

FCC 47 CFR PART 15 SUBPART C & INDUSTRY CANADA RSS-247 ISSUE 2 February 2017

CERTIFICATION TEST REPORT

For

Product Name: 5" Video Baby Monitor

Model No.: COMFORT75BU

Trademark: motorola

FCC ID: VLJ-CF75BU

IC: 4522A-CF75BU

HVIN: COMFORT75BU

Report No.: ES181024005W

Issue Date: November 15, 2018

Prepared for

Binatone Electronics International Ltd.

Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong

Prepared by

EMTEK (SHENZHEN) CO., LTD.

Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China TEL: 86-755-26954280 FAX: 86-755-26954282



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TEST RESULT CERTIFICATION 1

Applicant:	Binatone Electronics International Ltd. Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong
Manufacturer:	Foshan Shunde Alford Electronics Co., Ltd. Xinjiao Industrial Park, DaLiang, ShunDe, Foshan, China
Product Description:	5" Video Baby Monitor
Model Number:	COMFORT75BU

Measurement Procedure Used:

APPLICABLE STANDARDS				
STANDARD	TEST RESULT			
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C RSS-247 Issue2, February 2017 RSS-Gen, Issue5, April 2018	PASS			

The above equipment was tested by EMTEK (SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2, Part 15.247, IC RSS-247 IC RSS-GEN.

The test results of this report relate only to the tested sample identified in this report.

Date of Test :

September 26, 2018 to October 28, 2018

Prepared by :

Yaping Shen /Editor

SHENZHEN

Reviewer:

ESTING

Approve & Authorized Signer :

Lisa Wang/Manager

Joe Xia /Supervisor



2 EUT TECHNICAL DESCRIPTION

The EUT is a Baby Unit (Camera) which supports 2.4GHz FHSS wireless technology.

Characteristics	Description
Device Type:	FHSS
Modulation:	GFSK
Operating Frequency Range(s):	2415.375 - 2471.625 MHz
Number of Channels:	21 channels
Channel Spacing:	2.25 / 3.375 / 4.5 MHz
Transmit Power Max:	18.14 dBm
Antenna Type:	Integral antenna
Antenna Gain:	0 dBi
Operating Voltage:	DC 5.0V 1000mA input via AC/DC adapter
Adapter 1#:	Model: S005BNU0500100 (Tenpao) Input: AC 100-240V~50/60Hz, 150mA Output: DC 5.0V@1000mA
Adapter 2#:	Model: TPA-468050100UU (TianYin) Input: AC 100-240V~50/60Hz, 0.2mA Output: DC 5.0V@1000mA

Note: for more details, please refer to the User's manual of the EUT.



3 SUMMARY OF TEST RESULT

FCC&IC Part Clause	Test Parameter	Verdict
FCC Part 15.247(a)(1) RSS-247 Clause 5.1(a)	20 dB Bandwidth	PASS
FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)	Carrier Frequency Separation	PASS
FCC Part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)	Number of Hopping Frequencies	PASS
FCC Part 15.247(a)(1) RSS-247 Clause 5.4(b)	Average Time of Occupancy (Dwell Time)	PASS
FCC Part 15.247(b)1 RSS-247 Clause 5.4(b)	Maximum Peak Conducted Output Power and EIRP Power	PASS
FCC Part 15.247(d) RSS-247 Clause 5.5	Unwanted emissions	PASS
FCC Part 15.247(d) & FCC Part 15.209 & FCC Part 15.205 RSS-247 Clause 3.3	Radiated Spurious Emissions	PASS
FCC Part 15.207 RSS-Gen Clause 8.8	Conducted Emission	PASS
FCC Part 15.203 RSS-Gen Clause 6.8	Antenna Application	PASS
RSS-Gen Clause 6.7	99% Occupied Bandwidth	PASS
NOTE1: N/A (Not Applicable)		



4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards: FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C ANSI C63.10: 2013 DA 00-705 RSS-Gen, Issue 5 April 2018 RSS-247, Issue 2 February 2017.

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/19/2018	05/20/2019
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/19/2018	05/20/2019
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/19/2018	05/20/2019

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/19/2018	05/20/2019
Pre-Amplifier	HP	8447D	2944A07999	05/19/2018	05/20/2019
Bilog Antenna	Schwarzbeck	VULB9163	142	05/19/2018	05/20/2019
Loop Antenna	ARA	PLA-1030/B	1029	05/19/2018	05/20/2019
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/19/2018	05/20/2019
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/19/2018	05/20/2019
Cable	Schwarzbeck	AK9513	ACRX1	05/19/2018	05/20/2019
Cable	Rosenberger	N/A	FP2RX2	05/19/2018	05/20/2019
Cable	Schwarzbeck	AK9513	CRPX1	05/19/2018	05/20/2019
Cable	Schwarzbeck	AK9513	CRRX2	05/19/2018	05/20/2019

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	05/19/2018	05/20/2019
Power meter	Anritsu	ML2495A	0824006	05/19/2018	05/20/2019
Power sensor	Anritsu	MA2411B	0738172	05/19/2018	05/20/2019
Spectrum Analyzer	Agilent	N9010A	My53470879	05/19/2018	05/20/2019

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



4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
01	2415.375	08	2435.625	15	2454.750
02	2418.750	09	2437.875	16	2458.125
03	2423.250	10	2440.125	17	2460.375
04	2426.625	11	2443.500	18	2462.625
05	2428.875	12	2445.750	19	2466.000
06	2431.125	13	2449.125	20	2468.250
07	2433.375	14	2451.375	21	2471.625

Frequency and Channel list:



5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

- EMC Lab.
- : Accredited by CNAS, 2016.10.24 The certificate is valid until 2022.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L2291
- : Accredited by TUV Rheinland Shenzhen, 2010.5.25 The Laboratory has been assessed according to the requirements ISO/IEC 17025.
- : Accredited by FCC, August 06, 2018 The certificate is valid until August 07, 2020 Designation Number: CN1204 Test Firm Registration Number: 882943
- : Accredited by Industry Canada, November 24, 2015 The Certificate Registration Number is 4480A-2



6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5°C
Humidity	±3%

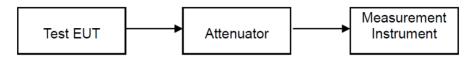
Measurement Uncertainty for a level of Confidence of 95%



7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The EUT component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

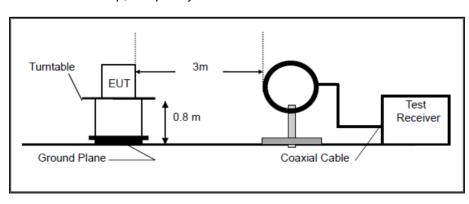
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

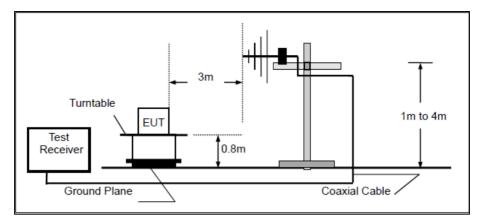
(Note: the FCC's permission to use 1.5 m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



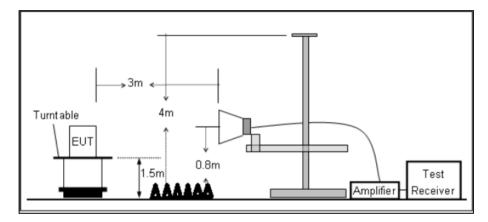
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



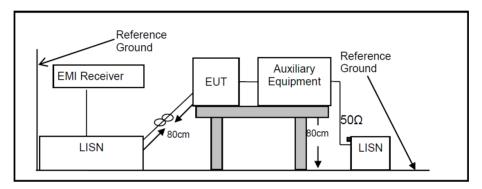


7.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (Perfect Share Mini) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

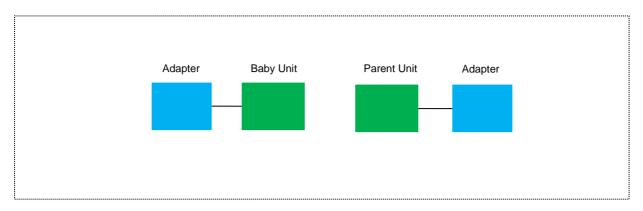
Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.





7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	S/N	Note
1.	5" Video Baby Monitor	motorola	COMFORT75PU	N/A	N/A

Notes:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



8 TEST REQUIREMENTS

8.1 20DB BANDWIDTH

8.1.1 Applicable Standard

According to FCC Part 15.247(a)(1) and RSS-247 Clause 5.1(a)

8.1.2 Conformance Limit

No limit requirement.

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.1.4 Test Procedure

The EUT was operating in mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1%-5% OBW

Set the video bandwidth (VBW) = 3 * RBW

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

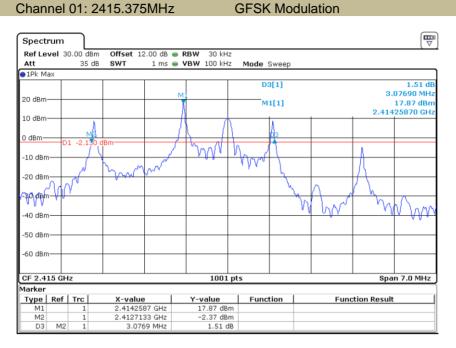
Measure and record the results in the test report.

Test Results

24°C 53 %	Test D Test B		2018		
Channel Number	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Verdict	
01	2415.375	3.07	N/A	PASS	
11	2443.500	3.08	N/A	PASS	
21	2471.625	3.08	N/A	PASS	
Note: N/A (Not Applicable)					
	53 % Channel Number 01 11 21	53 % Test B Channel Channel Frequency Number (MHz) 01 2415.375 11 2443.500 21 2471.625	53 % Test By: King Kong Channel Channel Frequency (MHz) 20dB Bandwidth (MHz) 01 2415.375 3.07 11 2443.500 3.08 21 2471.625 3.08	53 % Test By: King Kong Channel Channel Frequency 20dB Bandwidth Limit Number (MHz) (MHz) (kHz) 01 2415.375 3.07 N/A 11 2443.500 3.08 N/A 21 2471.625 3.08 N/A	

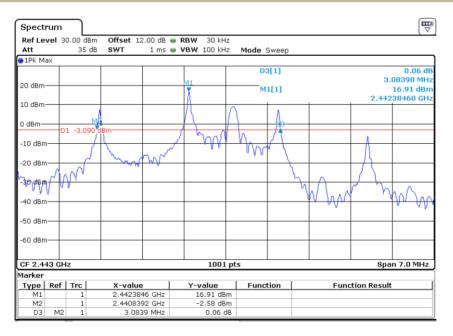


Test Model 20dB Bandwidth Channel 01: 2415.375MHz



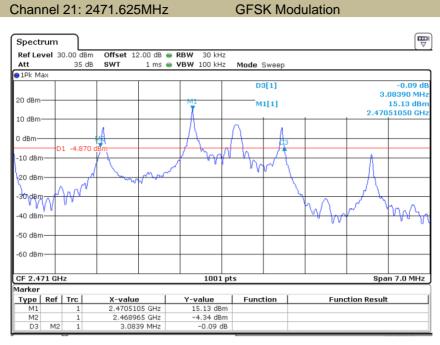
Test Model

20dB Bandwidth Channel 11: 2443.500MHz





Test Model 20dB Bandwidth Channel 21: 2471.625MHz





8.2 99%BANDWIDTH

8.2.1 Applicable Standard

According to RSS-Gen Clause 6.7

8.2.2 Conformance Limit

No limit requirement.

8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.2.4 Test Procedure

The EUT was operating in fixed frequency mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1%-5% OBW

Set the video bandwidth (VBW) ≥100kHz.

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.Use the marker-to-peak function to set the marker to the peak of the emission. Use themarker-delta function to measure 20 dB down one side of the emission. Reset the markerdeltafunction, and move the marker to the other side of the emission, until it is (asclose as possible to) even with the reference marker level. The marker-delta reading atthis point is the 20 dB bandwidth of the emission.

If this value varies with differentmodes of operation (e.g., data rate, modulation format, etc.), repeat this test for eachvariation.

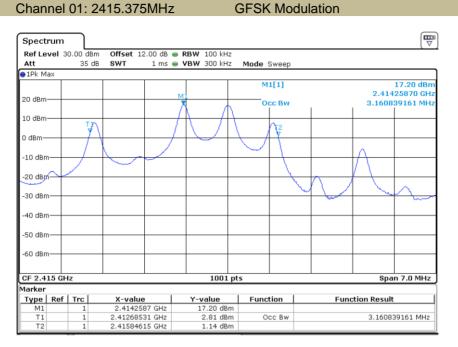
Measure and record the results in the test report.

Test Results

Temperature: Humidity:	24°C 53 %	Test D Test B	· · · · · · · · · · · · · · · · · · ·	2018
Modulation Mode	Channel Number	Channel Frequency (MHz)	99% Measurement Bandwidth(MHz)	Verdict
	01	2415.375	3.16	PASS
GFSK	11	2443.500	3.15	PASS
	21	2471.625	3.17	PASS

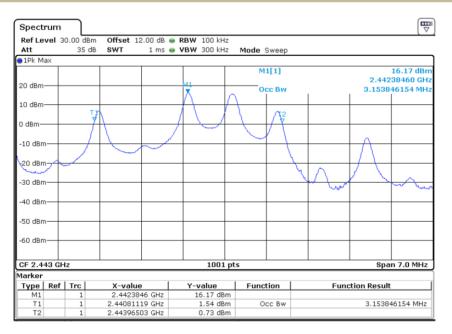


Test Model 99% Bandwidth Channel 01: 2415.375MHz



Test Model

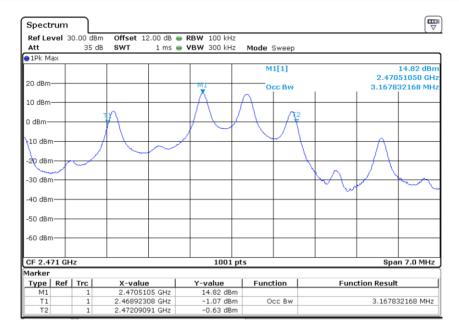
99% Bandwidth Channel 11: 2443.500MHz





Test Model 99% Band Channel 2

99% Bandwidth Channel 21: 2471.625MHz





8.3 CARRIER FREQUENCY SEPARATION

8.3.1 Applicable Standard

According to FCC Part 15.247(a)(1) and RSS-247 Clause 5.1(b)

8.3.2 Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

In case of an output power less than 125mW, the frequency hopping system may have channels separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.3.4 Test Procedure

According to FCC Part15.247(a)(1)& According to RSS-247 Clause 5.1(b)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Set the RBW =100kHz.

Set VBW =300kHz.

Set the span = wide enough to capture the peaks of two adjacent channels

Set Sweep time = auto couple.

Set Detector = peak.

Set Trace mode = max hold.

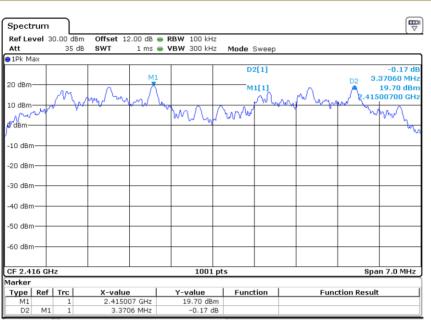
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

Test Results

Temperature: Humidity:	24°C 53 %	Test D Test B		[.] 24, 2018 ng	
Modulation	Channel	Channel Frequency	Channel Seperation	Limit	
Mode	Number	(MHz)	(MHz)	(MHz)	Verdict
	01	2415.375	3.37	>2.0	PASS
GFSK	11	2443.500	3.38	>2.1	PASS
	21	2471.625	3.38	>2.1	PASS
Note: Limit = 125mW (21dB		width * 2/3, if it is great	er than 25kHz and the	output power	is less than

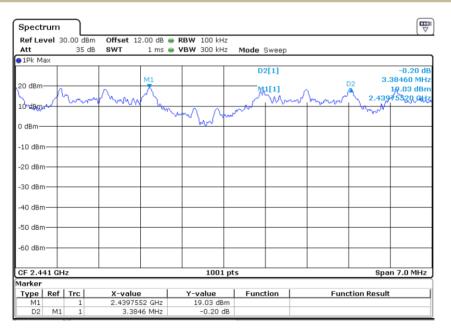


Test Model Carrier Frequency Separation Channel 01: 2415.375MHz GFSK Modulation



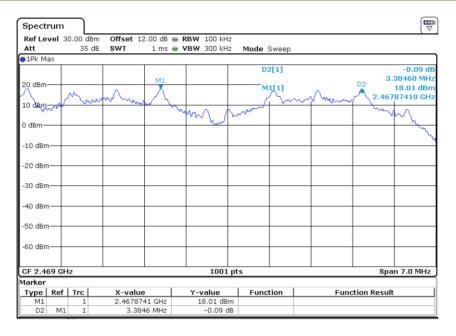
Test Model

Carrier Frequency Separation Channel 11: 2443.500MHz





Test Model Carrier Frequency Separation Channel 21: 2471.625MHz





8.4 NUMBER OF HOPPING FREQUENCIES

8.4.1 Applicable Standard

According to FCC Part 15.247(a)(1)(iii) and RSS-247 Clause 5.1(d)

8.4.2 Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall use at least 15 channels.

8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.4.4 Test Procedure

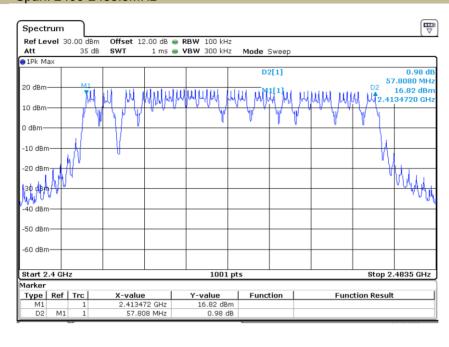
According to FCC Part15.247(a)(1)(iii) and RSS-247 Clause 5.1(d) The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = the frequency band of operation (2400-2483.5MHz) RBW \geq 100KHz VBW \geq RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

Test Results

Temperature: Humidity:	24°C 53 %	Test Date: Test By:	October 24, 2018 King Kong
Hopping Chan Ran	• •	Quantity of Hopping Channel	Quantity of Hopping Channel limit
2415.375MHz-	2471.625MHz	21	>15



Test Model Number Of Hopping Frequencies Span: 2400-2483.5MHz





8.5 AVERAGE TIME OF OCCUPANCY (DWELL TIME)

8.5.1 Applicable Standard

According to FCC Part 15.247(a)(1)(iii) and RSS-247 Clause 5.4(d)

8.5.2 Conformance Limit

For frequency hopping systems operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s multiplied by the number of hopping channels employed.

8.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.5.4 Test Procedure

■ According to FCC Part15.247(a)(1)(iii) and RSS-247 Clause 5.4(d)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1 MHz

 $\rm VBW\,\geqslant\,RBW$

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section.

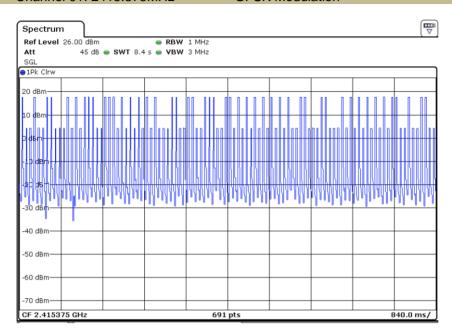
8.5.5 Test Results

Temperature Humidity:	e: 24°C 53 %		Test Date Test By:		ber 24, 2018 Kong	
Modulatio	Channel	Channel	Pulse	Dwell Time	Limit	
n Mode	Number	Frequency (MHz)	widths(ms)	(ms)	(ms)	Verdict
	01	2415.375	2.048	98.304	<400	PASS
GFSK	11	2443.500	1.608	41.808	<400	PASS
	21	2471.625	2.106	111.618	<400	PASS
		widths* Sum of hopping ch	of pulse widths annels			



Test Model

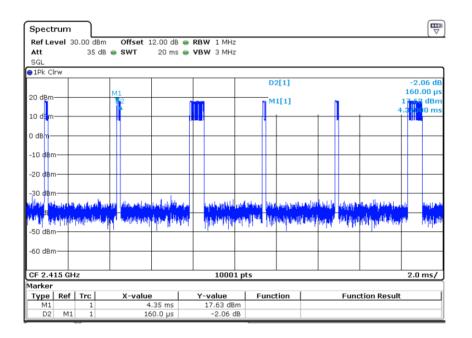
AVERAGE TIME OF OCCUPANCY Channel 01: 2415.375MHz



Spectr	um																														
Ref Lev Att	vel 3		m i dB 👄 S	Offse SWT								1 N 3 N																			
SGL																															_
●1Pk Clr	w									_																					_
																D	2[1]													10 d	
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							1									IVI	1[1]						1							9 ub 00 n	
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-10 dBm																															
-10 aBm							T												Т		T	Π						T			_
-20 ₁ dBm																															
-30 dBm					+		+	Ц	_		+		_						∔	\square	∔	Ц	Щ				_				
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-40 dBm	anto pla	leiteren til i sinsi.	Nines Inte des	(interin	ارون در	<u>nh</u>	nd jan	-0),	alba	410	e Li bach	- 11	-	ski jak	فرطان	<u>boqla</u>	ALCORA.)	- House	dia	a ja	luith	46	a da la	<u>n 1</u>	16	a, A	aup.	174	apla	alddagd	ų,
-50 dBm	-									-			+											\vdash				+			_
-60 dBm	+		-							\vdash			-											t				t			_
CF 2.41	.5 G⊢	IZ										100	001	. pt:	5				_		_				_			2	0.0	ms,	1
Marker																															
	Ref			X-va						Y		alue			F	unc	tion					F	un	ctio	on	Re	su	lt			
M1 D2	M1	1					1 m					.09						_													-
02	INIT				18	5.08	3 m	>			_	0.1	υa	в																	

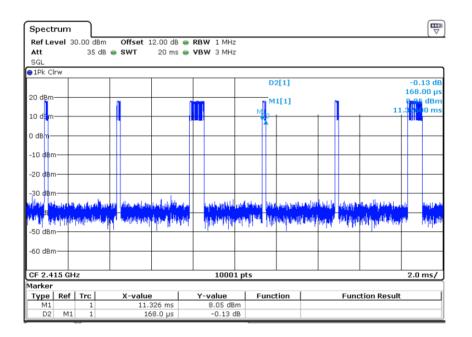


Att SGL			B 👄 SWT	211 ms 👄	VB	W 3 MHz								
1Pk Cl				20 115										
	rw													
								D	2[1]					.24 d
20 68 m					_									.00 µ 2 dBr
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10 dBn														
10 001	' T													
-20 dB n	n													
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-50 dBn		London and	and the stand	dis di statut	6	the side	an da la	146	a al a chi a	a i na lat	1.4.66	and he was not		1. Julia
50 ubii	'													
-60 dBn	n				_									
CF 2.4	15 GH	z			_	1000	1 pts						2.0	ms/
1arker														
	Ref	Trc	X-value			-value		unc	tion		Fund	tion Result		
Туре						4.4.4.9.10								
Type M1 D2	M1	1		52.0 μs 74.0 μs		16.12 dB -6.24 c								



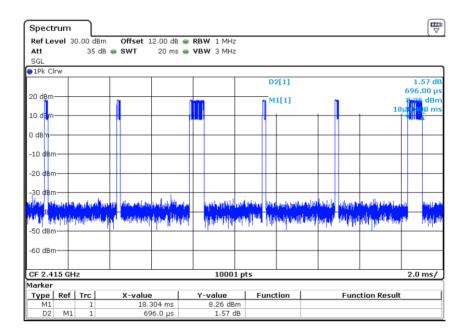


SGL		35 dB 🧉	SWT	20 ms 😑	VB	W З МН2	2								
1Pk Cli															
) IPK CI	rw				_			D'	2[1]						9.68 d
									2[1]						4.00 μ
20 dBm-			n.			2		M	1[1]		ſ			7	35 dBi
10 d m·				N									-	7.8	800 m
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20 dBm															
20 asm															
30 d8 m					1				L						
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50 dBm															
60 dBm															
00 001	.														
CF 2.4	15 CU-					1000	1 ptc							<u> </u>	0 ms/
JF 2.4. Iarker		2				1000	I pts							2.	u msy
Type	Ref	Trc	X-value		Y	-value	L EI	inc	tion			Euno	tion Result		
M1		1		338 ms	<u> </u>	7.85 dB						. and			
D2	M1	1		34.0 µs		9.68 (





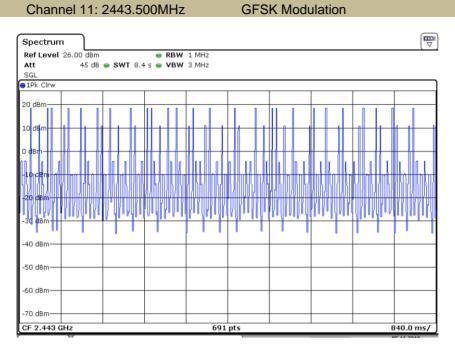
		35 dB 🧉		e 2.00 dB. 20 ms.											
SGL															
●1Pk Clr	W														
								D	2[1]						0.07 d 56.00 µ
20 dBm-			~					- M	1[1]			_		- 10	98 dBi
					ΪT			1	-[-]		м		1	4.8	1300 m
10 d m-												<u> </u>			
) dBm—															
10 d8m					1				L					11	
20 d8 m					+									++	
30 dBm			I	(du	+										-
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50 dBm		<u> </u>		1	+	da str	1.11	1.4	1			10	Je	·	1.11
60 dBm					+									+	
CF 2.41	L5 GHz					1000	1 pts							2	.0 ms/
larker															
	Ref 1	Trc	X-value		Y	-value		unc	tion			Fund	tion Resul	t	
M1		1	14.8	318 ms 6.0 µs		7.98 dB 0.07 d									





Test Model

AVERAGE TIME OF OCCUPANCY



Spect	um										
Ref Le [.] Att	vel 3		Bm Offset 1 dB 🕳 SWT		BBW 1 MHz VBW 3 MHz						
SGL											
UPK CI	TWV					D	2[1]			-0	.10 dB
00 d0m					M1	D2			1	8.08	00 ms
20 dBm-					T T	IT M	1[1]		19		ō dBm D0 ms
10 dBm·											
0 dBm—											
-10 dBm								الم المالية			
-20 dBm			Lut				. 11	البليل ال			
-30 dBm		the state		a karland		1 1					
-40 dBm	-	in pla -	and a state file sector		and a state state state						
-50 dBm	-										
-60 dBm											
CF 2.44	13 GH	z			10001	pts				40.0	ms/
Marker											
Туре	Ref	Trc	X-value		Y-value	Func	tion	Func	tion Result		
M1 D2	M1	1		.36 ms .08 ms	18.15 dBm -0.10 dB						

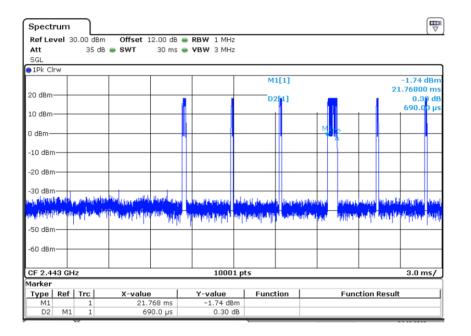


Spect																	0
	vel 3	0.00 dBm			_	RBW 1 MH:	-										
Att		35 dB	S₩T	30 ms	•	VBW 3 MH:	Ζ										
SGL																	
1Pk Cl	rw								_								
								D	2[1]						0.0	
20 dBm·																228.0	
					"# 2		1	M	1	1]					L	13.87 1.3130	
10 dBm·	_								H		+	-		-	- 11	.3130	
0 dBm—					╢				Ц		_	_					
					11												
-10 dBm					╨		<u> </u>		₩		_	-	-				-
					Ш												
-20 dBm					╨		<u> </u>		₩		_	-					-
					Ш												
-30 dBm					₩		-		Η		-	-					-
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-50 dBm							-		⊢								
-60 dBrr	-						<u> </u>		F								
CF 2.4	13 GH	z				1000	1 pt	5								3.0 n	ns/
1arker																	-
Type	Ref	Trc	X-value	. 1		Y-value	1	Fund	tie	on I			Fund	tion	Result		
M1		1		313 ms		13.87 dB	sm										
D2	M1	1		8.0 µs		0.04 (dB										

Spectr	um															
Ref Lev	el 3				_	RBW 1 MH:		_								
Att		35 d	B 👄 SWT	30 ms	•	VBW 3 MH:	Z									
SGL																
⊖1Pk Clr	w					1	D	70	11						7.4	5 dB
								-1	-1						168.0	
20 dBm-	-						M	1	1]						-1.73	Bn
10 dBm-					1									14	1.7900	ms
10 ubili-						-	2	Π								
0 dBm—	_				╢	M N		Ц			Щ					
-10 dBm	-				₩			╉		-						
-20 dBm					T			Π								
-30 dBm					Ш			Ц								
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-50 dBm								F								
-60 dBm								L								
00 0011																
CF 2.44	3.64	17				1000	1 nts								3.0 n	ne/
Marker	0 01	2			_	1000	1 pt3	-			_				0.01	137
	Ref	Trc	X-value	, I		Y-value	Func	tie	on			Fund	tion	Result		
M1		1		.79 ms		-1.73 dB	m									
D2	M1	1	16	68.0 µs		7.45 (ЗB									

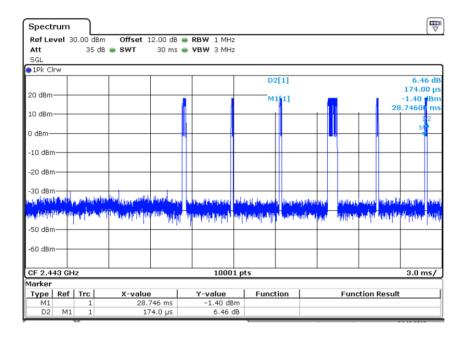


Spect		L														[₩
	vel 3	0.00 dBm	Offset 1			RBW 1 MHz										
Att SGL		35 dB	Sw1	30 ms	-	VBW 3 MHz										
1Pk Cl								_								
JIPK CI							D	70	11						-17.1	1 di
															171.0	
20 dBm							м	M	1]		_				15.89	
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0 dBm—									2							
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-10 dBm					Ш.			Ц								
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-20 dBm					╨											
					Ш											
-30 dBm			0		₩			┢			_					
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-50 dBrr		1	1.0.1	- int		1.1.1.1.1.1.1	10.00	1		r Pi		ton a	1		11.00	1.5
-30 ubii	'							Γ								
-60 dBrr								L								
CF 2.4	13 CU	-				1000	1 ptc								3.0 n	
darker	to GH	2				1000	r prs	-			_				3.U fi	157
Type	Ref	Trc	X-value			Y-value	Fund	t i e	n l			Euro	tion	Result		
M1	Nel	1		273 ms		15.89 dB		cit	<u>, , , , , , , , , , , , , , , , , , , </u>			ranc	auon	Result	-	
D2	M1	1		'1.0 µs		-17.11 0										





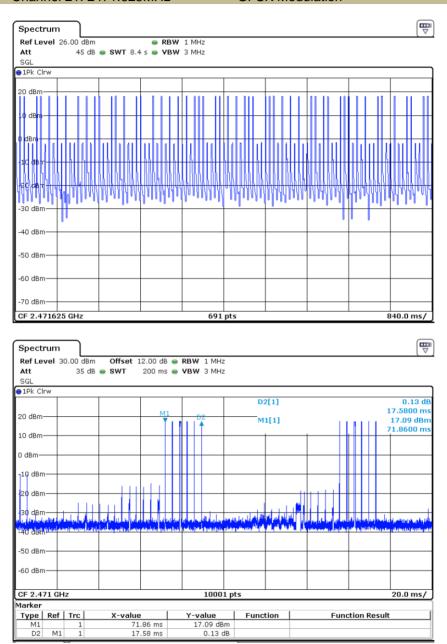
Spect		Ļ														[₩
	vel 3	0.00 dBm	Offset 1			RBW 1 MHz										
Att SGL		35 dB	swi	30 ms	-	VBW 3 MHz	2									
1Pk Cl								_								
JIFK CI							D	Л	1]						0.9	2 d
								- L	-1						177.0	
20 dBm-							M	1	1]		_				4.50	
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10 dBm·								Γ					N	2		
0 dBm—														r i		
o abiii					Π.			ľ	1							1
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-30 dBm		. In take	بالقرب الملالة	IL. IL	++		. La sura	Ħ								
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-50 dBm			· ·				11 11								1.	1
-60 dBm								┝		-						
CF 2.44	13 GH	z	1			1000	1 pts			-					3.0 n	ns/
/larker																
Туре	Ref	Trc	X-value			Y-value	Func	on 📋			Fund	tion	Result	t		
M1		1		254 ms		4.50 dB										
D2	M1	1	17	7.0 µs		0.92 (dB									





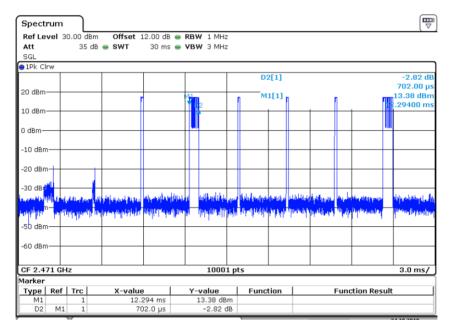
Test Model

AVERAGE TIME OF OCCUPANCY Channel 21: 2471.625MHz



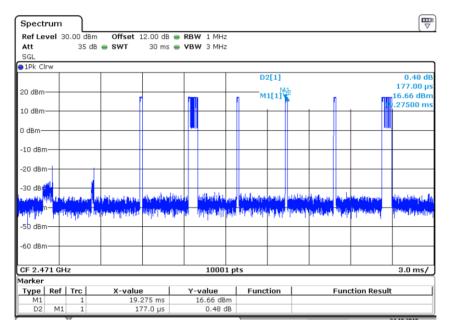


SGL		35 dB	SWT	30 ms	● VE	змна	2								
1Pk Cl	W		1						-					_	0.05.1
			M					D	2[1]						0.06 d 177.00 µ
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LO UDITI-															
) dBm—	_													100	
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20 dBm															
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-30 dBr <mark>i</mark>	1														
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50 dBm		or here is		1.5.7	·					<u> </u>	-	11			'
60 dBm					_		-		<u> </u>					_	
CF 2.47	71 GH	z	1			1000	1 pt	ts							3.0 ms/
1arker														_	
Туре	Ref	Trc	X-value	.	Y-value			Function				Func	tion Res	ult	
M1		1	8.1	305 ms		17.05 dB	m dB								



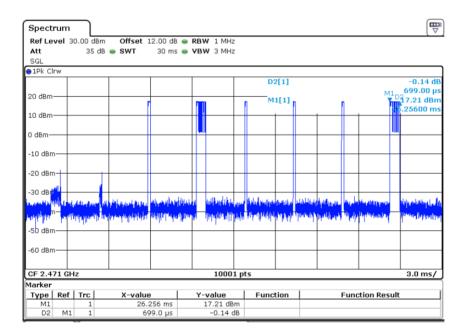


		35 dB	SWT	30 ms	● VE	ж змн:	Z								
∋1Pk Cl	rw														
									2[1]						-0.70 dl 177.00 μ
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10 dBm							\square								
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adhpha,	i parti l	արդերիս ա	yar-yayahhha	and the states	a starting	alitation at 11.	100	n dan h	יתיין	- Maria di A	that is		ليرسمنهم		here by south
-50 dBm							-								
-60 dBrr															
CF 2.4	71 GH	IZ				1000	1 p	ts							3.0 ms/
1arker		1 - 1					_	-		1		-			
Type M1	Ref	1 Trc	X-value	9 786 ms	Y-value 17.23 dBm			Function F					tion Res	ult	
D2	M1	1		786 ms 77.0 µs		-0.70 (





20 dBm Image: state	7																		rum	Spect
DPk Cirw D2[1] -0. 20 dBm M1[1] 174. 10 dBm M1[1] 17.7671 0 dBm M1[1] 17.7671 10 dBm M1[1] 17.7671 -10 dBm Image: State																			vel 3	Att
20 dBm D2[1] -0. 20 dBm M1[1] M12 174. 10 dBm M1[1] M12 7.674 0 dBm M1[1] M1 7.674 0 dBm M1 M1 M1 -10 dBm M1 M1 M1 -20 dBm M1 M1 M1 -20 dBm M1 M1 M1 -30 dBm M1 M1 M1 -20 dBm M1 M1 M1 -30 dBm M1 M1 M1 -30 dBm M1 M1 M1 -60 dBm M1 M1 M1																				
20 dBm 174, 17.22 10 dBm 174, 174, 174, 174, 174, 174, 174, 174,																			rw	1Pk Cl
20 dBm M1[1] 17.22 17.22 10 dBm 0 dBm 10 dBm 10 dBm 10 dBm -10 dBm 10 dBm 10 dBm 10 dBm 10 dBm -20 dBm 10 dBm 10 dBm 10 dBm 10 dBm -30 dBm 10 dBm 10 dBm 10 dBm 10 dBm -30 dBm 10 dBm 10 dBm 10 dBm 10 dBm -30 dBm 10 dBm 10 dBm 10 dBm 10 dBm -30 dBm 10 dBm 10 dBm 10 dBm 10 dBm -50 dBm 10 dBm 10 dBm 10 dBm 10 dBm -50 dBm 10001 pts 3.0	.14 d								2[1]	D										
10 dBm 11.12 10 dBm 10 dBm 20 dBm 10 dBm 10 dBm 10 dBm 10 dBm 10 dBm 10 dBm 10 dBm 20 dBm 10 dBm 10 dBm 10 dBm						Ъ	M													20 dBm-
10 dBm			T.			1			111	1 1					1					
10 dBm 20 dBm 10 dBm <td>00 11</td> <td>.707</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>\rightarrow</td> <td></td> <td>_</td> <td>10 dBm·</td>	00 11	.707	-		-												\rightarrow		_	10 dBm·
10 dBm 20 dBm 10 dBm <td></td>																				
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20 dBm 20 dBm <td></td>																				
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ութիր ^{In –} ուրդ դամը լու ուղեցերինը՝ Ադրի գավ բարը ⁻ լու կեղ լինին էլ չինին է էլ չինին էլ չինին						. 1	1.4			111.4		m. J.C.		. Door	a . A.					
-50 dBm -60 dBm 	1			of the star	14-00									a. Italia	all selfs	, March 100	197	dilimiten	MARK	a da ang ang ang ang ang ang ang ang ang an
-50 dBm -60 dBm 	le neut	(this is		vialia Pa	իրես	0,4	he have	pusch h	MAR	արդութ	1.5	ng kita (ji	1	a.A Jiw	66 B CT 64	et a Head Head	a l	rele, sparsify		and the
60 dBm 67 2.471 GHz 10001 pts 3.0 1arker		Ľ			Ľ.	11		1.1		1.1		. T		· · ·	1.1.1	1.1		or he is a		50 dBm
CF 2.471 GHz 10001 pts 3.0 Tarker																			'	-50 ubii
CF 2.471 GHz 10001 pts 3.0 1arker																				-60 dBm
larker																			.	00 000
larker												1000								
	ms/	3.0								s	тр	1000						Z	/1 GF	
								1		E	- 1	- 1		1		¥			D -6	
M1 1 22.767 ms 17.22 dBm			uit	n Res	πion	Fund			lion	Func				_					Ref	Type
D2 M1 1 174.0 μs -0.14 dB														_					M1	





8.6 MAXIMUM PEAK CONDUCTED OUTPUT POWER AND EIRP POWER

8.6.1 Applicable Standard

According to FCC Part 15.247(b)(1) and RSS-247 Clause 5.4(b)

8.6.2 Conformance Limit

The max For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

8.6.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.6.4 Test Procedure

■ According to FCC Part15.247(b)(1) and RSS-247 Clause 5.4(b)

As an alternative to a peak power measurement, compliance with the limit can be based on a measurement of the maximum conducted output power.

Use the following spectrum analyzer settings:

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel (about 10MHz) Set RBW > the 20 dB bandwidth of the emission being measured (about 3MHz)

Set VBW ≥ RBW

Set Sweep = auto

Set Detector function = peak

Set Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission to determine the peak amplitude level.

Test Results

Temperature:	24°C	Test Date				
Humidity:	53 %	Test By:	King Kon	g		
	-					
Operation	Channel	Channel Frequency	Max Peak Power	Limit	Verdict	
Mode	Number	(MHz)	(dBm)	(dBm)	veruici	
	01	2415.375	18.14	21	PASS	
GFSK	11	2443.500	16.98	21	PASS	
	21	2471.625	15.47	21	PASS	
Note: N/A						

Operation Mode	Channel Number	Channel Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Verdict				
	01	2415.375	18.14	36	PASS				
GFSK	11	2443.500	16.98	36	PASS				
	21 2471.625 15.47 36 PASS								
Note: EIRP= Ma	x Peak Powe	er+Antenna Gain (0dBi)						



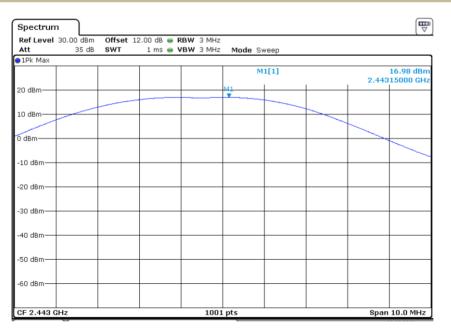
Test Model Max Peak Power Channel 01: 2415.375MHz GFSK Modulation

Spectrum				
Ref Level 30.00 dBm	Offset 12.00 dB 👄	RBW 3 MHz		
Att 35 dB	SWT 1 ms 👄	VBW 3 MHz Mode Sv	veep	
⊜1Pk Max				
			1[1]	18.14 dBm 2.41496000 GHz
20 dBm		ML		
10 dBm				
0 dBm				
-10 dBm				/
-10 0800				
00 40-0				
-20 dBm				
-30 dBm				
-40 dBm				
-50 dBm				
-60 dBm				
05.0.445.011-				
CF 2.415 GHz		1001 pts		Span 10.0 MHz

Test Model

Max Peak Power Channel 11: 2443.500MHz

GFSK Modulation





Test Model Max Peak Power Channel 21: 2471.625MHz

Spectrum	ר						
Ref Level 30.0		12.00 dB 👄 RE					
Att 1Pk Max	35 dB SWT	1 ms 👄 ۷	BW 3 MHz	Mode Sv	veep		
				м	1[1]		15.47 dBm 03100 GHz
20 dBm		M	ļ				
10 dBm							
0 dBm							
-10 dBm							
-20 dBm							
-30 dBm							
-40 dBm							
-50 dBm							
-60 dBm							
CF 2.471 GHz			1001	pts		Span	10.0 MHz

GFSK Modulation



8.7 CONDUCTED SUPRIOUS EMISSION

8.7.1 Applicable Standard

According to FCC Part 15.247(d) and RSS-Gen Clause 5.5

8.7.2 Conformance Limit

According to FCC Part 15.247(d) and RSS-Gen Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted, provided the transmitter demonstrates compliance with the peak conducted power limits.

8.7.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.7.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DSS channel center frequency.

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel.

Set the RBW = 100 kHz. Set the VBW \ge 3 x RBW.

Set Detector = peak. Set Sweep time = auto couple.

Set Trace mode = max hold. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum Maximum conduceted level.

Note that the channel found to contain the maximum conduceted level can be used to establish the reference level.

Band-edge Compliance of RF Conducted Emissions

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation Set RBW \ge 1% of the span=100kHz Set VBW \ge RBW

Set Sweep = auto Set Detector function = peak Set Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

Conduceted Spurious RF Conducted Emission

Use the following spectrum analyzer settings:

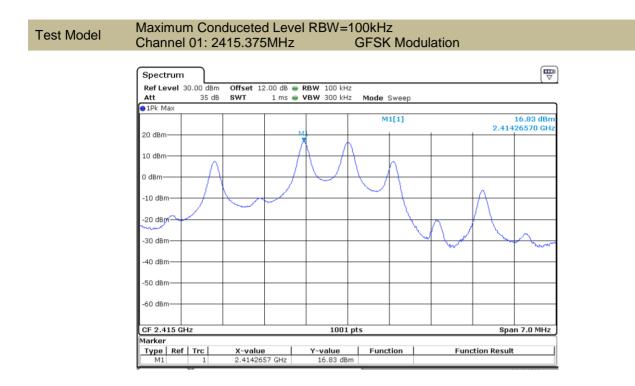
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.(30MHz to 25GHz). Set RBW = 100 kHz Set VBW \geq RBW

Set Sweep = auto Set Detector function = peak Set Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

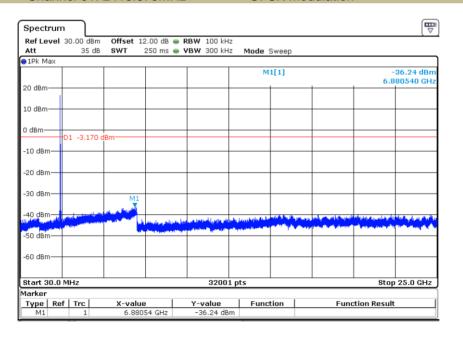


8.7.5 Test Results



Test Model

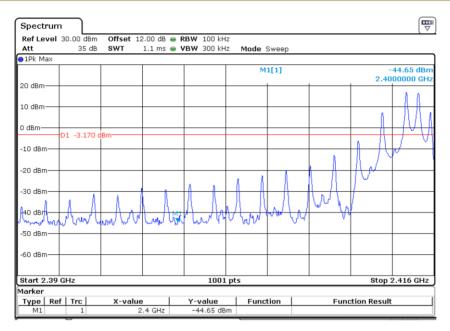
Conduceted Spurious RF Conducted Emission Channel 01: 2415.375MHz GFSK Modulation





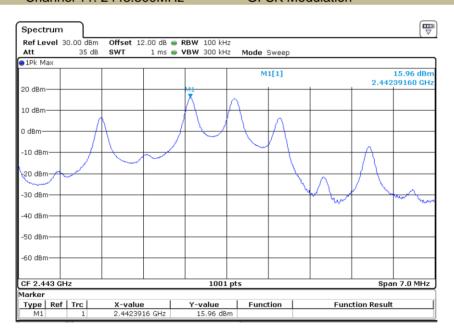
Test Model Band-edge Conducted Emissions Channel 01: 2415.375MHz

GFSK Modulation



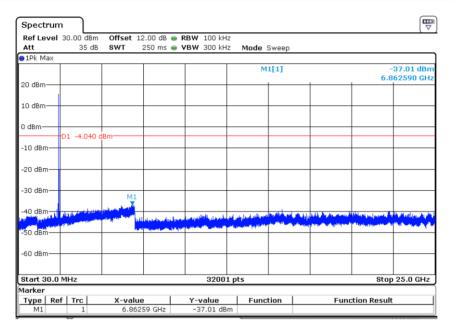
Test Model

Maximum Conduceted Level RBW=100kHz Channel 11: 2443.500MHz GFSK Modulation





Test Model Conduceted Spurious RF Conducted Emission Channel 11: 2443.500MHz GFSK Modulation



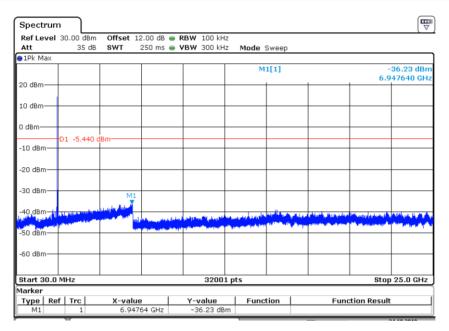
Test Model

Maximum Conduceted Level RBW=100kHz Channel 21: 2471.625MHz GFSK Modulation





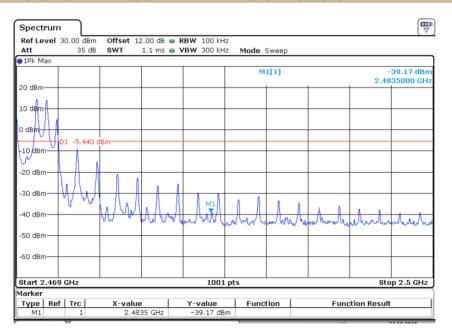
Test Model Conduceted Spurious RF Conducted Emission Channel 21: 2471.625MHz GFSK Modulation



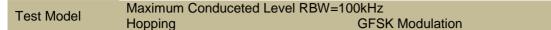
Test Model

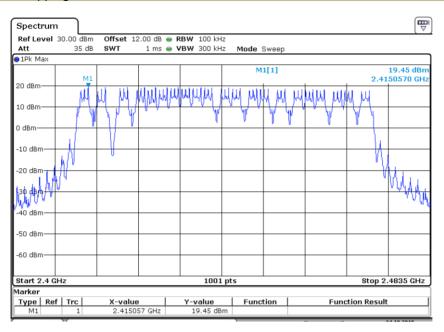
Band-edge Conducted Emissions Channel 21: 2471.625MHz

GFSK Modulation

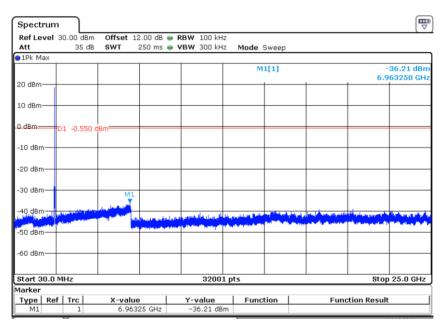






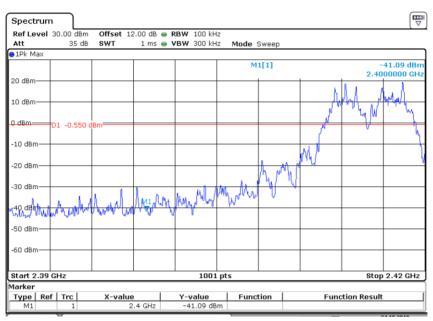


Test Model Conduceted Spurious RF Conducted Emission Hopping GFSK Modulation





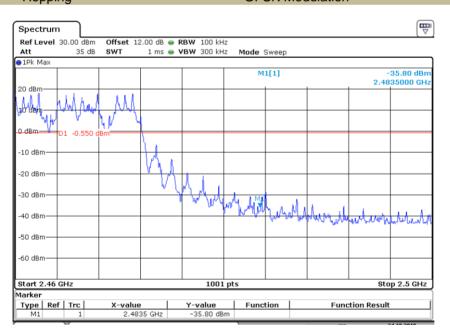




Test Model

Band-edge Conducted Emissions Hopping

GFSK Modulation



8.8 RADIATED SPURIOUS EMISSION

8.8.1 Applicable Standard

According to FCC Part 15.247(d), 15.209 and RSS-247 Clause 3.3

8.8.2 Conformance Limit

According to FCC Part 15.247(d): radiated 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) (see §15.205(c)). According to FCC Part15.205, Restricted bands

Accoluting to FOC Fartis.	200, Resilicieu Dalius		
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	24000/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

8.8.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

8.8.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

For Above 1GHz:

The EUT was placed on a turn table which is 0.1m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz

 $VBW \ge RBW$

Sweep = auto



Detector function = peak Trace = max hold For Below 1GHz: The EUT was placed on a turn table which is 0.1m above ground plane. Maximum procedure was performed on the highest emissions to ensure EUT compliance. Span = wide enough to fully capture the emission being measured RBW = 100 kHz for $VBW \ge RBW$ Sweep = auto Detector function = peak Trace = max holdFor Below 30MHz: The EUT was placed on a turn table which is 0.1m above ground plane. Maximum procedure was performed on the highest emissions to ensure EUT compliance. Span = wide enough to fully capture the emission being measured RBW = 9kHz $VBW \ge RBW$ Sweep = autoDetector function = peak Trace = max holdFor Below 150KHz: The EUT was placed on a turn table which is 0.1m above ground plane. Maximum procedure was performed on the highest emissions to ensure EUT compliance. Span = wide enough to fully capture the emission being measured RBW = 200Hz $VBW \ge RBW$ Sweep = autoDetector function = peak Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data. Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

• Calculation of Average factor

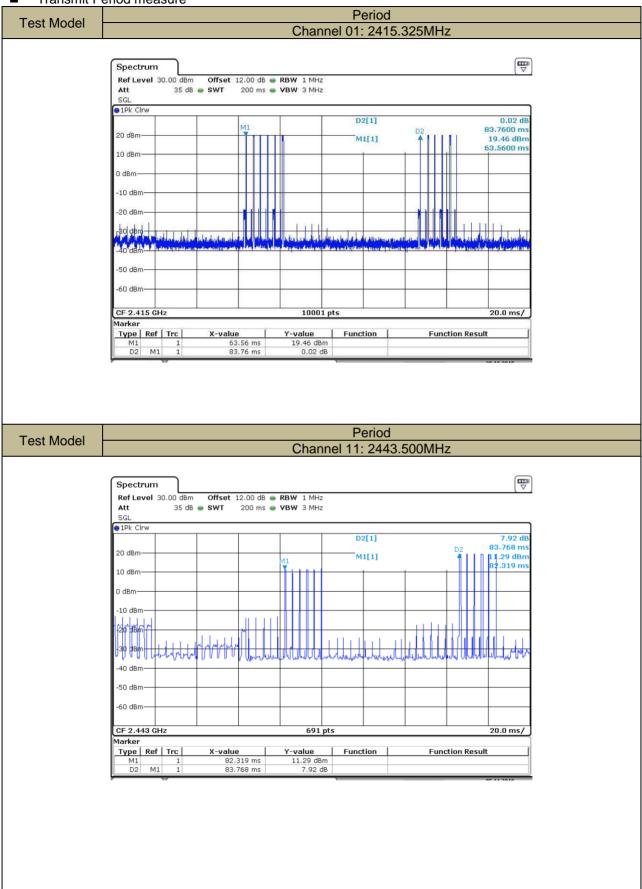
The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 20ms or the repetition cycle period, whichever is a shorter time frame, the duty cycle is measured by placing the spectrum analyzer to set zero span at 1MHz resolution bandwidth.

Modulation Mode	Channel Number	Channel Frequency (MHz)	Period (ms)	AV Factor (dB)	Limit (ms)	Verdict				
01 2415.375 83.760 -32.23 <400 PASS										
GFSK	11	2443.500	83.768	-34.33	<400	PASS				
	21	2471.625	83.768	-31.99	<400	PASS				
Note1: The p	Note1: The pulse widths is from the page 25.									
Note2: Duty cycle= Pulse widths/Period										
Note3: Avera	ging factor	in dB=20log(d	uty cycle)							



Transmit Period measure





Period Test Model Channel 21: 2471.625MHz Spectrum Ref Level 30.00 dBm Att 35 dB SGL Offset 12.00 dB 🖷 RBW 1 MHz 35 dB 👄 SWT 200 ms 👄 **VBW** 3 MHz ●1Pk Clrw D2[1] 0.03 d 83.768 m 20 dBm M1[1] D2 16.37 dBn 84 348 m 10 dBm 0 dBm--10 dBm -20 **de**m where the state of -30 d3m-+ - marine the state and the second -40 dBm--50 dBm--60 dBm-CF 2.471635 GHz 691 pts 20.0 ms/ Marker Y-value Function 16.37 dBm 0.03 dB X-value 84.348 ms 83.768 ms Type | Ref | Trc | Function Result M1 D2 M1 1



8.8.5 Test Results

■ Spurious Emission below 30MHz (9KHz to 30MHz)

Temperature:	24°C	Test Date:	October 28, 2018	
Humidity:	53 %	Test By:	KK	
Test mode:	TX Mode			

Freq.	Freq. (MHz)Ant.Pol.Emission Level(dBuV/m)H/VPKAV			Limit 3m	(dBuV/m)	Over(dB)		
			AV	PK	AV	PK	AV	

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission Above 1GHz (1GHz to 25GHz)

Temperature:	24°C	Test Date:	October 28, 2018
Humidity:	53 %	Test By:	King Kong
Test mode:	GFSK Modulation	Frequency:	Channel 01: 2415.375MHz

Freq.	Ant.Pol.	Emiss	Emission Level(dBuV/m)			(dBuV/m)	Over(dB)	
(MHz)	H/V	PK	AV factor	AV	PK	AV	PK	AV
4825.00	V	53.02	-32.23	20.79	74.00	54.00	-20.98	-33.21
7766.00	V	52.10	-32.23	19.87	74.00	54.00	-21.90	-16.77
25998.50	V	51.08	-32.23	18.85	74.00	54.00	-22.92	-15.60
4825.00	Н	60.88	-32.23	28.65	74.00	54.00	-13.12	-25.35
7239.00	Н	60.20	-32.23	27.97	74.00	54.00	-13.80	-26.03
25420.50	Н	52.40	-32.23	20.17	74.00	54.00	-21.60	-16.80

Temperature:	24°C	Test Date:	October 28, 2018
Humidity:	53 %	Test By:	King Kong
Test mode:	GFSK Modulation	Frequency:	Channel 11: 2443MHz

Freq.	Ant.Pol.	Emiss	ion Level(dB	uV/m)	Limit 3m	(dBuV/m)	Over	Over(dB)	
(MHz)	H/V	PK	AV factor	AV	PK	AV	PK	AV	
4876.00	V	54.70	-34.33	20.37	74.00	54.00	-19.30	-14.5	
8531.00	V	50.88	-34.33	16.55	74.00	54.00	-23.12	-18.7	
25633.00	V	51.05	-34.33	16.72	74.00	54.00	-22.95	-20.2	
4876.00	Н	59.86	-34.33	25.53	74.00	54.00	-14.14	-16.1	
7324.00	Н	59.30	-34.33	24.97	74.00	54.00	-14.70	-13.5	
25803.00	Н	51.33	-34.33	17.00	74.00	54.00	-22.67	-16.3	



Temperature Humidity: Test mode:	53 %	SK Modulatio	Test D Test B n Frequ	y:	October 28, 2018 King Kong Channel 21: 2471.625MH			
Freq.	Ant.Pol.	Emiss	ion Level(dB	uV/m)	Limit 3m	(dBuV/m)	Ove	r(dB)
(MHz)	H/V	PK	AV Factor	ÂV	PK	AV	PK	AV
4944.00	V	54.92	-31.99	22.93	74.00	54.00	-19.08	-31.07
9704.00	V	52.55	-31.99	20.56	74.00	54.00	-21.45	-13.40
23610.00	V	49.56	-31.99	17.57	74.00	54.00	-24.44	-18.80
4944.00	H	62.52	-31.99	30.53	74.00	54.00	-11.48	-23.47
7409.00	Н	54.16	-31.99	22.17	74.00	54.00	-19.84	-31.83
26007.00	Н	52.00	-31.99	20.01	74.00	54.00	-22.00	-17.10

Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).

- (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
- (3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) AV value of harmonics = PK+AV Factor



■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

Temperature: Humidity: Test mode:	: 24°C 53 % GFSK Modulation		Test Date: Test By: Frequency:	King K	er 28, 2018 íong iel 01: 2415.37	5MHz	
Frequency (MHz)	Polarity H/V	PK(dBuV/m) (VBW=3M Hz)	Limit 3m (dBuV/m)	Over(dB)	AV(dBuV/m) (VBW=3M Hz)	Limit 3m (dBuV/m)	Over(dB)
2386.12	Н	47.89	74.00	-26.11	33.33	54.00	-20.67
2354.55	V	47.92	74.00	-26.08	34.01	54.00	-19.99

Temperature:	24°C	Test Date:	October 28, 2018
Humidity:	53 %	Test By:	King Kong
Test mode:	GFSK Modulation	Frequency:	Channel 21: 2471.625MHz

Frequency (MHz)	Polarity H/V	PK(dBuV/m) (VBW=3M Hz)	Limit 3m (dBuV/m)	Over(dB)	AV(dBuV/m) (VBW=3M Hz)	Limit 3m (dBuV/m)	Over(dB)
2483.5	Н	46.99	74.00	-27.01	35.16	54.00	-18.84
2483.5	V	46.93	74.00	-27.07	35.26	54.00	-18.74

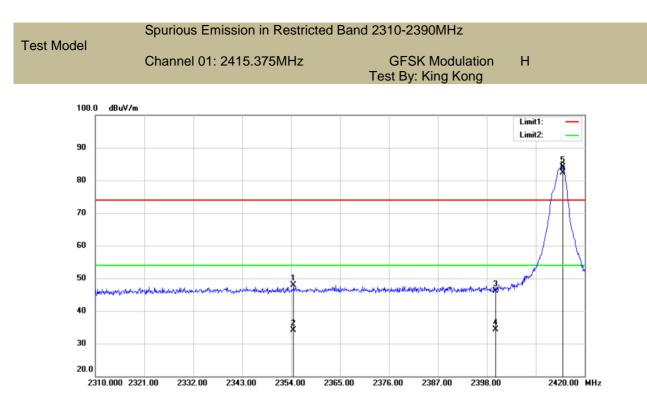
Temperature:	24°C	Test Date:	October 28, 2018
Humidity:	53 %	Test By:	KK
Test mode:	GFSK Modulation	Frequency:	Hopping

Frequency (MHz)	Polarity H/V	PK(dBuV/m) (VBW=3M Hz)	Limit 3m (dBuV/m)	Over(dB)	AV(dBuV/m) (VBW=3M Hz)	Limit 3m (dBuV/m)	Over(dB)
2386.38	Н	64.90	74.00	-9.10	44.94	54.00	-9.06
2483.50	V	59.53	74.00	-14.47	43.65	54.00	-10.35
2388.09	Н	62.96	74.00	-11.04	44.94	54.00	-9.06
2483.50	V	67.20	74.00	-6.80	49.45	54.00	-4.55

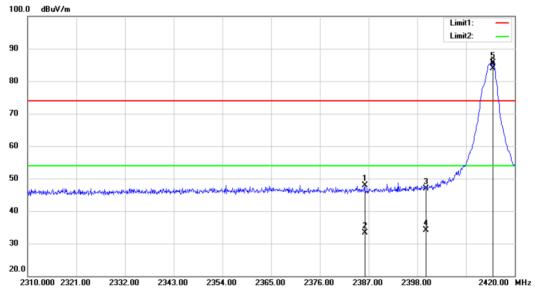
Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).

- (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
- (3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

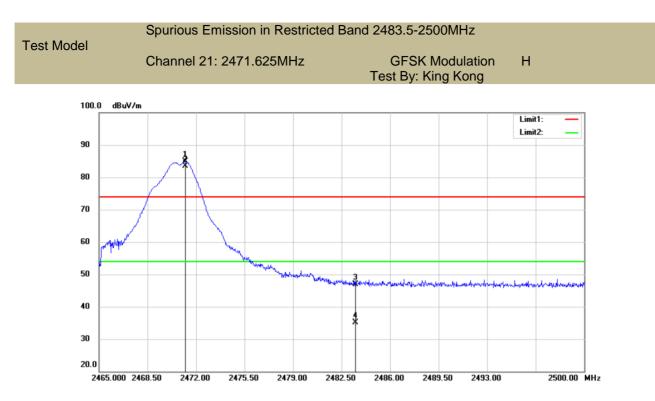




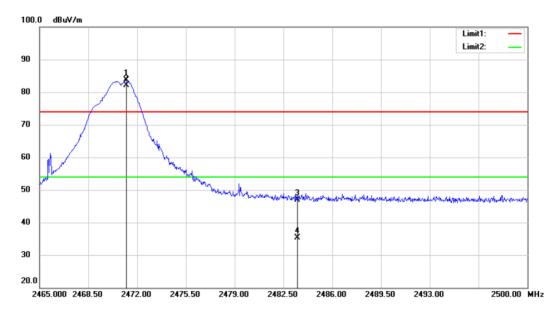




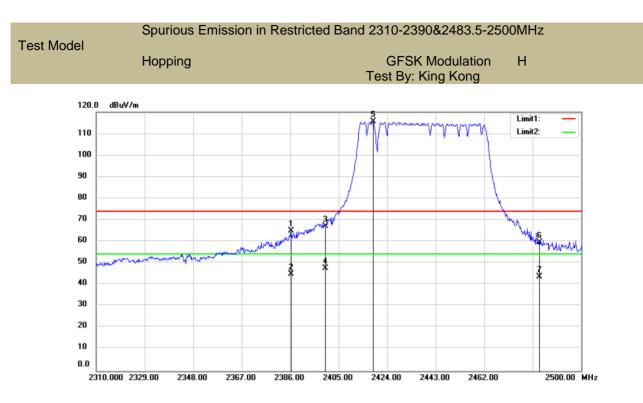




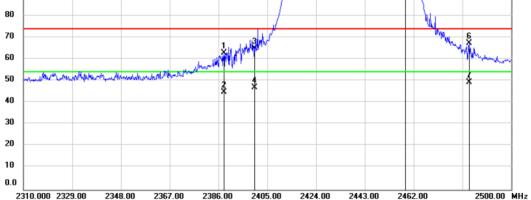




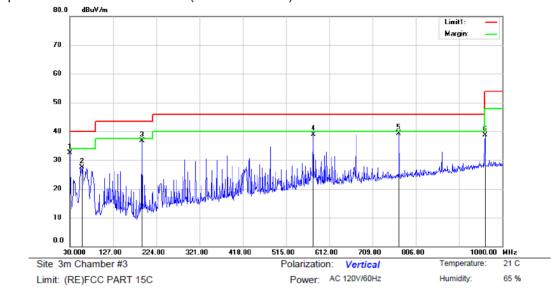










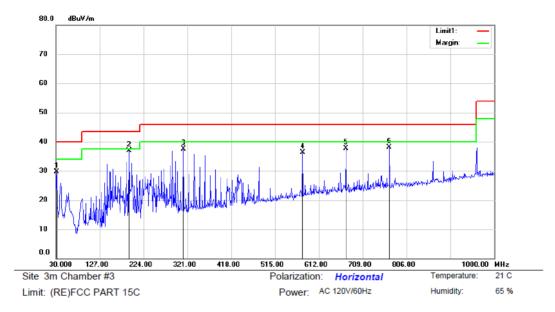


■ Spurious Emission below 1GHz (30MHz to 1GHz)

Mode:Low Channel Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	49.24	-16.73	32.51	40.00	-7.49	QP			
2		58.1300	42.79	-15.20	27.59	40.00	-12.41	QP			
3		191.9900	52.78	-16.04	36.74	43.50	-6.76	QP			
4	ļ	576.1100	45.36	-6.36	39.00	46.00	-7.00	QP			
5	*	768.1700	42.50	-3.17	39.33	46.00	-6.67	QP			
6	9	961.2000	38.49	0.12	38.61	54.00	-15.39	QP			

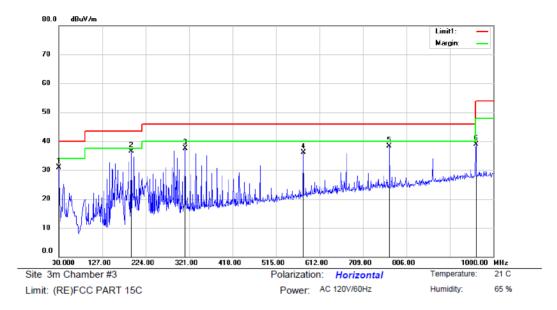




Mode:Low Channel Note:

Reading Correct Measure-Antenna Table Limit Over No. Mk. Freq. Level Factor ment Height Degree MHz dBuV dB dBuV/m dBuV/m dB Detector cm degree Comment 1 31.9400 46.43 -16.80 29.63 40.00 -10.37 QP 2 * 191.9900 52.86 -16.04 36.82 43.50 -6.68 QP 312.2700 50.01 QP 3 -12.44 37.57 46.00 -8.43 576.1100 42.74 -6.36 36.38 46.00 -9.62 QP 4 5 672.1400 42.47 -4.77 37.70 46.00 -8.30 QP 6 768,1700 41.25 -3.17 38.08 46.00 -7.92 QP

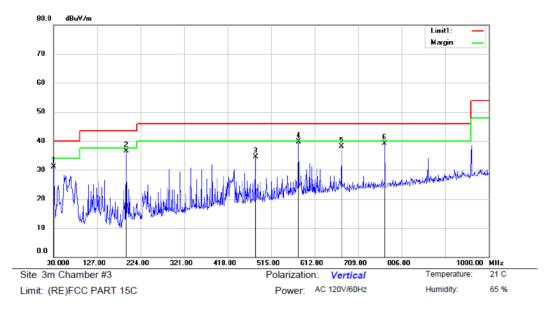




Mode: Middle Channel Note:

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	47.57	-16.73	30.84	40.00	-9.16	QP			
2	*	191.9900	52.45	-16.04	36.41	43.50	-7.09	QP			
3		312.2700	49.86	-12.44	37.42	46.00	-8.58	QP			
4		576.1100	42.52	-6.36	36.16	46.00	-9.84	QP			
5		768.1700	41.41	-3.17	38.24	46.00	-7.76	QP			
6		961.2000	38.85	0.12	38.97	54.00	-15.03	QP			

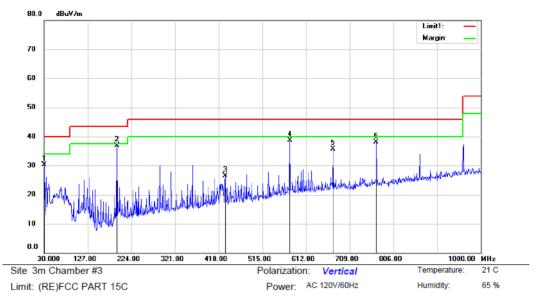




Mode: Middle Channel Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	47.82	-16.73	31.09	40.00	-8.91	QP			
2		191.9900	52.61	-16.04	36.57	43.50	-6.93	QP			
3		480.0800	43.07	-8.58	34.49	46.00	-11.51	QP			
4	*	576.1100	45.97	-6.36	39.61	46.00	-6.39	QP			
5		672.1400	42.97	-4.77	38.20	46.00	-7.80	QP			
6		768.1700	42.22	-3.17	39.05	46.00	-6.95	QP			

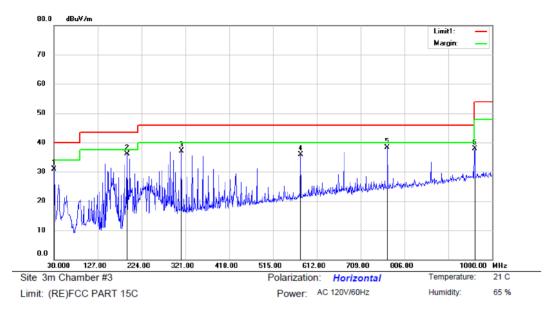




Mode: High Channel Note:

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	46.98	-16.73	30.25	40.00	-9.75	QP			
2	*	191.9900	52.93	-16.04	36.89	43.50	-6.61	QP			
3		432.5500	35.87	-9.40	26.47	46.00	-19.53	QP			
4		576.1100	45.05	-6.36	38.69	46.00	-7.31	QP			
5		672.1400	40.53	-4.77	35.76	46.00	-10.24	QP			
6		768.1700	41.37	-3.17	38.20	46.00	-7.80	QP			





Mode:High Channel Note:

No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	30.0000	47.71	-16.73	30.98	40.00	-9.02	QP			
2 *	191.9900	52.22	-16.04	36.18	43.50	-7.32	QP			
3	312.2700	49.56	-12.44	37.12	46.00	-8.88	QP			
4	576.1100	42.30	-6.36	35.94	46.00	-10.06	QP			
5	768.1700	41.42	-3.17	38.25	46.00	-7.75	QP			
6	961.2000	37.69	0.12	37.81	54.00	-16.19	QP			



8.9 CONDUCTED EMISSION TEST

8.9.1 Applicable Standard

According to FCC Part 15.207(a) and RSS-Gen Clause 8.8

8.9.2 Conformance Limit

Conducted Emission Limit						
Frequency(MHz)	Quasi-peak	Average				
0.15-0.5	66-56	56-46				
0.5-5.0	56	46				
5.0-30.0	60	50				
Note: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.						

8.9.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

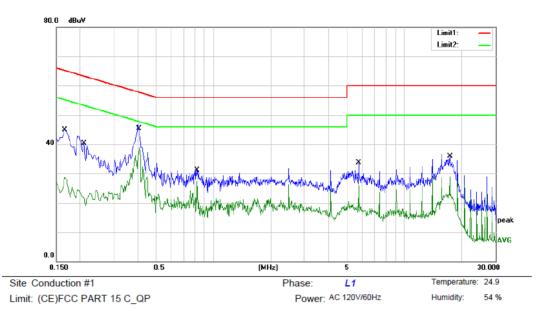
8.9.4 Test Procedure

The EUT was placed on a table which is 0.1m above ground plane. Maximum procedure was performed on the highest emissions to ensure EUT compliance. Repeat above procedures until all frequency measured were complete.

8.9.5 Test Results

Pass

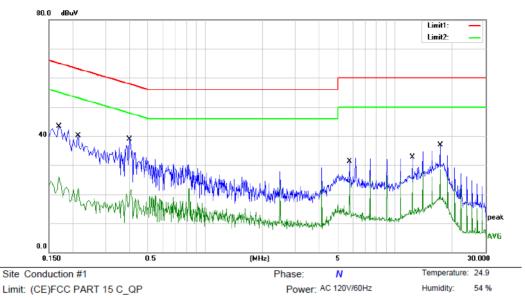




Mode: 2.4G Wireless connecting Note: Adapter: Tenpao

		Level	Factor	ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1660	35.39	9.56	44.95	65.16	-20.21	QP	
2	0.1660	19.14	9.56	28.70	55.16	-26.46	AVG	
3	0.2100	30.80	9.56	40.36	63.21	-22.85	QP	
4	0.2100	14.89	9.56	24.45	53.21	-28.76	AVG	
5	0.4100	37.06	9.57	46.63	57.65	-11.02	QP	
6 *	0.4100	29.42	9.57	38.99	47.65	-8.66	AVG	
7	0.8260	22.00	9.58	31.58	56.00	-24.42	QP	
8	0.8260	17.78	9.58	27.36	46.00	-18.64	AVG	
9	5.7740	23.98	9.68	33.66	60.00	-26.34	QP	
10	5.7740	16.25	9.68	25.93	50.00	-24.07	AVG	
11	17.3140	26.05	9.93	35.98	60.00	-24.02	QP	
12	17.3140	19.02	9.93	28.95	50.00	-21.05	AVG	

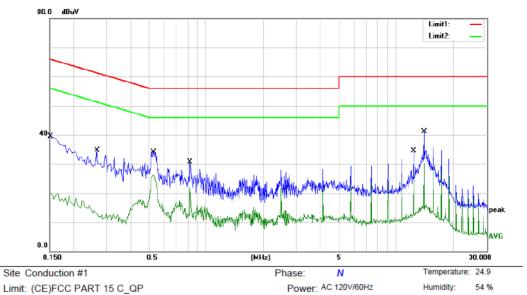




Mode: 2.4G Wireless connecting Note: Adapter: Tenpao

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1700	33.83	9.56	43.39	64.96	-21.57	QP	
2		0.1700	16.30	9.56	25.86	54.96	-29.10	AVG	
3		0.2140	30.47	9.56	40.03	63.05	-23.02	QP	
4		0.2140	12.55	9.56	22.11	53.05	-30.94	AVG	
5	*	0.4060	29.79	9.57	39.36	57.73	-18.37	QP	
6		0.4060	12.02	9.57	21.59	47.73	-26.14	AVG	
7		5.7740	21.67	9.68	31.35	60.00	-28.65	QP	
8		5.7740	15.46	9.68	25.14	50.00	-24.86	AVG	
9		12.3700	22.79	9.84	32.63	60.00	-27.37	QP	
10		12.3700	17.14	9.84	26.98	50.00	-23.02	AVG	
11		17.3180	26.94	9.93	36.87	60.00	-23.13	QP	
12		17.3180	18.57	9.93	28.50	50.00	-21.50	AVG	

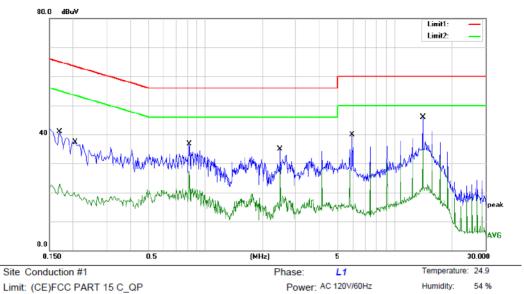




Mode: 2.4G Wireless connecting Note: Adapter: TianYin

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1540	30.57	9.56	40.13	65.78	-25.65	QP	
2	0.1540	10.37	9.56	19.93	55.78	-35.85	AVG	
3	0.2660	25.09	9.56	34.65	61.24	-26.59	QP	
4	0.2660	6.37	9.56	15.93	51.24	-35.31	AVG	
5	0.5260	24.57	9.57	34.14	56.00	-21.86	QP	
6	0.5260	16.75	9.57	26.32	46.00	-19.68	AVG	
7	0.8260	21.13	9.58	30.71	56.00	-25.29	QP	
8	0.8260	12.35	9.58	21.93	46.00	-24.07	AVG	
9	12.3700	24.73	9.84	34.57	60.00	-25.43	QP	
10	12.3700	16.75	9.84	26.59	50.00	-23.41	AVG	
11 *	14.0180	31.32	9.88	41.20	60.00	-18.80	QP	
12	14.0180	20.35	9.88	30.23	50.00	-19.77	AVG	





Mode: 2.4G Wireless connecting Note: Adapter: TianYin

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1700	32.52	9.56	42.08	64.96	-22.88	QP	
2	0.1700	13.28	9.56	22.84	54.96	-32.12	AVG	
3	0.2060	27.68	9.56	37.24	63.37	-26.13	QP	
4	0.2060	10.45	9.56	20.01	53.37	-33.36	AVG	
5	0.8260	27.08	9.58	36.66	56.00	-19.34	QP	
6	0.8260	17.70	9.58	27.28	46.00	-18.72	AVG	
7	2.4740	25.20	9.62	34.82	56.00	-21.18	QP	
8	2.4740	19.05	9.62	28.67	46.00	-17.33	AVG	
9	5.9540	30.20	9.68	39.88	60.00	-20.12	QP	
10	5.9540	18.12	9.68	27.80	50.00	-22.20	AVG	
11 *	14.0180	36.07	9.88	45.95	60.00	-14.05	QP	
12	14.0180	25.52	9.88	35.40	50.00	-14.60	AVG	



8.10 ANTENNA APPLICATION

8.10.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203 RSS-Gen Clause 6.7	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 §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 §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.

For intentional device, according to FCC 47 CFR Section 15.203 and IC RSS-Gen 6.8, 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. And according to FCC 47 CFR Section 15.247 (b) and IC RSS-Gen 6.8, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

8.10.2 Result

PASS.

Note:

The EUT has a Integral Antenna for 2.4G, the gain is 0 dBi

- Antenna use a permanently attached antenna which is not replaceable.
- Not using a standard antenna jack or electrical connector for antenna replacement
- The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

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