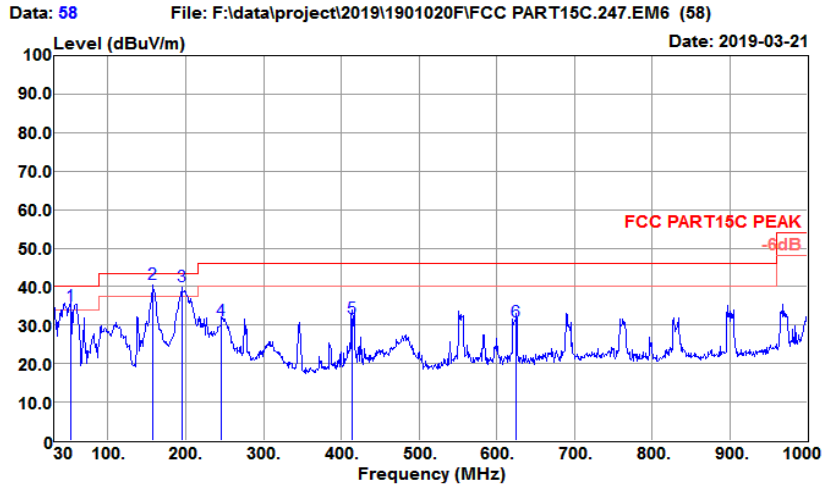
Test Site	: 3m Chamber	Temp/Humi	: 19℃/60%
Tested by	: Damon	Power rating	: AC120V/60Hz
EUT	: all in one	Pol/Phase	: HORIZONTAL
Model No.	: GK-MWZE501		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
158.040	56.32	14.20	2.47	32.51	40.48	43.50	-3.02	QP
197.810	59.00	10.03	2.80	32.55	39.28	43.50	-4.22	QP
249.220	55.56	11.38	3.20	32.53	37.61	46.00	-8.39	QP
278.320	56.45	12.25	3.31	32.53	39.48	46.00	-6.52	QP
416.060	49.07	15.07	4.09	32.48	35.75	46.00	-10.25	QP
689.600	42.27	19.56	5.50	32.77	34.56	46.00	-11.44	QP

Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 19℃/60%
Tested by	: Damon	Power rating	: AC120V/60Hz
EUT	: all in one	Pol/Phase	: VERTICAL
Model No.	: GK-MWZE501		
Test Mode	: Bluetooth 4.2-LE CH00(2402MHz)		



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV	dBuV/m	dB	
51.340	52.85	13.39	1.41	32.58	35.07	40.00	-4.93	QP
158.040	56.63	14.20	2.47	32.51	40.79	43.50	-2.71	QP
194.900	59.64	10.21	2.79	32.55	40.09	43.50	-3.41	QP
246.310	49.27	11.29	3.16	32.53	31.19	46.00	-14.81	QP
414.120	45.32	15.04	4.08	32.48	31.96	46.00	-14.04	QP
625.580	40.02	18.73	5.07	32.71	31.11	46.00	-14.89	QP

4.6 AC Conducted Emission Measurement

4.6.1 Limit of AC Conducted Emission

FCC §15.207

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

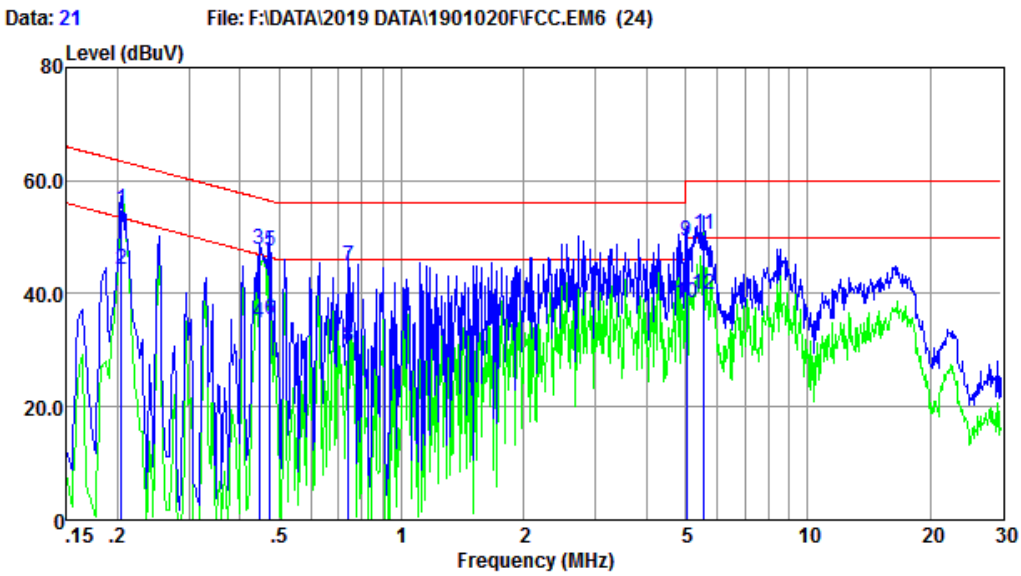
*Decreases with the logarithm of the frequency.

4.6.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

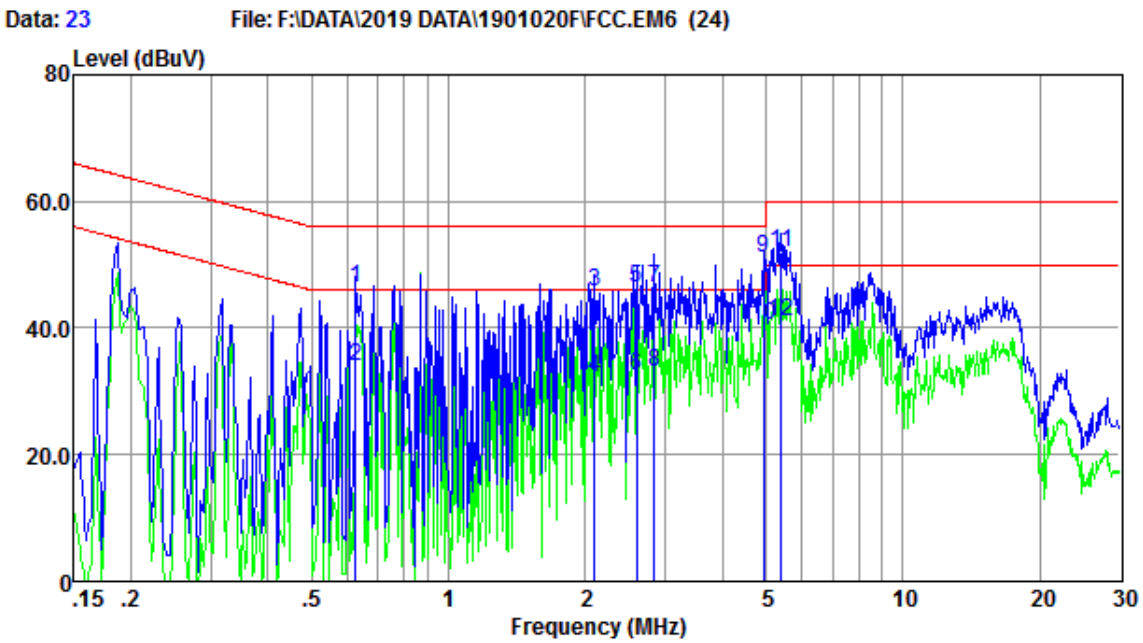
4.6.3 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Damon Zhang	**Relative Humidity :**	41~43%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	Mode 1		



Freq	Reading level	LISN/ISN factor	Cable loss		Limit level	Over limit	Remark
MHz	dBuV	dB	dB	level dBuV	dBuV	dB	
0.204	45.20	9.56	0.01	54.77	63.45	-8.68	QP
0.204	34.60	9.56	0.01	44.17	53.45	-9.28	Average
0.447	38.10	9.58	0.02	47.70	56.93	-9.23	QP
0.447	25.10	9.58	0.02	34.70	46.93	-12.23	Average
0.474	38.00	9.58	0.02	47.60	56.45	-8.85	QP
0.474	25.70	9.58	0.02	35.30	46.45	-11.15	Average
0.739	35.21	9.59	0.03	44.83	56.00	-11.17	QP
0.739	21.00	9.59	0.03	30.62	46.00	-15.38	Average
5.031	39.60	9.67	0.03	49.30	60.00	-10.70	QP
5.031	28.70	9.67	0.03	38.40	50.00	-11.60	Average
5.564	40.70	9.68	0.03	50.41	60.00	-9.59	QP
5.564	30.10	9.68	0.03	39.81	50.00	-10.19	Average

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Damon Zhang	Relative Humidity :	41~43%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Mode1		



Freq	Reading level	LISN/ISN factor	Cable loss	Limit level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.624	36.60	9.63	0.03	46.26	56.00	-9.74	QP
0.624	24.20	9.63	0.03	33.86	46.00	-12.14	Average
2.099	36.10	9.65	0.03	45.78	56.00	-10.22	QP
2.099	22.40	9.65	0.03	32.08	46.00	-13.92	Average
2.594	36.60	9.66	0.03	46.29	56.00	-9.71	QP
2.594	22.80	9.66	0.03	32.49	46.00	-13.51	Average
2.839	36.70	9.67	0.03	46.40	56.00	-9.60	QP
2.839	23.30	9.67	0.03	33.00	46.00	-13.00	Average
4.926	41.20	9.72	0.03	50.95	56.00	-5.05	QP
4.926	30.60	9.72	0.03	40.35	46.00	-5.65	Average
5.390	42.20	9.73	0.03	51.96	60.00	-8.04	QP
5.390	31.30	9.73	0.03	41.06	50.00	-8.94	Average

4.7 Antenna Requirements

4.7.1 Standard Applicable

According to antenna requirement of §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 re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 Antenna Connected Construction

An embedded-in antenna design is used.

4.7.3 Antenna Gain

The antenna peak gain of EUT is 2.0±0.5dBi less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY56510025	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY57030005	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY56510018	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY56480002	2019/1/23	2020/1/22	Conducted
Thermal Chamber	Sanmtest	SMC-408-CD	2435	2018/7/5	2019/7/4	Conducted
Base Station	R&S	CMW 270	101231	2019/1/23	2020/1/22	Conducted
Signal Generator (Blocker)	Keysight	N5171B	MY56200661	2019/1/23	2020/1/22	Conducted

Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Due Date**	**Remark**
Spectrum Analyzer	R&S	FSV 40	101433	2019/2/18	2020/2/17	Radiation
Amplifier	Sonoma	310	363917	2019/1/22	2020/1/21	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2019/1/22	2020/1/21	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2018/7/18	2019/7/17	Radiation
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-051	2017/3/3	2020/3/2	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2017-03-03	2020-03-02	Radiation
Horn Antenna	Schwarzbeck	BBHA 9120 D	1677	2017-03-03	2020-03-02	Radiation
Horn Antenna	COM-POWER	AH-1840	101117	2018-06-20	2021-06-19	Radiation
Test Software	Auidx	E3	6.111221a	N/A	N/A	Radiation
Filter	Micro-Tronics	BRM 50702	G266	N/A	N/A	Radiation

N/A: No Calibration Required

6. Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.64dB
Radiated emission	30MHz ~ 1GMHz	5.05dB
	1GHz ~ 18GHz	5.06 dB
	18GHz ~ 40GHz	3.65dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

----------End of the report----------