

TEST REPORT

FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013 RSS-GEN: Issue 5 RSS-247: Issue 2

> Test report On Behalf of D&M Holdings Inc. For Bluetooth Headphone Model No.: AH-GC30 FCC ID: BV2-AH-GC30 IC: 10369A-AHGC30

Prepared for :	D&M Holdings Inc.
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Prepared By :	Shenzhen HUAK Testing Technology Co., Ltd.
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	Bao'an District, Shenzhen City, China
Date of Test:	Nov. 29, 2018 to Dec. 14, 2018
Date of Report:	Dec. 17, 2018

Report Number: HK1811291748E



TEST RESULT CERTIFICATION

Applicant's name:	D&M Holdings Inc.
Address:	2-1 Nisshin-cho, Kawasaki-ku, Kawasaki, 210-8569, Japan
Manufacture's Name:	WATA ELECTRONIC CO.,LTD
Address:	NO 142, South Tanshen Road, Tanzhou Town, Zhongshan City, Guangdong, China
Factory's Name	WATA ELECTRONIC CO.,LTD
Address:	NO 142, South Tanshen Road, Tanzhou Town, Zhongshan City, Guangdong, China
Product description	
Trade Mark:	DENON
Product Name:	Bluetooth Headphone
Model and/or type reference:	AH-GC30
Standards	FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013 RSS-GEN: Issue 5 RSS-247: Issue 2

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Date of Test	
Date (s) of performance of tests:	Nov. 29, 2018 to Dec. 14, 2018
Date of Issue:	Dec. 17, 2018
Test Result:	Pass

2

Testing Engineer

Gory Qian)

Technical Manager

Edan Hu

(Eden Hu)

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(Jason Zhou)



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1. TEST SUMMARY

1.1. TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
Antenna Requirement	Compliant
Radiated Emission	Compliant
Band Edges	Compliant
6 dB Bandwidth	Compliant
Conducted Output Power	Compliant
Conducted Spurious Emission	Compliant
Conducted Power Spectral Density	Compliant
Line Conduction Emission	N/A

Note: N/A means it's not applicable to this item.

1.2. TEST FACILITY

1.2.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.

Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.2.2 Laboratory accreditation

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

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

FCC Registration No.: CN1229

Test Firm Registration Number : 616276

1.3. MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2



2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

Operation Frequency	2.402 GHz to 2.480GHz	
RF Output Power	6.629dBm(Max)	
Bluetooth Version	V5.0	
Modulation	GFSK for BLE	
Number of channels	40 for BLE	
Hardware Version	V2.4	
Software Version	V5.0	
Antenna Designation	Ceramic Antenna	
Antenna Gain	2.5dBi	
Power Supply	DC 3.7V by battery	
Note: The BT function of EUT didn't work when charging.		



2.2. CARRIER FREQUENCY OF CHANNELS

BLE Channel List

Frequency Band	Channel Number	Frequency		
2400~2483.5MHz	0	2402MHz		
	1	2404MHz		
	:	:		
	38	2478 MHz		
	39	2480 MHz		

2.3. OPERATION OF EUT DURING TESTING

NO.	TEST MODE DESCRIPTION		
1	Low channel GFSK		
2	Middle channel GFSK		
3	High channel GFSK		
4	BT Link(Hopping mode)		

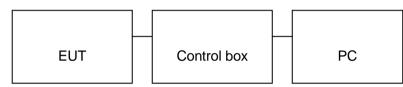


2.4. DESCRIPTION OF TEST SETUP

Configure 1: (Normal hopping)

EUT

Configure 2: (Control continuous TX)



2.5. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Equipment Mfr/Brand Model/Type No.		Remark
1	Bluetooth Headphone	DENON	AH-GC30	EUT
2	Battery	Guangdong Pow-Tech	PT403648	Accessory
3	USB Cable	N/A	1.2m unshielded	Accessory
4	AUX in Cable	N/A 1.2m unshielded		Accessory
5	PC	APPLE	A1465	A.E
6	Control box	CSR	USB_SPI_TOOLS	A.E
7	USB Cable	N/A	1m unshielded	A.E
8	Mobile Phone	Huawei V8		A.E
9	Temporary Antenna Connector	T10 N/A		A.E

Note: The temporary antenna connector is a RF SMA connector with fifty ohm resistor, which is welded to the PCB board or module.



2.6. MEASUREMENT INSTRUMENTS LIST

TEST EQUIPMENT OF RADIATED EMISSION TEST

ltem	Equipment	Manufacturer	Model No.	Lab Equipment No.	Last Cal.	Cal. Interval
1.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
2.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
4.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
5.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
6.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
7.	Broad-band Horn Antenna	A-INFOMW	LB-180400-K F	HKE-031	Dec. 28, 2017	1 Year
8.	Pre-amplifier	EMCI	EMC051845S E	HKE-015	Dec. 28, 2017	1 Year
9.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
10.	Radiation Cable 1	MXT	HK1	R05	N/A	N/A
11.	Radiation Cable 2	MXT	HK1	R06	N/A	N/A



3. ANTENNA REQUIREMENT

3.1. STANDARD APPLICABLE

According to FCC 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 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.

3.2. TEST RESULT

This product has a ceramic antenna, fulfill the requirement of this section.



4. RADIATED EMISSION

4.1 LIMITS

Frequency	Distance	Field Stren	gths Limit								
(MHz)	Meters	μ V/m	dB(µV)/m								
0.009 ~ 0.490	300	2400/F(kHz)									
0.490 ~ 1.705	30	24000/F(kHz)									
1.705 ~ 30	30	30									
30 ~ 88	3	100	40.0								
88 ~ 216	3	150	43.5								
216 ~ 960	3	200	46.0								
960 ~ 1000	3	500	54.0								
Above 1000	3	Other:74.0 dB(µV)/m	(Peak) 54.0 dB(µV)/m								
	(Average)										
Remark: (1) Emission											

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

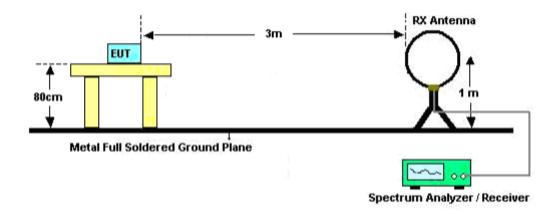
4.2 MEASUREMENT PROCEDURE

- 1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
- The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
- 3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
- 4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
- 6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak&AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

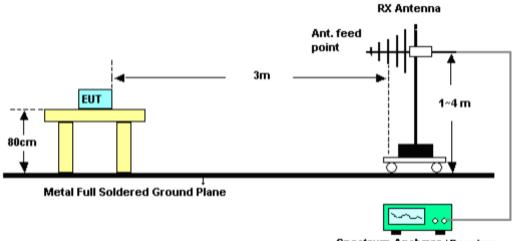


4.3 TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 30MHz



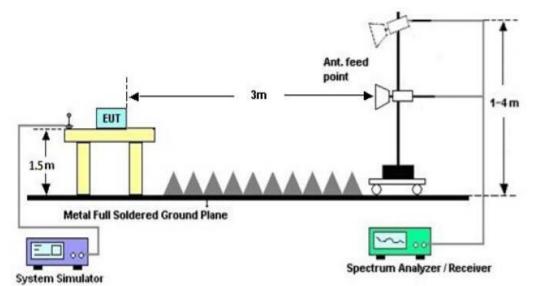
RADIATED EMISSION TEST SETUP 30MHz-1000MHz



Spectrum Analyzer / Receiver



RADIATED EMISSION TEST SETUP ABOVE 1000MHz





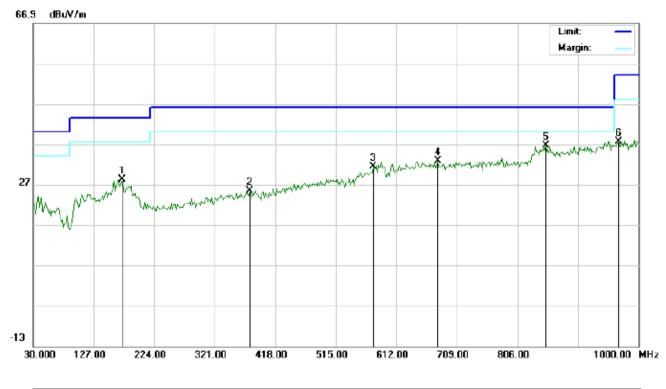
4.4 TEST RESULT

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHz

RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL

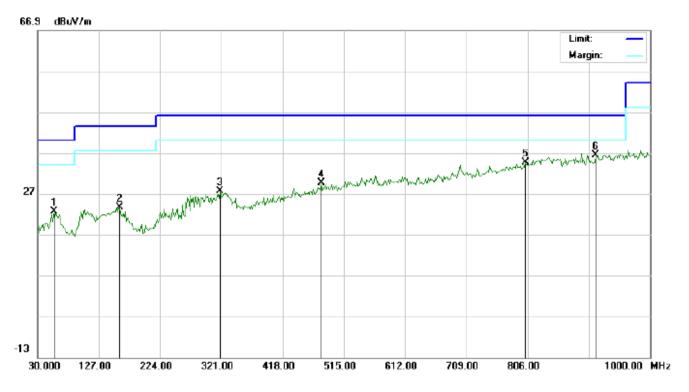


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBuV/m	dB		cm	degree	
1		172.2666	9.04	19.09	28.13	43.50	-15.37	peak			
2		377.5833	1.34	24.01	25.35	46.00	-20.65	peak			
3		574.8167	2.70	28.69	31.39	46.00	-14.61	peak			
4		678.2833	2.33	30.42	32.75	46.00	-13.25	peak			
5	*	851.2667	2.68	33.94	36.62	46.00	-9.38	peak			
6		967.6666	2.35	35.35	37.70	54.00	-16.30	peak			

RESULT: PASS



RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBuV/m	dBu∀/m	dB		cm	degree	
1		55.8667	1.68	20.89	22.57	40.00	-17.43	peak			
2		159.3333	3.25	20.32	23.57	43.50	-19.93	peak			
3		319.3833	5.76	21.84	27.60	46.00	-18.40	peak			
4		479.4333	2.98	26.67	29.65	46.00	-16.35	peak			
5		802.7667	1.37	33.21	34.58	46.00	-11.42	peak			
6	*	914.3167	1.68	34.81	36.49	46.00	-9.51	peak			

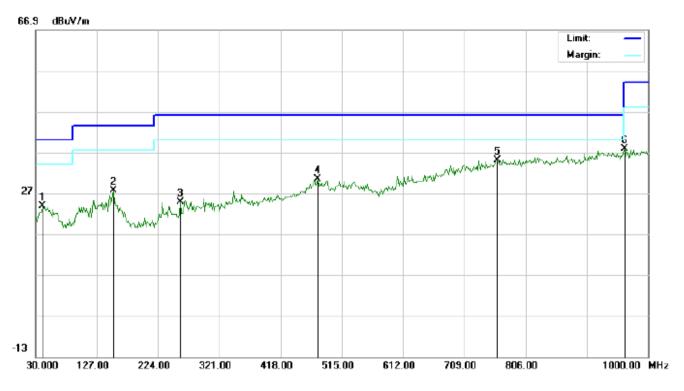
RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL

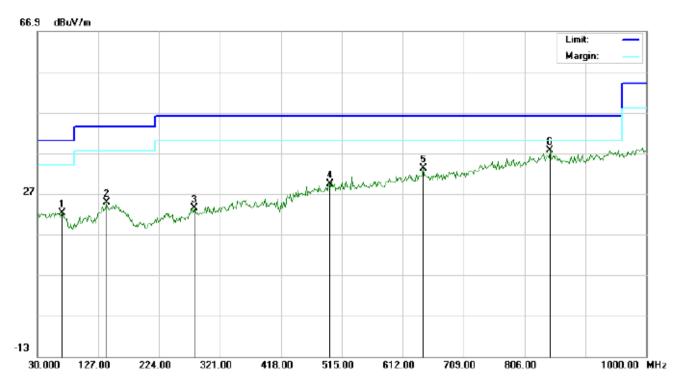


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBuV/m	dB		cm	degree	
1		41.3167	2.11	21.60	23.71	40.00	-16.29	peak			
2		152.8667	7.35	20.28	27.63	43.50	-15.87	peak			
3		259.5667	5.00	19.76	24.76	46.00	-21.24	peak			
4		476.2000	3.80	26.59	30.39	46.00	-15.61	peak			
5	*	760.7333	2.71	32.22	34.93	46.00	-11.07	peak			
6		962.8167	2.51	35.30	37.81	54.00	-16.19	peak			

RESULT: PASS



RADIATED EMISSION TEST- (30MHz-1GHz)- MIDDLE CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBuV/m	dBuV/m	dB		cm	degree	
1		68.8000	4.03	18.17	22.20	40.00	-17.80	peak			
2		139.9333	4.61	20.20	24.81	43.50	-18.69	peak			
3		280.5833	2.00	21.41	23.41	46.00	-22.59	peak			
4		495.6000	2.32	27.04	29.36	46.00	-16.64	peak			
5		644.3333	3.40	29.89	33.29	46.00	-12.71	peak			
6	*	846.4167	3.73	33.87	37.60	46.00	-8.40	peak			

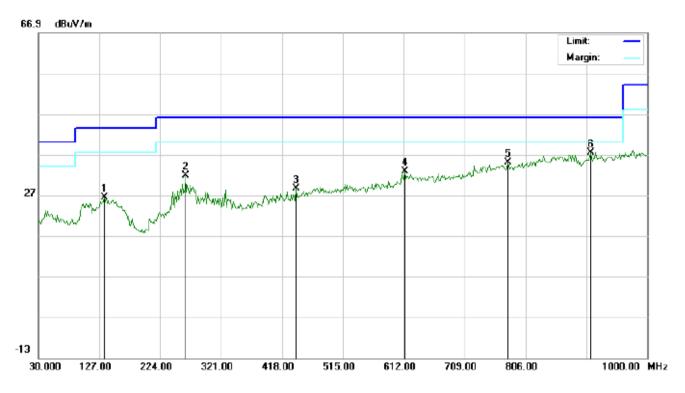
RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL

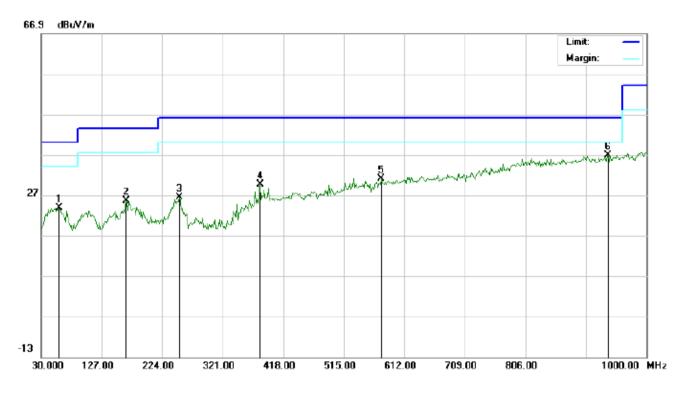


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		135.0833	6.95	19.42	26.37	43.50	-17.13	peak			
2		264.4166	11.64	20.12	31.76	46.00	-14.24	peak			
3		440.6333	2.74	25.77	28.51	46.00	-17.49	peak			
4		613.6167	3.30	29.42	32.72	46.00	-13.28	peak			
5		778.5167	2.39	32.65	35.04	46.00	-10.96	peak			
6	*	909.4667	2.57	34.76	37.33	46.00	-8.67	peak			

RESULT: PASS



RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBuV/m	dB		cm	degree	
1		59.1000	3.18	20.63	23.81	40.00	-16.19	peak			
2		165.8000	5.77	19.74	25.51	43.50	-17.99	peak			
3		251.4833	6.47	19.90	26.37	46.00	-19.63	peak			
4		380.8167	5.50	24.13	29.63	46.00	-16.37	peak			
5		574.8167	2.40	28.69	31.09	46.00	-14.91	peak			
6	×	938.5667	1.73	35.06	36.79	46.00	-9.21	peak			

RESULT: PASS

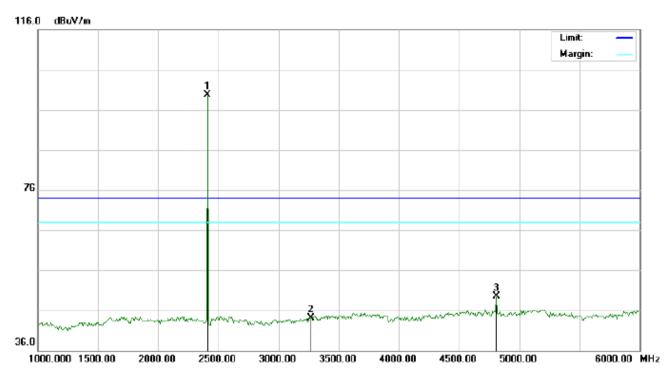
Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION ABOVE 1GHz

RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL

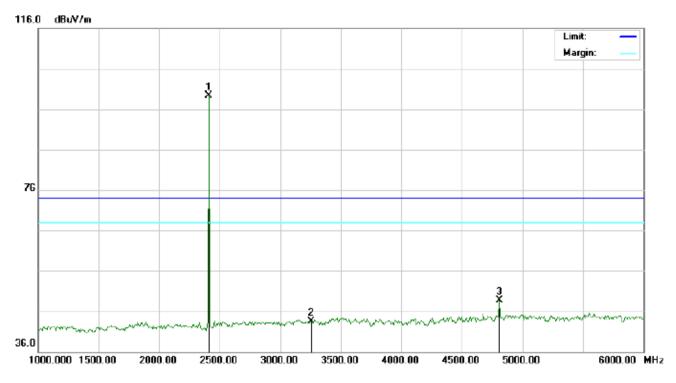


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	2402.000	89.41	10.32	99.73	74.00	25.73	peak			
2		3265.000	32.24	11.89	44.13	74.00	-29.87	peak			
3		4804.000	41.71	7.69	49.40	74.00	-24.60	peak			

RESULT: PASS



RADIATED EMISSION TEST-(ABOVE 1GHz)-LOW CHANNEL-VERTICAL



	No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		•	MHz	dBuV	dBu\//m	dBu∀/m	dBuV/m	dB		cm	degree	
Γ	1	*	2402.000	89.00	10.32	99.32	74.00	25.32	peak			
Γ	2		3251.000	31.56	11.88	43.44	74.00	-30.56	peak			
Γ	3		4804.000	41.05	7.69	48.74	74.00	-25.26	peak			

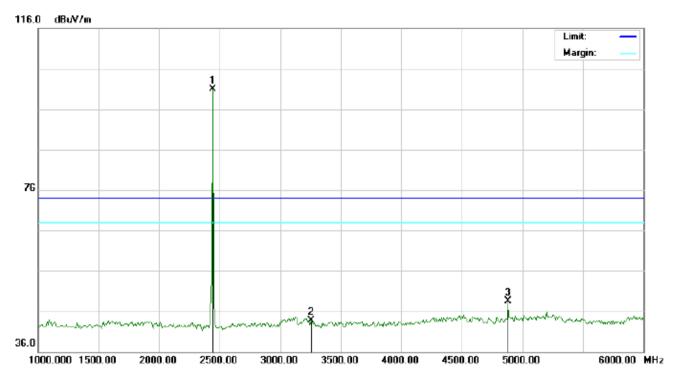
RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION TEST-(ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL

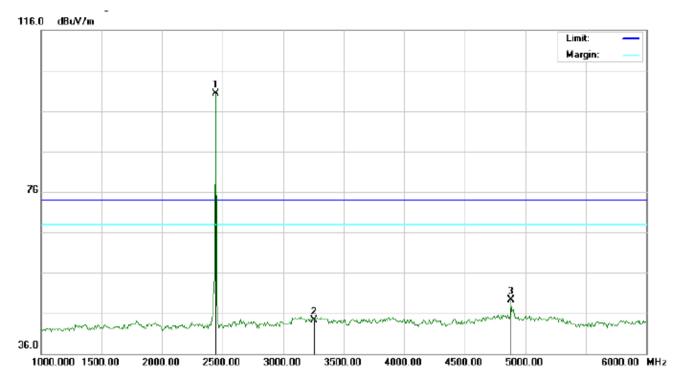


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2440.000	90.56	10.36	100.92	74.00	26.92	peak			
2		3256.000	31.73	11.88	43.61	74.00	-30.39	peak			
3		4880.000	40.66	7.89	48.55	74.00	-25.45	peak			

RESULT: PASS



RADIATED EMISSION TEST-(ABOVE 1GHz)-MIDDLE CHANNEL-VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBuV/m	dB		cm	degree	
1	*	2440.000	89.89	10.36	100.25	74.00	26.25	peak			
2		3251.000	32.37	11.88	44.25	74.00	-29.75	peak			
3		4880.000	41.39	7.89	49.28	74.00	-24.72	peak			

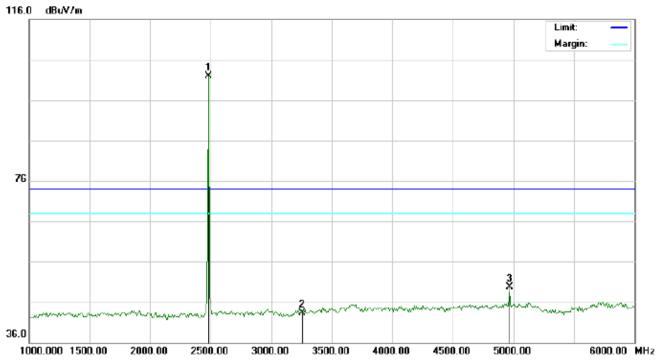
RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION TEST-(ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL

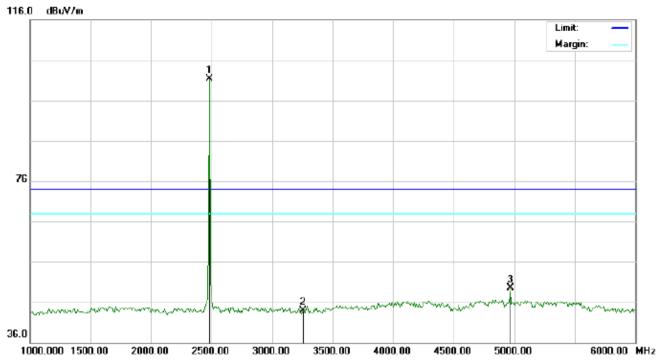


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBuV/m	dBu\//m	dBuV/m	dB		cm	degree	
1	*	2480.000	91.40	10.41	101.81	74.00	27.81	peak			
2		3251.000	31.41	11.88	43.29	74.00	-30.71	peak			
3		4960.000	41.60	8.09	49.69	74.00	-24.31	peak			

RESULT: PASS



RADIATED EMISSION TEST-(ABOVE 1GHz)-HIGH CHANNEL-VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBu∀/m	dBu∨/m	dB		cm	degree	
1	*	2480.000	90.94	10.41	101.35	74.00	27.35	peak			
2		3251.000	31.95	11.88	43.83	74.00	-30.17	peak			
3		4960.000	41.41	8.09	49.50	74.00	-24.50	peak			

RESULT: PASS

Note: 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor+ Cable loss-Amplifier gain,

Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

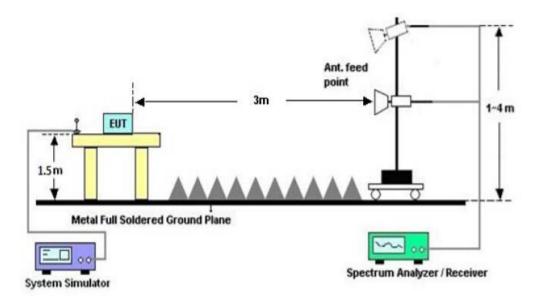


5. BAND EDGE EMISSION

5.1. MEASUREMENT PROCEDURE

- 1. Set the EUT Work on the top, the bottom operation frequency individually.
- Set SPA Start or Stop Frequency=Operation Frequency, For unrestricted band: RBW=100kHz, VBW=300kHz
 For restricted band: RBW=1MHz, VBW=3*RBW
 Center frequency =Operation frequency
- 3. The band edges was measured and recorded.

5.2. TEST SET-UP





5.3. TEST RESULT

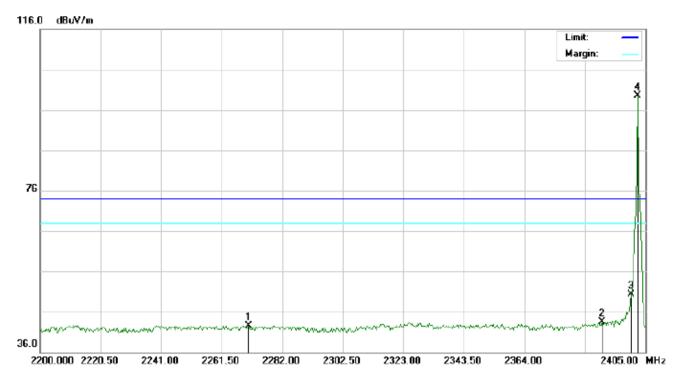
TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBuV/m	dBuV/m	dB		cm	degree	
1		2297.375	33.28	10.21	43.49	74.00	-30.51	peak			
2		2390.000	31.00	10.31	41.31	74.00	-32.69	peak			
3		2400.000	39.47	10.32	49.79	74.00	-24.21	peak			
4	*	2402.000	89.35	10.32	99.67	74.00	25.67	peak			



TEST PLOT OF BAND EDGE FOR LOW CHANNEL - Vertical

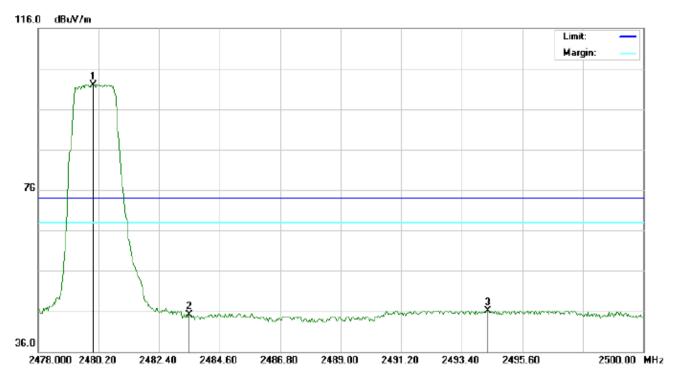


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	·	MHz	dBuV	dBu\//m	dBuV/m	dBuV/m	dB		cm	degree	
1		2270.725	32.31	10.18	42.49	74.00	-31.51	peak			
2		2390.000	33.21	10.31	43.52	74.00	-30.48	peak			
3		2400.000	40.06	10.32	50.38	74.00	-23.62	peak			
4	*	2402.000	89.09	10.32	99.41	74.00	25.41	peak			

RESULT: PASS



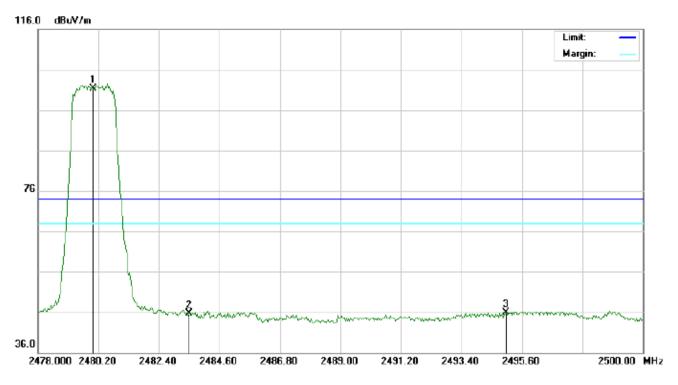
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBu\//m	dBu\//m	dBuV/m	dB		cm	degree	
1	*	2480.000	91.44	10.41	101.85	74.00	27.85	peak			
2		2483.500	34.69	10.41	45.10	74.00	-28.90	peak			
3		2494.353	35.77	10.42	46.19	74.00	-27.81	peak			



TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	·	MHz	dBuV	dBu\//m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	90.92	10.41	101.33	74.00	27.33	peak			
2		2483.500	35.26	10.41	45.67	74.00	-28.33	peak			
3		2495.013	35.39	10.42	45.81	74.00	-28.19	peak			

RESULT: PASS



6. 6DB BANDWIDTH

6.1. TEST PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW ≥3*RBW.
- 4. Set SPA Trace 1 Max hold, then View.

6.2. SUMMARY OF TEST RESULTS/PLOTS

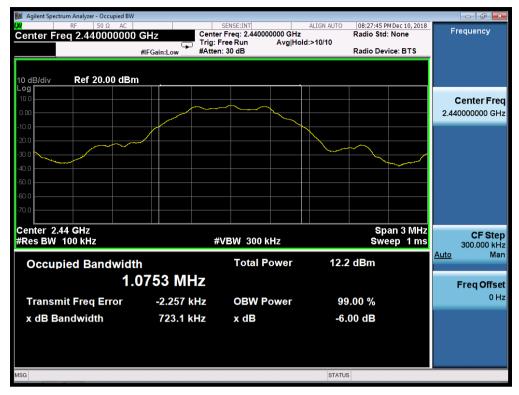
Channel	6dB Bandwidth (KHz)	Minimum Limit (KHz)	Pass/Fail
Low	713.3		Pass
Middle	723.1	500KHz	Pass
High	719.9		Pass



TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

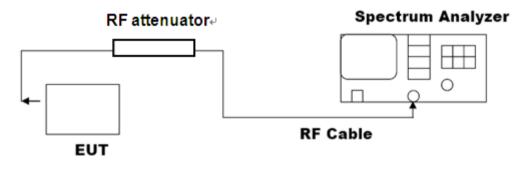


7. CONDUCTED OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
- 3. Use the following spectrum analyzer settings:
- a) Set the RBW \geq DTS bandwidth.
- b) Set VBW \geq 3 RBW.
- c) Set span ≥ 3 x RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.
- 4. Allow the trace to stabilize.
- 5. Record the result form the Spectrum Analyzer.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)





7.3. LIMITS AND MEASUREMENT RESULT

Channel	Peak Power (dBm)	Applicable Limits (dBm)	Pass/Fail
Low Channel	6.629	30	Pass
Middle Channel	5.665	30	Pass
High Channel	4.741	30	Pass

Agilent Spectrum Analyzer - Swept SA - **d e** 08:34:50 PM Dec 10, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN Marker 1 2.479665000000 GHz PNO: Fast IFGein:Low ALIGN AUTO Peak Search Avg Type: Log-Pwr Avg|Hold:>100/100 Trig: Free Run Atten: 30 dB Next Peak Mkr1 2.479 665 GHz 6.629 dBm Ref 20.00 dBm 10 dB/div 1 Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→RefLvl More 1 of 2 Center 2.480000 GHz #Res BW 1.5 MHz Span 5.000 MHz Sweep 1.000 ms (1001 pts) #VBW 5.0 MHz

The Low Channel Result



The Middle Channel Result

📕 Agilent Spectrum Analyzer - Swept SA					- đ ×
Marker 1 2.43968000000		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	08:35:02 PM Dec 10, 2018 TRACE 1 2 3 4 5 6	Peak Search
	PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Hold:>100/100	DET PNNNN	
			Mkr1	2.439 680 GHz	Next Peak
10 dB/div Ref 20.00 dBm				5.665 dBm	
		4			Next Pk Right
10.0		_ ↓ '			J
0.00					
					Next Pk Left
-10.0					
-20.0					
					Marker Delta
-30.0					
-40.0					Mkr→CF
-50.0					
-30.0					
-60.0					Mkr→RefLvl
-70.0					
70.0					More
Center 2.440000 GHz				Span 5.000 MHz	1 of 2
#Res BW 1.5 MHz	#VBW	5.0 MHz	Sweep 1	.000 ms (1001 pts)	
MSG			STATUS	; 	

The High Channel Result



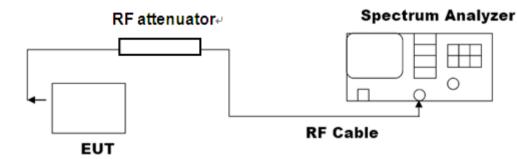


8. CONDUCTED SPURIOUS EMISSION

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. RBW = 100kHz; VBW ≥3 RBW; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



8.3. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT						
Ampliantia Limita	Measurement Result					
Applicable Limits	Test Data	Result				
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit					
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS				
intentional radiator is operating, the radio	Channel					
frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS				



TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF GFSK MODULATION IN LOW CHANNEL

📕 Agilent Spectrum Analyzer - Swept SA - 67 - X Marker 1 854.695397387 MHz PNO: Fast IFGain:Low Trig: Free Run Atten: 10 dB
 ALIGN AUTO
 12:37:48 PM Dec 11, 2018

 Avg Type: Log-Pwr
 TRACE
 2.3.4.5 G

 Avg|Hold:>100/100
 TYPE
 DET
 Peak Search Next Peak Mkr1 854.70 MHz -77.753 dBm 10 dB/div Ref 0.00 dBm bo Next Pk Right Next Pk Left **1** Marker Delta Stop 1.0000 GHz Sweep 92.83 ms (8192 pts) Start 9kHz #Res BW 100 kHz #VBW 300 kHz Mkr→CF FUNCTION FUNC 854.70 MHz -77.753 dBm Ν Mkr→RefLvl More 1 of 2 Swept SA 12:40:42 PM Dec 11, 2018 ALIGN AUTO Peak Search Marker 2 7.205835673300 GHz Avg Type: Log-Pwr Avg|Hold: 22/100 TRACE 1 2 3 4 5 TYPE MWWW DET P N N N Trig: Free Run Atten: 30 dB PNO: Fast IFGain:Low Next Peak Mkr2 7.205 84 GHz -48.210 dBm Ref 20.00 dBm 10 dB/div Log Next Pk Right Next Pk Left 2 Marker Delta Start 1.00 GHz #Res BW 100 kHz Stôp 25.00 GHz Sweep 2.294 s (8192 pts) #VBW 300 kHz Mkr→CF 5.062 dBm -48.210 dBm 2.402 00 GHz 7.205 84 GHz N 1 f N 1 f Mkr→RefLvl More 1 of 2 STATUS



TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN MIDDLE CHANNEL

Magilent Spectrum Analyzer - Swep	AC AC	SENSE:INT	ALIGN AUTO	12:38:13 PM Dec 11, 2018	
Marker 1 844.984739	1.18	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN	Peak Search
10 dB/div Ref 0.00 dB	IFGain:Low	Atten: 10 dB	MI	(r1 844.98 MHz -76.929 dBm	Next Peal
-10.0 -20.0					Next Pk Righ
-30.0					Next Pk Lef
-70.0 -80.0 -90.0					Marker Delt
Start 9 kHz #Res BW 100 kHz	X		Sweep 9	Stop 1.0000 GHz 2.83 ms (8192 pts)	Mkr→Cl
1 N 1 f 2 3 4 5 6	844.98 MHz	-76.929 dBm		Ξ	Mkr→RefLv
7					More
8 9 10 11				•	1 of:
9 10 11 •		m	STATUS	* •	1 of:
9 10 11 11 4 (at SA				
9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	AC 00000 GHz PNO: Fast	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100	12:41:56 PM Dec 11, 2018 TRACE 12 3 4 5 6	
9 10 11 Isg Agilent Spectrum Analyzer - Sweep Agilent Spectrum Analyzer - Sweep Marker 1 2.44000000 Marker 1 2.44000000	AC DOOOOO GHZ PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100	12:41:56 PM Dec 11, 2018	Peak Search
9 10 11 Isg Agilent Spectrum Analyzer - Sweep Agilent Spectrum Analyzer - Sweep Marker 1 2.44000000 Marker 1 2.44000000	AC DOOOOO GHZ PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100	12:41:56 PMDec 11, 2018 TRACE 12 34 5 6 TYPE WWWWW DET NNNNN 1 2.440 00 GHz	Peak Search Next Peal
9 10 10 11 15G 15G 15G 15G 15G 15G 15G	AC D0000 GHz PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100	12:41:56 PMDec 11, 2018 TRACE 12 34 5 6 TYPE WWWWW DET NNNNN 1 2.440 00 GHz	Peak Search Next Pea Next Pk Righ
9 10 11 4 4 4 4 4 4 4 4 4 4 4 4 4	AC DOOOOO GHZ PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100	12:41:56 PMDec 11, 2018 TRACE 12 34 5 6 TYPE WWWWW DET NNNNN 1 2.440 00 GHz	Peak Search Next Peal Next Pk Righ
9 10 11 11 13SG 14 15SG 15 16 17 17 17 17 17 17 17 17 17 17	AC D0000 GHz PN0: Fast IFGain:Low	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100 Mkr	12:41:56 PMDec 11, 2018 TRACE 12 34 5 6 TYPE WWWWW DET NNNNN 1 2.440 00 GHz	Peak Search Next Pea Next Pk Righ Next Pk Lef
9 9 10 11 15G 15G 16 16 17 17 16 17 17 10 10 10 10 10 10 10 10 10 10	AC D00000 GHz PN0: Fast IFGain:Low IBm AC AC AC AC AC AC AC AC AC AC	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100 MKr	12:41:56 PMDec 11, 2018 TRACE 1 2 3 4 5 0 TYPE M MININ 1 2.440 00 GHz 5.731 dBm 5.731 dBm 5.731 dBm 5.731 dBm 5.731 dBm 5.731 dBm	Peak Search Next Pea Next Pk Righ Next Pk Lef Marker Delt MkrC
9 9 10 11 11 135G 14 155G 15 10 10 10 10 10 10 10 10 10 10	AC	SENSE:INT Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 26/100 MKr	12:41:56 PMDec 11, 2018 TRACE 1 2 3 4 5 0 TYPE M MININ 1 2.440 00 GHz 5.731 dBm 5.731 dBm 5.731 dBm 5.731 dBm 5.731 dBm 5.731 dBm	1 of ; Peak Search Next Peal Next Pk Righ Next Pk Lef Marker Delt Mkr→Cl Mkr→Cl Mkr→Ref Lv 1 of ;



TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN HIGH CHANNEL

🕻 Agilent Spectrum Analyzer - Swep		SENSE:INT	ALIGN AUTO	12:38:38 PM Dec 11, 2018	
arker 1 462.597973		Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P NNNN	Peak Search
0 dB/div Ref 0.00 dB	IFGain:Low	Atten: 10 dB	Mł	r1 462.60 MHz -76.780 dBm	NextPea
10.0 20.0					Next Pk Righ
40.0					
50.0					Next Pk Le
70.0 80.0 90.0				ing blann, bli <mark>Hanner fan Romit yn s</mark> talinin stalen yn fers yn gwrann a' Mae fan y bli ffan yn fan Romit yn fers	Marker Del
tart 9kHz Res BW 100 kHz	#VBV	V 300 kHz	Sweep 92	Stop 1.0000 GHz 2.83 ms (8192 pts)	Mkr→C
IKR MODE TRC SCL	× 462.60 MHz	Y F -76.780 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	
3				=	Mkr→RefL
8					Мо
10					1 of
		Ш	STATUS	-	1 of
10 SG					
Agilent Spectrum Analyzer - Swep	AC 252106 GHz PNO: Fast	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 11/100	12:42:31 PM Dec 11, 2018 TRACE 0 34 5 6 TYPE 0 0000000000000000000000000000000000	
1 Agilent Spectrum Analyzer - Swep RF 50 Ω larker 2 21.4487852 0 dB/div Ref 20.00 d	AC 252106 GHz PNO: Fast G IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 11/100	12:42:31 PM Dec 11 2018	Peak Search
0 Agilent Spectrum Analyzer - Swep SG RF 50 Ω Iarker 2 21.4487852 0 0 0 dB/div Ref 20.00 c 0 10 1 0 0	AC 252106 GHz PNO: Fast G IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 11/100	12:42:31 PMDec 11, 2018 TRACE 2 3 4 5 6 TYPE MWWW DET P.NNNN 21.448 79 GHz	Peak Search Next Pea
10 11 356 5 Agilent Spectrum Analyzer - Swep RF 50 Ω 1arker 2 21.4487852 0 dB/div Ref 20.00 c 9 10.0 0.00 10.0 0.0	AC 252106 GHz PNO: Fast G IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 11/100	12:42:31 PMDec 11, 2018 TRACE 2 3 4 5 6 TYPE MWWW DET P.NNNN 21.448 79 GHz	Peak Search Next Pea Next Pk Righ
10 10 11 11 12 13 14 15 15 15 15 10 10 10 10 10 10 10 10 10 10	AC 252106 GHz PNO: Fast G IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 11/100	12:42:31 PMDec 11, 2018 TRACE 2 3 4 5 6 TYPE MWWW DET P.NNNN 21.448 79 GHz	Peak Search Next Pea Next Pk Rig
10 11 SG Agilent Spectrum Analyzer - Swep RE 50 Ω Narker 2 21.4487852 0 dB/div Ref 20.00 d	AC 252106 GHz PNO: Fast G IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 11/100	12:42:31 PMDec 11, 2018 TRACE 12 3 4 5 6 TYPE MWWWW DET PINNNN 21.448 79 GHz -49.519 dBm	Peak Search Next Pea Next Pk Righ Next Pk Le
0 10 11	AC 252106 GHz PNO: Fast IFGain:Low dBm #VEV	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg]Hoid: 11/100 Mkr2	12:42:31 PMDec 11, 2018 TRACE 12, 24, 5 G TYPE PANNAN 21.448 79 GHz -49.519 dBm	Peak Search Next Pea Next Pk Rigi Next Pk Le
0 10 11	AC 252106 GHz PNO: Fast IFGain:Low dBm	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr AvgJHold: 11/100 Mkr2	12:42:31 PMDec 11, 2018 TRACE 12:24 5 G TYPE PANNAN 21.448 79 GHz -49.519 dBm	Peak Search Next Pea Next Pk Rigi Next Pk Le Marker Del Mkr-C
10 Image: Constraint of the sector of t	AC 252106 GHz PN0: Fast IFGain:Low dBm dBm #VBi X 2.479 67 GHz	V 300 kHz	ALIGN AUTO Avg Type: Log-Pwr Avg]Hoid: 11/100 Mkr2	12:42:31 PMDec 11, 2018 TRACE 12, 24, 5 G TYPE PANNAN 21.448 79 GHz -49.519 dBm	Peak Search Next Pea Next Pk Rigi Next Pk Le Marker Del Mkr→Ref L
10 10 11 10 3G RF 50 Ω 1arker 2 21.4487852 10 10 1 10 10 1 10 10 1 10 10 1 10 10 1 10 10 1 10 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 100 1 100 110 1 1 120 1 1 130 1 1 14 1 1 15 1 1 100 1 1 100 <td>AC 252106 GHz PN0: Fast IFGain:Low dBm dBm #VBi X 2.479 67 GHz</td> <td>V 300 kHz</td> <td>ALIGN AUTO Avg Type: Log-Pwr Avg]Hoid: 11/100 Mkr2</td> <td>12:42:31 PMDec 11, 2018 TRACE 12, 24, 5 G TYPE PANNAN 21.448 79 GHz -49.519 dBm</td> <td>1 of Peak Search Next Pea Next Pk Righ Next Pk Le Marker Del Mkr→C Mkr→Ref L 1 of</td>	AC 252106 GHz PN0: Fast IFGain:Low dBm dBm #VBi X 2.479 67 GHz	V 300 kHz	ALIGN AUTO Avg Type: Log-Pwr Avg]Hoid: 11/100 Mkr2	12:42:31 PMDec 11, 2018 TRACE 12, 24, 5 G TYPE PANNAN 21.448 79 GHz -49.519 dBm	1 of Peak Search Next Pea Next Pk Righ Next Pk Le Marker Del Mkr→C Mkr→Ref L 1 of

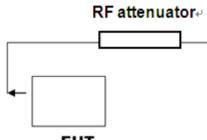
9. CONDUCTED OUTPUT POWER SPECTRAL DENSITY

9.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set the span to 1.5 times the DTS bandwidth, RBW: 3kHz<=RBW<=100KHz, VBW>=3*RBW
- (4). Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



EUT

Spectrum Analyzer

RF Cable

9.3 LIMITS AND MEASUREMENT RESULT

Channel No.	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
Low Channel	-8.985	8	Pass
Middle Channel	-9.421	8	Pass
High Channel	-8.804	8	Pass



TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

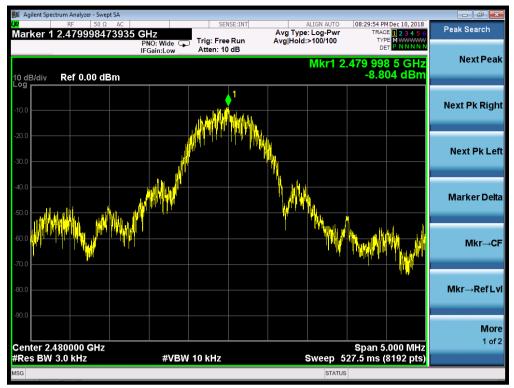




TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL





10. LINE CONDUCTED EMISSION TEST

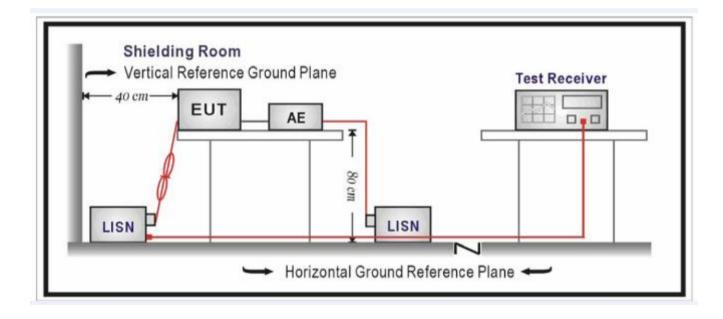
10.1 LIMITS

_	Maximum RF Line Voltage		
Frequency	Q.P.(dBuV)	Average(dBuV)	
150kHz~500kHz	66-56	56-46	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

10.2 TEST SETUP





10.3 PRELIMINARY PROCEDURE

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per ANSI C63.10.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4) All support equipments received AC120V/60Hz power from a LISN, if any.
- 5) The EUT received DC charging voltage by adapter which received 120V/60Hzpower by a LISN.
- 6) The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test.
- Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4 FINAL TEST PROCEDURE

- 1) EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

10.5 TEST RESULT OF POWER LINE

N/A

Note: The BT function of EUT didn't work when charging.



11. ANTENNA REQUIREMENT

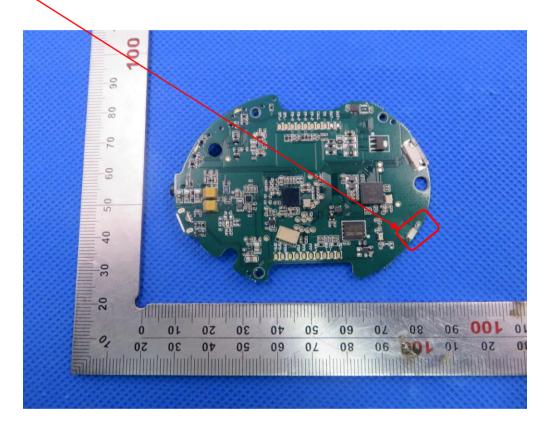
Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

Refer to statement below for compliance.

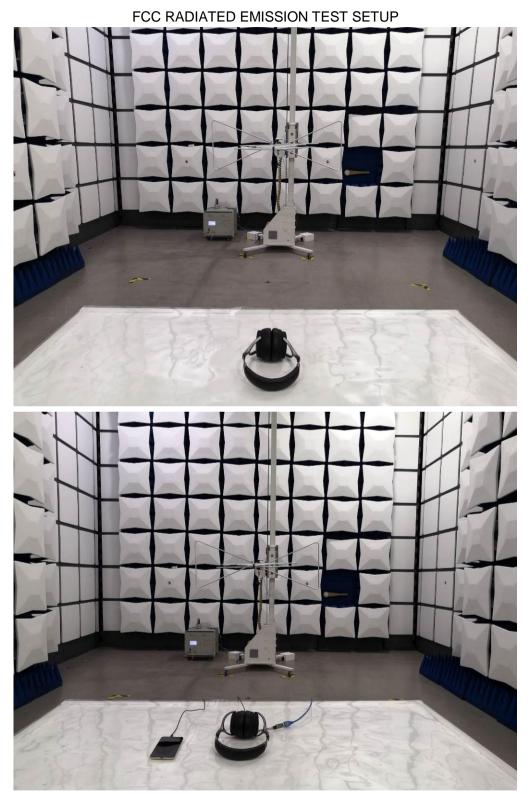
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

ANTENNA

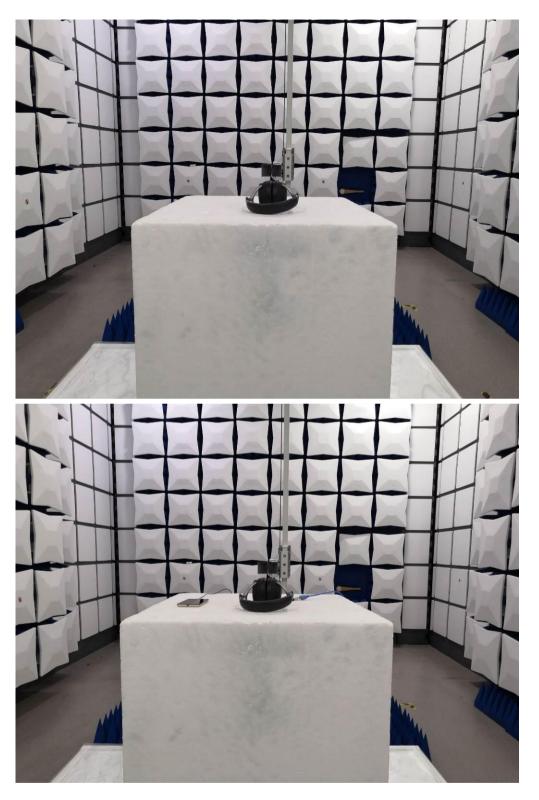




12. PHOTOGRAPH OF TEST

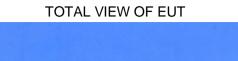








13. PHOTOGRAPHS OF EUT





TOP VIEW OF EUT





BOTTOM VIEW OF EUT



FRONT VIEW OF EUT





BACK VIEW OF EUT



LEFT VIEW OF EUT





RIGHT VIEW OF EUT



VIEW OF EUT (PORT)





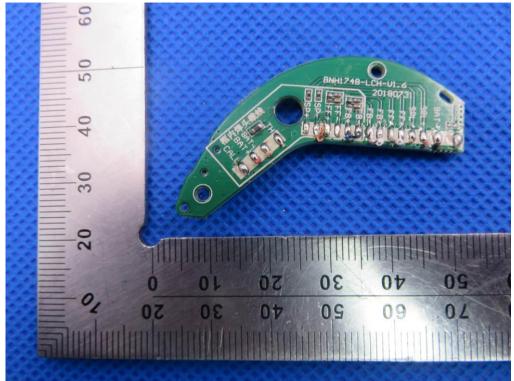
OPEN VIEW OF EUT

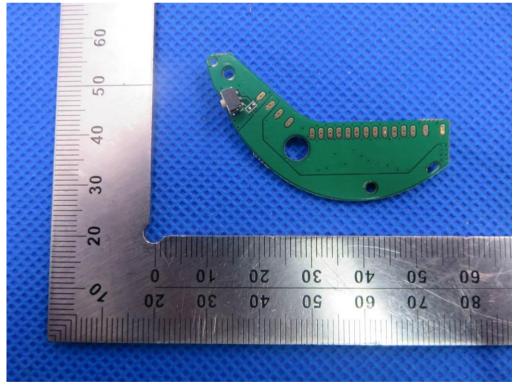


VIEW OF BATTERY

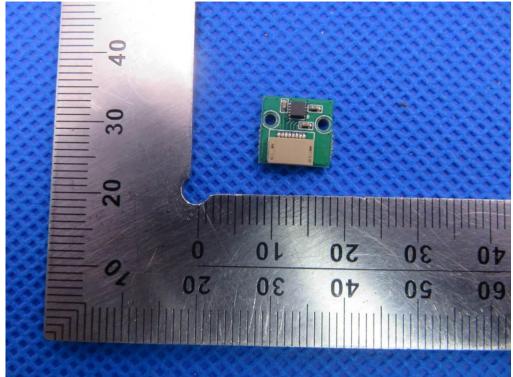


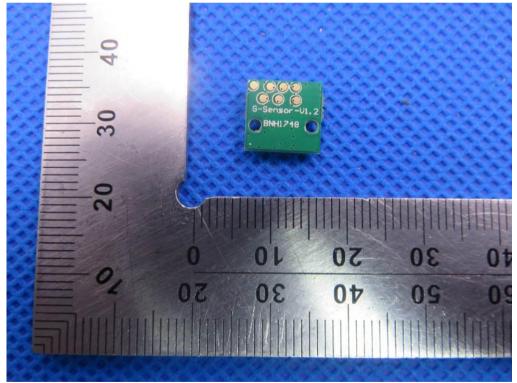






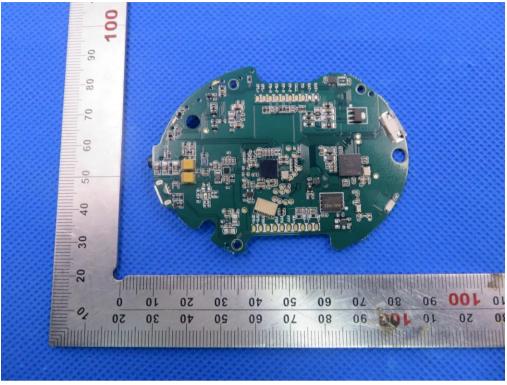


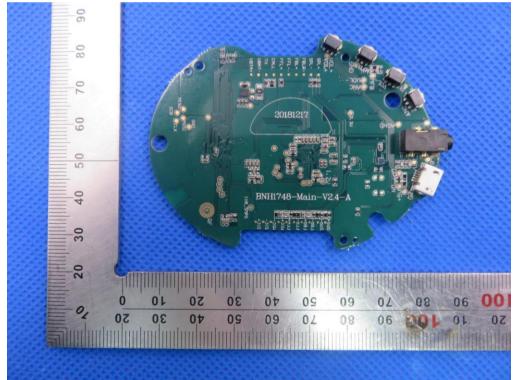






INTERNAL VIEW OF EUT-5











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Other Color Sample TOTAL VIEW OF EUT



TOP VIEW OF EUT

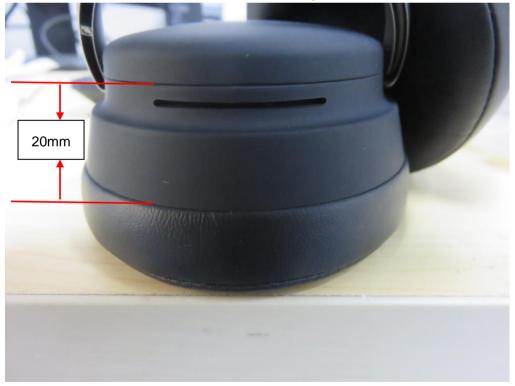




BOTTOM VIEW OF EUT



Distance from human body-20mm



----END OF REPORT----