

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

10.3-INCH reader

Model No.: SHERD-01-9BA, SHERD-0X-9BA
(X indicates the serial number from 1 to 10000, and B indicates color A to Z)

Trademark: N/A

FCC ID: 2A9YMSHERD-01

Report No.: E01A23010214F00101

Issue Date: February 22, 2023

Prepared for

Guangdong SID Technology CO.,LTD

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Dong Guan Anci Electronic Technology Co., Ltd.**

VERIFICATION OF COMPLIANCE

Applicant:	Guangdong SID Technology CO.,LTD Room 101, Building 5, No. 21, Dongke Road, Dongcheng Street, Dongguan City, Guangdong
Manufacturer:	Guangdong SID Technology CO.,LTD Room 101, Building 5, No. 21, Dongke Road, Dongcheng Street, Dongguan City, Guangdong
Product Description:	10.3-INCH reader
Trade Mark:	N/A
Model Number:	SHERD-01-9BA, SHERD-0X-9BA (X indicates the serial number from 1 to 10000, and B indicates color A to Z) (All models are the same except for the model name and color of appearance, we choose model: SHERD-01-9BA for all tests.)
Sample number:	A23010214 003

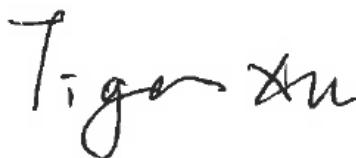
We hereby certify that:

The above equipment was tested by Dong Guan Anci Electronic Technology Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

Date of Test : January 07, 2023 to February 20, 2023



Prepared by : Duke Liu/Editor



Reviewer &
Authorized Signer : Tiger Xu/ Supervisor

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	E01A23010214F00101

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1. GENERAL INFORMATION

1.1 Product Description

Characteristics	Description
Product Name	10.3-INCH reader
Model number	SHERD-01-9BA
Input rating	DC 5V, 2A
Power Supply	DC 5V from adapter and Battery 3.8V
Kind of Device	Bluetooth Ver.4.2
Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK
Operating Frequency Range	2402-2480MHz
Number of Channels	79
Transmit Power Max(PK)	5.62dBm(0.0036W)
Antenna Type	Internal antenna
Antenna Gain	2.14dBi
Sample receipt date	January 07, 2023

1.2 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10-2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.3 Test Facility

Site Description

EMC Lab. : Accredited by FCC, May 30, 2019
Designation Number: CN1230
Test Firm Registration Number: 991798

Name of Firm : Dong Guan Anci Electronic Technology Co., Ltd.

Site Location : 1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan,
Lake Hi-tech Industrial Development Zone, Dongguan City,
Development Zone, Dongguan City, Guangdong Pr., China.

2. System Test Configuration

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of EUT was fixed in a particular direction according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

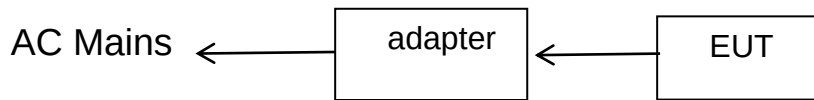


Table 2-1 Equipment Used in Tested System

Item	Equipment	Trademark	Model No.	FCC ID	Note
1.	10.3-INCH reader	N/A	SHERD-01-9BA	2A9YMSHERD-01	EUT
2.	adapter	FLYPOWER	Model:PS06C050K2000U Input: 100-240V~,50/60Hz,0.25A Output: DC 5V,2A	N/A	Support EUT

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.

3. Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	AC Power Conducted Emission	Compliant
§15.247(d),§15.209	Radiated Emission	Compliant
§15.247(a)(1)	Channel Separation test	Compliant
§15.247(a)(1)	20dB Bandwidth	Compliant
§15.247(a)(1)(iii)	Quantity of Hopping Channel	Compliant
§15.247(a)(1)(iii)	Time of Occupancy(Dwell Time)	Compliant
§15.247(b)	Max Peak output Power test	Compliant
§15.247(d)	Band edge test	Compliant
§15.203	Antenna Requirement	Compliant

4. Description of test modes

The EUT has been tested under its typical operating condition for EUT tested alone. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode A. Therefore only the test data of the mode was recorded in this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting mode is programmed. EUT is connected by com port, and transmit the control instruction via test software(BT tool V1.1.0.exe). The test software power value is set to the maximum.

The EUT has been tested under TX operating condition. This EUT is a FHSS system, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes GFSK, $\pi/4$ -DQPSK, 8DPSK have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test.

Channel	Frequency(MHz)
1	2402
40	2441
79	2480

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5. TEST SYSTEM UNCERTAINTY

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

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

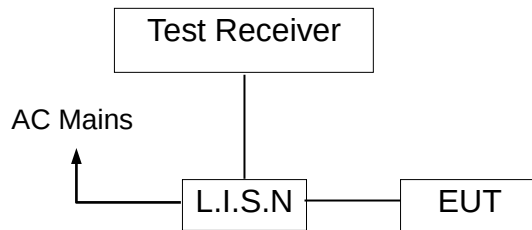
Remark: The coverage Factor ($k=2$), and measurement Uncertainty for a level of Confidence of 95%

6. Conducted Emissions Test

6.1 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used:

Item	EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Calibrated until
1.	LISN	ROHDE&SCHWARZ	ENV216	101413	2023-10-07
2.	RF Cable	N/A	ZT06S-NJ-NJ-2.5M	19044022	2023-05-12
3.	EMI Test Receiver	ROHDE&SCHWARZ	ESCI	101358	2023-05-12
4.	1# Shielded Room	chengyu	8m*4m*3.3m	N/A	2025-11-21
5.	Test Software	Farad	EZ-EMC (Ver.ANCI-3A1)	N/A	N/A

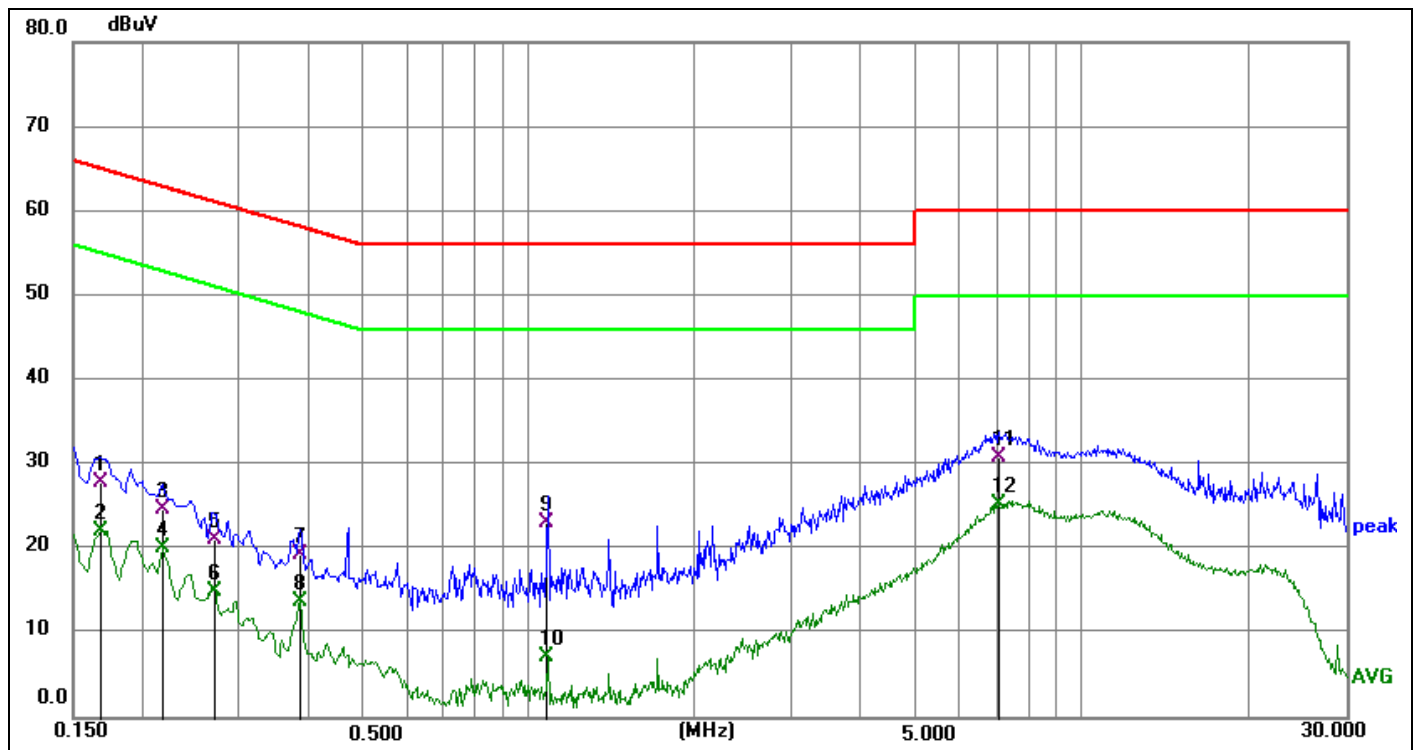
6.4 Measurement Result:

Operation Mode: TX Test Date : 2023-01-09
 Frequency Range: 0.15MHz~30MHz Temperature : 24℃
 Test Result: PASS Humidity : 58 %
 Test By: Zero

All the modulation modes were tested the data of the worst mode (8DPSK TX 2441MHz) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following data.

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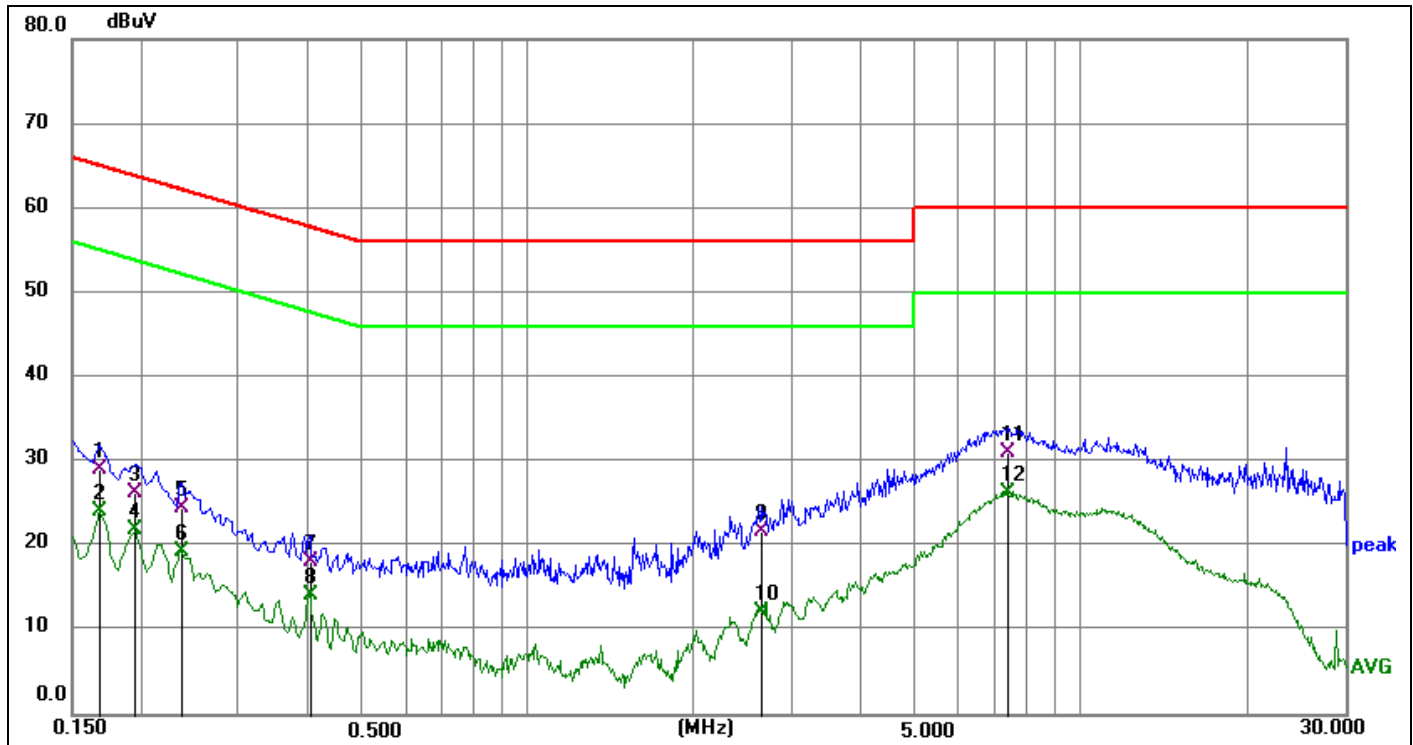


Site:	843	Phase:L1	Temperature(C):26(C)
Limit:	FCC Part 15 C Conduction(QP)	Test Time:	Humidity(%):60%
EUT:	10.3-INCH reader	Power Rating:	2023-01-09
M/N.:	SHERD-01-9BA	Test Engineer:	AC 120V/60Hz
Mode:	TX 2441		Sunshine
Note:			

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	0.1680	18.23	9.59	27.82	65.06	-37.24	QP	
2	0.1680	12.45	9.59	22.04	55.06	-33.02	AVG	
3	0.2175	15.14	9.55	24.69	62.91	-38.22	QP	
4	0.2175	10.54	9.55	20.09	52.91	-32.82	AVG	
5	0.2714	11.67	9.53	21.20	61.07	-39.87	QP	
6	0.2714	5.37	9.53	14.90	51.07	-36.17	AVG	
7	0.3840	9.53	9.77	19.30	58.19	-38.89	QP	
8	0.3840	3.94	9.77	13.71	48.19	-34.48	AVG	
9	1.0859	13.27	9.95	23.22	56.00	-32.78	QP	
10	1.0859	-2.69	9.95	7.26	46.00	-38.74	AVG	
11	7.0935	20.70	10.09	30.79	60.00	-29.21	QP	
12	7.0935	15.29	10.09	25.38	50.00	-24.62	AVG	

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

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Site:	843	Phase:	N	Temperature(C):	26(C)
Limit:	FCC Part 15 C Conduction(QP)	Test Time:	2023-01-09	Humidity(%):	60%
EUT:	10.3-INCH reader	Power Rating:	AC 120V/60Hz		
M/N.:	SHERD-01-9BA	Test Engineer:	Sunshine		
Mode:	TX 2441				
Note:					

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	0.1680	19.51	9.52	29.03	65.06	-36.03	QP	
2	0.1680	14.53	9.52	24.05	55.06	-31.01	AVG	
3	0.1949	16.76	9.59	26.35	63.83	-37.48	QP	
4	0.1949	12.35	9.59	21.94	53.83	-31.89	AVG	
5	0.2355	14.80	9.78	24.58	62.25	-37.67	QP	
6	0.2355	9.66	9.78	19.44	52.25	-32.81	AVG	
7	0.4020	8.37	9.88	18.25	57.81	-39.56	QP	
8	0.4020	4.28	9.88	14.16	47.81	-33.65	AVG	
9	2.6385	11.58	10.06	21.64	56.00	-34.36	QP	
10	2.6385	2.10	10.06	12.16	46.00	-33.84	AVG	
11	7.3725	20.87	10.13	31.00	60.00	-29.00	QP	
12	7.3725	16.13	10.13	26.26	50.00	-23.74	AVG	

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

6.5 Conducted Measurement Photos:



7. Radiated Emission Test

7.1 Measurement Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.
2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
7. Test Procedure of measurement (For Above 1GHz):
 - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
 - 2) Change the antenna polarization and repeat 1) with vertical polarization.
 - 3) Make a hardcopy of the spectrum.
 - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
 - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
 - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
 - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
 - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

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Use the following spectrum analyzer settings:

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

EMI Test Receiver	Setting
Attenuation	Auto
RB	120KHz
VB	300KHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

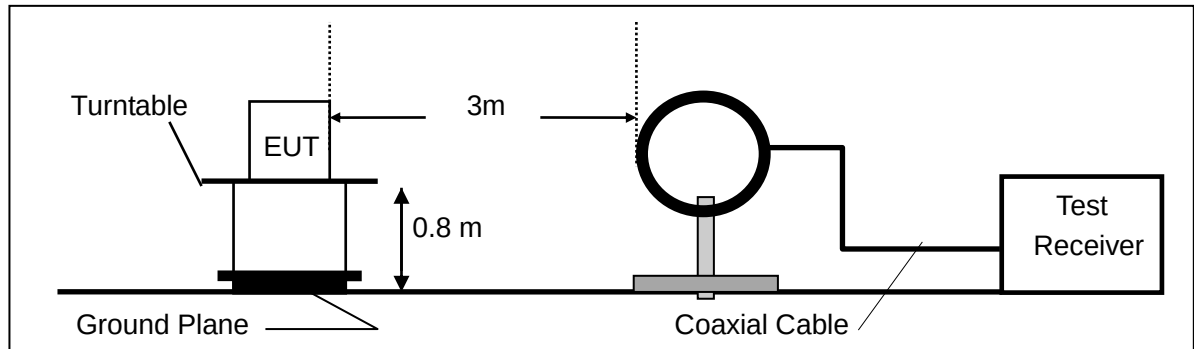
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

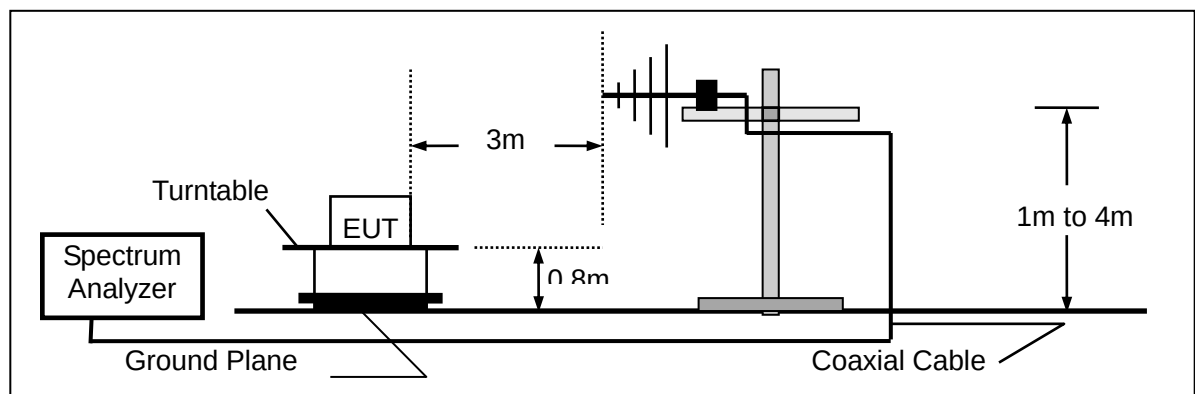
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	Average
Trace	Max hold

7.2 Test SET-UP (Block Diagram of Configuration)

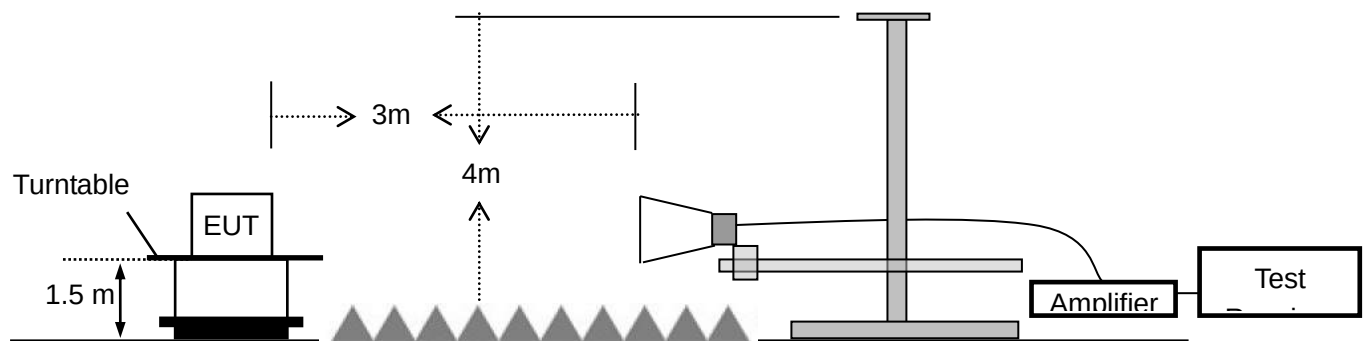
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



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7.3 Measurement Equipment Used:

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1.	EMI Test Receiver	Rohde & Schwarz	ESPI	100502	2022-11-12
2.	Pre-Amplifier	HP	8447D	2727A06172	2023-05-12
3.	Bilog Antenna	Schwarzbeck	VULB9163	VULB9163-588	2023-05-12
4.	Loop Antenna	Schwarzbeck	FMZB 1516	1516-141	2022-11-12
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	US40240623	2022-11-12
6.	Low noise Amplifiers	A-INFO	LA1018N4009	J101313052400 1	2023-05-12
7.	Horn antenna	A-INFO	LB-10180-SF	J203109061212 3	2023-05-12
8.	Broadband RF Power Amplifier	AEROFLEX	AEROFLEX10 0KHz-40GHz	J101313052400 1	2022-11-12
9.	DRG Horn Antenna	A.H.SYSTEMS	SAS-574	J203109061212 3	2022-11-12
10.	RF Cable	Gigalink Microwave	ZT40-2.92J-2. 92J-2m	N/A	2022-11-12
11.	RF Cable	Gigalink Microwave	ZT40-2.92J-2. 92J-0.3m	N/A	2022-11-12
12.	RF Cable	N/A	N/A	6#	2023-05-12
13.	RF Cable	N/A	N/A	1-1#	2023-05-12
14.	RF Cable	N/A	N/A	1-2#	2023-05-12
15.	RF Cable	N/A	N/A	7#	2023-05-12
16.	3m Semi-anechoic Chamber	chengyu	9m*6m*6m	N/A	2023-05-12
17.	Test Software	Farad	EZ-EMC Ver:ANCI-3A1	N/A	N/A

7.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

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

15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

Remark 1. Emission level in dBuV/m=20 log (uV/m)

: 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

7.5 Measurement Result

Operation Mode:	TX	Test Date :	2023-01-09
Test By:	Sunshine	Temperature :	25°C
Test Result:	PASS	Humidity :	58 %
Measured Distance:	3m		

Below 30MHz:

Freq.	Ant.Pol.	Emission	Limit 3m	Over
(MHz)	H/V	Level	(dBuV/m)	(dB)
		(dBuV/m)		
--	--	--	--	--

Note: The low frequency, which started from 9KHz-30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

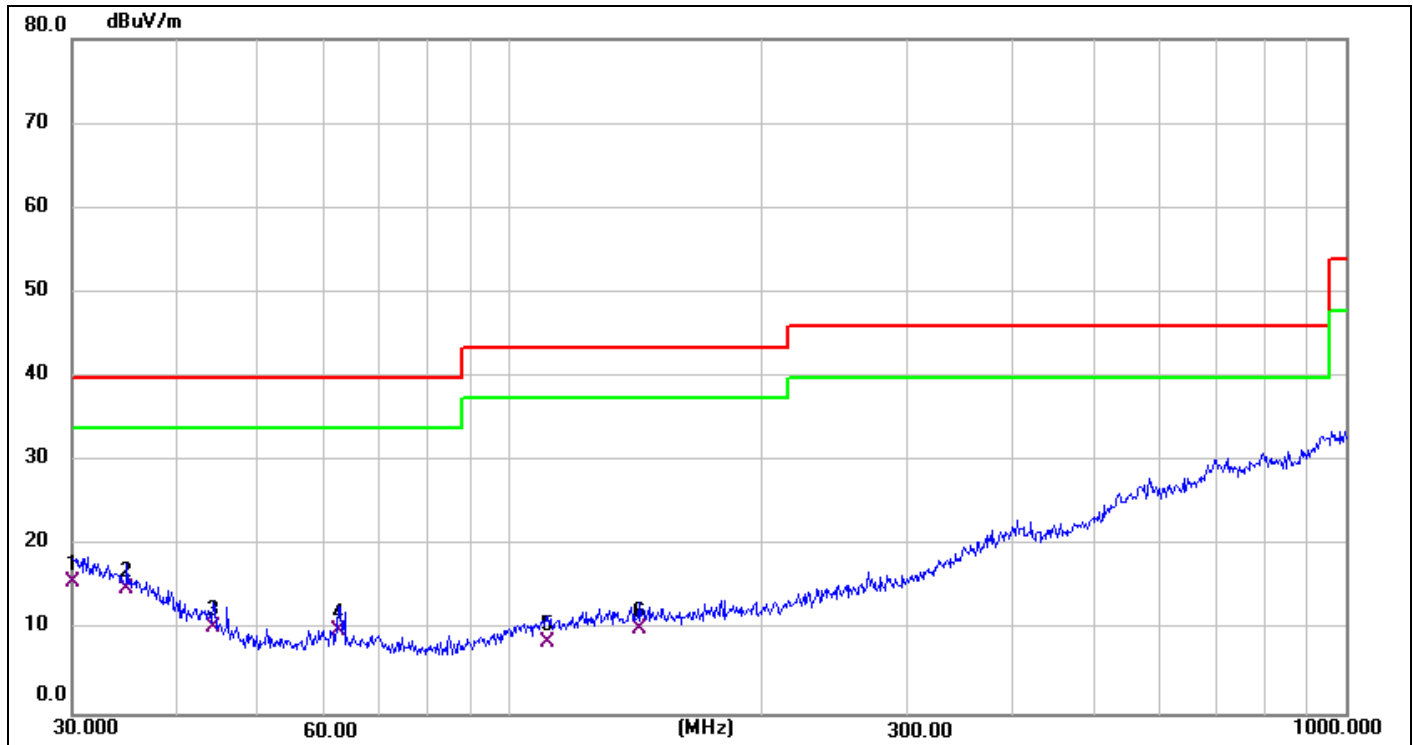
Below 1000MHz:

Pass.

All the modulation modes were tested the data of the worst mode (8DPSK TX 2480MHz) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following data.

E01A23010214F00101

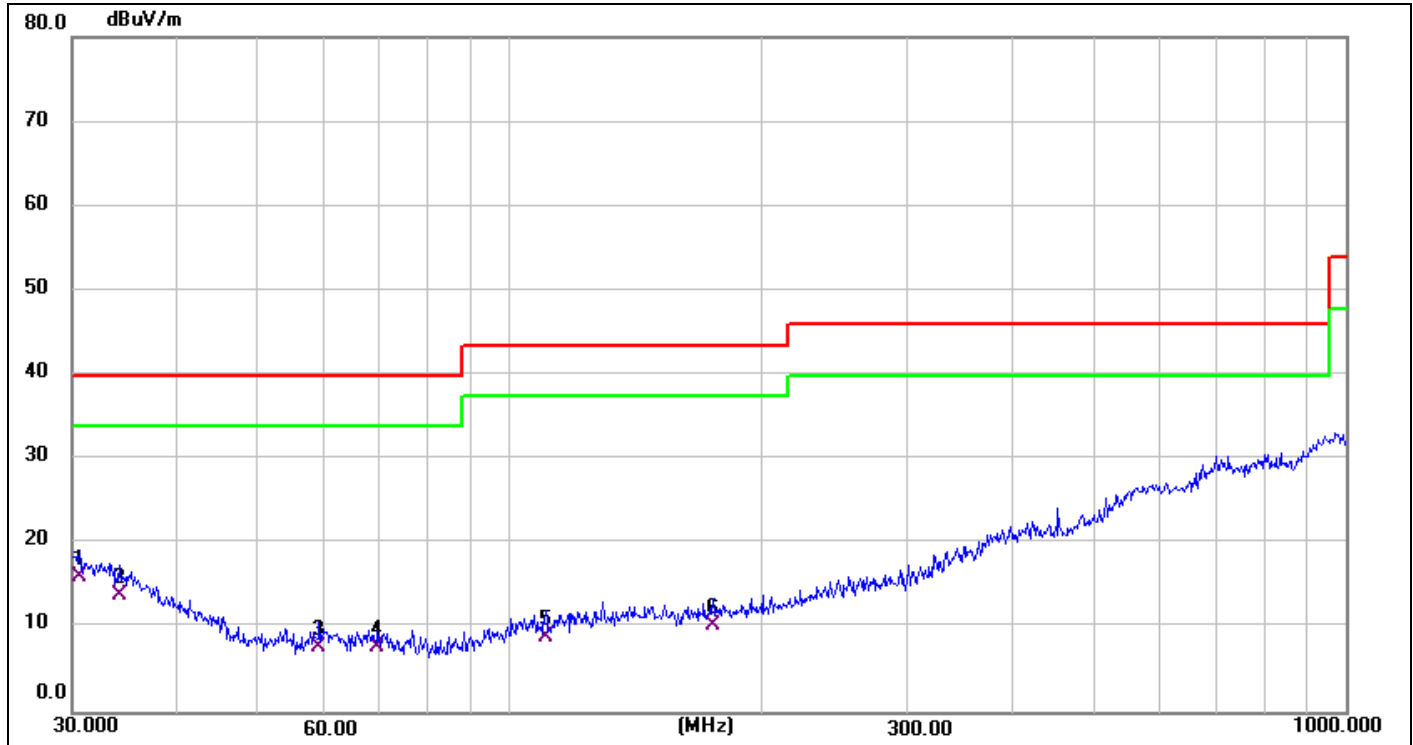


Site:	LAB	Antenna::Horizontal	Temperature(C):26(C)
Limit:	FCC Part 15 C 3m Radiation		Humidity(%):60%
EUT:	10.3-INCH reader	Test Time:	2023-01-09
M/N.:	SHERD-01-9BA	Power Rating:	Battery 3.8V
Mode:	TX2480	Test Engineer:	Sunshine
Note:			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1 *	30.0000	24.34	-8.56	15.78	40.00	-24.22	QP	200	45	
2	34.8822	26.37	-11.36	15.01	40.00	-24.99	QP	200	36	
3	44.2752	27.07	-16.66	10.41	40.00	-29.59	QP	200	48	
4	62.4313	41.91	-31.94	9.97	40.00	-30.03	QP	200	74	
5	111.3468	39.92	-31.23	8.69	43.50	-34.81	QP	200	76	
6	142.8243	41.80	-31.51	10.29	43.50	-33.21	QP	200	79	

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

E01A23010214F00101



Site:	LAB	Antenna:: Vertical	Temperature(C): 26(C)
Limit:	FCC Part 15 C 3m Radiation		Humidity(%): 60%
EUT:	10.3-INCH reader	Test Time:	2023-01-09
M/N.:	SHERD-01-9BA	Power Rating:	Battery 3.8V
Mode:	TX2480	Test Engineer:	Sunshine
Note:			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1 *	30.6378	25.14	-8.93	16.21	40.00	-23.79	QP	100	39	
2	34.2760	25.03	-11.02	14.01	40.00	-25.99	QP	100	42	
3	59.2324	39.85	-31.99	7.86	40.00	-32.14	QP	100	36	
4	69.6004	39.65	-31.83	7.82	40.00	-32.18	QP	100	78	
5	110.5686	40.34	-31.24	9.10	43.50	-34.40	QP	100	79	
6	175.0367	42.15	-31.79	10.36	43.50	-33.14	QP	100	85	

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

E01A23010214F00101

Above 1000MHz~10th Harmonics:**Please refer to the following data.**

Operation Mode: GFSK (CH1: 2402MHz) Test Date : 2023-01-09

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4804	V	94.61	75.32	-32.3	62.31	43.02	74	54	-11.69	-10.98
7206	V	98.5	78.94	-37.25	61.25	41.69	74	54	-12.75	-12.31
9608	V	100.37	80.69	-39.8	60.57	40.89	74	54	-13.43	-13.11
12010	V	98.12	79.13	-40.5	57.62	38.63	74	54	-16.38	-15.37
14412	V	98.05	79.28	-41.7	56.35	37.58	74	54	-17.65	-16.42
16814	V	95.36	76.58	-40	55.36	36.58	74	54	-18.64	-17.42
4804	H	93.43	74.98	-31.4	62.03	43.58	74	54	-11.97	-10.42
7206	H	96.63	77.86	-35.5	61.13	42.36	74	54	-12.87	-11.64
9608	H	98.85	79.5	-38.3	60.55	41.2	74	54	-13.45	-12.8
12010	H	96.62	77.32	-39	57.62	38.32	74	54	-16.38	-15.68
14412	H	98.33	78.47	-42	56.33	36.47	74	54	-17.67	-17.53
16814	H	94.77	75.65	-39.3	55.47	36.35	74	54	-18.53	-17.65

Operation Mode: GFSK (CH40: 2441MHz) Test Date : 2023-01-09

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4882	V	94.67	75.55	-32.3	62.37	43.25	74	54	-11.63	-10.75
7323	V	97.56	78.4	-37.2	60.36	41.2	74	54	-13.64	-12.8
9764	V	98.23	79.07	-39.6	58.63	39.47	74	54	-15.37	-14.53
12205	V	97.76	79.13	-40.5	57.26	38.63	74	54	-16.74	-15.37
14646	V	97.32	78.81	-41	56.32	37.81	74	54	-17.68	-16.19
17087	V	96.12	77.22	-41.1	55.02	36.12	74	54	-18.98	-17.88
4882	H	93.73	74.39	-31.6	62.13	42.79	74	54	-11.87	-11.21
7323	H	96.01	76.95	-35.7	60.31	41.25	74	54	-13.69	-12.75
9764	H	96.61	77.95	-38.3	58.31	39.65	74	54	-15.69	-14.35
12205	H	96.32	77.14	-39	57.32	38.14	74	54	-16.68	-15.86
14646	H	98.32	79.85	-42	56.32	37.85	74	54	-17.68	-16.15
17087	H	96.97	77.97	-41.5	55.47	36.47	74	54	-18.53	-17.53

E01A23010214F00101

Operation Mode: GFSK (CH79: 2480MHz) Test Date : 2023-01-09

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4960	V	94.61	75.88	-32.3	62.31	43.58	74	54	-11.69	-10.42
7440	V	97.52	78.78	-37.2	60.32	41.58	74	54	-13.68	-12.42
9920	V	99.23	79.92	-39.6	59.63	40.32	74	54	-14.37	-13.68
12400	V	98.02	79.35	-40.7	57.32	38.65	74	54	-16.68	-15.35
14880	V	97.47	78.85	-41	56.47	37.85	74	54	-17.53	-16.15
17360	V	96.41	77.68	-41.1	55.31	36.58	74	54	-18.69	-17.42
4960	H	92.75	74.29	-31.6	61.15	42.69	74	54	-12.85	-11.31
7440	H	96.02	77.28	-35.7	60.32	41.58	74	54	-13.68	-12.42
9920	H	97.46	78.42	-38.1	59.36	40.32	74	54	-14.64	-13.68
12400	H	96.12	77.69	-39	57.12	38.69	74	54	-16.88	-15.31
14880	H	98.32	79.84	-42	56.32	37.84	74	54	-17.68	-16.16
17360	H	96.97	78.08	-41.5	55.47	36.58	74	54	-18.53	-17.42

Operation Mode: Pi/4-DQPSK (CH1: 2402MHz) Test Date : 2023-01-09

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4804	V	94.99	75.82	-32.3	62.69	43.52	74	54	-11.31	-10.48
7206	V	97.51	79.05	-37.2	60.31	41.85	74	54	-13.69	-12.15
9608	V	99.43	80.11	-39.8	59.63	40.31	74	54	-14.37	-13.69
12010	V	98.95	80.01	-40.5	58.45	39.51	74	54	-15.55	-14.49
14412	V	98.02	78.75	-41.7	56.32	37.05	74	54	-17.68	-16.95
16814	V	95.28	76.48	-40	55.28	36.48	74	54	-18.72	-17.52
4804	H	93.73	75.18	-31.6	62.13	43.58	74	54	-11.87	-10.42
7206	H	95.82	77.08	-35.5	60.32	41.58	74	54	-13.68	-12.42
9608	H	97.93	78.62	-38.3	59.63	40.32	74	54	-14.37	-13.68
12010	H	97.72	79.03	-39.4	58.32	39.63	74	54	-15.68	-14.37
14412	H	98.32	79.51	-42	56.32	37.51	74	54	-17.68	-16.49
16814	H	94.44	75.55	-39.3	55.14	36.25	74	54	-18.86	-17.75

E01A23010214F00101

Operation Mode: Pi/4-DQPSK (CH40: 2441MHz) Test Date : 2023-01-09

Freq. (MHz)	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor dB	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4882	V	95.55	75.56	-32.3	63.25	43.26	74	54	-10.75	-10.74
7323	V	98.4	79.35	-37.2	61.2	42.15	74	54	-12.8	-11.85
9764	V	99.43	80.51	-39.8	59.63	40.71	74	54	-14.37	-13.29
12205	V	98.97	80.05	-40.5	58.47	39.55	74	54	-15.53	-14.45
14646	V	98.58	79.25	-41	57.58	38.25	74	54	-16.42	-15.75
17087	V	96.31	77.57	-41.1	55.21	36.47	74	54	-18.79	-17.53
4882	H	94.71	75.18	-31.6	63.11	43.58	74	54	-10.89	-10.42
7323	H	96.52	77.86	-35.5	61.02	42.36	74	54	-12.98	-11.64
9764	H	97.77	78.62	-38.3	59.47	40.32	74	54	-14.53	-13.68
12205	H	97.63	78.58	-39	58.63	39.58	74	54	-15.37	-14.42
14646	H	98.32	79.52	-42	56.32	37.52	74	54	-17.68	-16.48
17087	H	96.56	77.98	-41.4	55.16	36.58	74	54	-18.84	-17.42

Operation Mode: Pi/4-DQPSK (CH79: 2480MHz) Test Date : 2023-01-09

Freq. (MHz)	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor dB	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4960	V	94.62	75.95	-32.3	62.32	43.65	74	54	-11.68	-10.35
7440	V	97.55	78.56	-37.2	60.35	41.36	74	54	-13.65	-12.64
9920	V	99.43	80.12	-39.8	59.63	40.32	74	54	-14.37	-13.68
12400	V	98.82	80.13	-40.5	58.32	39.63	74	54	-15.68	-14.37
14880	V	97.25	78.85	-41	56.25	37.85	74	54	-17.75	-16.15
17360	V	96.57	77.98	-41.1	55.47	36.88	74	54	-18.53	-17.12
4960	H	94.01	75.18	-31.6	62.41	43.58	74	54	-11.59	-10.42
7440	H	95.13	76.02	-35.5	59.63	40.52	74	54	-14.37	-13.48
9920	H	96.93	78.1	-38.3	58.63	39.8	74	54	-15.37	-14.2
12400	H	95.32	76.65	-39	56.32	37.65	74	54	-17.68	-16.35
14880	H	97.58	78.47	-42	55.58	36.47	74	54	-18.42	-17.53
17360	H	96.82	78.08	-41.5	55.32	36.58	74	54	-18.68	-17.42

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Operation Mode: 8DPSK (CH1: 2402MHz) Test Date : 2023-01-09

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4804	V	96.08	76.53	-32.3	63.78	44.23	74	54	-10.22	-9.77
7206	V	99.5	80.22	-37.2	62.3	43.02	74	54	-11.7	-11
9608	V	100.12	81.03	-39.8	60.32	41.23	74	54	-13.68	-12.8
12010	V	99.13	80.08	-40.5	58.63	39.58	74	54	-15.37	-14.4
14412	V	99.33	80.3	-41.7	57.63	38.6	74	54	-16.37	-15.4
16814	V	96.02	77.85	-40	56.02	37.85	74	54	-17.98	-16.2
4804	H	95.05	75.92	-31.6	63.45	44.32	74	54	-10.55	-9.68
7206	H	97.63	77.86	-35.5	62.13	42.36	74	54	-11.87	-11.6
9608	H	98.43	79.53	-38.3	60.13	41.23	74	54	-13.87	-12.8
12010	H	97.36	78.63	-39	58.36	39.63	74	54	-15.64	-14.4
14412	H	99.42	80.63	-42	57.42	38.63	74	54	-16.58	-15.4
16814	H	94.66	75.88	-39.3	55.36	36.58	74	54	-18.64	-17.4

Operation Mode: 8DPSK (CH40: 2441MHz) Test Date : 2023-01-09

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4882	V	95.5	76.32	-32.3	63.2	44.02	74	54	-10.8	-9.98
7323	V	98.54	79.56	-37.2	61.34	42.36	74	54	-12.66	-11.64
9764	V	99.16	79.92	-39.8	59.36	40.12	74	54	-14.64	-13.88
12205	V	98.06	79.04	-40.5	57.56	38.54	74	54	-16.44	-15.46
14646	V	97.32	78.58	-41	56.32	37.58	74	54	-17.68	-16.42
17087	V	96.57	77.48	-41.1	55.47	36.38	74	54	-18.53	-17.62
4882	H	94.78	76.18	-31.6	63.18	44.58	74	54	-10.82	-9.42
7323	H	96.73	77.86	-35.5	61.23	42.36	74	54	-12.77	-11.64
9764	H	97.66	78.62	-38.3	59.36	40.32	74	54	-14.64	-13.68
12205	H	96.15	77.69	-39	57.15	38.69	74	54	-16.85	-15.31
14646	H	98.32	79.85	-42	56.32	37.85	74	54	-17.68	-16.15
17087	H	96.64	77.75	-41.5	55.14	36.25	74	54	-18.86	-17.75

E01A23010214F00101

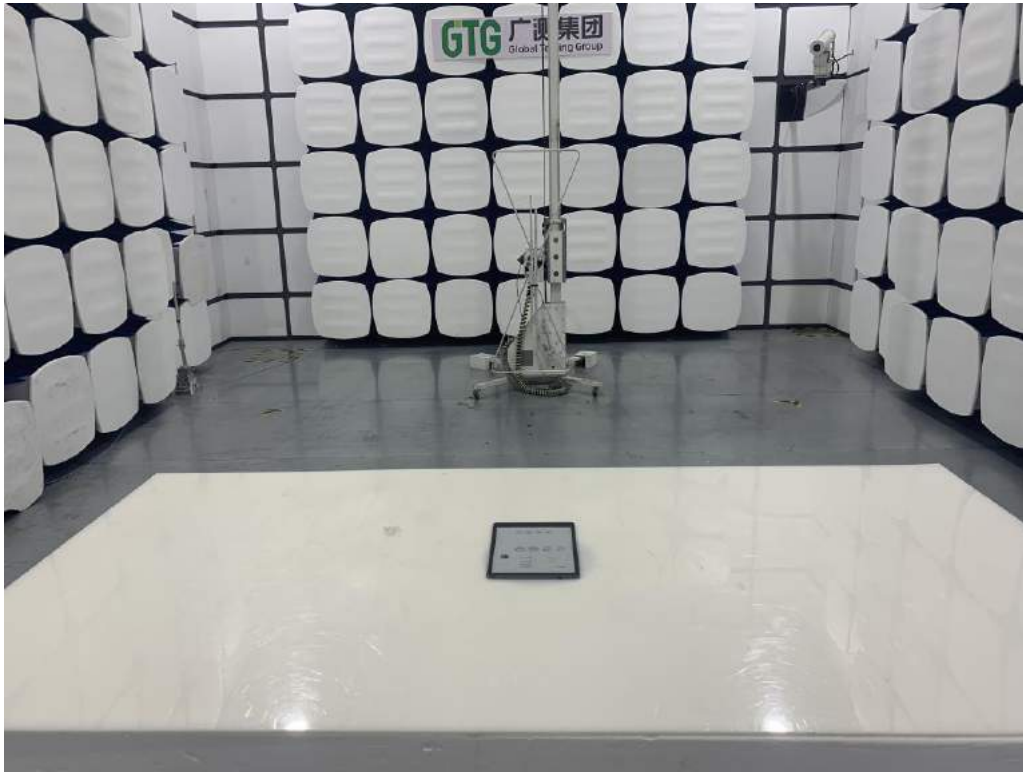
Operation Mode: 8DPSK (CH79: 2480MHz) Test Date : 2023-01-09

Freq. (MHz)	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor dB	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4960	V	94.99	75.99	-32.3	62.69	43.69	74	54	-11.31	-10.31
7440	V	97.45	78.72	-37.2	60.25	41.52	74	54	-13.75	-12.48
9920	V	99.16	79.93	-39.8	59.36	40.13	74	54	-14.64	-13.87
12400	V	98.04	79	-40.5	57.54	38.5	74	54	-16.46	-15.5
14880	V	97.58	78.58	-41	56.58	37.58	74	54	-17.42	-16.42
17360	V	96.42	77.45	-41.1	55.32	36.35	74	54	-18.68	-17.65
4960	H	93.91	74.7	-31.6	62.31	43.1	74	54	-11.69	-10.9
7440	H	95.86	77.19	-35.5	60.36	41.69	74	54	-13.64	-12.31
9920	H	97.47	78.55	-38.3	59.17	40.25	74	54	-14.83	-13.75
12400	H	96.68	77.11	-39	57.68	38.11	74	54	-16.32	-15.89
14880	H	98.58	79.85	-42	56.58	37.85	74	54	-17.42	-16.15
17360	H	96.97	77.97	-41.5	55.47	36.47	74	54	-18.53	-17.53

Other harmonics emissions are lower than 20dB below the allowable limit.

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level+ Probe Factor +Cable Loss.
 - (3) The average measurement was not performed when the peak measured data under the limit of average detection.
 - (4) Measuring frequencies from 1GHz to 25GHz.

7.5 Radiated Measurement Photos:



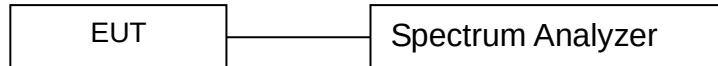
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8. Channel Separation test

8.1 Measurement Procedure

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

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CALIBRATED UNTIL
Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
RF Test Software	MWRF-test	MTS 8310	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12

8.4 Measurement Results:

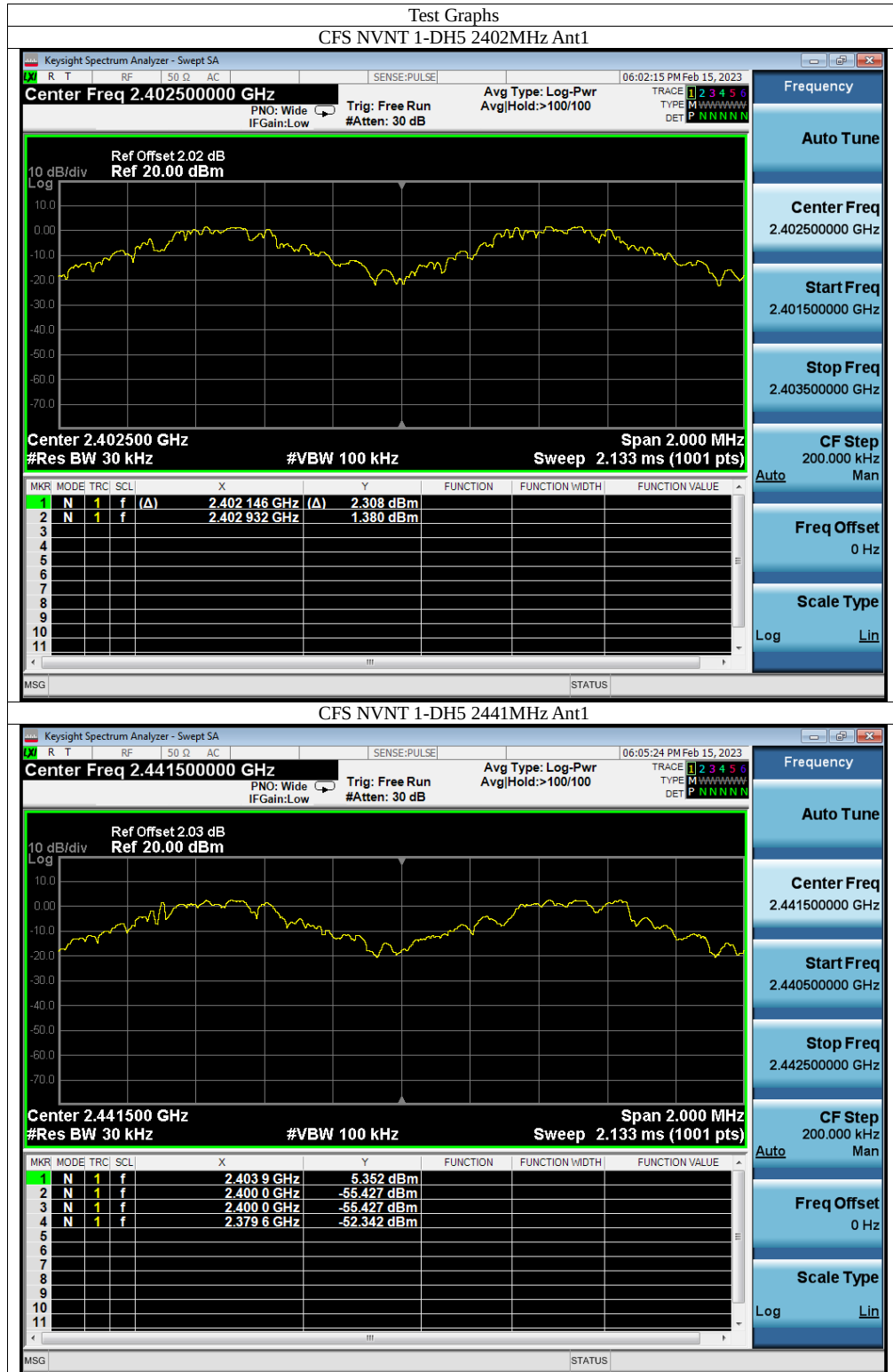
Refer to attached data chart.

E01A23010214F00101

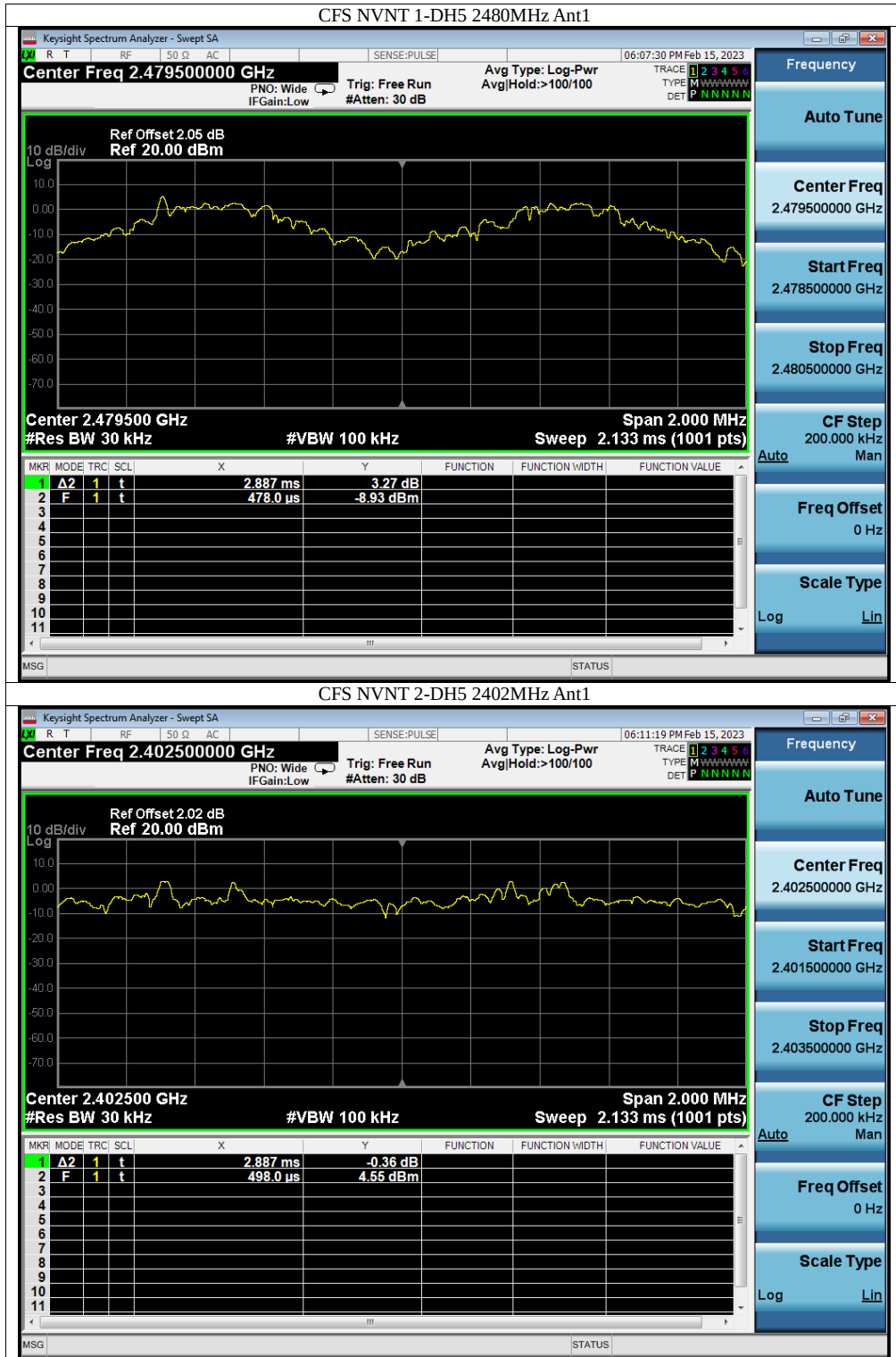
Spectrum Detector: PK Test Date : 2023-02-15
 Test By: Sunshine Temperature : 24°C
 Test Result: PASS Humidity : 53 %

Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
Ant1	2401.932	2402.928	0.996	0.685	Pass
Ant1	2441.004	2442.136	1.132	0.687	Pass
Ant1	2478.806	2480.02	1.214	0.687	Pass
Ant1	2401.808	2402.816	1.008	0.687	Pass
Ant1	2440.818	2441.936	1.118	0.686	Pass
Ant1	2478.922	2479.804	0.882	0.688	Pass
Ant1	2402.104	2402.816	0.712	0.686	Pass
Ant1	2440.826	2441.832	1.006	0.686	Pass
Ant1	2478.832	2480.142	1.31	0.687	Pass

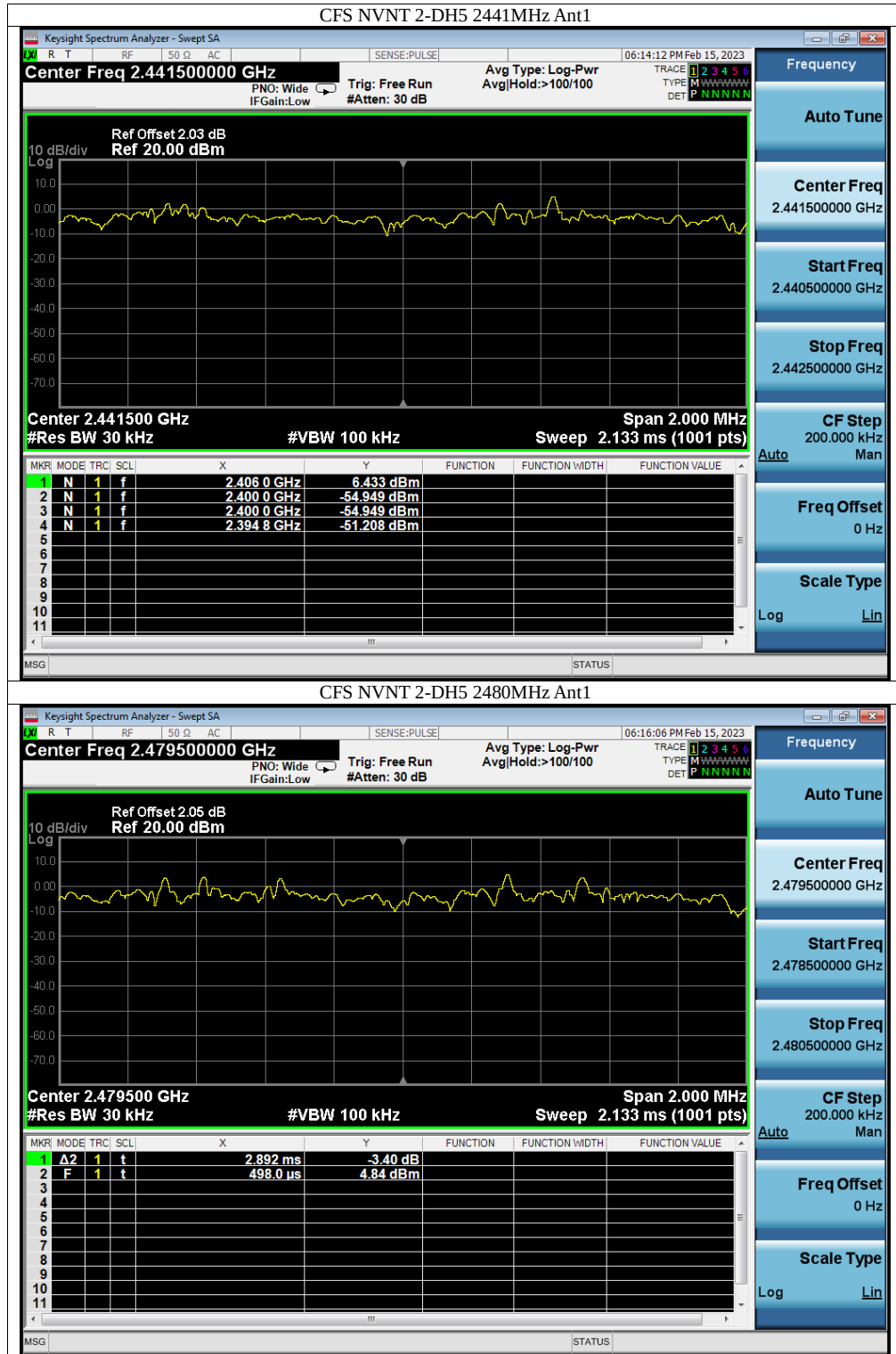
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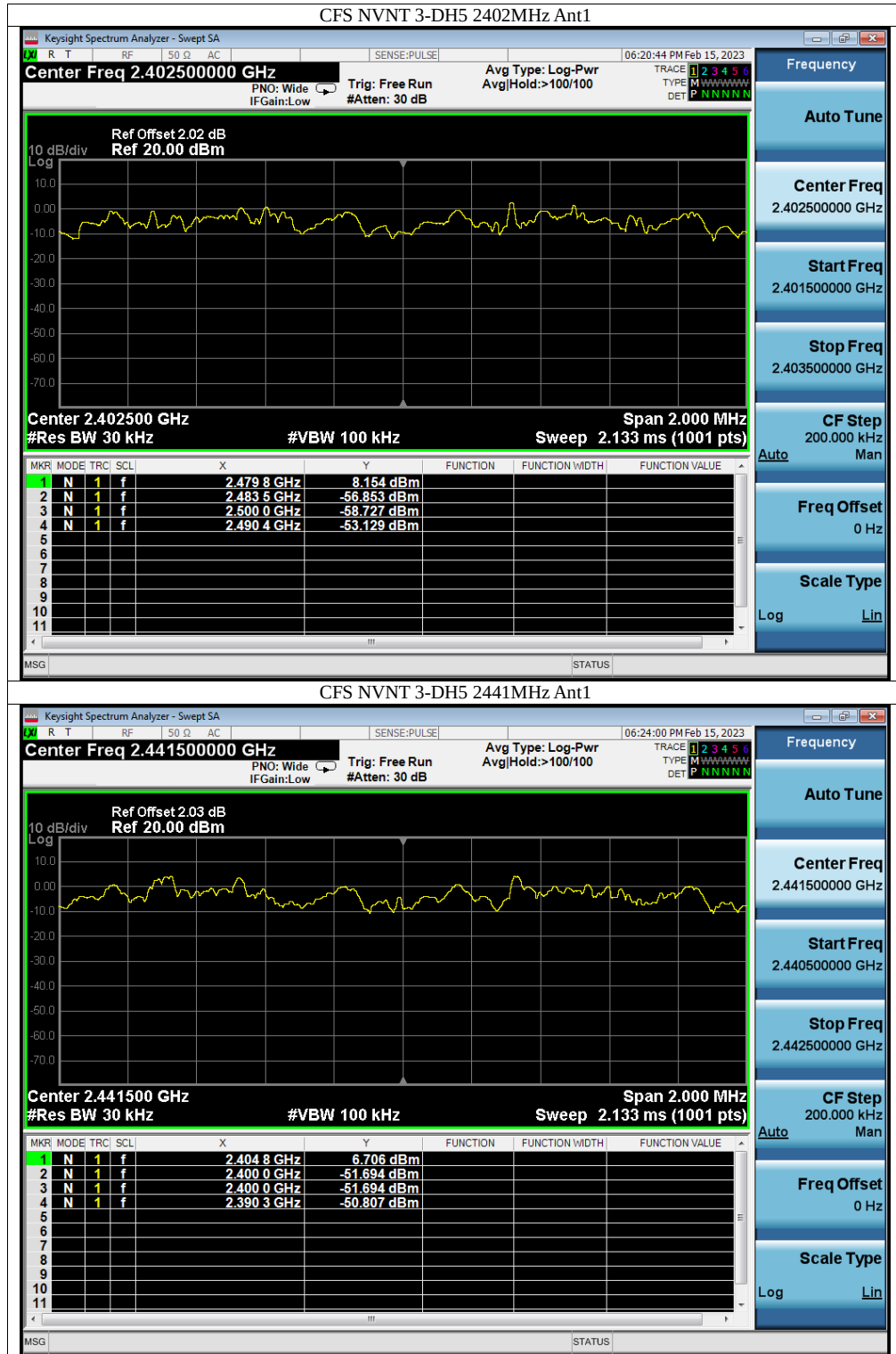
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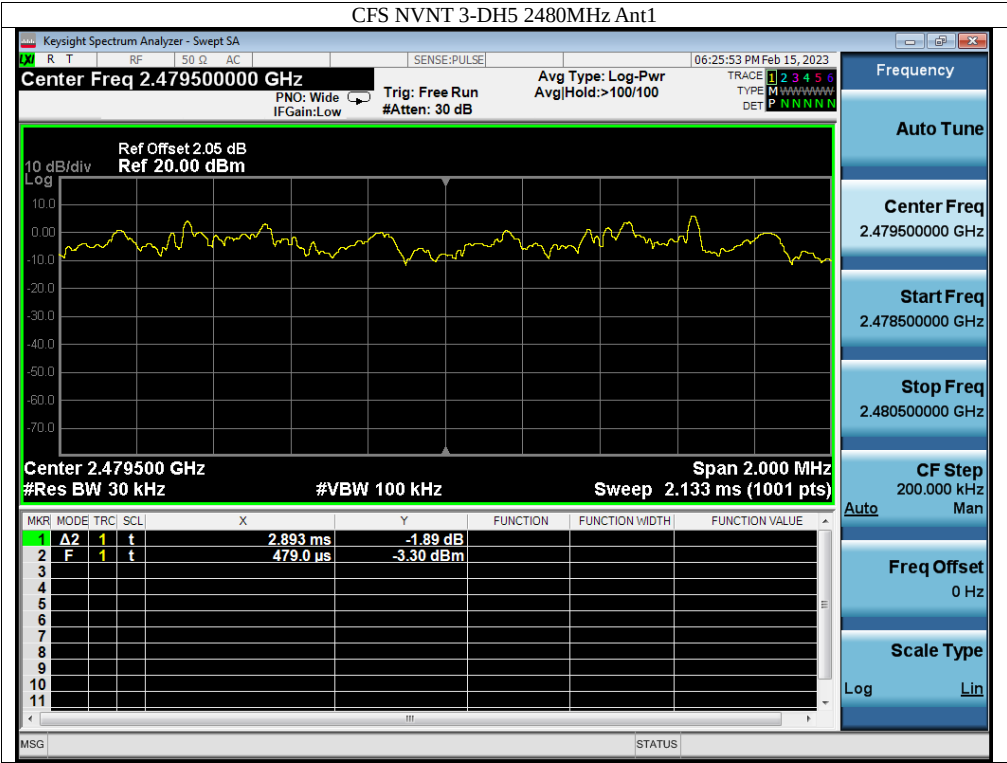
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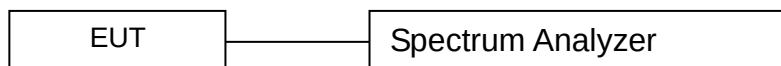
E01A23010214F00101

9. 20dB Bandwidth test

9.1 Measurement Procedure

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

9.2 Test SET-UP (Block Diagram of Configuration)



9.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CALIBRATED UNTIL
Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
RF Test Software	MWRF-test	MTS 8310	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12

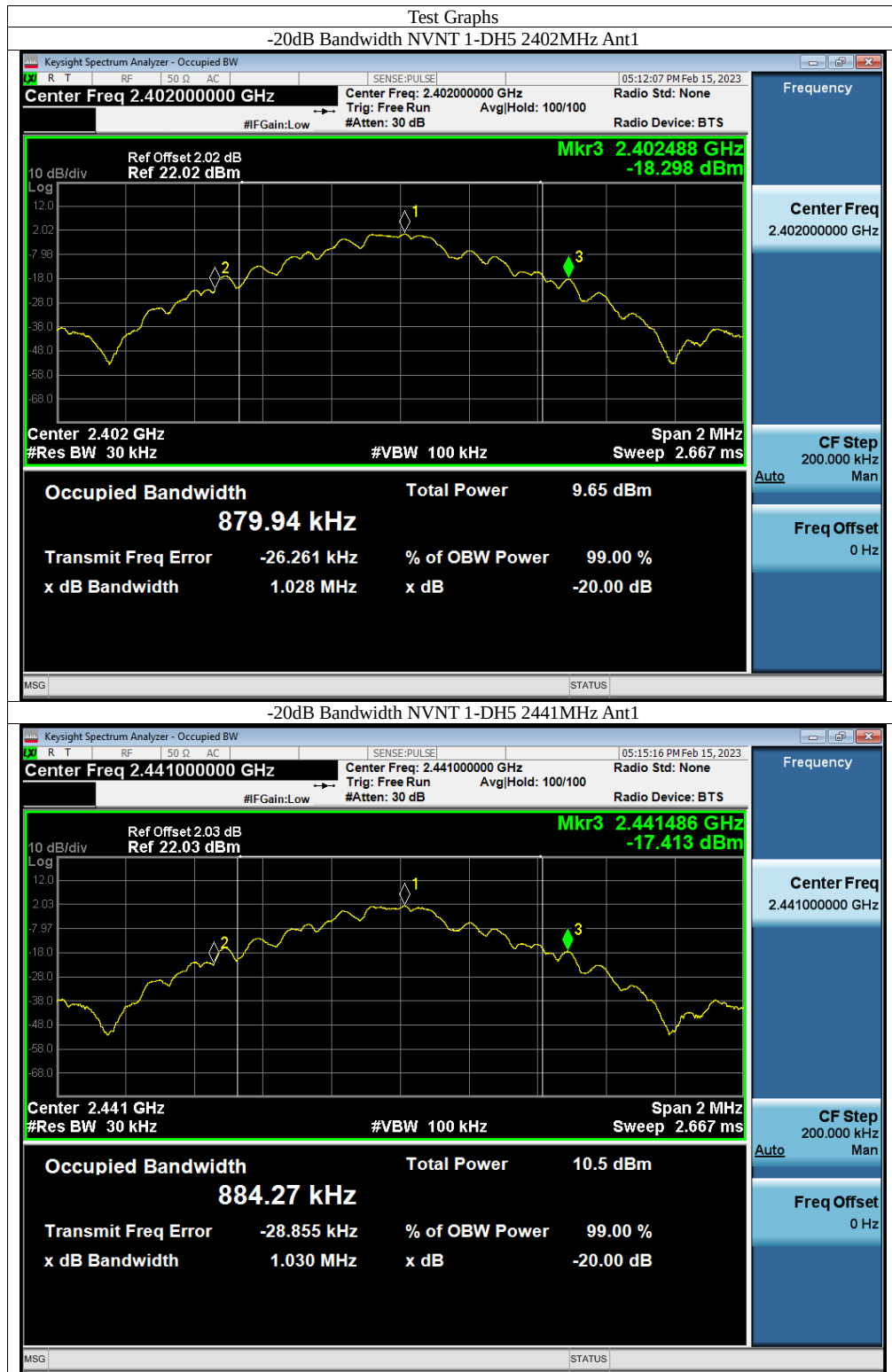
9.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	2023-02-15
Test By:	Sunshine	Temperature :	24°C
Test Result:	PASS	Humidity :	53 %

Mode	Frequency (MHz)	Antenna	-20 Bandwidth (MHz)	dB	Verdict
1-DH5	2402	Ant1	1.028		Pass
1-DH5	2441	Ant1	1.03		Pass
1-DH5	2480	Ant1	1.031		Pass
2-DH5	2402	Ant1	1.03		Pass
2-DH5	2441	Ant1	1.029		Pass
2-DH5	2480	Ant1	1.032		Pass
3-DH5	2402	Ant1	1.029		Pass
3-DH5	2441	Ant1	1.029		Pass
3-DH5	2480	Ant1	1.031		Pass

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E01A23010214F00101



E01A23010214F00101



E01A23010214F00101



E01A23010214F00101



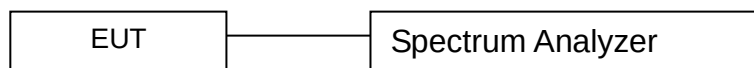
E01A23010214F00101

10. Quantity of Hopping Channel Test

10.1 Measurement Procedure

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

10.2 Test SET-UP (Block Diagram of Configuration)



10.3 Measurement Equipment Used:

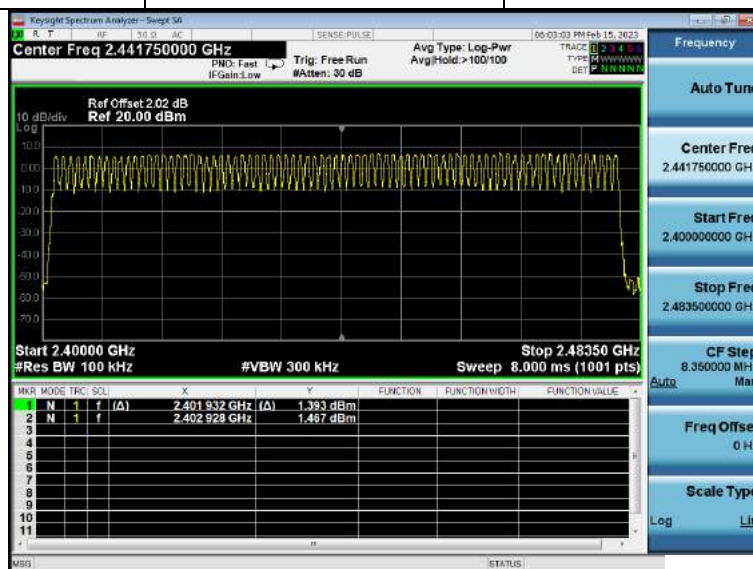
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CALIBRATED UNTIL
Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
RF Test Software	MWRF-test	MTS 8310	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12

10.4 Measurement Results:

Refer to attached data chart.

Worst Test Mode	GFSK	Test Date :	2023-02-15
Test By:	Sunshine	Temperature :	24 °C
Test Result:	PASS	Humidity :	53 %

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel
2402-2480	79	>15



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11. Time of Occupancy (Dwell Time) test

11.1 Test Description

The Equipment Under Test (EUT) was set up to perform the dwell time measurements. The EUT was connected to the spectrum analyzer via a short coax cable. The dwell time is calculated by:

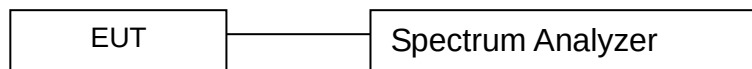
$$\text{Dwell time} = \text{time slot length} * \text{hop rate} / \text{number of hopping channels} * 31.6\text{s}$$

with:

- hop rate = $1600 * 1/\text{s}$ for DH1 packets = 1600 s^{-1}
- hop rate = $1600/3 * 1/\text{s}$ for DH3 packets = 533.33 s^{-1}
- number of hopping channels = 79
- $31.6 \text{ s} = 0.4 \text{ seconds multiplied by the number of hopping channels} = 0.4 \text{ s} * 79$

The highest value of the dwell time is reported.

11.2 Test SET-UP (Block Diagram of Configuration)



11.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CALIBRATED UNTIL
Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
RF Test Software	MWRF-test	MTS 8310	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12

11.4 Test Requirements / Limits

FCC Part 15, Subpart C, §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Since the Bluetooth technology uses 79 channels this period is calculated to be 31.6seconds. Refer to attached data chart.

11.5 Test result

Spectrum Detector: PK

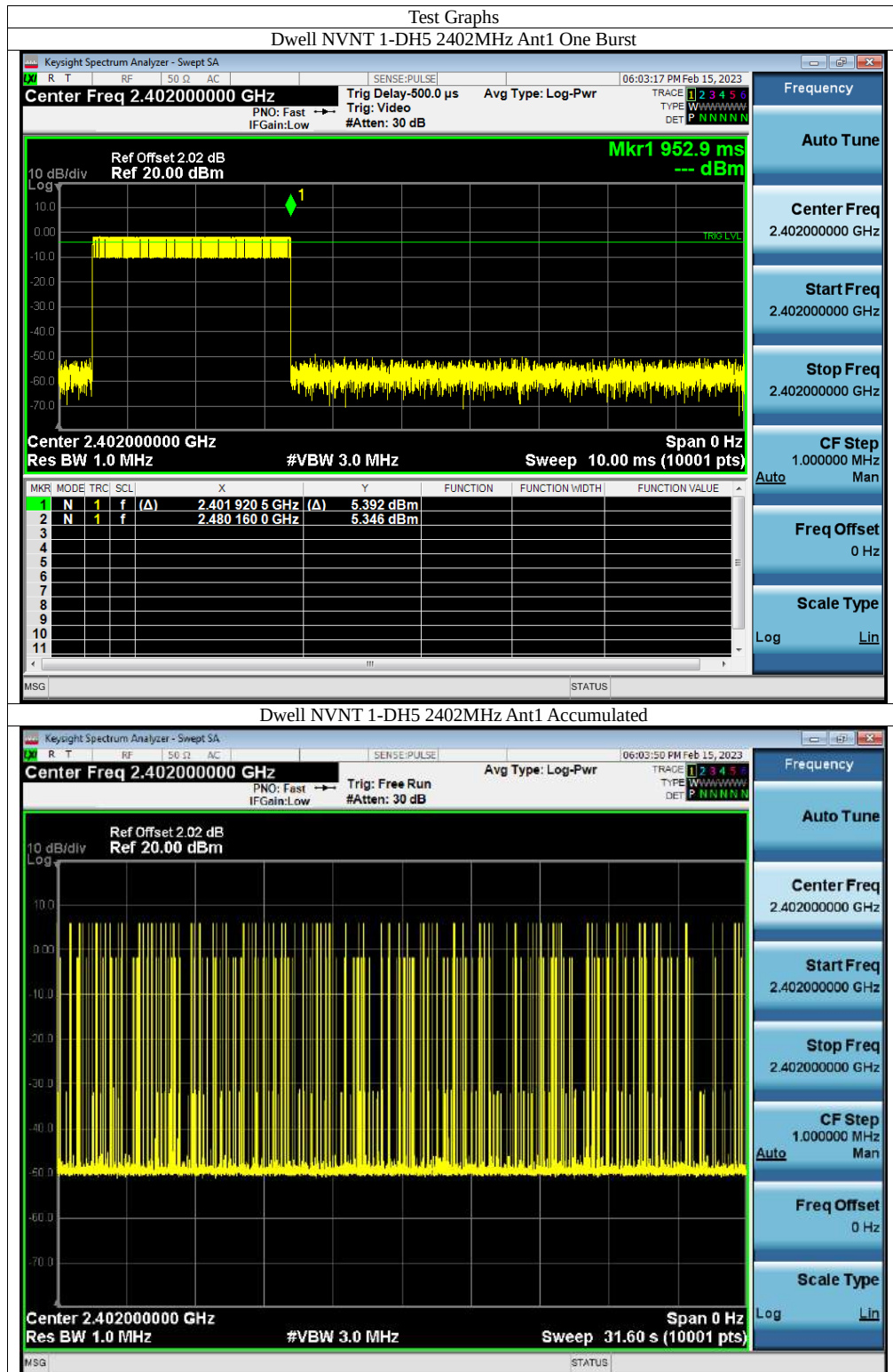
Test Date : 2023-02-15

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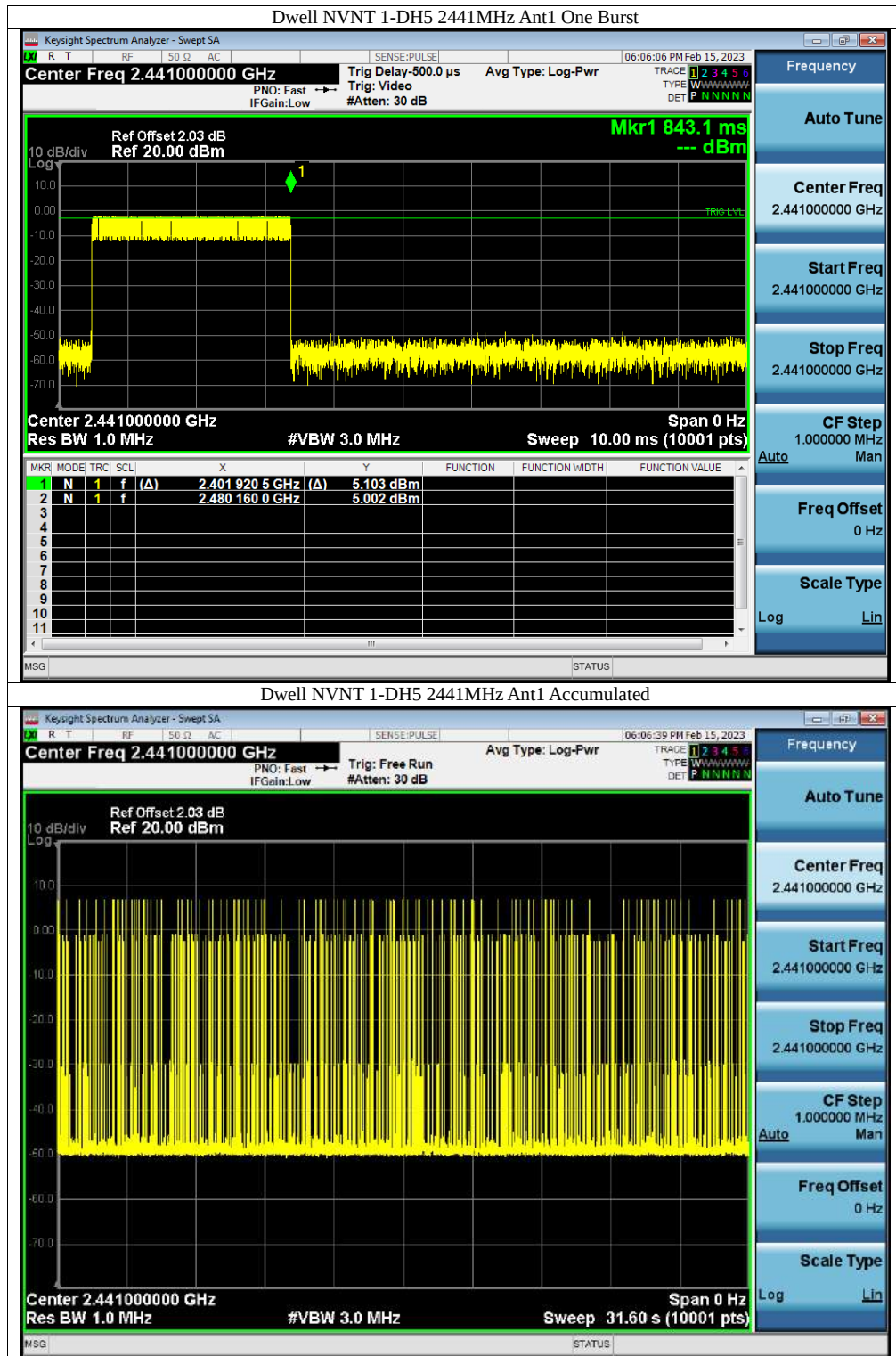
Test By: Sunshine Temperature : 24°C
 Test Result: PASS Humidity : 53 %

Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH5	2402	Ant1	2.887	323.344	112	31600	400	Pass
1-DH5	2441	Ant1	2.887	317.57	110	31600	400	Pass
1-DH5	2480	Ant1	2.887	268.491	93	31600	400	Pass
2-DH5	2402	Ant1	2.892	355.716	123	31600	400	Pass
2-DH5	2441	Ant1	2.892	312.336	108	31600	400	Pass
2-DH5	2480	Ant1	2.891	320.901	111	31600	400	Pass
3-DH5	2402	Ant1	2.893	274.835	95	31600	400	Pass
3-DH5	2441	Ant1	2.893	321.123	111	31600	400	Pass
3-DH5	2480	Ant1	2.893	303.765	105	31600	400	Pass

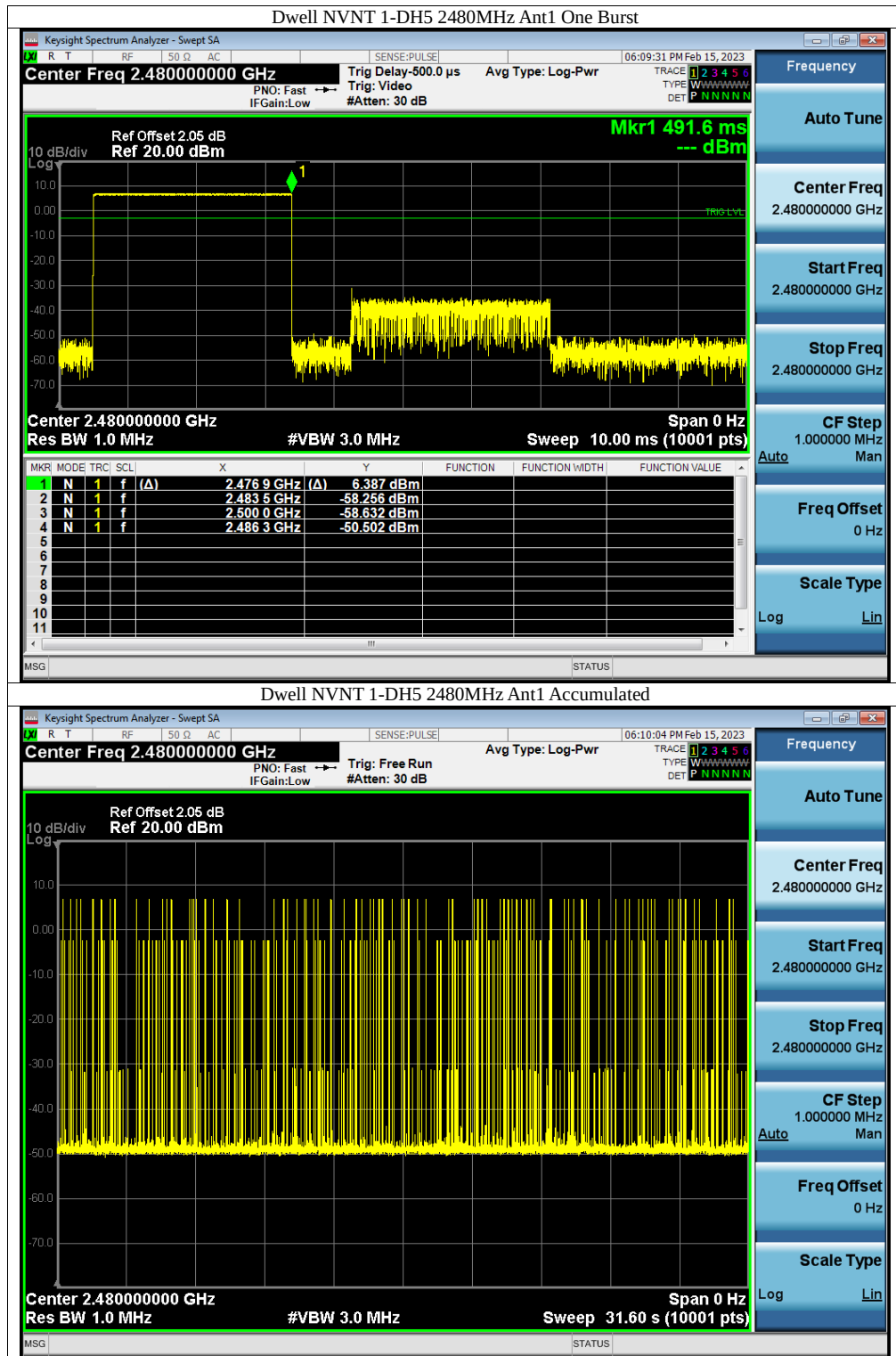
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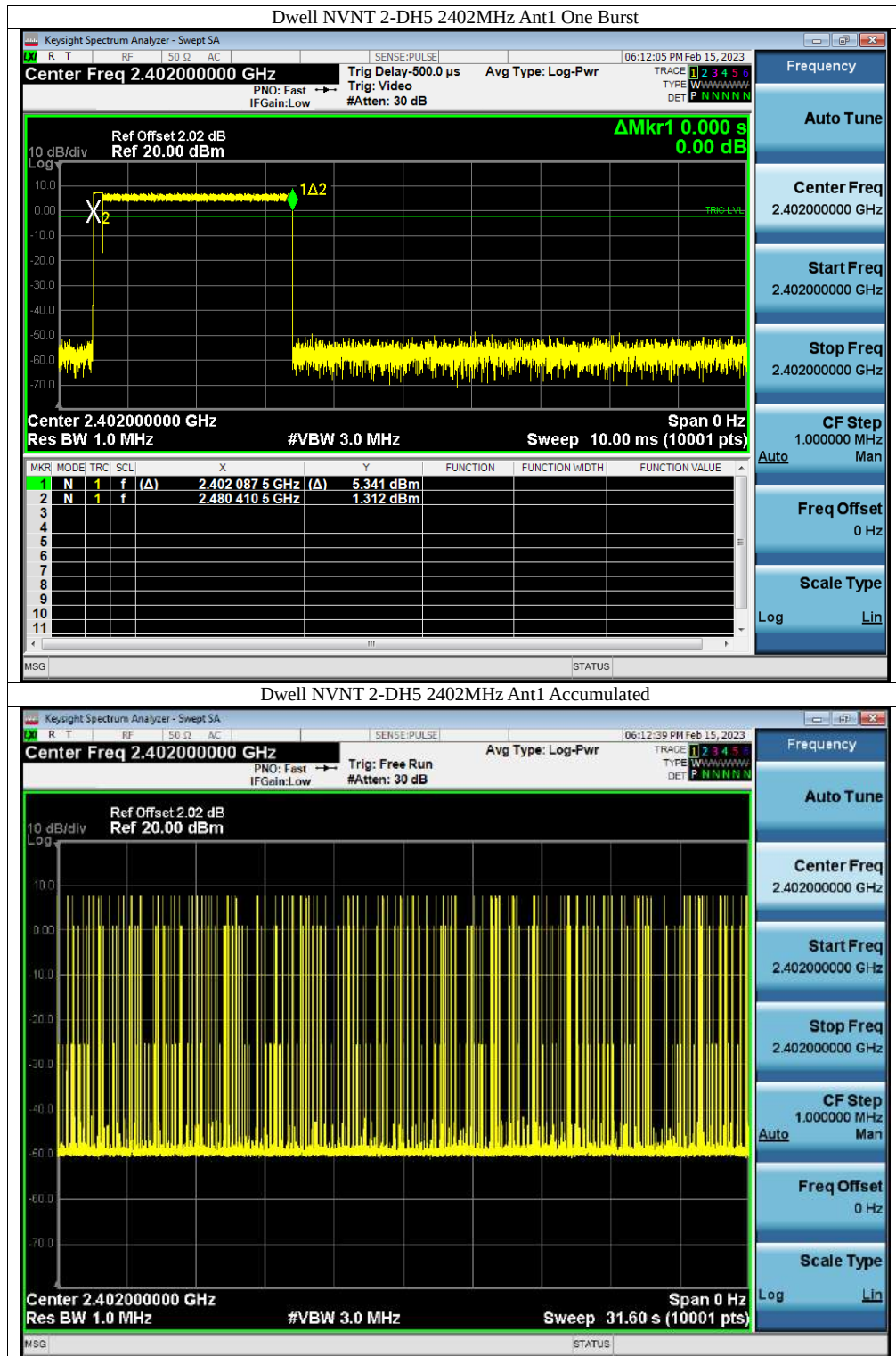
E01A23010214F00101



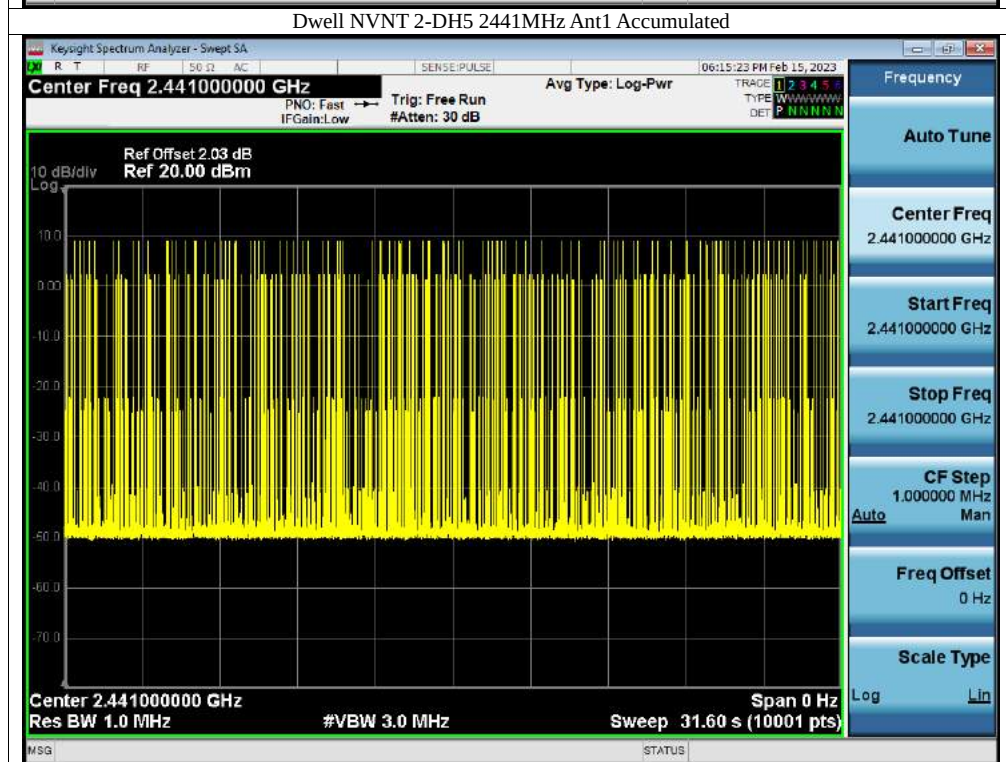
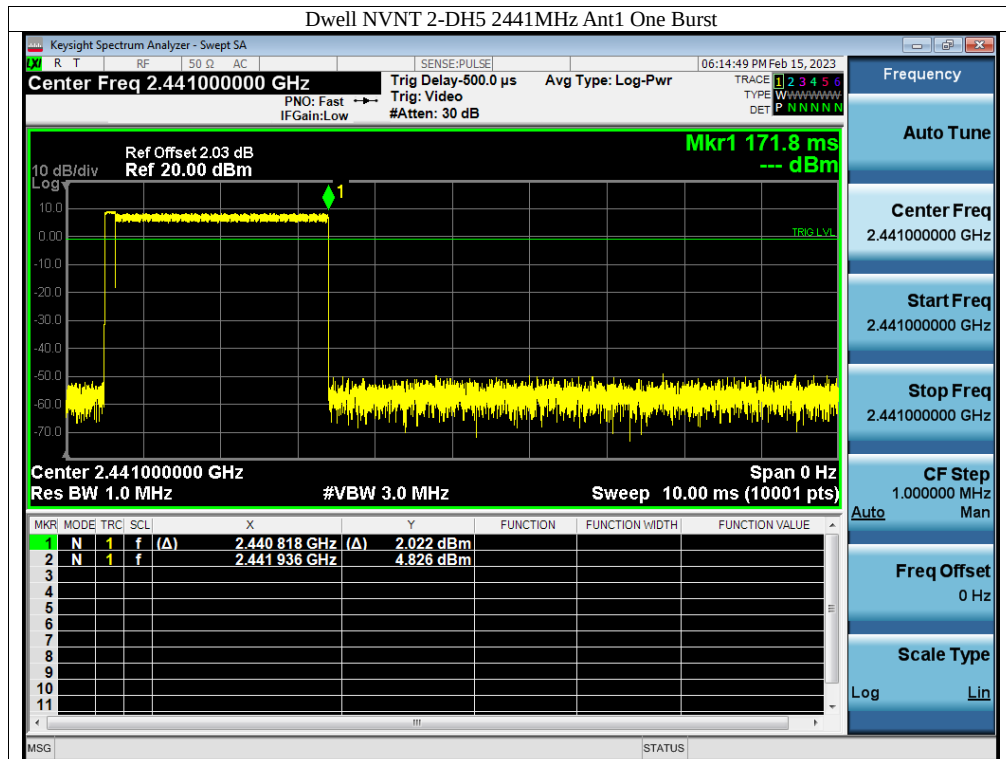
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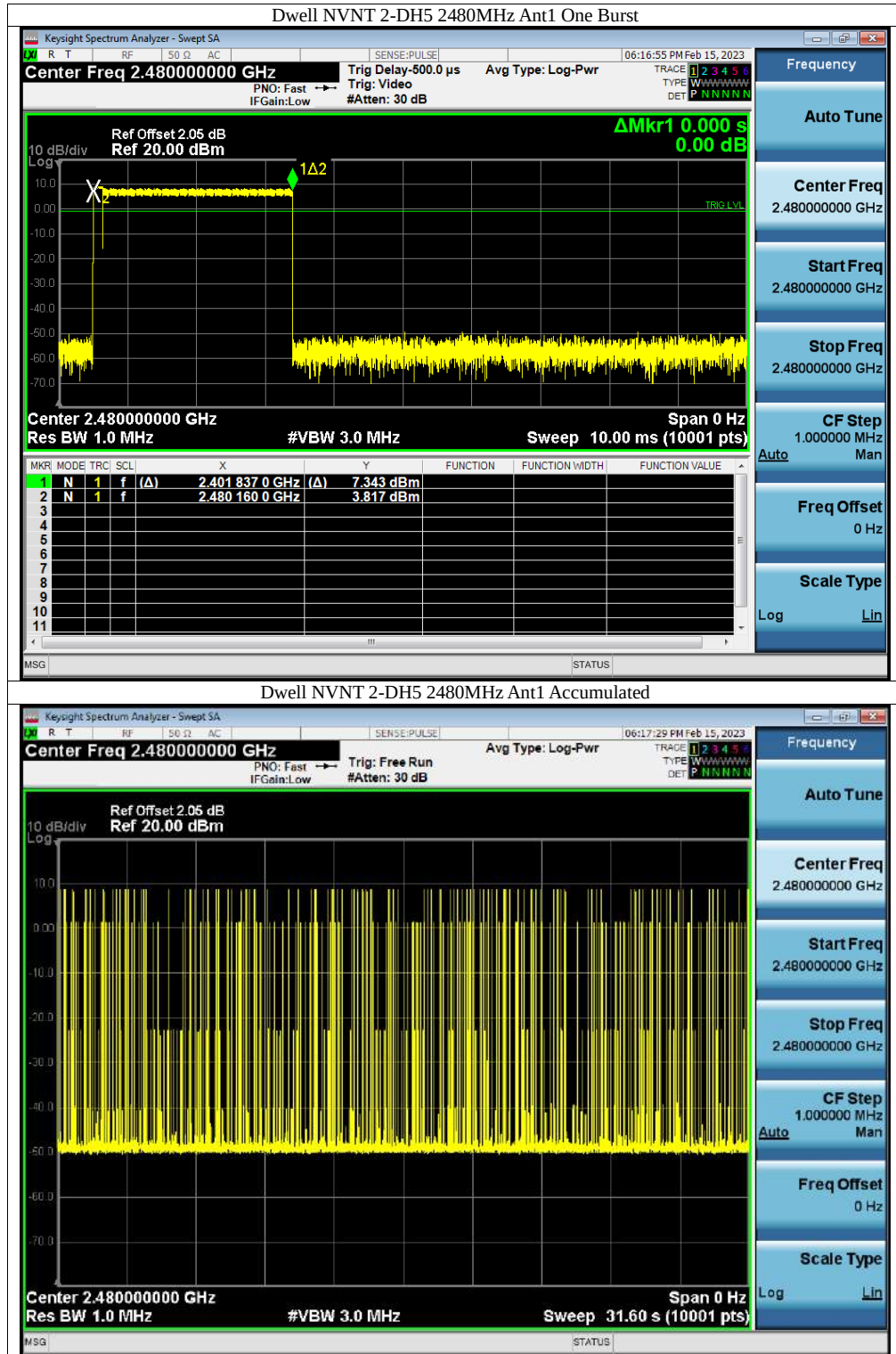
E01A23010214F00101



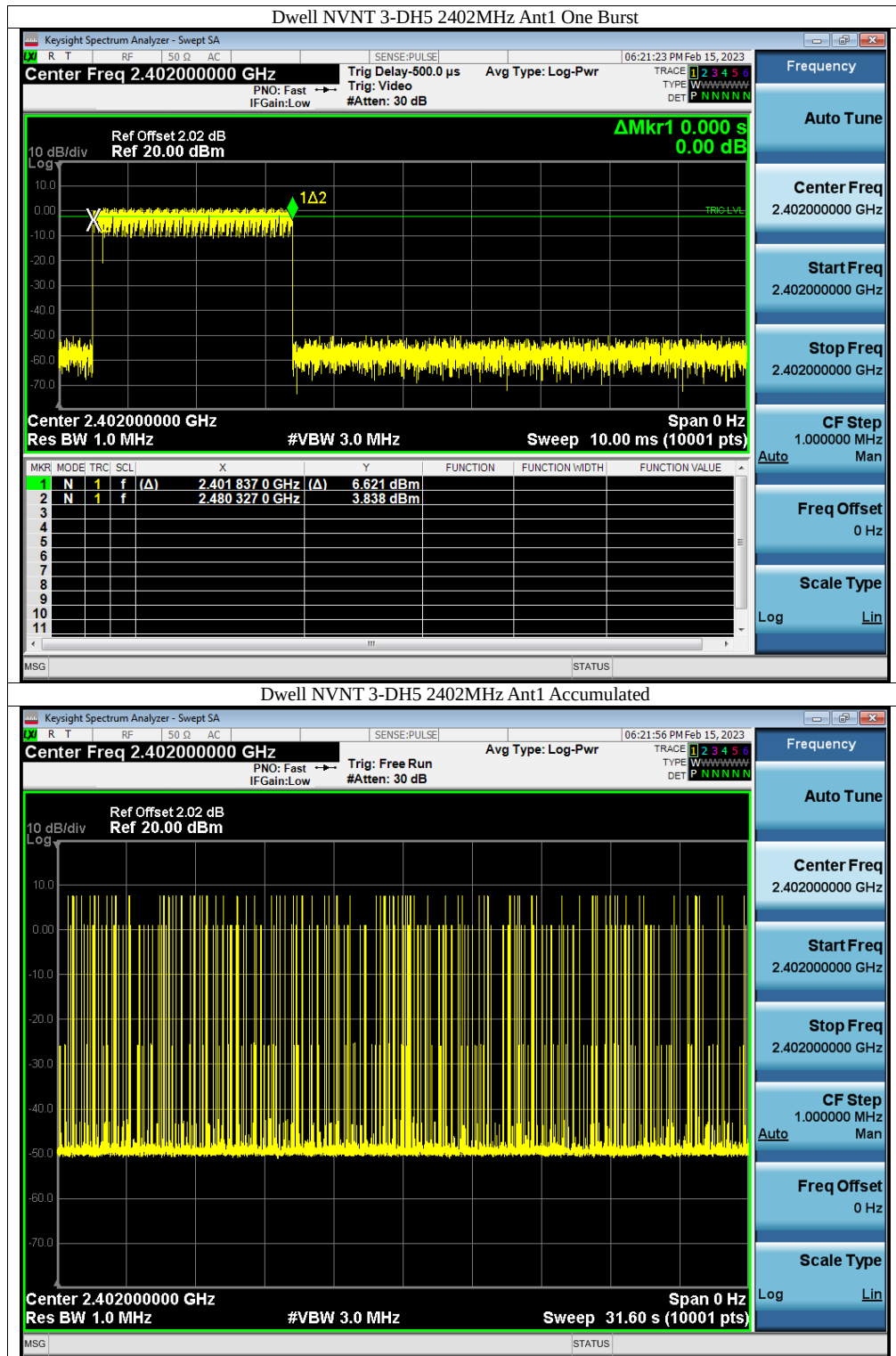
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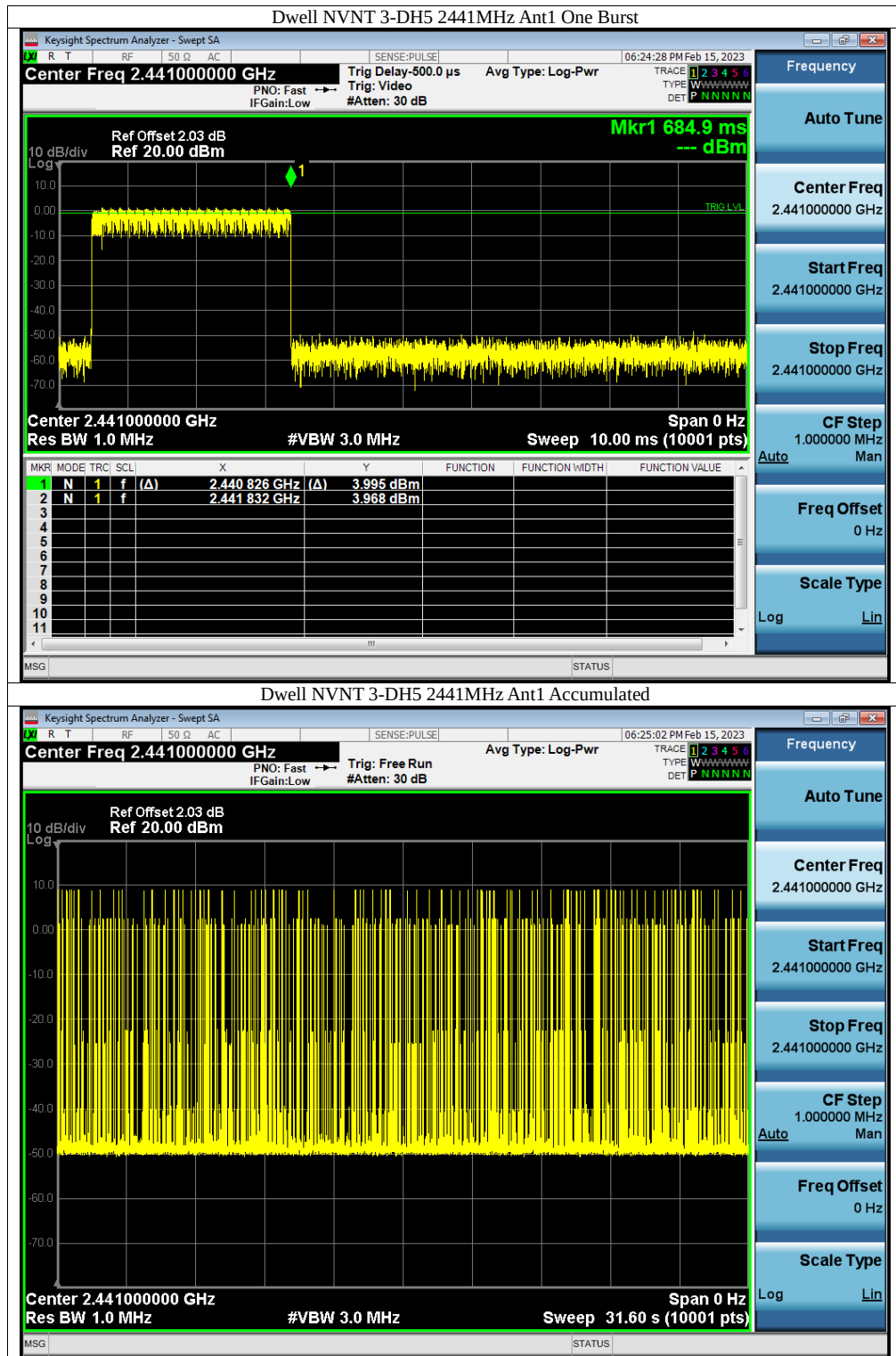
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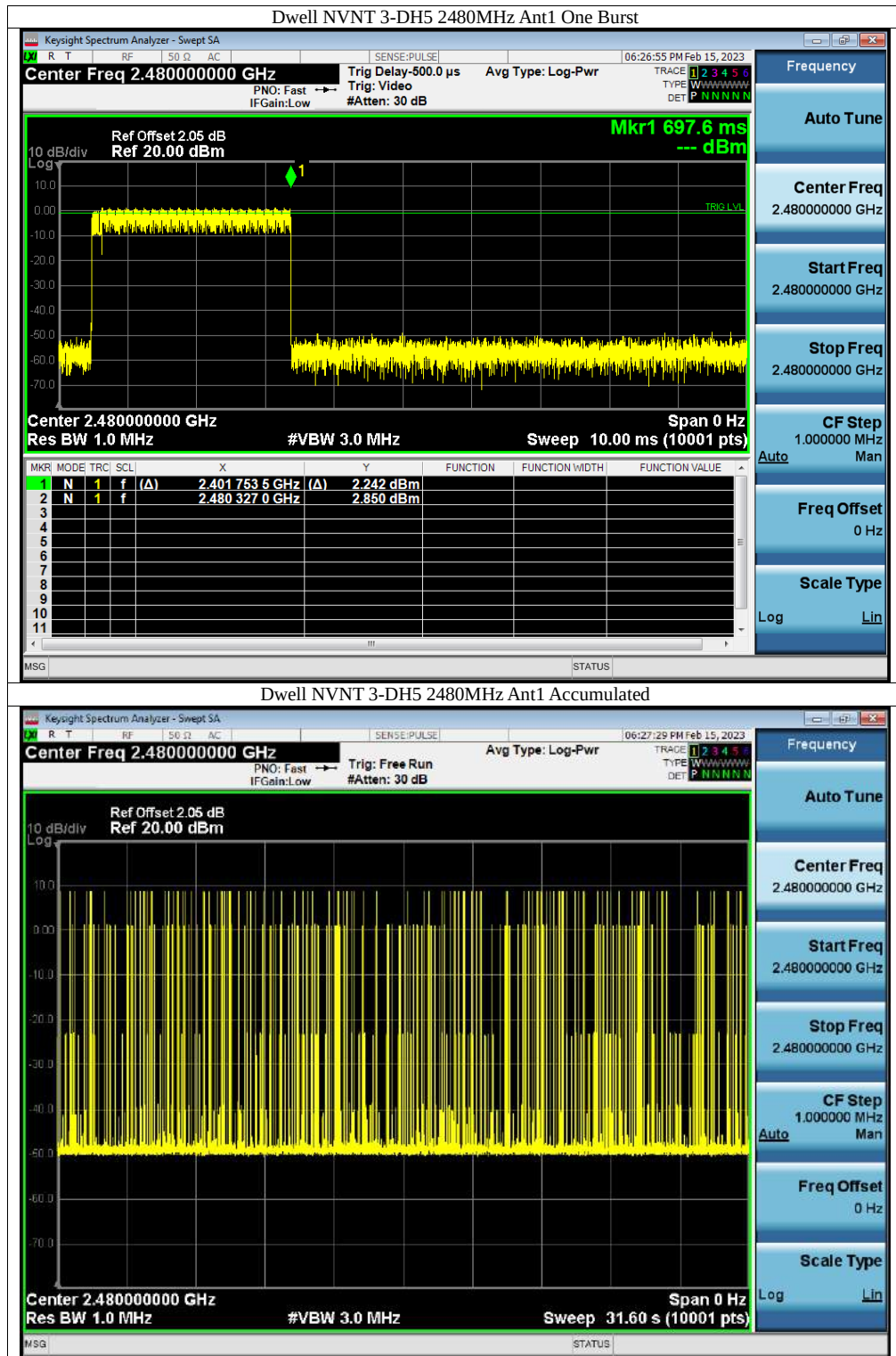
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E01A23010214F00101



E01A23010214F00101

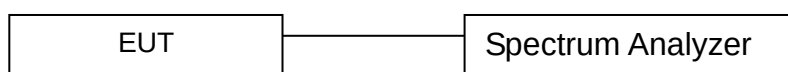


12. MAXIMUM PEAK OUTPUT POWER TEST

12.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- 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.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

12.2 Test SET-UP (Block Diagram of Configuration)



12.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CALIBRATED UNTIL
Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
RF Test Software	MWRF-test	MTS 8310	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12

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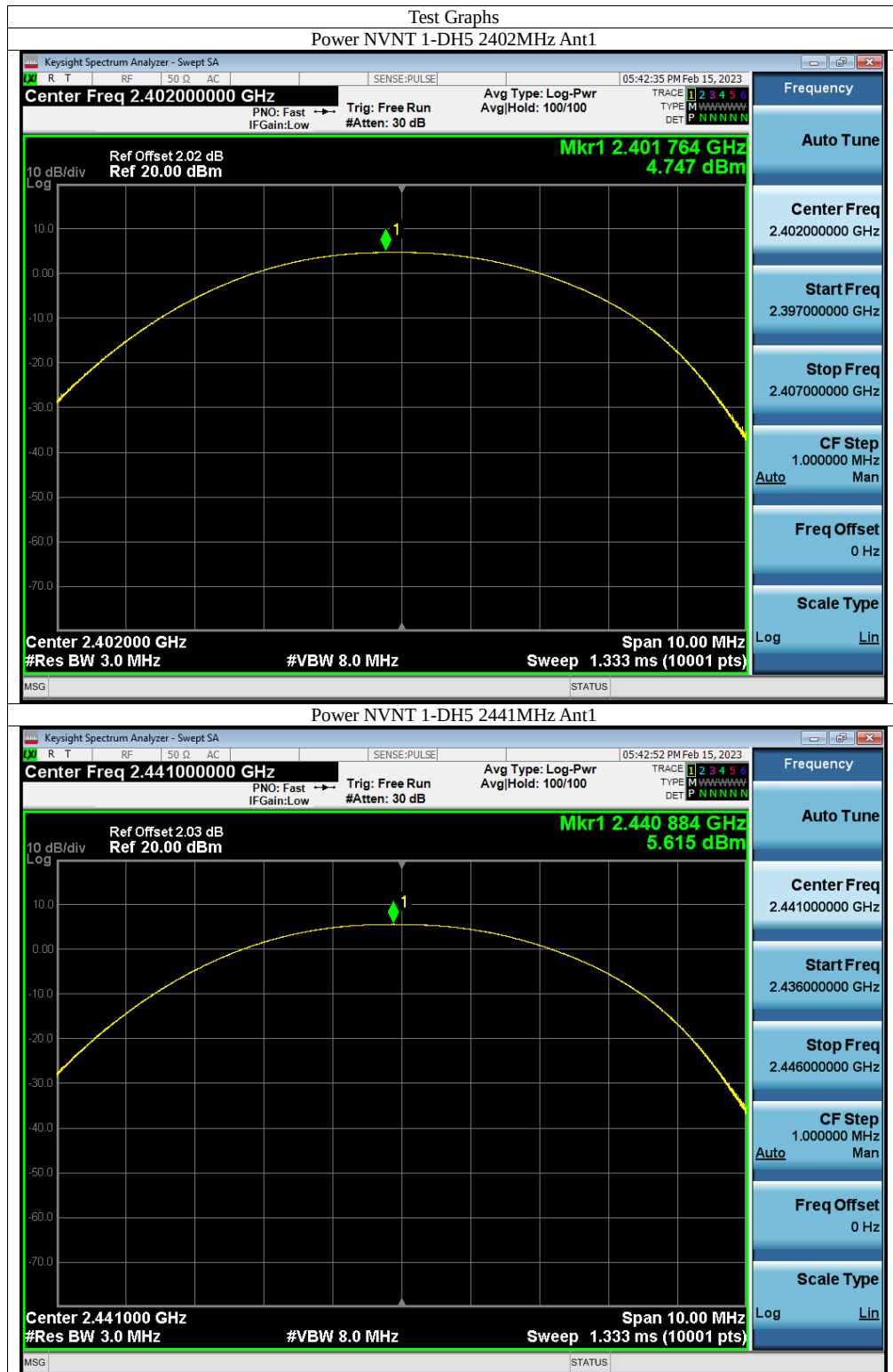
12.4 Measurement Results:

Refer to attached data chart.

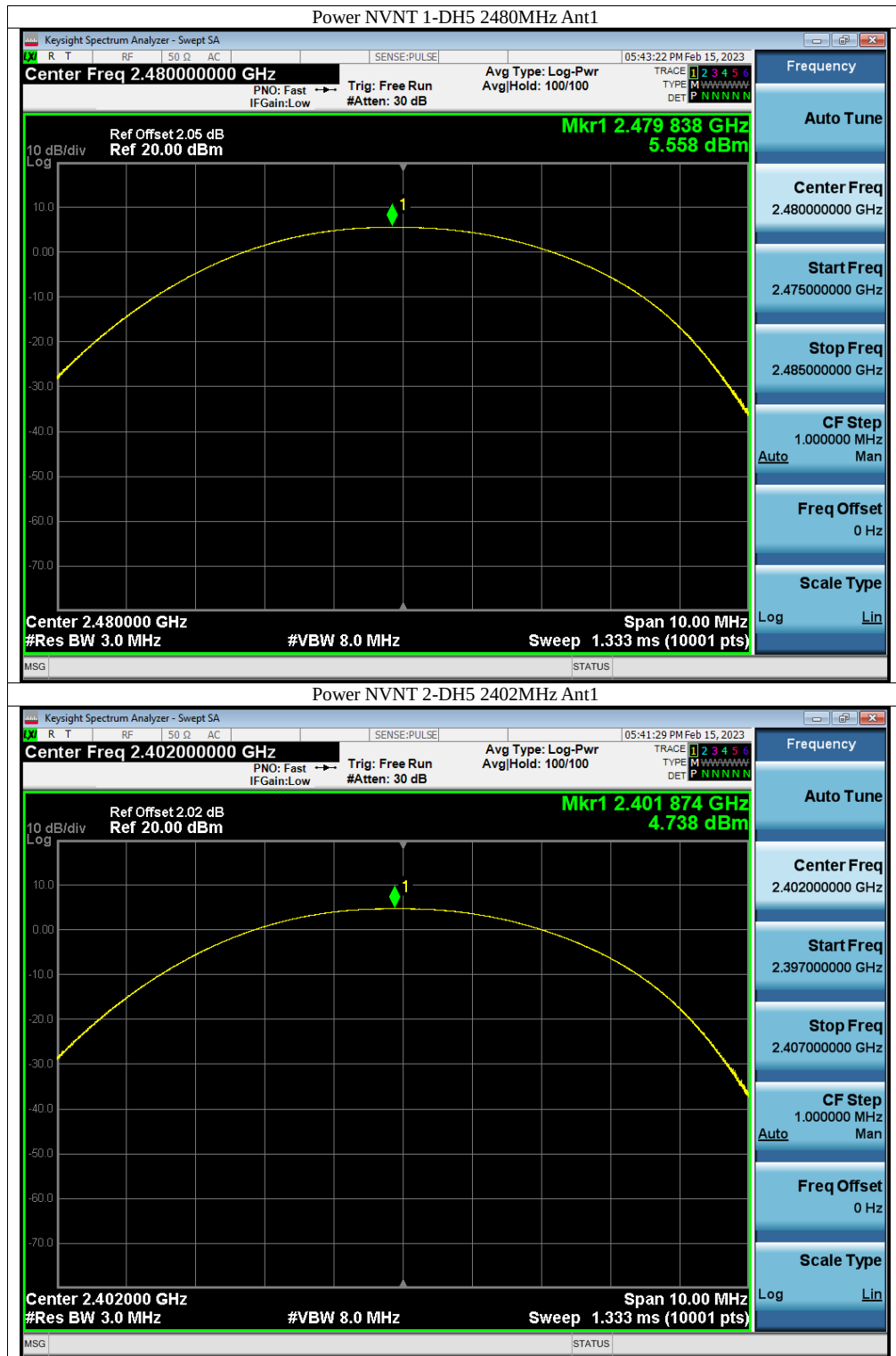
Spectrum Detector: PK Test Date : 2023-02-15
 Test By: Sunshine Temperature : 24 °C
 Test Result: PASS Humidity : 53 %

Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
1-DH5	2402	Ant1	4.75	0	4.75	21	Pass
1-DH5	2441	Ant1	5.62	0	5.62	21	Pass
1-DH5	2480	Ant1	5.56	0	5.56	21	Pass
2-DH5	2402	Ant1	4.74	0	4.74	21	Pass
2-DH5	2441	Ant1	5.56	0	5.56	21	Pass
2-DH5	2480	Ant1	5.53	0	5.53	21	Pass
3-DH5	2402	Ant1	4.76	0	4.76	21	Pass
3-DH5	2441	Ant1	5.6	0	5.6	21	Pass
3-DH5	2480	Ant1	5.53	0	5.53	21	Pass

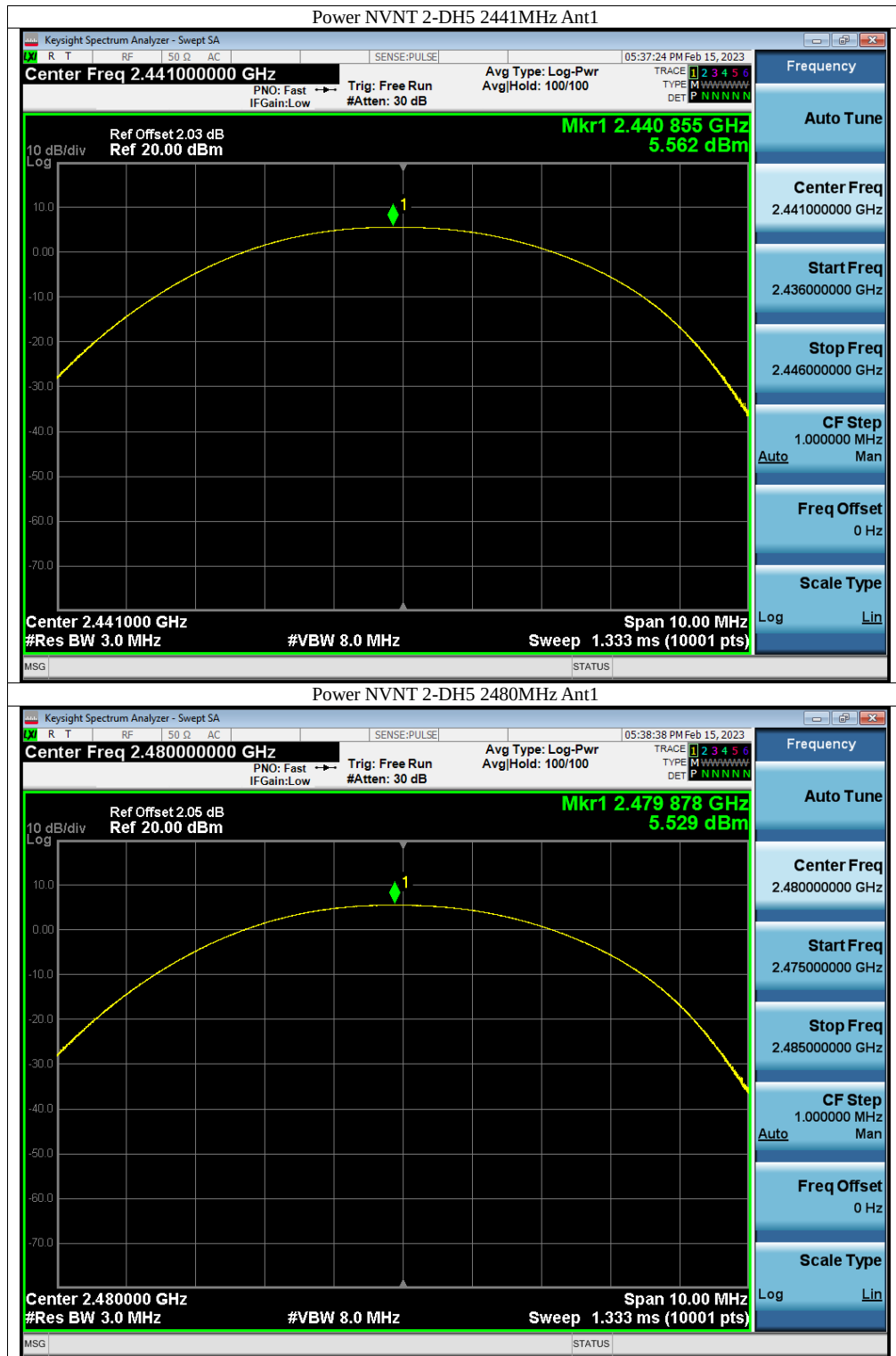
E01A23010214F00101



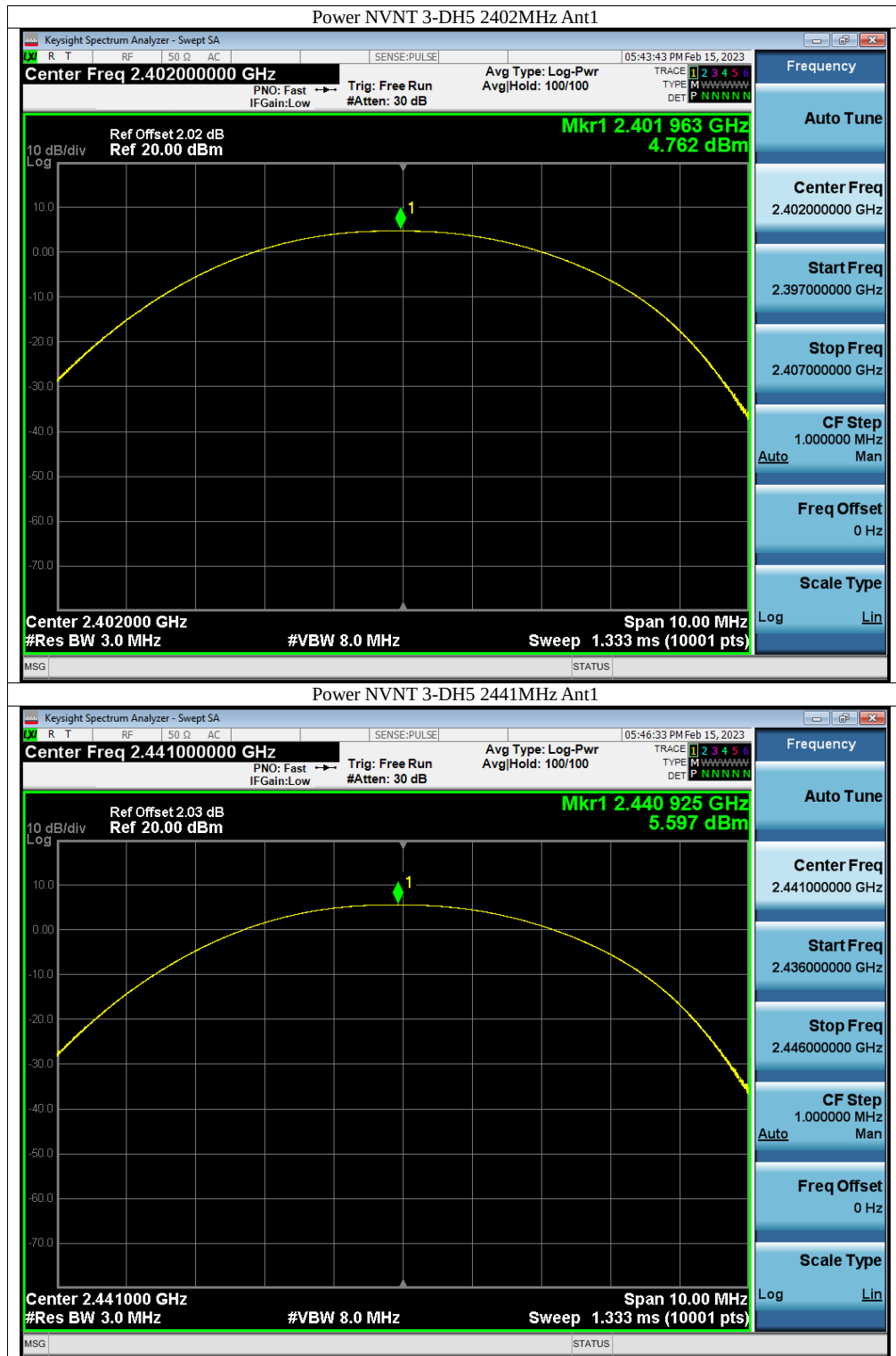
E01A23010214F00101



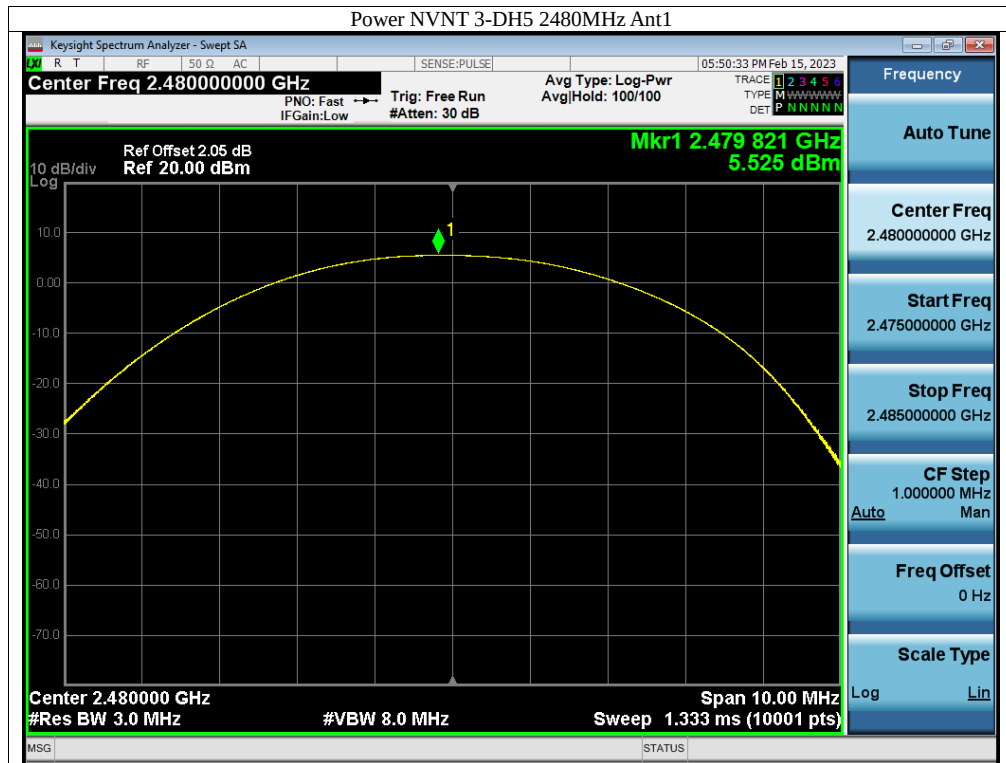
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13. Band EDGE test

13.1 Measurement Procedure

For Conducted Test

1. The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.
2. The spectrum from 30MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

EMI Test Receiver	Setting
Attenuation	Auto
RBW	100KHz
VBW	300KHz
Detector	Peak
Trace	Max hold

For Radiated emission Test

The EUT was placed on a styrofoam table which is 1.5m above ground plane.

The measurement procedure at the band edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were encompassed by the span. After trace stabilization, the maximum peak was determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limit for the emissions in the unrestricted band. A maximum-peak-detector marks the highest emission in the unrestricted band next to the band edge.

The measurements were performed at the lower end of the 2.4GHz band.

Use the following spectrum analyzer settings:

For Restricted Band, When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

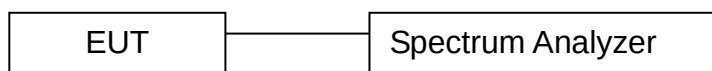
EMI Test Receiver	Setting
Attenuation	Auto
RBW	1MHz
VBW	3MHz
Detector	Peak
Trace	Max hold

For Non-Restricted Band, When spectrum scanned above 1GHz setting resolution bandwidth 100KHz, video bandwidth 300KHz:

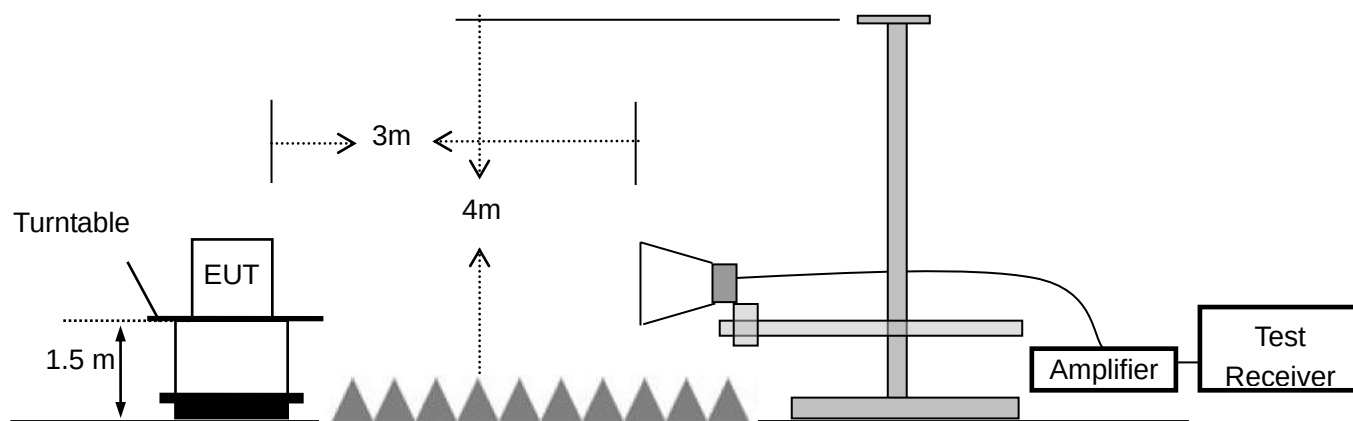
EMI Test Receiver	Setting
Attenuation	Auto
RBW	100KHz
VBW	300KHz
Detector	Peak
Trace	Max hold

13.2 Test SET-UP (Block Diagram of Configuration)

For Conducted Test



For Radiated emission Test



13.3 Measurement Equipment Used:

For Conducted Test

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CALIBRATED UNTIL
Spectrum Analyzer	KEYSIGHT	N9020A	MY61250185	2023-10-07
RF Test Software	MWRF-test	MTS 8310	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2023-05-12

For Radiated emission Test

Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
Signal Analyzer	Rohde & Schwarz	FSV40	US40240623	2023-05-12
Broadband RF Power Amplifier	AEROFLEX	AEROFLEX100KHz-40G Hz	J1013130524 001	2023-05-12
DRG Horn Antenna	A.H.SYSTEMS	SAS-574	J2031090612 123	2023-05-12
RF Cable	Gigalink Microwave	ZT40-2.92J-2.92J-2m	N/A	2023-05-12
RF Cable	Gigalink Microwave	ZT40-2.92J-2.92J-0.3m	N/A	2023-05-12

E01A23010214F00101

13.4 Measurement Results:

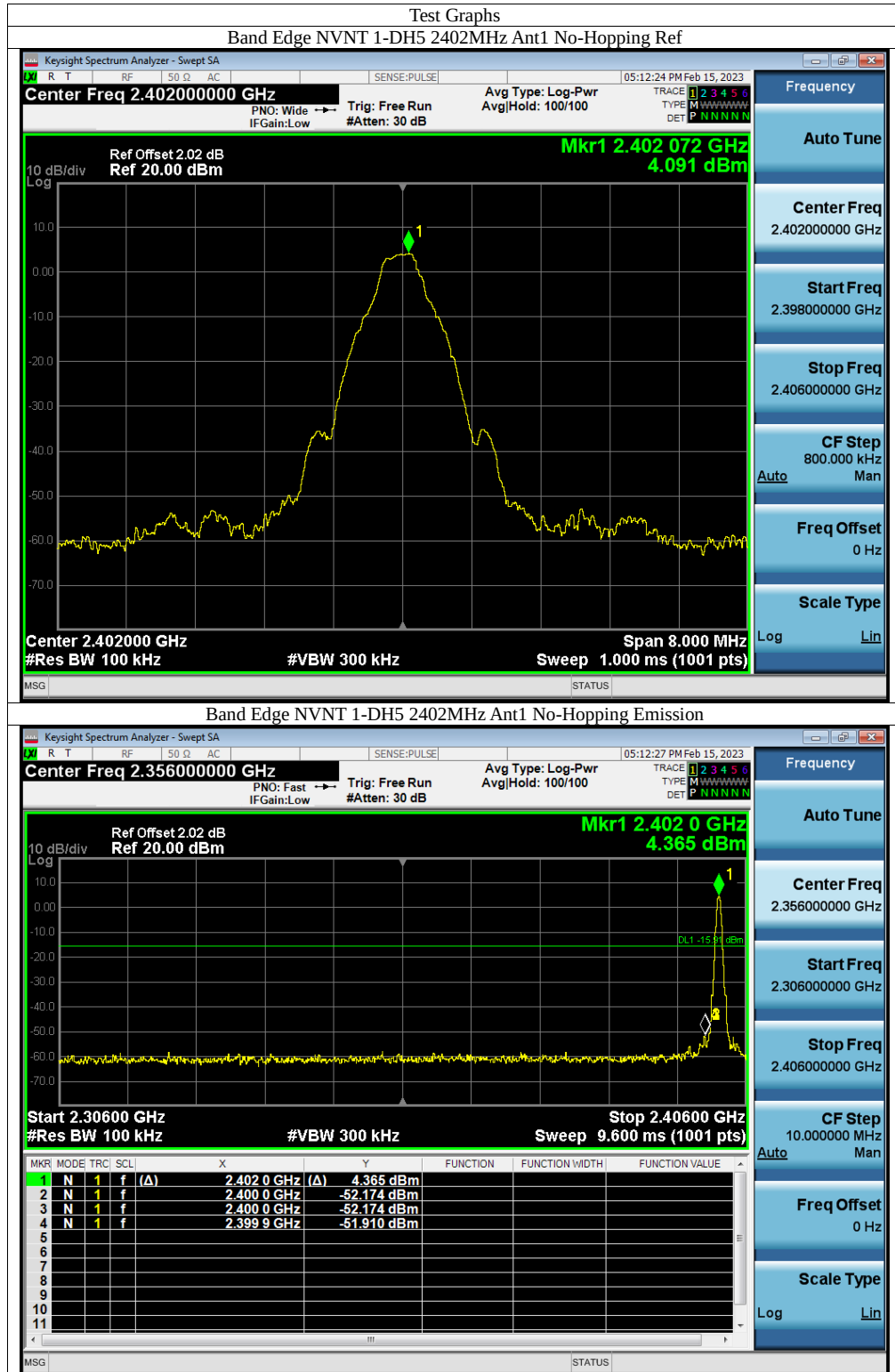
Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	2023-02-15
Test By:	Sunshine	Temperature :	24 °C
Test Result:	PASS	Humidity :	53 %

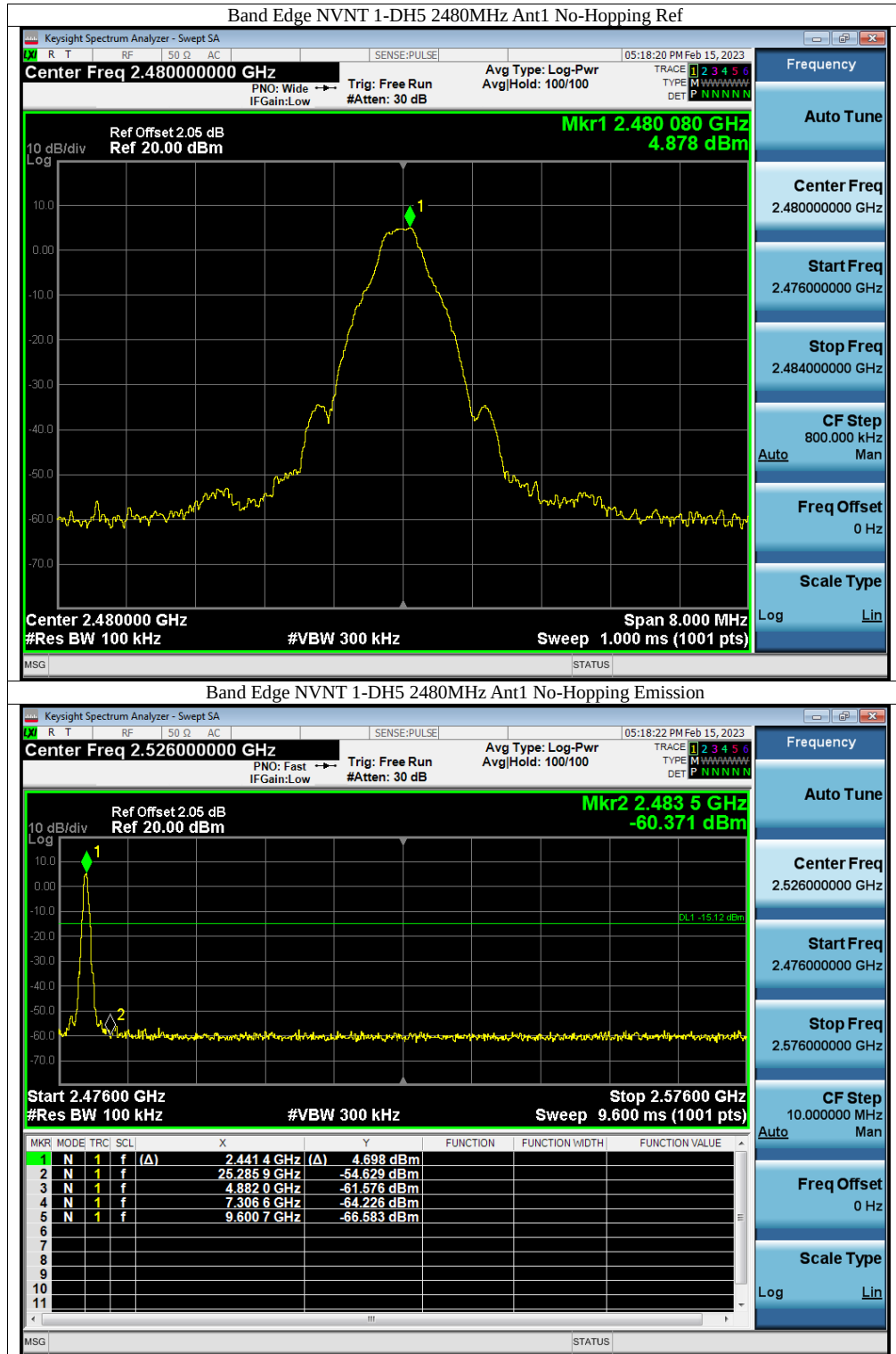
1. Conducted Test

Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
1-DH5	2402	Ant1	No-Hopping	-56	-20	Pass
1-DH5	2480	Ant1	No-Hopping	-61.12	-20	Pass
2-DH5	2402	Ant1	No-Hopping	-58.02	-20	Pass
2-DH5	2480	Ant1	No-Hopping	-61.81	-20	Pass
3-DH5	2402	Ant1	No-Hopping	-58.29	-20	Pass
3-DH5	2480	Ant1	No-Hopping	-62.06	-20	Pass

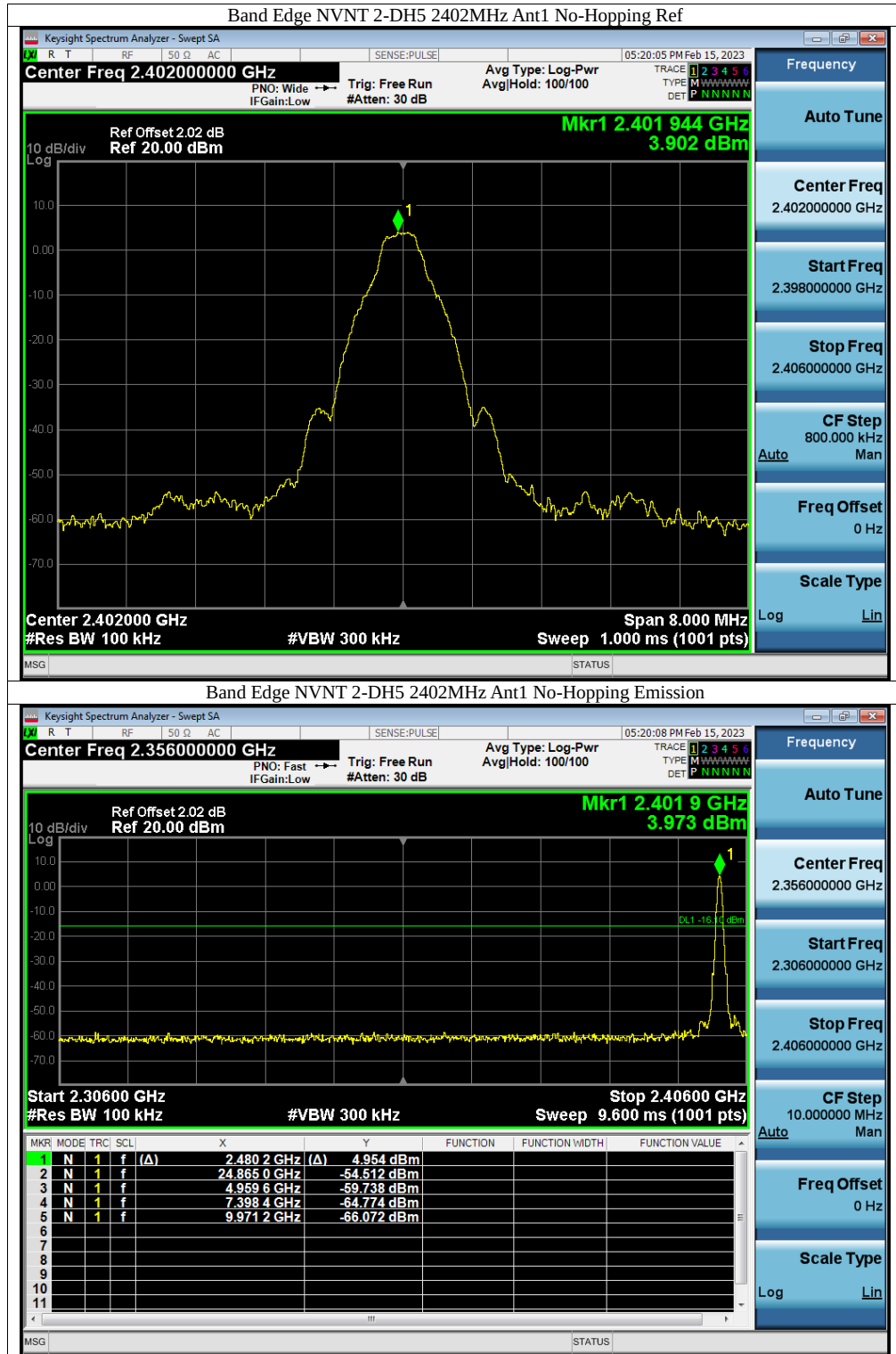
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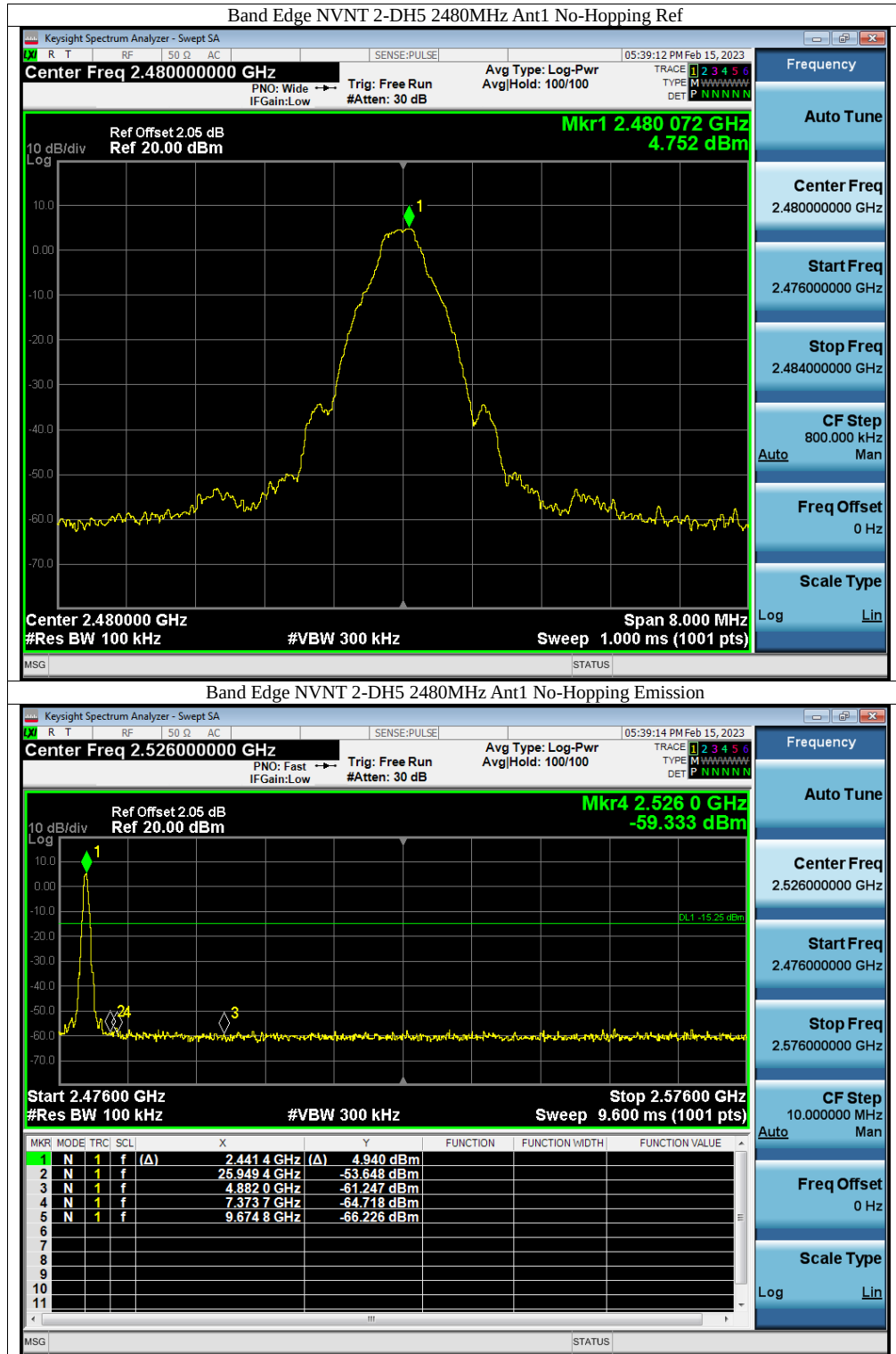
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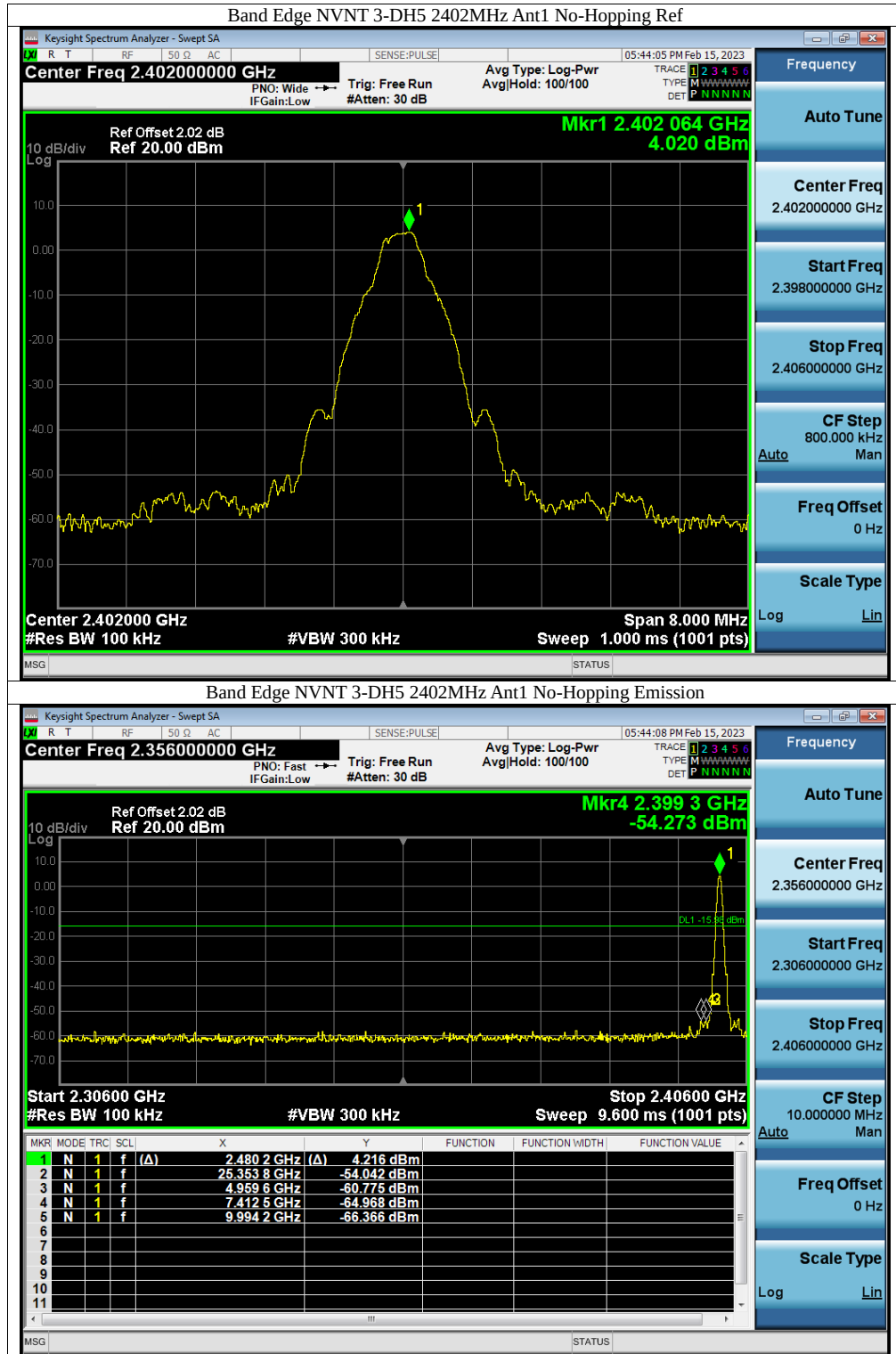
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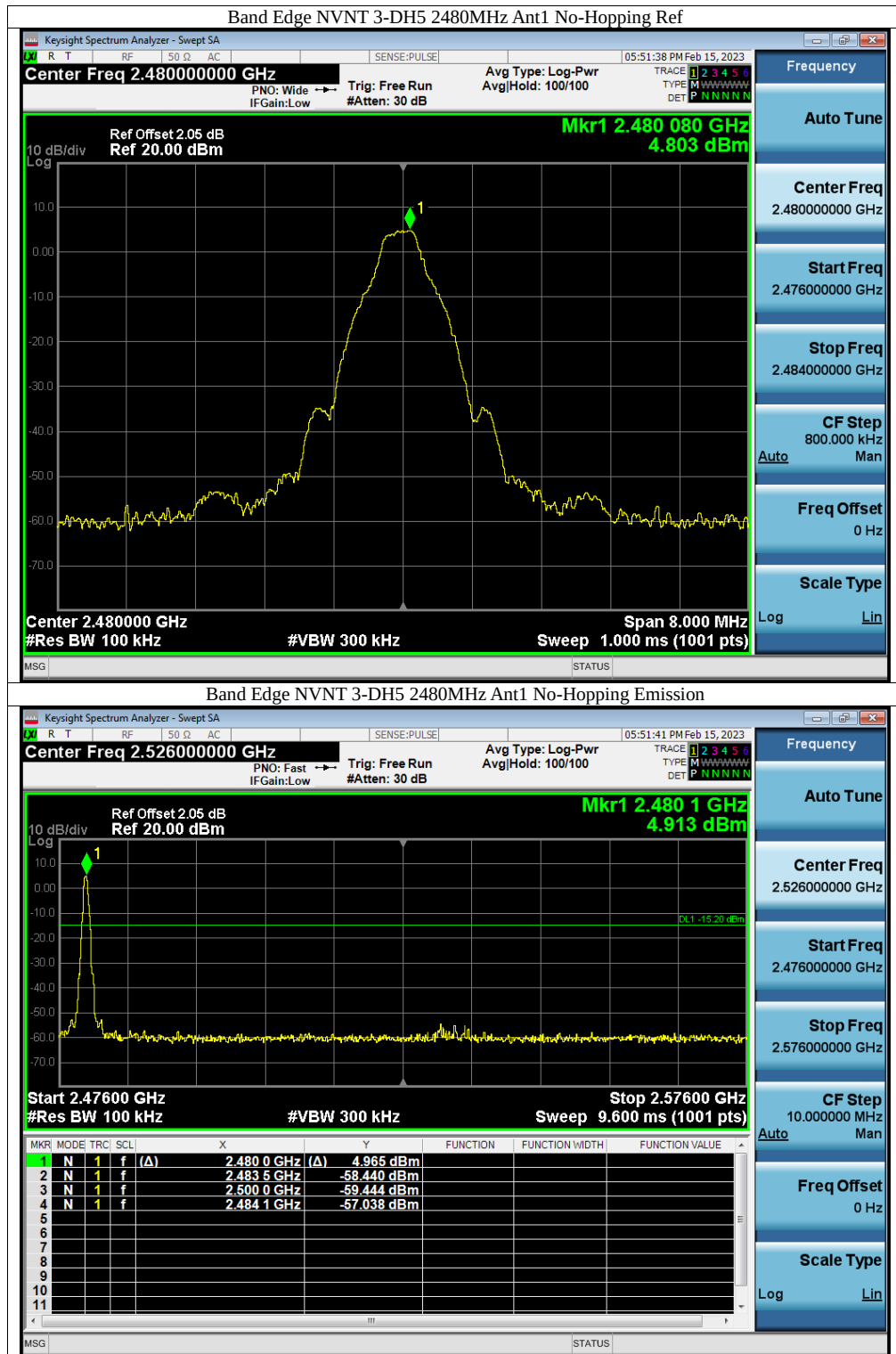
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E01A23010214F00101



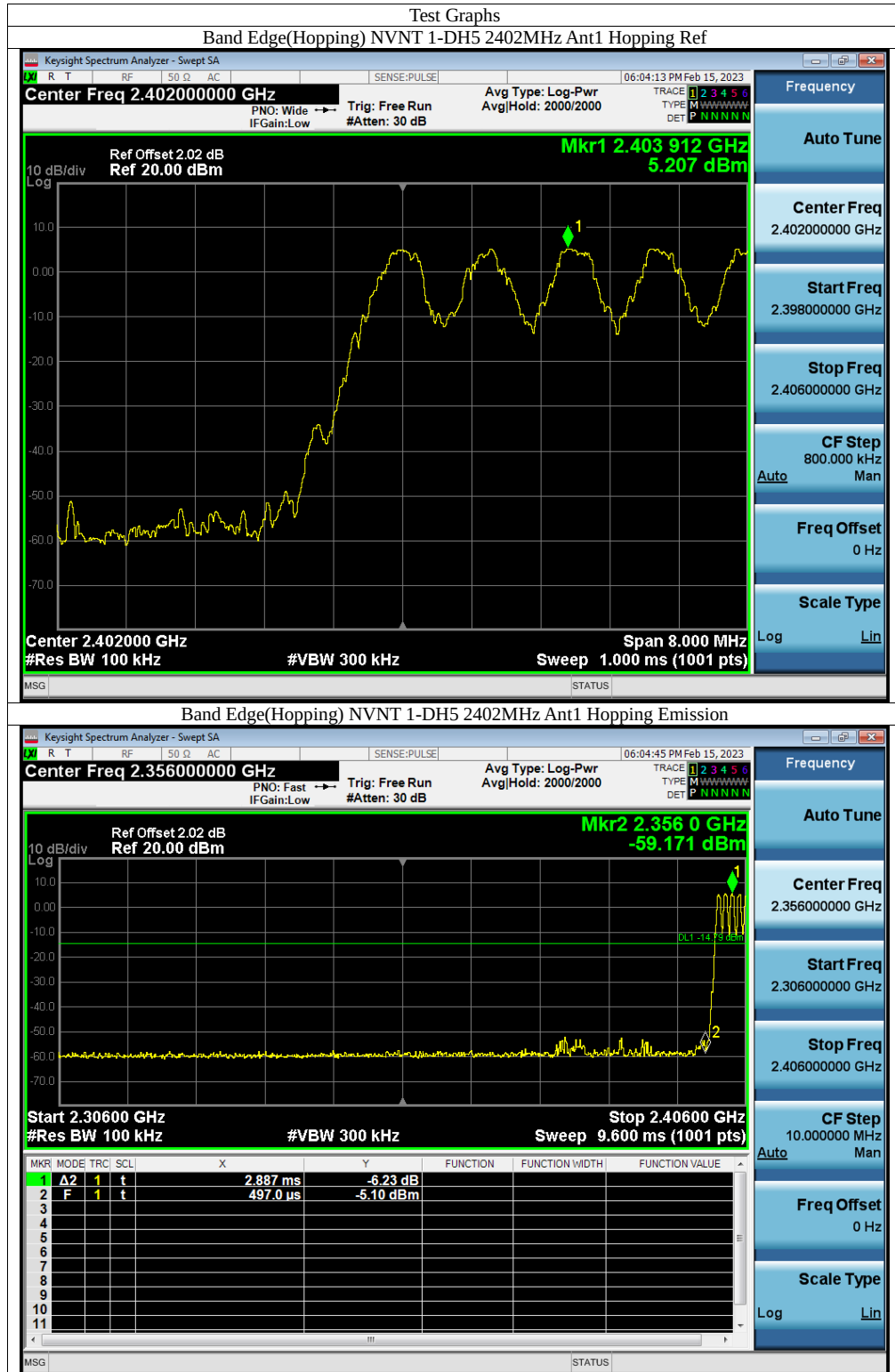
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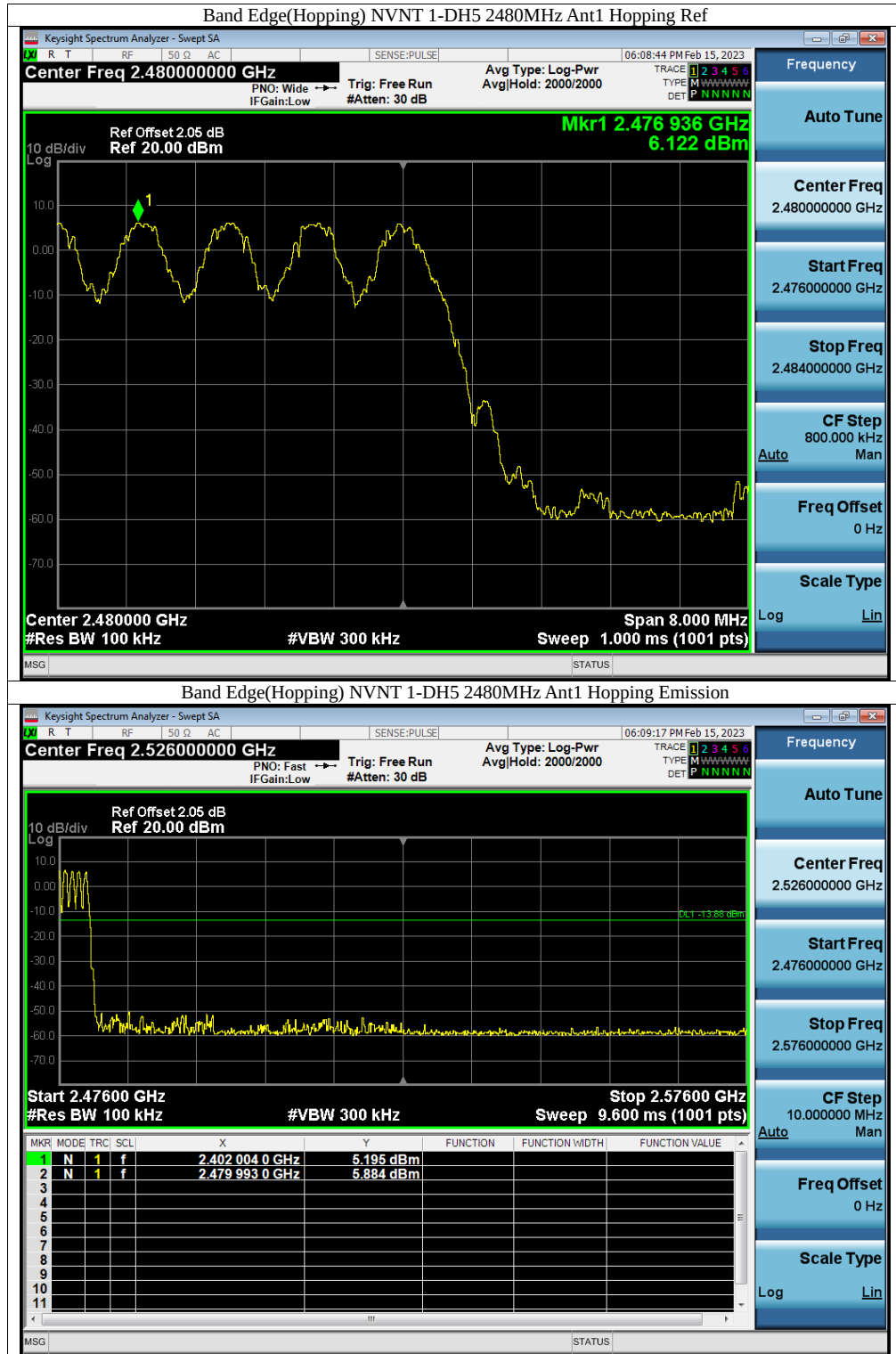
E01A23010214F00101

Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
1-DH5	2402	Ant1	Hopping	-57.55	-20	Pass
1-DH5	2480	Ant1	Hopping	-56.62	-20	Pass
2-DH5	2402	Ant1	Hopping	-57.76	-20	Pass
2-DH5	2480	Ant1	Hopping	-60.8	-20	Pass
3-DH5	2402	Ant1	Hopping	-58.21	-20	Pass
3-DH5	2480	Ant1	Hopping	-59.8	-20	Pass

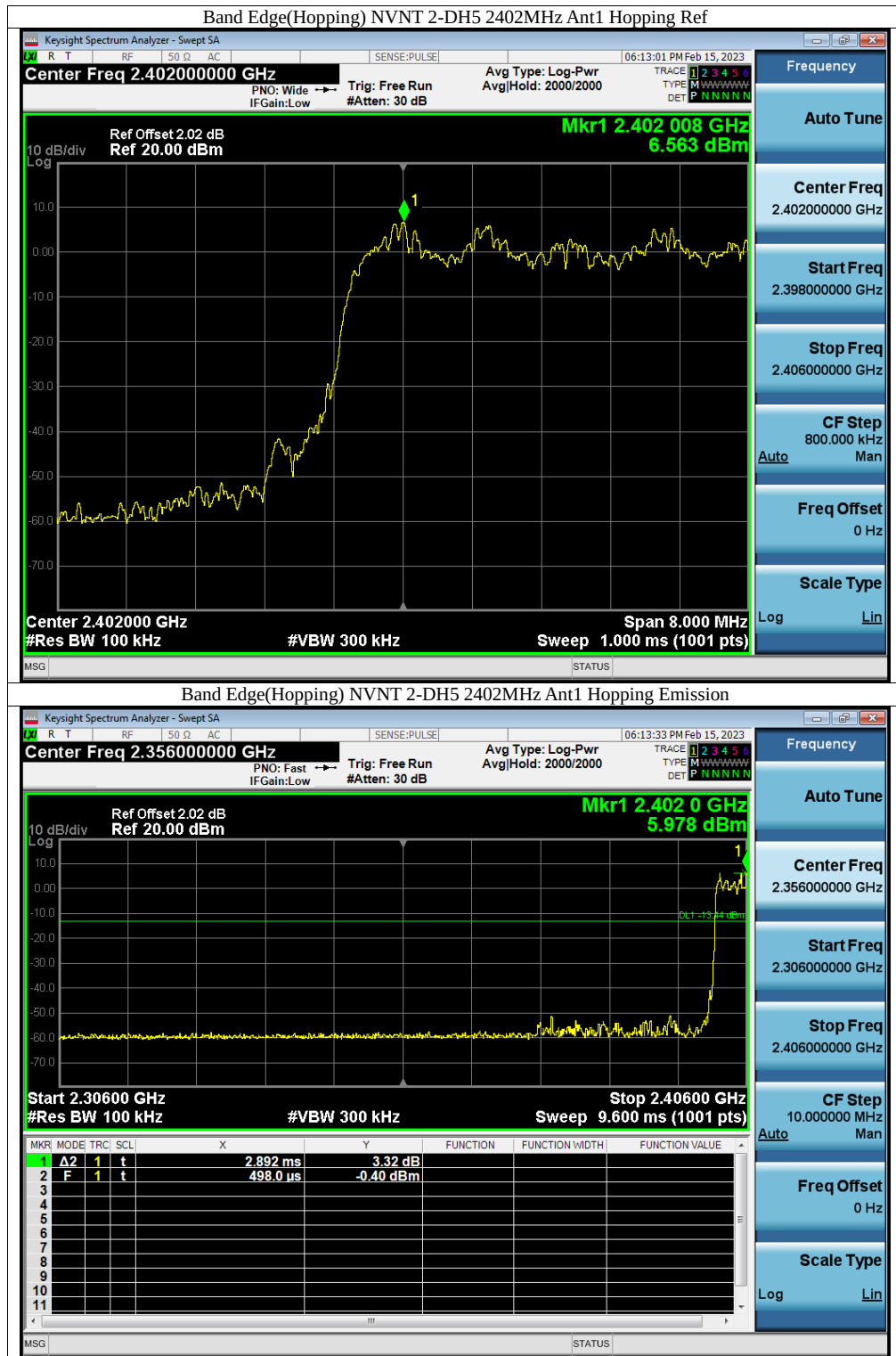
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E01A23010214F00101



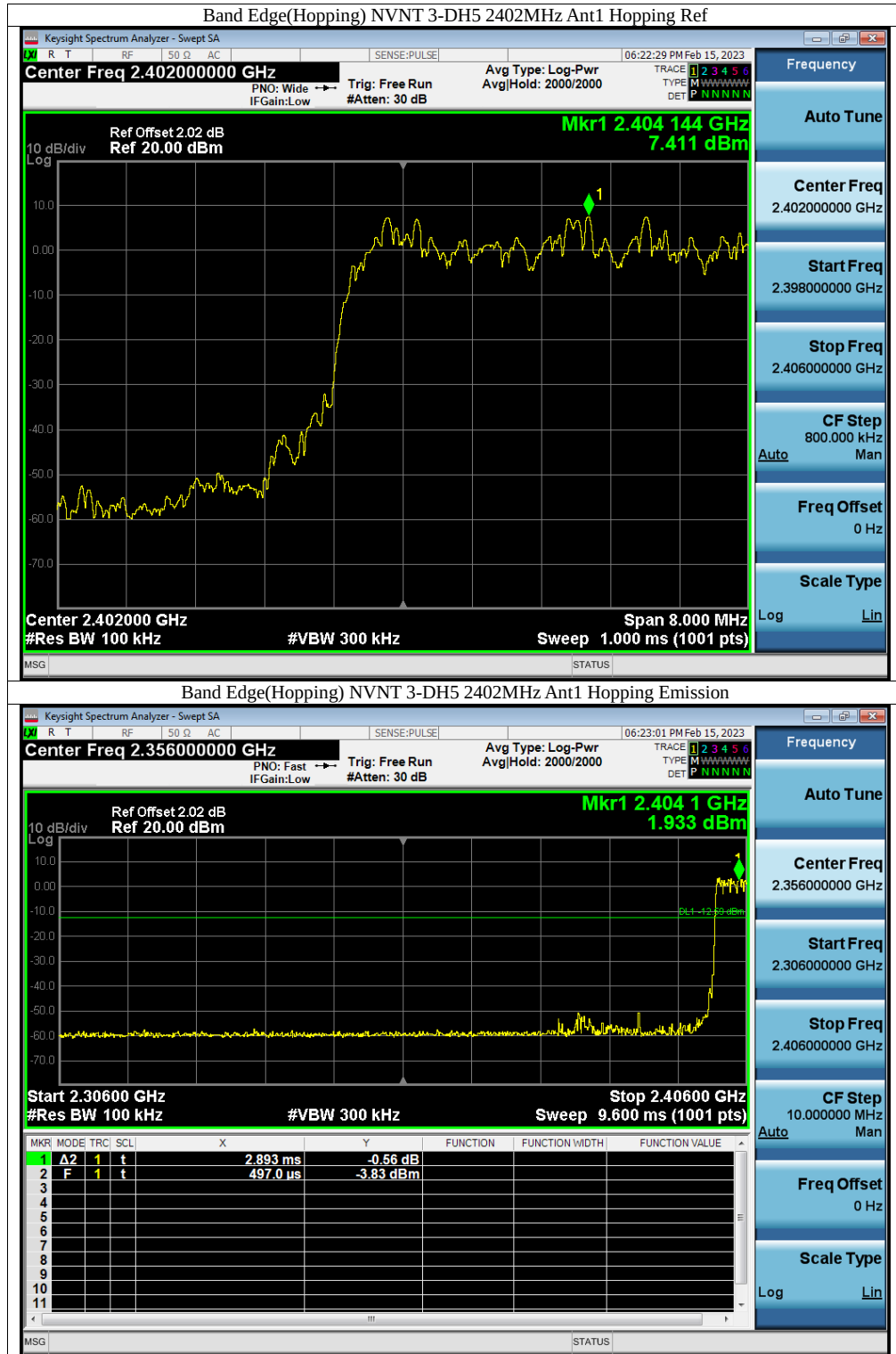
E01A23010214F00101



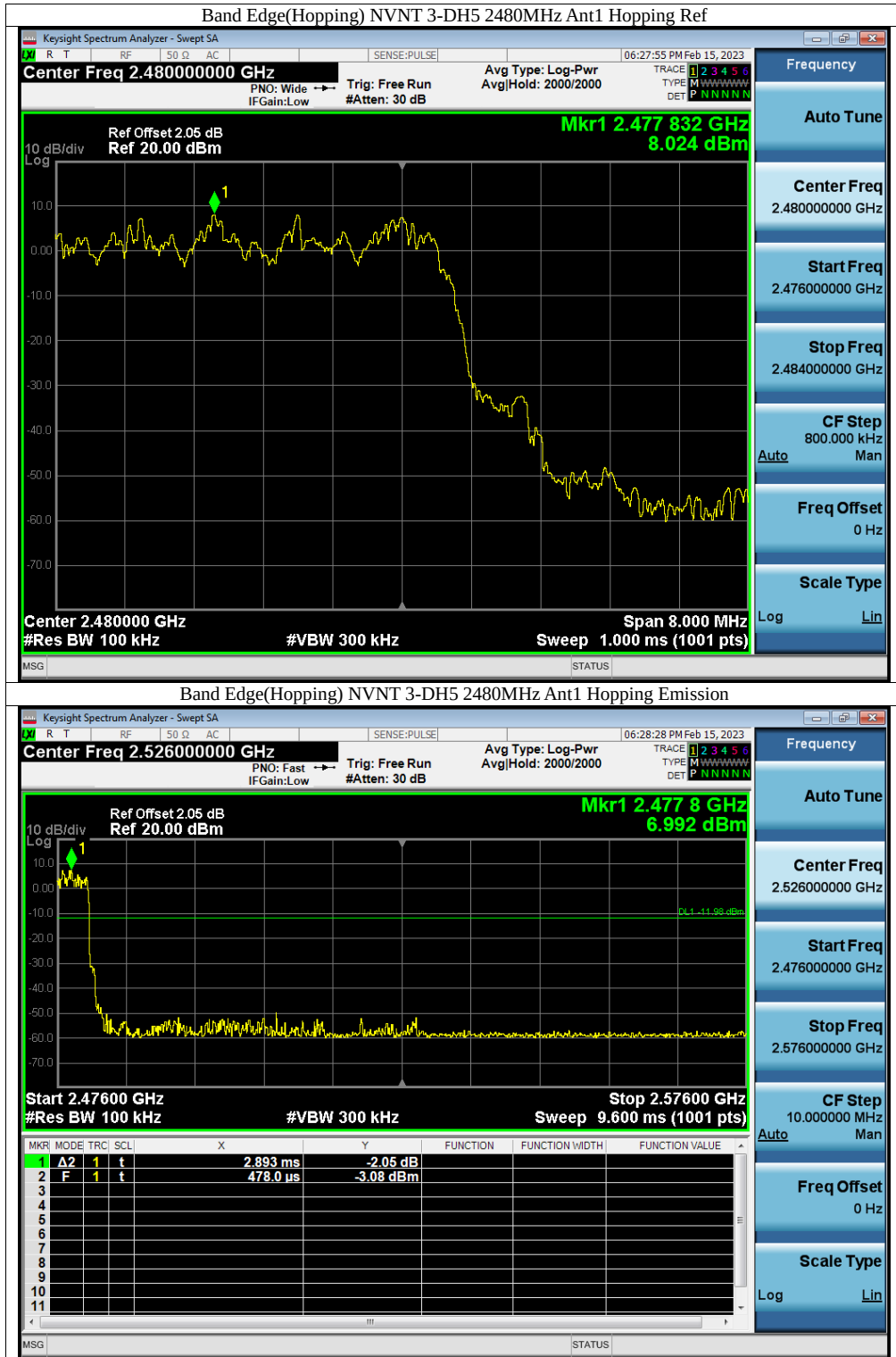
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E01A23010214F00101



E01A23010214F00101

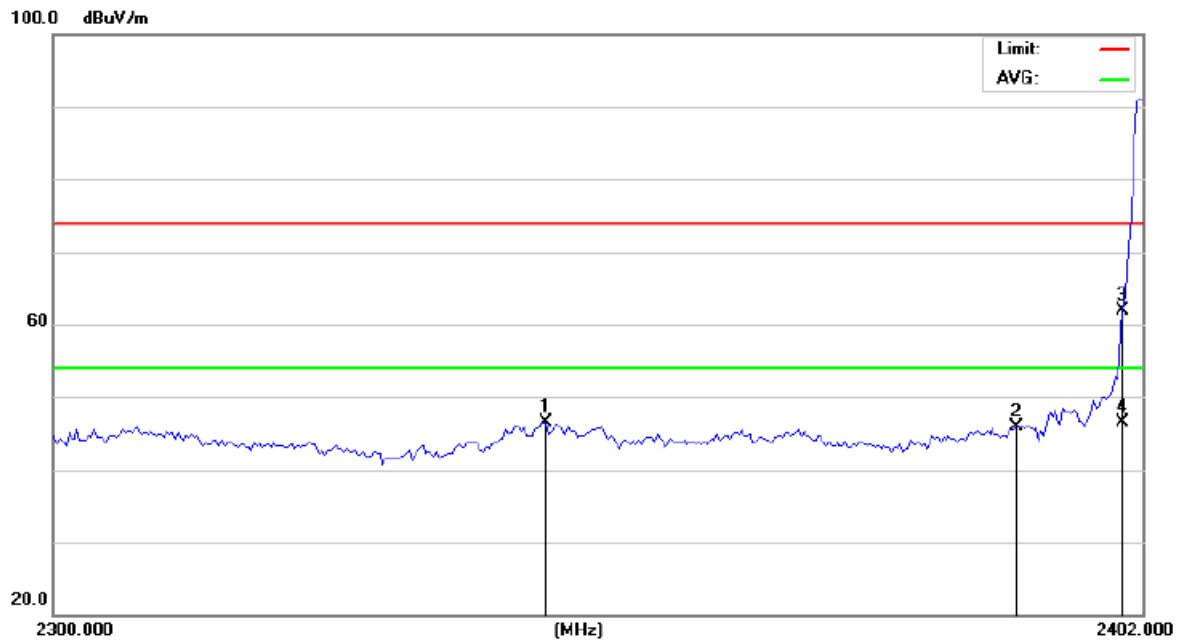


E01A23010214F00101

2. Radiated emission Test

Worst test modulation 8DPSK

For Non-Hopping Mode:



Site ANCI 843.3

Polarization: **Horizontal**

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: Battery 3.7V

Humidity: 60.6 %

Mode: TX2402

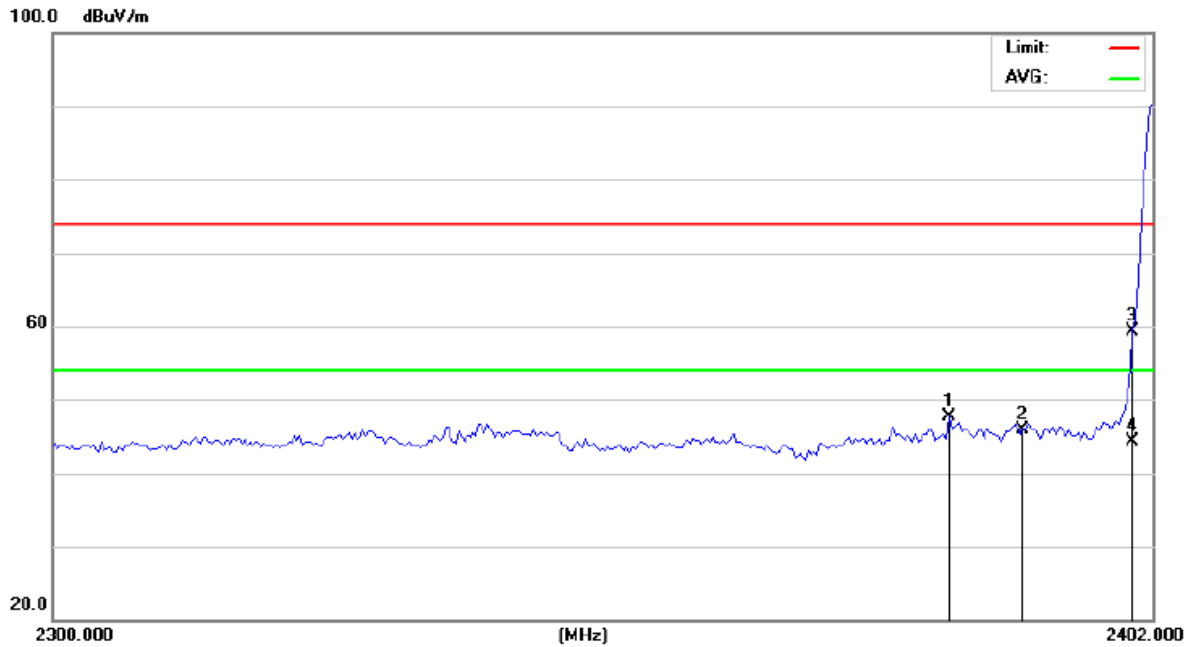
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		2345.607	51.66	-5.12	46.54	74.00	-27.46	peak		
2		2390.000	50.74	-4.82	45.92	74.00	-28.08	peak		
3		2400.000	66.69	-4.75	61.94	74.00	-12.06	peak		
4	*	2400.000	51.26	-4.75	46.51	54.00	-7.49	AVG		

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

<Reference Only

E01A23010214F00101



Site ANCI 843.3

Polarization: **Vertical**

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: Battery 3.7V

Humidity: 60.6 %

Mode: TX2402

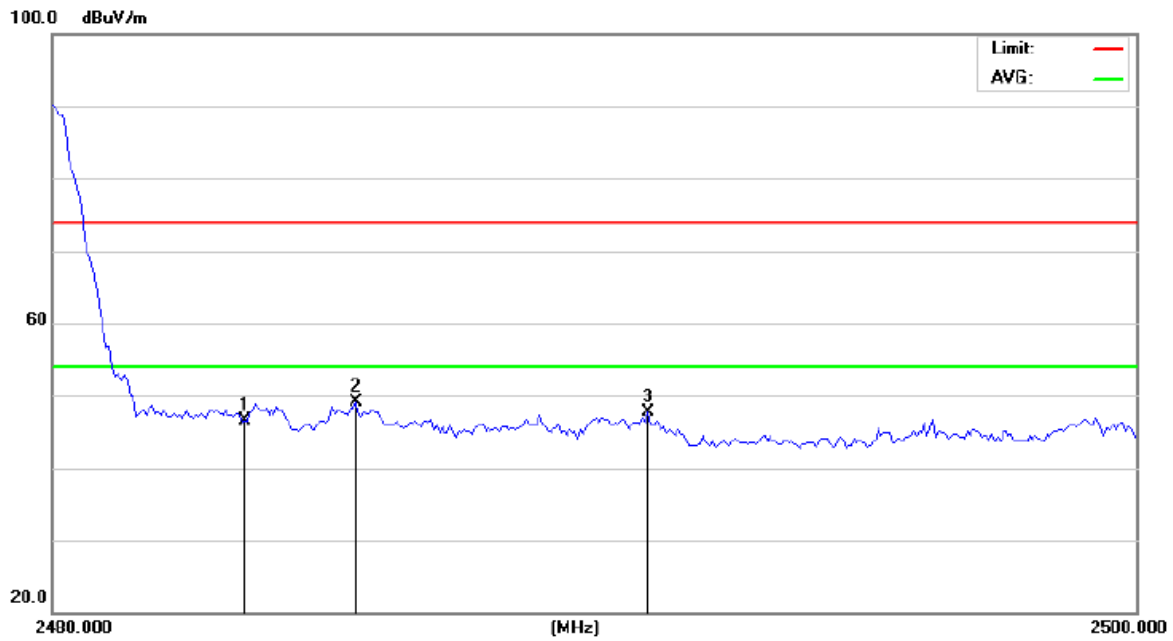
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		2382.795	52.50	-4.87	47.63	74.00	-26.37			peak
2		2390.000	50.68	-4.82	45.86	74.00	-28.14			peak
3		2400.000	64.00	-4.75	59.25	74.00	-14.75			peak
4	*	2400.000	48.96	-4.75	44.21	54.00	-9.79			AVG

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

(Reference Only)

E01A23010214F00101



Site ANCI 843.3

Polarization: Vertical

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: Battery 3.7V

Humidity: 60.6 %

Mode: TX2480

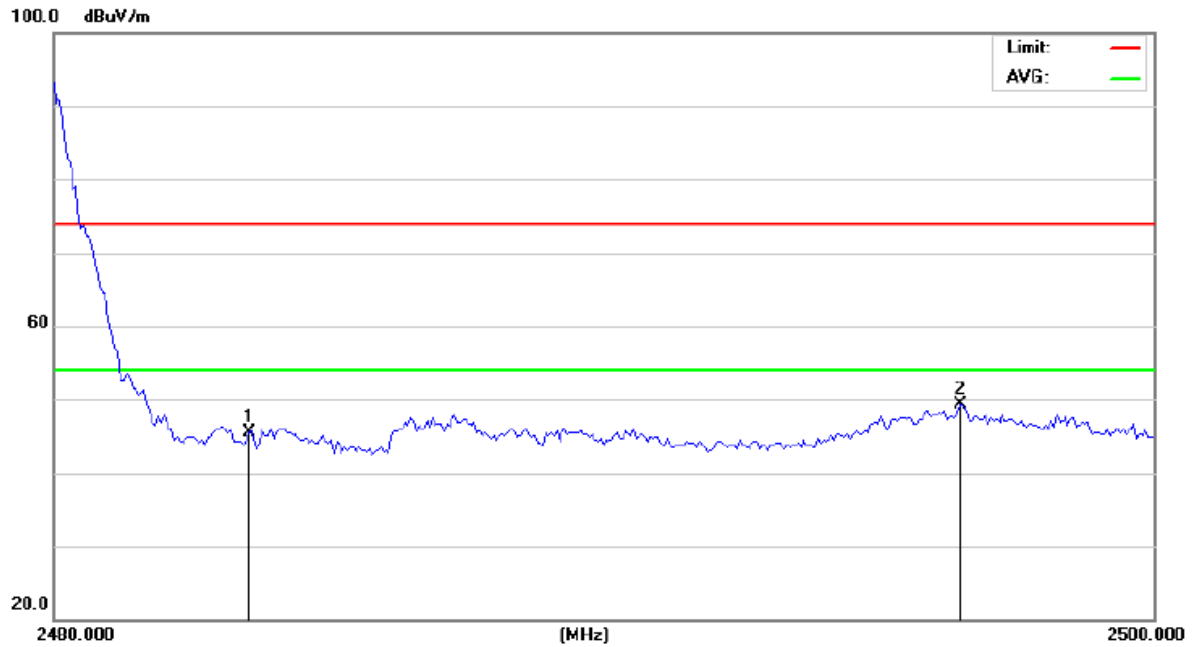
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		2483.500	50.72	-4.19	46.53	74.00	-27.47	peak		
2	*	2485.584	53.28	-4.18	49.10	74.00	-24.90	peak		
3		2490.980	51.78	-4.15	47.63	74.00	-26.37	peak		

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

(Reference Only)

E01A23010214F00101



Site ANCI 843.3

Polarization: **Horizontal**

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: Battery 3.7V

Humidity: 60.6 %

Mode: TX2480

Note:

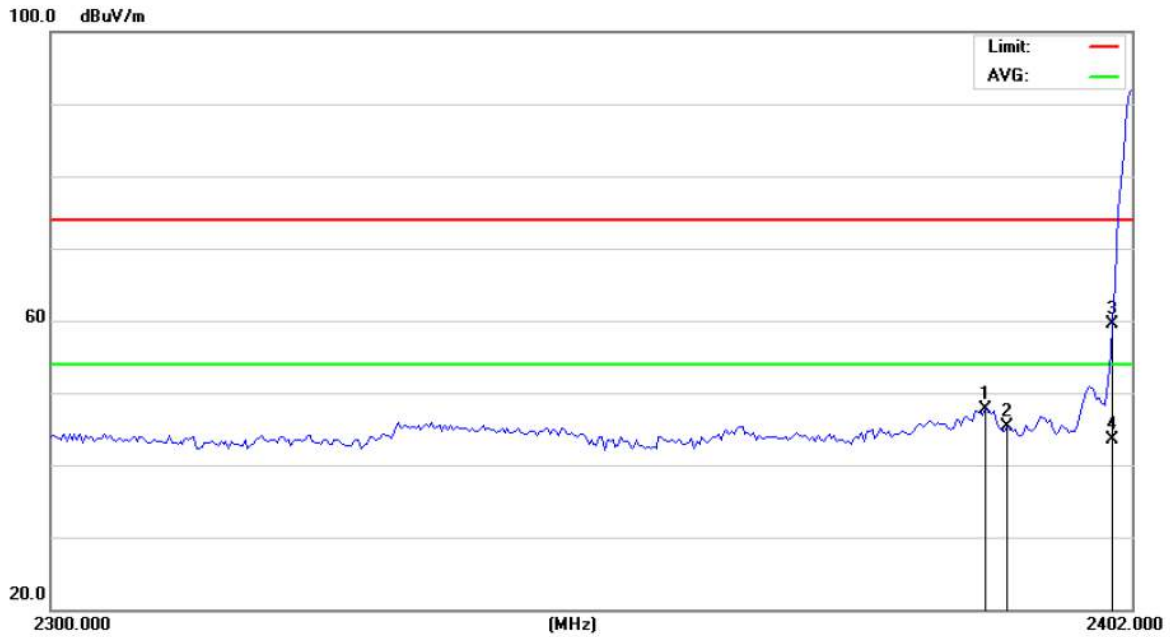
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		2483.500	49.62	-4.19	45.43	74.00	-28.57	peak		
2	*	2496.488	53.33	-4.11	49.22	74.00	-24.78	peak		

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

⟨Reference Only

E01A23010214F00101

For Hopping Mode:



Site ANCI 843.3

Polarization: *Vertical*

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: DC 3.7V

Humidity: 60.6 %

Mode: Hopping

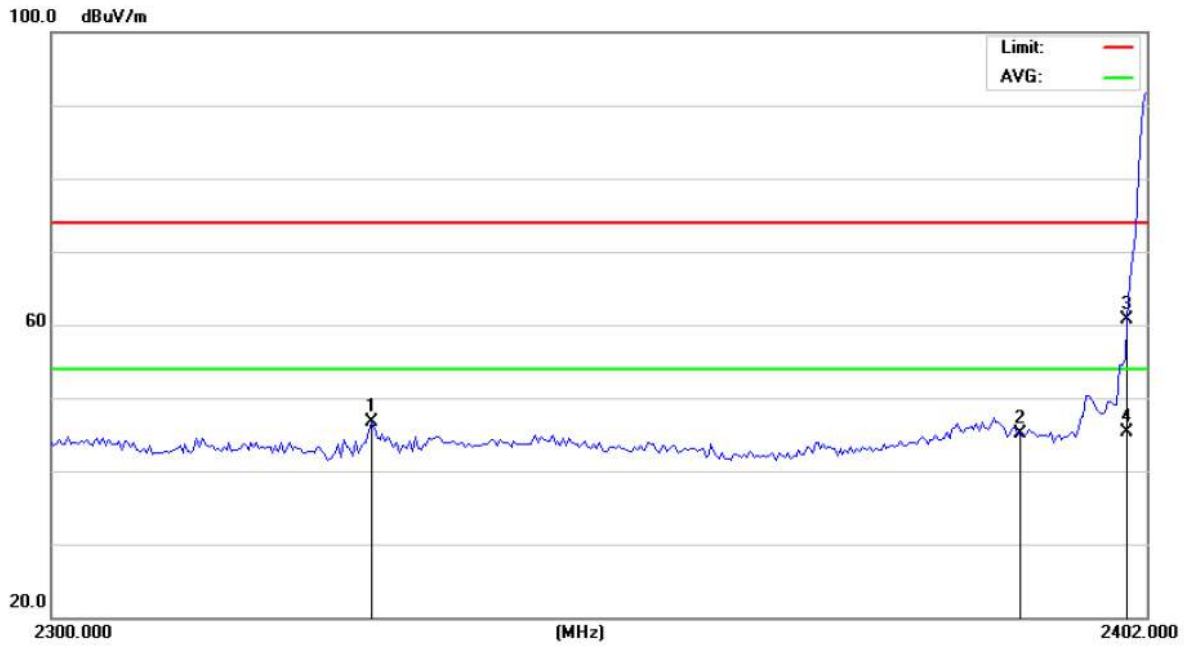
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		2387.970	52.51	-4.83	47.68	74.00	-26.32	peak		
2		2390.000	50.03	-4.82	45.21	74.00	-28.79	peak		
3		2400.000	64.16	-4.75	59.41	74.00	-14.59	peak		
4	*	2400.000	48.25	-4.75	43.50	54.00	-10.50	AVG		

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

<Reference Only

E01A23010214F00101



Site ANCI 843.3

Polarization: **Horizontal**

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: DC 3.7V

Humidity: 60.6 %

Mode: Hopping

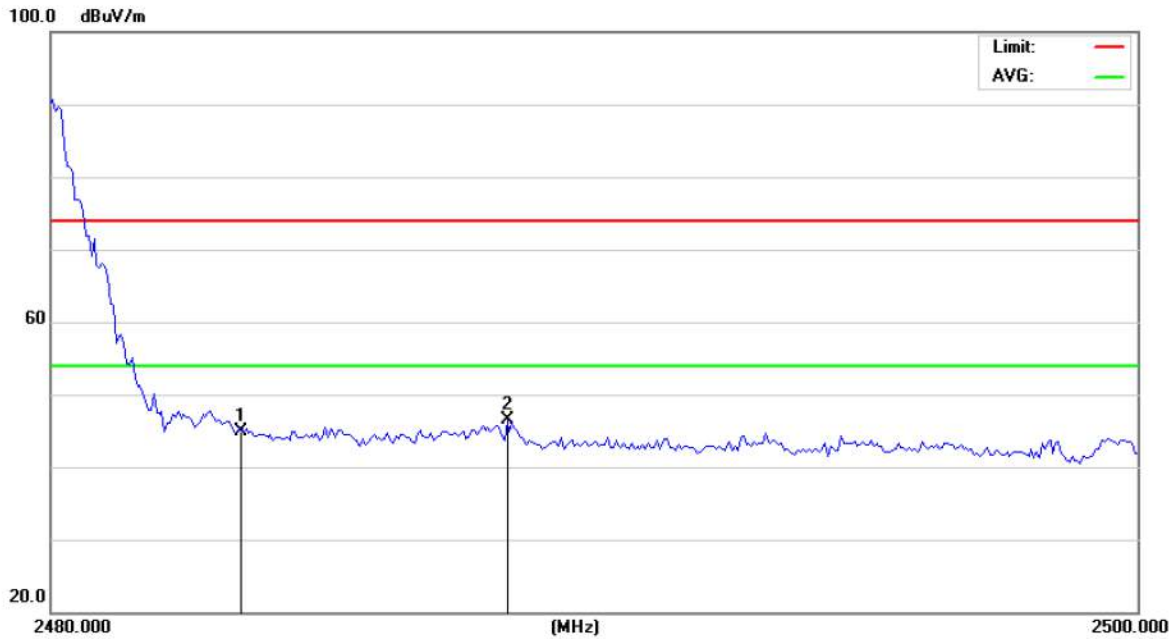
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree	Comment
1		2329.378	51.94	-5.23	46.71	74.00	-27.29	peak		
2		2390.000	50.01	-4.82	45.19	74.00	-28.81	peak		
3		2400.000	65.44	-4.75	60.69	74.00	-13.31	peak		
4	*	2400.000	50.02	-4.75	45.27	54.00	-8.73	AVG		

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

<Reference Only

E01A23010214F00101



Site ANCI 843.3

Polarization: *Horizontal*

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: DC 3.7V

Humidity: 60.6 %

Mode: Hopping

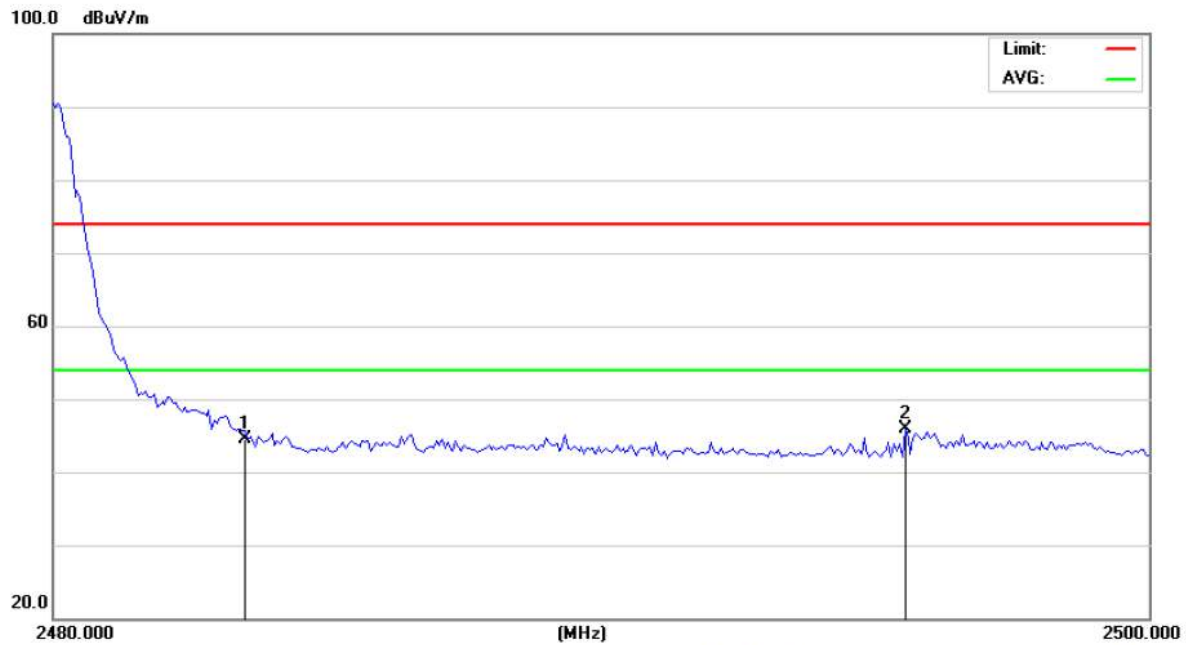
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		2483.500	49.12	-4.19	44.93	74.00	-29.07	peak		
2	*	2488.380	50.59	-4.16	46.43	74.00	-27.57	peak		

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

〈Reference Only

E01A23010214F00101



Site ANCI 843.3

Polarization: **Vertical**

Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak)

Power: DC 3.7V

Humidity: 60.6 %

Mode: Hopping

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		2483.500	48.72	-4.19	44.53	74.00	-29.47	peak		
2	*	2495.536	50.02	-4.11	45.91	74.00	-28.09	peak		

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

(Reference Only)

E01A23010214F00101

14. Antenna Application

14.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247.

FCC part 15C section 15.247 requirements:

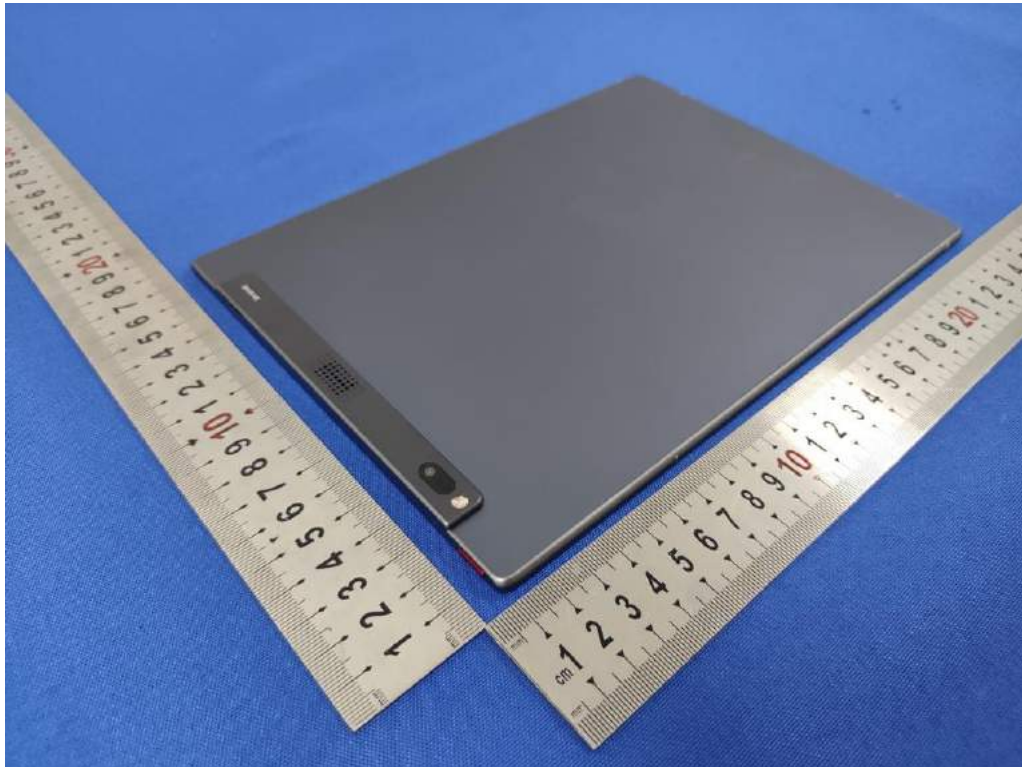
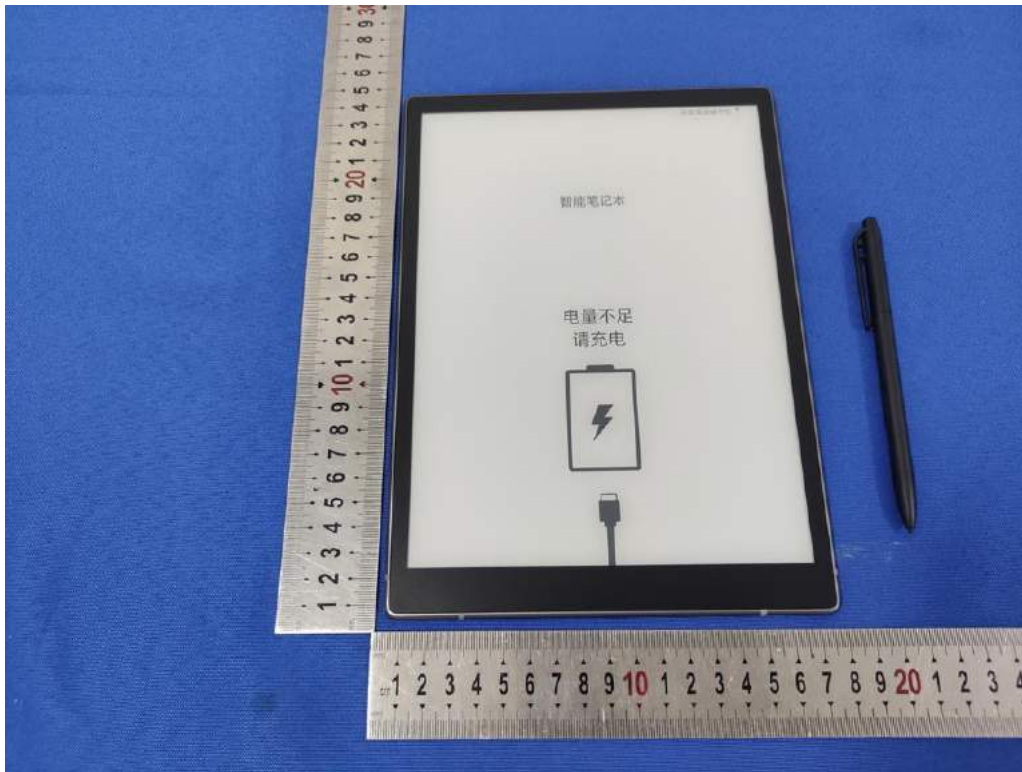
Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

14.2 Result

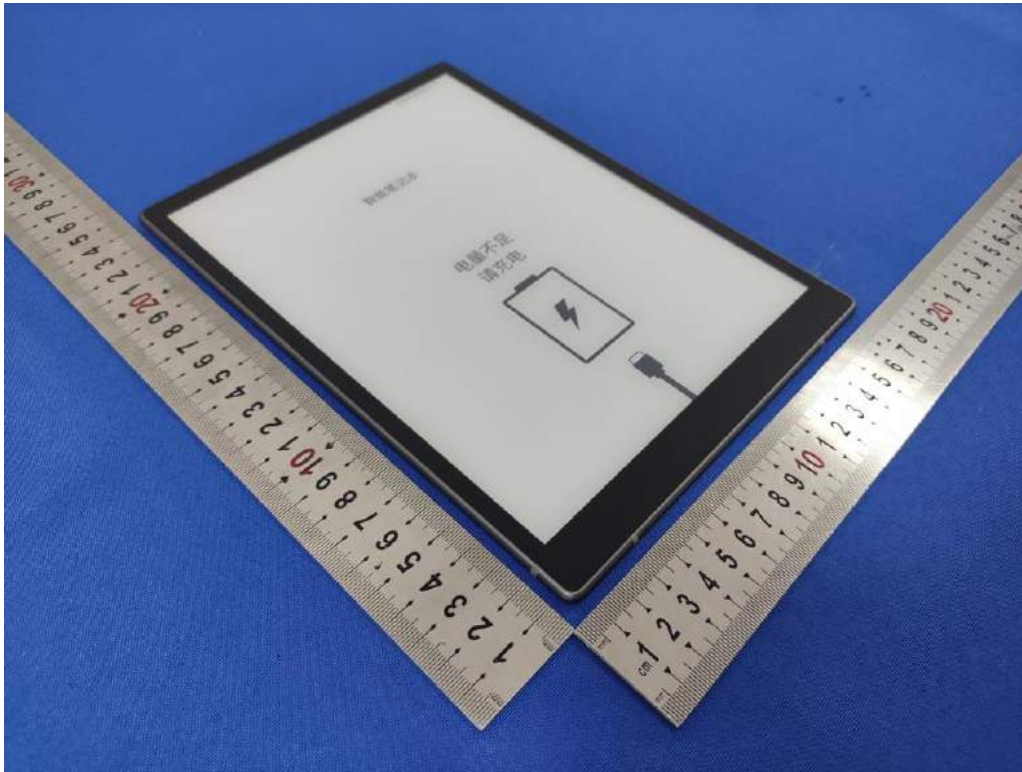
The EUT'S antenna is an Internal antenna. The antenna's gain is 2.14dBi and meets the requirement.

APPENDIX (Photos of EUT)

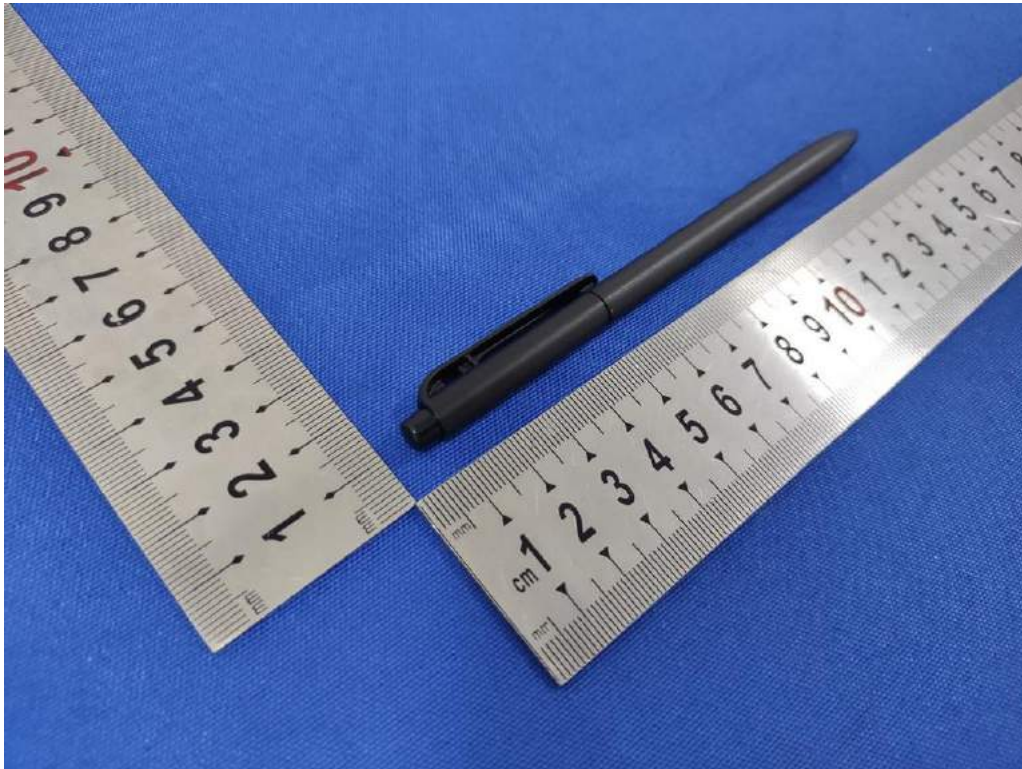
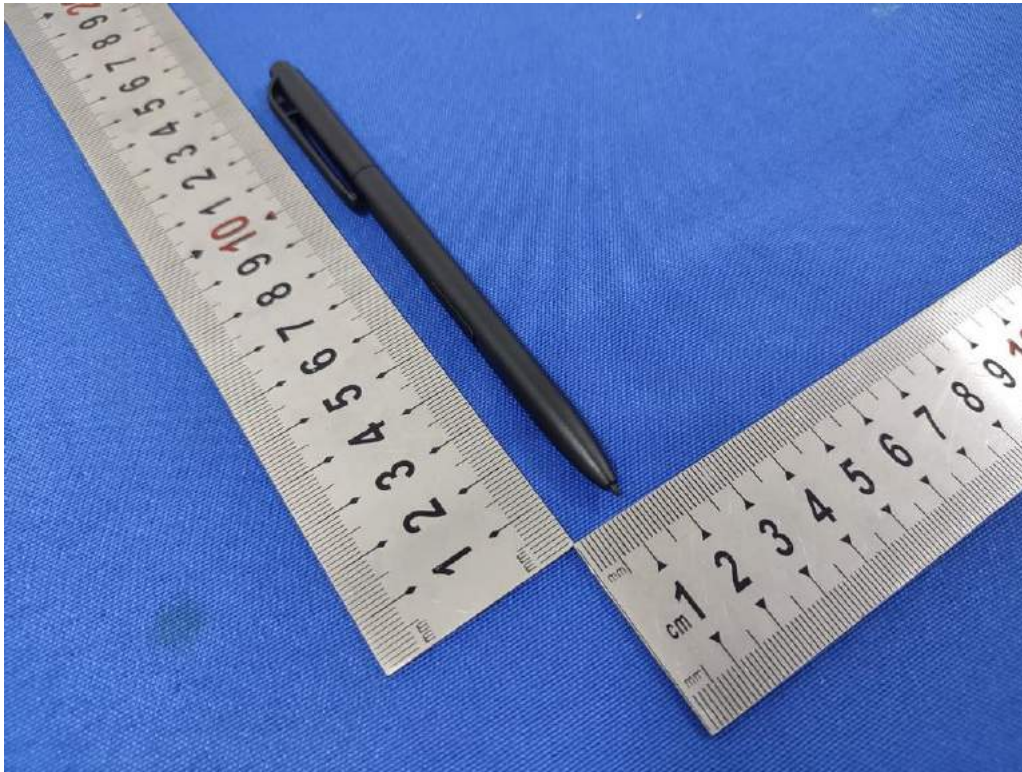
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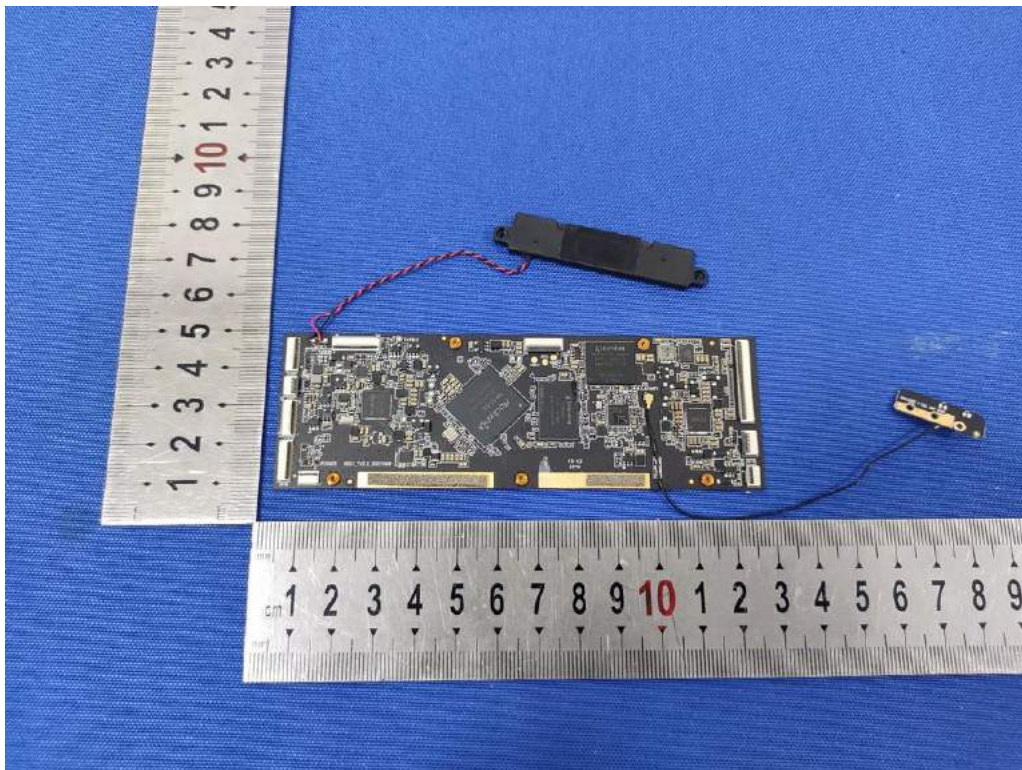
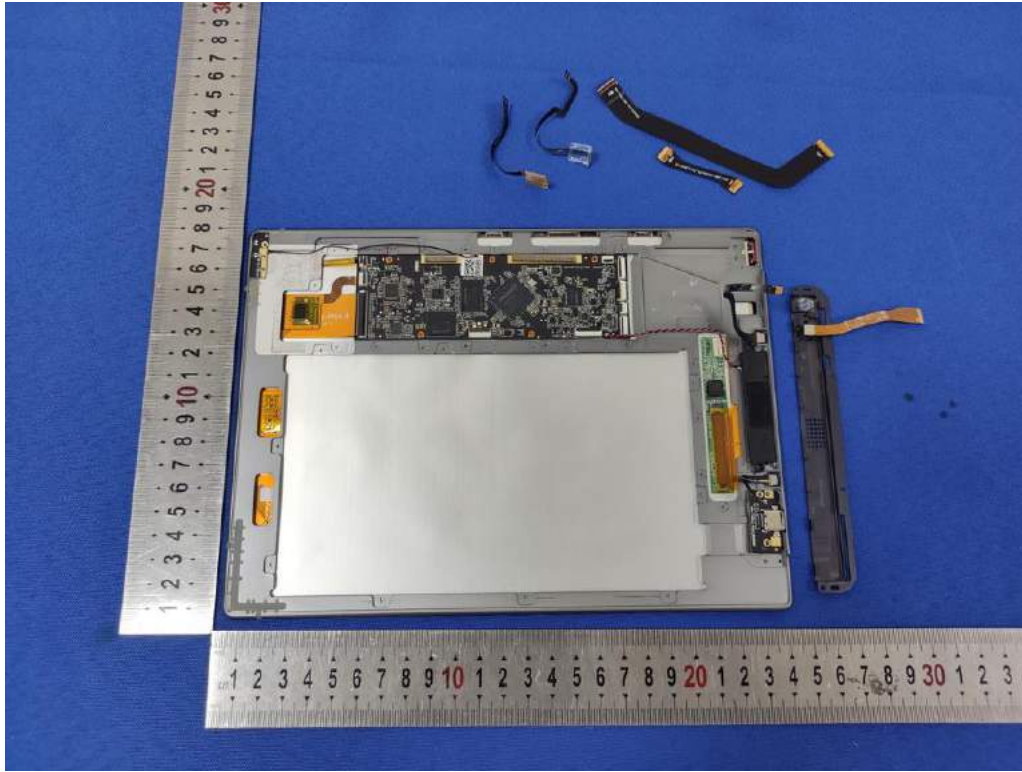


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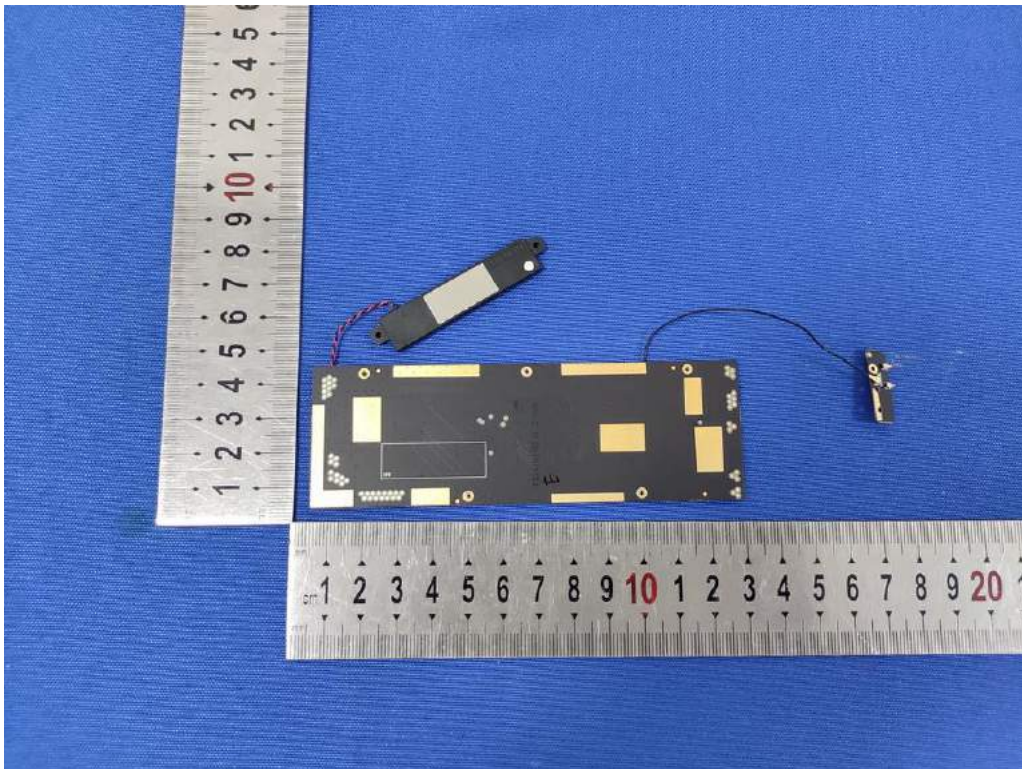
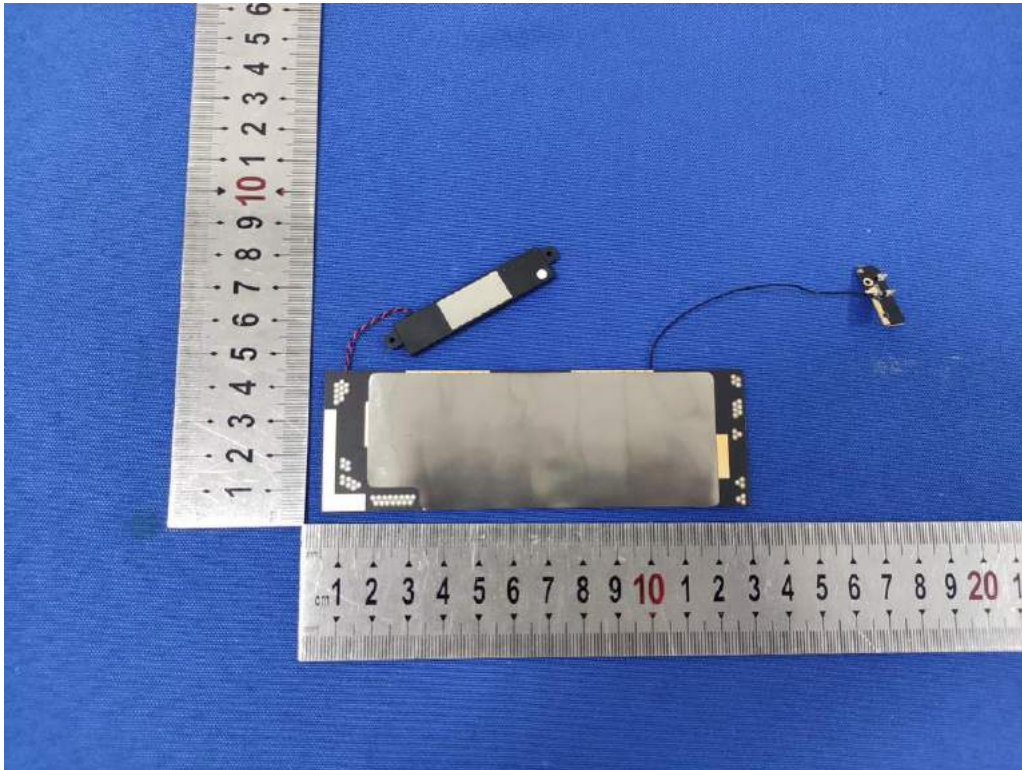


TRF No.: 01-R001-3A-BT

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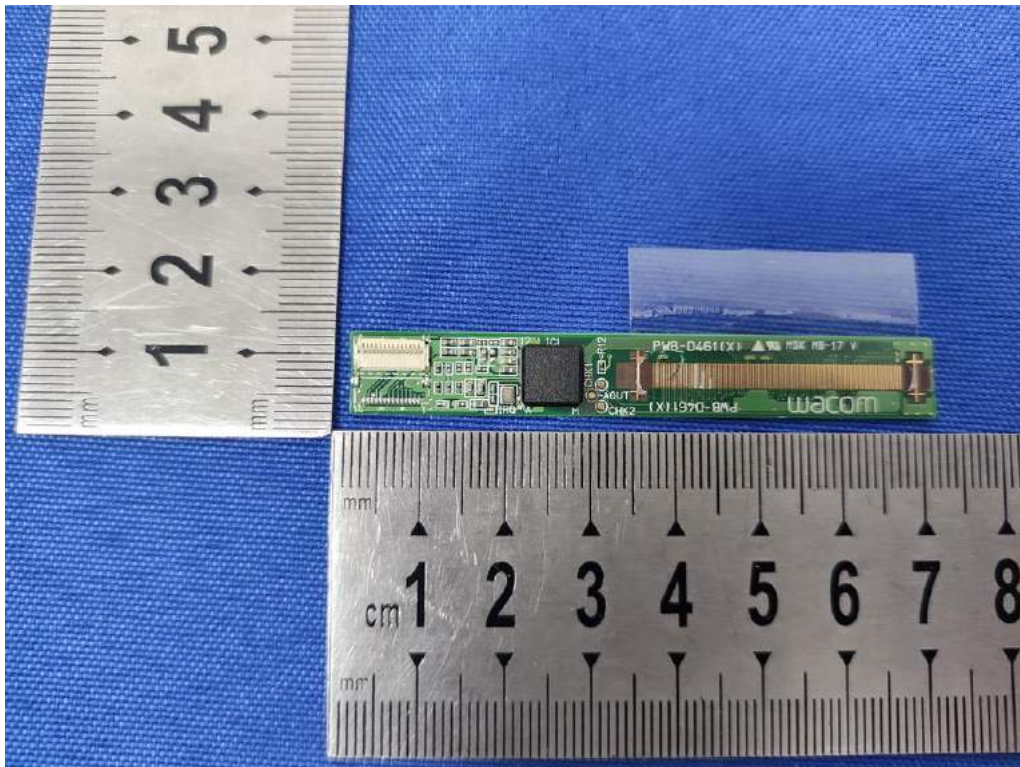
E01A23010214F00101



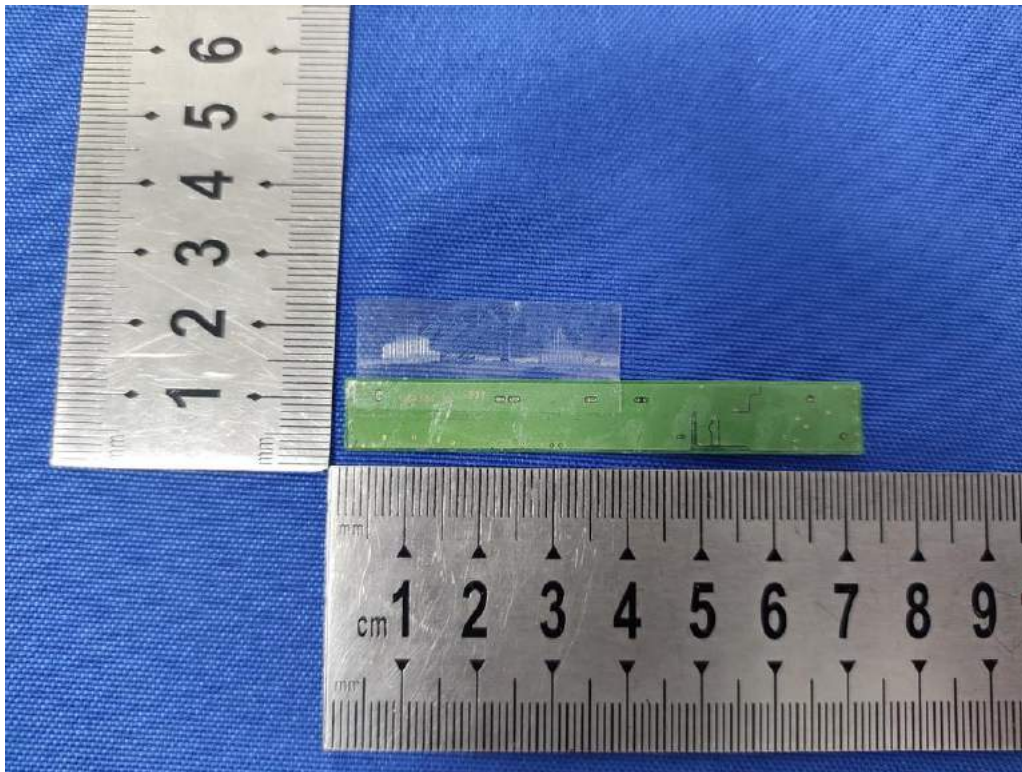
TRF No.: 01-R001-3A-BT

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---The end of report---