

Shenzhen Toby Technology Co., Ltd.



Report No.: TBR-C-202308-0151-11

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RF Test Report

FCC ID: 2AF2R-53TX

Report No. TBR-C-202308-0151-11

Shenzhen Videotimes Technology Co., Ltd **Applicant**

Equipment Under Test (EUT)

EUT Name 2.4GHz Digital Wireless Video Baby Camera

Model No. **HB50**

HB50-2, HB50RX, HB50TX, VT50, VT50-2, VT50RX, VT50TX,

Series Model No. BBM819, BBM819-2, BBM819RX, BBM819TX

Brand Name

RW-C-202308-0151-5-1# & RW-C-202308-0151-5-2# Sample ID

Receipt Date 2023-08-24

Test Date 2023-08-24 to 2023-09-11

Issue Date 2023-09-11

Standards FCC Part 15, Subpart C 15.247

ANSI C63.10:2013 **Test Method**

KDB 558074 D01 15.247 Meas Guidance v05r02

Conclusions **PASS**

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC requirements

Test/Witness Engineer

: Loy La. **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.

TB-RF-074-1.0



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Revision History

Report No.	Version	Description	Issued Date
TBR-C-202308-0151-11	Rev.01	Initial issue of report	2023-09-11
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1. General Information about EUT

1.1 Client Information

Applicant	pplicant : Shenzhen Videotimes Technology Co., Ltd	
		Room 2106, Building 11, Tianan Yungu Phase II(Plot of Land 02-08), Gangtou Community, Bantian Street, Longgang District, Shenzhen, Guangdong.China
Manufacturer : Shenzhen Videotimes Technology Co., Ltd		Shenzhen Videotimes Technology Co., Ltd
		Room 2106, Building 11, Tianan Yungu Phase II(Plot of Land 02-08), Gangtou Community, Bantian Street, Longgang District, Shenzhen, Guangdong.China

1.2 General Description of EUT (Equipment Under Test)

EUT Name		2.4GHz Digital Wireless Video Baby Camera		
Models No.		HB50, HB50-2, HB50RX, HB50TX, VT50, VT50-2, VT50RX, VT50TX, BBM819, BBM819-2, BBM819RX, BBM819TX		
Model Difference	100	All these models are identical in the same PCB, layout and electrical circuit, the only difference is different customers, different model name.		
MAG		Operation Frequency:	2.4GHz: 2412MHz~2469MHz	
Product		Number of Channel:	58Channels see Note 2	
Description	n	Antenna Gain:	2.5dBi Dipole antenna	
MILLOR		Modulation Type:	GFSK	
Power Rating		AC Adapter #1 (Model: K05S050100U): Input: 100-240V~50/60Hz, 0.2A Output: 5.0V=1.0A AC Adapter #2 (Model: A318-050100W-US2): Input: 100-240V~50/60Hz, 0.2A Output: 5.0V=1.0A		
Software Version	:	1.0		
Hardware Version		1.0		
Remark		The adapter and antenna gain provided by the applicant, the verified for the		
	V	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.



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(2) Channel List:

Channel List						
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	
00	2412	20	2432	40	2452	
01	2413	21	2433	41	2453	
02	2414	22	2434	42	2454	
03	2415	23	2435	43	2455	
04	2416	24	2436	44	2456	
05	2417	25	2437	45	2457	
06	2418	26	2438	46	2458	
07	2419	27	2439	47	2459	
08	2420	28	2440	48	2460	
09	2421	29	2441	49	2461	
10	2422	30	2442	50	2462	
11	2423	31	2443	51	2463	
12	2424	32	2444	52	2464	
13	2425	33	2445	53	2465	
14	2426	34	2446	54	2466	
15	2427	35	2447	55	2467	
16	2428	36	2448	56	2468	
17	2429	37	2449	57	2469	
18	2430	38	2450			
19	2431	39	2451	A STATE OF THE STA	1/10	

Note: Test frequencies are lowest channel: 2412MHz, middle channel: 2442MHz and highest channel: 2469MHz.

- (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

N. S.	Adapter	EUT		





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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	Adapter#1+ TX Mode Channel 00			
Mode 2	Adapter#2+ TX Mode Channel 00			

For Radiated Test			
Final Test Mode	Description		
Mode 3	Adapter#1+ TX Mode Channel 00		
Mode 4	Adapter#2+ TX Mode Channel 00		
Mode 5	TX Mode Channel 00/30/57		
Mode 6	Hopping TX Mode		

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.





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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	Adjust and control the corresponding transmission frequency through the EUT entity key.				
Frequency	2412MHz	2442MHz	2469MHz		
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	±4.20 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB





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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.





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2. Test Summary

Standard Section	To at Have	To at Commission	landama and	Dawe
FCC	Test Item	Test Sample(s)	Judgment	Remar
FCC 15.207(a)	Conducted Emission	RW-C-202308-0151-5-1#	PASS	N/A
FCC 15.209 & 15.247(d)	Radiated Unwanted Emissions	RW-C-202308-0151-5-1#	PASS	N/A
FCC 15.203	Antenna Requirement	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.247(a)	99% Occupied Bandwidth & 20dB Bandwidth	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.247(b)(1)	Peak Output Power	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.247(a)(1)	Carrier frequency separation	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.247(a)(1)	Time of occupancy	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.247(b)(1)	Number of Hopping Frequency	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.247(d)	Band Edge	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.207(a)	Conducted Unwanted Emissions	RW-C-202308-0151-5-2#	PASS	N/A
FCC 15.205	Emissions in Restricted Bands	RW-C-202308-0151-5-2#	PASS	N/A

Note: N/A is an abbreviation for Not Applicable.

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
RF Test System	JS1120-3	Tonscend	V3.2.22





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4. Test Equipment

Conducted Emiss	sion Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jun. 20, 2023	Jun. 19, 2024
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jun. 20, 2023	Jun. 19, 2024
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jun. 20, 2023	Jun. 19, 2024
LISN	Rohde & Schwarz	ENV216	101131	Jun. 20, 2023	Jun. 19, 2024
ISN	SCHWARZBECK	NTFM 8131	8131-193	Jun. 20, 2023	Jun. 19, 2024
ISN	SCHWARZBECK	CAT3 8158	cat3 5158-0094	Jun. 20, 2023	Jun. 19, 2024
ISN	SCHWARZBECK	NTFM5158	NTFM5158 0145	Jun. 20, 2023	Jun. 19, 2024
ISN	SCHWARZBECK	CAT 8158	cat5 8158-179	Jun. 20, 2023	Jun. 19, 2024
Radiation Emissi	on Test (B Site)				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100060	Jun. 20, 2023	Jun. 19, 2024
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jun. 20, 2023	Jun. 19, 2024
EMI Test Receiver	Rohde & Schwarz	ESU-8	100472/008	Feb. 23, 2023	Feb. 22, 2024
Bilog Antenna	SCHWARZBECK	VULB 9168	1225	Dec. 05, 2021	Dec. 04, 2023
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2463	Feb. 26, 2022	Feb.25, 2024
Horn Antenna	SCHWARZBECK	BBHA 9170	1118	Jun. 26, 2022	Jun.25, 2024
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jun. 26, 2022	Jun.25, 2024
HF Amplifier	Tonscend	TAP9E6343	AP21C806117	Jun. 20, 2023	Jun. 19, 2024
HF Amplifier	Tonscend	TAP051845	AP21C806141	Jun. 20, 2023	Jun. 19, 2024
HF Amplifier	Tonscend	TAP0184050	AP21C806129	Jun. 20, 2023	Jun. 19, 2024
Highpass Filter	CD	HPM-6.4/18G		N/A	N/A
Highpass Filter	CD	HPM-2.8/18G		N/A	N/A
Highpass Filter	XINBO	XBLBQ-HTA67(8-25G)	22052702-1	N/A	N/A
Antenna Conduc	ted Emission				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jun. 20, 2023	Jun. 19, 2024
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jun. 20, 2023	Jun. 19, 2024
MXA Signal Analyzer	KEYSIGHT	N9020B	MY60110172	Jun. 20, 2023	Jun. 19, 2024





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MXA Signal Analyzer	Agilent	N9020A	MY47380425	Jun. 20, 2023	Jun. 19, 2024
Vector Signal Generator	Agilent	N5182A	MY50141294	Jun. 20, 2023	Jun. 19, 2024
Analog Signal Generator	Agilent	N5181A	MY48180463	Jun. 20, 2023	Jun. 19, 2024
Vector Signal Generator	KEYSIGHT	N5182B	MY59101429	Jun. 20, 2023	Jun. 19, 2024
Analog Signal Generator	KEYSIGHT	N5173B	MY61252685	Jun. 20, 2023	Jun. 19, 2024
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Jun. 20, 2023	Jun. 19, 2024
DE D	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Jun. 20, 2023	Jun. 19, 2024
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Jun. 20, 2023	Jun. 19, 2024
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	Jun. 20, 2023	Jun. 19, 2024
RF Control Unit	Tonsced	JS0806-1	21C8060380	N/A	N/A
RF Control Unit	Tonsced	JS0806-2	21F8060439	Jun. 20, 2023	Jun. 19, 2024
Band Reject Filter Group	Tonsced	JS0806-F	21D8060414	Jun. 20, 2023	Jun. 19, 2024
Power Control Box	Tonsced	JS0806-4ADC	21C8060387	N/A	N/A
Wideband Radio Comunication Tester	Rohde & Schwarz	CMW500	144382	Jun. 20, 2023	Jun. 19, 2024
Universal Radio Communication Tester	Rohde&Schwarz	CMW500	168796	Feb. 23, 2023	Feb.22, 2024
Temperature and Humidity Chamber	ZhengHang	ZH-QTH-1500	ZH2107264	Jun. 20, 2023	Jun. 19, 2024





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5. Conducted Emission Test

5.1 Test Standard and Limit

5.1.1Test Standard

FCC Part 15.207

5.1.2 Test Limit

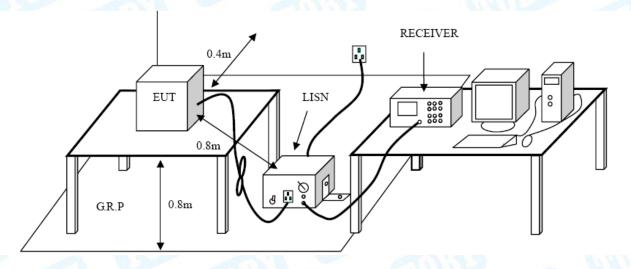
Conducted Emission Test Limit

	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







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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.





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6. Radiated Emission Test

6.1 Test Standard and Limit

6.1.1 Test Standard

FCC Part 15.209 & FCC Part 15.247(d)

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 Meters(at 3m)	
(MHz)	Peak	Average
Above 1000	74	54

Note:

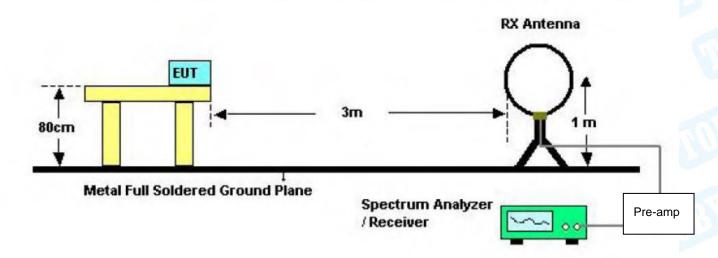
- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)



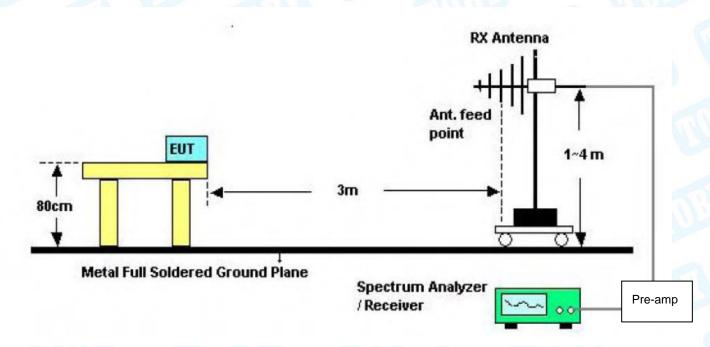


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6.2 Test Setup



Below 30MHz Test Setup

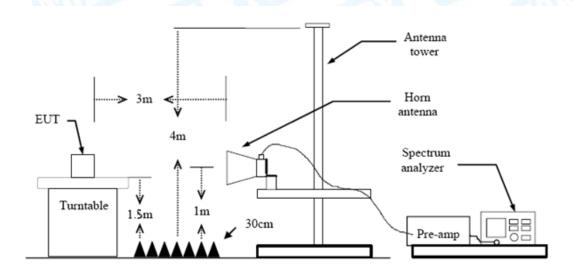


Below 1000MHz Test Setup





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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





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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.



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7. Restricted Bands and Band-edge test

7.1 Test Standard and Limit

7.1.1 Test Standard

FCC Part 15.205 & FCC Part 15.247(d)

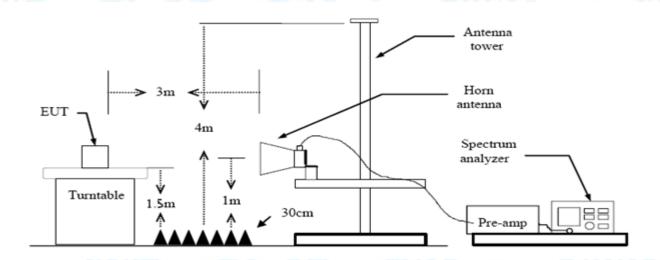
7.1.2 Test Limit

	Radiated measurement		
Restricted Frequency	Distance Meters(at 3m)		
Band (MHz)	Peak (dBuV/m)	Average (dBuV/m)	
2310 ~2390	74	54	
2483.5 ~2500	74	54	
C	onducted measurement		
	Peak (dBm)see 7.3 e)	Average (dBm) see 7.3 e	
2310 ~2390	-41.20	-21.20	
2483.5 ~2500	-41.20	-21.20	

Note: According the ANSI C63.10 11.12.2 antenna-port conducted measurements may also be used as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test forcabinet/case emissions is required.

7.2 Test Setup

Radiated measurement



Conducted measurement





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7.3 Test Procedure

---Radiated measurement

- (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 Below 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.

---Conducted measurement

- a) Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 11.12.2.3 through 11.12.2.5 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP (see 11.12.2.6 for guidance on determining the applicable antenna gain).





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c) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies ≤30 MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies > 1000 MHz).

- d) For MIMO devices, measure the power of each chain and sum the EIRP of all chains in linear terms (i.e., watts and mW).
- e) Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

 $E = EIRP-20 \log d + 104.8$

where

E is the electric field strength in dBuV/m

EIRP is the equivalent isotropically radiated power in dBm

d is the specified measurement distance in m

- f) Compare the resultant electric field strength level with the applicable regulatory limit.
- g) Perform the radiated spurious emission test.
- 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: The test uses antenna-port conducted measurements as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. Please refer to the Attachment C.





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8. Number of Hopping Channel

8.1 Test Standard and Limit

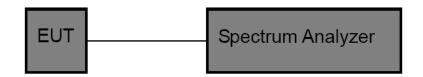
8.1.1 Test Standard

FCC Part 15.247 (a)(1)

8.1.2 Test Limit

Section	Test Item	Limit
45.047	Number of Hopping	>1E
15.247	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.





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9. Average Time of Occupancy

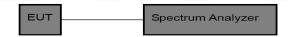
- 9.1 Test Standard and Limit
 - 9.1.1 Test Standard

FCC Part 15.247 (a)(1)

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





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9.5 Test Data

Please refer to the Attachment E.





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10. Channel Separation and Bandwidth Test

10.1 Test Standard and Limit

10.1.1 Test Standard

FCC Part 15.247

10.1.2 Test Limit

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

10.2 Test Setup

EUT	Spectrum Analyzer

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.





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11. Peak Output Power Test

11.1 Test Standard and Limit

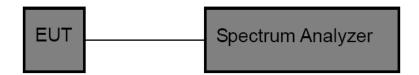
11.1.1 Test Standard

FCC Part 15.247 (b) (1)

11.1.2 Test Limit

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

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.





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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 2.5dBi, 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 Dipole antenna. It complies with the standard requirement.

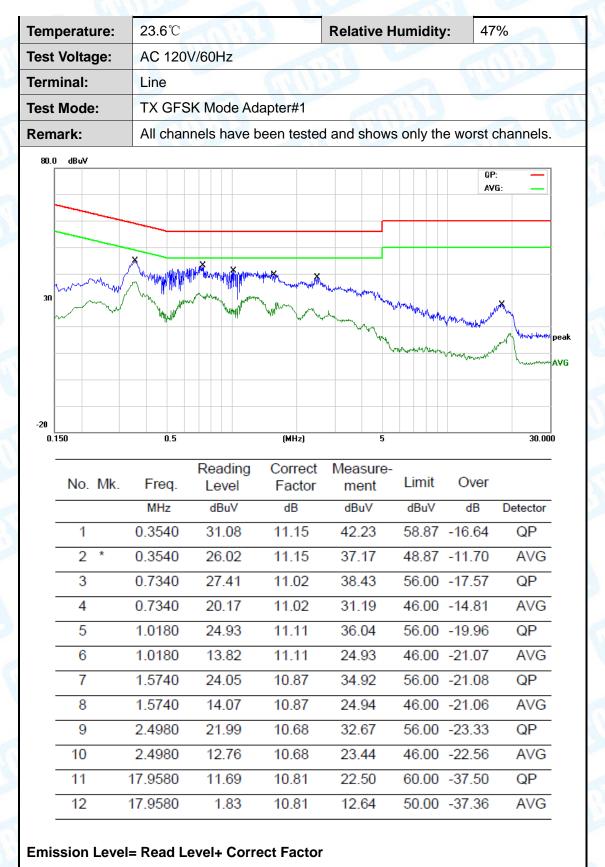
Ant	enna Type
⊠Permane	nt attached antenna
☐Unique c	onnector antenna
□Professio	nal installation antenna





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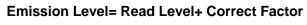
Attachment A-- Conducted Emission Test Data







erature:	23.6℃			. Columbia	Humidity:	Т.	7%
/oltage:	AC 120	V/60Hz	J W				
inal:	Neutral				MILES		1
Mode:	TX GFS	SK Mode A	dapter#1	2.0			
ırk:	All char	nels have	been teste	d and show	vs only the	worst	channels.
dBu∀							QP: —
		Mary Mary Mary Mary Mary Mary Mary Mary	A Property of the Control of the Con	Les Colombia de Co	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Maria de la companya della companya	AVG: —
	0.5		(MHz)	5			30.000
No. Mk.	Freq.	Reading Level	Correct Factor	ment	Limit	Over	
							Detector
							QP
							AVG
							QP
							AVG
							QP
							AVG
							QP
8	1.8020	19.08	10.78	29.86	46.00 -		AVG
0	2 2740	23.69	10.68	34.37	56.00 -		QP
9	2.2740		40.00	00.00	40.00	4704	A \ //>
9 10 11	2.2740 2.2740 17.7340	17.38	10.68 10.79	28.06	46.00 -		AVG QP
	Mode: ark: dBuv	No. Mk. Freq. MHz 1 0.3580 2 * 0.3580 3 0.7260 4 0.7260 5 1.3220 6 1.3220	Mode: TX GFSK Mode Add All channels have dBuV No. Mk. Freq. Reading Level MHz dBuV 1 0.3580 35.21 2 * 0.3580 29.11 3 0.7260 30.07 4 0.7260 23.19 5 1.3220 27.52 6 1.3220 21.37	Mode: TX GFSK Mode Adapter#1 All channels have been tested abov No. Mk. Freq. Reading Correct Factor	Mode: TX GFSK Mode Adapter#1 All channels have been tested and show above the sted and show above the	Mode: TX GFSK Mode Adapter#1 All channels have been tested and shows only the dbw No. Mk. Freq. Reading Level Factor ment Limit MHz dBuV dB dBuV dBuV 1 0.3580 35.21 11.16 46.37 58.77 - 2 * 0.3580 29.11 11.16 40.27 48.77 - 3 0.7260 30.07 11.01 41.08 56.00 - 4 0.7260 23.19 11.01 34.20 46.00 - 5 1.3220 27.52 10.98 38.50 56.00 - 6 1.3220 21.37 10.98 32.35 46.00 -	No. Mk. Freq. Level Factor ment Limit Over MHz dBuV dB dBuV dBuV dB dBuV dBuV dB dBuV dBuV







Temperature:	23.6℃	1000		Relative H	umidity	: 47	%
Test Voltage:	AC 120	V/60Hz	F AFE	U.S.			No.
Terminal:	Line	THE	3)		1115		
Test Mode:	TX GFS	SK Mode Ad	lapter#2	Sell 1	1		THE B
Remark:	All chan	nels have b	een tested	d and shows	only the	e worst o	hannels.
80.0 dBuV						QF	
						AV	
	x						
	$- \Lambda $, X v					
30	^^^ <u>\</u>	PARKALINAN AND PARKA	Nacional Marketini, India	Mah		J	
VV	14/1/4	111	Jahra Alian Albay	May yellow Lot & May	/W/W/W [*] \//	MMM/vv	My
1 1.0 MM	may I may have		Maria Mallan Jawa	h Johnson Prof.	hadler Maa	Marran	When how
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							manual
-20							
-20 0.150	0.5		(MHz)	5			30.000
	0.5	Reading					30.000
0.150		Reading	Correct	Measure-	Limit	Over	30.000
	Freq.	Level	Correct Factor	Measure- ment			
0.150 No. Mk.	Freq.	Level dBuV	Correct Factor	Measure- ment dBuV	dBuV	dB	Detector
0.150	Freq.	Level	Correct Factor	Measure- ment	dBuV		
0.150 No. Mk.	Freq.	Level dBuV	Correct Factor	Measure- ment dBuV	dBuV 57.02	dB	Detector
0.150 No. Mk.	Freq. MHz 0.4420	dBuV 26.99	Correct Factor dB 11.35	Measure- ment dBuV 38.34	dBuV 57.02 47.02	dB -18.68	Detector QP
0.150 No. Mk.	Freq. MHz 0.4420 0.4420	Level dBuV 26.99 17.90	Correct Factor dB 11.35 11.35	Measure- ment dBuV 38.34 29.25	dBuV 57.02 47.02 56.00	dB -18.68 -17.77	Detector QP AVG
0.150 No. Mk. 1 2 * 3	Freq. MHz 0.4420 0.4420 0.9980	Level dBuV 26.99 17.90 16.23	Correct Factor dB 11.35 11.35	Measure- ment dBuV 38.34 29.25 27.34	dBuV 57.02 47.02 56.00 46.00	dB -18.68 -17.77 -28.66	Detector QP AVG QP
0.150 No. Mk. 1 2 * 3 4	Freq. MHz 0.4420 0.4420 0.9980 0.9980	Level dBuV 26.99 17.90 16.23 6.31	Correct Factor dB 11.35 11.35 11.11	Measure- ment dBuV 38.34 29.25 27.34 17.42	dBuV 57.02 47.02 56.00 46.00 56.00	dB -18.68 -17.77 -28.66 -28.58	Detector QP AVG QP AVG
0.150 No. Mk. 1 2 * 3 4 5	Freq. MHz 0.4420 0.4420 0.9980 0.9980 1.2260	Level dBuV 26.99 17.90 16.23 6.31 13.35	Correct Factor dB 11.35 11.35 11.11 11.11 11.02	Measure- ment dBuV 38.34 29.25 27.34 17.42 24.37	dBuV 57.02 47.02 56.00 46.00 56.00 46.00	dB -18.68 -17.77 -28.66 -28.58 -31.63	Detector QP AVG QP AVG QP
0.150 No. Mk. 1 2 * 3 4 5 6	Freq. MHz 0.4420 0.4420 0.9980 0.9980 1.2260 1.2260	Level dBuV 26.99 17.90 16.23 6.31 13.35 5.47	Correct Factor dB 11.35 11.35 11.11 11.11 11.02 11.02	Measure- ment dBuV 38.34 29.25 27.34 17.42 24.37 16.49	dBuV 57.02 47.02 56.00 46.00 56.00 56.00	dB -18.68 -17.77 -28.66 -28.58 -31.63 -29.51	Detector QP AVG QP AVG QP AVG
0.150 No. Mk. 1 2 * 3 4 5 6 7	Freq. MHz 0.4420 0.4420 0.9980 0.9980 1.2260 1.2260 1.7260	Level dBuV 26.99 17.90 16.23 6.31 13.35 5.47 12.81	Correct Factor dB 11.35 11.35 11.11 11.11 11.02 11.02 10.82	Measure- ment dBuV 38.34 29.25 27.34 17.42 24.37 16.49 23.63	dBuV 57.02 47.02 56.00 46.00 56.00 46.00 46.00	dB -18.68 -17.77 -28.66 -28.58 -31.63 -29.51 -32.37	Detector QP AVG QP AVG QP AVG QP
0.150 No. Mk. 1 2 * 3 4 5 6 7 8	Freq. MHz 0.4420 0.4420 0.9980 0.9980 1.2260 1.7260 1.7260	Level dBuV 26.99 17.90 16.23 6.31 13.35 5.47 12.81 3.93	Correct Factor dB 11.35 11.35 11.11 11.02 11.02 10.82 10.82	Measure- ment dBuV 38.34 29.25 27.34 17.42 24.37 16.49 23.63 14.75	dBuV 57.02 47.02 56.00 46.00 56.00 46.00 56.00	dB -18.68 -17.77 -28.66 -28.58 -31.63 -29.51 -32.37 -31.25	Detector QP AVG QP AVG QP AVG AVG
No. Mk. 1 2 * 3 4 5 6 7 8 9	Freq. MHz 0.4420 0.4420 0.9980 0.9980 1.2260 1.7260 1.7260 4.3900	Level dBuV 26.99 17.90 16.23 6.31 13.35 5.47 12.81 3.93 12.03	Correct Factor dB 11.35 11.35 11.11 11.11 11.02 10.82 10.82 10.09	Measure-ment dBuV 38.34 29.25 27.34 17.42 24.37 16.49 23.63 14.75 22.12	dBuV 57.02 47.02 56.00 46.00 56.00 46.00 56.00 46.00	dB -18.68 -17.77 -28.66 -28.58 -31.63 -29.51 -32.37 -31.25 -33.88	Detector QP AVG QP AVG QP AVG QP AVG QP AVG





em	perature:	23.6℃	1	CENT !	Relative H	lumidity:	479	%
Гest	Voltage:	AC 120	V/60Hz	A AFR	The second			
Tern	ninal:	Neutral		3				
Гest	Mode:	TX GFS	K Mode Ad	apter#2		33.3	000	CEE
Rem	nark:	All chan	nels have b	een testec	d and shows	only the	worst c	hannels.
80.0	dBuV						QF	
30		× × × × × × × × × × × × × × × × × × ×	Alphophiliph Anthropy	May have a fact of the first of the fact o	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	wheel the state of	www.wyw.	/G:
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-			Reading	Correct	Measure-			
	No. Mk.	Freq.	Level	Factor	ment	Limit	Over	
-		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
_	1	0.3260	18.05	11.11	29.16	59.55	-30.39	QP
-								
	2	0.3260	8.50	11.11	19.61	49.55	-29.94	AVG
-	3	0.3260 0.4460	8.50 29.65	11.11 11.36	19.61 41.01	49.55 56.95		QP
-							-15.94	
-	3	0.4460	29.65	11.36	41.01	56.95	-15.94 -15.37	QP
- - -	3 4 *	0.4460 0.4460	29.65 20.22	11.36 11.36	41.01 31.58	56.95 46.95	-15.94 -15.37 -27.80	QP AVG
-	3 4 * 5	0.4460 0.4460 0.8860	29.65 20.22 17.14	11.36 11.36 11.06	41.01 31.58 28.20	56.95 46.95 56.00	-15.94 -15.37 -27.80 -27.20	QP AVG QP
-	3 4 * 5 6	0.4460 0.4460 0.8860 0.8860	29.65 20.22 17.14 7.74	11.36 11.36 11.06 11.06	41.01 31.58 28.20 18.80	56.95 46.95 56.00 46.00	-15.94 -15.37 -27.80 -27.20 -26.14	QP AVG QP AVG
- - - -	3 4 * 5 6 7	0.4460 0.4460 0.8860 0.8860 1.0940	29.65 20.22 17.14 7.74 18.79	11.36 11.36 11.06 11.06 11.07	41.01 31.58 28.20 18.80 29.86	56.95 46.95 56.00 46.00 56.00	-15.94 -15.37 -27.80 -27.20 -26.14 -25.90	QP AVG QP AVG QP
- - - -	3 4 * 5 6 7 8	0.4460 0.4460 0.8860 0.8860 1.0940 1.0940	29.65 20.22 17.14 7.74 18.79 9.03	11.36 11.36 11.06 11.06 11.07	41.01 31.58 28.20 18.80 29.86 20.10	56.95 46.95 56.00 46.00 56.00 46.00	-15.94 -15.37 -27.80 -27.20 -26.14 -25.90 -31.71	QP AVG QP AVG QP AVG
-	3 4 * 5 6 7 8	0.4460 0.4460 0.8860 0.8860 1.0940 1.0940 4.5060	29.65 20.22 17.14 7.74 18.79 9.03 14.24	11.36 11.36 11.06 11.06 11.07 11.07	41.01 31.58 28.20 18.80 29.86 20.10 24.29	56.95 46.95 56.00 46.00 56.00 56.00	-15.94 -15.37 -27.80 -27.20 -26.14 -25.90 -31.71 -30.03	QP AVG QP AVG QP AVG QP





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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

emper	rature:	23.8	C			Rela	tive Humi	idity:	4	8%		M
est Vo	Itage:	AC 1	20V/	60H	z					51		V
nt. Po	ı.	Horiz	onta	l		13		1			3	
est Mo	ode:	TX G	FSK	Mod	de Adapter	#1		100				
Remark	(:	Only	wors	se ca	ase is repor	ted	1.1				M	%
80.0 dl	BuV/m											
70												
60												
50								F)FCC 15		adiation	·	Н
30							- Ma	rgin -6 d	В			+
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0 —												
-10												
-10 -20		CO 00										
-10		60.00				Hz)	300.00					000.00
-10 -20	Frequen (MHz)	icy F	Read (dBu	ling			300.00 Limit	Ma	rgin B)		1	000.00
-10 -20 30.000		cy F	Read	ling	(M Factor	Hz)	300.00 Limit	Ma) (d	rgin		1 ctor	000.00
-10 -20 30.000 No.	(MHz)	cy F	Read (dBu	ling IV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m	Ma) (d	rgin (B)	Detec	ctor	000.00
-10 -20 30.000 No.	(MHz) 36.000	7 8	Read (dBu	ling IV) 39	Factor (dB/m) -22.91	Level (dBuV/m) 21.98	Limit (dBuV/m 40.00	Ma (d -18	rgin B)	Detec	ctor	000.00 P/F
-10 -20 30.000 No. 1 2 *	(MHz) 36.000 44.586	7 8	Read (dBu 44.8 48.5	ling IV) 89 58	Factor (dB/m) -22.91 -22.74	Level (dBuV/m) 21.98 25.84	300.00 Limit (dBuV/m 40.00 40.00	Ma) (d -18 -14	rgin (B) 3.02	Detection pea	tctor ak ak	P/F
-10 -20 30.000 No. 1 2 * 3	36.000 44.586 53.881	7 8 8 5	Read (dBu 44.8 48.5 42.2	ling IV) 39 58 25	Factor (dB/m) -22.91 -22.74 -22.96	Level (dBuV/m) 21.98 25.84 19.29	Limit (dBuV/m 40.00 40.00	Ma (d -18 -14 -20 -22	rgin (B) 3.02 1.16	Detection pea	to tor ak ak ak ak	P/F P P

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



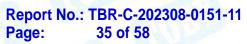




empera	ture:	23.8	$^{\circ}$ C		a V	Relat	ive Humid	ity: 4	8%	
est Volt	tage:	AC 1	20V	/60Hz	33		CALLE:			
nt. Pol.	•	Verti	cal	MA			C. Service			
est Mod	de:	TX G	SFSK	(Mode	e Adapter#1	N. S.		MA		
emark:		Only	wor	se cas	e is reporte	ed	MARIA			
80.0 dB	uV/m									_
70										
60							(RF)F	CC 15C 3M R	adiation	_
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40										Н
30	1 63		- 6	<u> </u>					Ma subject the	peal
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20 10 0	1	ARAÎN JOA	\$ 6	Y-happy A-yar	draggery the solvest high tageth	OPH/ANGARASASA	hiving the property that the state of the st	ng dinasayan di galakan sa	argan Perusah Melakakan Ahri	peal
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20 10 0		60.00			MICHAEL COMMING		300.00	apple and the same of the same		peal
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20 10 0 -10 -20 30.000	(MF	ency łz) 165	Re (dl	ading BuV)	Factor (dB/m)	Level (dBuV/m)	300.00 Limit (dBuV/m)	Margin (dB)	Detector	D00.00
20 10 0 -10 -20 30.000	(MF 37.4	ency Iz) 165 119	Re (dl	ading BuV) 6.82	Factor (dB/m)	Level (dBuV/m) 23.91	300.00 Limit (dBuV/m) 40.00	Margin (dB)	Detector	P/F
20 10 0 10 10 10 10 10 10 10 10 10 10 10	(MF 37.4 43.8	ency Iz) 165 119 755	Re (dl 44 44	ading BuV) 6.82	Factor (dB/m) -22.91 -22.77	Level (dBuV/m) 23.91 25.28	300.00 Limit (dBuV/m) 40.00 40.00	Margin (dB) -16.09	Detector peak peak	P/F
20 10 0 -10 -20 30.000 No.	(MF 37.4 43.8 45.3	ency dz) 165 119 755	Re (dl 44 44 44 44	ading BuV) 6.82 8.05 6.73	Factor (dB/m) -22.91 -22.77 -22.69	Level (dBuV/m) 23.91 25.28 24.04	300.00 Limit (dBuV/m) 40.00 40.00 40.00	Margin (dB) -16.09 -14.72 -15.96	Detector peak peak peak	P/F P

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



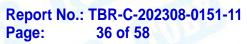




Tempe	rature:	23.8	8℃		A 1	Rela	tive Humid	lity: 4	8%	
est Vo	Itage:	AC	120V/	60H	Z		CALL.			
Ant. Po	ı.	Hor	izonta	W			Children of the Control of the Contr		TIM	
Test Mo	ode:	TX	GFSK	Мо	de Adapter	#2		11/1		
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80.0	dBuV/m									
70										
50							1 1	FCC 15C 3M gin -6-dB	Radiation	
40										_
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0										
-10 -20										
30.000	D	60.00)		(A	(Hz)	300.00			1000.00
No.	Frequen (MHz)	-	Readi (dBu	_	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	42.1540	0	49.2	8	-22.83	26.45	40.00	-13.55	peak	Р
2 *	45.6946	6	49.4	6	-22.68	26.78	40.00	-13.22	peak	Р
3	145.861	0	43.4	5	-22.54	20.91	43.50	-22.59	peak	Р
	385.280	3	40.3	5	-18.32	22.03	46.00	-23.97	peak	Р
4										
5	603.539	0	40.6	6	-12.77	27.89	46.00	-18.11	peak	P

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







emper	rature:	23.8	${}^{\circ}\mathbb{C}$		Rela	tive Humid	lity: 4	8%	
est Vo	Itage:	AC	120V/60Hz	100		CALL			
nt. Po	ı.	Vert	ical		61.1		1	MAN.	9
est Mo	ode:	TX	GFSK Mode	e Adapter#	2		11/1		
emark	C :	Only	/ worse cas	e is report	ed	V.PO			6
30.0 dB	BuV/m								
70									
60						(RF)F	CC 15C 3M F	Radiation	7
50						Marg	in -6 dB		#
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10 -20 30.000		60.00			Hz)	300.00			1000.00
10	Freque (MH:	ency			Hz)		Margin		1000.00
20 30.000		ency z)	Reading	reactor	Hz)	300.00 Limit	Margin		
10 20 30.000 No.	(MH	ency z) 64	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
10 20 30.000 No.	(MH: 37.41	ency z) 64	Reading (dBuV) 45.82	Factor (dB/m) -22.91	Level (dBuV/m) 22.91	200.00 Limit (dBuV/m) 40.00	Margin (dB) -17.09	Detector	P/F
No. 1	(MH: 37.41 41.85	ency z) 64 94	Reading (dBuV) 45.82 48.56	Factor (dB/m) -22.91 -22.85	Level (dBuV/m) 22.91 25.71	300.00 Limit (dBuV/m) 40.00 40.00	Margin (dB) -17.09 -14.29	Detector peak peak	P/F
No. 1 2 3 *	(MH: 37.41 41.85 43.81	ency z) 64 94 19	Reading (dBuV) 45.82 48.56 50.05	Factor (dB/m) -22.91 -22.85 -22.77	Level (dBuV/m) 22.91 25.71 27.28	300.00 Limit (dBuV/m) 40.00 40.00	Margin (dB) -17.09 -14.29 -12.72	Detector peak peak peak	P/F P P

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





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Above 1GHz (Only worse case is reported)

Temperature:	24.3 °C	Relative Humidity:	45%
Test Voltage:	AC 120V/60Hz	Will Die	
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2412MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F
1	9644.500	52.01	-7.31	44.70	74.00	-29.30	peak	Р
2 *	12067.000	48.43	-0.68	47.75	74.00	-26.25	peak	Р

Remark:

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

Temperature:	24.3 °C	Relative Humidity:	45%
Test Voltage:	AC 120V/60Hz		THU
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2412MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F
1	9644.500	55.28	-7.31	47.97	74.00	-26.03	peak	Р
2 *	12067.000	51.14	-0.68	50.46	74.00	-23.54	peak	Р

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 μ V/m)-Limit PK/AVG(dB μ 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.





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Temperature:	24.3°C	Relative Humidity:	45%			
Test Voltage:	AC 120V/60Hz	C 120V/60Hz				
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2442MHz		HILL			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F
1	4876.000	55.64	-19.89	35.75	74.00	-38.25	peak	Р
2 *	9772.000	51.74	-6.94	44.80	74.00	-29.20	peak	Р

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

Temperature:	24.3°C	Relative Humidity:	45%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		U
Test Mode:	TX GFSK Mode 2442MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F
1 *	9772.000	57.34	-6.94	50.40	74.00	-23.60	peak	Р
2	12220.000	47.43	-0.91	46.52	74.00	-27.48	peak	Р

Remark:

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





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Temperature:	24.3 °C	Relative Humidity:	45%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2469MHz		10

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F
1	9644.500	50.79	-7.31	43.48	74.00	-30.52	peak	Р
2 *	12067.000	48.67	-0.68	47.99	74.00	-26.01	peak	Р

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

Temperature:	24.3℃	Relative Humidity:	45%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		W.
Test Mode:	TX GFSK Mode 2469MHz		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F
1	9644.500	53.79	-7.31	46.48	74.00	-27.52	peak	Р
2 *	12067.000	49.80	-0.68	49.12	74.00	-24.88	peak	Р

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





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Conducted Emission Test Data

Condition	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2412	-43.93	-20	Pass
NVNT	2442	-44.09	-20	Pass
NVNT	2469	-42.16	-20	Pass







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Attachment C-- Restricted Bands Requirement Test Data

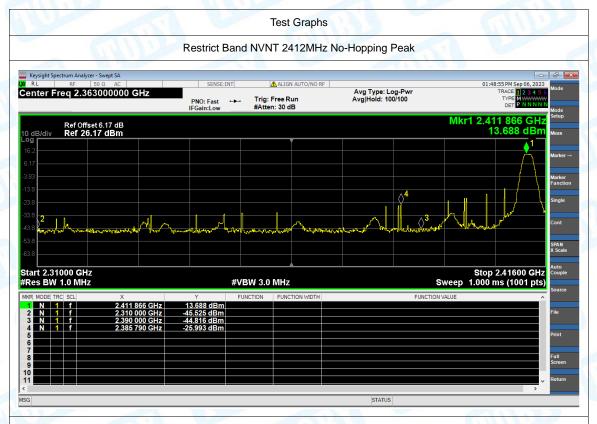
(1) Radiation Test

Condition	Frequency	Hopping	Spur Freq	Power	Gain	E	Detector	Limit	Verdict
	(MHz)	Mode	(MHz)	(dBm)	(dBi)	(dBuV/m)		(dBuV/m)	
NVNT	2412	No-Hopping	2310	-45.52	2.5	52.24	Peak	74	Pass
NVNT	2412	No-Hopping	2310	-55.43	2.5	42.33	Average	54	Pass
NVNT	2412	No-Hopping	2385.79	-25.99	2.5	71.77	Peak	74	Pass
NVNT	2412	No-Hopping	2336.5	-44.36	2.5	53.4	Average	54	Pass
NVNT	2412	No-Hopping	2390	-44.82	2.5	52.94	Peak	74	Pass
NVNT	2412	No-Hopping	2390	-54.83	2.5	42.93	Average	54	Pass
NVNT	2469	No-Hopping	2483.5	-39.61	2.5	58.15	Peak	74	Pass
NVNT	2469	No-Hopping	2483.5	-48.28	2.5	49.48	Average	54	Pass
NVNT	2469	No-Hopping	2485.125	-25.13	2.5	72.63	Peak	74	Pass
NVNT	2469	No-Hopping	2485.055	-45.45	2.5	52.31	Average	54	Pass
NVNT	2469	No-Hopping	2500	-39.21	2.5	58.55	Peak	74	Pass
NVNT	2469	No-Hopping	2500	-48.82	2.5	48.94	Average	54	Pass

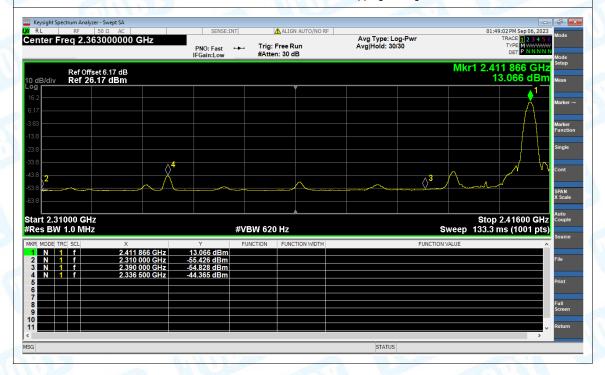




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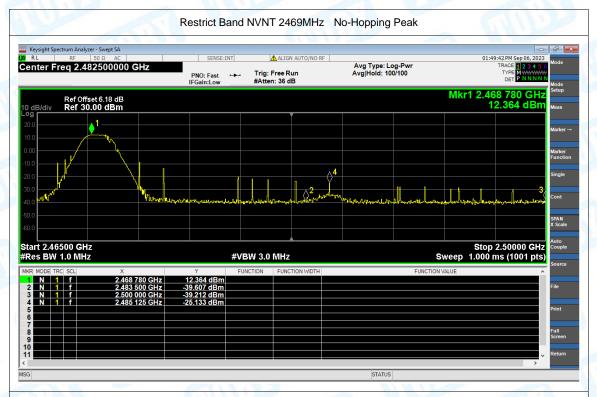
Restrict Band NVNT 2412MHz No-Hopping Average







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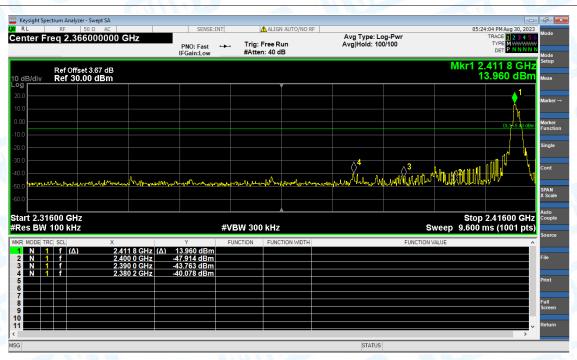


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(2) Band Edge

Condition	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2412	No-Hopping	-54.60	-20	Pass
NVNT	2469	No-Hopping	-52.46	-20	Pass





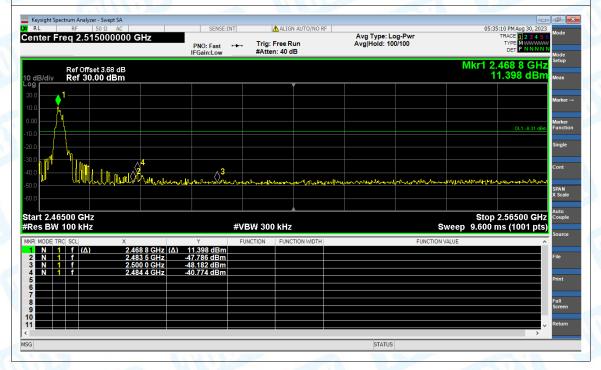




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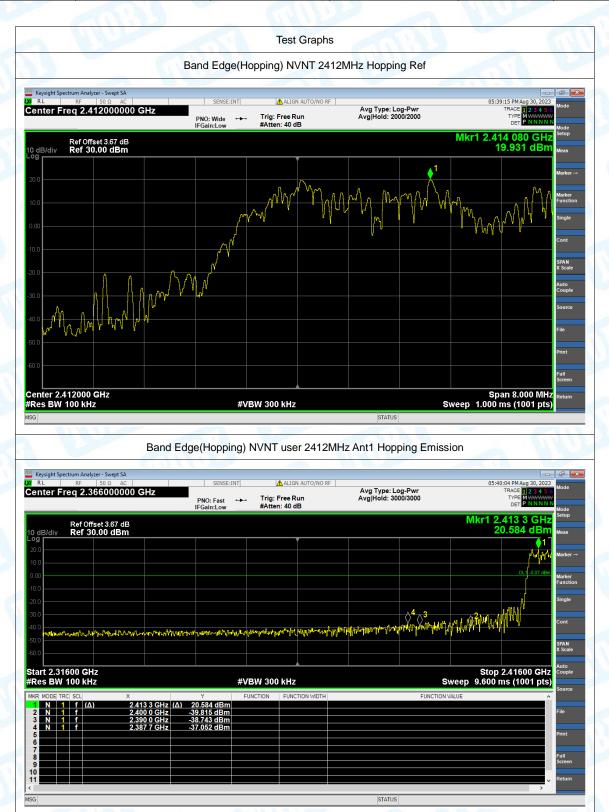




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(1) Band Edge(Hopping)

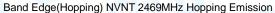
Condition	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2412	Hopping	-56.98	-20	Pass
NVNT	2469	Hopping	-54.25	-20	Pass

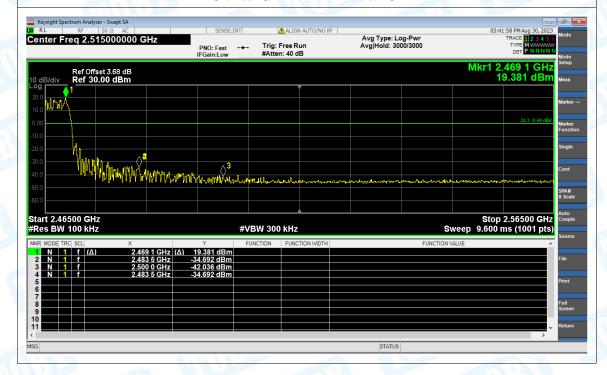




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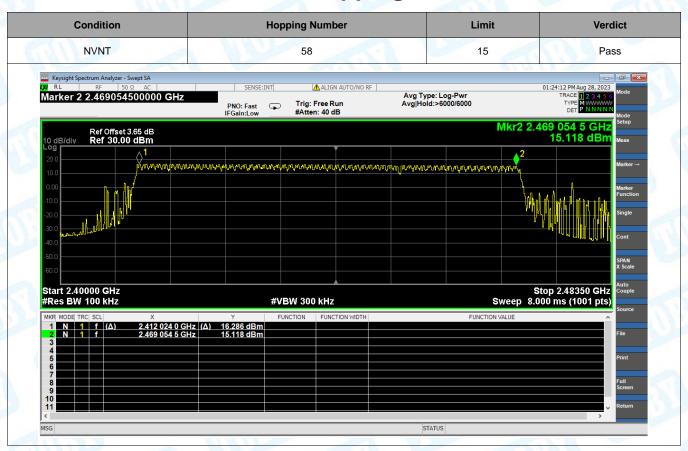








Attachment D-- Number of Hopping Channel Test Data









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Attachment E-- Average Time of Occupancy Test Data

Temper	ature:	25°	C	Rel	ative Humidity:	55%	
Test Vo	Itage:	DC	5V		1 Car		130
Test Mo	de:	Hop	oping Mode (GFS	K)		Also	
Test	Chan	nel	Reading Time	Total hans	Test Result	Limit	Decult
Mode	(MH:	z)	(ms)	Total hops	(ms)	(ms)	Result
GFSK	244	2	36	11	396	400	PASS

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:

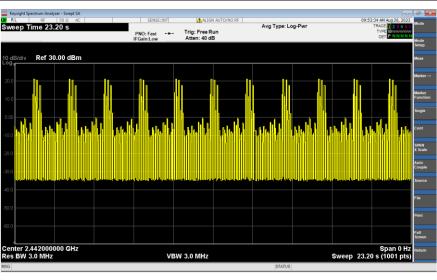
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 58 [ch] =23.2[s*ch];

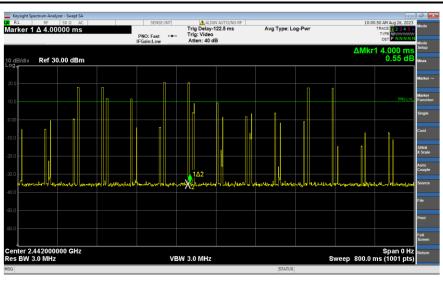
The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in 23.2s is 11.

Reading Time=4.0ms*9=36ms

GFSK Hopping Mode











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Attachment F-- Channel Separation and Bandwidth Test

Data

Bandwidth Test Data:

Condition	Frequency (MHz)	20dB BW (MHz)	2/3 *20dB BW (MHz)
NVNT	2412	1.78	1.19
NVNT	2442	1.80	1.20
NVNT	2469	1.79	1.19







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Keysight Spectrum Analyzer - Occupied BW ALIGN AUTO/NO RF | Center Freq: 2.469000000 GHz Trig: Free Run #Atten: 30 dB 05:33:10 PM Aug 30, 2023 Radio Std: None Center Freq 2.469000000 GHz Avg|Hold: 100/100 Mkr3 2.470036 GHz -7.6046 dBm Center 2.469000 GHz #Res BW 51 kHz Span 5.000 MHz Sweep 2 ms #VBW 150 kHz **Total Power** 16.9 dBm **Occupied Bandwidth** 1.8301 MHz 143.31 kHz **Transmit Freq Error** % of OBW Power 99.00 % 1.785 MHz x dB Bandwidth x dB -20.00 dB







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Occupied Channel Bandwidth

Condition	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	2412	Ant1	1.825
NVNT	2442	Ant1	1.809
NVNT	2469	Ant1	1.811















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Channel Separation Test data:

Condition	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	2440.075	2442.105	2.03	1.20	Pass









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Attachment G-- Peak Output Power Test Data

Condition	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2412	14.469	21	Pass
NVNT	2442	13.249	21	Pass
NVNT	2469	11.882	21	Pass

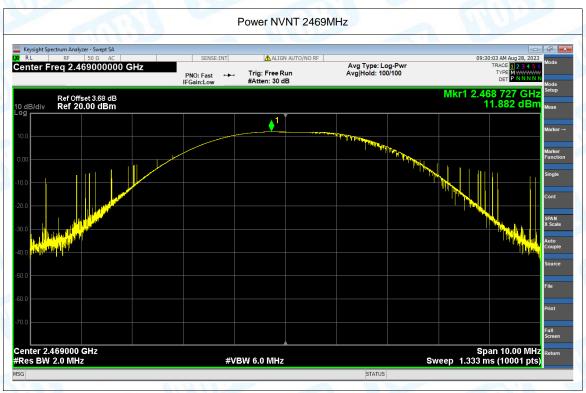






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----END OF THE REPORT----

