



FCC Test Report

Report No: FCS202604263W03

Issued for

Applicant:	Chengdu Lelian Zhichuang Technology Co., Ltd
Address:	No. 202, floor 2, building 1, No. 1288, Huandao Road, high tech Zone, Chengdu, Sichuan Province China
Product Name:	Astrion Remote Control
Brand Name:	Astrion
Model Name:	HA100
Series Model:	HA100S, HA100 Pro, HA100A, HA100B, HA100C, HA100L
FCC ID:	2BDZT-HA100
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.FCS-lab.com	

TEST RESULT CERTIFICATION

Applicant's Name.....: Chengdu Lelian Zhichuang Technology Co., Ltd
Address.....: No. 202, floor 2, building 1, No. 1288, Huandao Road,high tech Zone, Chengdu, Sichuan Province China
Manufacture's Name.....: Chengdu Lelian Zhichuang Technology Co., Ltd
Address.....: No. 202, floor 2, building 1, No. 1288, Huandao Road,high tech Zone, Chengdu, Sichuan Province China

Product Description

Product Name.....: Astrion Remote Control
Brand Name.....: Astrion
Model Name.....: HA100
Series Model.....: HA100S, HA100 Pro, HA100A, HA100B, HA100C, HA100L
Test Standards.....: FCC Rules and Regulations Part 15 Subpart C, Section 247
Test Procedure.....: ANSI C63.10:2020+Cor.1-2023

This device described above has been tested by Flux Compliance Service Laboratory, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of Flux Compliance Service Laboratory, this document may be altered or revised by Flux Compliance Service Laboratory, personal only, and shall be noted in the revision of the document..

Date of Test.....:

Date (s) of performance of tests.: Apr. 24, 2026 ~ Apr. 29, 2026

Date of Issue.....: Apr. 29, 2026

Test Result.....: Pass

Tested by

:



(orange OuYang)

Reviewed by

:



(Jayden)

Approved by

:



(Jack Wang)

Table of Contents	Page
1. SUMMARY OF TEST RESULTS	6
1.1 TEST FACTORY	7
1.2 MEASUREMENT UNCERTAINTY	7
2. GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF THE EUT	8
2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.4 EQUIPMENTS LIST	12
3 CONDUCTED EMISSION MEASUREMENT	13
4. 20 DB BANDWIDTH	17
4.1 Limit	17
4.2 Test Procedure	17
4.3 Test setup	17
4.4 Test results	17
4.5 Original Test Data	18
5. CONDUCTED OUTPUT POWER	20
5.1 LIMIT	20
5.3 TEST SETUP	20
5.5 TEST RESULTS	20
6 NUMBER OF HOPPING CHANNEL	21
6.1 LIMIT	21
6.2 TEST PROCEDURE	21
5.3 TEST SETUP	21
6.4 EUT OPERATION CONDITIONS	21
6.5 TEST RESULTS	22
7. BAND EDGE AND SPURIOUS(CONDUCTED)	23
7.1 LIMIT	23
7.2 TEST PROCEDURE	23
7.3 TEST SETUP	23
7.4 TEST RESULTS	24
8. RADIATED EMISSION MEASUREMENT	27
8.1 RADIATED EMISSION LIMITS	27

Table of Contents	Page
8.2 TEST PROCEDURE	28
8.3 TESTSETUP	29
8.4. TEST RESULTS	30
8.5 (30MHZ-1000MHZ)	31
8.7 RADIATED BAND EDGE DATA	36
9. AVERAGE TIME OF OCCUPANCY	38
9.1 LIMIT	38
9.2 TEST PROCEDURE	38
9.3 TEST SETUP	38
9.4 TEST RESULTS	39
9.5 ORIGINAL TEST DATA	39
10. HOPPING CHANNEL SEPARATION MEASUREMEN	41
10.1 LIMIT	41
10.2 TEST PROCEDURE	41
10.3 TEST SETUP	41
10.4 EUT OPERATION CONDITIONS	41
10.5 TEST RESULTS	42
11. ANTENNA REQUIREMENT	43
11.1 STANDARD REQUIREMENT	43
11.2 RESULT	43

Revision History

Rev.	Issue Date	Effect Page	Contents
00	Apr. 29, 2026	N/A	N/A

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02

FCC Part 15.247, Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247(a)(1)	Hopping Channel Separation	PASS	--
15.247 (b)(1)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)(i)	Number of Hopping Frequency	PASS	--
15.247(a)(1)(i)	Dwell Time	PASS	--
15.247(a)(1)	20dB Bandwidth 99% Bandwidth	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) All tests are according to ANSI C63.10:2020+Cor.1-2023

1.1 TEST FACTORY

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
Laboray Accreditations	
FCC Test Firm Registration Number: 514908 CNAS Number: L15566 Designation number: CN0127 A2LA accreditation number: 5545.01 ISED Number: 25801	

1.2 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 %**.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.71 \text{ dB}$
2	Unwanted Emissions, conducted	$\pm 2.988 \text{ dB}$
3	Conducted Emission (9KHz-150KHz)	$\pm 4.13 \text{ dB}$
4	All emissions radiated (9KHz -30MHz)	$\pm 3.1 \text{ dB}$
5	Conducted Emission (150KHz-30MHz)	$\pm 4.74 \text{ dB}$
6	All emissions,radiated(<1G) 30MHz-1000MHz	$\pm 5.2 \text{ dB}$
7	All emissions,radiated 1GHz -18GHz	$\pm 4.66 \text{ dB}$
8	All emissions,radiated 18GHz -40GHz	$\pm 4.31 \text{ dB}$
9	Occupied bandwidth	$\pm 0.3 \text{ dB}$
10	Power Spectral Density	$\pm 0.48 \text{ dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Astrion Remote Control
Trade Name	Astrion
Model Name	HA100
Series Model	HA100S, HA100 Pro, HA100A, HA100B, HA100C, HA100L
Model Difference	The above product with same circuit, PCB layout, electrical parts, materials and wiring structures, Appearance shape, the materials of decorative accessories is same, the only difference is the model name.
Channel List	Please refer to the Note 2.
Operation frequency	2402MHz-2480MHz
Modulation:	GFSK
Channel number	79 CH
Transmitter rate:	1Mbps
Power Supply	Input: 100-240V-50/60Hz Output: DC 5V 2A 10W
Battery	DC 3.8V,200mAh
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

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

2.

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

3. Table for Filed Antenna

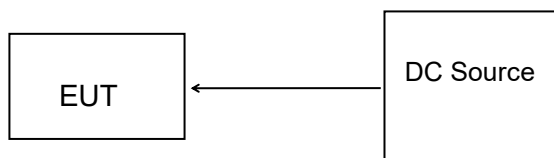
Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	NA	NA	PCB Antenna	NA	1.26	NA

2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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.

Block diagram of EUT configuration for test

RE:



Conduction



Test software: FCC_assist.exe

The test software was used to control EUT work in continuous TX mode, and select test channel, Wireless mode as below table

No.	Test model descrtion
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Hopping GFSK
5	Charging

Note:

1. All the test modes can be supply by battery, only the result of the worst case recorded in the report. GFSK mode is worst mode.
2. For radiated emission, 3 axis were chosen for testing for each applicable mode.
3. The EUT used fully charge battery when tested.

1. Remark:The EDR function is disabled by software control

2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
1	Adapter	N/A	J121L-0502000IU	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
	N/A	N/A	N/A	N/A	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.4 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2025.08.25	2026.08.24
Signal Analyzer	R&S	FSV40-N	FCS-E012	2025.08.25	2026.08.24
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2025.08.25	2026.08.24
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2025.08.25	2026.08.24
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2025.08.25	2026.08.24
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2025.08.25	2026.08.24
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2025.08.25	2026.08.24
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2025.08.25	2026.08.24
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2025.08.25	2026.08.24
Temperature & Humidity	HTC-1	victor	FCS-E005	2025.08.25	2026.08.24
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2025.08.25	2026.08.24
LISN	R&S	ENV216	FCS-E007	2025.08.25	2026.08.24
LISN	ETS	3810/2NM	FCS-E009	2025.08.25	2026.08.24
Temperature & Humidity	HTC-1	victor	FCS-E008	2025.08.25	2026.08.24
Testing Software	EZ-EMC(Ver.EMC-CON 3A1.1)				

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2025.08.25	2026.08.24
Spectrum Analyzer	Agilent	E4447A	MY50180039	2025.08.25	2026.08.24
Spectrum Analyzer	R&S	FSV-40	101499	2025.08.25	2026.08.24
Power Sensor	Agilent	UX2021XA	FCS-E021	2025.08.25	2026.08.24
Testing Software	EZ-EMC(Ver.STSLAB 03A1 RE)				

3 CONDUCTED EMISSION MEASUREMENT

3.1 LIMIT

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

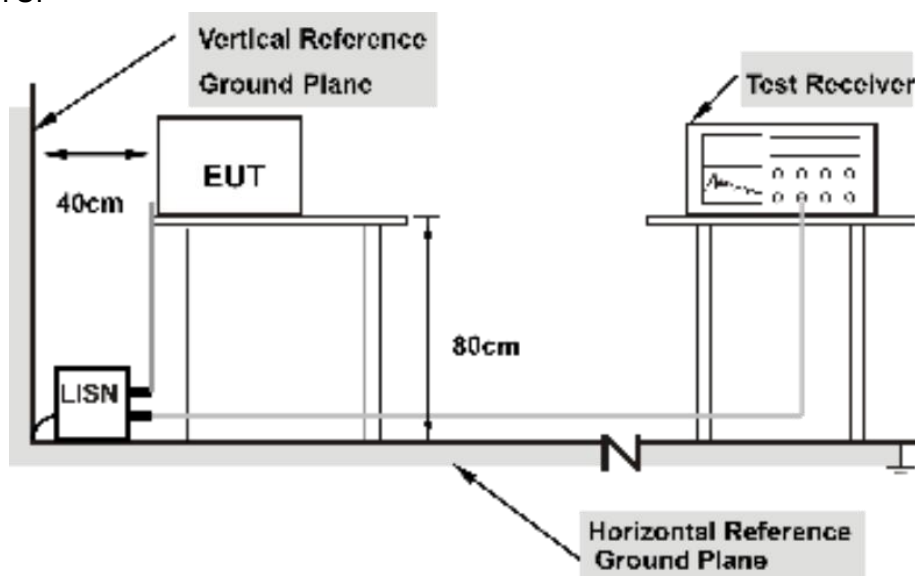
3.2 TEST PROCEDURE

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical 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.
- b. 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.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP

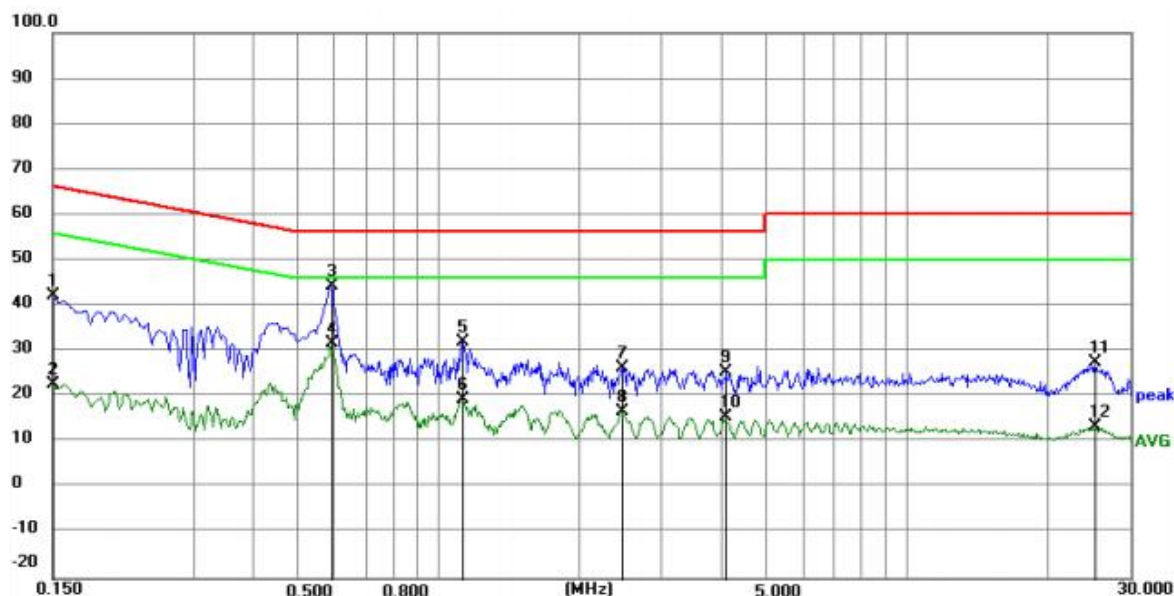


Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

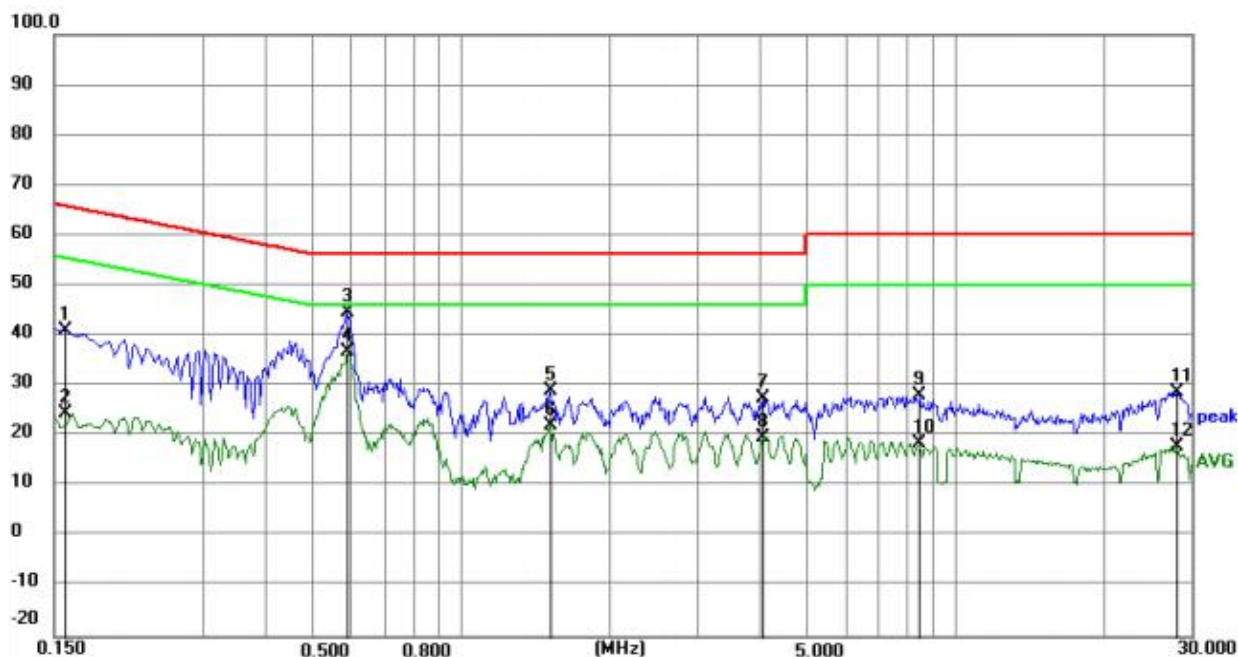
3.4 TEST RESULTS

Temperature:	26 °C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Charging(worst mode)		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1500	32.16	9.99	42.15	66.00	23.85	QP
2	0.1500	12.88	9.99	22.87	56.00	33.13	AVG
3	0.5910	34.42	9.91	44.33	56.00	11.67	QP
4	0.5910	21.76	9.91	31.67	46.00	14.33	AVG
5	1.1220	22.19	10.00	32.19	56.00	23.81	QP
6	1.1220	9.41	10.00	19.41	46.00	26.59	AVG
7	2.4675	16.35	10.04	26.39	56.00	29.61	QP
8	2.4675	6.73	10.04	16.77	46.00	29.23	AVG
9	4.1280	15.33	10.07	25.40	56.00	30.60	QP
10	4.1280	5.49	10.07	15.56	46.00	30.44	AVG
11	25.2465	17.33	10.30	27.63	60.00	32.37	QP
12	25.2465	3.12	10.30	13.42	50.00	36.58	AVG

Temperature:	26°C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Charging(worst mode)		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1590	31.17	9.89	41.06	65.52	24.46	QP
2	0.1590	14.79	9.89	24.68	55.52	30.84	AVG
3	0.5865	34.59	9.93	44.52	56.00	11.48	QP
4	0.5865	26.78	9.93	36.71	46.00	9.29	AVG
5	1.5090	19.01	10.01	29.02	56.00	26.98	QP
6	1.5090	12.19	10.01	22.20	46.00	23.80	AVG
7	4.0875	17.53	10.05	27.58	56.00	28.42	QP
8	4.0875	9.85	10.05	19.90	46.00	26.10	AVG
9	8.4570	18.04	10.12	28.16	60.00	31.84	QP
10	8.4570	8.33	10.12	18.45	50.00	31.55	AVG
11	28.0545	18.55	10.27	28.82	60.00	31.18	QP
12	28.0545	7.72	10.27	17.99	50.00	32.01	AVG

4. 20 DB BANDWIDTH

4.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247a(1)	20dB bandwidth	N/A	2400-2483.5

4.2 Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Set the spectrum analyzer as follows

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 20 dB Bandwidth :30KHz For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 20dB Bandwidth : $\geq 3 \times \text{RBW}$ For 99% Bandwidth : approximately $3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto

- (3) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator
- (4) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (5) Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

4.3 Test setup

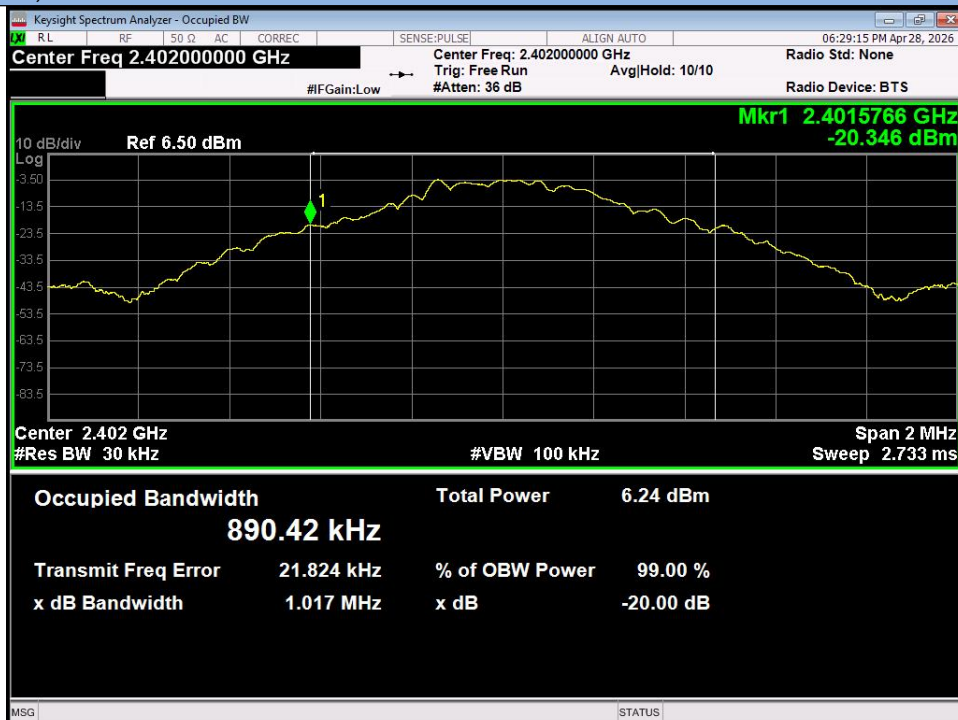


4.4 Test results

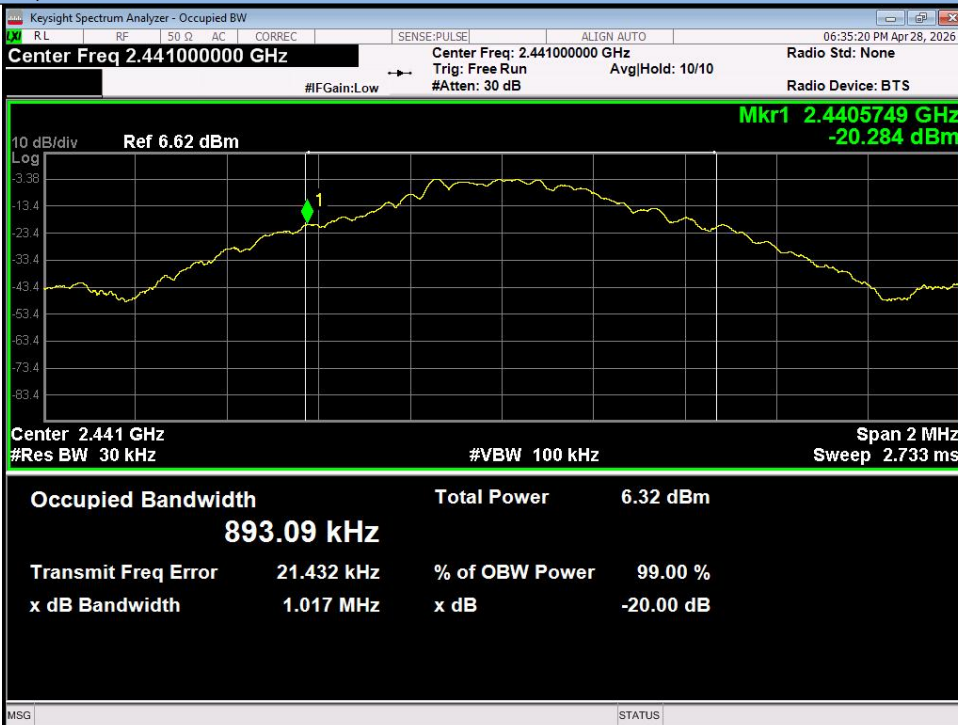
TestMode	Channel (MHz)	99%OBW(MHz)	20dB Bandwidth (MHz)	Verdict
Lowest	2402MHz	0.890	1.017	Pass
Middle	2440MHz	0.893	1.017	Pass
Highest	2480MHz	0.898	1.026	Pass

4.5 Original Test Data

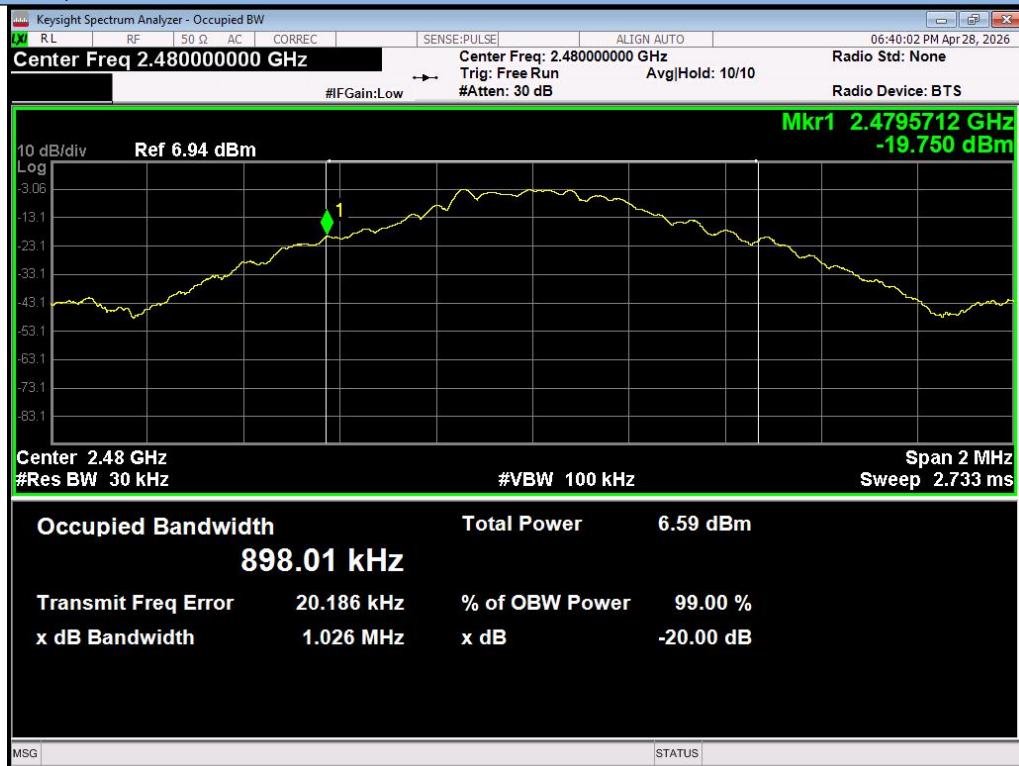
OCB,1DH1,LOWEST



OCB,1DH1,MIDDLE



OCB,1DH1,HIGHEST



5. CONDUCTED OUTPUT POWER

5.1 LIMIT

FCC Part 15 Subpart C			
Section	Test Item	Limit	Frequency Range
15.247(b)(1)	Peak output power	Power <(21dBm)	2400-2483.5

- 1.Connect each EUT's antenna output to power sensor by RF cable and attenuator
- 2.Measure the PK output power of each antenna port by power sensor.

5.3 TEST SETUP



5.5 TEST RESULTS

TestMode	Channel (MHz)	Result (dBm)	Limit (dBm)	Verdict
Lowest	2402MHz	-0.70	21	Pass
Middle	2441MHz	-0.72	21	Pass
Highest	2480MHz	-0.45	21	Pass

6 NUMBER OF HOPPING CHANNEL

6.1 LIMIT

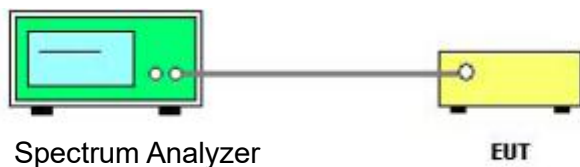
FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	>15	2400-2483.5	PASS

6.2 TEST PROCEDURE

a The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto

5.3 TEST SETUP



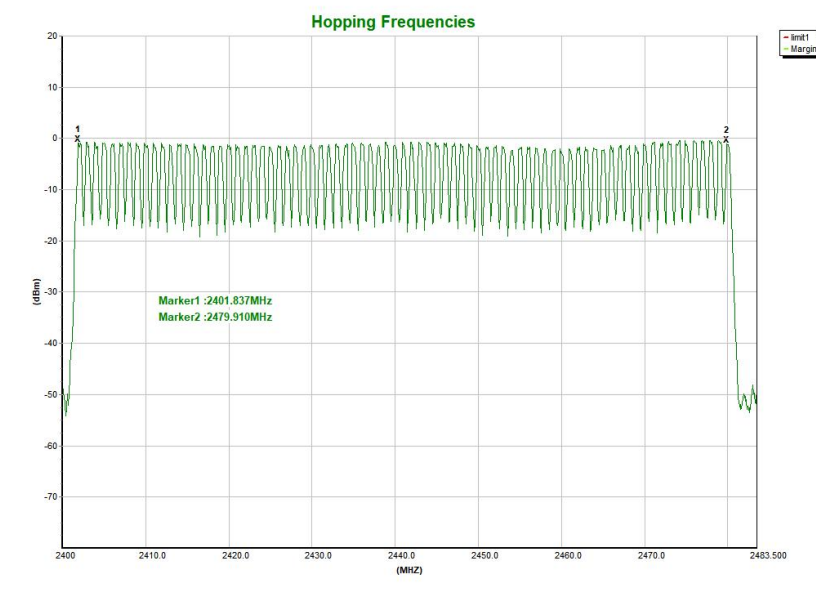
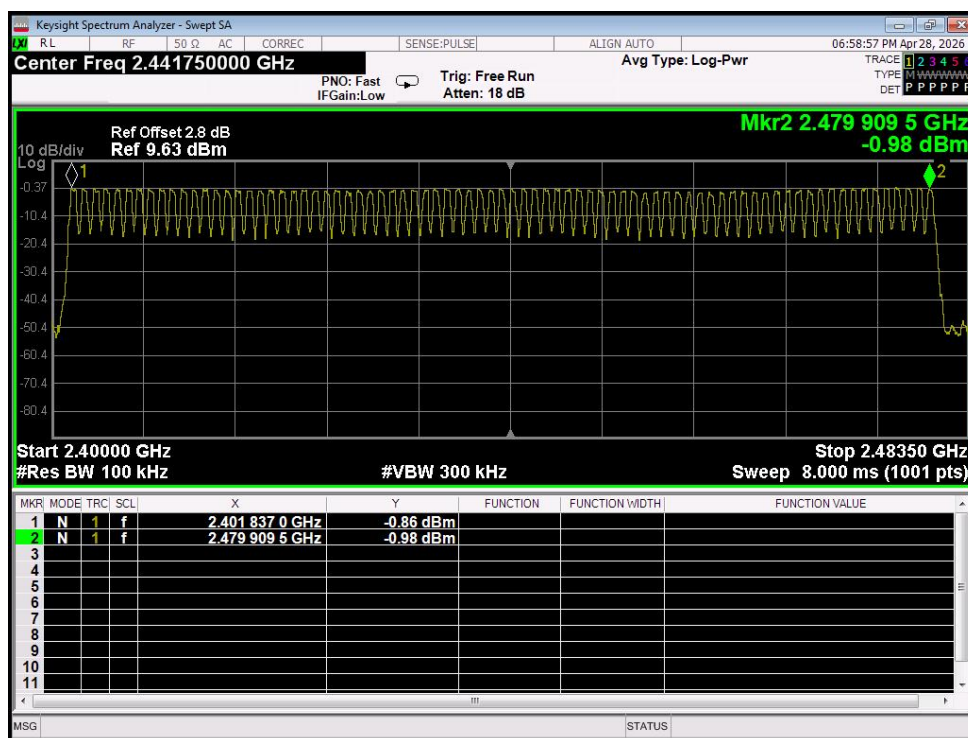
6.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.5 TEST RESULTS

Temperature:	26°C	Relative Humidity:	54%
Test Mode:	Hopping Mode	Test Voltage:	DC 5V

Condition	Mode	Hopping Number	Limit	Frequency Range(MHz)	Results
NVNT	1DH1	79	>15	2400-2483.5	Pass



7. BAND EDGE AND SPURIOUS(CONDUCTED)

7.1 LIMIT

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

7.2 TEST PROCEDURE

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

Center frequency	Channel center frequency
RBW:	100kHz
VBW:	300kHz
Span	1.5times the bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

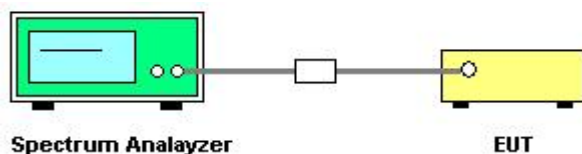
(3) Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the spectrum analyzer as follows:

RBW:	100kHz
VBW:	300kHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{span}/\text{RBW}$
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

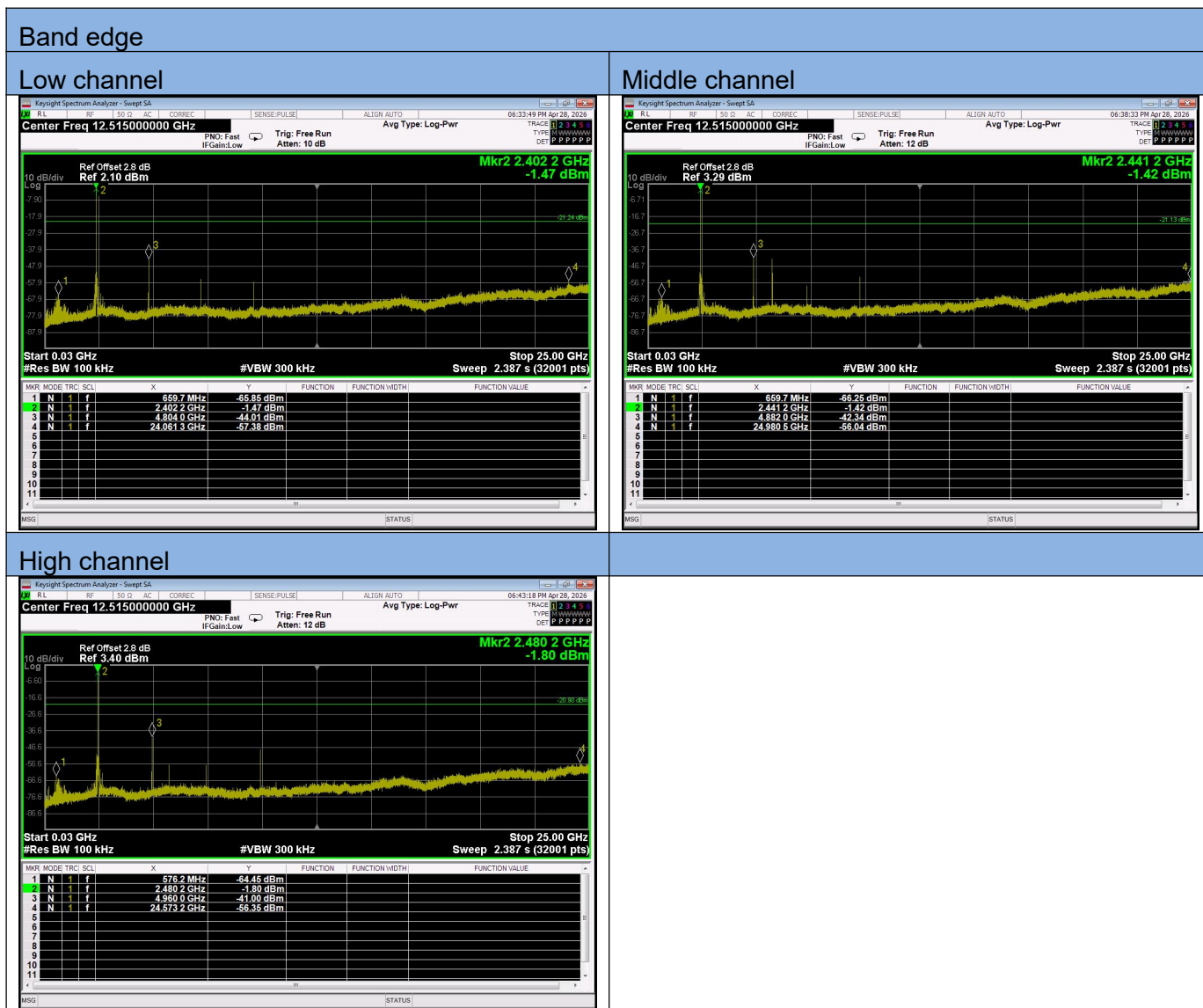
7.3 TEST SETUP



7.4 TEST RESULTS

Eut set mode	CH or Frequency	Result
GFSK	CH1	Pass
	CH79	Pass

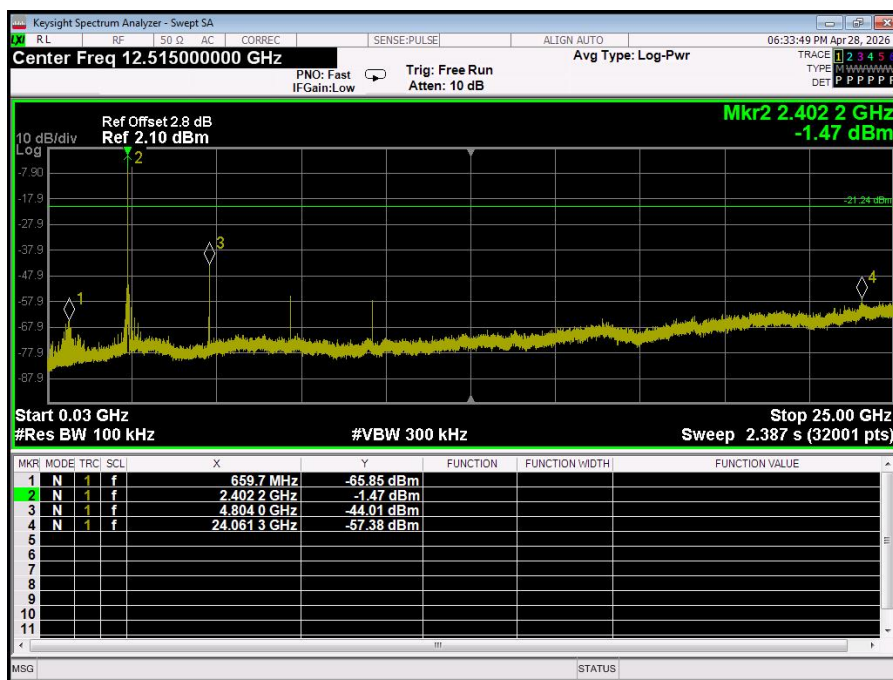
Original test data



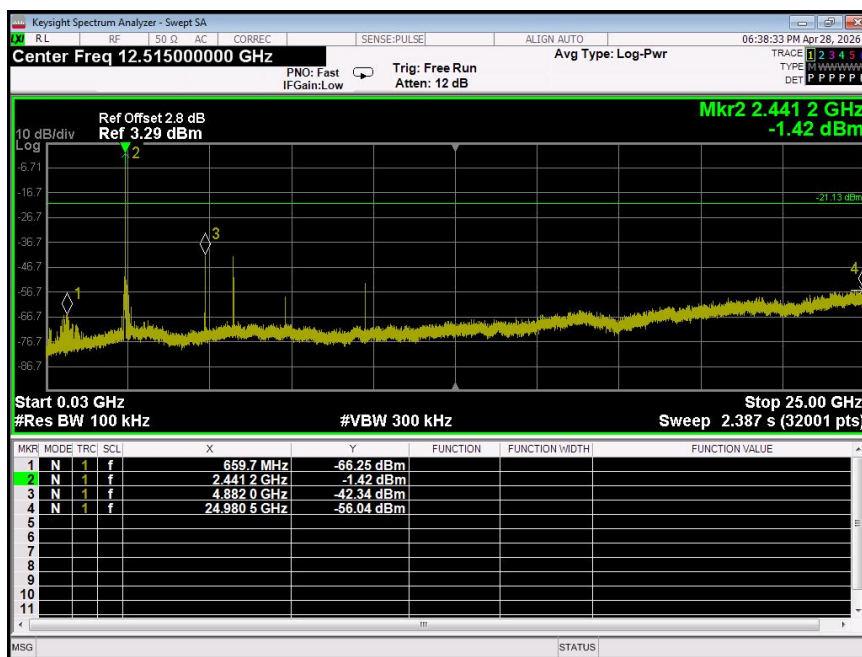
Temperature:	25 °C	Relative Humidity:	60%
Test Mode:	GFSK Mode	Test Voltage:	DC 5V

Spurious emissions

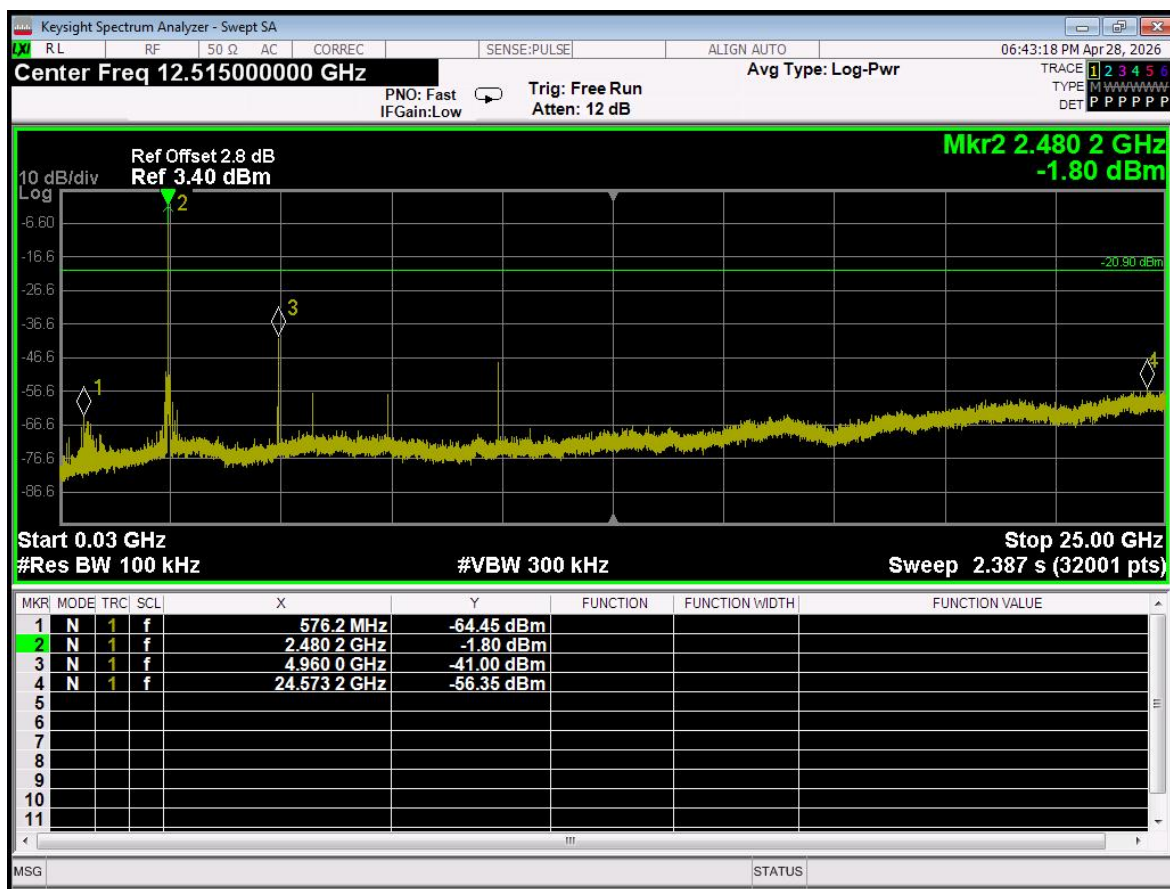
Lowest



Middle



Highest



8. RADIATED EMISSION MEASUREMENT

8.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10:2020+Cor.1-2023 below has to be followed

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/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

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz

For Band edge

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2300 to 2403 MHz Upper Band Edge: 2479 to 2500 MHz
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz / 10 Hz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

8.2 TEST PROCEDURE

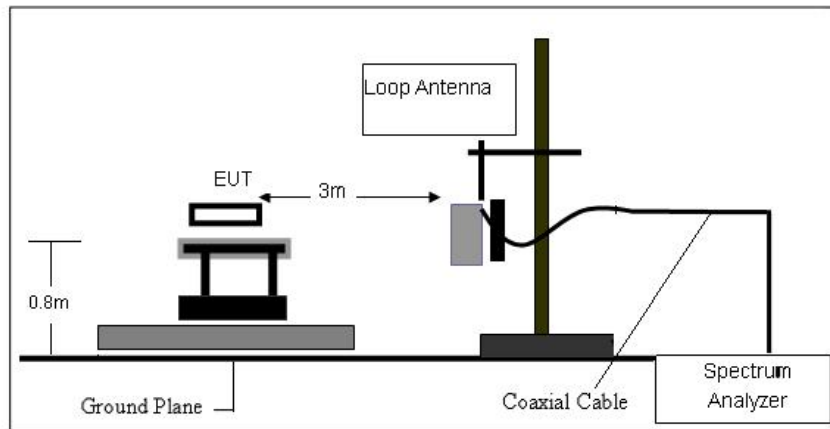
- The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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 QuasiPeak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

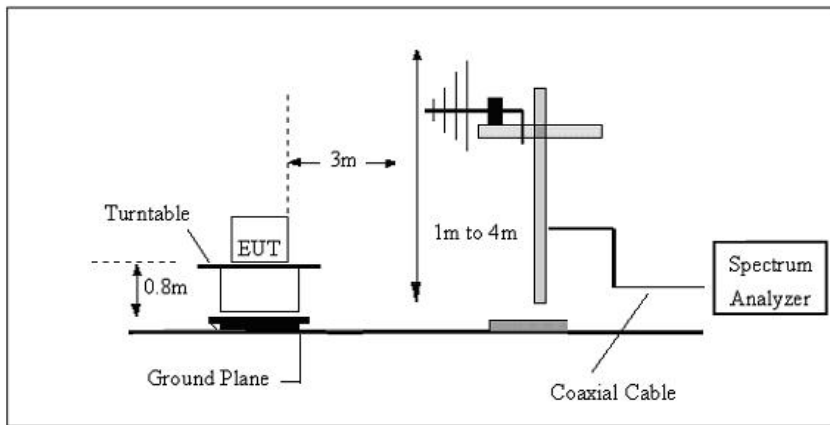
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

8.3 TESTSETUP

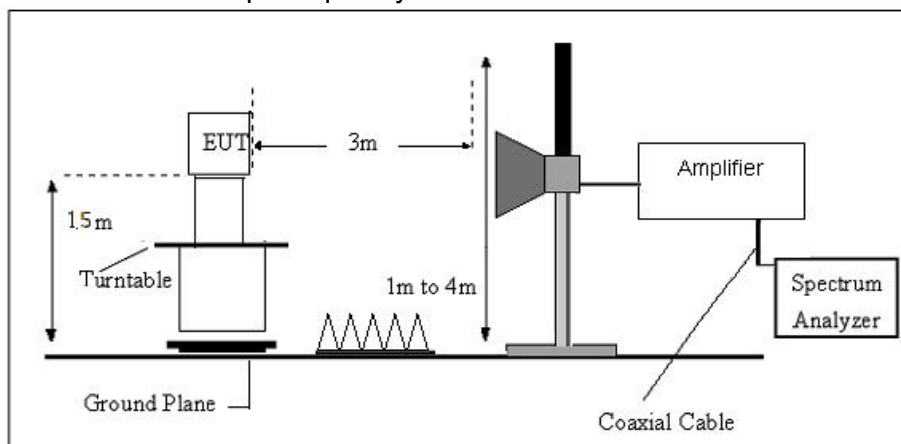
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



8.4. TEST RESULTS

(9KHz-30MHz)

Temperature:	26°C	Relative Humidity:	54%
Test Voltage:	DC 5V	Test Mode:	GFSK(worst mode)

Freq.	Reading	Limit	Margin	State	Test Result
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	
--	--	--	--	--	PASS
--	--	--	--	--	PASS

Note:

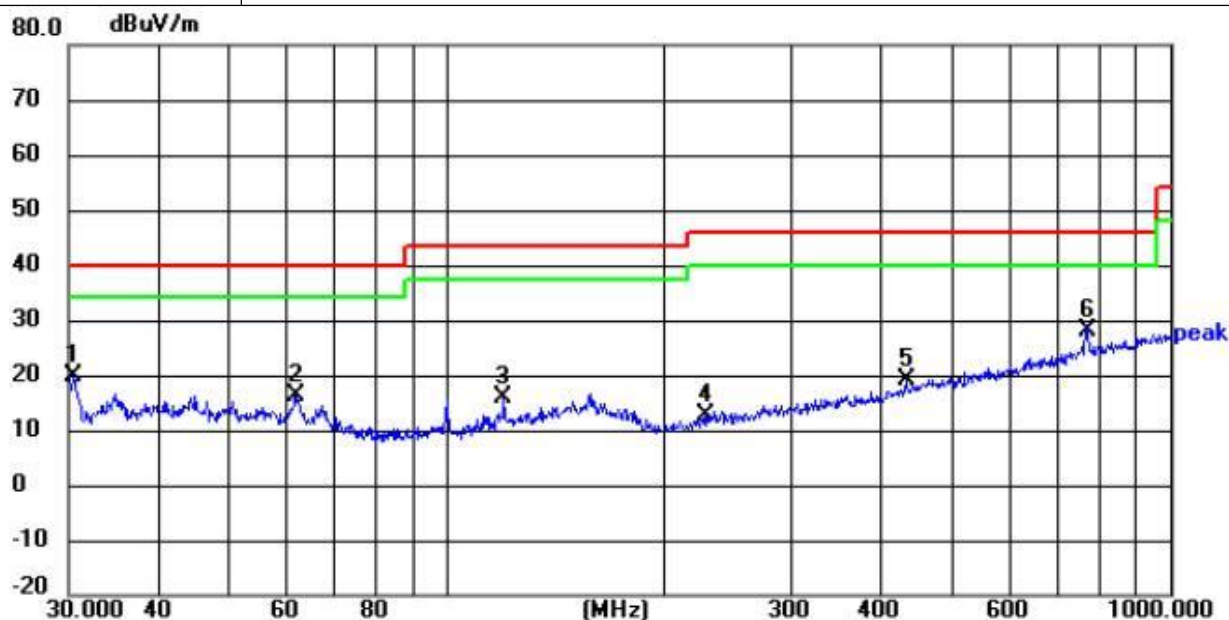
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

8.5 (30MHZ-1000MHZ)

Temperature:	26°C	Relative Humidity:	54%
Test Voltage:	DC 5V	Phase:	Horizontal
Test Mode:	GFSK(worst mode)		



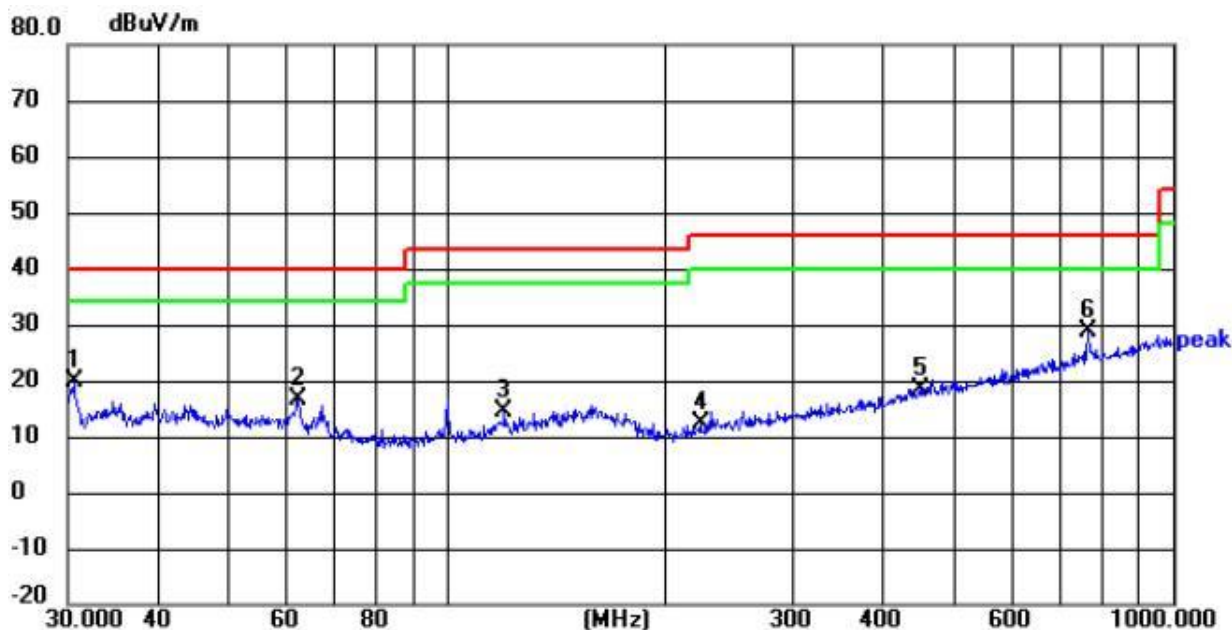
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/ m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.5306	32.17	-12.30	19.87	40.00	-20.13	peak
2	61.9951	29.65	-13.35	16.30	40.00	-23.70	peak
3	119.8556	29.54	-13.70	15.84	43.50	-27.66	peak
4	227.6906	26.37	-13.68	12.69	46.00	-33.31	peak
5	431.0316	27.50	-8.34	19.16	46.00	-26.84	peak
6	768.7481	29.69	-1.75	27.94	46.00	-18.06	peak

Note: 1. Margin = Result (Result =Reading + Factor)–Limit

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 100 kHz, VBW: 300 kHz, Sweep time: auto.

Temperature:	26°C	Relative Humidity:	54%
Test Voltage:	DC 5V	Phase:	Vertical
Test Mode:	GFSK(worst mode)		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/ m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.6379	32.12	-12.30	19.82	40.00	-20.18	peak
2	62.2128	30.11	-13.39	16.72	40.00	-23.28	peak
3	119.8556	28.28	-13.70	14.58	43.50	-28.92	peak
4	223.7334	26.11	-13.88	12.23	46.00	-33.77	peak
5	447.9822	26.01	-7.69	18.32	46.00	-27.68	peak
6	766.0571	30.58	-1.80	28.78	46.00	-17.22	peak

Note: 1. Margin = Result (Result = Reading + Factor) – Limit

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 100 kHz, VBW: 300 kHz, Sweep time: auto.

8.6 Above 1GHz

Flux Compliance Service Laboratory

Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan

Tel: 769-27280901 Fax: 769-27280901 <http://www.FCS-lab.com>

Low CH (GFSK)

Peak

Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	36.7	31.78	8.6	32.09	44.23	74	-29.77	Vertical
7206	34.69	36.15	11.65	32	46.73	74	-27.27	Vertical
9608	35.57	37.95	14.14	31.62	51.13	74	-22.87	Vertical
12010	*					74		Vertical
14412	*					74		Vertical
4804	39.3	31.78	8.6	32.09	48.24	74	-25.76	Horizontal
7206	34.49	36.15	11.65	32	48.36	74	-25.64	Horizontal
9608	33.62	37.95	14.14	31.62	50.43	74	-23.57	Horizontal
12010	*					74		Horizontal
14412	*					74		Horizontal

Avg

Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	29.4	31.78	8.6	32.09	33.3	54	-20.7	Vertical
7206	21.54	36.15	11.65	32	35.57	54	-18.43	Vertical
9608	20.28	37.95	14.14	31.62	39.4	54	-14.6	Vertical
12010	*					54		Vertical
14412	*					54		Vertical
4804	33.42	31.78	8.6	32.09	37.38	54	-16.62	Horizontal
7206	23.36	36.15	11.65	32	37.65	54	-16.35	Horizontal
9608	20.47	37.95	14.14	31.62	39.02	54	-14.98	Horizontal
12010	*					54		Horizontal
14412	*					54		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. "***", means this data is the too weak instrument of signal is unable to test.

Middle CH (GFSK)

Peak

Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4882	38.18	31.85	8.67	32.12	44.44	74	-29.56	Vertical
7323	32.39	36.37	11.72	31.89	47.19	74	-26.81	Vertical
9764	32.46	38.35	14.25	31.62	51.7	74	-22.3	Vertical
12205	*					74		Vertical
14646	*					74		Vertical
4882	42.6	31.85	8.67	32.12	48.47	74	-25.53	Horizontal
7323	34.29	36.37	11.72	31.89	48.83	74	-25.17	Horizontal
9764	34.37	38.35	14.25	31.62	51	74	-23	Horizontal
12205	*					74		Horizontal
14646	*					74		Horizontal

Avg

Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4882	27.46	31.85	8.67	32.12	33.5	54	-20.5	Vertical
7323	22.39	36.37	11.72	31.89	36.02	54	-17.98	Vertical
9764	18.48	38.35	14.25	31.62	39.96	54	-14.04	Vertical
12205	*					54		Vertical
14646	*					54		Vertical
4882	29.75	31.85	8.67	32.12	37.59	54	-16.41	Horizontal
7323	23.22	36.37	11.72	31.89	38.11	54	-15.89	Horizontal
9764	22.34	38.35	14.25	31.62	39.59	54	-14.41	Horizontal
12205	*					54		Horizontal
14646	*					54		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. "*", means this data is the too weak instrument of signal is unable to test.

High CH(GFSK)

Peak

Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4960	35.42	31.93	8.73	32.16	44.39	74	-29.61	Vertical
7440	34.24	36.59	11.79	31.78	47.49	74	-26.51	Vertical
9920	34.63	38.81	14.38	31.88	51.95	74	-22.05	Vertical
12400	*					74		Vertical
14880	*					74		Vertical
4960	39.99	31.93	8.73	32.16	48.39	74	-25.61	Horizontal
7440	35.78	36.59	11.79	31.78	49.13	74	-24.87	Horizontal
9920	33.36	38.81	14.38	31.88	51.23	74	-22.77	Horizontal
12400	*					74		Horizontal
14880	*					74		Horizontal

Avg

Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4960	25.49	31.93	8.73	32.16	33.52	54	-20.48	Vertical
7440	19.6	36.59	11.79	31.78	36.37	54	-17.63	Vertical
9920	18.72	38.81	14.38	31.88	40.24	54	-13.76	Vertical
12400	*					54		Vertical
14880	*					54		Vertical
4960	33.94	31.93	8.73	32.16	37.6	54	-16.4	Horizontal
7440	23.88	36.59	11.79	31.78	38.45	54	-15.55	Horizontal
9920	21.1	38.81	14.38	31.88	39.86	54	-14.14	Horizontal
12400	*					54		Horizontal
14880	*					54		Horizontal

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss- Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. "**", means this data is the too weak instrument of signal is unable to test.

8.7 RADIATED BAND EDGE DATA

Remark: All restriction band have been tested, and only the worst case is shown in report

Low CH (GFSK)

Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	40.34	27.61	5.36	30.18	41.05	74	-32.95	Horizontal
2390	39.36	27.59	5.38	30.18	40.75	74	-33.25	Horizontal
2400	54.48	27.58	5.39	30.18	56.83	74	-17.17	Horizontal
2310	37.37	27.61	5.36	30.18	40.64	74	-33.36	Vertical
2390	40.56	27.59	5.38	30.18	40.83	74	-33.17	Vertical
2400	45.49	27.58	5.39	30.18	58.34	74	-15.66	Vertical

Avg

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	34.28	27.61	5.36	30.18	35.09	54	-18.91	Horizontal
2390	29.39	27.59	5.38	30.18	32.41	54	-21.59	Horizontal
2400	42.44	27.58	5.39	30.18	43.36	54	-10.64	Horizontal
2310	34.09	27.61	5.36	30.18	34.36	54	-19.64	Vertical
2390	32.03	27.59	5.38	30.18	32	54	-22	Vertical
2400	40.77	27.58	5.39	30.18	44.54	54	-9.46	Vertical

High CH(GFSK)
Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	39.29	27.53	5.47	29.93	42.55	74	-31.45	Horizontal
2500	41.35	27.55	5.49	29.93	42.7	74	-31.3	Horizontal
2483.5	44.08	27.53	5.47	29.93	42.57	74	-31.43	Vertical
2500	40.79	27.55	5.49	29.93	43.23	74	-30.77	Vertical

Avg

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	34.35	27.53	5.47	29.93	35.46	54	-18.54	Horizontal
2500	33.18	27.55	5.49	29.93	34.21	54	-19.79	Horizontal
2483.5	35.42	27.53	5.47	29.93	36.26	54	-17.74	Vertical
2500	30.67	27.55	5.49	29.93	33.72	54	-20.28	Vertical

Remark.

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor
- 2.The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

9. AVERAGE TIME OF OCCUPANCY

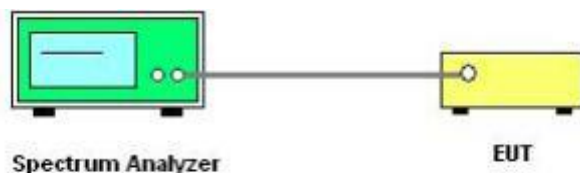
9.1 LIMIT

FCC PART 15 (15.247), Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247(a)(1)	Average Time of Occupancy	0.4 sec	2400-2483.5

9.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer.
- Set RBW =1MHz/VBW =1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Set the EUT for DH5, DH3 and DH1 packet transmitting.
- Measure the maximum time duration of one single pulse.
- To the number of pulses in the observation period of 31.6 seconds is 138(DH1).
- To the number of pulses in the observation period of 31.6 seconds is 125(DH3).
- The number of pulses in the observation period of 31.6 seconds is 116(DH5).

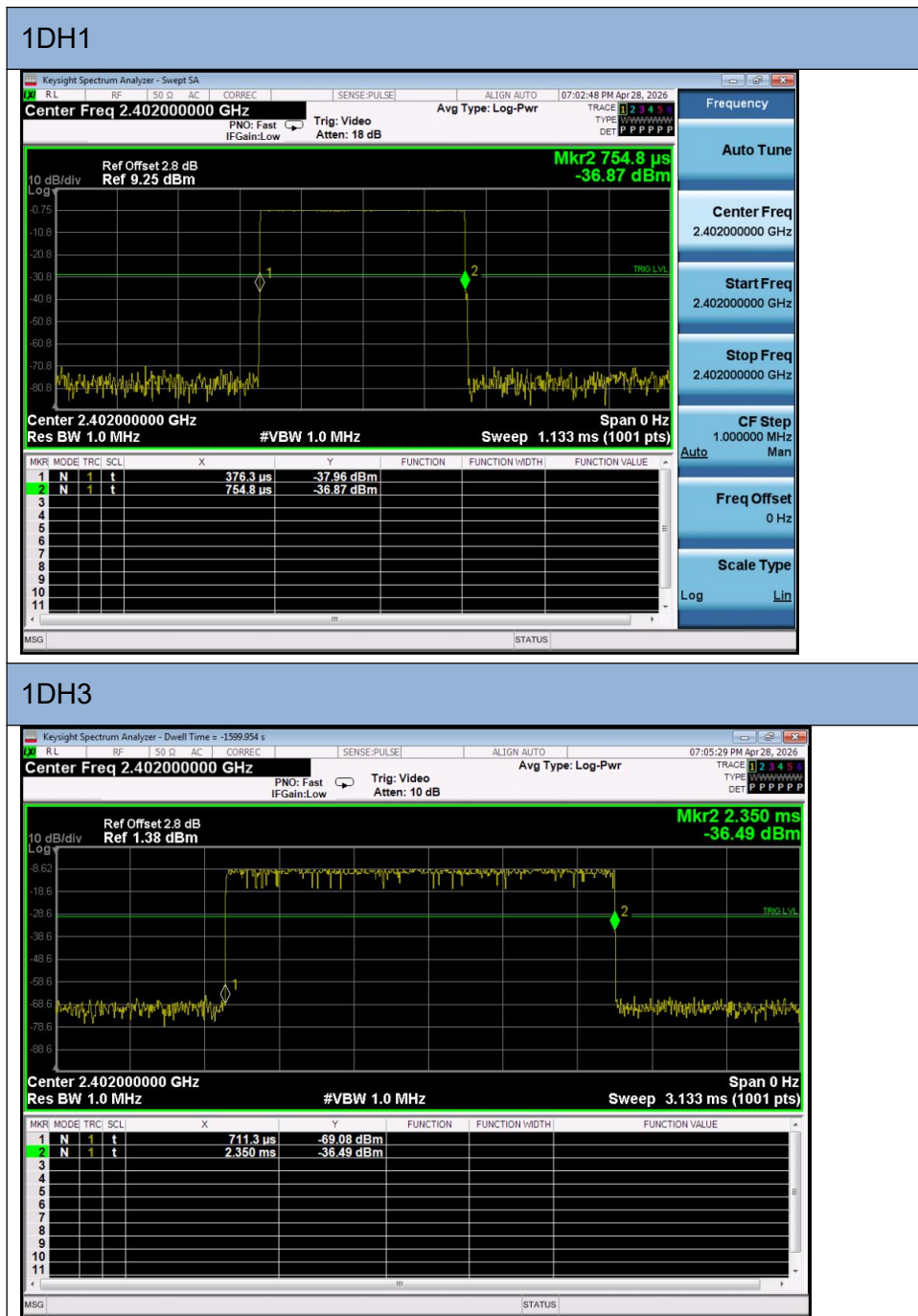
9.3 TEST SETUP

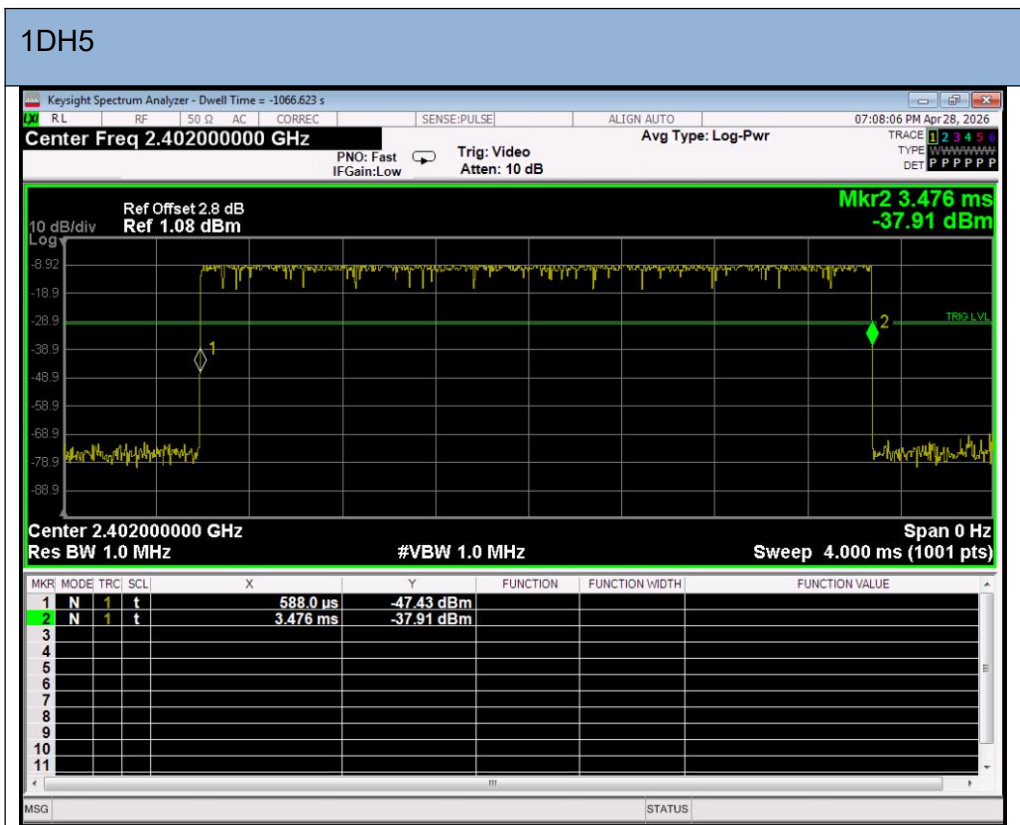


9.4 TEST RESULTS

AVERAGE TIME OF OCCUPANCY							
CONDITION	MODE	FREQUENCY (MHZ)	PULSE TIME (MS)	TOTAL DWELL TIME (MS)	LIMIT (MS)	BURST NUMBER	RESULTS
NVNT	1DH1	2402	0.379	52.302	400	138	PASS
NVNT	1DH3	2402	1.639	204.875	400	125	PASS
NVNT	1DH5	2402	2.889	335.124	400	116	PASS

9.5 ORIGINAL TEST DATA





10. HOPPING CHANNEL SEPARATION MEASUREMENT

10.1 LIMIT

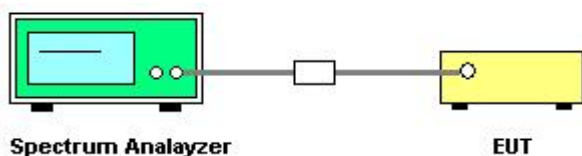
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

10.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement

10.3 TEST SETUP



10.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

10.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	60%
Test Mode:	Hopping Mode	Test Voltage:	DC 5V

Modulation	Test Mode	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
GFSK	1DH1	2402	1	> 0.59	Pass
	1DH1	2440	1	> 0.61	Pass
	1DH1	2480	1.01	> 0.62	Pass



11. ANTENNA REQUIREMENT

11.1 STANDARD REQUIREMENT

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), 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.

11.2 RESULT

The antennas used for this product are PCB Antenna and no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.26dBi.

*****END OF THE REPORT*****