

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC180596 Page: 1 of 47

FCC Radio Test Report FCC ID: 2AWNK-VM300RX

Original Grant

Report No.	-	TB-FCC180596
Applicant	15	Shenzhen Apeman Innovations Technology Co., Ltd.
Equipment Under T	est	(EUT)
EUT Name	:	Baby Monitor
Model No.	-	VM300RX
Series Model No.	:	VM300, VM300S, VM430, VM430S, VM500, VM510, VM550, VM200, VM200S, BM24, BM32, BM24S, BM32S
Brand Name	119	Voger
Sample ID	-	20210422-06-01
Receipt Date	1	2021-05-26
Test Date	2	2021-05-27 to 2021-07-03
Issue Date	3	2021-08-05
Standards		FCC Part 15, Subpart C 15.247
Test Method	. : (ANSI C63.10: 2013
Conclusions): '	PASS

In the configuration tested, the EUT complied with the standards specified above, The EUT technically complies with the FCC requirements

Nade

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Test/Witness Engineer

Engineer Supervisor

Engineer Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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TB-RF-074-1.0



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Revision History

Report No.	Version	Description	Issued Date
TB-FCC180596	Rev.01	Initial issue of report	2021-08-05
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1. General Information about EUT

1.1 Client Information

Applicant	: Shenzhen Apeman Innovations Technology Co., Ltd.
Address	 1808, Heng Lu E Times Building, No. 159, North Pingji Road, Hehua Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, CHINA
Manufacturer	: Shenzhen Apeman Innovations Technology Co., Ltd.
Address	: 1808, Heng Lu E Times Building, No. 159, North Pingji Road, Hehua Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, CHINA

1.2 General Description of EUT (Equipment Under Test)

EUT Name		Baby Monitor		
Models No.	:	VM300RX, VM300, VM300S, VM430, VM430S, VM500, VM510, VM550, VM200, VM200S, BM24, BM32, BM24S, BM32S		
Model Difference		All these models are identical in the same PCB, layout and electrical circuit, The only difference is appearance.		
(GIN)		Operation Frequency:	2406MHz~2475MHz	
Product Description		Number of Channel:	24 Channels See Note 2	
		Max Peak Output Power:	8.446dBm	
Decemption	~	Antenna Gain:	3dBi Internal Antenna	
		Modulation Type:	GFSK (4Mbps)	
Power Rating		Adapter (TPQ-236A050100UW01) Input: 100-240V~, 50/60Hz, 0.3A Output: DC 5V1A DC 3.7V by 930mAh Li-ion battery		
Software Version		VM300-RX-Voger-V1.0		
Hardware Version	:	VM300RX-V01		
Remark		The adapter and antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.		

Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



(2) Channel List:

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2406	09	2430	17	2454
02	2409	10	2433	18	2457
03	2412	11	2436	19	2460
04	2415	12	2439	20	2463
05	2418	13	2442	21	2466
06	2421	14	2445	22	2469
07	2424	15	2448	23	2472
08	2427	16	2451	24	2475

2475 MHz.

(3) The Antenna information about the equipment is provided by the applicant.

1.3 Block Diagram Showing the Configuration of System Tested

Adapter & TX Mode

Adapter —	EUT

1.4 Description of Support Units

The EUT has been tested as an independent unit.



1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test		
Final Test Mode	Description	
Mode 1	TX Mode	

For Radiated Test			
Description			
TX GFSK Mode			
TX Mode (GFSK) Channel 01/13/24			

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate. We have pretested all the test modes above.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

- TX Mode: GFSK (4Mbps)
- (2) The EUT is considered a Mobile unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. Therefore only the test data of this X-plane was used for radiated emission measurement test.



1.6 Description of Test Software Setting

During testing channel power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth mode.

Test Software Version	Control by pressing the button		
Frequency	2406 MHz	2442 MHz	2475 MHz
GFSK	DEF	DEF	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement y \pm U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U _{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.50 dB ±3.10 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.50 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB



1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F.,Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.



2. Test Summary

FCC Part 15 Subpart C (15.247)/ RSS 247 Issue 2				
Standard Section	Te of House		ludanaant	
FCC		Test Sample(s)	Judgment	Remark
15.203	Antenna Requirement	20210422-06-01	PASS	N/A
15.207	Conducted Emission	20210422-06-01	PASS	N/A
15.205	Restricted Bands	20210422-06-01	PASS	N/A
15.247(a)(1)	Hopping Channel Separation	20210422-06-01	PASS	N/A
15.247(a)(1)	Dwell Time	20210422-06-01	PASS	N/A
15.247(b)(1)	Peak Output Power	20210422-06-01	PASS	N/A
15.247(a)(1)	Number of Hopping Frequency	20210422-06-01	PASS	N/A
15.247(d)	Band Edge	20210422-06-01	PASS	N/A
15.247(c)& 15.209	Radiated Spurious Emission	20210422-06-01	PASS	N/A
15.247(a)	99% Occupied Bandwidth & 20dB Bandwidth	20210422-06-01	PASS	N/A

3. Test Software

Test Item	Test Software	Manufacturer	Version No.
Conducted Emission	EZ-EMC	EZ	CDI-03A2
Radiation Emission	EZ-EMC	EZ	FA-03A2RE
RF Conducted Measurement	MTS-8310	MWRFtest	V2.0.0.0

4. Test Equipment

Conducted Emission	Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 06, 2020	Jul. 05, 2021
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 06, 2020	Jul. 05, 2021
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 06, 2020	Jul. 05, 2021
LISN	Rohde & Schwarz	ENV216	101131	Jul. 06, 2020	Jul. 05, 2021
Radiation Emission 1	Test	-	-	-	•
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 06, 2020	Jul. 05, 2021
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 06, 2020	Jul. 05, 2021
Spectrum Analyzer	Rohde & Schwarz	FSVR	102197	Jul. 06, 2020	Jul. 05, 2021
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	BBHA 9170	BBHA9170582	Mar.01, 2020	Feb. 28, 2022
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 07, 2020	Jul. 06, 2021
Pre-amplifier	Sonoma	310N	185903	Mar.01, 2020	Feb. 28, 2021
Pre-amplifier	HP	8449B	3008A00849	Mar.01, 2020	Feb. 28, 2021
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.01, 2020	Feb. 28, 2021
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted	Emission				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 06, 2020	Jul. 05, 2021
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 06, 2020	Jul. 05, 2021
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 11, 2020	Sep. 10, 2021
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 11, 2020	Sep. 10, 2021
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 11, 2020	Sep. 10, 2021
La contra	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO26	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Sep. 11, 2020	Sep. 10, 2021
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO31	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO33	Sep. 11, 2020	Sep. 10, 2021



Conducted Emission	Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 02, 2021	Jul. 01, 2022
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 02, 2021	Jul. 01, 2022
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 02, 2021	Jul. 01, 2022
LISN	Rohde & Schwarz	ENV216	101131	Jul. 02, 2021	Jul. 01, 2022
Radiation Emission T	est				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 02, 2021	Jul. 01, 2022
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 02, 2021	Jul. 01, 2022
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	BBHA 9170	BBHA9170582	Mar.01, 2020	Feb. 28, 2022
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 02, 2021	Jul. 01, 2022
Pre-amplifier	Sonoma	310N	185903	Feb. 25, 2021	Feb. 24, 2022
Pre-amplifier	HP	8449B	3008A00849	Feb. 25, 2021	Feb. 24, 2022
Pre-amplifier	SKET	LNPA_1840G-50	SK201904032	Feb. 25, 2021	Feb. 24, 2022
Cable	HUBER+SUHNER	100	SUCOFLEX	Feb. 25, 2021	Feb. 24, 2022
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted E	Emission				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 02, 2021	Jul. 01, 2022
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 11, 2020	Sep. 10, 2021
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 11, 2020	Sep. 10, 2021
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO26	Sep. 11, 2020	Sep. 10, 2021
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Sep. 11, 2020	Sep. 10, 2021
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO31	Sep. 11, 2020	Sep. 10, 2021
	DARE !! Instruments	RadiPowerRPR3006W	17100015SNO33	Sep. 11, 2020	Sep. 10, 2021



5. Conducted Emission Test

- 5.1 Test Standard and Limit
 - 5.1.1Test Standard FCC Part 15.207/RSS-GEN 8.8
 - 5.1.2 Test Limit

	Maximum RF Line Voltage (dBμV)		
Frequency	Quasi-peak Level	Average Level	
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

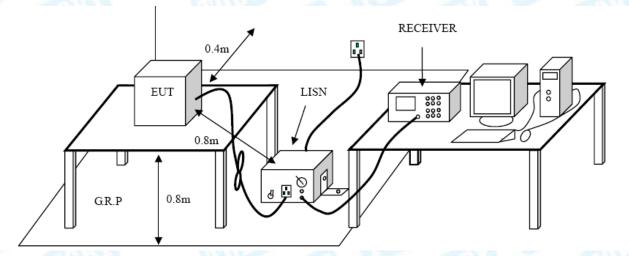
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.2 Test Setup



ctod Emission To 1.2



5.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

5.4 Deviation From Test Standard

No deviation

5.5 EUT Operating Mode

Please refer to the description of test mode.

5.6 Test Data

Please refer to the Attachment A.



6. Radiated Emission Test

- 6.1 Test Standard and Limit
 - 6.1.1 Test Standard
 - FCC Part 15.209/RSS-GEN 8.9
 - 6.1.2 Test Limit

Radiated Emission Limit (9 kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/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

Radiated Emission Limit (Above 1000MHz)

Frequency	Distance Met	ers(at 3m)
(MHz)	Peak	Average
Above 1000	74	54

Note:

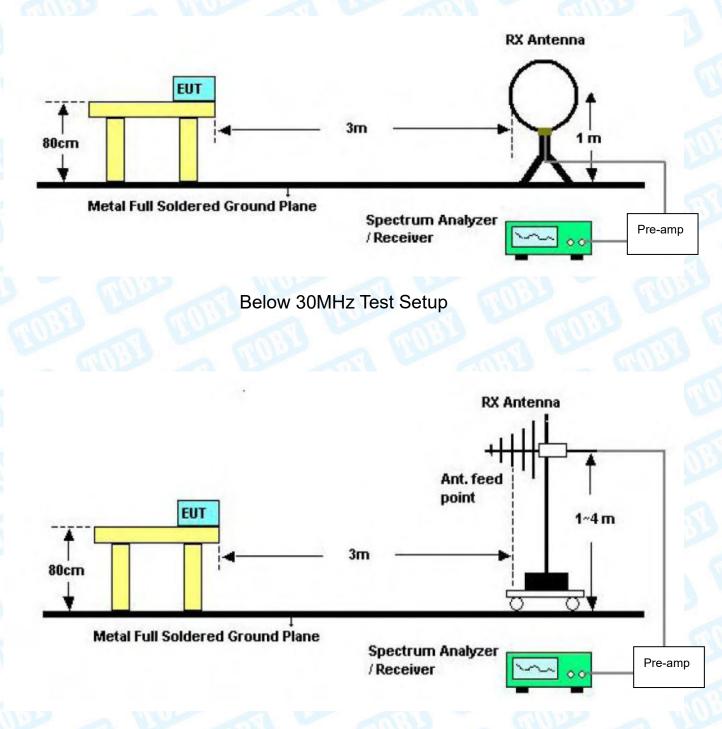
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m)



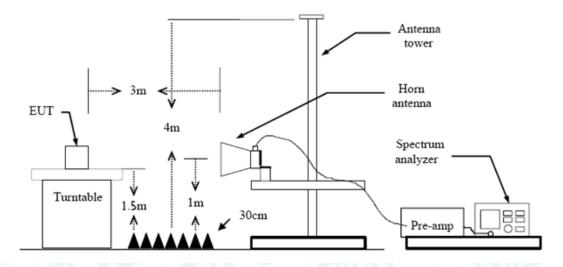
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6.2 Test Setup



Below 1000MHz Test Setup





Above 1GHz Test Setup

6.3 Test Procedure

- (1) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency Below 1GHz. The EUT was placed on a rotating 0.8m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.



6.4 Deviation From Test Standard

No deviation

6.5 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.6 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values. Please refer to the Attachment B.

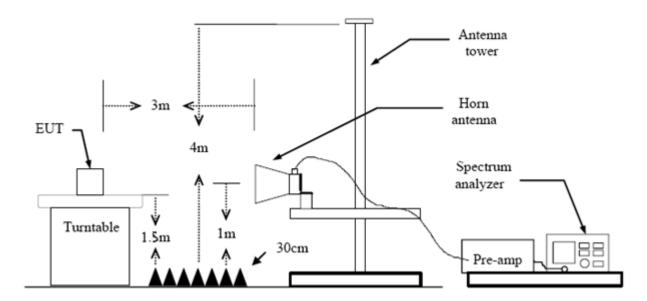


7. Restricted Bands and Band-edge test

- 7.1 Test Standard and Limit
 - 7.1.1 Test Standard FCC Part 15.209&15.205 RSS-GEN 8.9&8.10
 - 7.1.2 Test Limit

Restricted Frequency	Distance Meters(at 3m)	
Band (MHz)	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

7.2 Test Setup





7.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with AVG Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.
- 7.4 Deviation From Test Standard

No deviation

7.5 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

7.6 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

All restriction bands have been tested, only the worst case is reported. Please refer to the Attachment C.

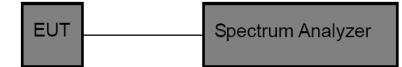


8. Number of Hopping Channel

- 8.1 Test Standard and Limit
 - 8.1.1 Test Standard
 - FCC Part 15.247 (a)(1) / RSS 247 5.1(4)
 - 8.1.2 Test Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

8.2 Test Setup



8.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=100 KHz, VBW=100 KHz, Sweep time= Auto.
- 8.4 Deviation From Test Standard

No deviation

8.5 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

8.6 Test Data

Please refer to the Attachment D.

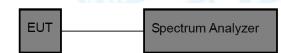


9. Average Time of Occupancy

- 9.1 Test Standard and Limit
 - 9.1.1 Test Standard
 - FCC Part 15.247 (a)(1) / RSS 247 5.1(d)
 - 9.1.2 Test Limit

Test Item	Limit
Average Time of Occupancy	0.4 sec

9.2 Test Setup



9.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=100KHz, VBW=300KHz.
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.

9.4 EUT Operating Condition

The average time of occupancy on any channel within the Period can be calculated with formulas:

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows: The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 20 [ch] = 8.0 [s*ch]; The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in $8.0s = 3^{*}(8.0/0.24) = 100$

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

The EUT was set to the Hopping Mode by the Customer.

9.4 Deviation From Test Standard

No deviation

9.5 Test Data

Please refer to the Attachment E.



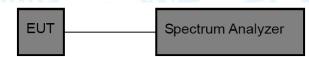
10. Channel Separation and Bandwidth Test

10.1 Test Standard and Limit

- 10.1.1 Test Standard
 - FCC Part 15.247/RSS 247 5.1(b)
- 10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	<=1 MHz (20dB bandwidth)	2400~2483.5
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

10.2 Test Setup



10.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: Channel Separation: RBW=100 kHz, VBW=100 kHz. Bandwidth: RBW=30 kHz, VBW=100 kHz.
- (3) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (4) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:30 kHz, and Video Bandwidth:100 kHz. Sweep Time set auto.

10.4 Deviation From Test Standard

No deviation

10.5 EUT Operating Condition

The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Bandwidth Test.

10.6 Test Data

Please refer to the Attachment F.

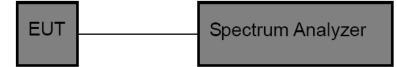


11. Peak Output Power Test

- 11.1 Test Standard and Limit
 - 11.1.1 Test Standard
 - FCC Part 15.247 (b) (1)/RSS 247 5.4(b)
 - 11.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm)	2400~2483.5
	Other <125 mW(21dBm)	COBL C

11.2 Test Setup



11.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz. RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

11.4 Deviation From Test Standard

No deviation

11.5 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

11.6 Test Data

Please refer to the Attachment G.



12. Antenna Requirement

12.1 Standard Requirement

12.1.1 Standard

FCC Part 15.203

12.1.2 Requirement

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.

12.2 Deviation From Test Standard

No deviation

12.3 Antenna Connected Construction

The gains of the antenna used for transmitting is 3dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

12.4 Result

The EUT antenna is a Internal Antenna. It complies with the standard requirement.

	Antenna Type
22	Permanent attached antenna
TOR	Unique connector antenna
2	Professional installation antenna

Attachment A-- Conducted Emission Test Data

Temperature:	22.5℃	Relative Humidity:	42%
Test Voltage:	AC 120V/60Hz	101	RN Y
Terminal:	Line		
Test Mode:	TX GFSK Mode 2406M	1Hz	- MUP
Remark:	All channels have been	tested and Shows only the w	orst channels.
80.0 dBuV			
			QP: AVG:
X.	X		
1×mm mont	WWW AND MAN .		*
30		Mr. Marry My randow Marrie and Mar	wheelper A latter
30 X M MMM		Ma like the second de the second	M.M. Am
30 XMMMM		Marthan and a second and a se	Mahar Autor
30 MMMMMM		and all and a second and a se	Madree Marrier Di
30 X My		Marthan Martin	hope and
30 X M M M M M M M M M M M M M M M M M M		Mar Mar and Mar	hope and

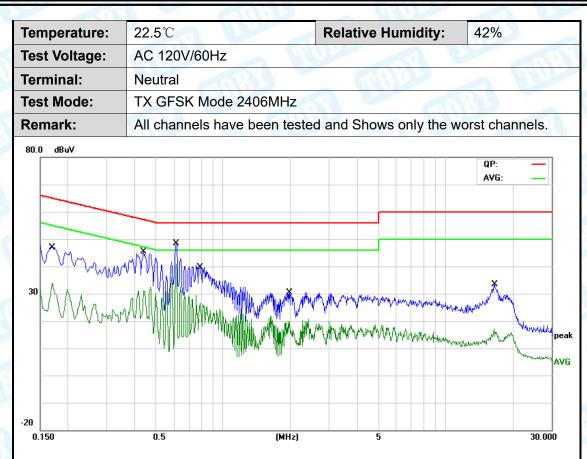
			Pooding	Corroct	Mogeuro			
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1740	35.60	9.70	45.30	64.76	-19.46	QP
2		0.1740	21.77	9.70	31.47	54.76	-23.29	AVG
3		0.3980	25.41	9.70	35.11	57.89	-22.78	QP
4		0.3980	9.68	9.70	19.38	47.89	-28.51	AVG
5		0.6140	37.76	9.70	47.46	56.00	-8.54	QP
6	*	0.6140	29.85	9.70	39.55	46.00	-6.45	AVG
7		0.7340	27.17	9.71	36.88	56.00	-19.12	QP
8		0.7340	13.21	9.71	22.92	46.00	-23.08	AVG
9		1.9220	18.31	9.71	28.02	56.00	-27.98	QP
10		1.9220	9.62	9.71	19.33	46.00	-26.67	AVG
11		16.6420	16.89	10.00	26.89	60.00	-33.11	QP
12		16.6420	3.53	10.00	13.53	50.00	-36.47	AVG

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)





No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1700	35.12	9.80	44.92	64.96	-20.04	QP
2		0.1700	21.46	9.80	31.26	54.96	-23.70	AVG
3		0.4380	31.35	9.80	41.15	57.10	-15.95	QP
4		0.4380	16.27	9.80	26.07	47.10	-21.03	AVG
5		0.6140	37.28	9.80	47.08	56.00	-8.92	QP
6	*	0.6140	30.03	9.80	39.83	46.00	-6.17	AVG
7		0.7900	26.38	9.80	36.18	56.00	-19.82	QP
8		0.7900	13.20	9.80	23.00	46.00	-23.00	AVG
9		1.9820	17.08	9.80	26.88	56.00	-29.12	QP
10		1.9820	8.20	9.80	18.00	46.00	-28.00	AVG
11		16.6540	17.75	10.00	27.75	60.00	-32.25	QP
12		16.6540	4.17	10.00	14.17	50.00	-35.83	AVG

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)



Attachment B-- Radiated Emission Test Data

9KHz~30MHz

From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

30MHz~1GHz

emperature:	23.9℃	Relative Humidity:	44%
est Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		LUL -
Fest Mode:	TX GFSK Mode 2406MHz		
Remark:	Only worse case is reported	the second se	100
80.0 dBuV/m			
		(RF)FCC 150	C 3M Radiation Margin -6 dB
30		5 Amsterlander Ander Ander Ander	har and

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		30.8535	42.42	-13.58	28.84	40.00	-11.16	peak
2		72.0841	47.73	-23.20	24.53	40.00	-15.47	peak
3		126.3285	54.06	-22.27	31.79	43.50	-11.71	peak
4	*	144.3348	56.12	-21.93	34.19	43.50	-9.31	peak
5		240.8303	49.75	-17.72	32.03	46.00	-13.97	peak
6		869.1301	40.82	-5.26	35.56	46.00	-10.44	peak

*:Maximum data x:Over limit !:over margin

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = QuasiPeak (dBµV/m)-Limit QPK(dBµV/m)



Temperature:	23.9℃			Relative H	umidity	: 44%	
Test Voltage:	AC 120)V/60Hz		1000	5		N/U
Ant. Pol.	Vertica				-	A D	
Test Mode:	TX GFS	SK Mode 24	106MHz	2			5
Remark:	Only w	orse case is	reported	Call D	2		
80.0 dBu∀/m							
					(RF)FCC	15C 3M Radiation	1
						Margin -6	ab [
			1 2 3 X X X	4 5 X X	6 X		
30					he I h	Julamor	m
m.			L Allo Kullert	- ALLAN, LLAN, AND	Mr Wilward	~	
			1 21.01 4.0001111	THE MARK TRIVER THEN	2		
mound	Month	mullim	M MARPHI	MIN MARY MARY HAR	~~		
and and	Norman	mulling	M M M M	MIN RADIA ROMATING	~~		
	Monardy	mahlandm	ANG MAY ANN ANN A	MIR A ANY MIRY MIRY MIRY	~/		
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	wanther	ANT HAD AND HAVE	100 M 10			
-20			ANT HALFAN AND A	200 10 10 10 10 10 10 10 10 10 10 10 10 10 1	~/		
		80	(MH2)	-м ^р ⁶⁴ Ч(л., 1416, ., 1416) 300	400	500 600 700	1000.00
30.000 40 5	i0 60 70	80 Reading	Correct	Measure-			1000.00
		80			400 s	500 600 700 Over	1000.00
30.000 40 5	i0 60 70	80 Reading	Correct	Measure-		Over	1000.00
30.000 40 5	50 60 70 Freq.	80 Reading Level	Correct Factor	Measure- ment	Limit	Over dB	
30.000 40 5 No. Mk.	60 60 70 Freq. MHz	80 Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detecto
30.000 40 5 No. Mk. 1 14 2 17	50 60 70 Freq. MHz 4.3348 5.6516	BO Reading Level dBuV 53.78	Correct Factor dB/m -21.93 -20.28	Measure- ment dBuV/m 31.85 32.38	Limit dBuV/m 43.50 43.50	Over dB -11.65 -11.12	Detecto peak peak
30.000         40         5           No.         Mk.           1         14           2         17           3         *         19	Freq. MHz 4.3348 5.6516 2.4185	80 Reading Level dBuV 53.78 52.66 53.22	Correct Factor dB/m -21.93 -20.28 -19.83	Measure- ment dBuV/m 31.85 32.38 33.39	Limit dBuV/m 43.50 43.50 43.50	Over dB -11.65 -11.12 -10.11	Detecto peak peak peak
30.000         40         5           No.         Mk.           1         14           2         17           3         *         19           4         24	Freq. MHz 4.3348 5.6516 2.4185 0.8303	₽0         Reading Level         dBuV         53.78         52.66         53.22         50.52	Correct Factor dB/m -21.93 -20.28 -19.83 -17.72	Measure- ment dBuV/m 31.85 32.38 33.39 32.80	Limit dBuV/m 43.50 43.50 43.50 46.00	Over dB -11.65 -11.12 -10.11 -13.20	Detecto peak peak peak
30.000         40         5           No.         Mk.           1         14           2         17           3         *         19           4         24           5         33	Freq. MHz 4.3348 5.6516 2.4185	№           Reading Level           dBuV           53.78           52.66           53.22	Correct Factor dB/m -21.93 -20.28 -19.83	Measure- ment dBuV/m 31.85 32.38 33.39	Limit dBuV/m 43.50 43.50 43.50	Over dB -11.65 -11.12 -10.11 -13.20	Detecto peak peak peak

*:Maximum data x:Over limit !:over margin

#### Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB) 2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = QuasiPeak (dBµV/m)-Limit QPK(dBµV/m)

#### Above 1GHz (Only worse case is reported)

-										
ŀ	Tempe	ratu	re:	23.2	°C		Relative H	lumidity:	41%	1
-	Test V	oltag	je:	AC 1	20V/60Hz		0170	525		NUE
4	Ant. P	ol.		Horiz	contal			-	20	
•	Test M	ode		TX G	FSK Mode 2	2406MHz	2 1			5
	No.	Mk	. Fr	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			M	Hz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
	1	*	4811	.730	33.86	13.07	46.93	54.00	-7.07	AVG
	2		4811	.904	46.84	13.07	59.91	74.00	-14.09	peak

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Tempe	eratu	re:	23.2℃			<b>Relative Hur</b>	nidity:	41%	
Test V	oltag	e:	AC 1	20V/60Hz		6000			
Ant. Pol. Vertical							Sall B		m c
Test M	lode:		TX C	GFSK Mode	2406MHz			- DI	
No.	Mk.	Fre	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MF	lz	dBuV	dB/m	dBuV/m	dBuV/m	n dB	Detector
1		4811.	668	44.68	13.07	57.75	74.00	-16.25	peak
2	*	4811.	764	31.69	13.07	44.76	54.00	-9.24	AVG

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.



Tempe	ratu	re:	23.2	°C		<b>Relative Hun</b>	nidity:	41%	
Test V	oltag	e:	AC 120V/60Hz						
Ant. P	ol.		Horizontal						
Test M	ode:		TX C	FSK Mode 2	2442MHz	2			1177
No.	Mk.	Fr	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		M	Hz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883	.886	45.17	13.60	58.77	74.00	-15.23	peak
2	*	4884	.050	34.73	13.60	48.33	54.00	-5.67	AVG

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB) 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)

3. Margin (dB) = Peak/AVG (dB $\mu$ V/m)-Limit PK/AVG(dB $\mu$ V/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

	111			and the second					
Tempe	eratu	re:	23.2	°C		Relative H	lumidity:	41%	
Test V	oltag	je:	AC 1	20V/60Hz	Canb		aller.		
Ant. P	ol.		Verti	cal		A B		111	02
Test N	lode:		TX C	GFSK Mode 2	2442MHz		1		
No.	Mk	. Fre	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MH	Ηz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883	.602	47.16	13.59	60.75	74.00	-13.25	peak
2	*	4883	.878	32.95	13.60	46.55	54.00	-7.45	AVG

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB) 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)

3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.



Tempe	eratu	re:	23.2℃			Relative H	umidity:	41%	100
Test V	oltag	e:	AC 120V/60Hz						RANK
Ant. P	ol.	Horizontal							
Test N	lode:		TX C	GFSK Mode 2	2475MHz	2		1	641
No.	Mk.	Fr	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		M	Ηz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4949	.838	31.14	14.08	45.22	54.00	-8.78	AVG
2		4949	.914	45.00	14.08	59.08	74.00	-14.92	peak

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

Tempe	Temperature:23.2°C				600	Relative Hu	midity:	41%	
Test Vo	oltage	e:	AC 1	20V/60Hz	6			117	200
Ant. Po	ol.		Vertical						
Test Mode: TX GFSK Mode 2475MHz							RUP	~	
No.	Mk	. Fr	eq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		М	Hz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4949	.722	46.83	14.08	60.91	74.00	-13.09	peak
2	*	4950	.038	32.93	14.08	47.01	54.00	-6.99	AVG

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)

3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.

5. No report for the emission which more than 20dB below the prescribed limit.

# **Attachment C-- Restricted Bands Requirement Test Data**

Test Voltage:       AC 120V/60Hz         Ant. Pol.       Horizontal         Test Mode:       TX GFSK Mode 2406MHz         Remark:       Only worse case is reported         120.0       dBuV/m         dBuV/m       3         ////////////////////////////////////	Temperature:	<b>23.2℃</b>	Relative Humidity:	<mark>41%</mark>
Test Mode:         TX GFSK Mode 2406MHz           Remark:         Only worse case is reported           120.0         dBuV/m           Image: Strategy of the	Test Voltage:	AC 120V/60Hz		
Remark:         Only worse case is reported           120.0         dBuV/m           3         3           3         3           3         3           4         4           4         4           70         4           1         1           1         1           1         1           1         1           1         1           1         1           1         1           1         1           1         1           1         1           1         1           1         1           1         1           2         4           20.0         1	Ant. Pol.	Horizontal		$\eta_{m} =$
120.0       dBuV/m	Test Mode:	TX GFSK Mode 240	6MHz	
70         3           1         1           1         1           1         1           1         1           1         1           1         1           1         1           2         1           20.0         1	Remark:	Only worse case is r	reported	
20.0         X         X           20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0 <td>120.0 dBuV/m</td> <td></td> <td></td> <td></td>	120.0 dBuV/m			
20.0         X         X           20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0 <th></th> <th></th> <th></th> <th></th>				
20.0         X         X           20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0         20.0 <td></td> <td></td> <td></td> <td>3</td>				3
70 70 1 (RF) FCC PART 15C (AVB) 1 (RF) FCC PART 15C (AVB) 2 20.0				× X
70 70 1 (RF) FCC PART 15C (AVB)				$ \rightarrow $
70 70 1 (RF) FCC PART 15C (AVB) 1 (RF) FCC PART 15C (AVB) 2 20.0				
20.0	70		(RF) FCC P4	IRT 15C (PEAK)
20.0	/0			
20.0			(BF) FCC F	ART 15C (AVG)
20.0				M
			× ×	
2319.000 2329.00 2339.00 2349.00 2359.00 2369.00 2379.00 2389.00 2399.00 241	20.0			
	2319.000 2329.00	2339.00 2349.00 2359.00	2369.00 2379.00 2389.00 2399.0	0 241

No	. Mk	. Freq.	Level	Factor	ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	50.17	1.28	51.45	74.00	-22.55	peak
2		2390.000	40.84	1.28	42.12	54.00	-11.88	AVG
3	Х	2405.200	99.46	1.35	100.81	Fundamental	Frequency	peak
4	*	2405.400	96.05	1.35	97.40	Fundamental	Frequency	AVG

Remark:

- Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
   Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)



emperature:	23.2℃	Relative Humidity:	41%
est Voltage:	AC 120V/60Hz	n nu	A V
nt. Pol.	Vertical		5
est Mode:	TX GFSK Mode 2406MHz	10	- OB
emark:	Only worse case is reporte	d	
120.0 dBuV/m			
70			3 X X ART 15C (PEAK)
20.0			PART 15CI AVG)

No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	51.12	1.28	52.40	74.00	-21.60	peak
2		2390.000	43.24	1.28	44.52	54.00	-9.48	AVG
3	Х	2405.200	102.75	1.35	104.10	Fundamental I	requency	peak
4	*	2405.400	99.29	1.35	100.64	Fundamental	Frequency	AVG

- Remark: 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB) 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)



Temperature:	<b>23.2℃</b>		Relative Humidity:	41%			
Test Voltage:	AC 120V/60H	z	- TUP	A 12			
Ant. Pol.	Horizontal		AND AND				
Test Mode:	TX GFSK Mo	de 2475 MHz					
Remark:	Only worse ca	ase is reported					
120.0 dBuV/m							
12	2						
Ă	•						
	1		(RF) FCC P4	ART 15C (PEAK)			
70	3						
N	_ ↓ ×			PART 15C (AVG)			
M	4			ART ISC (AVG)			
M	and the						
×		~~~ <u>~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					
20.0 2459.000 2469.00	2479.00 2489.00						

No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2474.200	96.57	1.81	98.38	Fundamental	Frequency	AVG
2	Х	2476.000	100.07	1.83	101.90	Fundamental	Frequency	peak
3		2483.500	60.83	1.88	62.71	74.00	-11.29	peak
4		2483.500	47.03	1.88	48.91	54.00	-5.09	AVG

- Remark: 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB) 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)



Гетр	eratur	e:	23.2°	С			R	elativ	e Humidity	<b>y:</b> 41%		
lest \	<b>/</b> oltag	e:	AC 1	20V/60H	Ηz			R	100		180	1
Ant. F	Pol.		Vertic	cal	UP					100		
lest N	Mode:		TX G	FSK Mo	de 24	175 MHz	22			y -	200	
Rema	ark:		Only	worse c	ase is	s reporte	d	102	32		NUE	2
120.0	dBuV/m											
		1 X										ĺ
		Å										
			<b>ι</b>						(85) 500	PART 15C (PI		
70			4 3							, FANT 150 (FI		
		N	×									
	w								(RF) FC	C PART 15C (/	4VG)	
	wal		1 1	Mar Mar								ĺ
v				- Mary	m							
20.0	9.000 246	9.00 24	479.00	2489.00	2499.0	0 2509.0	0 251	9.00	2529.00 253	9.00	2559.00	 MHz
				Readi	· ·	Correct	Меа	asure				
N	o. Mk	. Fre	eq.	Readi Leve	· ·	Correct Factor		asure ent	- Limit	Over		
No	o. Mk	. Fre M⊦			ľ		m			Over dB	Detect	or
No 1	o. Mk X		Iz	Leve	.  '	Factor	m dB	ent	Limit	dB	Detecto	
		MF	Iz 000	Leve dBuV	1 3	Factor dB/m	т _{dB} 10	ent uV/m	Limit dBuV/m Fundamenta	dB	peal	k

#### Remark:

4

Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
 Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)

2483.500

- 3. Margin (dB) = Peak/AVG (dBµV/m)-Limit PK/AVG(dBµV/m)

48.77

1.88

50.65

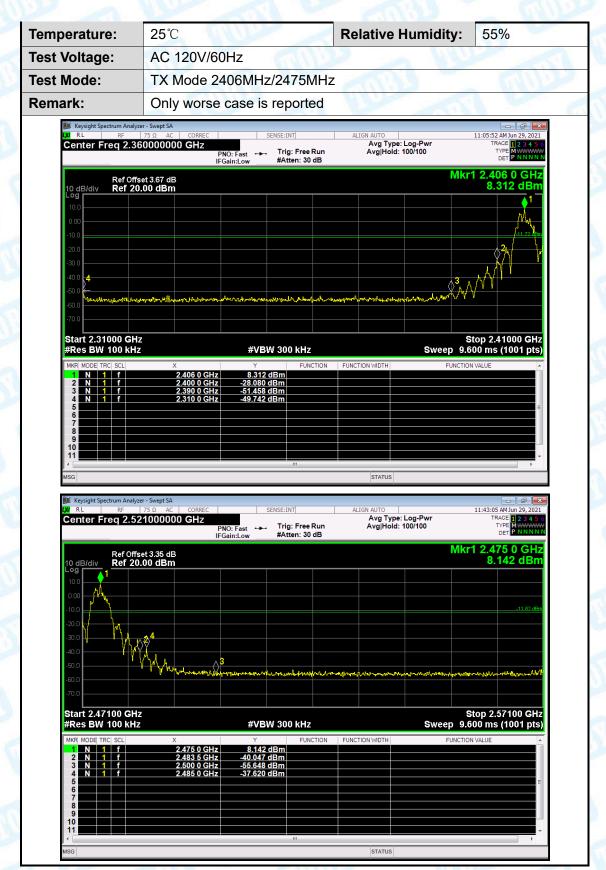
-3.35

54.00

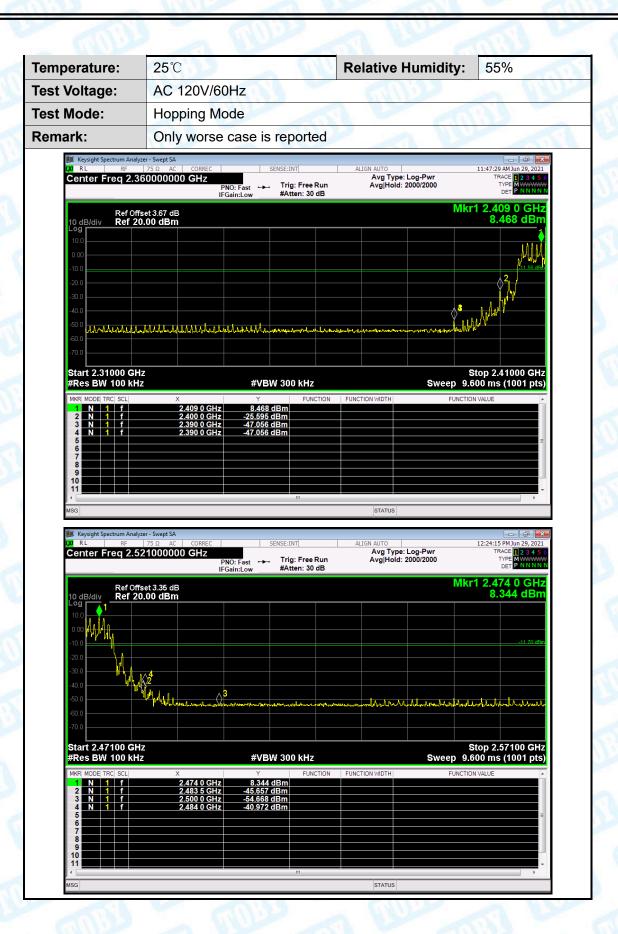
AVG



#### (2) Conducted Band Edge Test









# Attachment D-- Number of Hopping Channel Test Data

Temperature:	<b>25</b> ℃	-	Relative Humidity:	55%
Test Voltage:	AC 1	20V/60Hz		
Test Mode:	Норр	oing Mode		199
Frequency Rar	ige	Test Mode	Quantity of Hopping Channel	Limit
2406MHz~2475MHz GFSK			24	>15
		(	GFSK Mode	1

RL enter l	RF Freq 2	75Ω A 2.4417500	CORREC		SENSE:INT			ype: Log-Pwr		TACE 1 2 3 4 5 6
				PNO: Fast ++ IFGain:Low	. Trig: Fre #Atten:		Avg H	old: 2000/2000		
) dB/div		Offset 3.61 of <b>20.00 dB</b>						Mkr	1 2.405 0 8	)10 0 GHz .431 dBm
og 0.0 0.00		MANA,	J. W. M. W. M. W.		MANY	HANG				2
0.0 0.0 0.0										
tart 2.4 Res BV				#VE	W 300 KH	Iz		Swee	Stop 2 p 8.000 m	.48350 GHz s (1001 pts)
KR MODE	TRC SCL		× 405 010 0 GH	Y	F dBm	JNCTION	FUNCTION WIDTH	4  F	FUNCTION VALUE	<u>^</u>
2 N	1 f	2.	476 068 5 GH		dBm					
3										
5 6										=
7										
•										
9										

## Attachment E-- Average Time of Occupancy Test Data

Temper	ature:	25°	C	55%	CUD 2			
Test Vo	Test Voltage: AC 120V/60Hz							
Test Mo	de:	Hopping Mode (GFSK)						
Remark	:	The	e number of total h	opping frequen	cies up to 24.		Ner	
Test	Test Channel		Reading Time	Total hops	Test Result	Limit	Result	
Mode	(MHz)		(ms)	(N)	(ms)	(ms)	Result	
GFSK	2442		0.174	24	19.14	400	PASS	

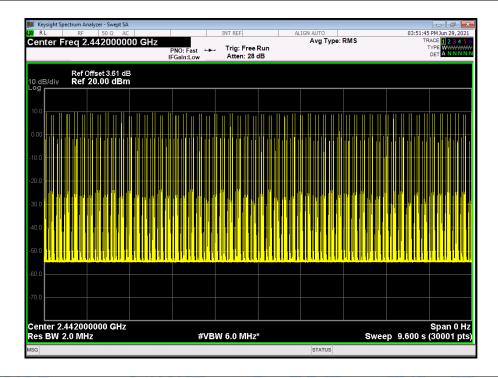
The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows: The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 24[ch] = 9.6[s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

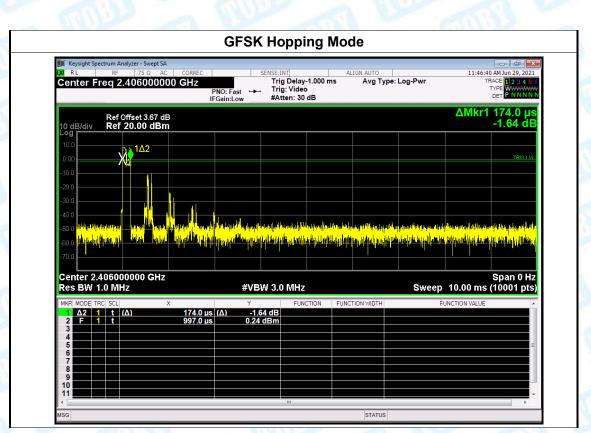
The maximum number of hopping channels in 9.6s is 110.

Reading Time=0.174ms*110=19.14ms

#### Hopping Channels in 9.6s







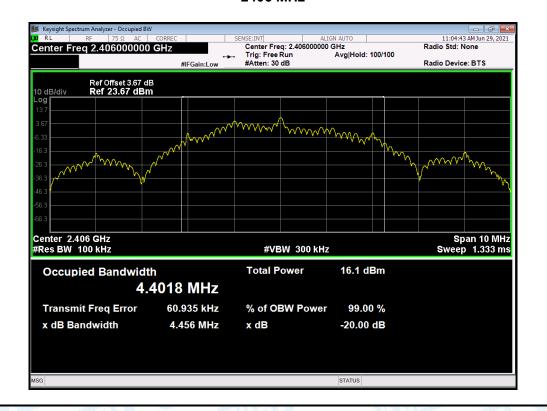
# TOBY

# **Attachment F-- Channel Separation and Bandwidth Test**

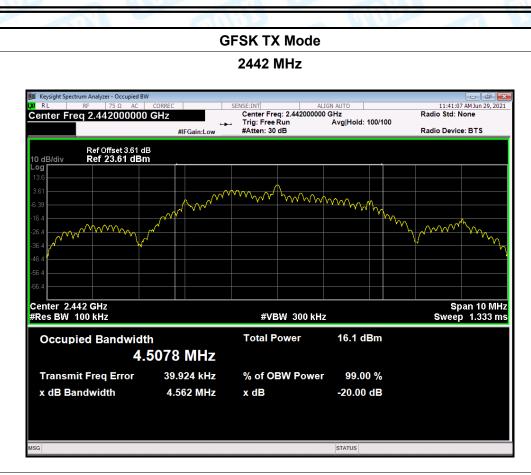
## Data

Temperature:	25°	С	Relative Humidity:	55%
Test Voltage:	AC	120V/60Hz		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Test Mode:				
Channel frequency (MHz)		99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2406		4401.8	4456	2970
2442		4507.8	4562	3041
2475		4392.5	4438	2958
		CESK TY	Mada	

GFSK TX Mode 2406 MHz







#### **GFSK TX Mode**

2475 MHz



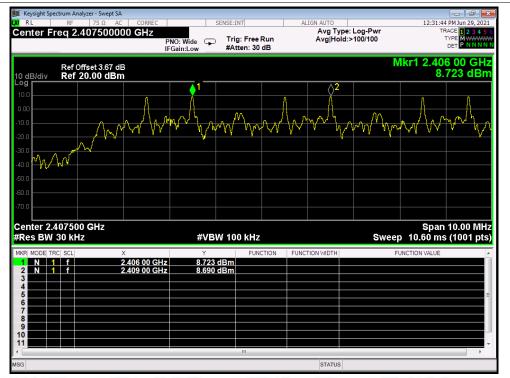


#### **Channel Separation Test data:**

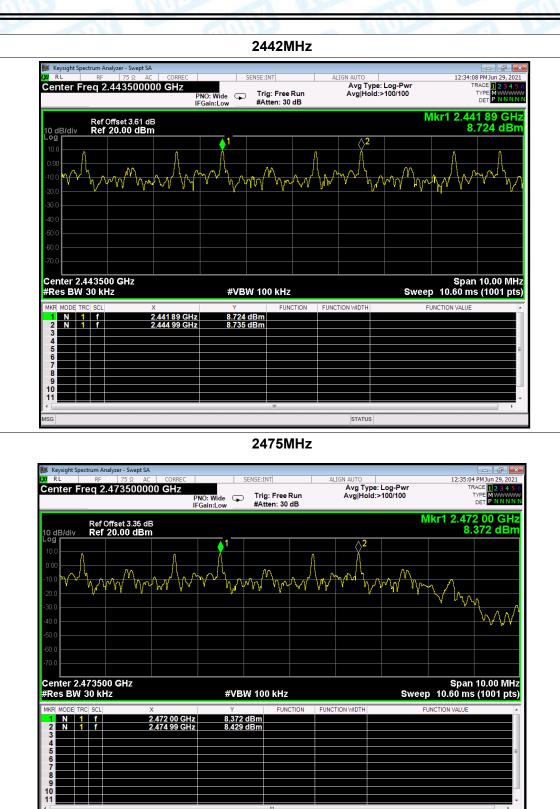
Temperature:	<b>25</b> ℃		Relative Humidity	: 55%				
Test Voltage:	AC 120V/60Hz							
Test Mode:	Hopping Mode (GFSK)							
Remark:	We test all channel and worse case recorded in the report.							
Channel frequency		Separation Re	ad Value S	Separation Limit				
(MHz)		(kHz)		(kHz)				
2406		3000		2970				
2442		3100		3041				
2475		2990		2958				

#### Hopping Mode

#### 2406 MHz





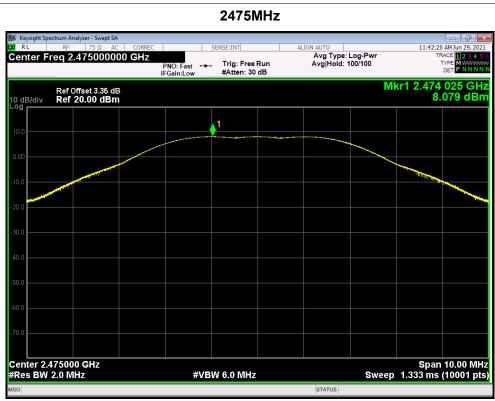


STATUS

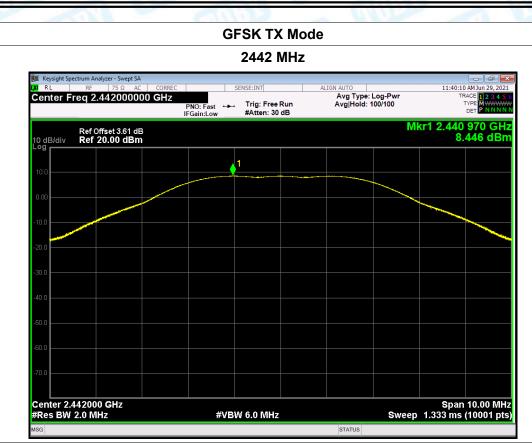
# Attachment G-- Peak Output Power Test Data

nperature:	<b>25</b> ℃		Re	lative Hu	midity:	55%	
st Voltage:	AC 120V/60Hz						
st Mode:	TX Mode		n o P				
annel frequency (MHz)		Test Result (dBm)			Limit (dBm)		
2406		8.301					
2442		8.446			30		
2475		8.079					
		GFSK	TX Mod	е			
		240	06 MHz				
📕 Keysight Spectrum Analyze							
Center Freq 2.40	75 Ω AC CORREC 6000000 GHz		: Free Run en: 30 dB	ALIGN AUTO Avg Type: I Avg Hold: 1	_og-Pwr 00/100	11:03:21 AM Jun 29, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	
Ref Offs 10 dB/div Ref 20.	et 3.67 dB 00 dBm				Mkr	1 2.406 010 GHz 8.301 dBm	
10.0			1				
0.00							
-10.0							
-20.0							
-30.0							
-40.0							
-50.0							
-60.0							
-70.0							
Center 2.406000 G #Res BW 2.0 MHz	GHz	#VBW 6.0	MHz		Sweep 1	Span 10.00 MHz .333 ms (10001 pts)	
MSG				STATUS			

-----END OF REPORT-----







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