

FCC TEST REPORT

FCC ID:2BXSU-LR-0019

Applicant Name..... : Shenzhen Zhengwei Electronics Co., Ltd.

Address..... : Building 5, Room 309, Hezhou Industrial Zone, Hezhou Village, Hangcheng Subdistrict, Bao'an District, Shenzhen, China

Manufacturer Name..... : Shenzhen Zhengwei Electronics Co., Ltd.

Address..... : Building 5, Room 309, Hezhou Industrial Zone, Hezhou Village, Hangcheng Subdistrict, Bao'an District, Shenzhen, China

Product..... : WIRELESS CONTROLLER RECEIVER FOR GC

Model(s)..... : LR-0019

Additional Model(s)..... : /

Trademark..... : Linkretro

Model Difference..... : /

Prepared by..... : Guangdong Zhonghan Testing Technology Co., Ltd.

Address..... : Room 104/201, Building 1, Yibaolai Industrial Park, Qiaotou, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

Date of Receipt..... : Aug. 24, 2026

Date of Test(s)..... : Aug. 24, 2026 to Sep. 2, 2026

Date of Issue..... : Sep. 2, 2026

Test Requested..... : Select test(s) as requested by the client.

Test Standard(s)..... : FCC CFR Title 47 Part 15 Subpart C Section 15.247

Test procedure..... : KDB558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 +
Errata to C63.10a-2024

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

Prepared by

Leon Li

Leon Li/ Engineer

Reviewed by:

Baret Wu

Baret Wu/ Director

Approved by:

Levi Lee

Levi Lee/ Manager

Note: This device described above has been tested by ZHT, and 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 ZHT, this document may be altered or revised by ZHT, personal only, and shall be noted in the revision of the document.



Table of Contents

	Page
1. TEST SUMMARY	3
2. GENERAL INFORMATION	4
2.1 GENERAL DESCRIPTION OF EUT	4
2.2 Test Setup Configuration	6
2.3 Support Equipment	6
2.4 Test Mode	7
3. TEST FACILITY AND TEST INSTRUMENT USED	8
3.1 TEST FACILITY	8
3.2 INSTRUMENT LIST FOR ALL TEST ITEMS	8
3.3 Testing software	10
3.4 MEASUREMENT UNCERTAINTY	10
4. EMC EMISSION TEST	11
4.1 Conducted emissions	11
4.2 Radiated emissions	15
5. RADIATED BAND EMISSION MEASUREMENT	23
5.1 Test Requirement:	23
5.2 TEST PROCEDURE	23
5.3 DEVIATION FROM TEST STANDARD	24
5.4 TEST SETUP	24
5.5 EUT OPERATING CONDITIONS	24
5.6 TEST RESULT	25
6. CONDUCTED BAND EDGE AND SPURIOUS EMISSION	27
6.1 Limit	27
6.2 Test Setup	27
6.3 Test procedure	27
6.4 DEVIATION FROM STANDARD	27
6.5 Test Result	28
7. 20DB&99% BANDWIDTH	52
7.1 Test Setup	52
7.2 Limit	52
7.3 Test procedure	52
7.4 DEVIATION FROM STANDARD	52
7.5 Test Result	52
8. MAXIMUM PEAK OUTPUT POWER	63
8.1 Block Diagram Of Test Setup	63
8.2 Limit	63
8.3 Test procedure	63
8.4 DEVIATION FROM STANDARD	63
8.5 Test Result	63
9. HOPPING CHANNEL SEPARATION	69
9.1 Test Setup	69
9.2 Test procedure	69
9.3 DEVIATION FROM STANDARD	69
9.4 Test Result	69
10. NUMBER OF HOPPING FREQUENCY	75
10.1 Test Setup	75
10.2 Test procedure	75
10.3 DEVIATION FROM STANDARD	75
10.4 Test Result	75
11. DWELL TIME	78
11.1 Test Setup	78
11.2 Test procedure	78
11.3 DEVIATION FROM STANDARD	78
11.4 Test Result	79
12. ANTENNA REQUIREMENT	89
13. TEST SETUP PHOTO	90
14. EUT CONSTRUCTIONAL DETAILS	90



Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Result	Remark
FCC part 15.203/15.247 (b)(4)	Antenna Requirement	PASS	
15.207	AC Power Line Conducted Emission	PASS	
15.247 (b)(1)	Conducted Peak Output Power	PASS	
15.247 (a)(1)	20dB Occupied Bandwidth 99% OCB	PASS	
15.247 (a)(1)	Carrier Frequencies Separation	PASS	
15.247 (a)(1)(iii)	Hopping Channel Number	PASS	
15.247 (a)(1)(iii)	Dwell Time	PASS	
15.205/15.209	Radiated Emission and Restricted Band	PASS	
15.247(d)	Conducted Unwanted emissions and Band Edge	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.



ZHONGHAN

2. GENERAL INFORMATION

Project No.: ZHT-260824125W01-2

Page 4 of 90

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	WIRELESS CONTROLLER RECEIVER FOR GC
Test Model No.:	LR-0019
Hardware Version:	V1.0
Software Version:	V1.0
Sample(s) Status:	Engineer sample
Channel numbers:	79
Channel separation:	2402MHz-2480MHz
Modulation technology:	GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna Type:	Chip antenna
Antenna gain:	1.71dBi
Power supply:	Input: 3.3V  0.1A
Sample Number:	260824125YP001
Remark: The antenna gain is provided by the customer, if the data provided by the customer is not accurate, Guangdong Zhonghan Testing Technology Co., Ltd. does not assume any responsibility.	



Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz



2.2 Test Setup Configuration

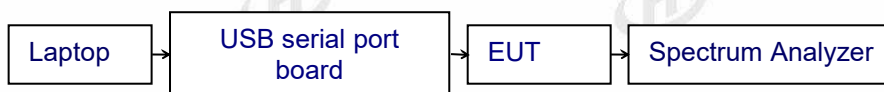
Conducted Emission



Radiated Emission



RF Conducted Emission





2.3 Support Equipment

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Laptop	Lenovo (Beijing) Co., Ltd	ThinkPad E480	/	AE
E-2	USB serial port board	/	/	/	AE
E-3	AC Adapter	Huizhou Jinhu Industrial Development Co., Ltd.	VCBAJACH	/	AE

Item	Shielded Type	Ferrite Core	Length	Note

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) The test software is the adb V1.0 which can set the EUT into the individual test modes.TX Power: Default

2.4 Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	



3. TEST FACILITY AND TEST INSTRUMENT USED

3.1 TEST FACILITY

Guangdong Zhonghan Testing Technology Co., Ltd.
Add.: Room 104/201, Building 1, Yibaolai Industrial Park, Qiaotou, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

FCC Registration Number:255941
Designation Number: CN0325
IC Registered No.: 29832
CAB identifier: CN0143

3.2 INSTRUMENT LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Model	Serial No.	Equipment No.	Last Cal.	Next Cal.
1	Receiver	R&S	ESCI	100874	ZH-E005	Apr. 24, 2026	Apr. 23, 2027
2	Loop Antenna	TESEQ	HLA6121	58357	ZH-E036	Sept. 8, 2025	Sept. 7, 2026
3	Amplifier	Schwarzbeck	BBV 9743 B	00378	ZH-E019	Apr. 24, 2026	Apr. 23, 2027
4	Amplifier	Schwarzbeck	BBV 9718 B	00040	ZH-E021	May 8, 2026	May 7, 2027
5	Bilog Antenna	Schwarzbeck	VULB9162	00498	ZH-E017	Apr. 25, 2026	Apr. 24, 2027
6	Horn Antenna	Schwarzbeck	BBHA9120D	02623	ZH-E020	Apr. 25, 2026	Apr. 24, 2027
7	Horn Antenna	A.H.SYSTEMS	SAS574	588	ZH-E062	Oct. 20, 2025	Oct. 19, 2026
8	Amplifier	AEROFLEX	100KHz-40GHz	097	ZH-E063	Oct. 20, 2025	Oct. 19, 2026
9	Spectrum Analyzer	R&S	FSV40	101413	ZH-E064	Apr. 24, 2026	Apr. 23, 2027
10	Spectrum Analyzer	KEYSIGHT	N9020A	MY53420208	ZH-E032	Apr. 24, 2026	Apr. 23, 2027
11	WIDBAND RADIO COMMUNICATION TESTER	R&S	CMW500	109863	ZH-E033	Apr. 24, 2026	Apr. 23, 2027
12	Single Generator	Agilent	N5182A	MY48180575	ZH-E034	Apr. 24, 2026	Apr. 23, 2027
13	Power Sensor	MWRFTest	MW100-RFCB	/	ZH-E066	Apr. 24, 2026	Apr. 23, 2027
14	CABLE	EMToni	DA800-NM-NM-11000MM	/	ZH-E018	Apr. 24, 2026	Apr. 23, 2027



ZHONGHAN

Conduction Test equipment

Project No.: ZHT-260824125W01-2

Page 9 of 90

Item	Equipment	Manufacturer	Model	Serial No.	Equipment No.	Last Cal.	Next Cal.
1	Receiver	R&S	ESCI	100874	ZH-E005	Apr. 24, 2026	Apr. 23, 2027
2	LISN	R&S	ENV216	102794	ZH-E006	Jul. 8, 2026	Jul. 7, 2027
3	ISN CAT 6	Schwarzbeck	NTFM 8158	00318	ZH-E012	Apr. 24, 2026	Apr. 23, 2027
4	ISN CAT 5	Schwarzbeck	CAT5 8158	00343	ZH-E013	Apr. 24, 2026	Apr. 23, 2027
5	Capacitive Voltage Probe	Schwarzbeck	CVP 9222C	00101	ZH-E014	May 8, 2026	May 7, 2027
6	Current Transformer Clamp	Schwarzbeck	SW 9605	SW9605 #209	ZH-E015	May 8, 2026	May 7, 2027
7	CABLE	EMToni	RG223-NM-BNCM-2000MM	/	ZH-E007	Apr. 24, 2026	Apr. 23, 2027

Conducted Test equipment

Item	Equipment	Manufacturer	Model	Serial No.	Equipment No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	KEYSIGHT	N9020A	MY53420208	ZH-E032	Apr. 24, 2026	Apr. 23, 2027
2	Power Sensor	MWRFTest	MW100-RFCB	/	ZH-E066	Apr. 24, 2026	Apr. 23, 2027



Project	Software name	Edition
RF Conducted	MTS 8310	4.0.0.0
Conducted Emission	EZ-EMC	EMC-CON 3A1.1+
Radiated Emission	EZ-EMC	FA-03A2 RE+

3.4 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded 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	Conducted Emission Test	0.92dB
2	RF conducted power	0.16dB
3	Conducted spurious emissions	0.21dB
4	All radiated emissions (9k-30MHz)	1.68dB
5	All radiated emissions (30-1GHz)	5.1dB
6	All radiated emissions (1-6GHz)	3.9dB
7	All radiated emissions (6GHz-18GHz)	4.3dB
8	All radiated emissions (18-40GHz)	4.65dB
9	Temperature	0.5°C
10	Humidity	2%
11	Occupied Bandwidth	4.96%
12	Power Spectral Density	0.71dB

Decision Rule

- ☒ Uncertainty is not included
☐ Uncertainty is included



4. EMC EMISSION TEST

4.1 Conducted emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C 63.10a-2024
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

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

Note:

(1) *Decreases with the logarithm of the frequency.

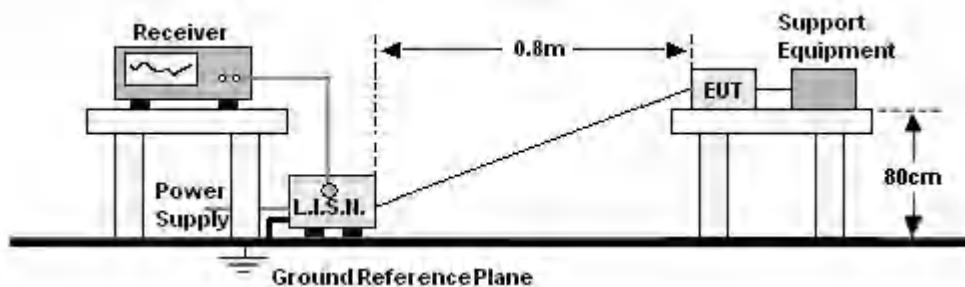
4.1.2 TEST PROCEDURE

- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



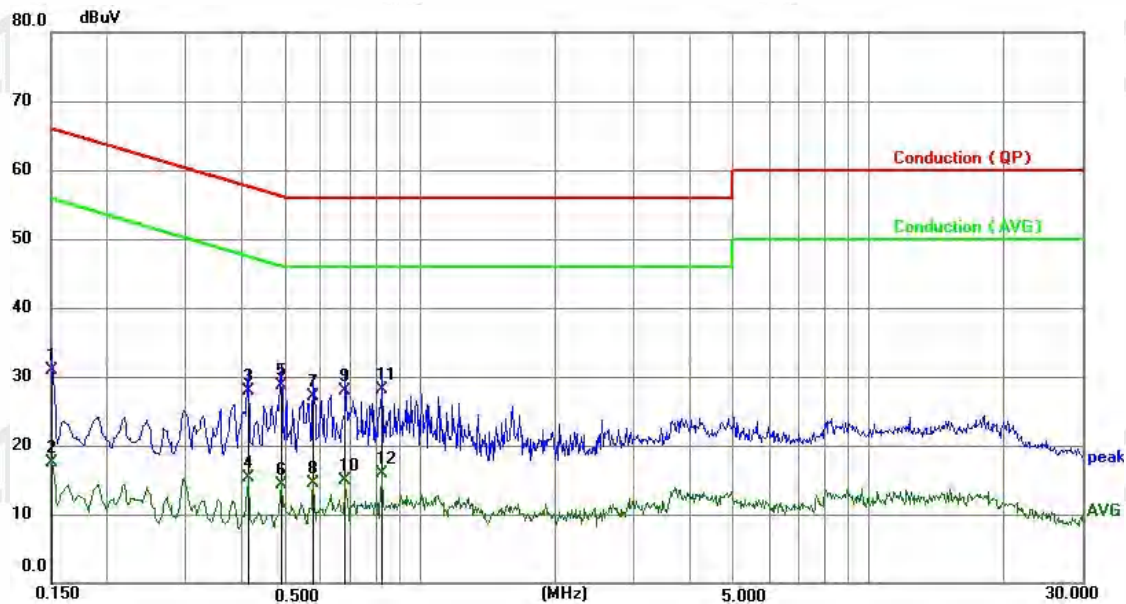
4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



4.1.6 Test result

Temperature:	24.3℃	Relative Humidity :	50%
Pressure:	101kPa	Phase :	L
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	20.95	9.89	30.84	66.00	-35.16	QP
2	0.1500	7.59	9.89	17.48	56.00	-38.52	AVG
3	0.4126	17.84	9.99	27.83	57.60	-29.77	QP
4	0.4126	5.27	9.99	15.26	47.60	-32.34	AVG
5 *	0.4890	18.79	10.01	28.80	56.18	-27.38	QP
6	0.4890	4.28	10.01	14.29	46.18	-31.89	AVG
7	0.5760	17.03	10.03	27.06	56.00	-28.94	QP
8	0.5760	4.39	10.03	14.42	46.00	-31.58	AVG
9	0.6790	17.86	10.03	27.89	56.00	-28.11	QP
10	0.6790	4.89	10.03	14.92	46.00	-31.08	AVG
11	0.8216	17.99	10.05	28.04	56.00	-27.96	QP
12	0.8216	5.84	10.05	15.89	46.00	-30.11	AVG

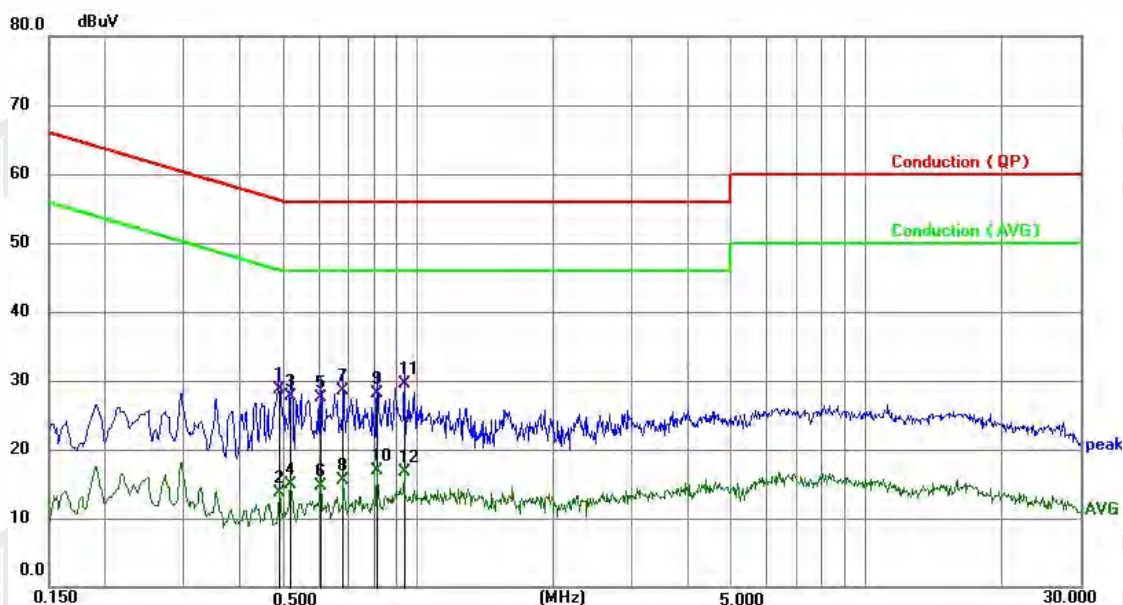
Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor
4. The test data shows only the worst case 8DPSK mode (Low Channel: 2402MHz).



ZHONGHAN

Temperature:	24.3℃	Relative Humidity :	50%
Pressure:	101kPa	Phase :	N
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.4873	18.66	10.01	28.67	56.21	-27.54	QP
2	0.4873	3.63	10.01	13.64	46.21	-32.57	AVG
3	0.5190	17.76	10.02	27.78	56.00	-28.22	QP
4	0.5190	4.79	10.02	14.81	46.00	-31.19	AVG
5	0.6045	17.54	10.03	27.57	56.00	-28.43	QP
6	0.6045	4.69	10.03	14.72	46.00	-31.28	AVG
7	0.6809	18.44	10.03	28.47	56.00	-27.53	QP
8	0.6809	5.57	10.03	15.60	46.00	-30.40	AVG
9	0.8114	18.03	10.04	28.07	56.00	-27.93	QP
10	0.8114	6.77	10.04	16.81	46.00	-29.19	AVG
11 *	0.9330	19.41	10.05	29.46	56.00	-26.54	QP
12	0.9330	6.61	10.05	16.66	46.00	-29.34	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor
4. The test data shows only the worst case 8DPSK mode (Low Channel: 2402MHz).



4.2 Radiated emissions

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Average	1MHz	10Hz	Average

4.2.1 Radiated Emission Limits

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

FREQUENCY (MHz)	Limit (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).

4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

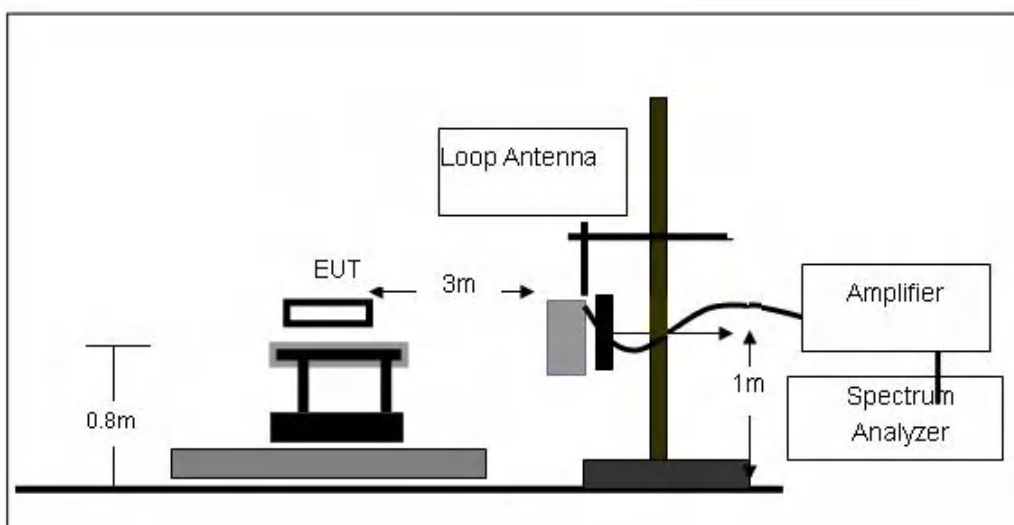
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

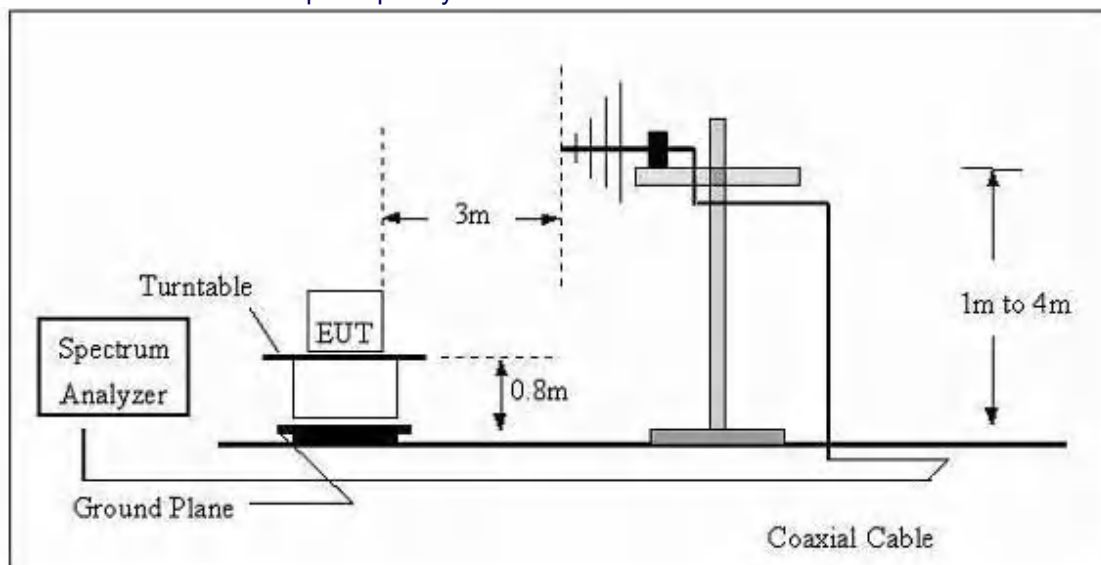
No deviation

4.2.4 TEST SETUP

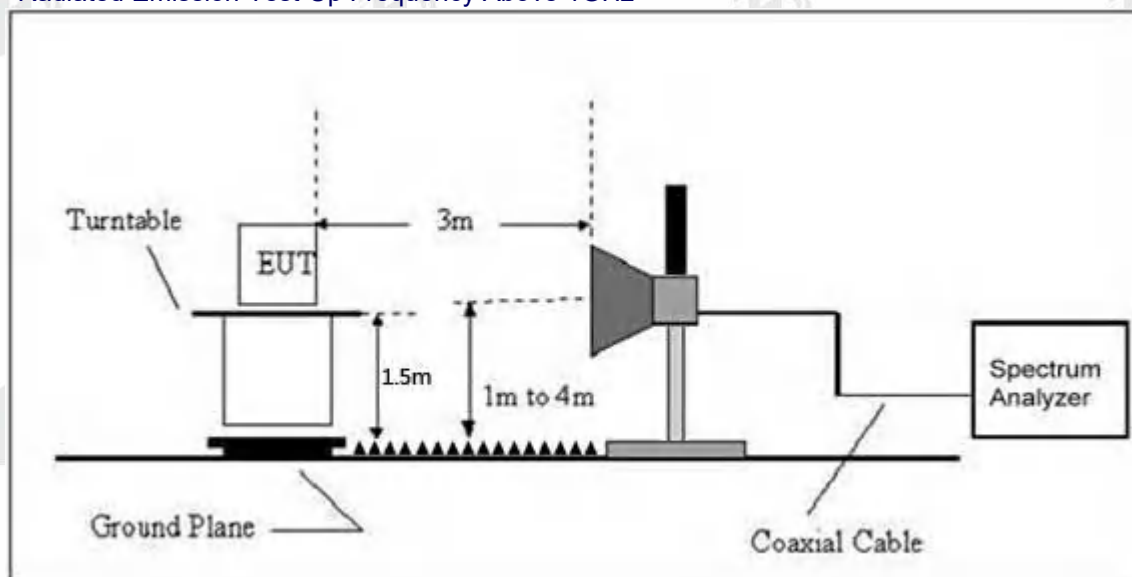
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.5 EUT OPERATING 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.



4.2.6 TEST RESULTS

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

Between 30MHz – 1GHz

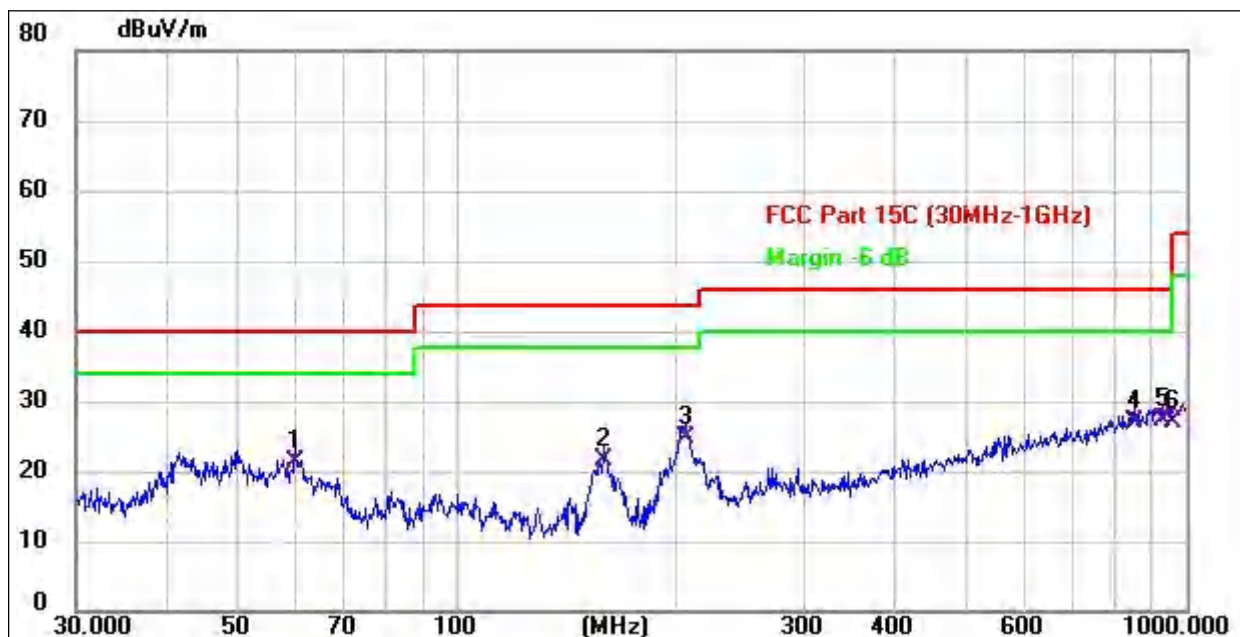
Temperature:	25.2℃	Relative Humidity:	50%
Pressure:	1010kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	104.5360	27.68	-10.73	16.95	43.50	-26.55	QP
2	191.0738	27.83	-11.12	16.71	43.50	-26.79	QP
3	205.6750	29.07	-10.15	18.92	43.50	-24.58	QP
4	271.3245	27.71	-8.36	19.35	46.00	-26.65	QP
5	397.6333	25.73	-5.64	20.09	46.00	-25.91	QP
6 *	675.2080	32.87	-0.58	32.29	46.00	-13.71	QP



Temperature:	25.2℃	Relative Humidity:	50%
Pressure:	1010kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	59.8588	30.76	-9.39	21.37	40.00	-18.63	QP
2	159.2250	34.47	-13.02	21.45	43.50	-22.05	QP
3	205.6750	34.82	-10.15	24.67	43.50	-18.83	QP
4	851.0353	24.98	2.11	27.09	46.00	-18.91	QP
5	929.0081	23.87	3.32	27.19	46.00	-18.81	QP
6	958.7943	23.53	3.60	27.13	46.00	-18.87	QP

Remarks:

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss
- 2.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3.The test data shows only the worst case 8DPSK mode(Low Channel:2402MHz).



GFSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-ampli fier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4804	55.32	30.55	5.77	24.66	55.2	74	-18.8	Pk
V	4804	41.9	30.55	5.77	24.66	41.78	54	-12.22	AV
V	7206	59.11	30.33	6.32	24.55	59.65	74	-14.35	Pk
V	7206	41.17	30.33	6.32	24.55	41.71	54	-12.29	AV
H	4804	58.34	30.55	5.77	24.66	58.22	74	-15.78	Pk
H	4804	43.32	30.55	5.77	24.66	43.2	54	-10.8	AV
H	7206	55.72	30.33	6.32	24.55	56.26	74	-17.74	Pk
H	7206	43.53	30.33	6.32	24.55	44.07	54	-9.93	AV
Middle Channel:2441MHz									
V	4882	59.7	30.55	5.77	24.66	59.58	74	-14.42	Pk
V	4882	41.47	30.55	5.77	24.66	41.35	54	-12.65	AV
V	7323	58.38	30.33	6.32	24.55	58.92	74	-15.08	Pk
V	7323	43.05	30.33	6.32	24.55	43.59	54	-10.41	AV
H	4882	58.48	30.55	5.77	24.66	58.36	74	-15.64	Pk
H	4882	41.33	30.55	5.77	24.66	41.21	54	-12.79	AV
H	7323	59.58	30.33	6.32	24.55	60.12	74	-13.88	Pk
H	7323	41.27	30.33	6.32	24.55	41.81	54	-12.19	AV
High Channel:2480MHz									
V	4960	58.32	30.55	5.77	24.66	58.2	74	-15.8	Pk
V	4960	41.82	30.55	5.77	24.66	41.7	54	-12.3	AV
V	7440	56.29	30.33	6.32	24.55	56.83	74	-17.17	Pk
V	7440	44.87	30.33	6.32	24.55	45.41	54	-8.59	AV
H	4960	55.01	30.55	5.77	24.66	54.89	74	-19.11	Pk
H	4960	41.83	30.55	5.77	24.66	41.71	54	-12.29	AV
H	7440	59.32	30.33	6.32	24.55	59.86	74	-14.14	Pk
H	7440	41.67	30.33	6.32	24.55	42.21	54	-11.79	AV



ZHONGHAN

 $\pi/4$ DQPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4804	58.09	30.55	5.77	24.66	57.97	74	-16.03	Pk
V	4804	44.99	30.55	5.77	24.66	44.87	54	-9.13	AV
V	7206	58.06	30.33	6.32	24.55	58.6	74	-15.4	Pk
V	7206	44.8	30.33	6.32	24.55	45.34	54	-8.66	AV
H	4804	56.58	30.55	5.77	24.66	56.46	74	-17.54	Pk
H	4804	42.7	30.55	5.77	24.66	42.58	54	-11.42	AV
H	7206	56.21	30.33	6.32	24.55	56.75	74	-17.25	Pk
H	7206	41.69	30.33	6.32	24.55	42.23	54	-11.77	AV
Middle Channel:2441MHz									
V	4882	56.47	30.55	5.77	24.66	56.35	74	-17.65	Pk
V	4882	41.18	30.55	5.77	24.66	41.06	54	-12.94	AV
V	7323	57.2	30.33	6.32	24.55	57.74	74	-16.26	Pk
V	7323	42.37	30.33	6.32	24.55	42.91	54	-11.09	AV
H	4882	59.93	30.55	5.77	24.66	59.81	74	-14.19	Pk
H	4882	41.26	30.55	5.77	24.66	41.14	54	-12.86	AV
H	7323	55.03	30.33	6.32	24.55	55.57	74	-18.43	Pk
H	7323	41.59	30.33	6.32	24.55	42.13	54	-11.87	AV
High Channel:2480MHz									
V	4960	59.5	30.55	5.77	24.66	59.38	74	-14.62	Pk
V	4960	41.78	30.55	5.77	24.66	41.66	54	-12.34	AV
V	7440	58.38	30.33	6.32	24.55	58.92	74	-15.08	Pk
V	7440	42.65	30.33	6.32	24.55	43.19	54	-10.81	AV
H	4960	58.96	30.55	5.77	24.66	58.84	74	-15.16	Pk
H	4960	41.71	30.55	5.77	24.66	41.59	54	-12.41	AV
H	7440	59.04	30.33	6.32	24.55	59.58	74	-14.42	Pk
H	7440	42.73	30.33	6.32	24.55	43.27	54	-10.73	AV



ZHONGHAN

8DPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4804	55.89	30.55	5.77	24.66	55.77	74	-18.23	Pk
V	4804	43.07	30.55	5.77	24.66	42.95	54	-11.05	AV
V	7206	55.16	30.33	6.32	24.55	55.7	74	-18.3	Pk
V	7206	43.54	30.33	6.32	24.55	44.08	54	-9.92	AV
H	4804	59.76	30.55	5.77	24.66	59.64	74	-14.36	Pk
H	4804	42.57	30.55	5.77	24.66	42.45	54	-11.55	AV
H	7206	58.34	30.33	6.32	24.55	58.88	74	-15.12	Pk
H	7206	42.28	30.33	6.32	24.55	42.82	54	-11.18	AV
Middle Channel:2441MHz									
V	4882	58.16	30.55	5.77	24.66	58.04	74	-15.96	Pk
V	4882	41.13	30.55	5.77	24.66	41.01	54	-12.99	AV
V	7323	57.04	30.33	6.32	24.55	57.58	74	-16.42	Pk
V	7323	42.08	30.33	6.32	24.55	42.62	54	-11.38	AV
H	4882	55.44	30.55	5.77	24.66	55.32	74	-18.68	Pk
H	4882	41.16	30.55	5.77	24.66	41.04	54	-12.96	AV
H	7323	59.1	30.33	6.32	24.55	59.64	74	-14.36	Pk
H	7323	41.73	30.33	6.32	24.55	42.27	54	-11.73	AV
High Channel:2480MHz									
V	4960	56.17	30.55	5.77	24.66	56.05	74	-17.95	Pk
V	4960	41.43	30.55	5.77	24.66	41.31	54	-12.69	AV
V	7440	55.83	30.33	6.32	24.55	56.37	74	-17.63	Pk
V	7440	41.74	30.33	6.32	24.55	42.28	54	-11.72	AV
H	4960	55.45	30.55	5.77	24.66	55.33	74	-18.67	Pk
H	4960	43.37	30.55	5.77	24.66	43.25	54	-10.75	AV
H	7440	56.46	30.33	6.32	24.55	57	74	-17	Pk
H	7440	41.55	30.33	6.32	24.55	42.09	54	-11.91	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit

2. If peak below the average limit, the average emission was no test.

3. The attenuation level of (18GHz - 25GHz) exceeds the permitted value by 20 decibels. no need to be reported



5. RADIATED BAND EMISSION MEASUREMENT

5.1 Test Requirement:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024				
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Average	1MHz	3MHz	Average

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (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).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

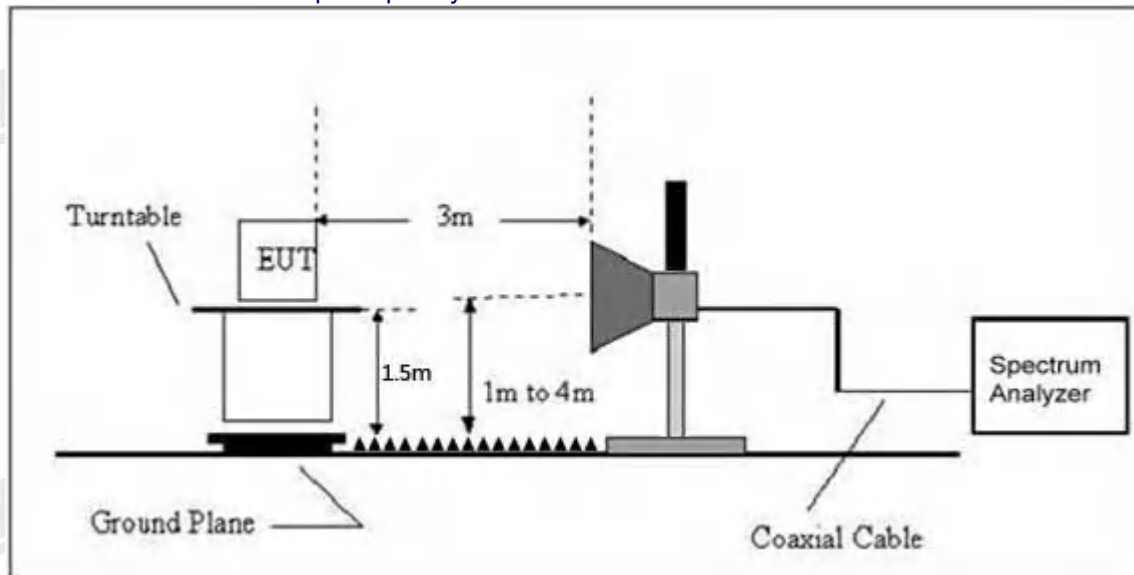
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



ZHONGHAN
5.6 TEST RESULT

Project No.: ZHT-260824125W01-2
Page 25 of 90

	Polar (H/V)	Frequenc y (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV /m)	Margi n (dB)	Detec tor Type	Result
GFSK	Low Channel: 2402MHz										
	H	2390.00	59.77	30.22	4.85	23.98	58.38	74.00	-15.62	PK	PASS
	H	2390.00	47.25	30.22	4.85	23.98	45.86	54.00	-8.14	AV	PASS
	H	2400.00	60.19	30.22	4.85	23.98	58.80	74.00	-15.20	PK	PASS
	H	2400.00	46.14	30.22	4.85	23.98	44.75	54.00	-9.25	AV	PASS
	V	2390.00	59.74	30.22	4.85	23.98	58.35	74.00	-15.65	PK	PASS
	V	2390.00	47.84	30.22	4.85	23.98	46.45	54.00	-7.55	AV	PASS
	V	2400.00	59.67	30.22	4.85	23.98	58.28	74.00	-15.72	PK	PASS
	V	2400.00	46.68	30.22	4.85	23.98	45.29	54.00	-8.71	AV	PASS
	High Channel: 2480MHz										
	H	2483.50	60.94	30.22	4.85	23.98	59.55	74.00	-14.45	PK	PASS
	H	2483.50	47.25	30.22	4.85	23.98	45.86	54.00	-8.14	AV	PASS
	H	2500.00	61.48	30.22	4.85	23.98	60.09	74.00	-13.91	PK	PASS
	H	2500.00	46.78	30.22	4.85	23.98	45.39	54.00	-8.61	AV	PASS
	V	2483.50	59.53	30.22	4.85	23.98	58.14	74.00	-15.86	PK	PASS
	V	2483.50	48.89	30.22	4.85	23.98	47.50	54.00	-6.50	AV	PASS
	V	2500.00	59.30	30.22	4.85	23.98	57.91	74.00	-16.09	PK	PASS
	V	2500.00	47.40	30.22	4.85	23.98	46.01	54.00	-7.99	AV	PASS
π/4DQPSK	Low Channel: 2402MHz										
	H	2390.00	59.47	30.22	4.85	23.98	58.08	74.00	-15.92	PK	PASS
	H	2390.00	47.97	30.22	4.85	23.98	46.58	54.00	-7.42	AV	PASS
	H	2400.00	61.51	30.22	4.85	23.98	60.12	74.00	-13.88	PK	PASS
	H	2400.00	46.68	30.22	4.85	23.98	45.29	54.00	-8.71	AV	PASS
	V	2390.00	61.58	30.22	4.85	23.98	60.19	74.00	-13.81	PK	PASS
	V	2390.00	48.71	30.22	4.85	23.98	47.32	54.00	-6.68	AV	PASS
	V	2400.00	59.13	30.22	4.85	23.98	57.74	74.00	-16.26	PK	PASS
	V	2400.00	46.87	30.22	4.85	23.98	45.48	54.00	-8.52	AV	PASS
	High Channel: 2480MHz										
	H	2483.50	61.73	30.22	4.85	23.98	60.34	74.00	-13.66	PK	PASS
	H	2483.50	48.54	30.22	4.85	23.98	47.15	54.00	-6.85	AV	PASS
	H	2500.00	61.75	30.22	4.85	23.98	60.36	74.00	-13.64	PK	PASS
	H	2500.00	47.22	30.22	4.85	23.98	45.83	54.00	-8.17	AV	PASS
	V	2483.50	60.23	30.22	4.85	23.98	58.84	74.00	-15.16	PK	PASS
	V	2483.50	47.04	30.22	4.85	23.98	45.65	54.00	-8.35	AV	PASS
	V	2500.00	62.77	30.22	4.85	23.98	61.38	74.00	-12.62	PK	PASS
	V	2500.00	48.63	30.22	4.85	23.98	47.24	54.00	-6.76	AV	PASS



8DPSK	Low Channel: 2402MHz										
	H	2390.00	59.78	30.22	4.85	23.98	58.39	74.00	-15.61	PK	PASS
	H	2390.00	48.53	30.22	4.85	23.98	47.14	54.00	-6.86	AV	PASS
	H	2400.00	61.36	30.22	4.85	23.98	59.97	74.00	-14.03	PK	PASS
	H	2400.00	47.93	30.22	4.85	23.98	46.54	54.00	-7.46	AV	PASS
	V	2390.00	62.48	30.22	4.85	23.98	61.09	74.00	-12.91	PK	PASS
	V	2390.00	47.26	30.22	4.85	23.98	45.87	54.00	-8.13	AV	PASS
	V	2400.00	60.39	30.22	4.85	23.98	59.00	74.00	-15.00	PK	PASS
	V	2400.00	47.58	30.22	4.85	23.98	46.19	54.00	-7.81	AV	PASS
	High Channel: 2480MHz										
	H	2483.50	59.93	30.22	4.85	23.98	58.54	74.00	-15.46	PK	PASS
	H	2483.50	47.45	30.22	4.85	23.98	46.06	54.00	-7.94	AV	PASS
	H	2500.00	59.96	30.22	4.85	23.98	58.57	74.00	-15.43	PK	PASS
	H	2500.00	47.81	30.22	4.85	23.98	46.42	54.00	-7.58	AV	PASS
	V	2483.50	62.49	30.22	4.85	23.98	61.10	74.00	-12.90	PK	PASS
	V	2483.50	47.33	30.22	4.85	23.98	45.94	54.00	-8.06	AV	PASS
	V	2500.00	59.21	30.22	4.85	23.98	57.82	74.00	-16.18	PK	PASS
	V	2500.00	48.42	30.22	4.85	23.98	47.03	54.00	-6.97	AV	PASS
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit											



6. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024

6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

6.2 Test Setup



6.3 Test procedure

Using the following spectrum analyzer setting:

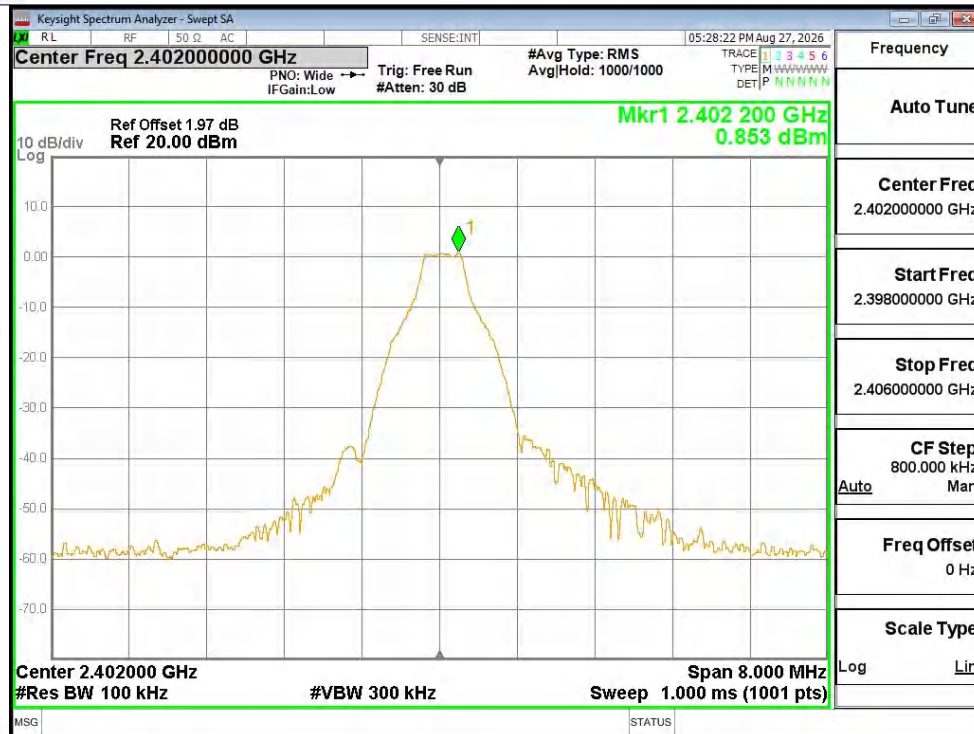
- A) Set the RBW = 100KHz.
- B) Set the VBW = 300KHz.
- C) Sweep time = auto couple.
- D) Detector function = peak.
- E) Trace mode = max hold.
- F) Allow trace to fully stabilize.

6.4 DEVIATION FROM STANDARD

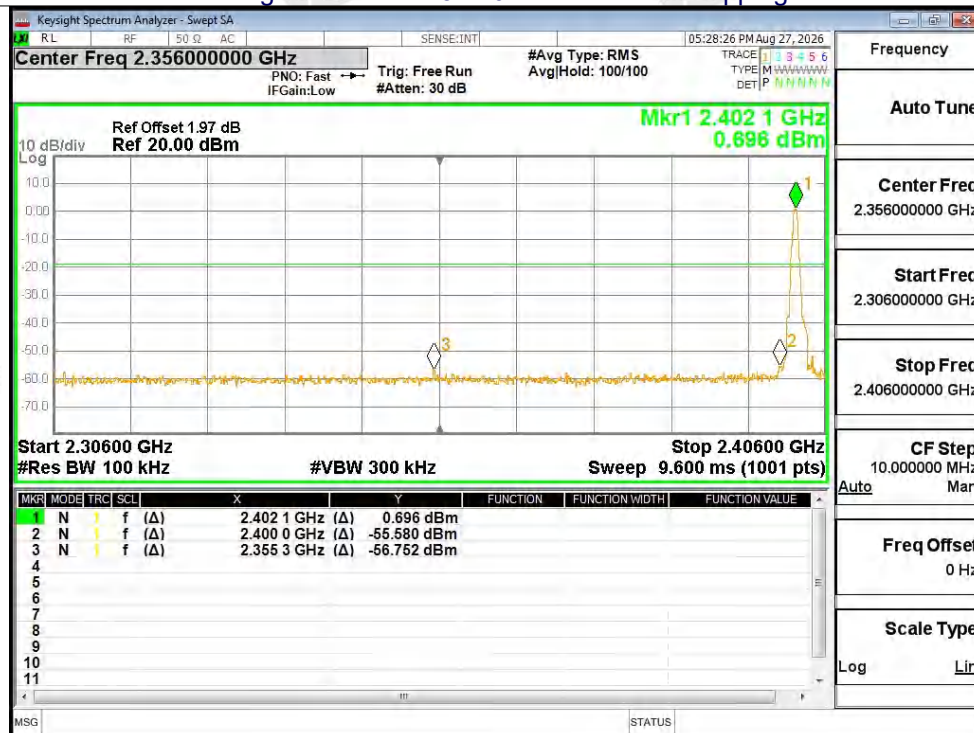
No deviation.

**Band Edge**

Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
1-DH5	2402	No-Hopping	-56.43	-20	Pass
1-DH5	2480	No-Hopping	-58.28	-20	Pass
2-DH5	2402	No-Hopping	-56.58	-20	Pass
2-DH5	2480	No-Hopping	-57.73	-20	Pass
3-DH5	2402	No-Hopping	-56.63	-20	Pass
3-DH5	2480	No-Hopping	-57.32	-20	Pass

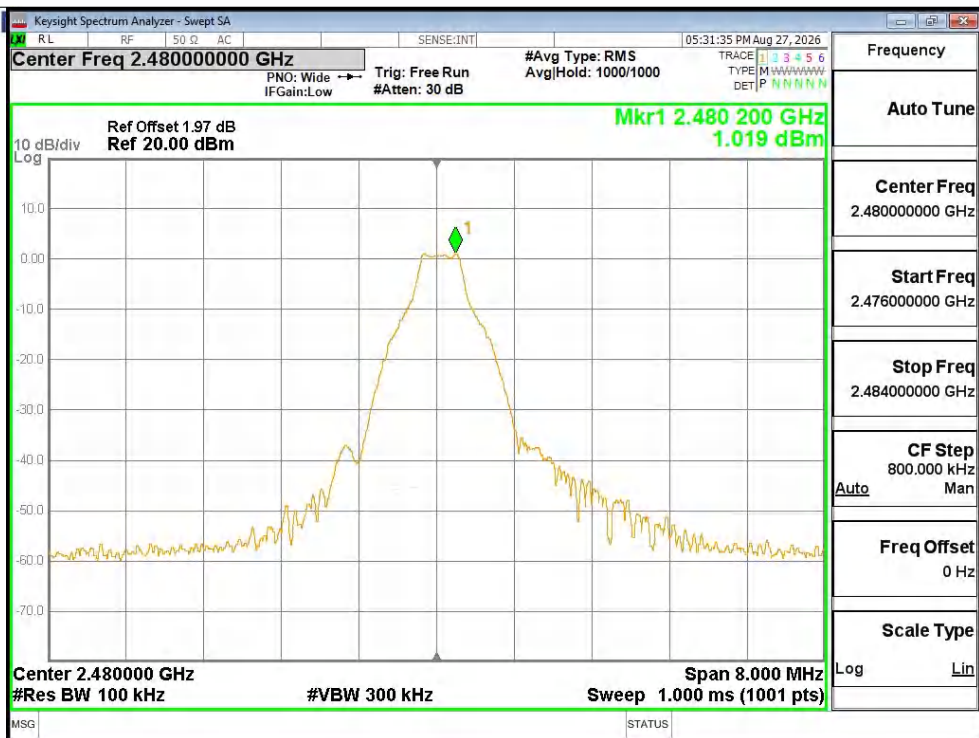


Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Ref

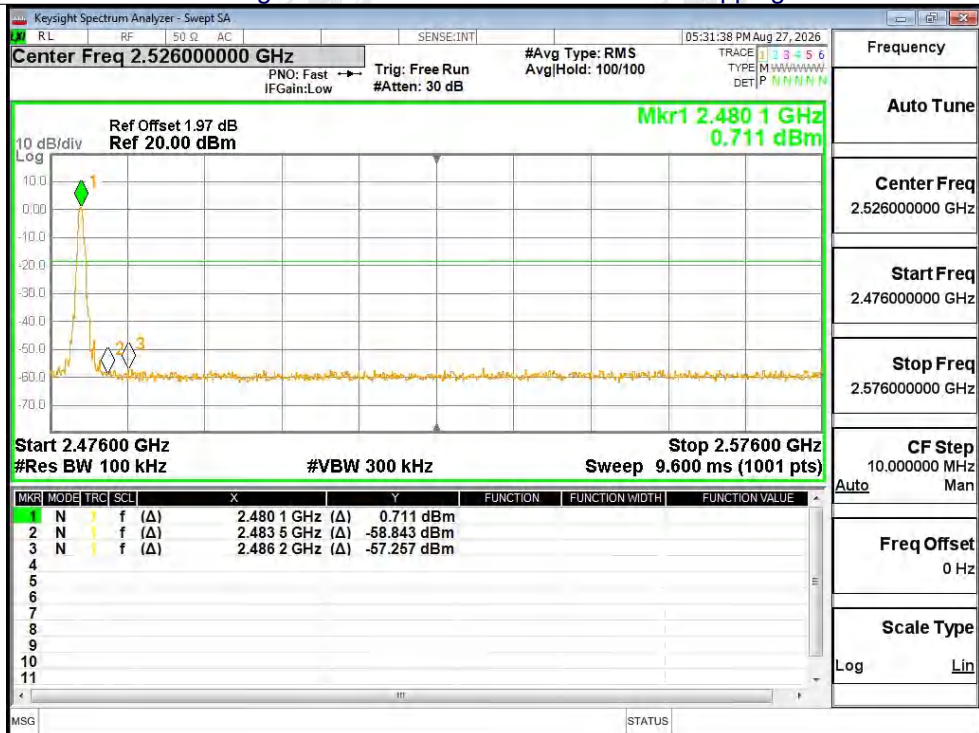


Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Emission

ZHONGHA

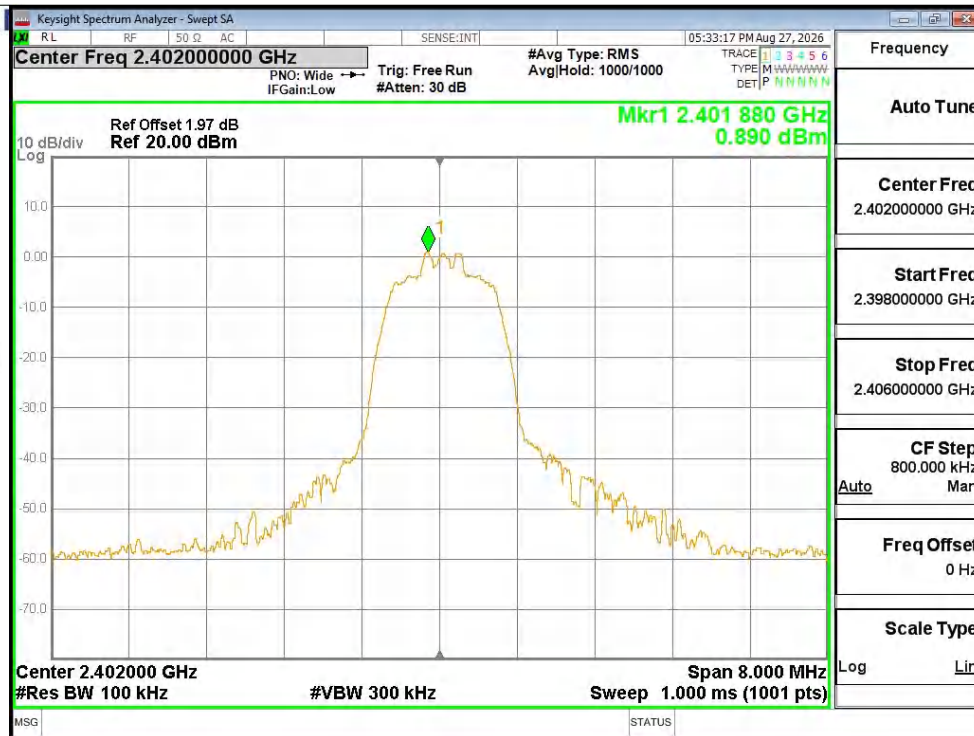


Band Edge NVNT 1-DH5 2480MHz Ant1 No-Hopping Ref

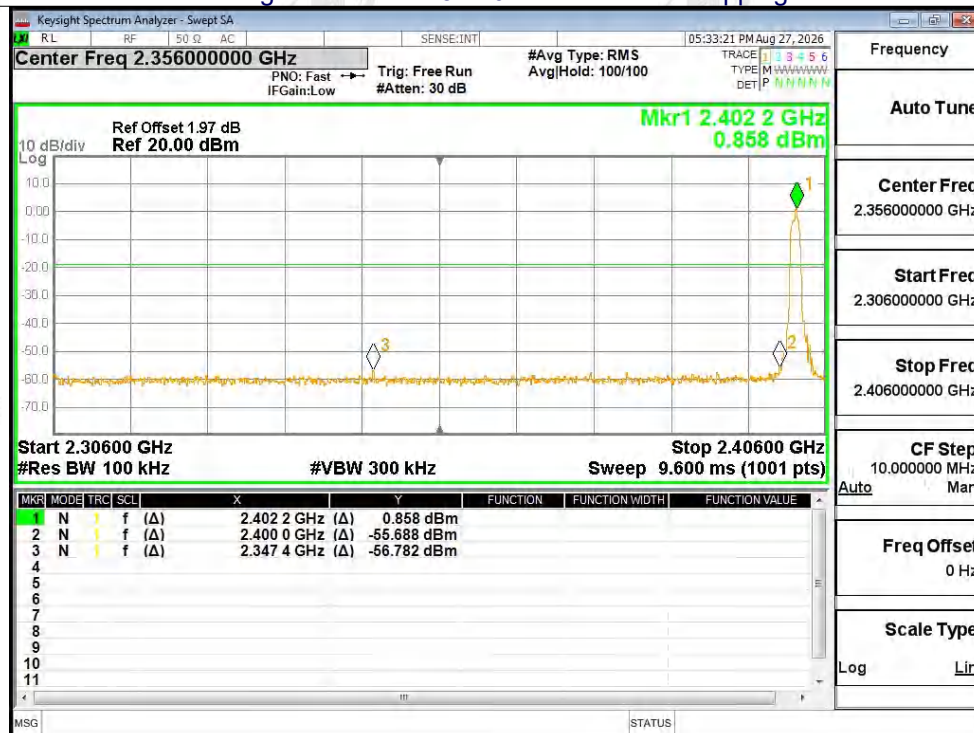


Band Edge NVNT 1-DH5 2480MHz Ant1 No-Hopping Emission

ZHONGHA

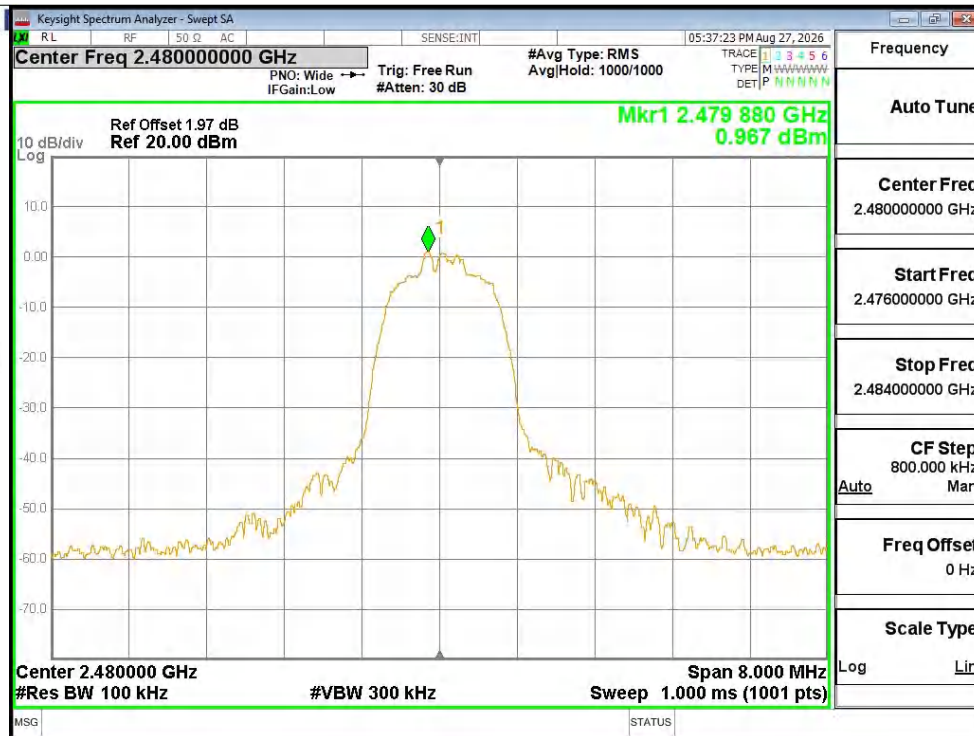


Band Edge NVNT 2-DH5 2402MHz Ant1 No-Hopping Ref

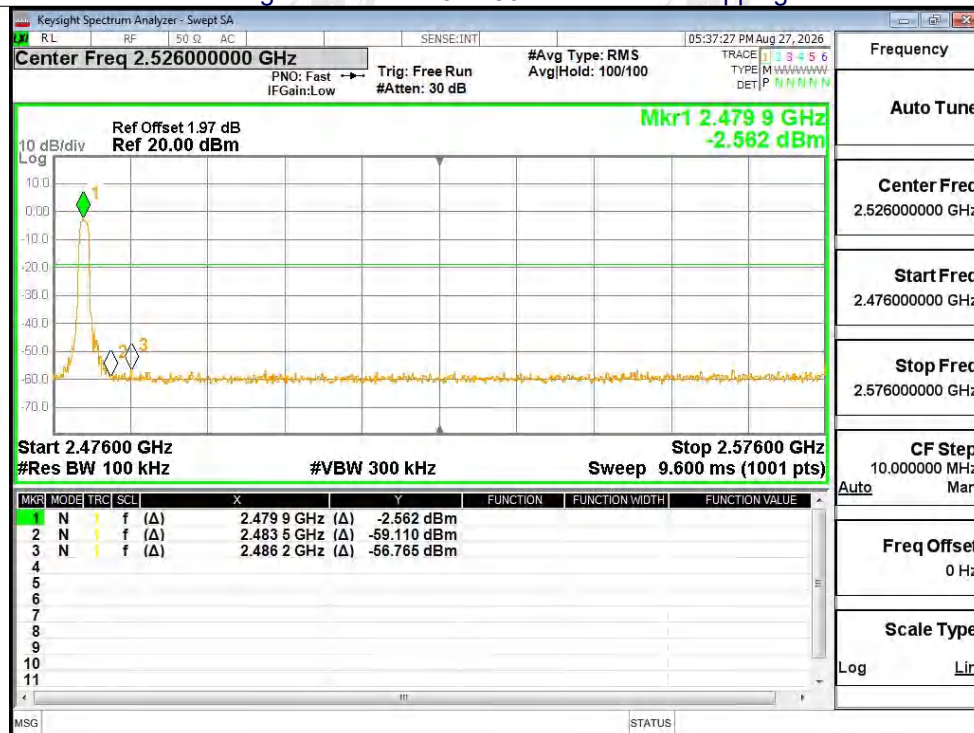


Band Edge NVNT 2-DH5 2402MHz Ant1 No-Hopping Emission

ZHONGHA

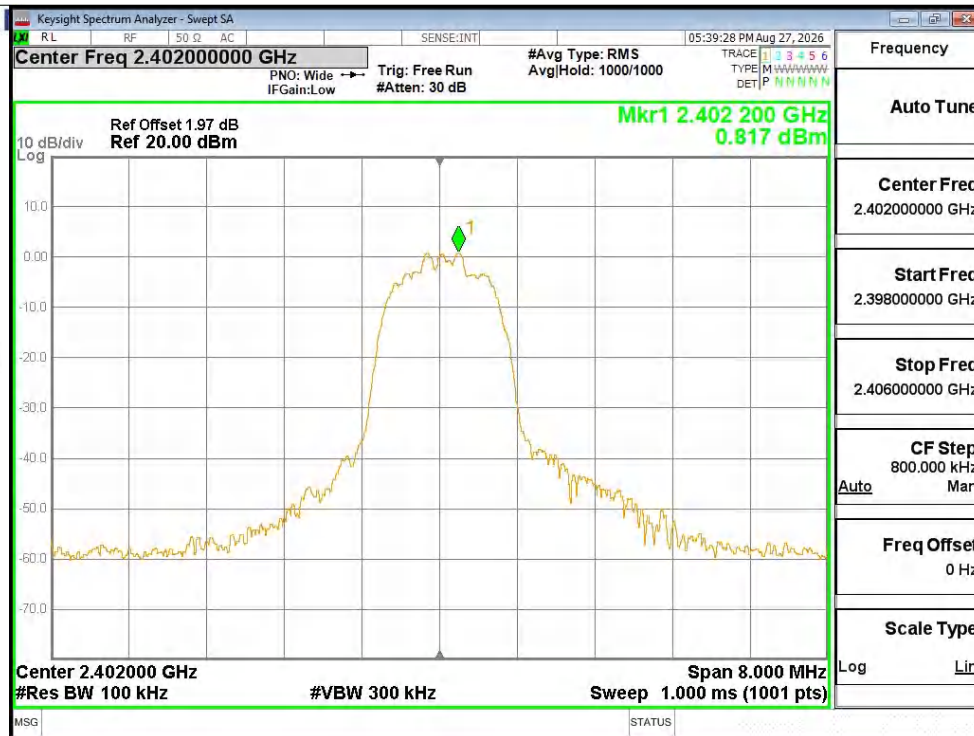


Band Edge NVNT 2-DH5 2480MHz Ant1 No-Hopping Ref

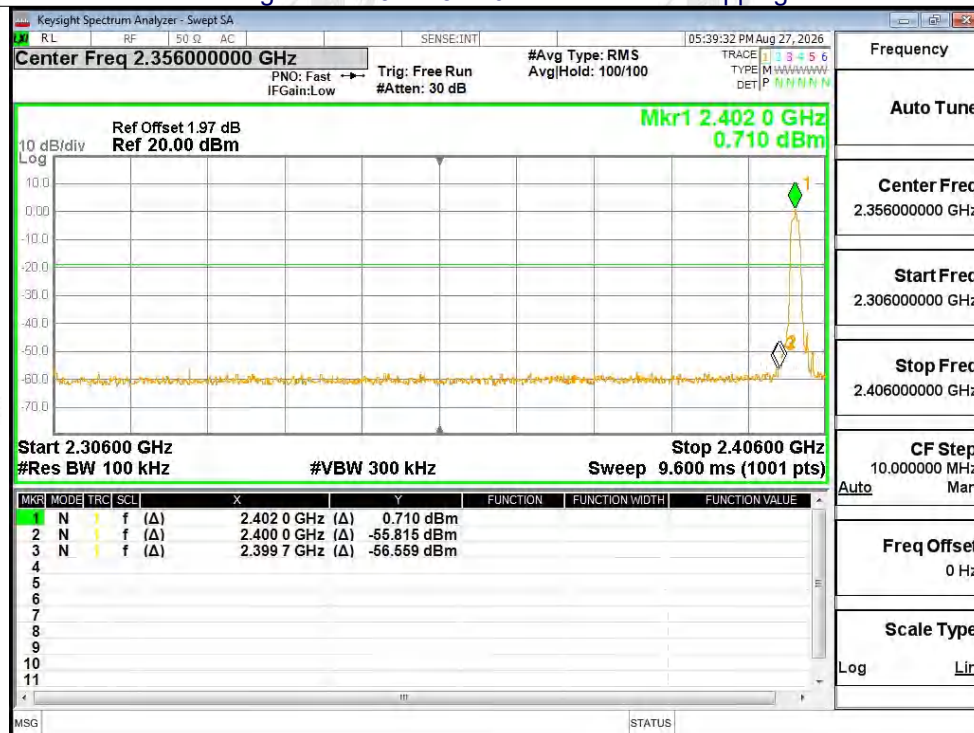


Band Edge NVNT 2-DH5 2480MHz Ant1 No-Hopping Emission

ZHONGHA

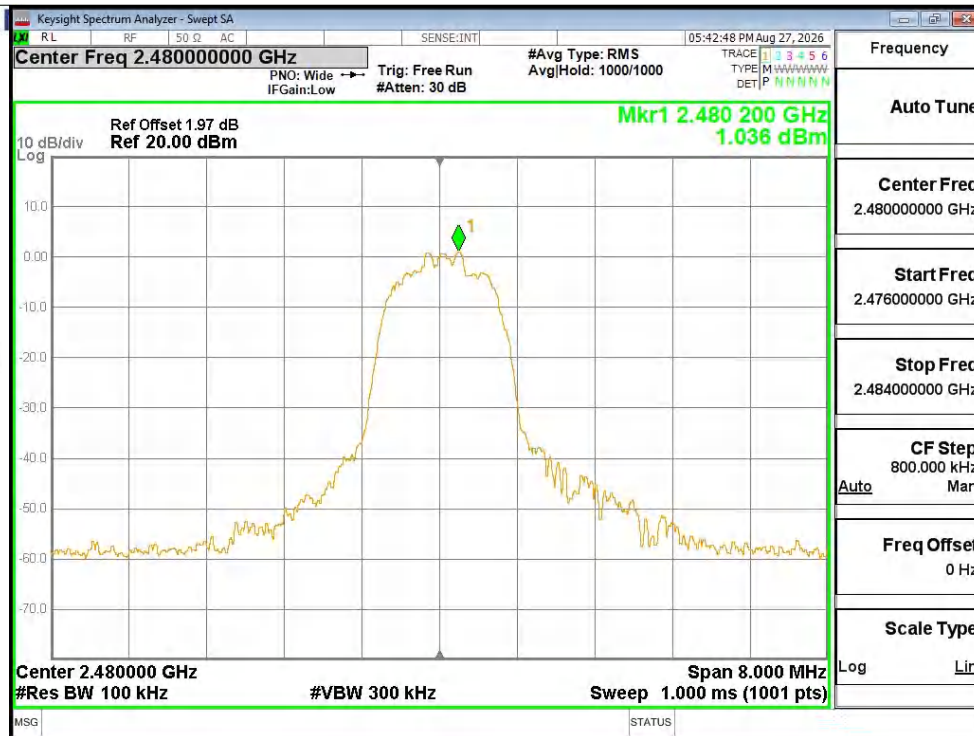


Band Edge NVNT 3-DH5 2402MHz Ant1 No-Hopping Ref

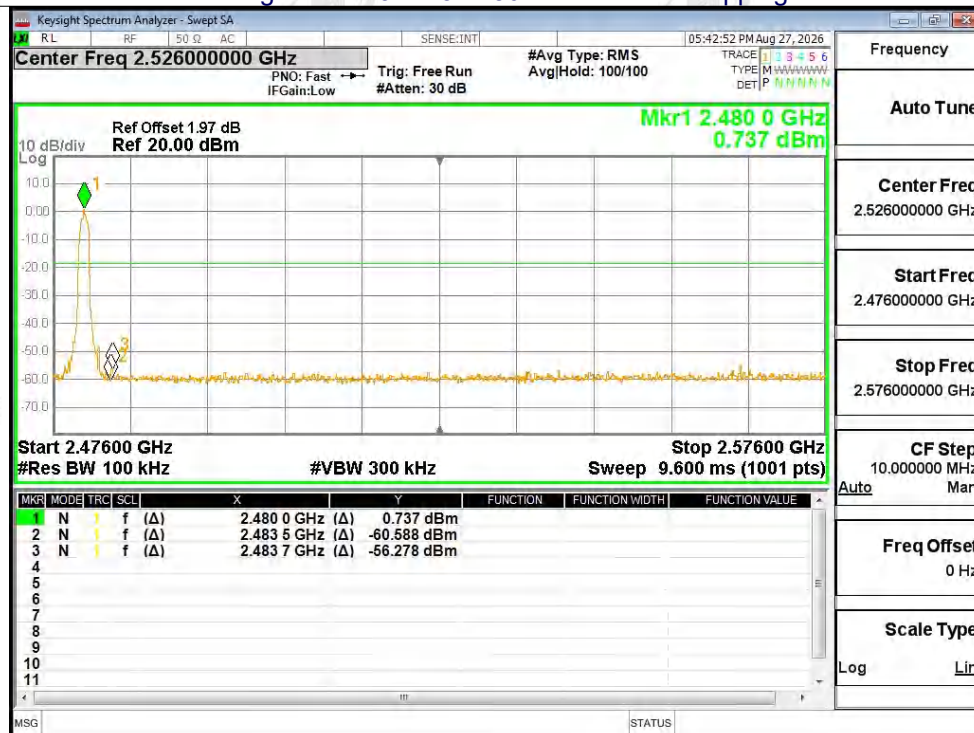


Band Edge NVNT 3-DH5 2402MHz Ant1 No-Hopping Emission

ZHONGHA



Band Edge NVNT 3-DH5 2480MHz Ant1 No-Hopping Ref



Band Edge NVNT 3-DH5 2480MHz Ant1 No-Hopping Emission



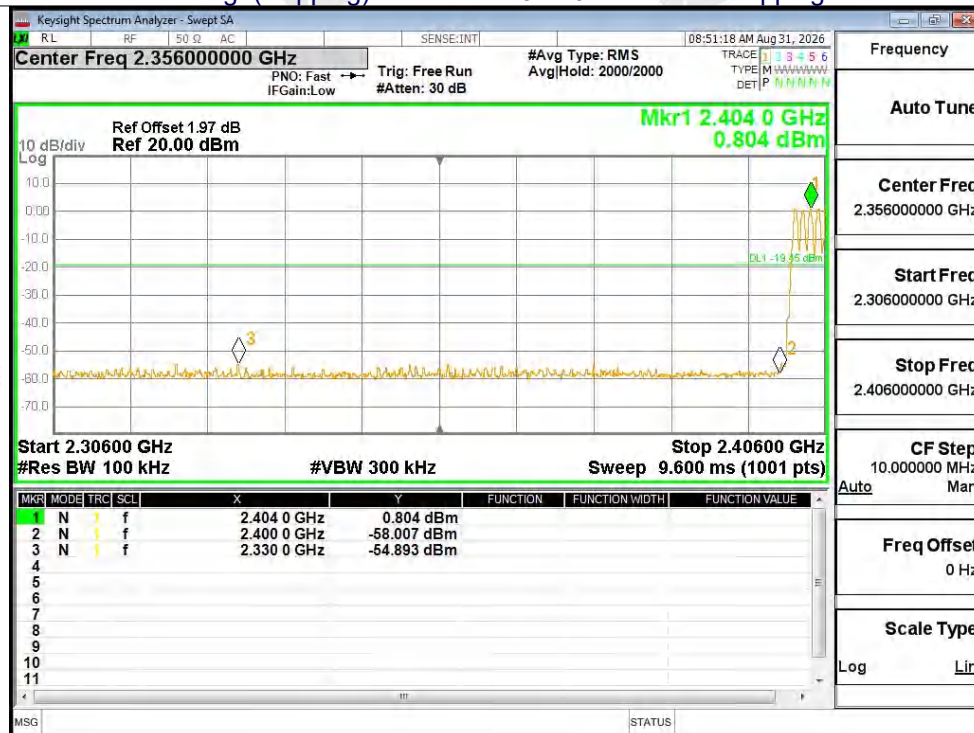
ZHONGHAN

Band Edge(Hopping)

Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
1-DH5	2402	Hopping	-55.44	-20	Pass
1-DH5	2480	Hopping	-56.97	-20	Pass
2-DH5	2402	Hopping	-55.18	-20	Pass
2-DH5	2480	Hopping	-56.33	-20	Pass
3-DH5	2402	Hopping	-56.39	-20	Pass
3-DH5	2480	Hopping	-57.1	-20	Pass

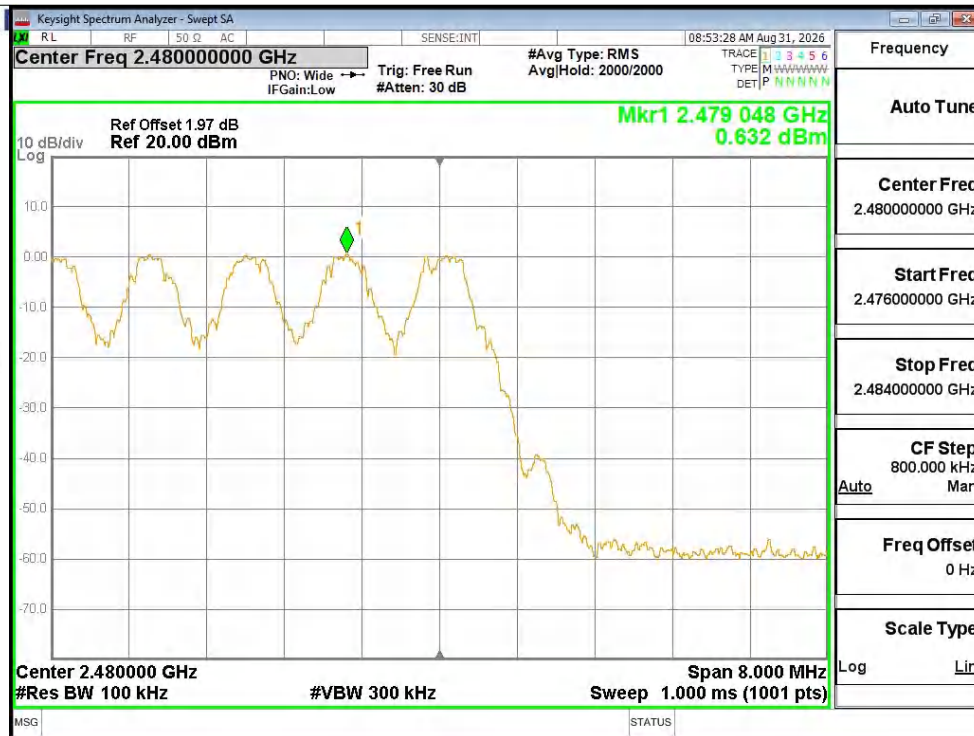


Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Ref

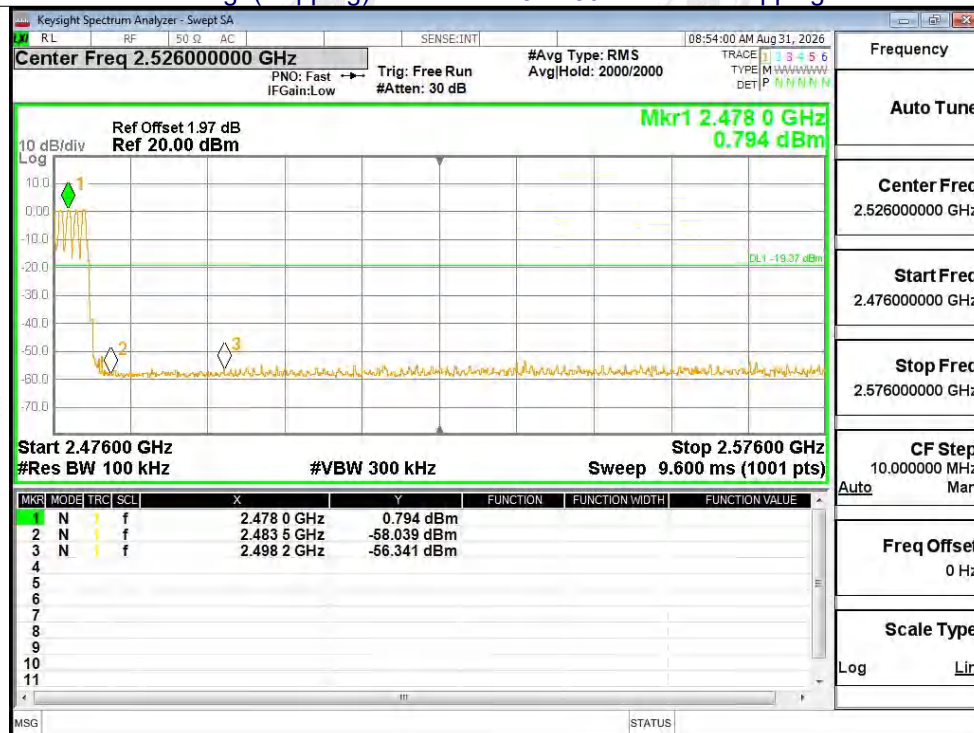


Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Emission

ZHONGHA

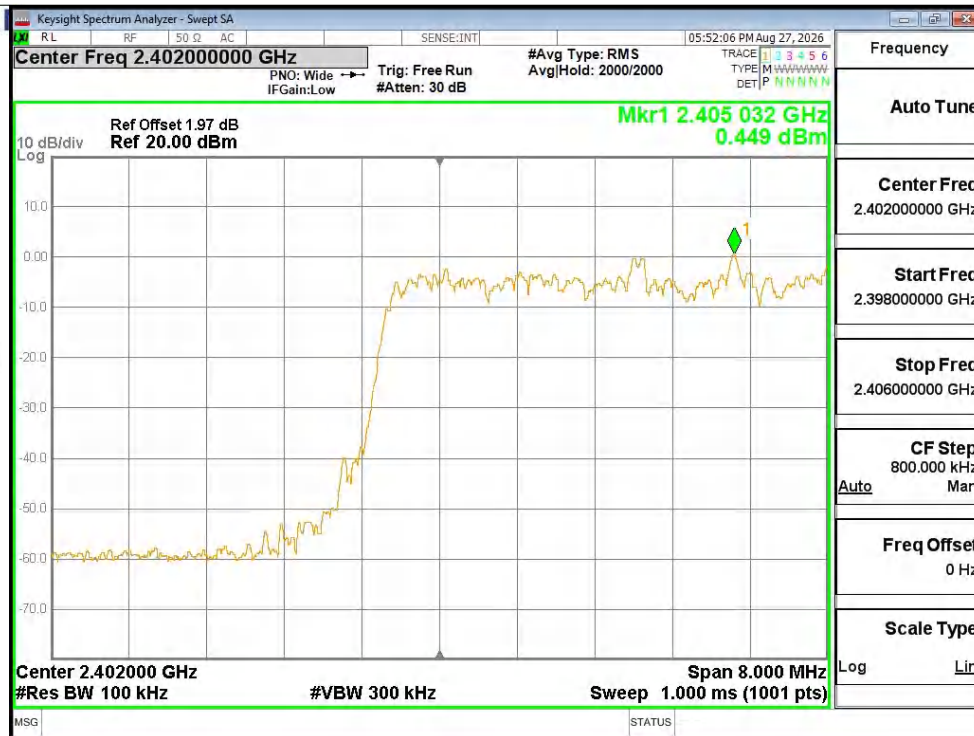


Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant1 Hopping Ref

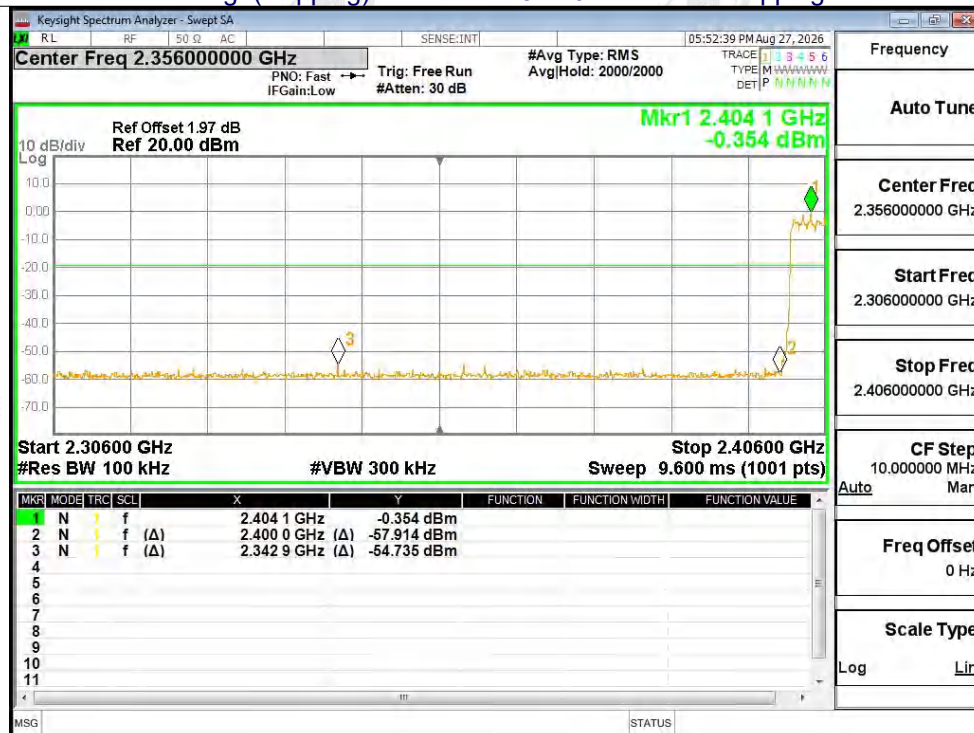


Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant1 Hopping Emission

ZHONGHA



Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Ref

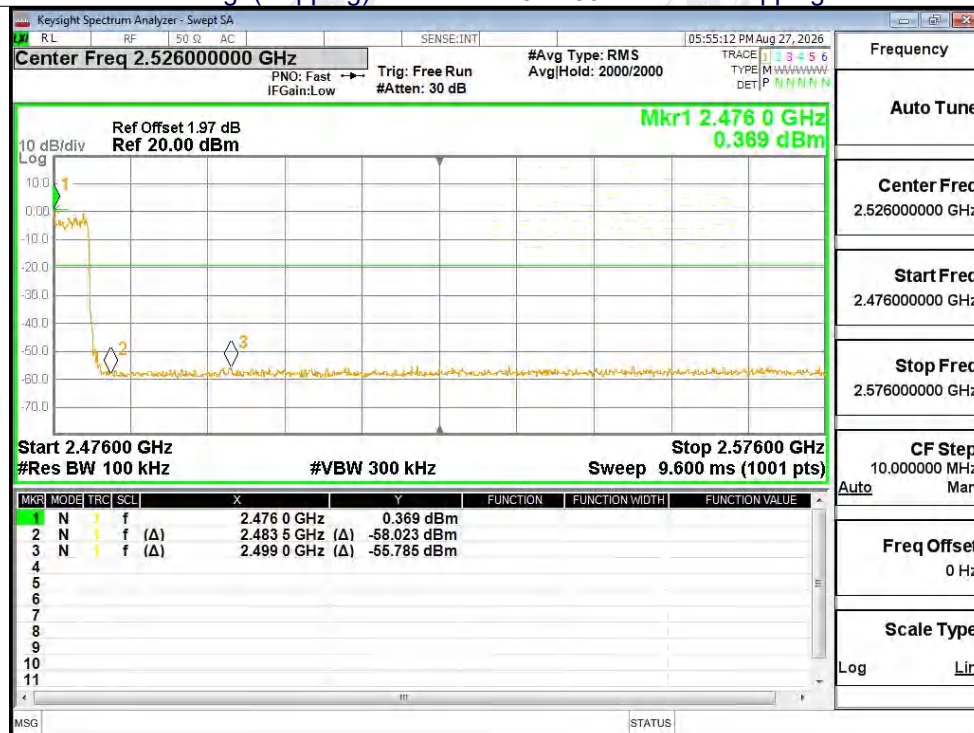


Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Emission

ZHONGHA

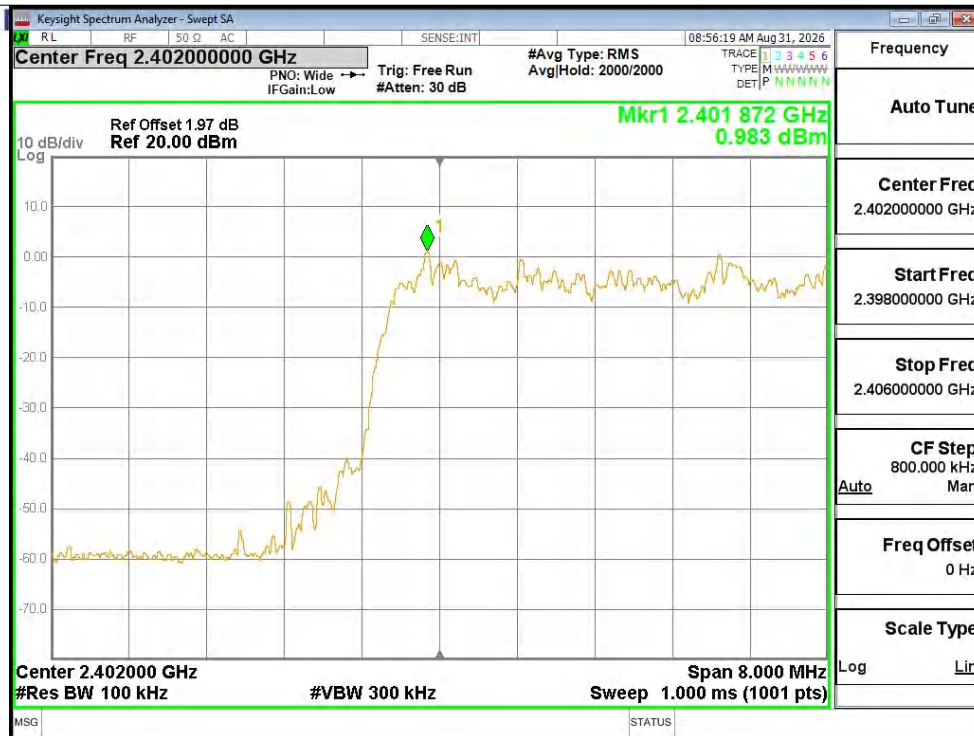


Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Ref

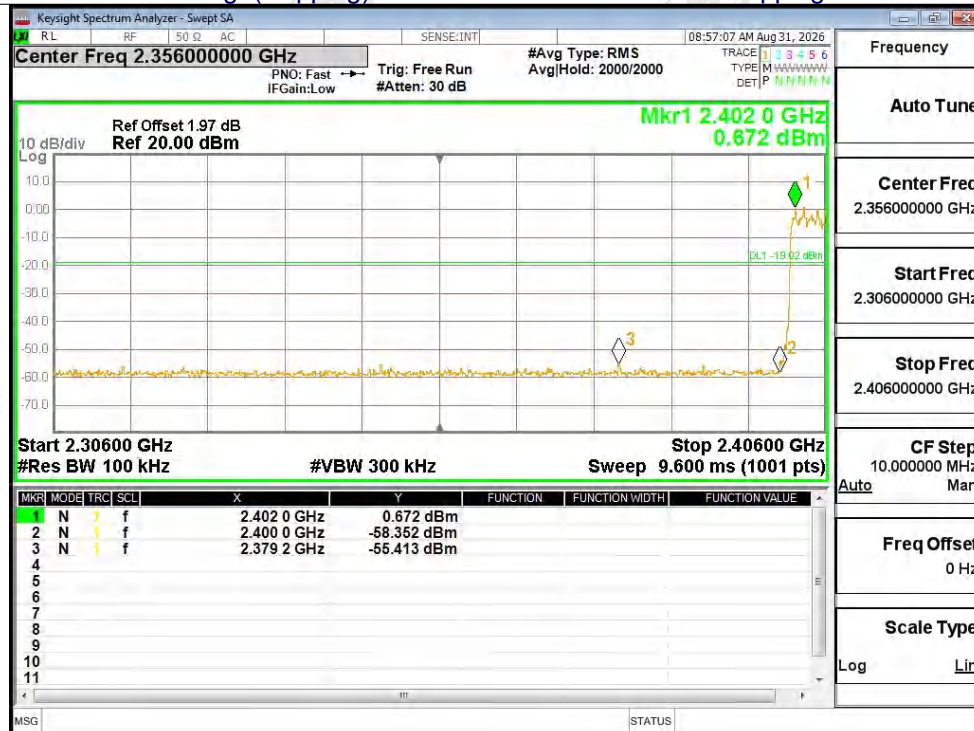


Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Emission

ZHONGHA



Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Ref

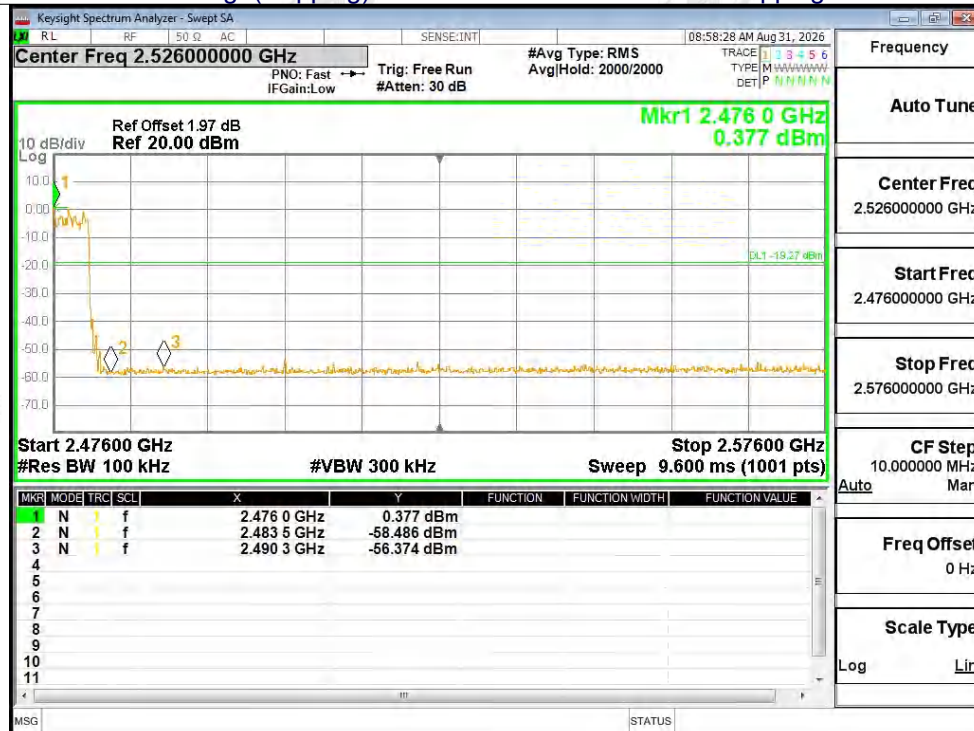


Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Emission

ZHONGHA



Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant1 Hopping Ref



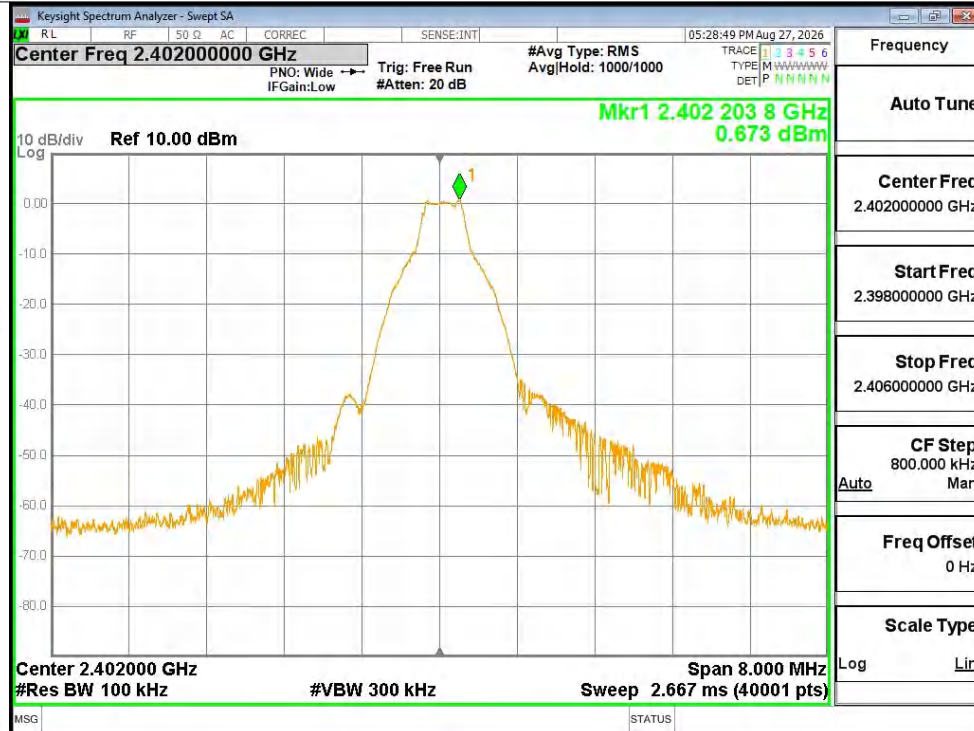
Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant1 Hopping Emission



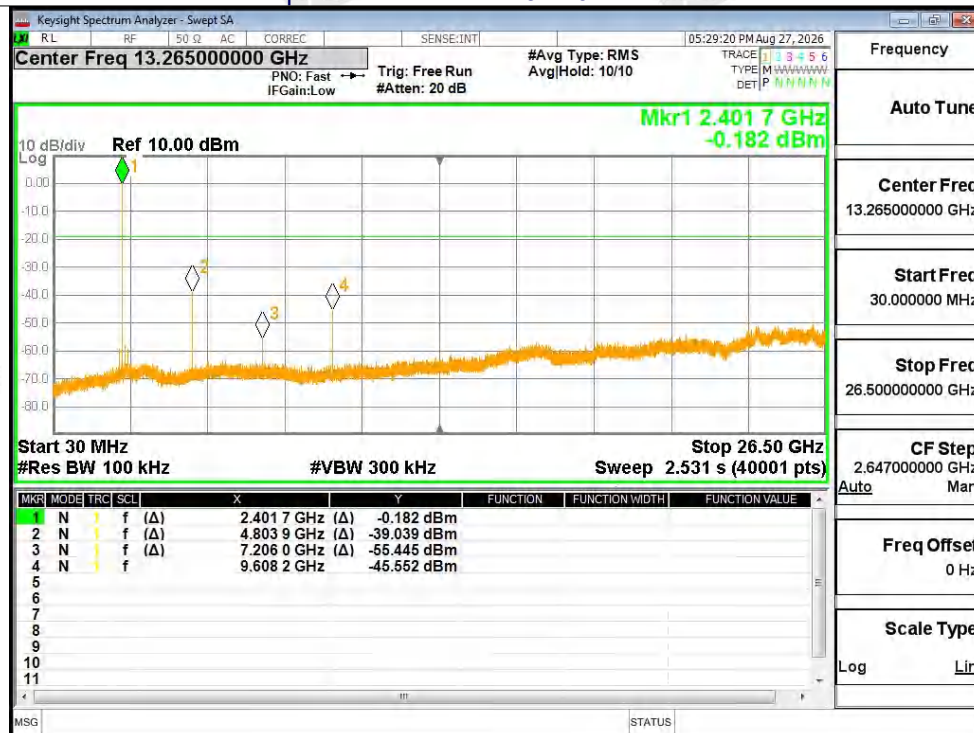
ZHONGHAN

Conducted RF Spurious Emission

Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
1-DH5	2402	-39.71	-20	Pass
1-DH5	2441	-42.33	-20	Pass
1-DH5	2480	-41.13	-20	Pass
2-DH5	2402	-44.15	-20	Pass
2-DH5	2441	-43.8	-20	Pass
2-DH5	2480	-44.03	-20	Pass
3-DH5	2402	-44.67	-20	Pass
3-DH5	2441	-45.21	-20	Pass
3-DH5	2480	-43.67	-20	Pass

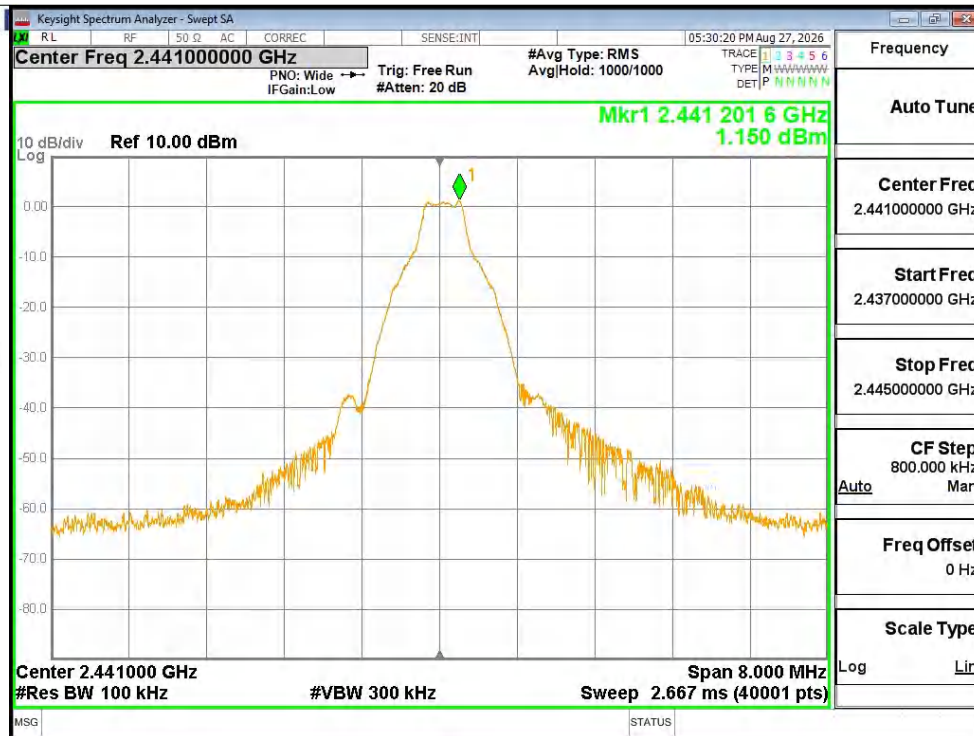


Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref

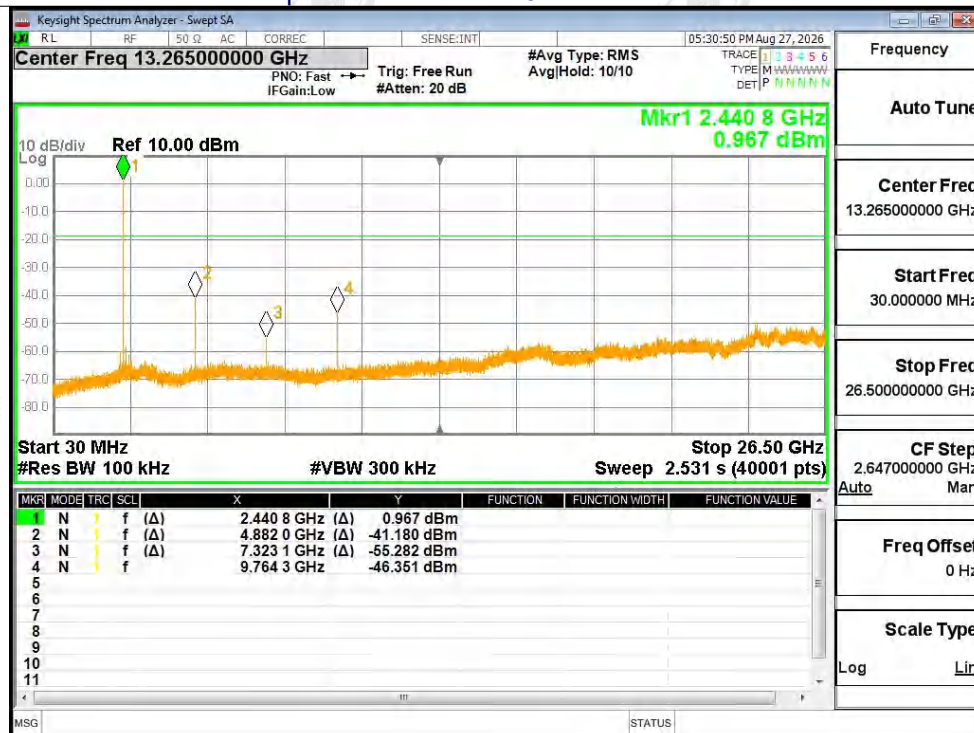


Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission

ZHONGHA

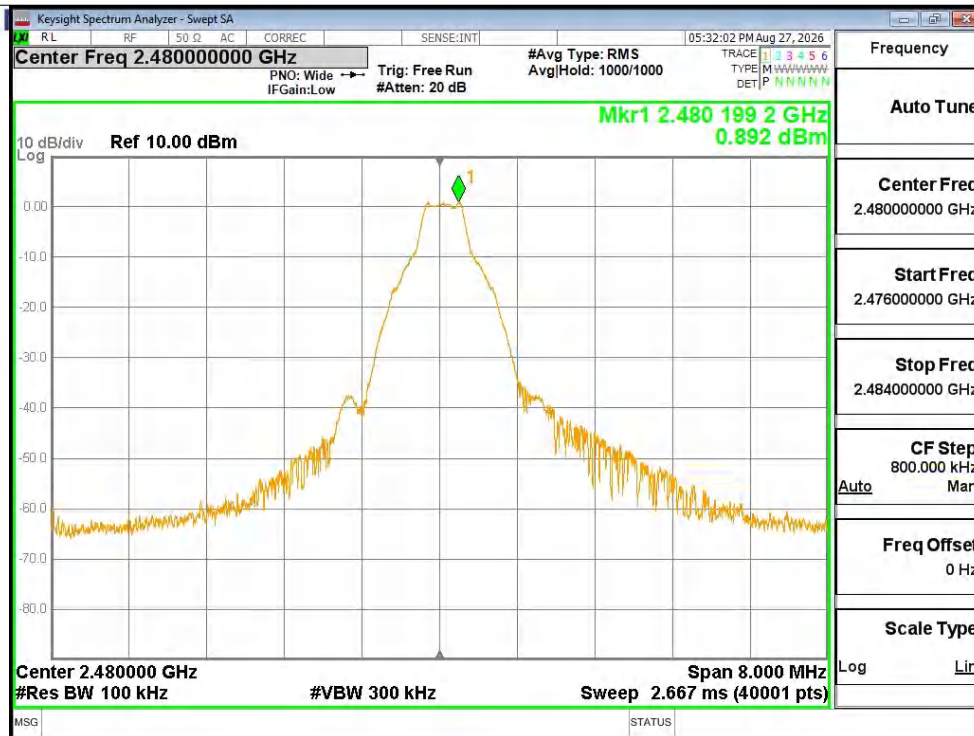


Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Ref

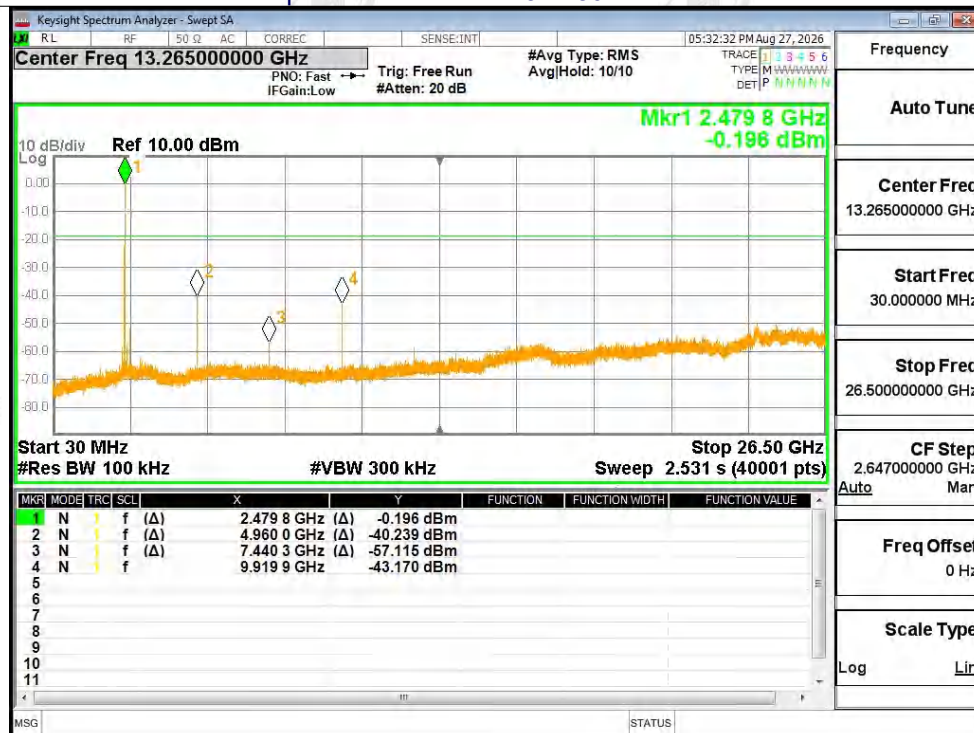


Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Emission

ZHONGHA

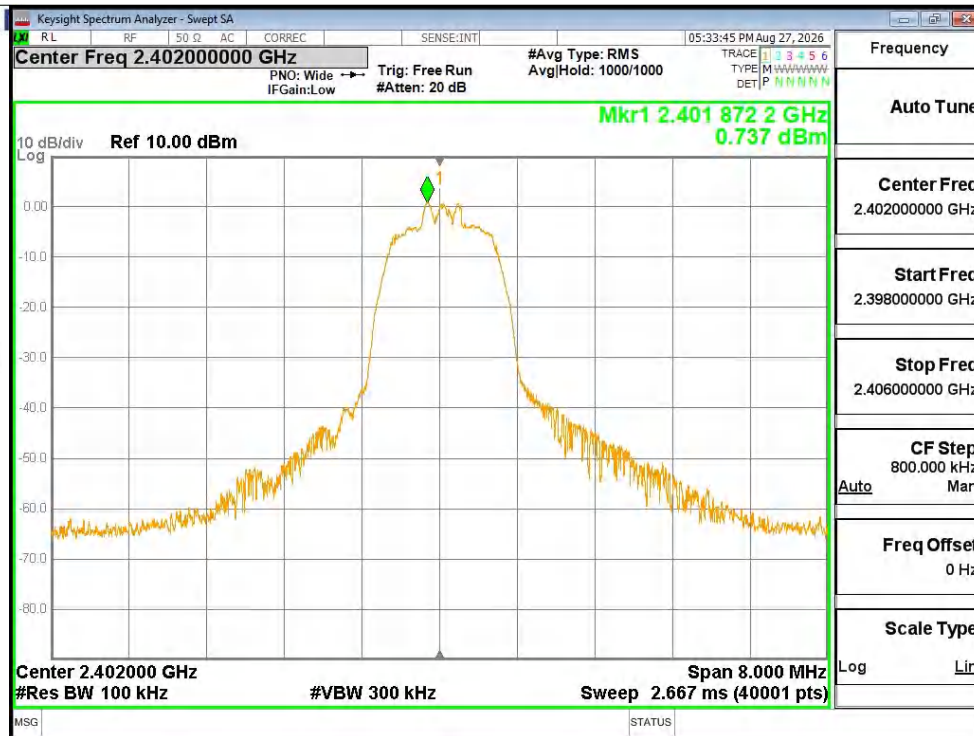


Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Ref

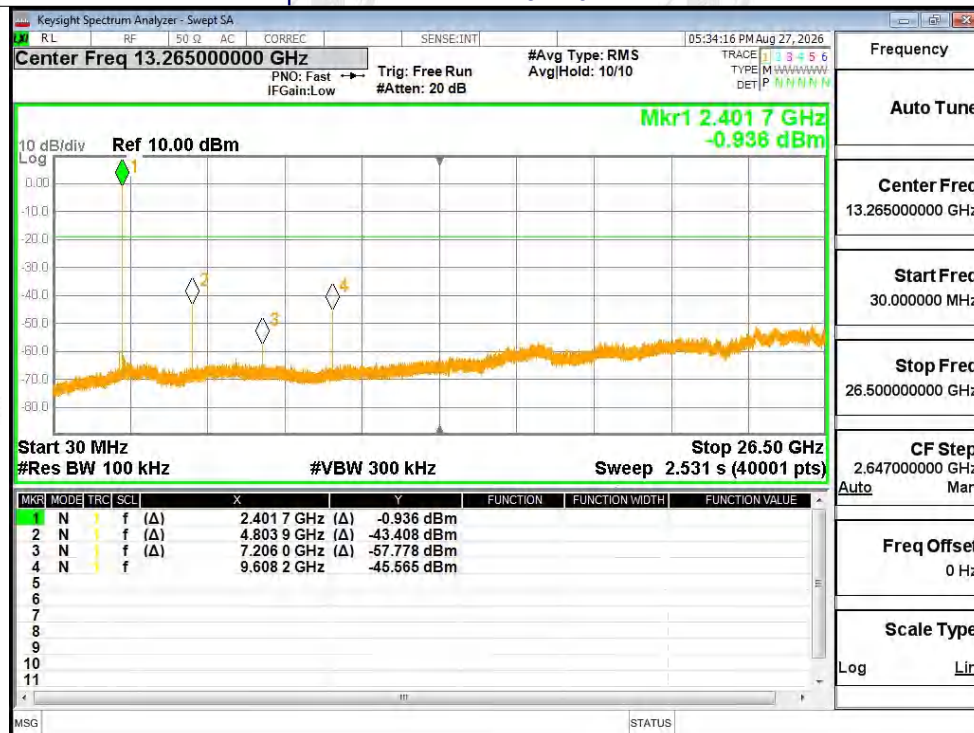


Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Emission

ZHONGHA

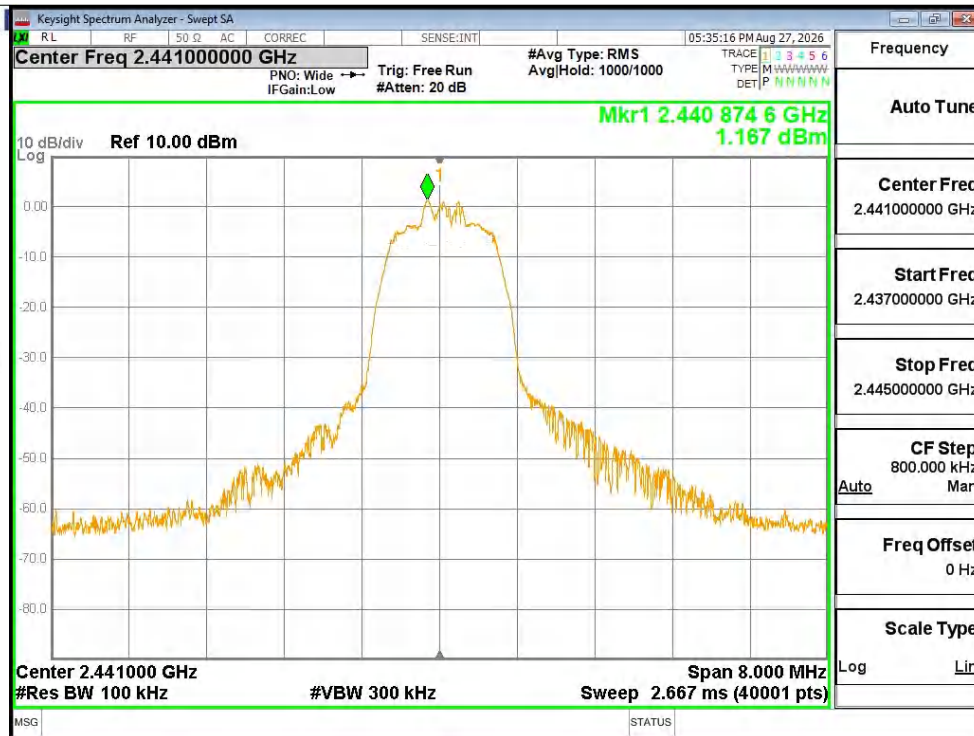


Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Ref

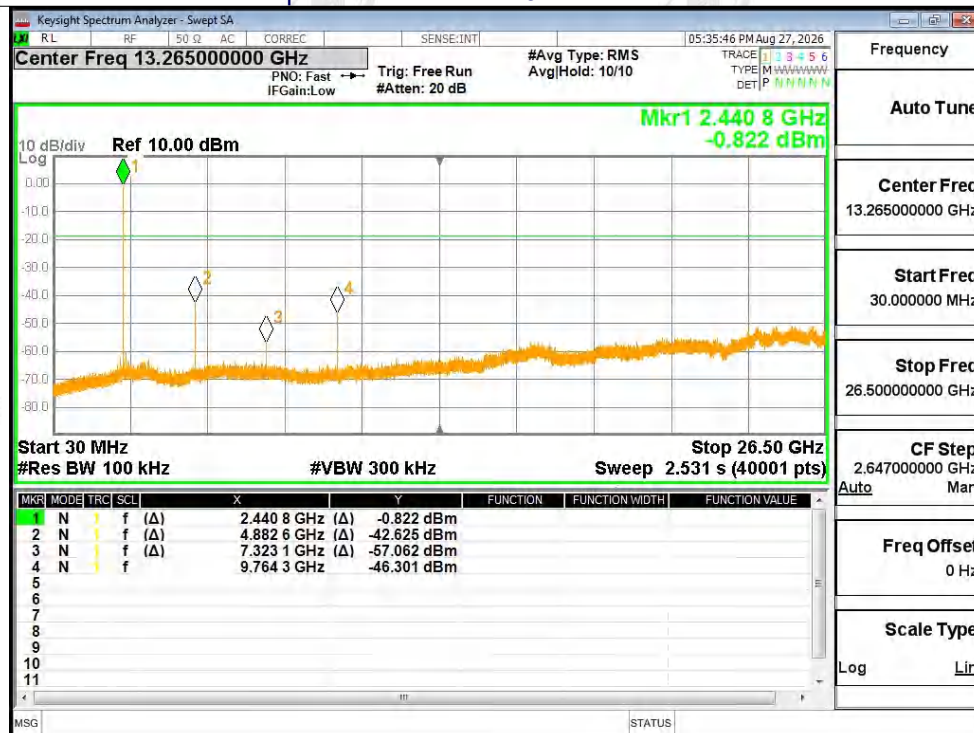


Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Emission

ZHONGHA

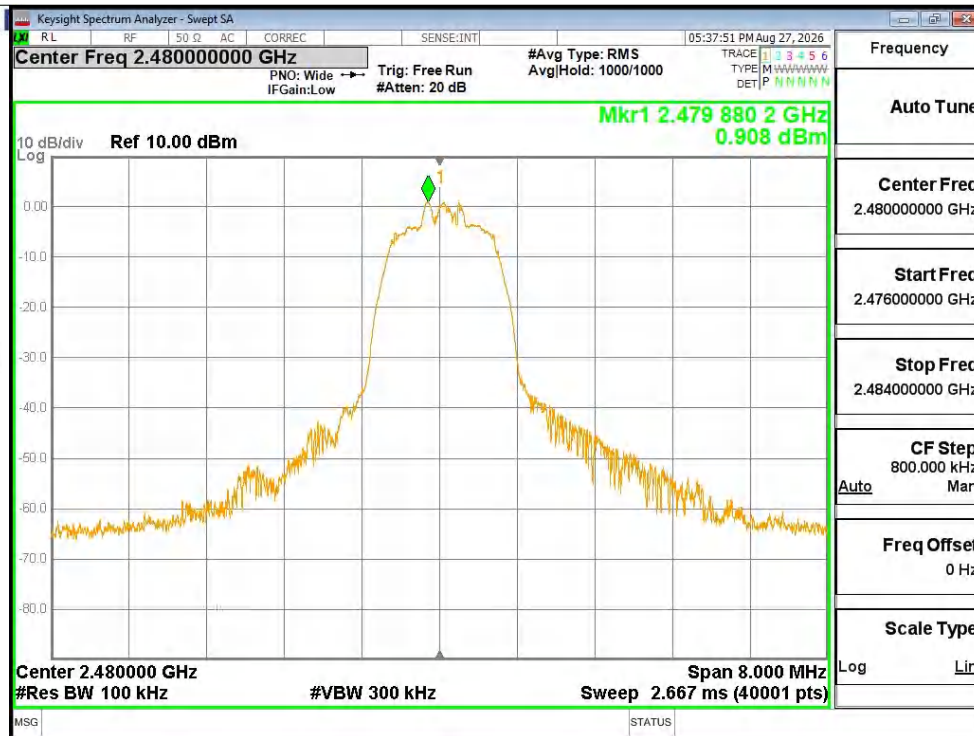


Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Ref

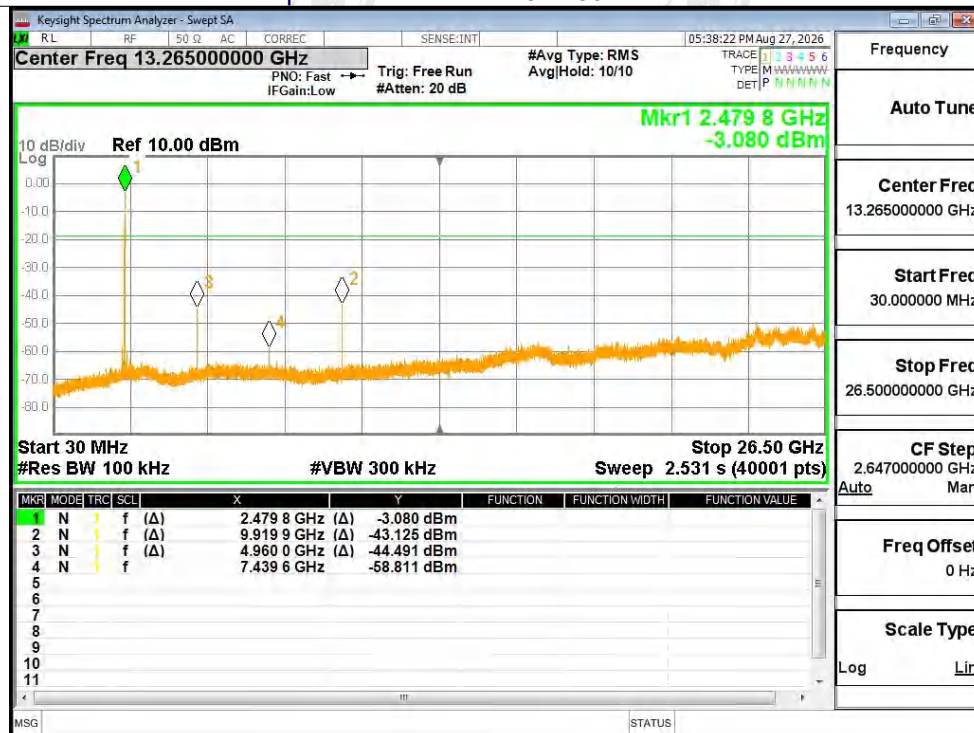


Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Emission

ZHONGHA

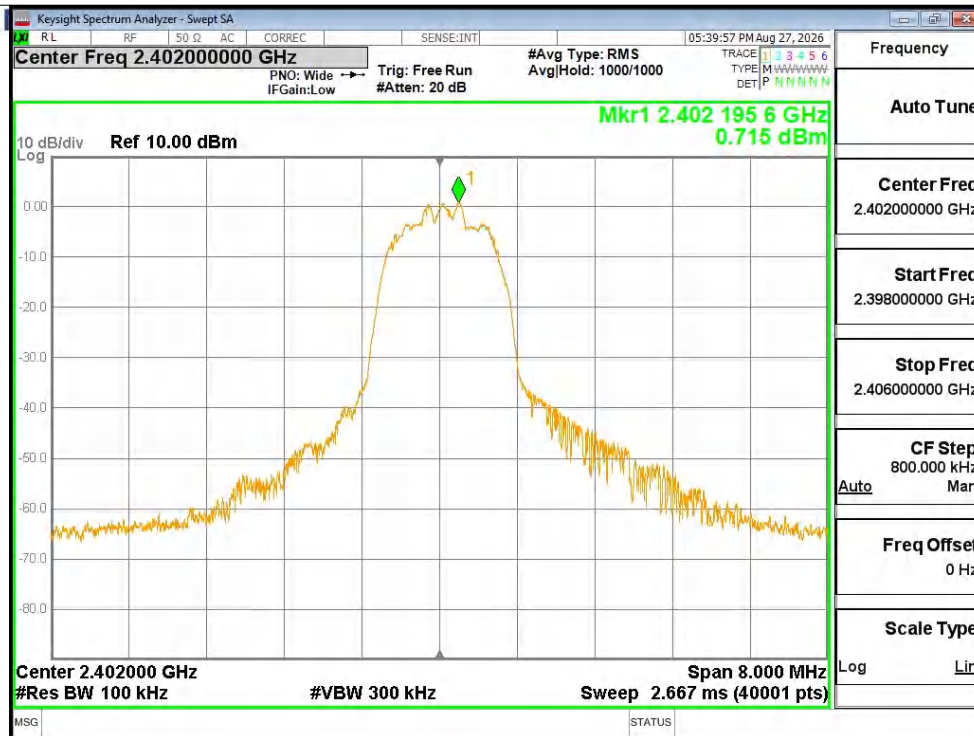


Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Ref

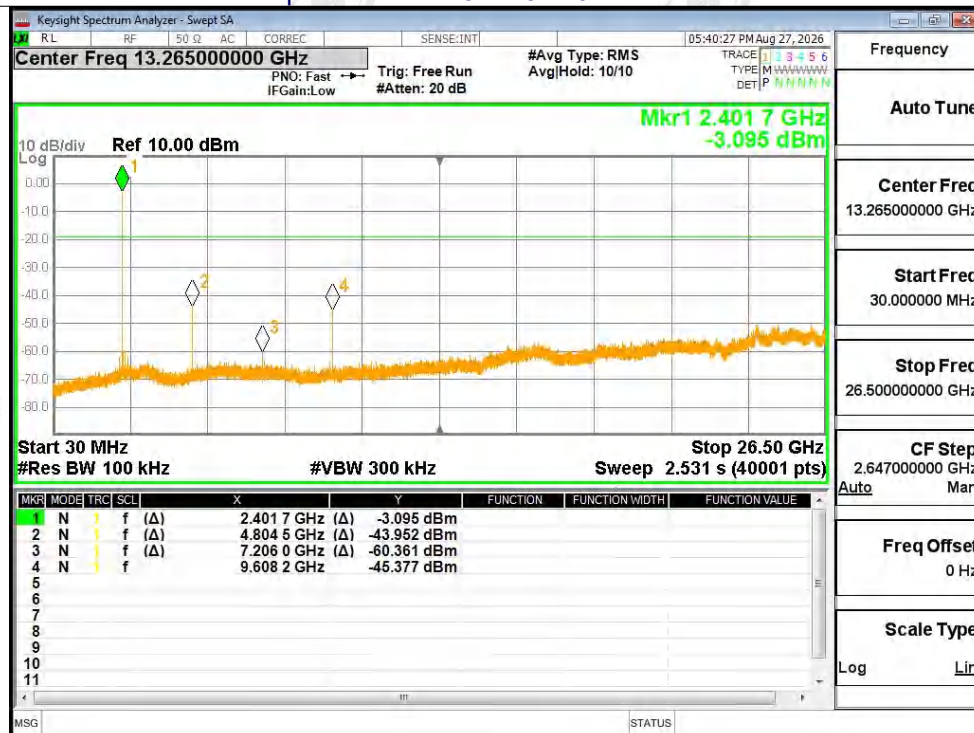


Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Emission

ZHONGHA

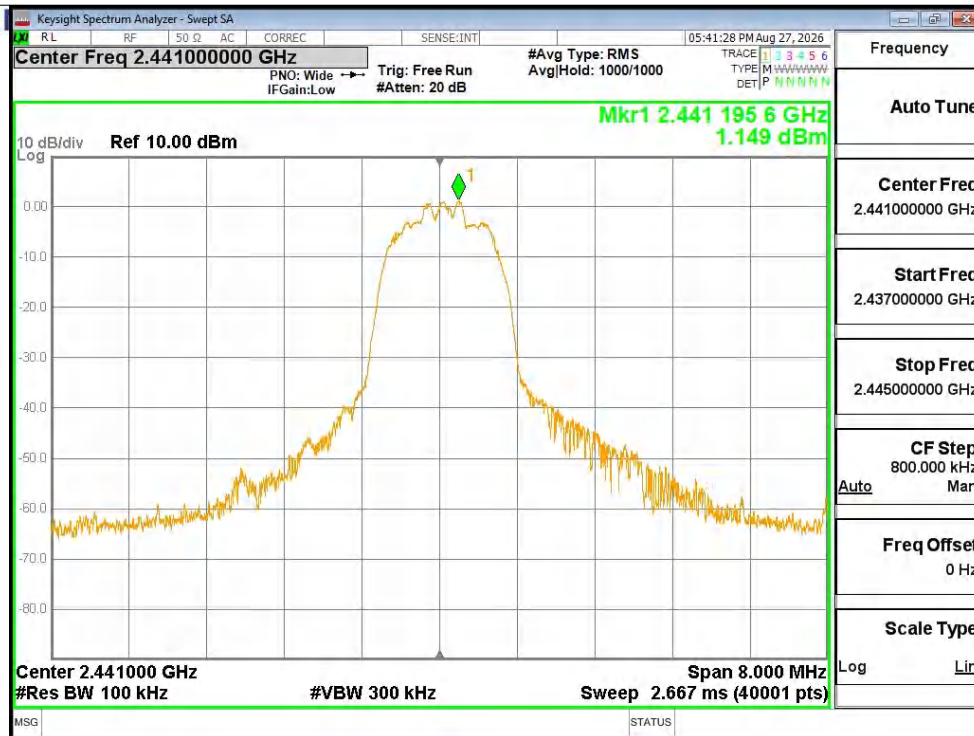


Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Ref

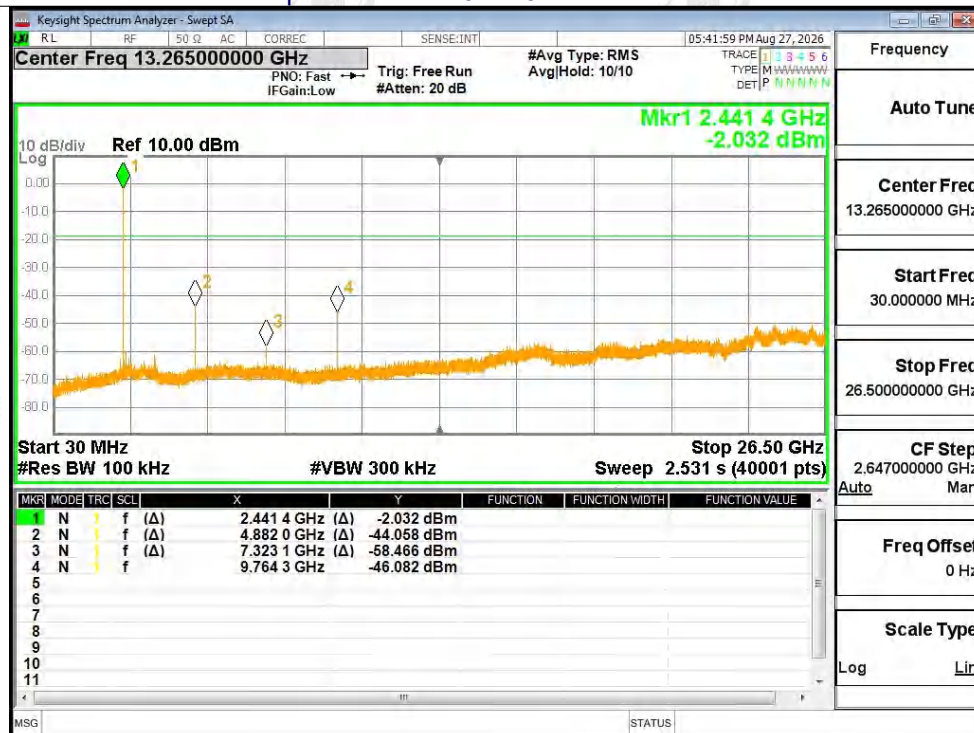


Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Emission

ZHONGHA

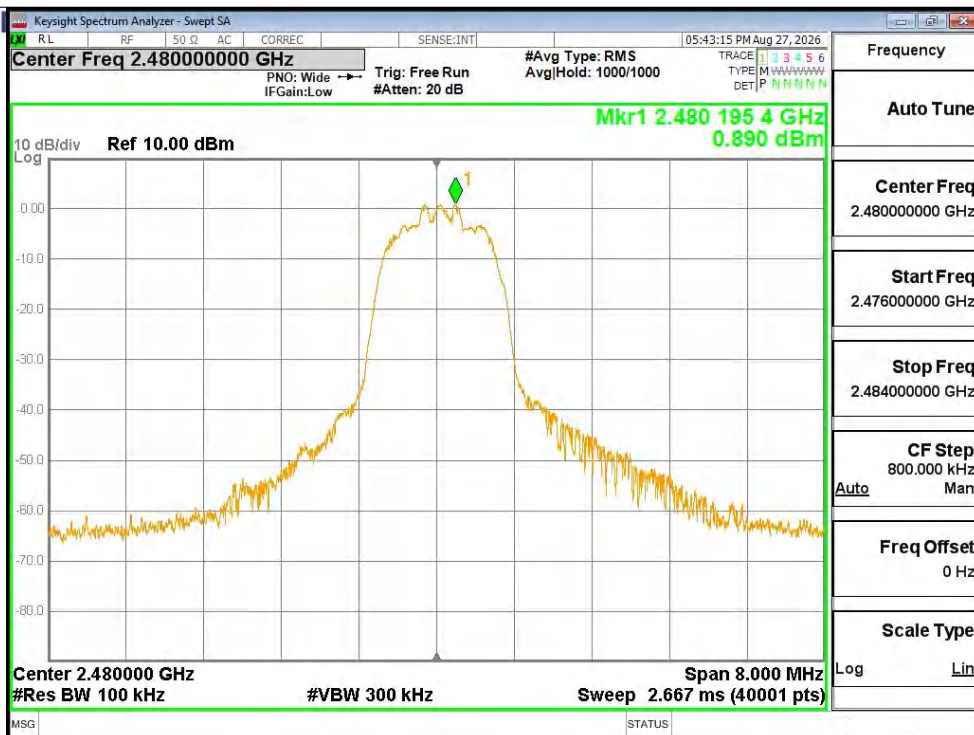


Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Ref

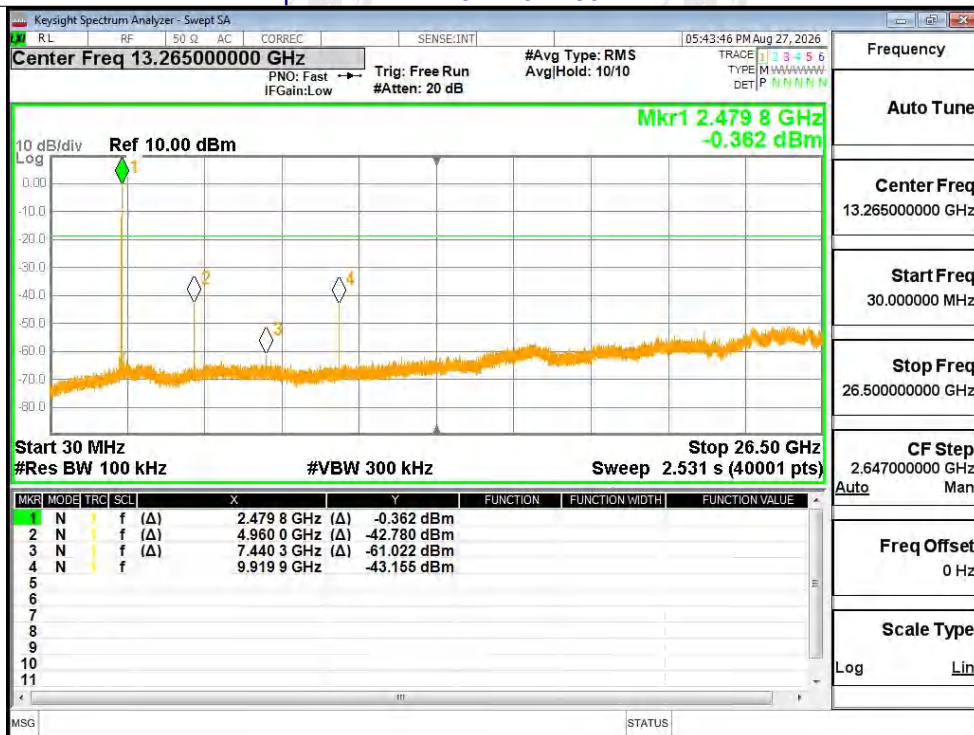


Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Emission

ZHONGHA



Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Ref



Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Emission

**7. 20DB&99% BANDWIDTH**

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024

7.1 Test Setup**7.2 Limit**

There is no corresponding limit requirement for this test item.

7.3 Test procedure

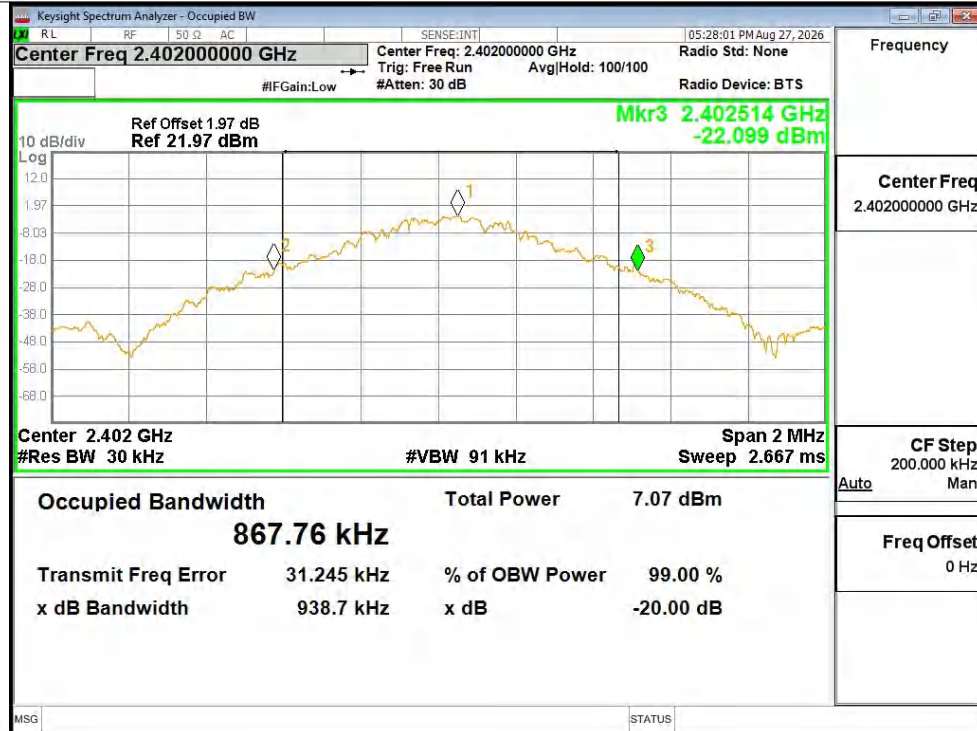
1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
8. The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30KHz RBW and 100 KHz VBW record the 99% bandwidth.

7.4 DEVIATION FROM STANDARD

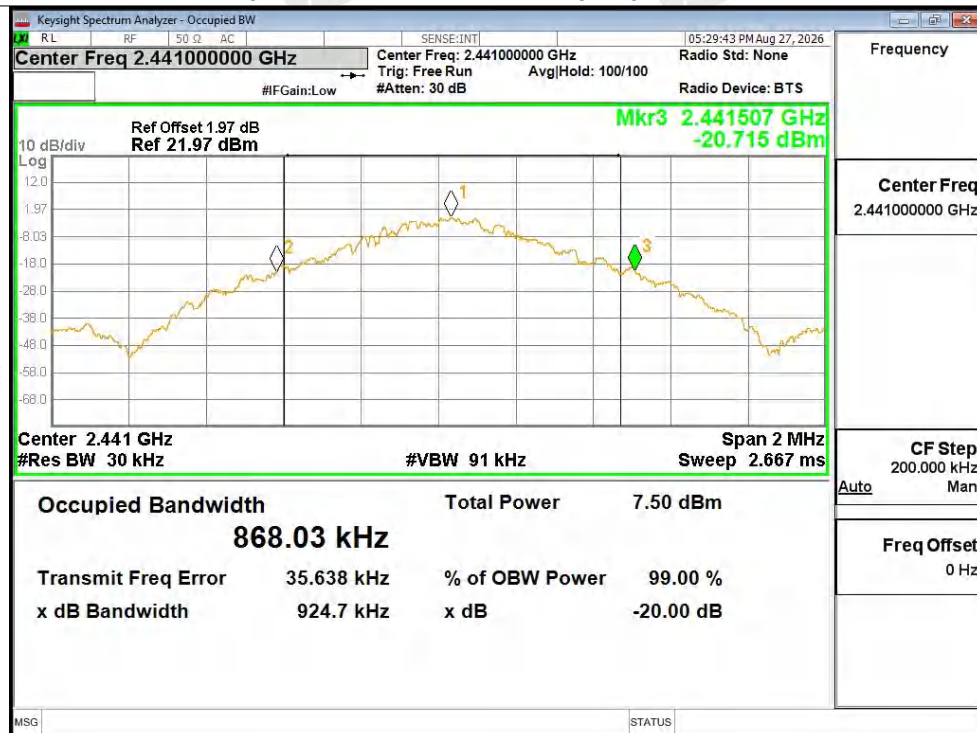
No deviation.

7.5 Test Result

Mode	Test channel	20dB Emission Bandwidth (MHz)	99%Bandwidth (MHz)	Result
GFSK	Lowest	0.939	0.859	Pass
	Middle	0.925	0.873	
	Highest	0.948	0.885	
$\pi/4$ DQPSK	Lowest	1.277	1.185	Pass
	Middle	1.277	1.188	
	Highest	1.278	1.190	
8DPSK	Lowest	1.289	1.184	Pass
	Middle	1.274	1.179	
	Highest	1.289	1.187	

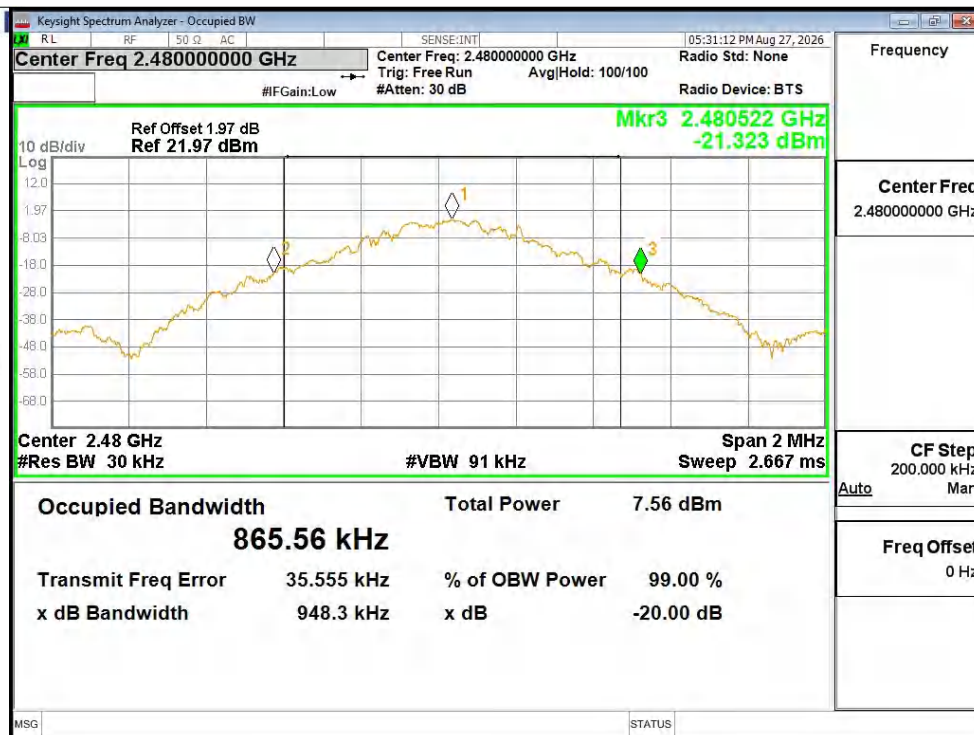


-20dB Bandwidth NVNT 1-DH5 2402MHz Ant1

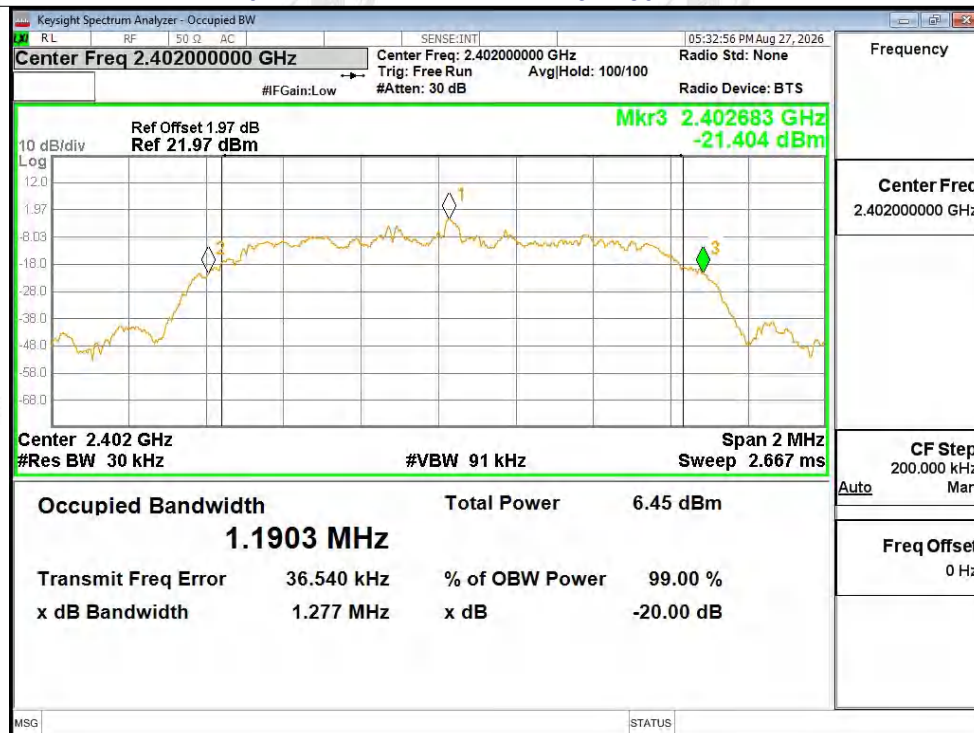


-20dB Bandwidth NVNT 1-DH5 2441MHz Ant1

ZHONGHA



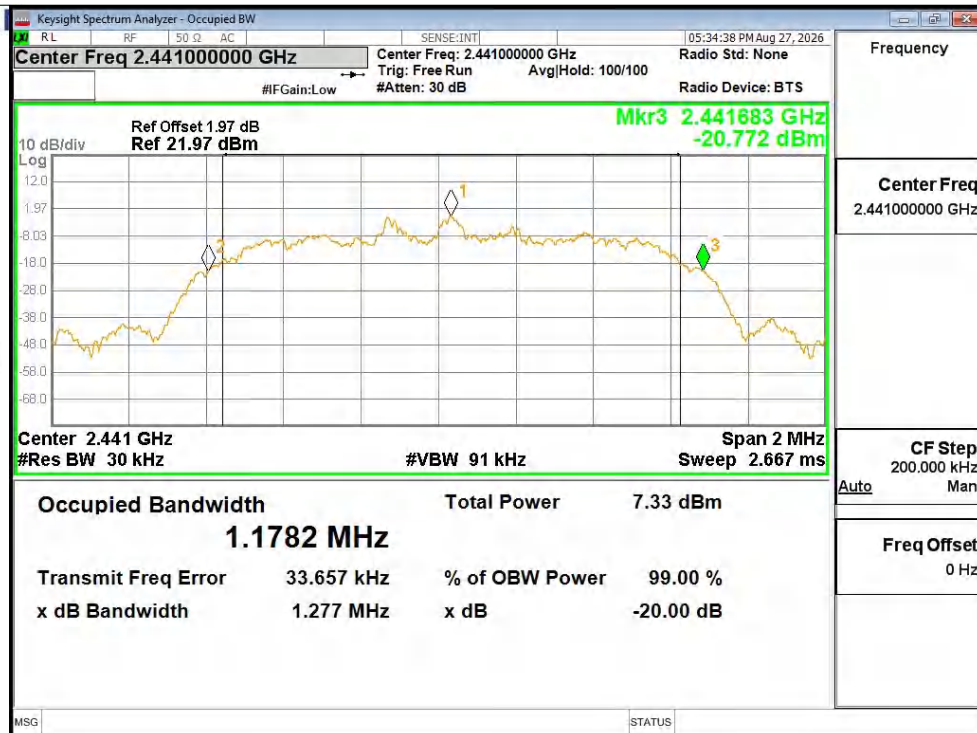
-20dB Bandwidth NVNT 1-DH5 2480MHz Ant1



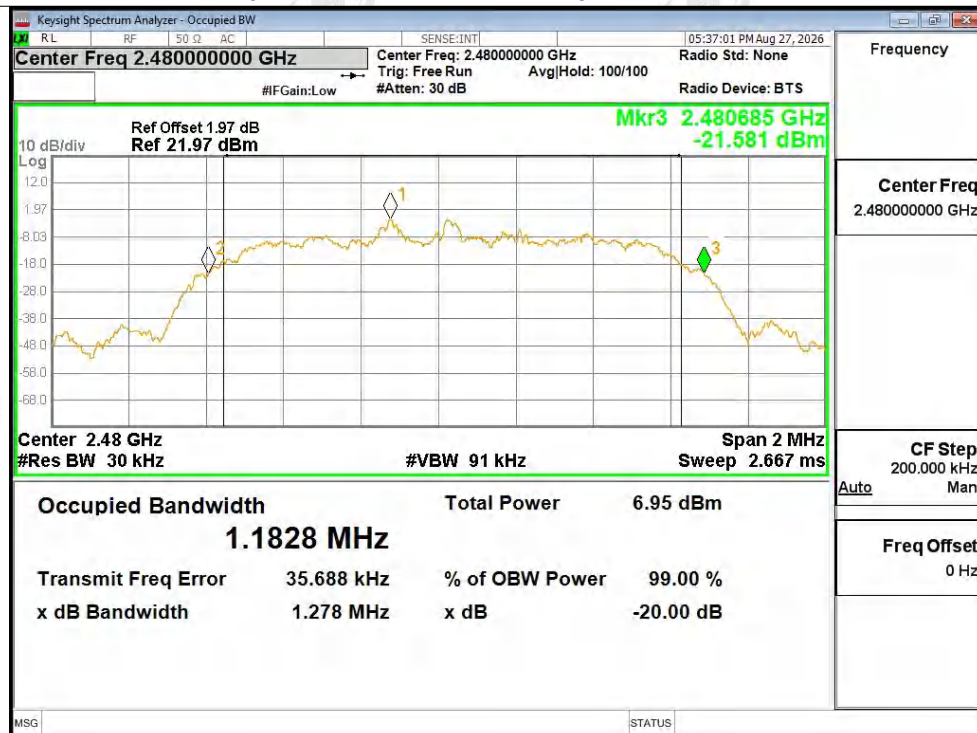
-20dB Bandwidth NVNT 2-DH5 2402MHz Ant1



ZHONGHA



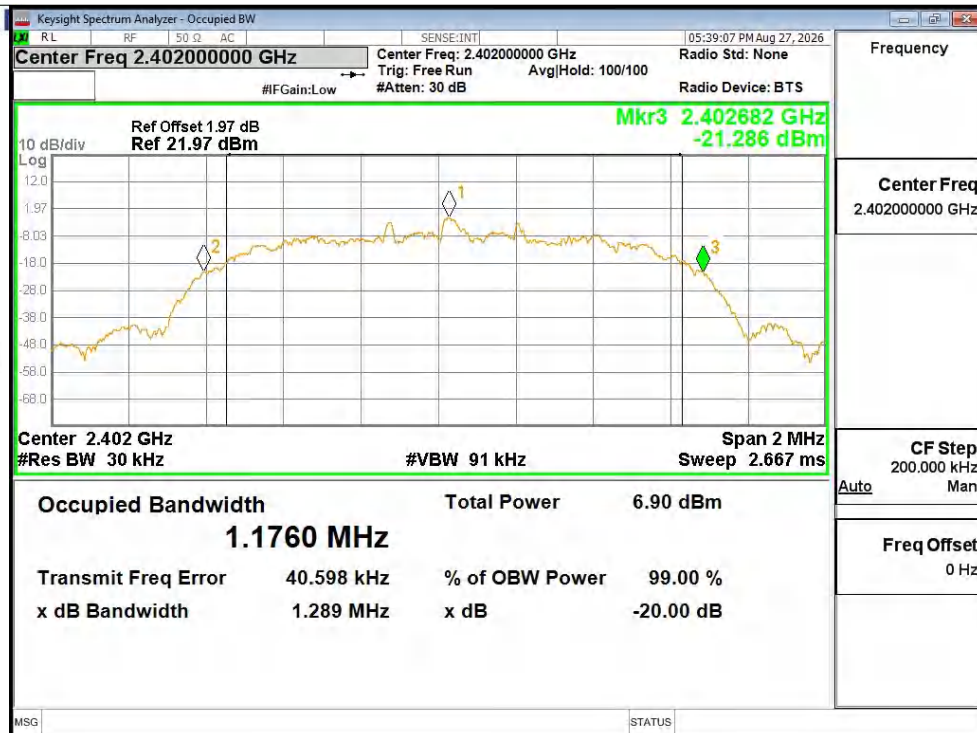
-20dB Bandwidth NVNT 2-DH5 2441MHz Ant1



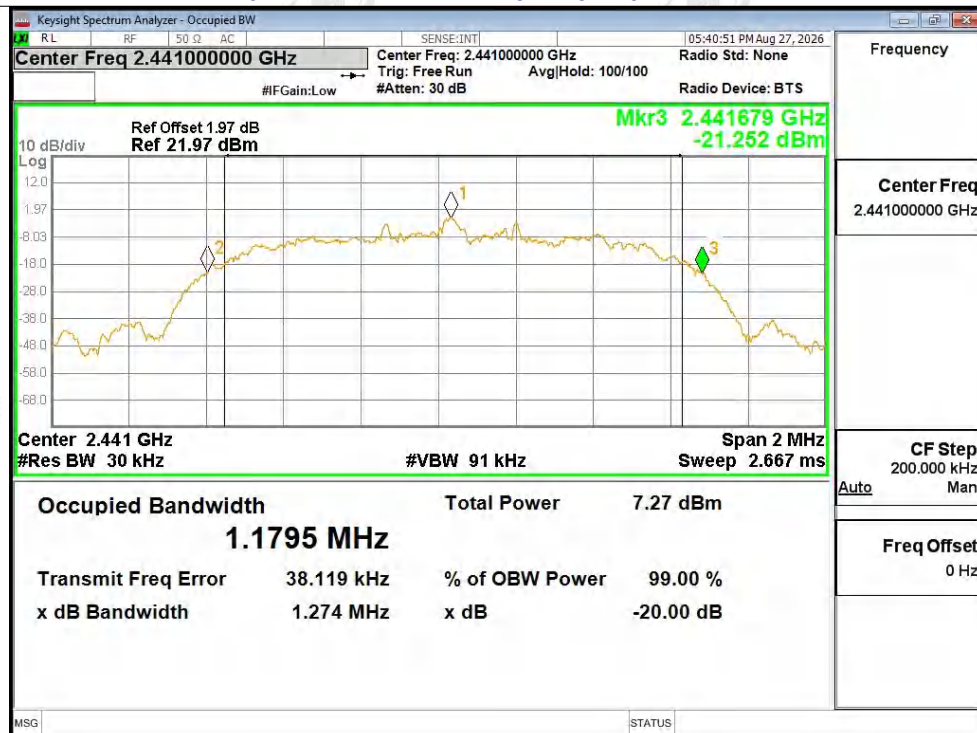
-20dB Bandwidth NVNT 2-DH5 2480MHz Ant1



ZHONGHA



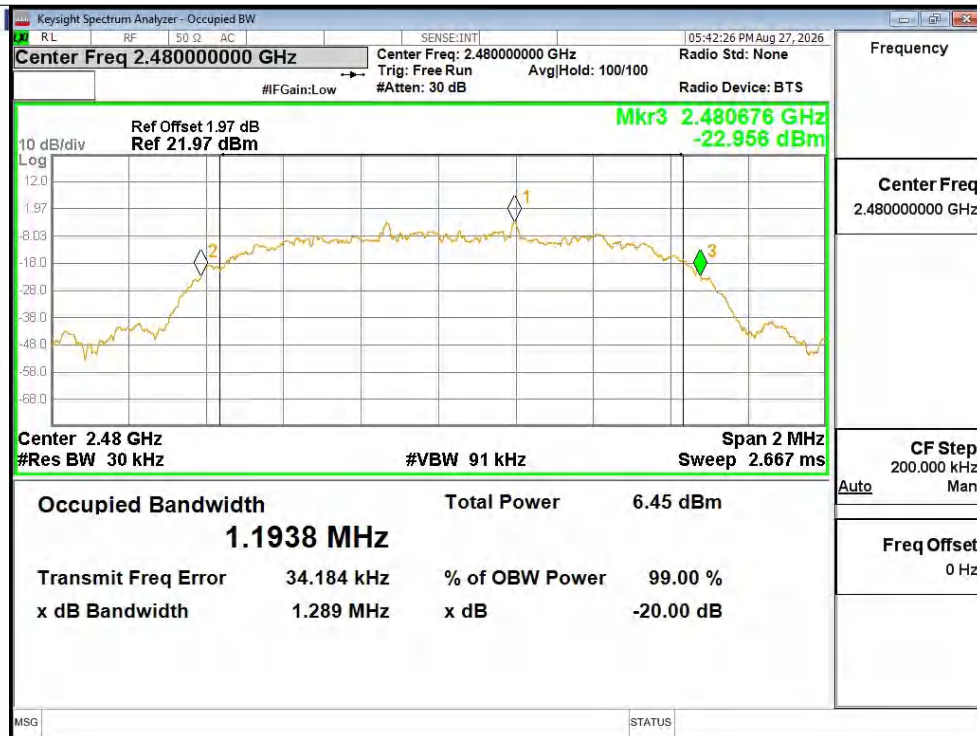
-20dB Bandwidth NVNT 3-DH5 2402MHz Ant1



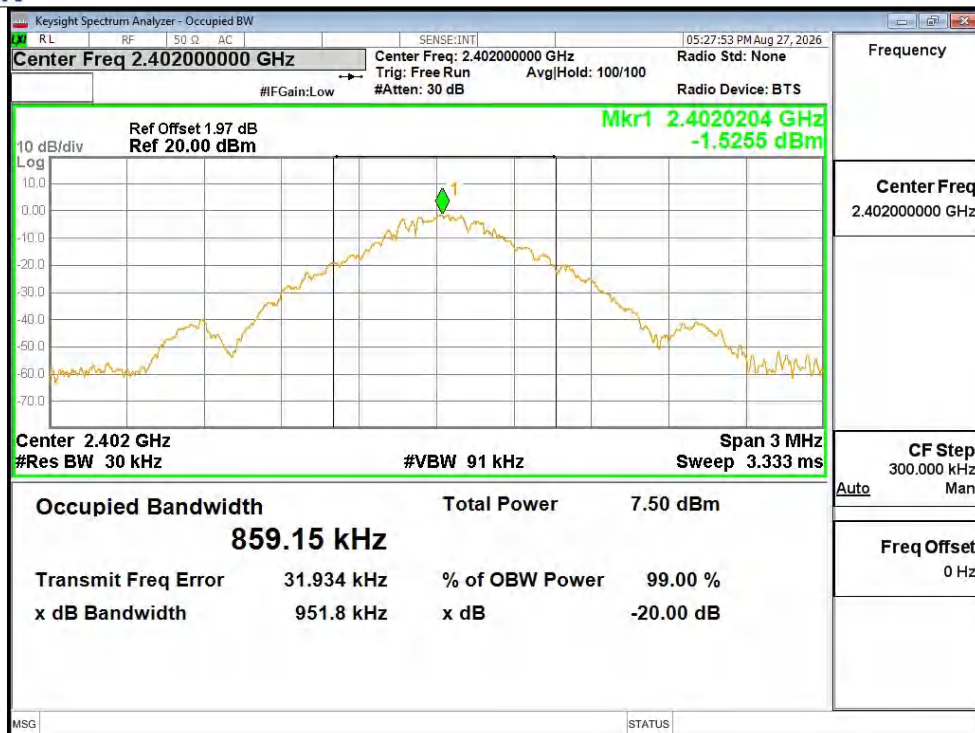
-20dB Bandwidth NVNT 3-DH5 2441MHz Ant1



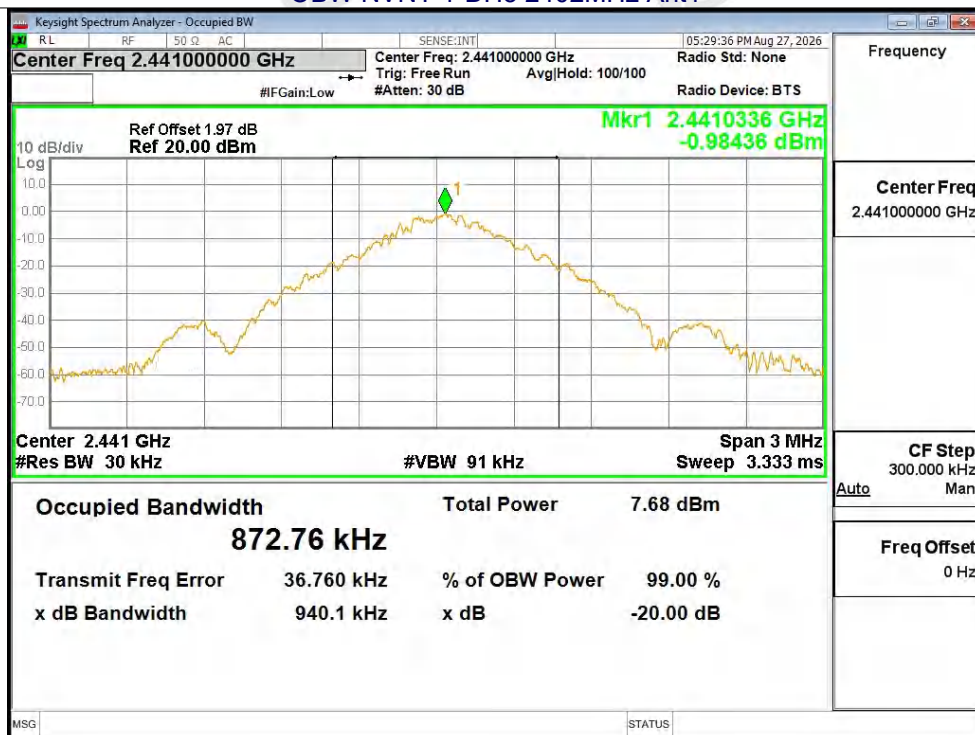
ZHONGHA



-20dB Bandwidth NVNT 3-DH5 2480MHz Ant1

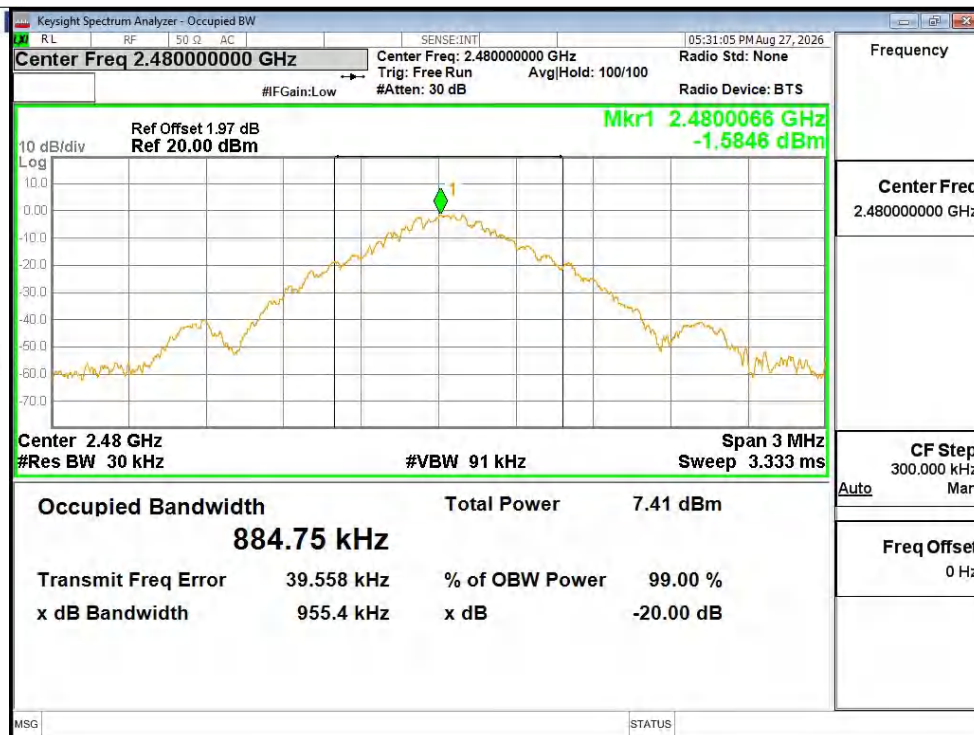


OBW NVNT 1-DH5 2402MHz Ant1

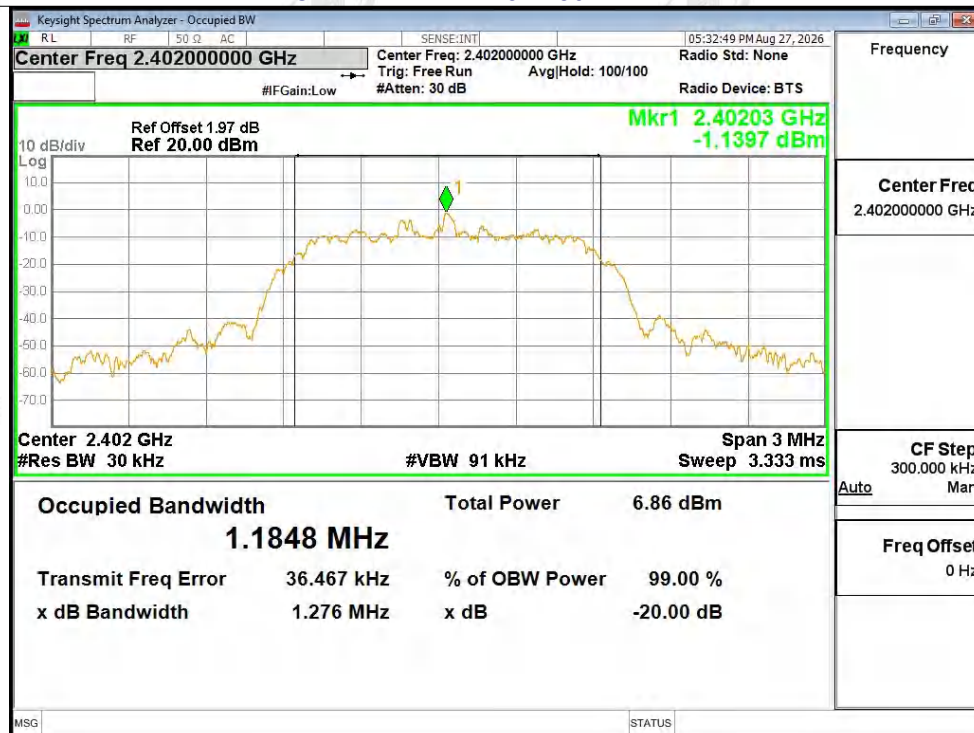


OBW NVNT 1-DH5 2441MHz Ant1

ZHONGHA

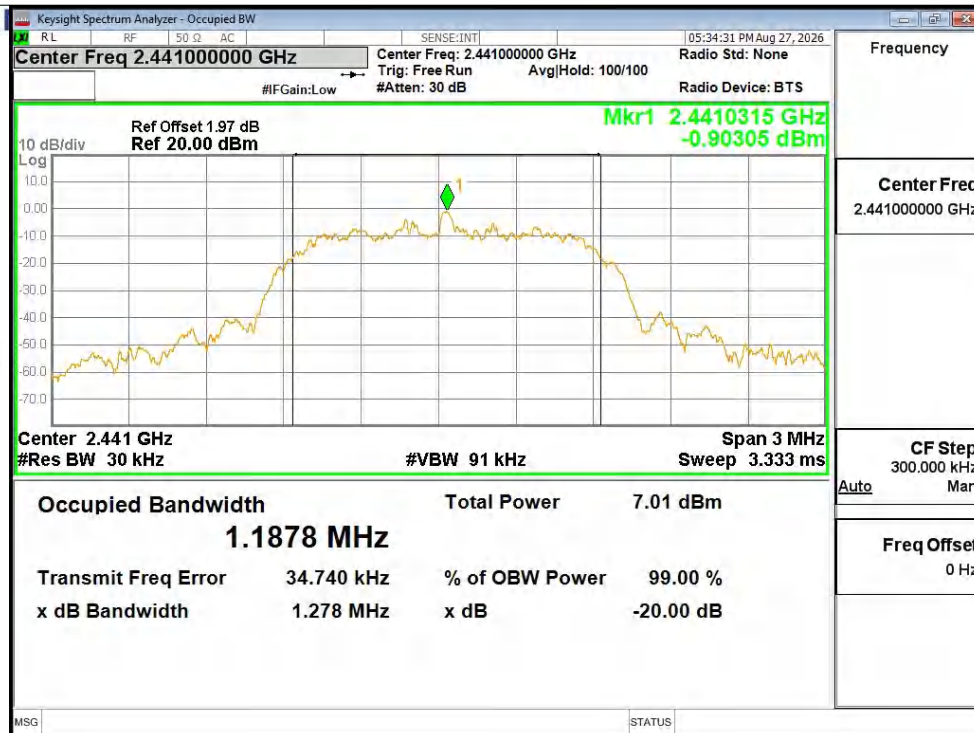


OBW NVNT 1-DH5 2480MHz Ant1

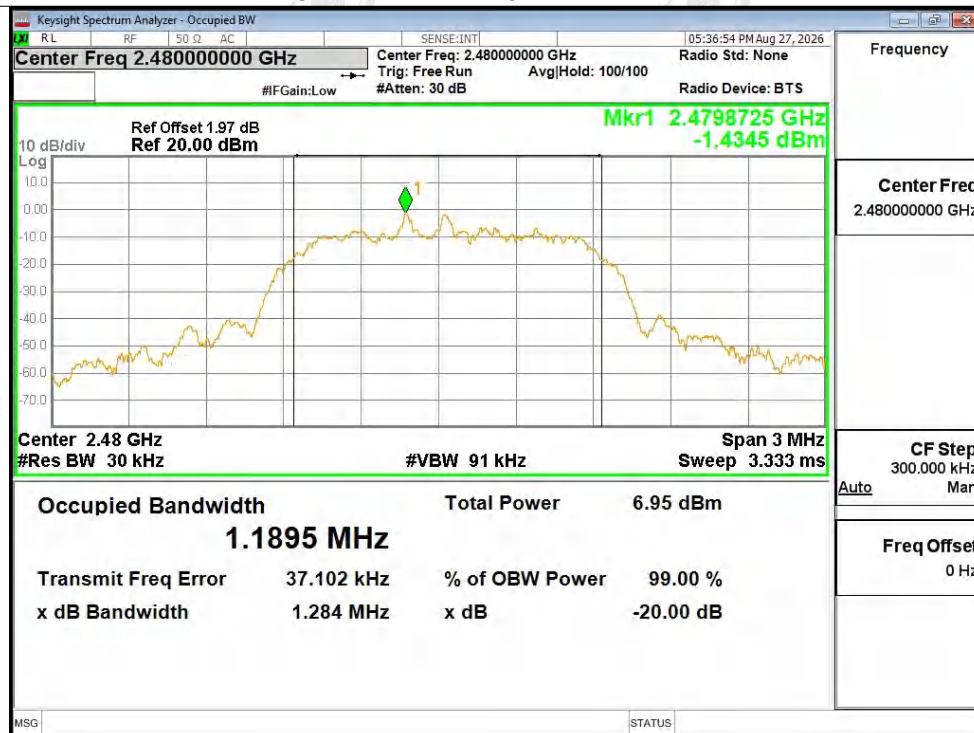


OBW NVNT 2-DH5 2402MHz Ant1

ZHONGHA



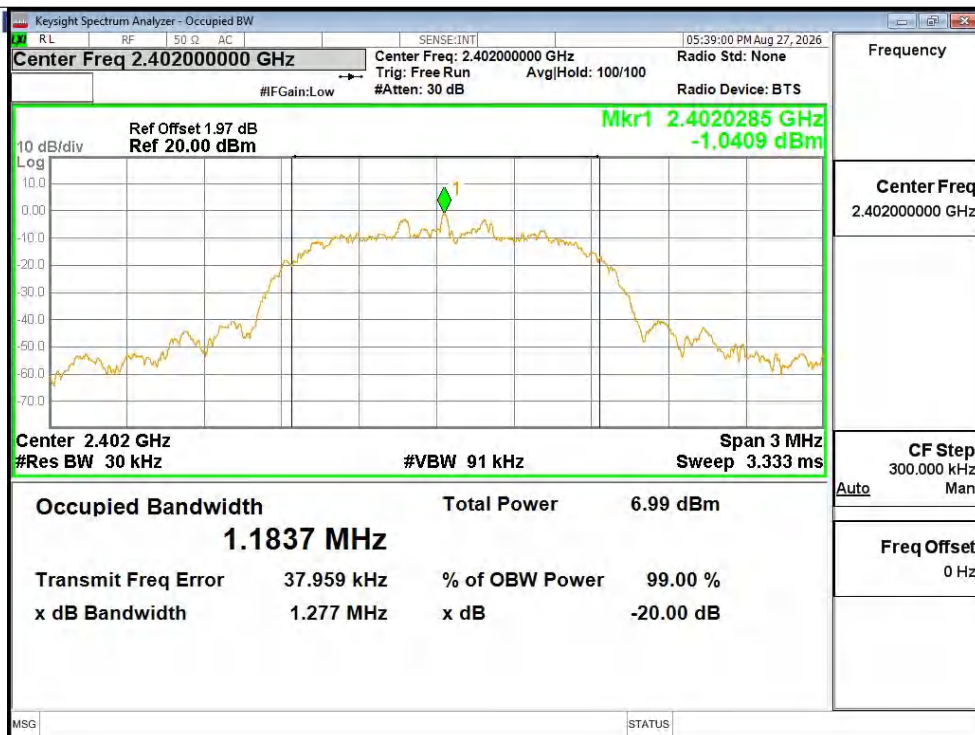
OBW NVNT 2-DH5 2441MHz Ant1



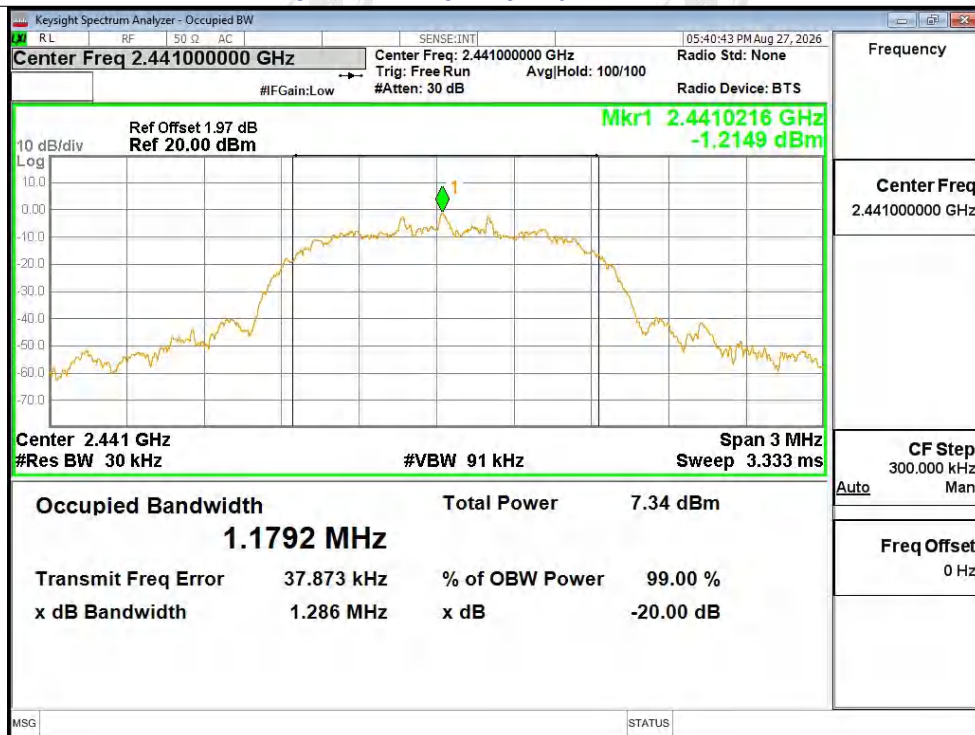
OBW NVNT 2-DH5 2480MHz Ant1



ZHONGHA



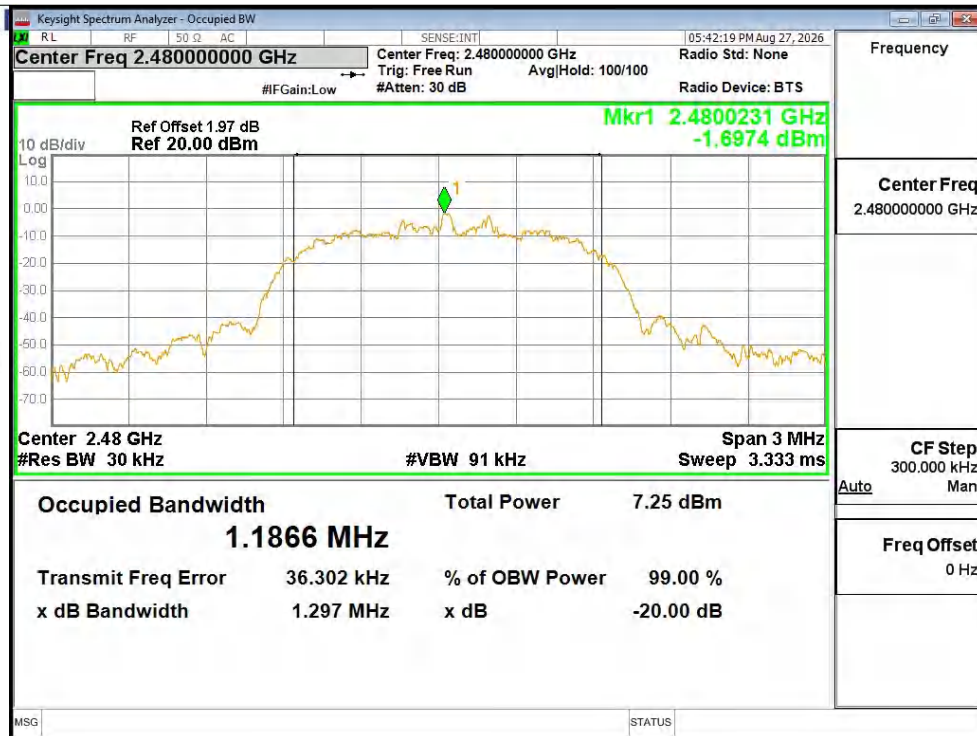
OBW NVNT 3-DH5 2402MHz Ant1



OBW NVNT 3-DH5 2441MHz Ant1



ZHONGHA



OBW NVNT 3-DH5 2480MHz Ant1



8. Maximum Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024

8.1 Block Diagram Of Test Setup



8.2 Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W.

8.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 2MHz. VBW = 6MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

8.4 DEVIATION FROM STANDARD

No deviation.

8.5 Test Result

Mode	Test channel	Peak Output Power (dBm)	Peak Output Power Limit (dBm)	Result
GFSK	Lowest	1.06	21.00	Pass
	Middle	1.39		
	Highest	1.22		
$\pi/4$ DQPSK	Lowest	2.01	21.00	Pass
	Middle	2.3		
	Highest	2.17		
8DPSK	Lowest	2.36	21.00	Pass
	Middle	2.67		
	Highest	2.5		

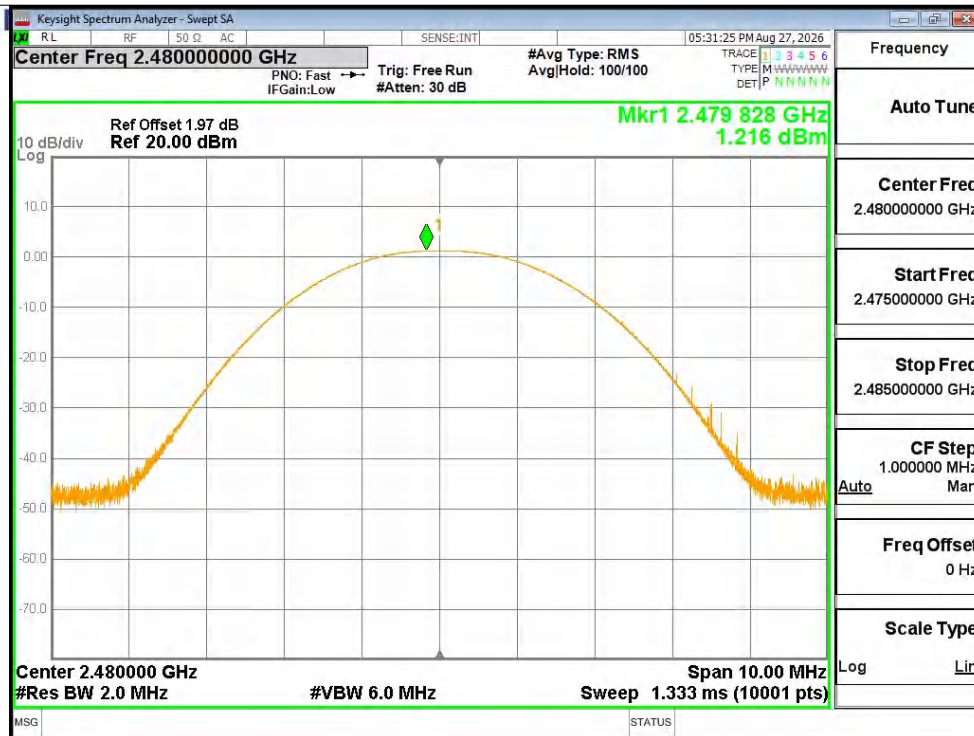


Peak Power NVNT 1-DH5 2402MHz Ant1



Peak Power NVNT 1-DH5 2441MHz Ant1

ZHONGHA

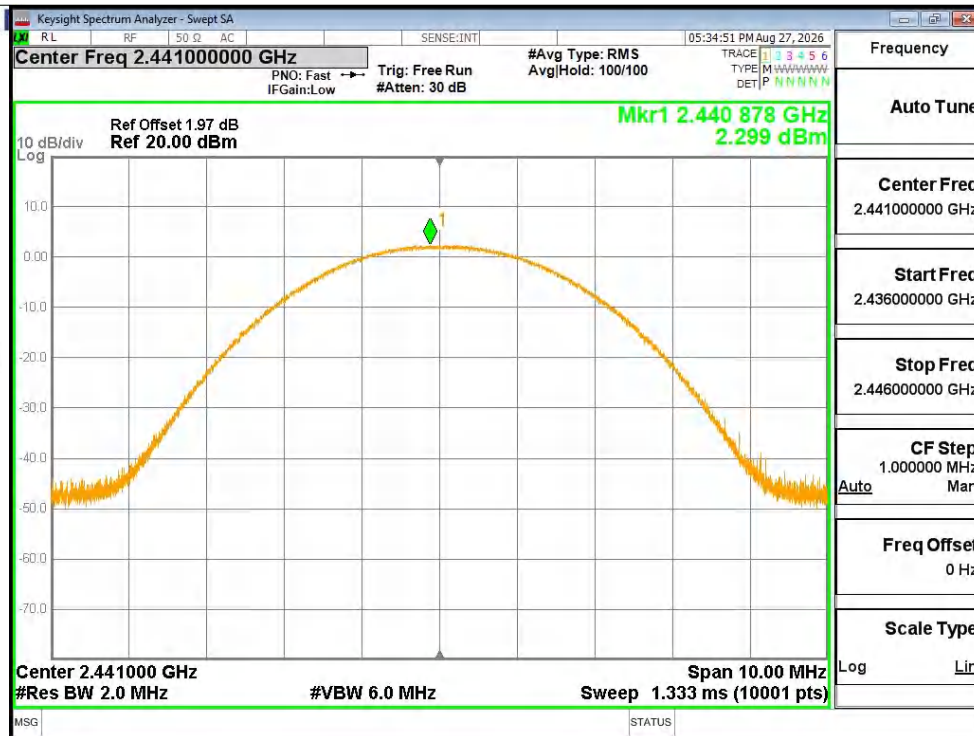


Peak Power NVNT 1-DH5 2480MHz Ant1



Peak Power NVNT 2-DH5 2402MHz Ant1

ZHONGHA

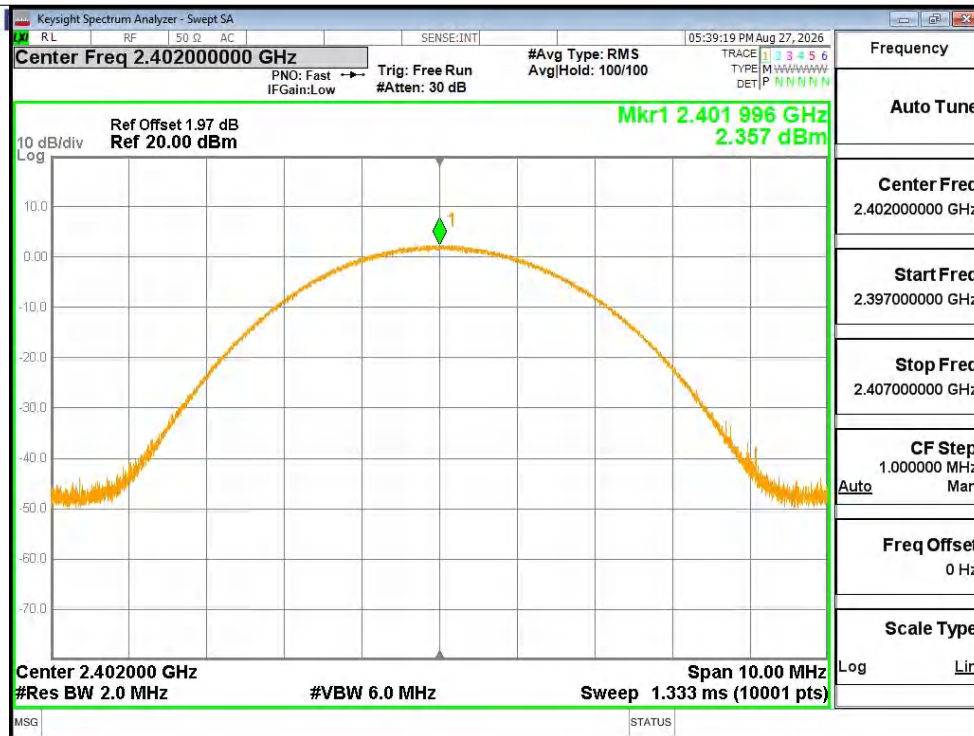


Peak Power NVNT 2-DH5 2441MHz Ant1



Peak Power NVNT 2-DH5 2480MHz Ant1

ZHONGHA



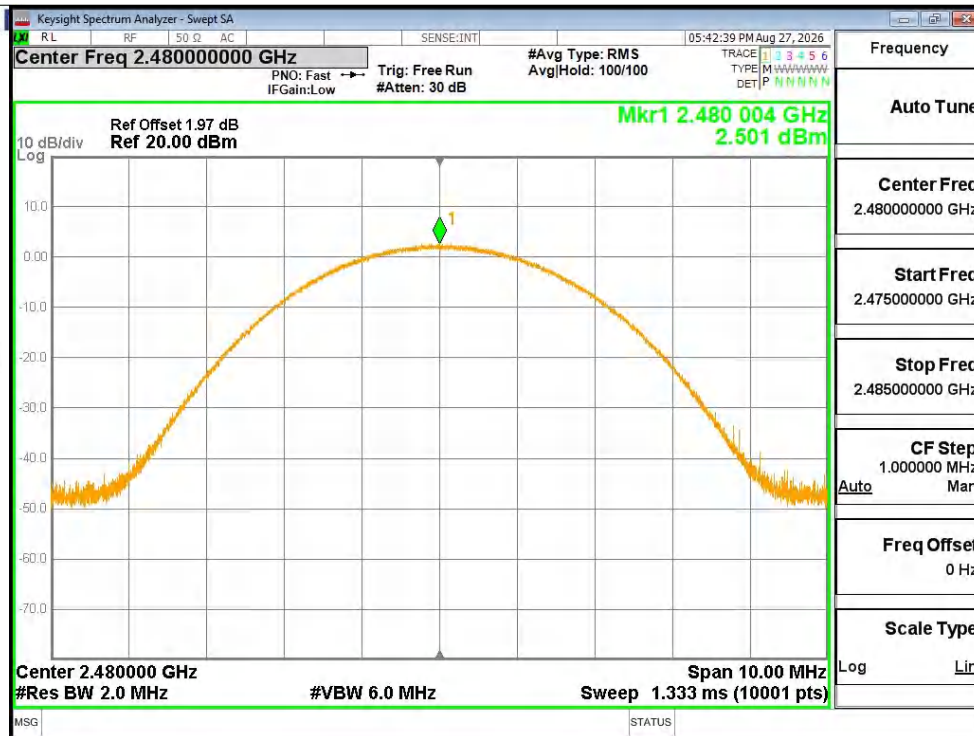
Peak Power NVNT 3-DH5 2402MHz Ant1



Peak Power NVNT 3-DH5 2441MHz Ant1



ZHONGHA



Peak Power NVNT 3-DH5 2480MHz Ant1

9. HOPPING CHANNEL SEPARATION

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak
Limit:	GFSK, $\pi/4$ -DQPSK & 8DSK: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

9.1 Test Setup



9.2 Test procedure

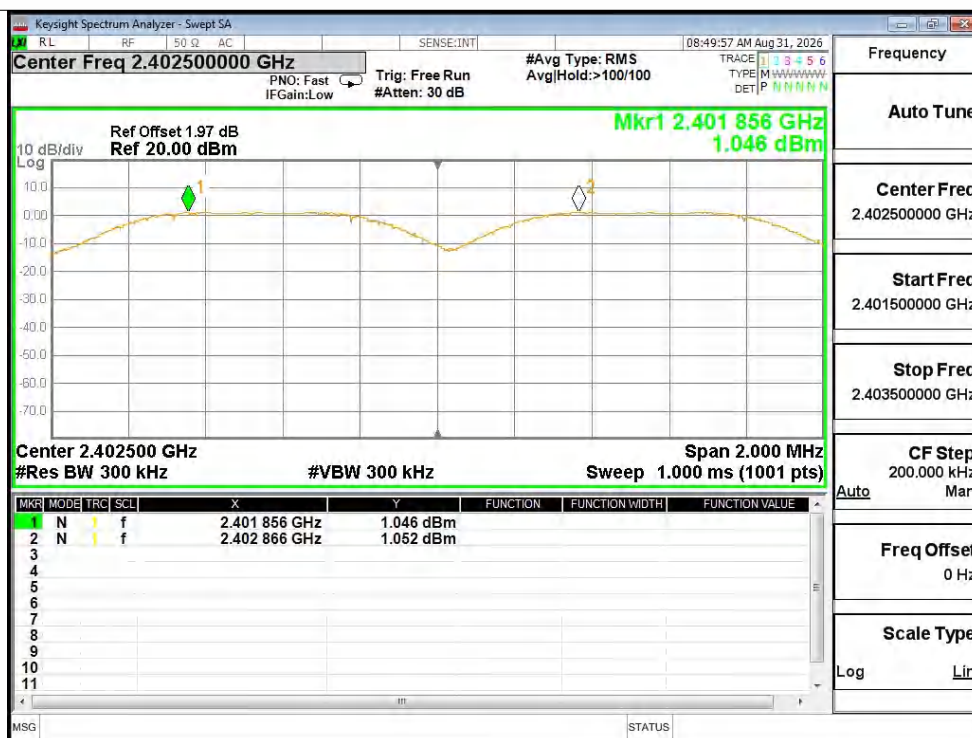
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

9.3 DEVIATION FROM STANDARD

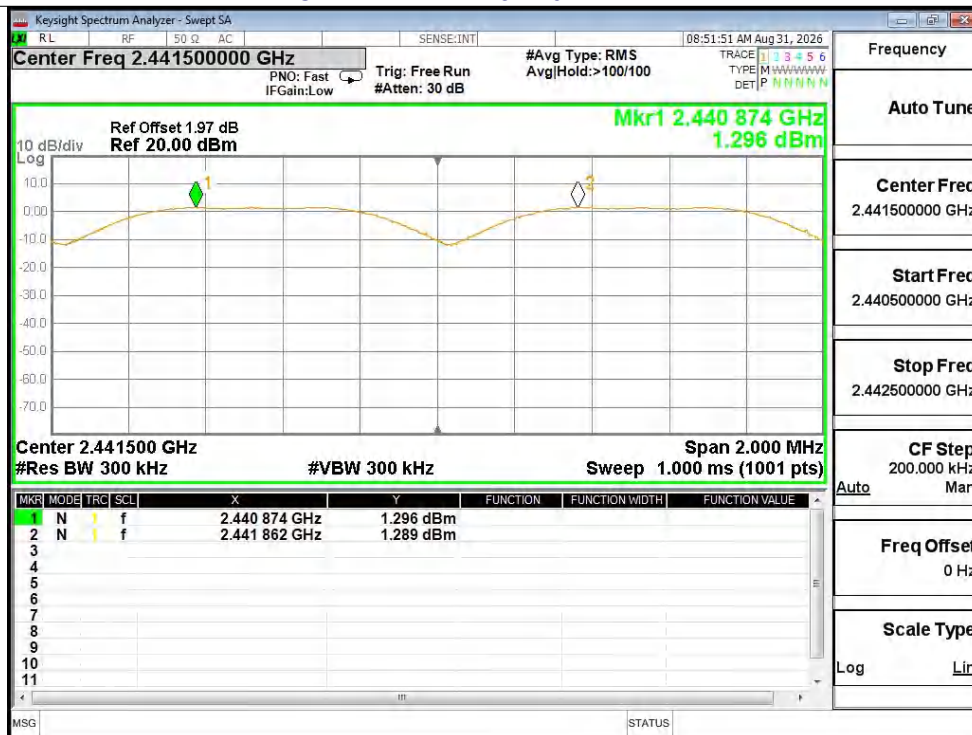
No deviation.

9.4 Test Result

Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
1-DH5	Ant1	2401.856	2402.866	1.010	0.626	Pass
1-DH5	Ant1	2440.874	2441.862	0.988	0.616	Pass
1-DH5	Ant1	2478.872	2480.166	1.294	0.632	Pass
2-DH5	Ant1	2402.032	2403.056	1.024	0.851	Pass
2-DH5	Ant1	2441.094	2442.041	0.946	0.851	Pass
2-DH5	Ant1	2479.001	2480.043	1.043	0.852	Pass
3-DH5	Ant1	2402.001	2403.189	1.188	0.859	Pass
3-DH5	Ant1	2441.019	2442.041	1.022	0.849	Pass
3-DH5	Ant1	2479.016	2480.030	1.014	0.859	Pass



CFS NVNT 1-DH5 2402MHz Ant1

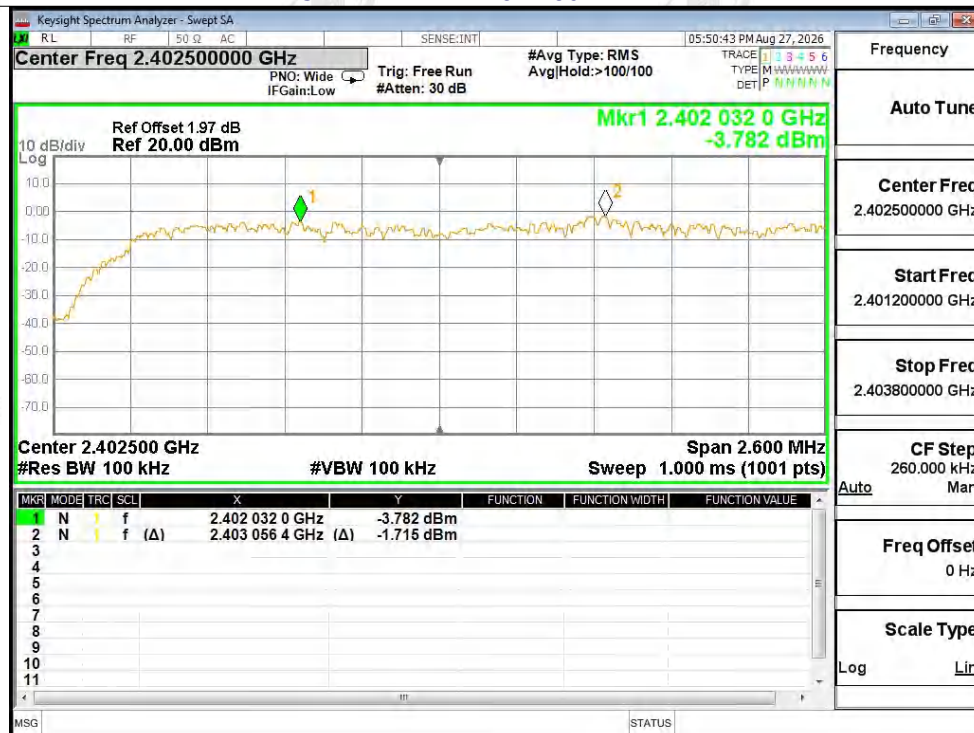


CFS NVNT 1-DH5 2441MHz Ant1

ZHONGHA



CFS NVNT 1-DH5 2480MHz Ant1

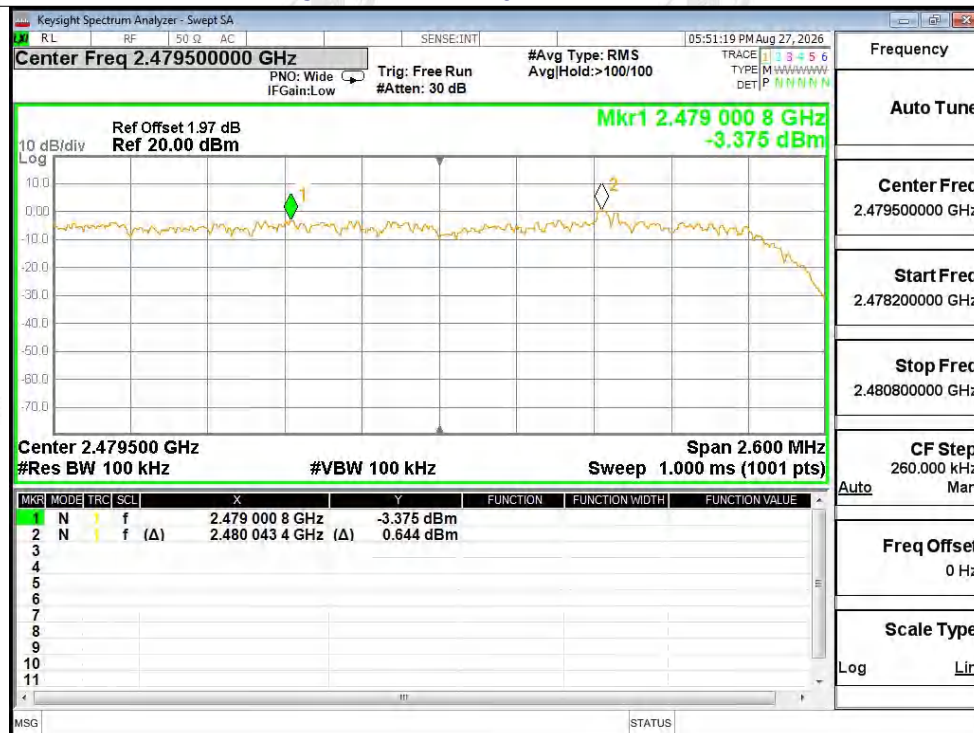


CFS NVNT 2-DH5 2402MHz Ant1

ZHONGHA

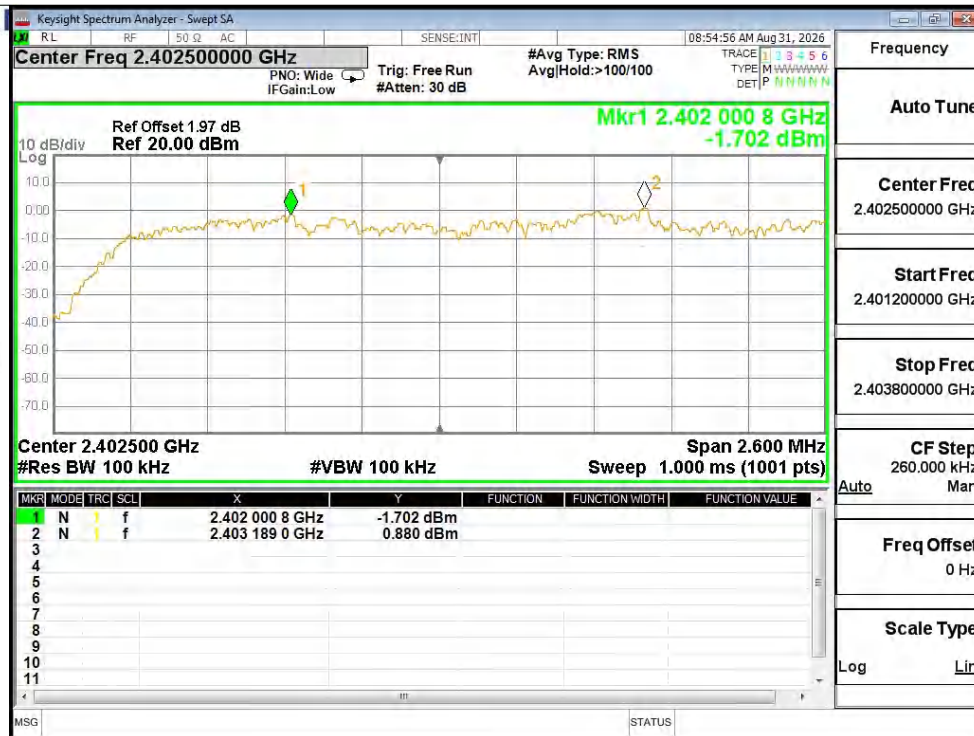


CFS NVNT 2-DH5 2441MHz Ant1



CFS NVNT 2-DH5 2480MHz Ant1

ZHONGHA



CFS NVNT 3-DH5 2402MHz Ant1



CFS NVNT 3-DH5 2441MHz Ant1



ZHONGHA



CFS NVNT 3-DH5 2480MHz Ant1

**10.NUMBER OF HOPPING FREQUENCY**

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels

10.1 Test Setup**10.2 Test procedure**

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

10.3 DEVIATION FROM STANDARD

No deviation.

10.4 Test Result

Mode	Antenna	Hopping Number	Limit	Verdict
1-DH5	Ant1	79	15	Pass
2-DH5	Ant1	79	15	Pass
3-DH5	Ant1	79	15	Pass



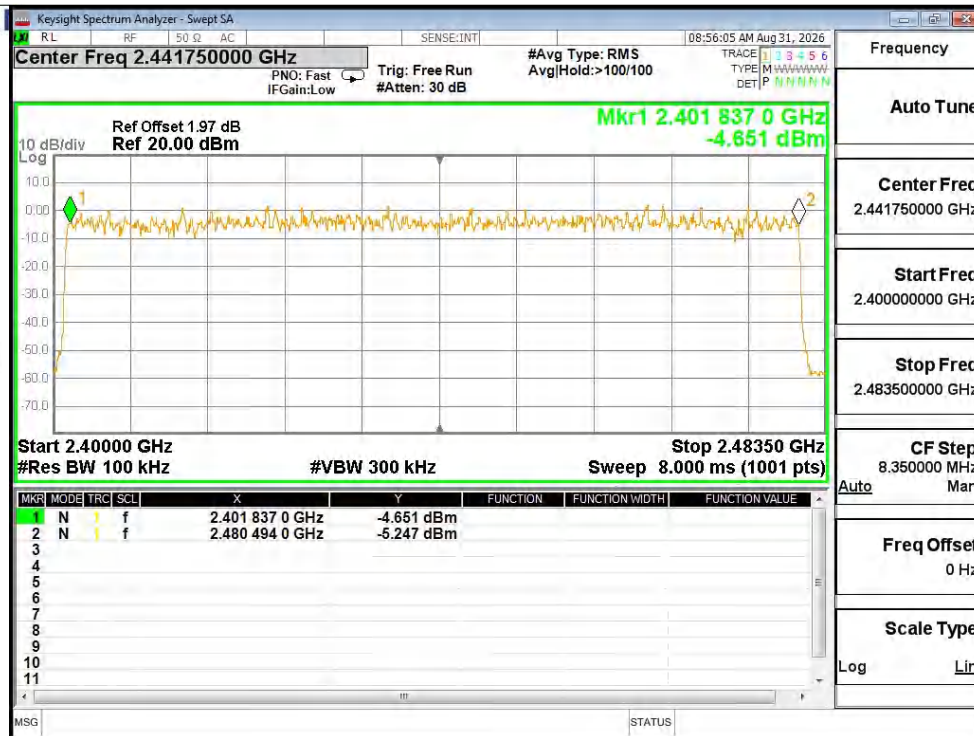
Hopping No. NVNT 1-DH5 2402MHz Ant1



Hopping No. NVNT 2-DH5 2402MHz Ant1



ZHONGHA



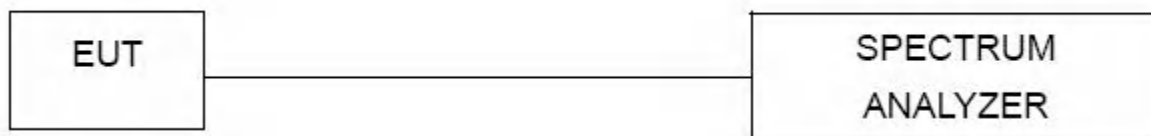
Hopping No. NVNT 3-DH5 2402MHz Ant1



11. DWELL TIME

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second

11.1 Test Setup



11.2 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0Hz;
3. Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

11.3 DEVIATION FROM STANDARD

No deviation.



11.4 Test Result

Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2441	Ant1	0.378	120.582	319	31600	400	Pass
1-DH3	2441	Ant1	1.639	254.045	155	31600	400	Pass
1-DH5	2441	Ant1	2.88	270.72	94	31600	400	Pass
2-DH1	2441	Ant1	0.392	124.656	318	31600	400	Pass
2-DH3	2441	Ant1	1.645	246.75	150	31600	400	Pass
2-DH5	2441	Ant1	2.892	329.688	114	31600	400	Pass
3-DH1	2441	Ant1	0.373	117.868	316	31600	400	Pass
3-DH3	2441	Ant1	1.644	254.82	155	31600	400	Pass
3-DH5	2441	Ant1	2.894	289.4	100	31600	400	Pass

Remarks:

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

(1 / 2 / 3)-DH1: Dwell time (ms) = Pulse Time (ms) * $[1600 / (2 * 79)] * 31.6\text{s}$

(1 / 2 / 3)-DH3: Dwell time (ms) = Pulse Time (ms) * $[1600 / (4 * 79)] * 31.6\text{s}$

(1 / 2 / 3)-DH5: Dwell time (ms) = Pulse Time (ms) * $[1600 / (6 * 79)] * 31.6\text{s}$



Dwell NVNT 1-DH1 2441MHz Ant1 One Burst

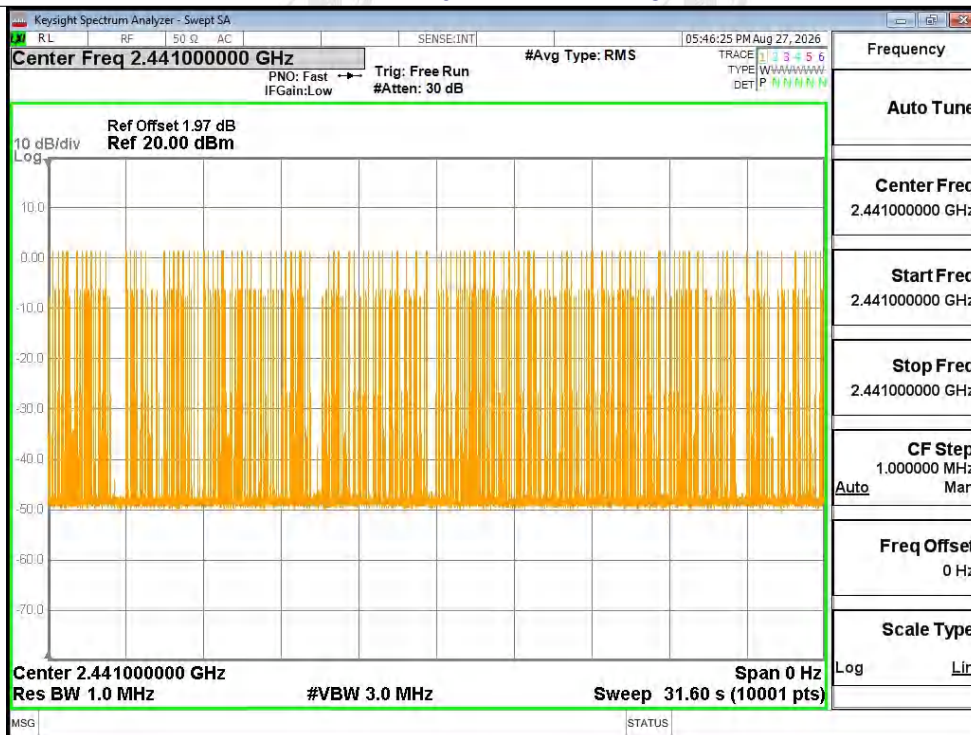


Dwell NVNT 1-DH1 2441MHz Ant1 Accumulated

ZHONGHA

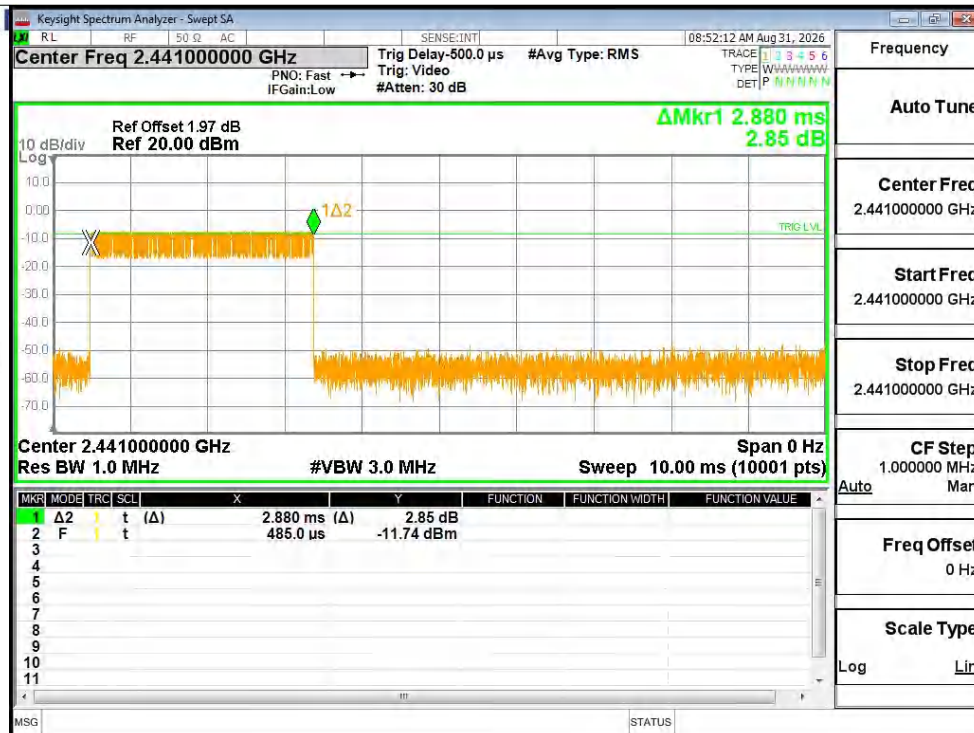


Dwell NVNT 1-DH3 2441MHz Ant1 One Burst

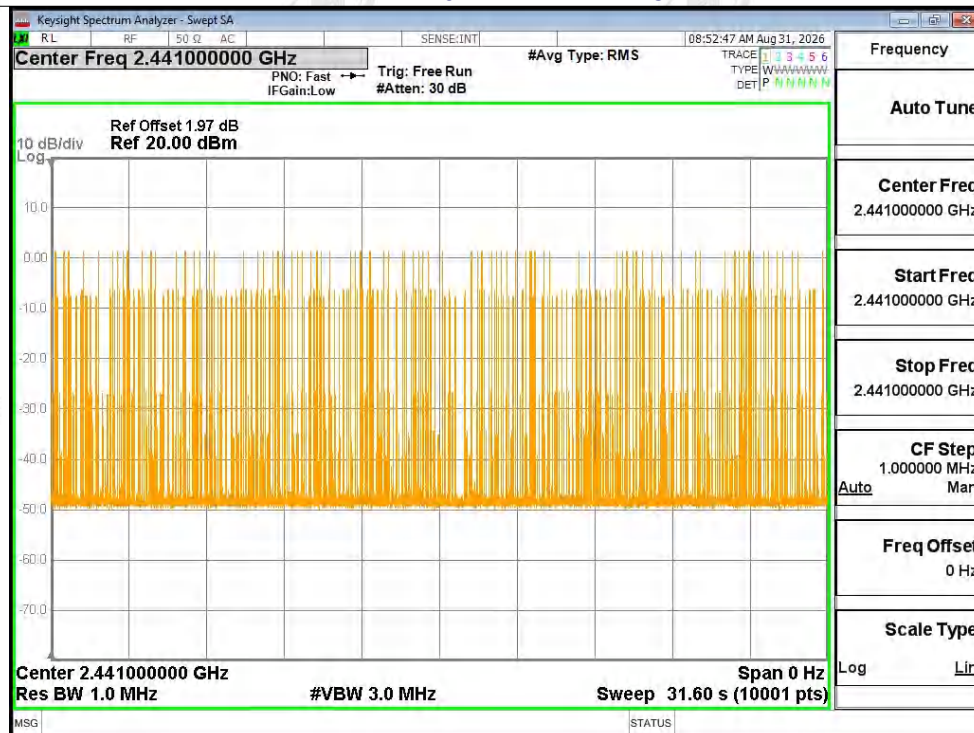


Dwell NVNT 1-DH3 2441MHz Ant1 Accumulated

ZHONGHA

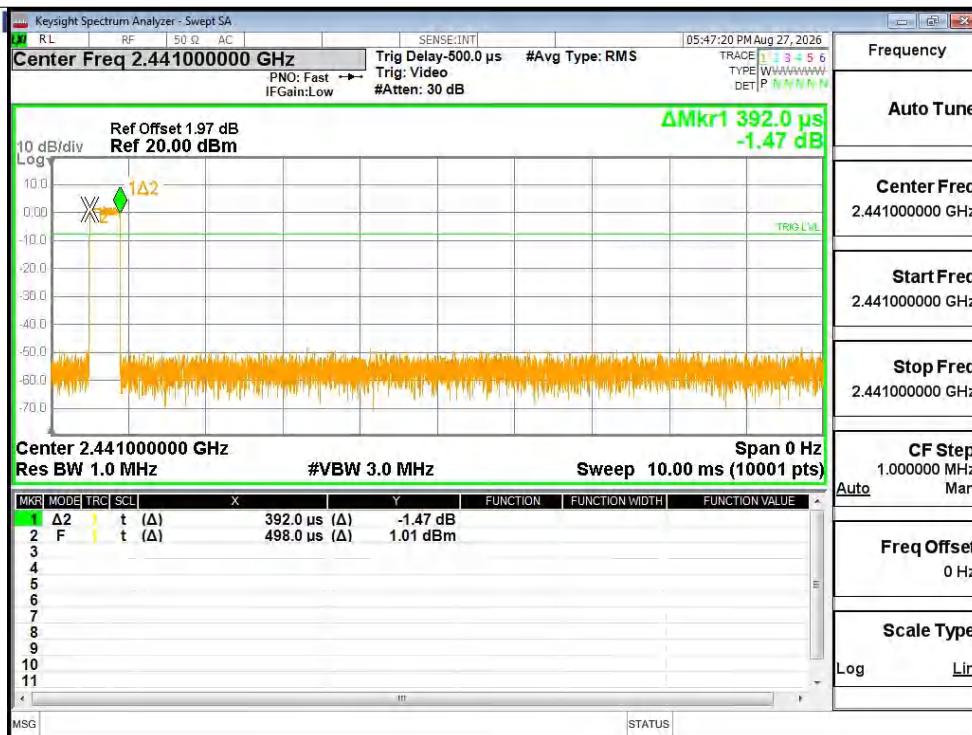


Dwell NVNT 1-DH5 2441MHz Ant1 One Burst

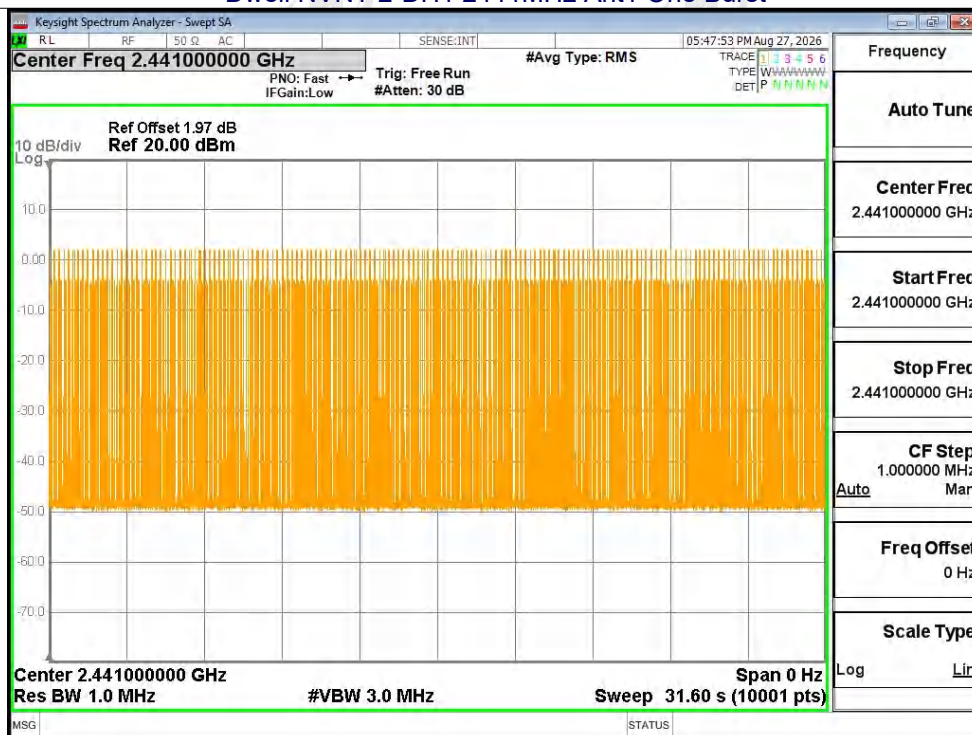


Dwell NVNT 1-DH5 2441MHz Ant1 Accumulated

ZHONGHA

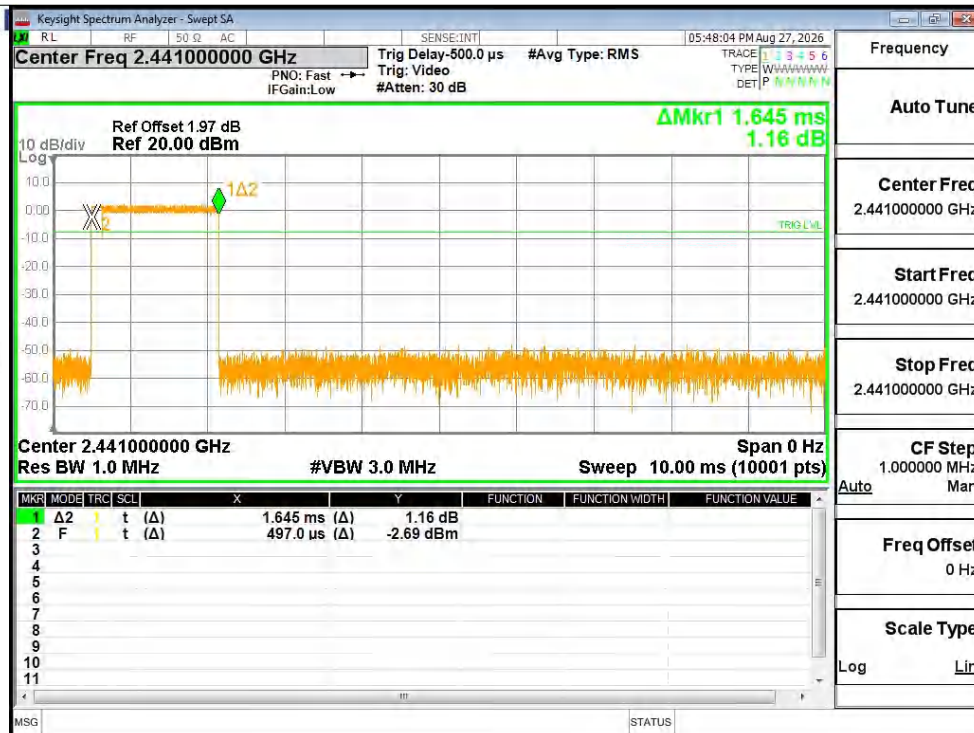


Dwell NVNT 2-DH1 2441MHz Ant1 One Burst

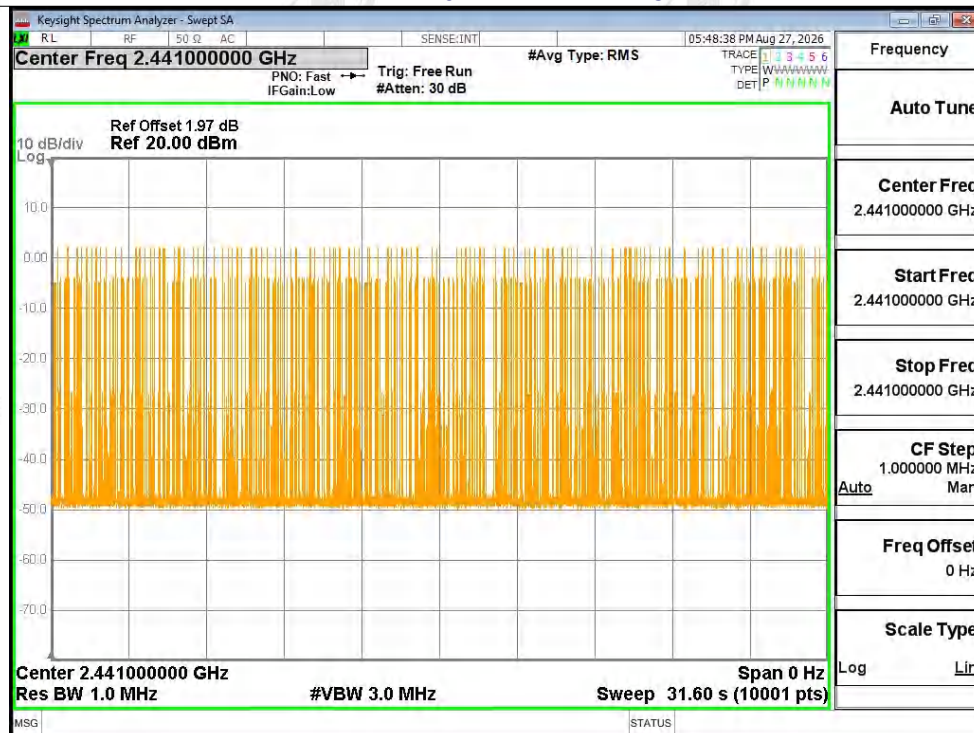


Dwell NVNT 2-DH1 2441MHz Ant1 Accumulated

ZHONGHA

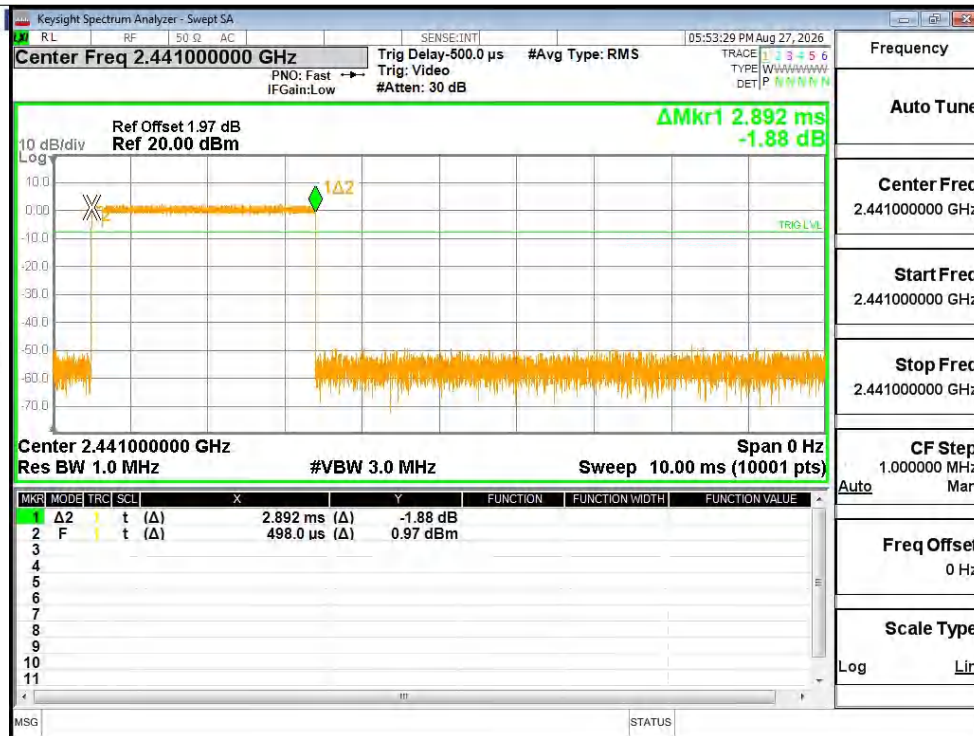


Dwell NVNT 2-DH3 2441MHz Ant1 One Burst

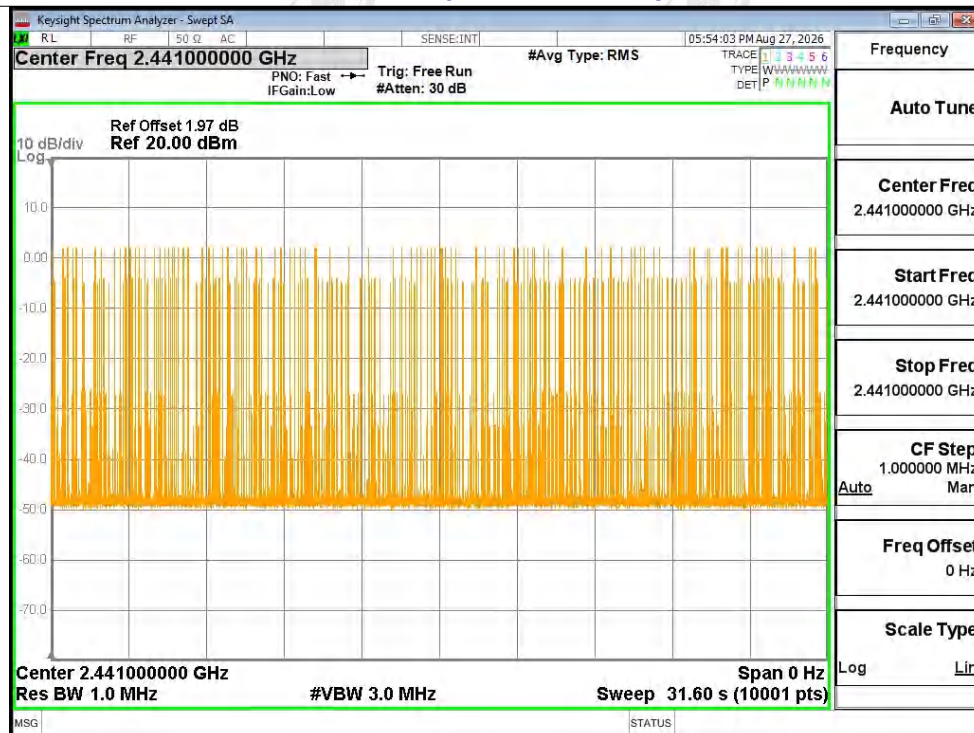


Dwell NVNT 2-DH3 2441MHz Ant1 Accumulated

ZHONGHA



Dwell NVNT 2-DH5 2441MHz Ant1 One Burst

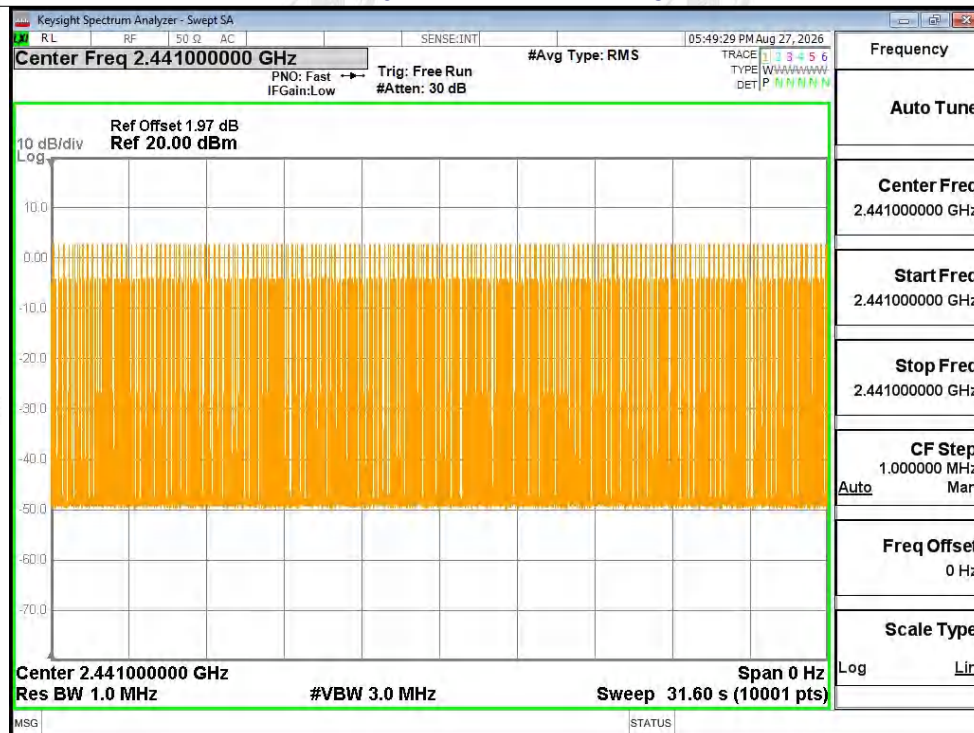


Dwell NVNT 2-DH5 2441MHz Ant1 Accumulated

ZHONGHA



Dwell NVNT 3-DH1 2441MHz Ant1 One Burst

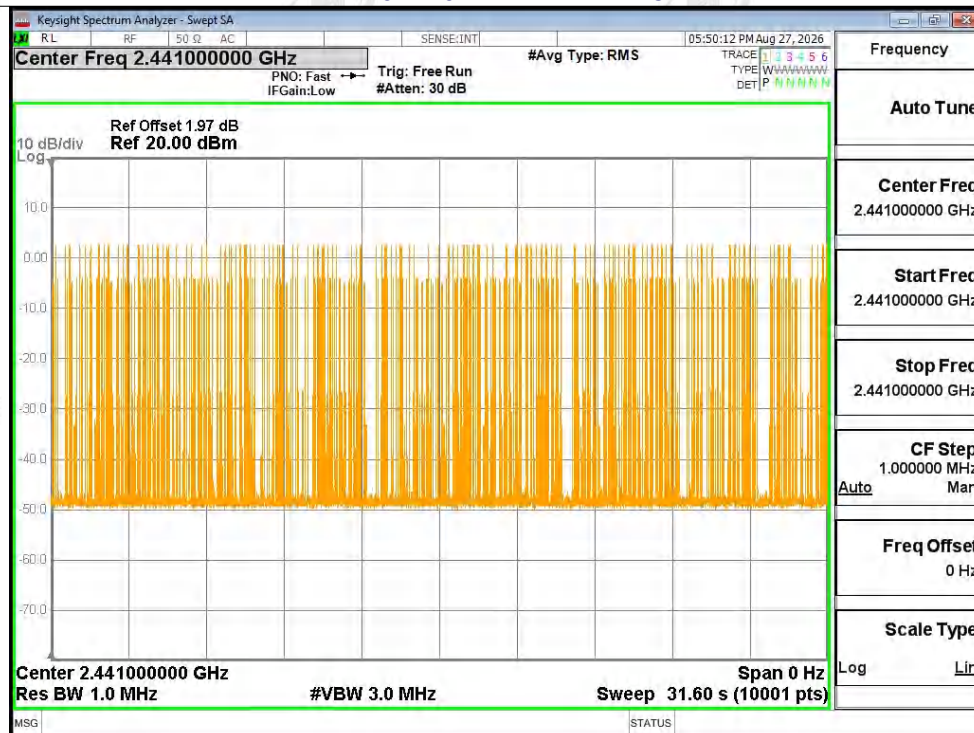


Dwell NVNT 3-DH1 2441MHz Ant1 Accumulated

ZHONGHA

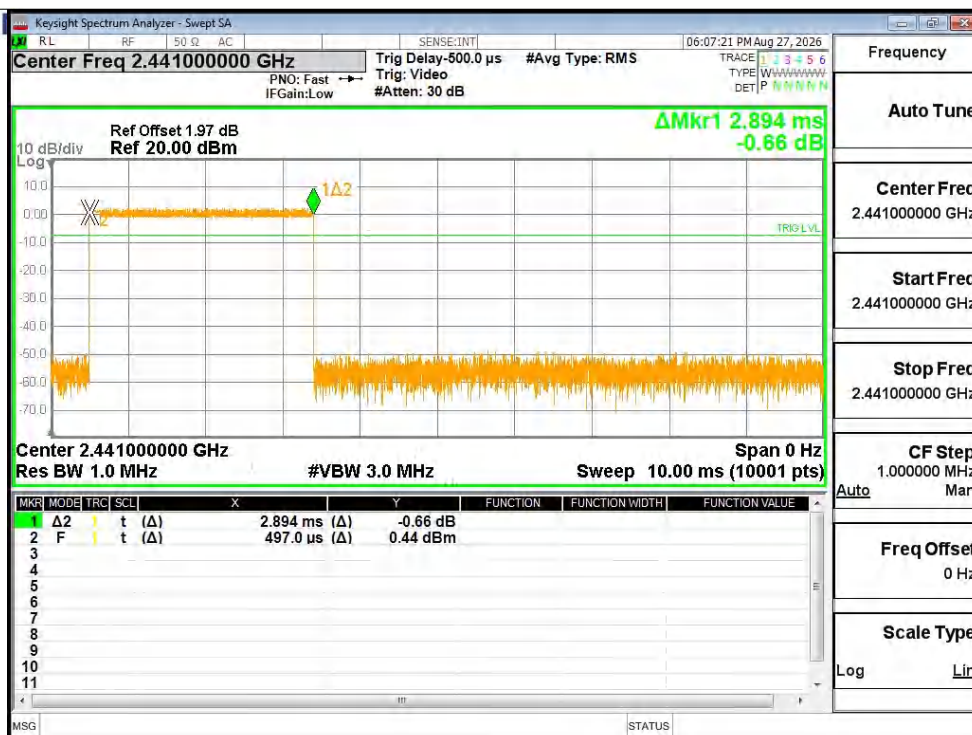


Dwell NVNT 3-DH3 2441MHz Ant1 One Burst

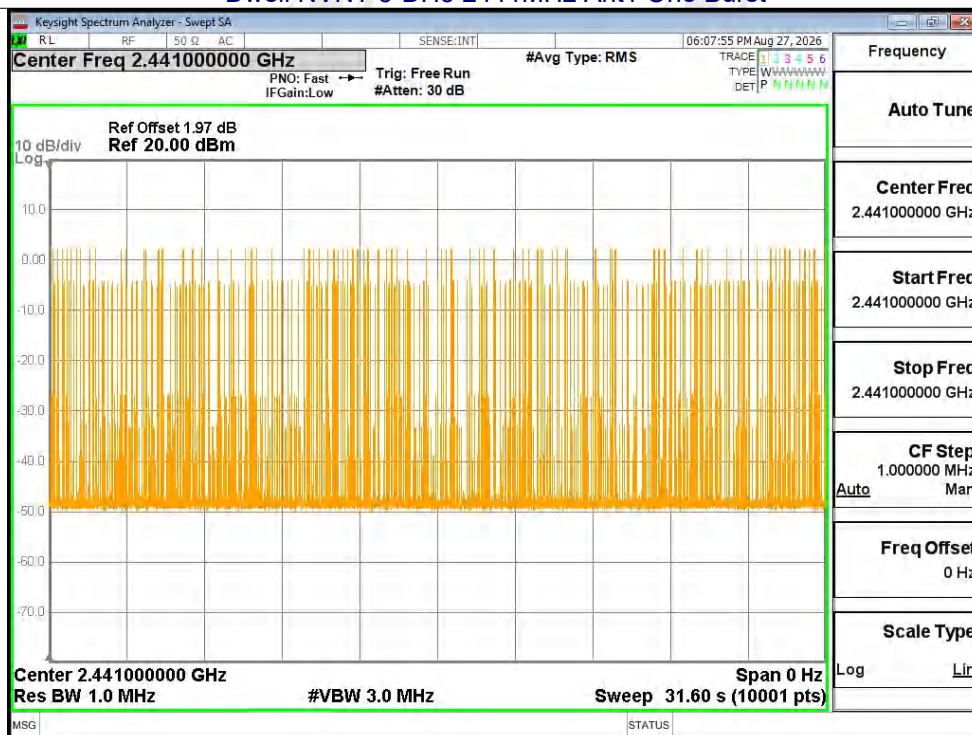


Dwell NVNT 3-DH3 2441MHz Ant1 Accumulated

ZHONGHA



Dwell NVNT 3-DH5 2441MHz Ant1 One Burst



Dwell NVNT 3-DH5 2441MHz Ant1 Accumulated



12. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(b)(4)
15.203 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, 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. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	
The antenna is Chip antenna, the best case gain of the antennas is 1.71dBi, reference to the appendix II for details	



ZHONGHAN

13. Test Setup Photo

Reference to the appendix I for details.

14. EUT Constructional Details

Reference to the appendix II for details.

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