



Report No.: TW2309256E

Applicant: VSM Group AB

Product: Singer Momento

Model No.: Momento

Trademark: **SINGER**

Test Standards: FCC Part 15.247

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.10, FCC Part 15.247 for the evaluation of electromagnetic compatibility

Approved By

*Terry Tang*

Terry Tang

Manager

Dated: November 17, 2023

**Results appearing herein relate only to the sample tested**

**The technical reports is issued errors and omissions exempt and is subject to withdrawal at**

## SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

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### **Special Statement:**

#### **FCC-Registration No.: 744189**

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

#### **Industry Canada (IC) —Registration No.:5205A**

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

#### **A2LA (Certification Number:5013.01)**

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

#### **CAB identifier: CN0033**

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## 1.0 General Details

### 1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.  
Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China  
Telephone: (755) 83448688  
Fax: (755) 83442996  
Site Listed with Federal Communications commission (FCC)  
Registration Number: 744189  
For 3m Anechoic Chamber  
Site Listed with Industry Canada of Ottawa, Canada  
Registration Number: IC: 5205A  
For 3m Anechoic Chamber

### 1.2 Applicant Details

Applicant: VSM Group AB  
Address: Soldatorpsgatan 3, SE-554 74 Jonkoping, Sweden  
Telephone: --  
Fax: --

### 1.3 Description of EUT

Product: Singer Momento  
Manufacturer: VSM Group AB  
Address: Soldatorpsgatan 3, SE-554 74 Jonkoping, Sweden  
Trademark:

**SINGER®**

Additional Trademark: N/A  
Model Number: Momento  
Additional Model Number: N/A  
Hardware Version: V2.01  
Software Version: V2.332  
Serial No.:



Rating: Input: DC24V, 2.7A  
Power Supply: Model: FJ- SW20172402700  
Input: 100-240V~, 50/60Hz, 1.5A Max; Output: DC24.0V, 2.7A, 64.8W  
Alternative: Model: GM60-240275-F

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	Input: 100-240V~, 50/60Hz, 2.0A Max; Output: DC24.0V, 2.75A, 66.0W
Type of Modulation	IEEE 802.11b: DSSS (CCK, QPSK, DBPSK)
	IEEE 802.11g/n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK)
Frequency range	IEEE 802.11b/g/n (HT20): 2412-2462MHz;
Channel Spacing	5MHz for IEEE 802.11b/g/n (HT20)
Air Data Rate	IEEE 802.11b: 11, 5.5, 2, 1 Mbps
	IEEE 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps
	IEEE 802.11n HT20: mcs0-mcs7
Frequency Selection	By software
Channel Number	IEEE 802.11b/g/n (HT20): 11 Channels
Antenna:	PCB antenna with gain 1.42dBi Max (Get from the antenna specification)

1.4 Submitted Sample: 7 Samples

1.5 Test Duration

2023-09-21 to 2023-11-17

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions below 1GHz Uncertainty =4.7dB

Radiated Emissions above 1GHz Uncertainty =6.0dB

Conducted Power Uncertainty =6.0dB

Occupied Channel Bandwidth Uncertainty =5%

Note: The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

1.7 Test Engineer

The sample tested by

*Andy Xing*

Print Name: Andy Xing

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2023-07-14	2024-07-13
LISN	R&S	EZH3-Z5	100294	2023-07-14	2024-07-13
LISN	R&S	EZH3-Z5	100253	2023-07-14	2024-07-13
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2023-07-14	2024-07-13
Loop Antenna	EMCO	6507	00078608	2022-07-18	2025-07-17
Spectrum	R&S	FSIQ26	100292	2023-07-14	2024-07-13
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2022-07-18	2025-07-17
Horn Antenna	R&S	BBHA 9120D	9120D-631	2022-07-18	2024-07-17
Power meter	Anritsu	ML2487A	6K00003613	2023-07-14	2024-07-13
Power sensor	Anritsu	MA2491A	32263	2023-07-14	2024-07-13
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2022-07-18	2025-07-17
9*6*6 Anechoic	--	--	N/A	2022-07-26	2025-07-25
EMI Test Receiver	RS	ESVB	826156/011	2023-07-14	2024-07-13
EMI Test Receiver	RS	ESCS 30	834115/006	2023-07-14	2024-07-13
Spectrum	HP/Agilent	E4407B	MY50441392	2023-07-14	2024-07-13
Spectrum	RS	FSP	1164.4391.38	2023-07-14	2024-07-13
RF Cable	Zhengdi	ZT26-NJ-NJ-8M/FA	--	2023-07-14	2024-07-13
RF Cable	Zhengdi	7m	--	2023-07-14	2024-07-13
Pre-Amplifier	Schwarebeck	BBV9743	#218	2023-07-14	2024-07-13
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2023-07-14	2024-07-13
LISN	SCHAFFNER	NNB42	00012	2023-07-14	2024-07-13
ESPI Test Receiver	R&S	ESPI 3	100379	2023-07-14	2024-07-13
LISN	R&S	EZH3-Z5	100294	2023-07-14	2024-07-13

## 2.2 Automation Test Software

### For Conducted Emission Test

Name	Version
EZ-EMC	Ver.EMC-CON 3A1.1

### For Radiated Emissions

Name	Version
EMI Test Software BL410-EV18.91	V18.905
EMI Test Software BL410-EV18.806 High Frequency	V18.06

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### 3. DESCRIPTION OF TEST MODES

#### IEEE 802.11b, 802.11g, 802.11n (HT20) mode

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode: 1Mbps data rate (worst case) was chosen for full testing. IEEE 802.11g mode: 6Mbps data rate (worst case) was chosen for full testing. IEEE 802.11n (HT20) mode: mcs0 (worst case) were chosen for full testing;

Note: During the test, the duty cycle was set up to >98%

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### 3.0 Technical Details

#### 3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.203	Antenna Requirement	Pass	Complies
FCC Part 15, Paragraph 15.207	Conducted Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth > 500kHz	Pass	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	Pass	Complies
FCC Part 15, Paragraph 15.109, 15.205 & 15.209	Transmitter Radiated Emission Limit: Table 15.209	Pass	Complies
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density Limit: max. 8dBm/3kHz	Pass	Complies
FCC Part 15, Paragraph 15.247(d)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	Pass	Complies

#### 3.2 Test Standards

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

#### 4.0 EUT Modification

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

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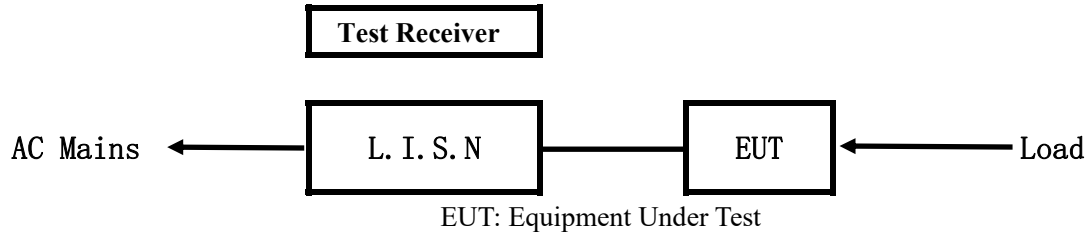
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## 5.0 Power Line Conducted Emission Test

### 5.1 Schematics of the test

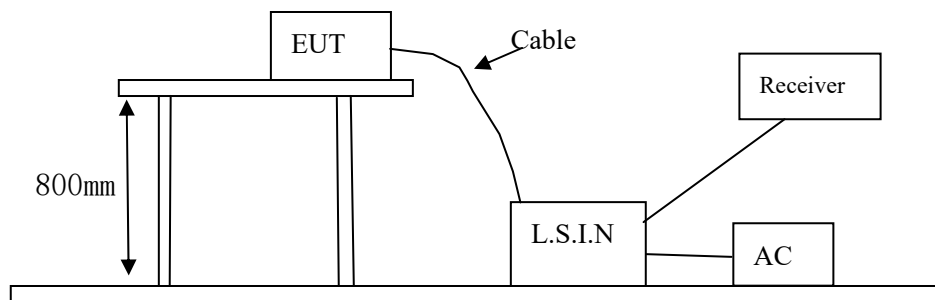


### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum from 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10 –2013.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



### 5.3 Configuration of the EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

#### A. EUT

Device	Manufacturer	Model	FCC ID
Singer Momento	VSM Group AB	Momento	2BBQS-MOMENTO

#### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

#### C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A	--	--	--	--

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#### 5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

#### 5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

- Notes:
1. \*Decreasing linearly with logarithm of frequency.
  2. The tighter limit shall apply at the transition frequencies

#### 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

Note: Two power supplies were tested and only the worst case was recorded in the test report

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**A: Conducted Emission on Live Terminal (150kHz to 30MHz)**

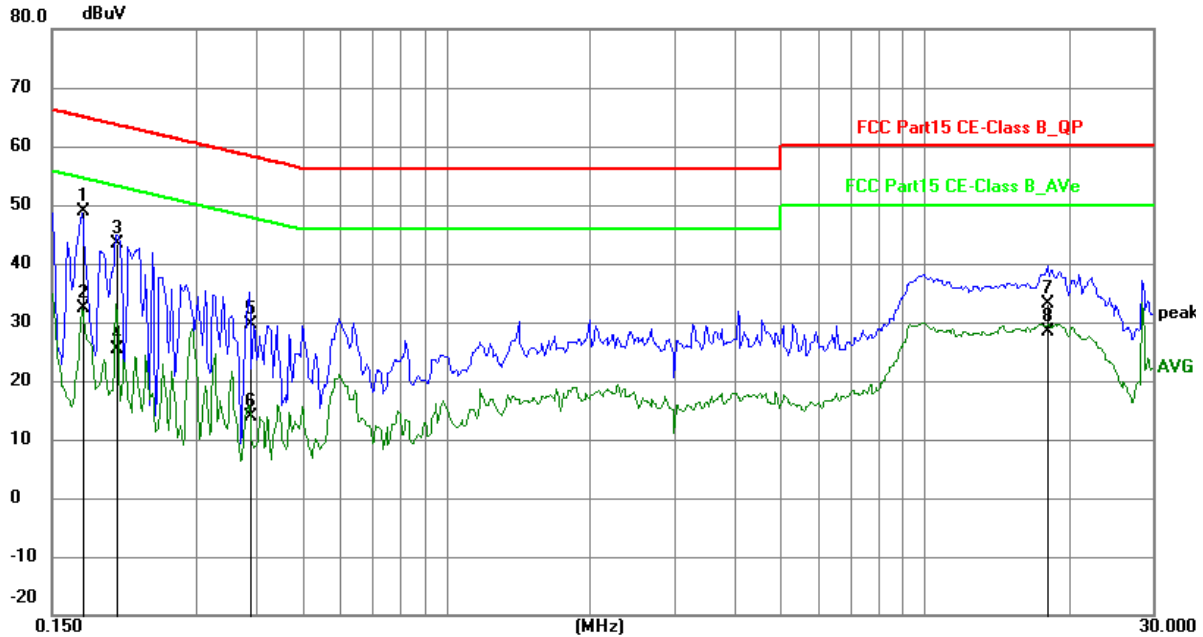
**EUT Operating Environment**

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

**EUT set Condition: Keep WIFI Transmitting**

**Results: Pass**

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1734	39.01	9.77	48.78	64.80	-16.02	QP	P
2	0.1734	22.58	9.77	32.35	54.80	-22.45	AVG	P
3	0.2046	33.65	9.75	43.40	63.42	-20.02	QP	P
4	0.2046	15.63	9.75	25.38	53.42	-28.04	AVG	P
5	0.3879	19.81	9.76	29.57	58.11	-28.54	QP	P
6	0.3879	4.19	9.76	13.95	48.11	-34.16	AVG	P
7	18.1164	22.61	10.57	33.18	60.00	-26.82	QP	P
8	18.1164	17.78	10.57	28.35	50.00	-21.65	AVG	P

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**B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)**

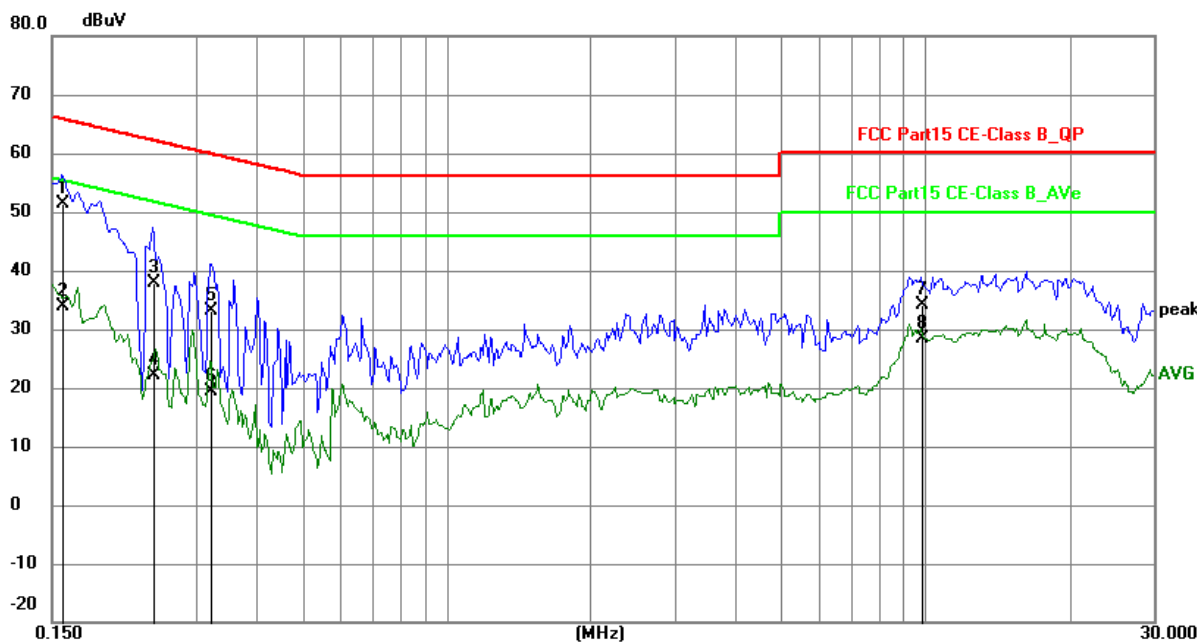
**EUT Operating Environment**

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

**EUT set Condition: Keep WIFI Transmitting**

**Results: Pass**

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1578	41.56	9.78	51.34	65.58	-14.24	QP	P
2	0.1578	24.01	9.78	33.79	55.58	-21.79	AVG	P
3	0.2436	28.24	9.75	37.99	61.97	-23.98	QP	P
4	0.2436	12.29	9.75	22.04	51.97	-29.93	AVG	P
5	0.3215	23.40	9.76	33.16	59.67	-26.51	QP	P
6	0.3215	9.65	9.76	19.41	49.67	-30.26	AVG	P
7	9.8289	23.91	10.15	34.06	60.00	-25.94	QP	P
8	9.8289	18.14	10.15	28.29	50.00	-21.71	AVG	P

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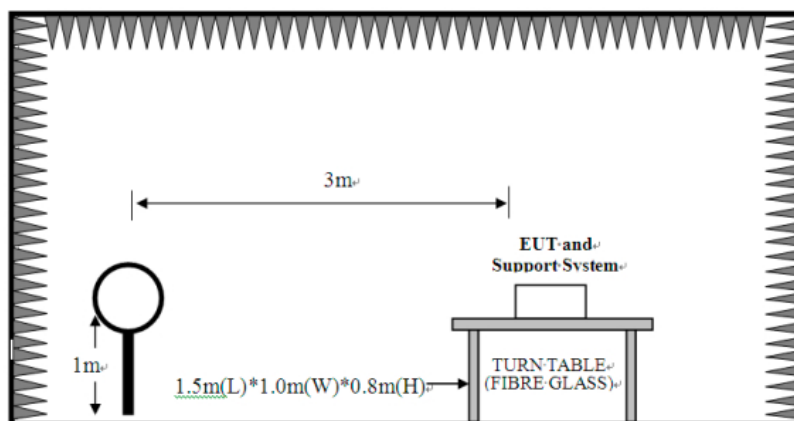
## 6 Radiated Emission Test

### 6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=1MHz VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a “QP” in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

### Block diagram of Test setup

For radiated emissions from 9kHz to 30MHz



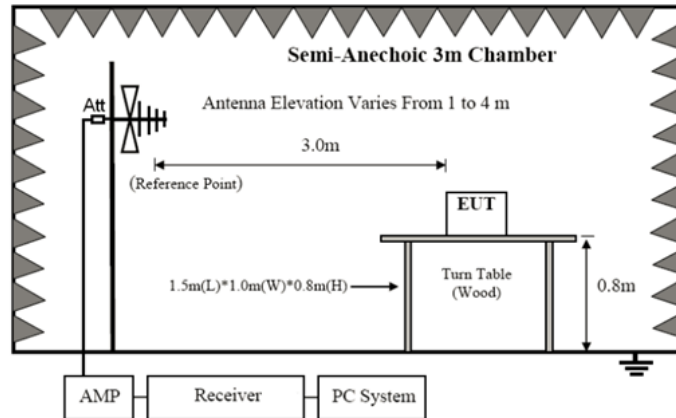
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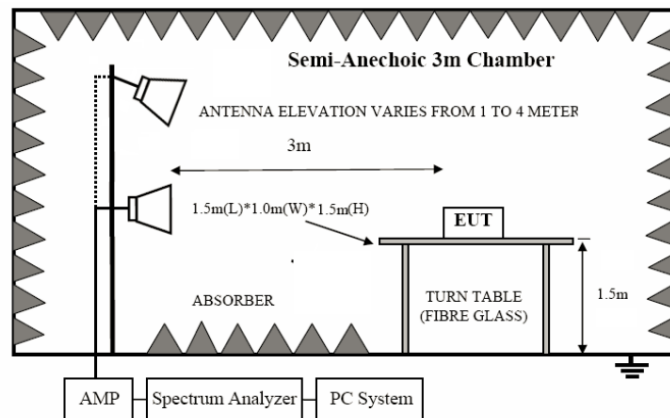
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For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



## 6.2 Configuration of The EUT

Same as section 5.3 of this report

## 6.3 EUT Operating Condition

Same as section 5.4 of this report.

## 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

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**Frequencies in restricted band are complied to limit on Paragraph 15.209**

Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)
0.009-0.049	3	$20\log(2400/F(\text{kHz})) + 40\log(300/3)$
0.490-1.705	3	$20\log(24000/F(\text{kHz})) + 40\log(30/3)$
1.705-30	3	69.5
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
1. RF Voltage (dBuV) =  $20 \log$  RF Voltage ( $\mu$ V)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
  4. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-25G, the final emission level got using PK. For fundamental measurement, PK detector used.
  5. For radiated emissions from 9kHz to 30MHz, the emission level is much less than the limit for more than 20dB. No necessary to take down the record.
  6. Worse case were recorded in the test report. 802.11b was the worst case.
  7. Two power supplies were tested and only the worst case was recorded in the test report

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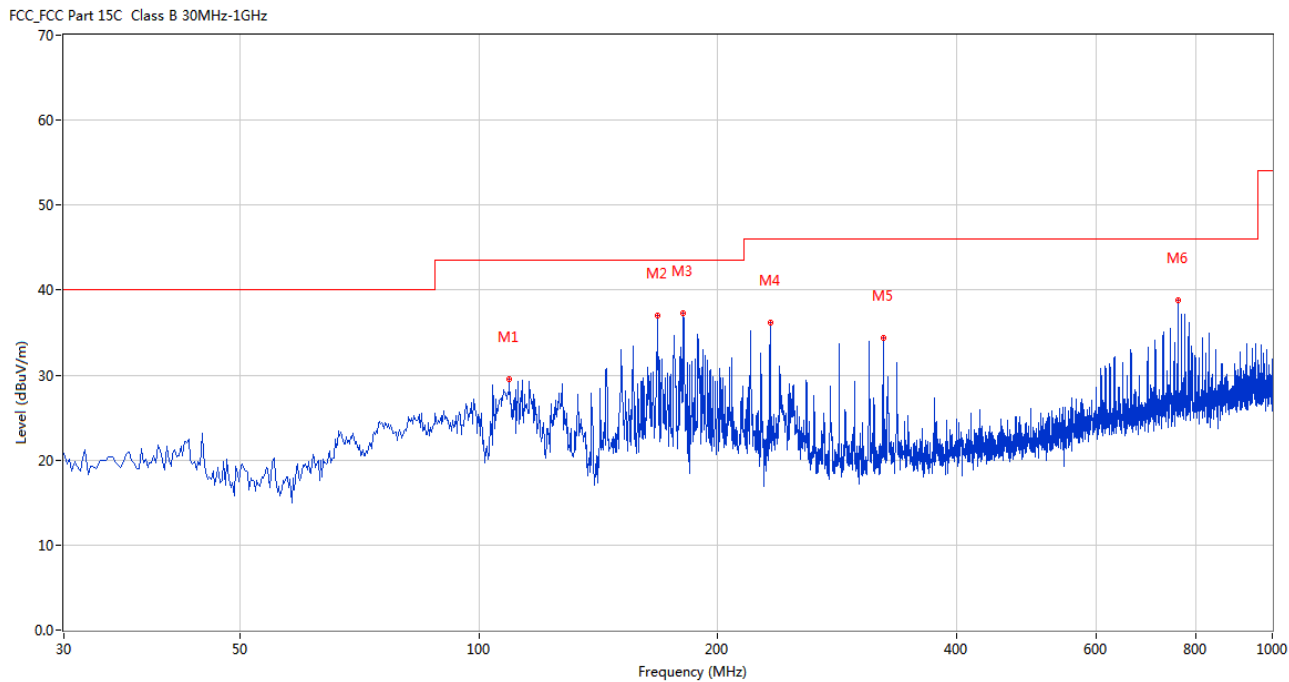


Test result  
General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Transmitting

Results: Pass



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	109.278	29.52	-13.56	43.5	13.98	Peak	0.00	100	Horizontal	Pass
2	168.190	37.06	-16.14	43.5	6.44	Peak	2.00	100	Horizontal	Pass
3	181.040	37.24	-15.15	43.5	6.26	Peak	0.00	100	Horizontal	Pass
4	232.922	36.16	-12.53	46.0	9.84	Peak	2.00	100	Horizontal	Pass
5	323.594	34.33	-10.50	46.0	11.67	Peak	0.00	100	Horizontal	Pass
6	759.985	38.81	-3.29	46.0	7.19	Peak	2.00	100	Horizontal	Pass

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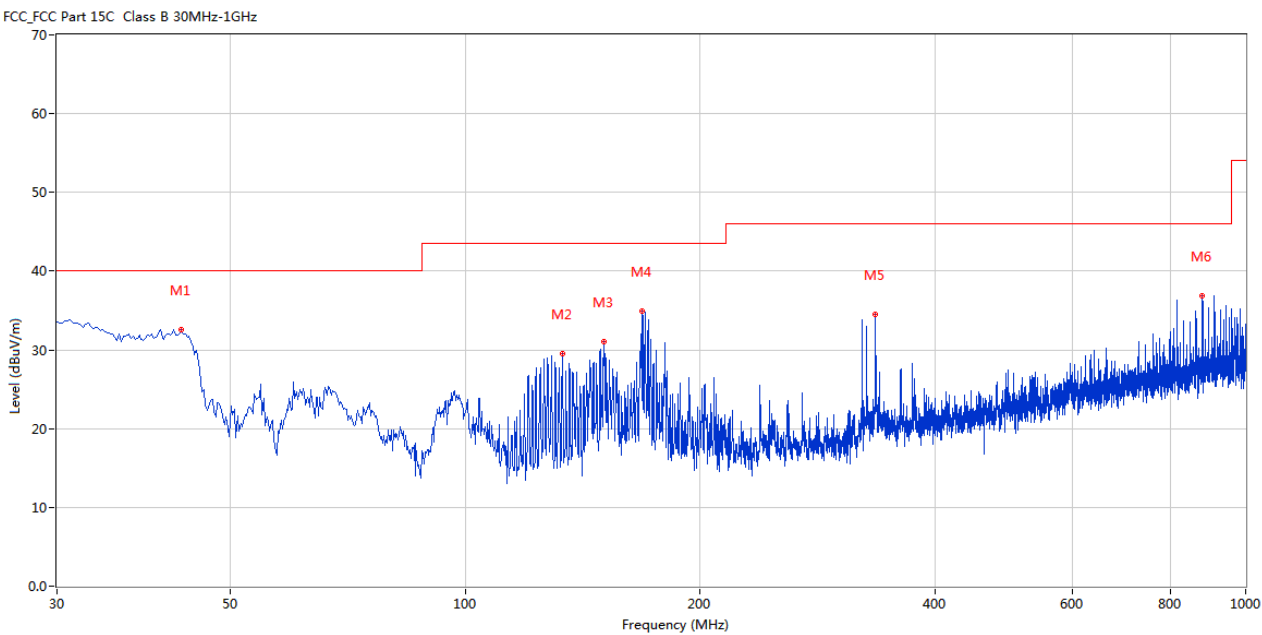


Test result  
General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: Keep Transmitting

Results: Pass



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	43.334	32.62	-11.49	40.0	7.38	Peak	358.00	100	Vertical	Pass
2	133.279	29.57	-16.99	43.5	13.93	Peak	360.00	100	Vertical	Pass
3	150.735	31.02	-16.99	43.5	12.48	Peak	358.00	100	Vertical	Pass
4	168.675	34.89	-16.12	43.5	8.61	Peak	356.00	100	Vertical	Pass
5	335.716	34.58	-9.92	46.0	11.42	Peak	358.00	100	Vertical	Pass
6	879.750	36.84	-1.96	46.0	9.16	Peak	360.00	100	Vertical	Pass

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**Operation Mode: Transmitting under CH01 for 802.11b mode**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
4824.00	61.8 (PK) / 45.9 (AV)	H	74(Peak)/ 54(AV)
4824.00	57.3 (PK) / 41.6 (AV)	V	74(Peak)/ 54(AV)
7236.00	--	H/V	74(Peak)/ 54(AV)
9648.00	--	H/V	74(Peak)/ 54(AV)
12060	--	H/V	74(Peak)/ 54(AV)
14472	--	H/V	74(Peak)/ 54(AV)
16884	--	H/V	74(Peak)/ 54(AV)
19296	--	H/V	74(Peak)/ 54(AV)
21708	--	H/V	74(Peak)/ 54(AV)
24120	--	H/V	74(Peak)/ 54(AV)

**Operation Mode: Transmitting under CH06 for 802.11b mode**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
4874.00	60.9 (PK)/ 45.1 (AV)	H	74(Peak)/ 54(AV)
4874.00	56.7 (PK)/ 41.3 (AV)	V	74(Peak)/ 54(AV)
7311.00	--	H/V	74(Peak)/ 54(AV)
9748.00	--	H/V	74(Peak)/ 54(AV)
12185	--	H/V	74(Peak)/ 54(AV)
14622	--	H/V	74(Peak)/ 54(AV)
17059	--	H/V	74(Peak)/ 54(AV)
19496	--	H/V	74(Peak)/ 54(AV)
21933	--	H/V	74(Peak)/ 54(AV)
24370	--	H/V	74(Peak)/ 54(AV)

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**Operation Mode: Transmitting under CH11 for 802.11b mode**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
4924	60.6 (PK)/ 45.3 (AV)	H	74(Peak)/ 54(AV)
4924	57.1 (PK)/ 41.8 (AV)	V	74(Peak)/ 54(AV)
7368	--	H/V	74(Peak)/ 54(AV)
9848	--	H/V	74(Peak)/ 54(AV)
12310	--	H/V	74(Peak)/ 54(AV)
14772	--	H/V	74(Peak)/ 54(AV)
17234	--	H/V	74(Peak)/ 54(AV)
19696	--	H/V	74(Peak)/ 54(AV)
22158	--	H/V	74(Peak)/ 54(AV)
24620	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

3. For 802.11b mode at 1Mbps

4. For radiated Emissions from 18-25GHz and below 30MHz, it is only the floor noise and less than the limit for more than 20dB. No necessary to take down.

5. Note: the final peak measurement results less than the AV limit. No necessary to take down the final AV measurement result

The report refers only to the sample tested and does not apply to the bulk.

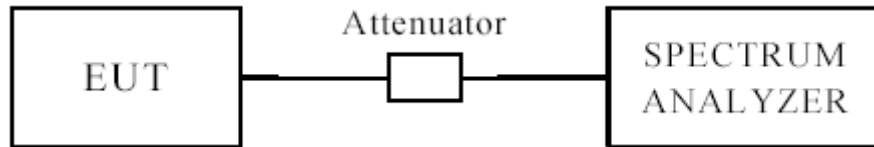
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## 7.0 6dB Bandwidth Measurement

### 7.1 Test Setup



### 7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500 kHz

### 7.3 Test Procedure

1. Set resolution bandwidth (RBW) = 100 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) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 7.4 Test Result

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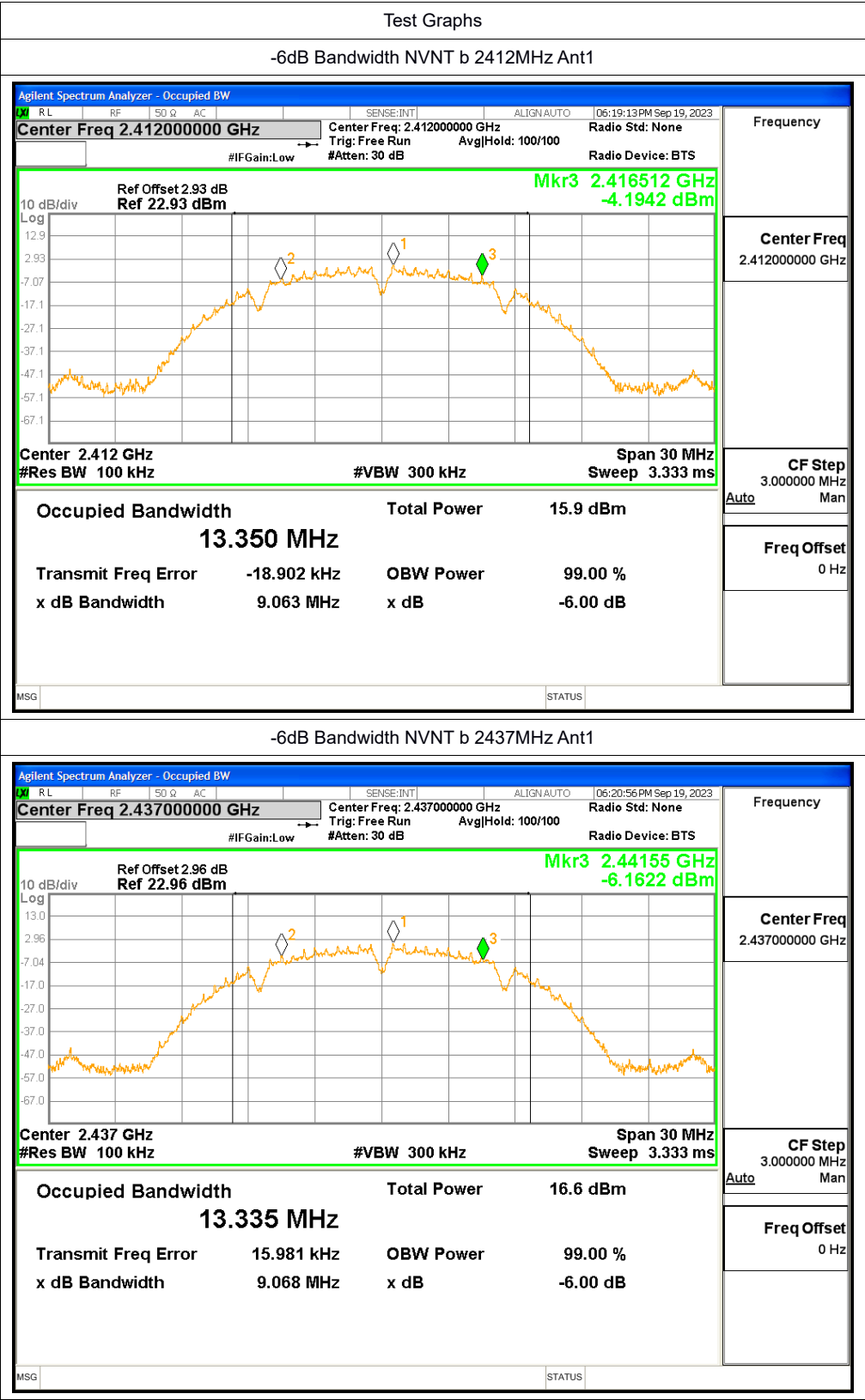
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6dB Occupied Bandwidth

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11b	SISO	2412	1	9.063	>=0.5	Pass
		2437	1	9.068	>=0.5	Pass
		2462	1	10.032	>=0.5	Pass
802.11g	SISO	2412	1	16.36	>=0.5	Pass
		2437	1	16.31	>=0.5	Pass
		2462	1	16.32	>=0.5	Pass
802.11n (HT20)	SISO	2412	1	17.02	>=0.5	Pass
		2437	1	16.82	>=0.5	Pass
		2462	1	17.05	>=0.5	Pass

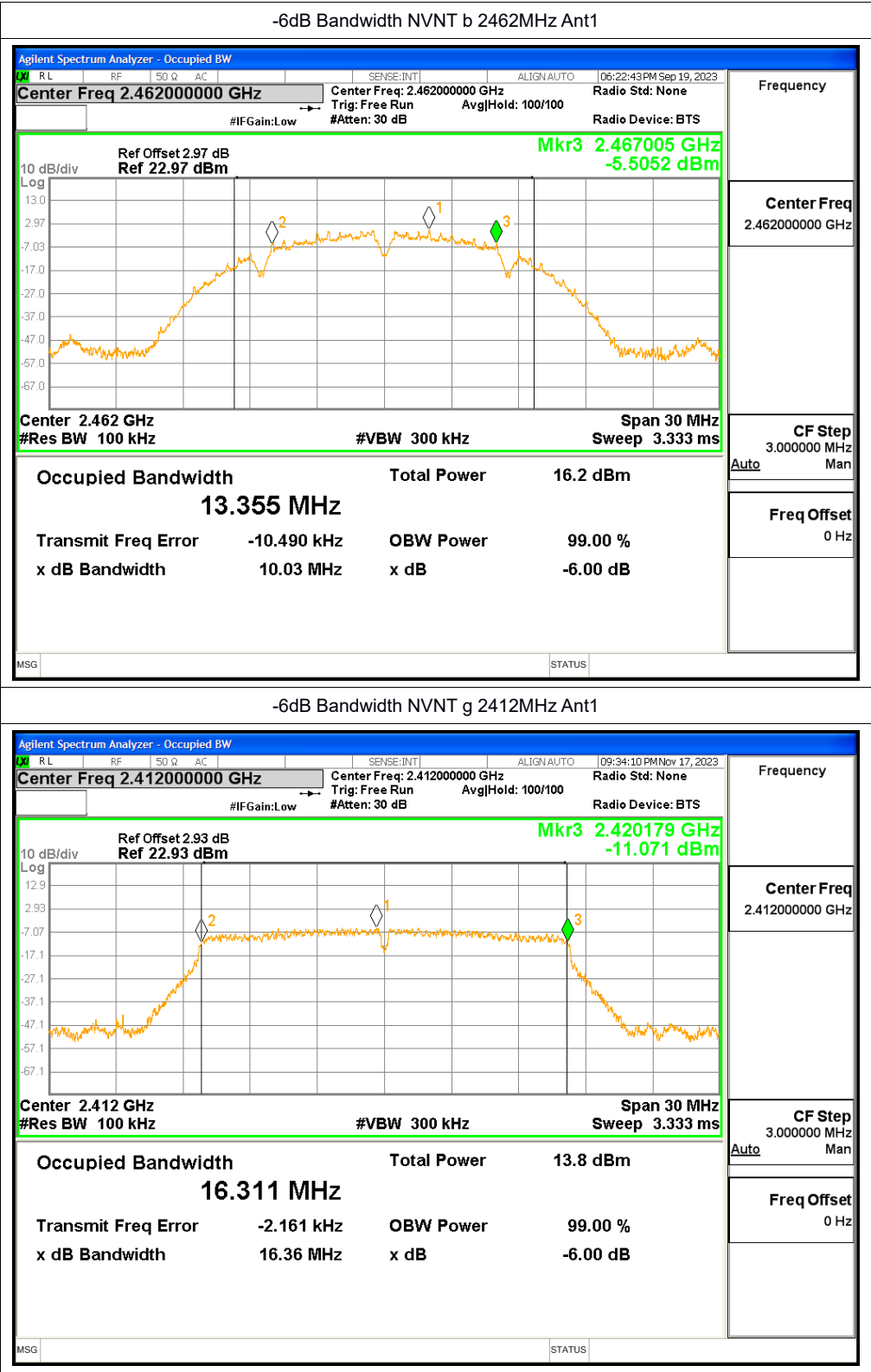
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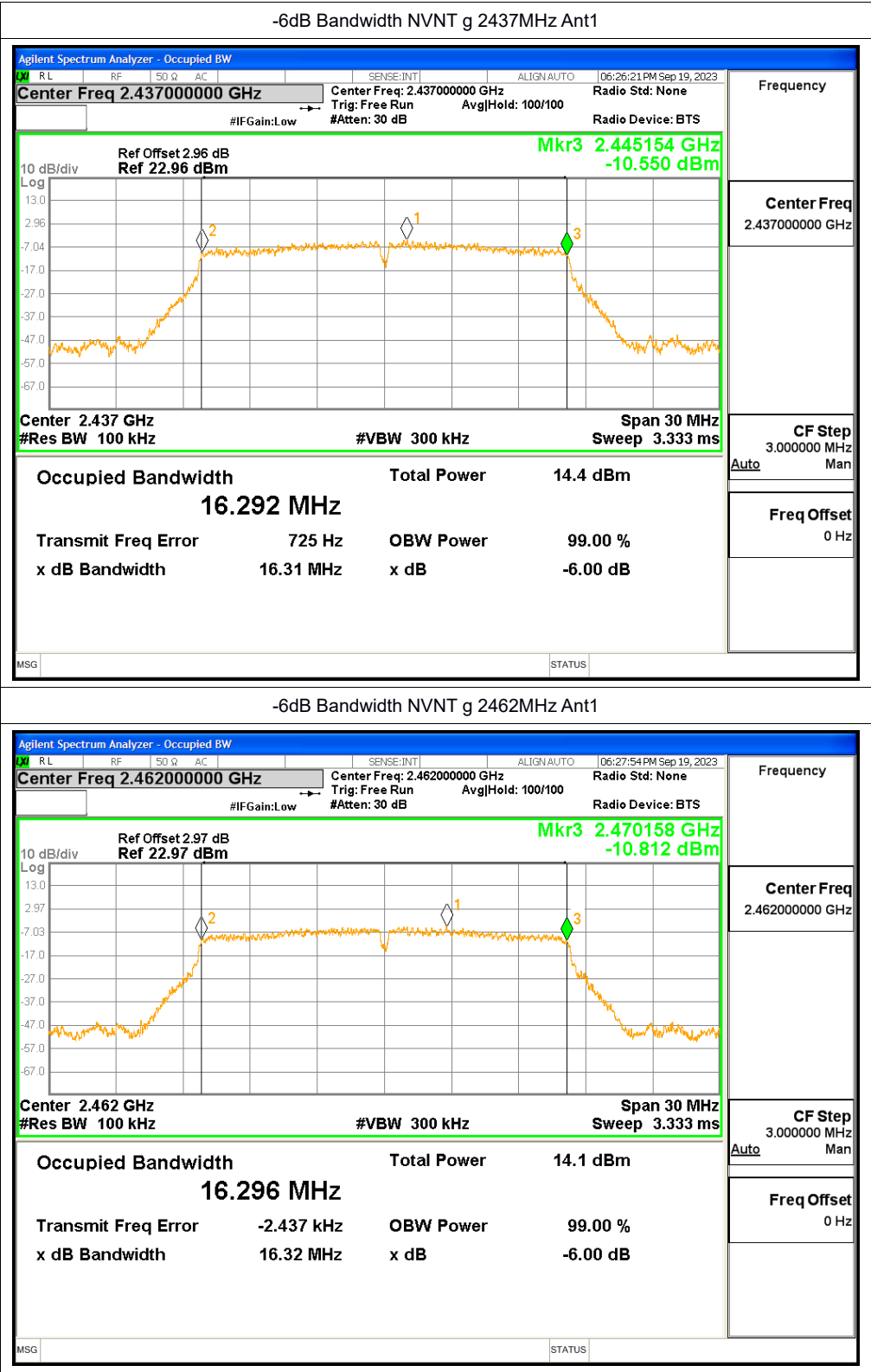
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Agilent Spectrum Analyzer - Occupied BW

RL

RF

50 Ω

AC

SENSE:INT

ALIGN: AUTO

06:27:54 PM Sep 19, 2023

Center Freq 2.462000000 GHz

Center Freq: 2.462000000 GHz

Trig: Free Run

Avg/Hold: 100/100

Radio Std: None

#IF Gain: Low

#Atten: 30 dB

Radio Device: BTS

10 dB/div

Log

Ref Offset 2.97 dB

Ref 22.97 dBm

Mkr3 2.470158 GHz

-10.812 dBm

Center 2.462 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 30 MHz

Sweep 3.333 ms

Occupied Bandwidth

16.296 MHz

Total Power

14.1 dBm

Transmit Freq Error

-2.437 kHz

OBW Power

99.00 %

x dB Bandwidth

16.32 MHz

x dB

-6.00 dB

MSG

STATUS

Frequency

Center Freq

2.462000000 GHz

CF Step

3.000000 MHz

Auto

Man

Freq Offset

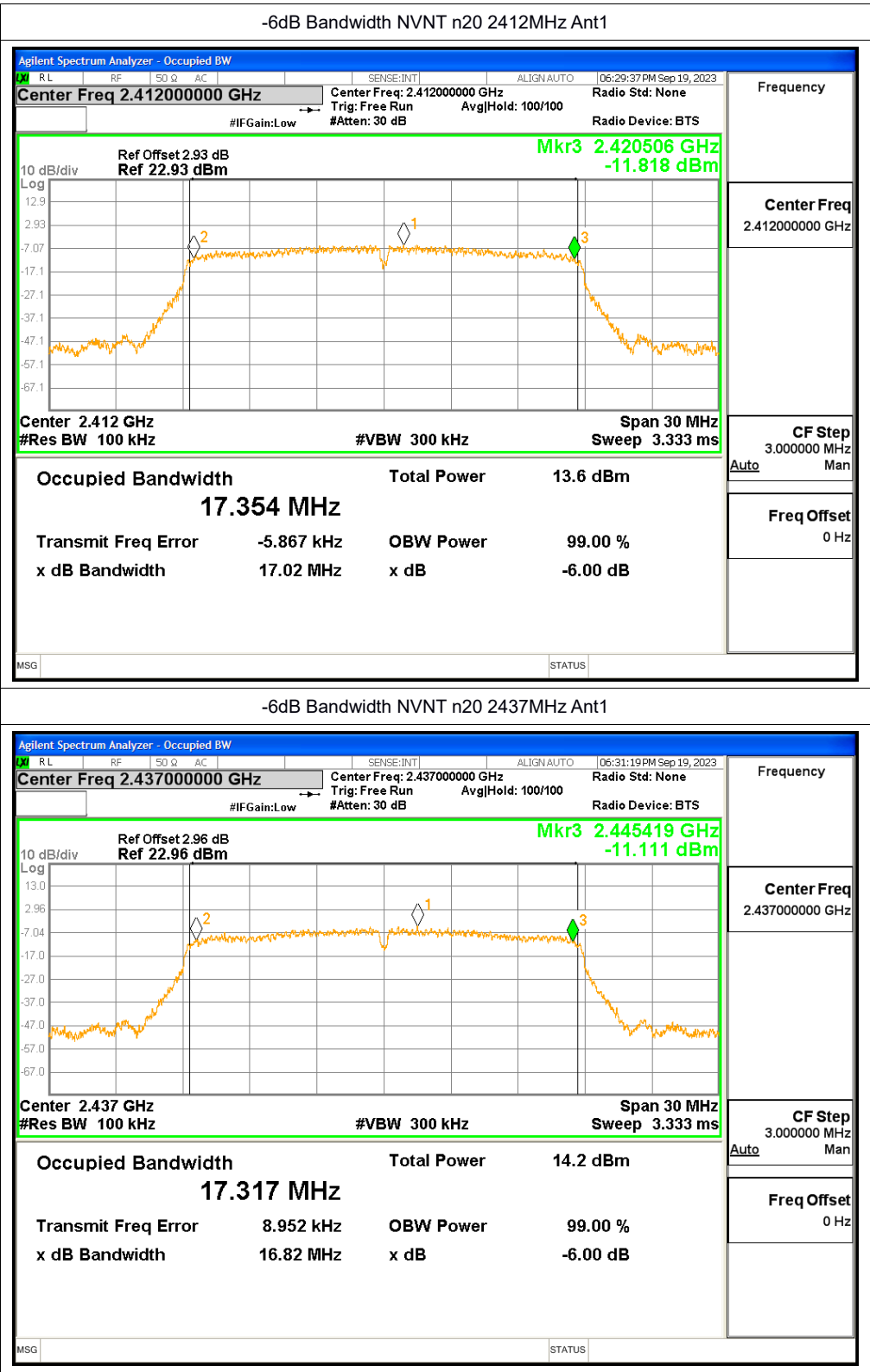
0 Hz

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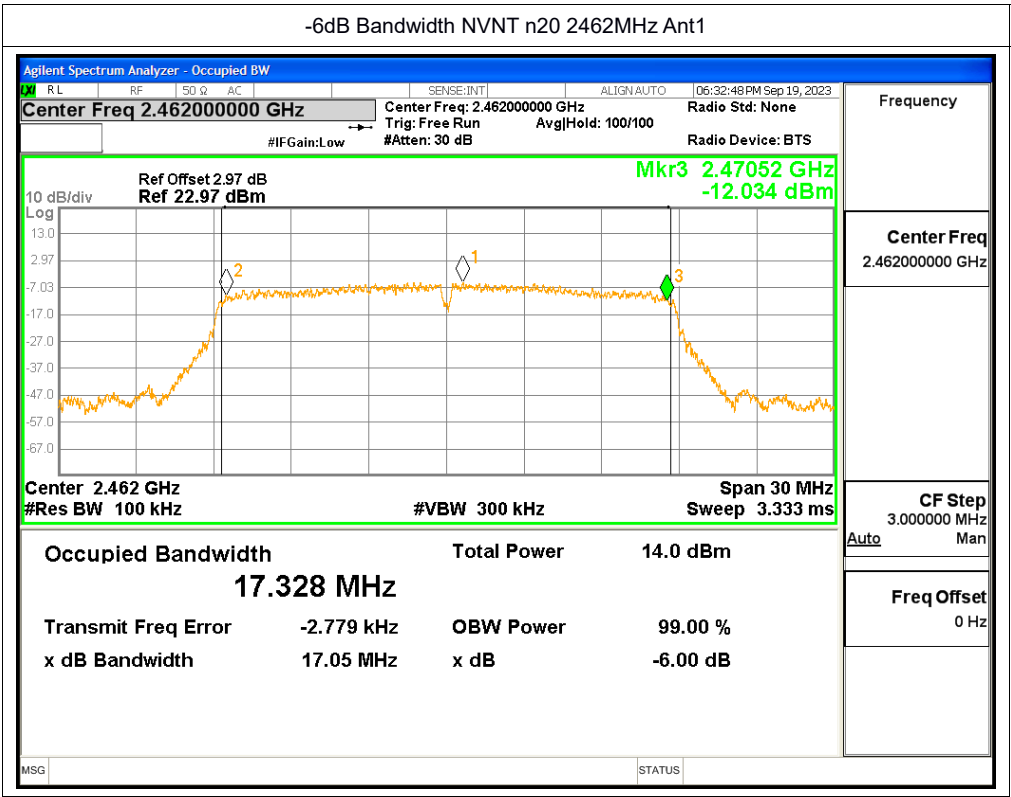




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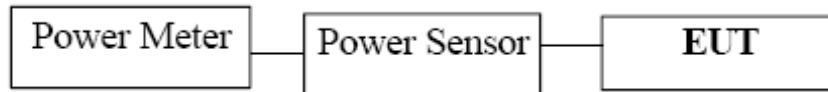
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## 8. Maximum Output Power

### 8.1 Test Setup



### 8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

### 8.3 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

**Note: The PK power was measured**

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#### 8.4 Test Results

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	9.52	<=30	Pass
		2437	10.4	<=30	Pass
		2462	9.02	<=30	Pass
802.11g	SISO	2412	8.17	<=30	Pass
		2437	8.33	<=30	Pass
		2462	7.74	<=30	Pass
802.11n (HT20)	SISO	2412	7.96	<=30	Pass
		2437	8.8	<=30	Pass
		2462	7.59	<=30	Pass

Note: 1. At final test to get the worst-case emission at msc0 of 11n HT40 for CH03, CH06 and CH09

2. The result basic equation calculation as follow:

$$\text{Power Output} = \text{Power Reading} + \text{Cable loss} + \text{Attenuator}$$

3. The worse case was recorded

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## 9. Power Spectral Density Measurement

### 9.1 Test Setup



### 9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm/3kHz.

### 9.3 Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW  $\geq$  300 kHz.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be  $\leq$  8 dBm/3kHz.

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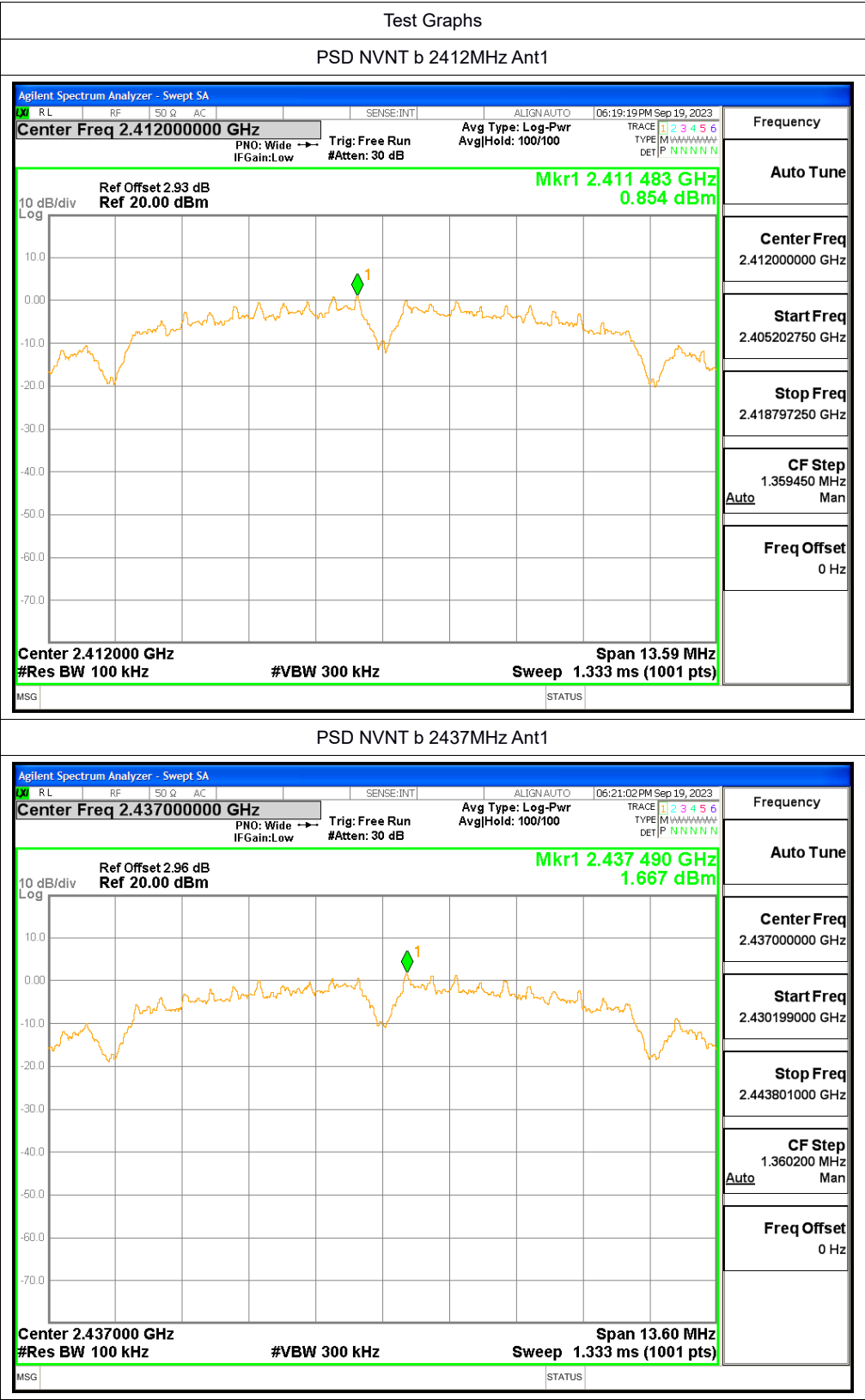
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9.4Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/100kHz)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	0.85	<=8	Pass
		2437	1.67	<=8	Pass
		2462	1.3	<=8	Pass
802.11g	SISO	2412	-5.00	<=8	Pass
		2437	-4.45	<=8	Pass
		2462	-4.59	<=8	Pass
802.11n (HT20)	SISO	2412	-5.37	<=8	Pass
		2437	-4.05	<=8	Pass
		2462	-4.68	<=8	Pass

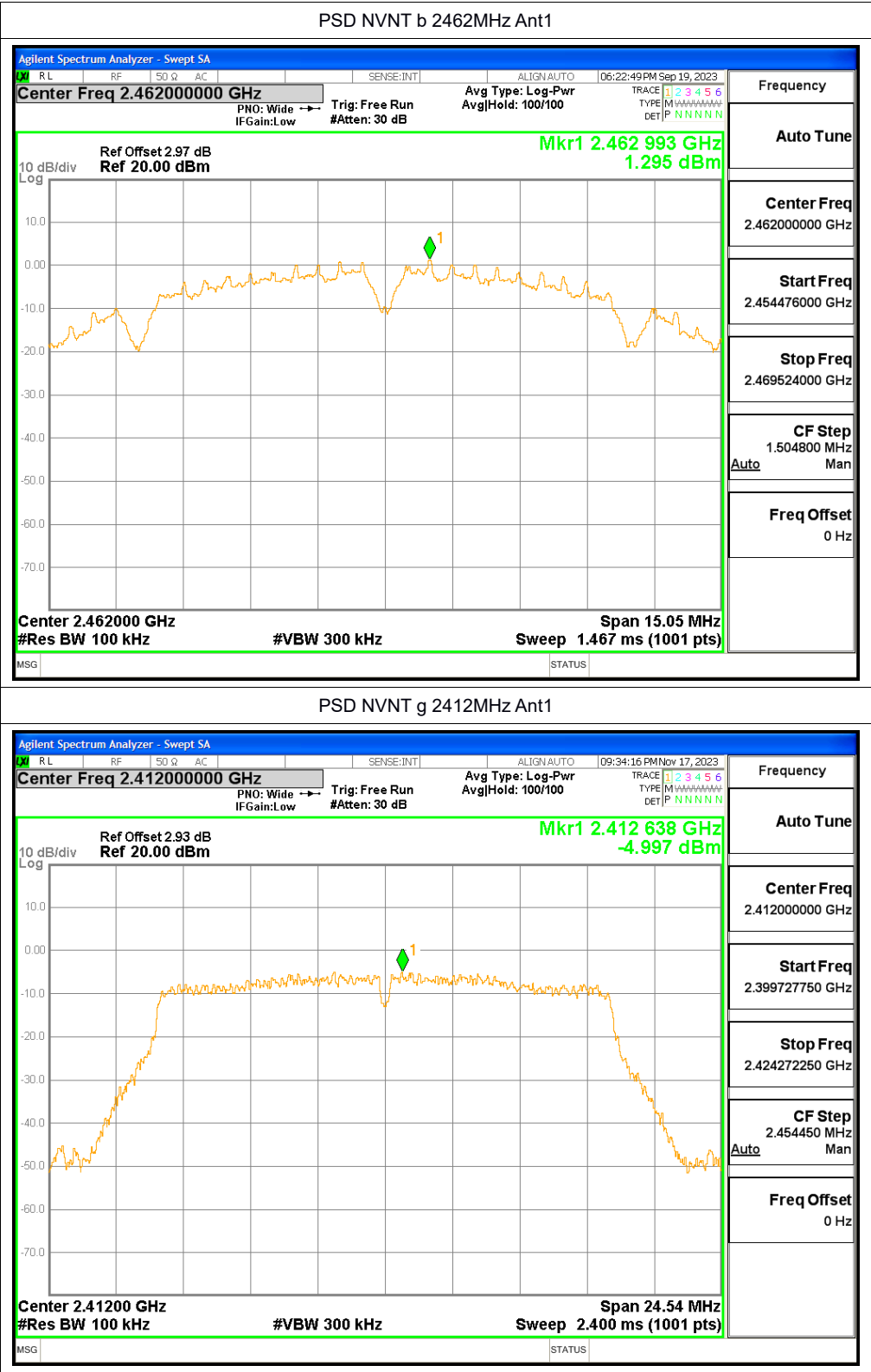
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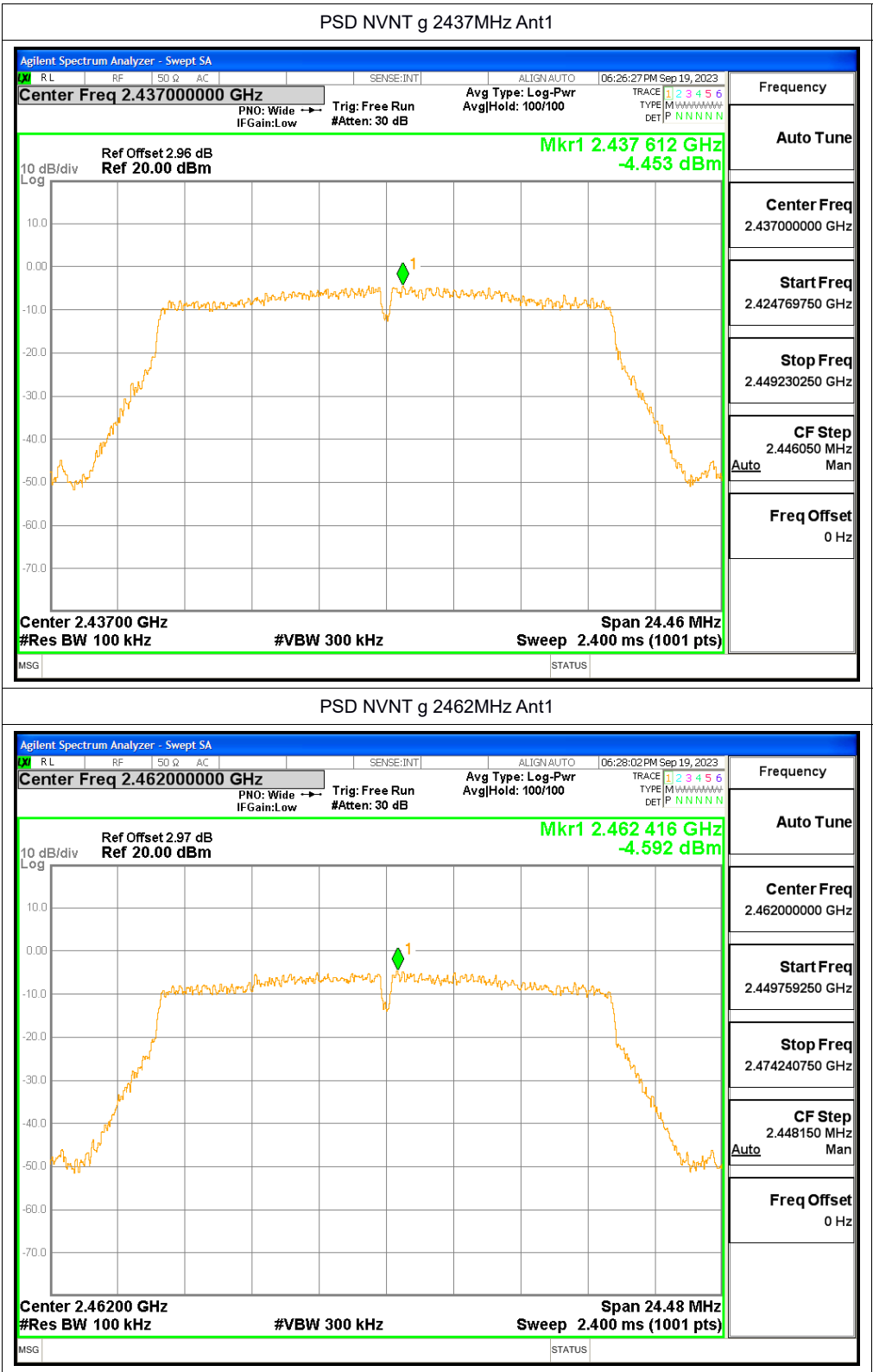


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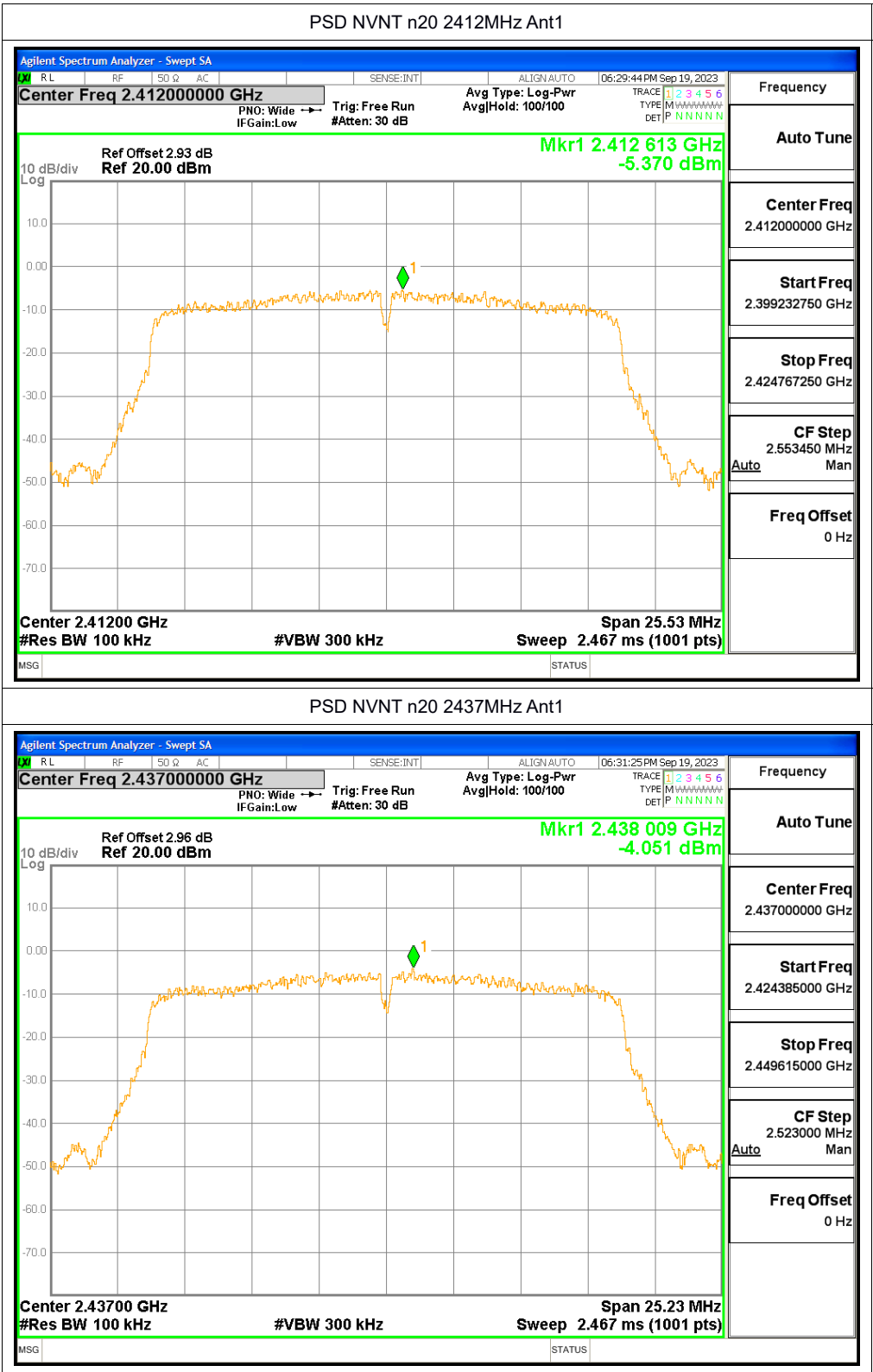




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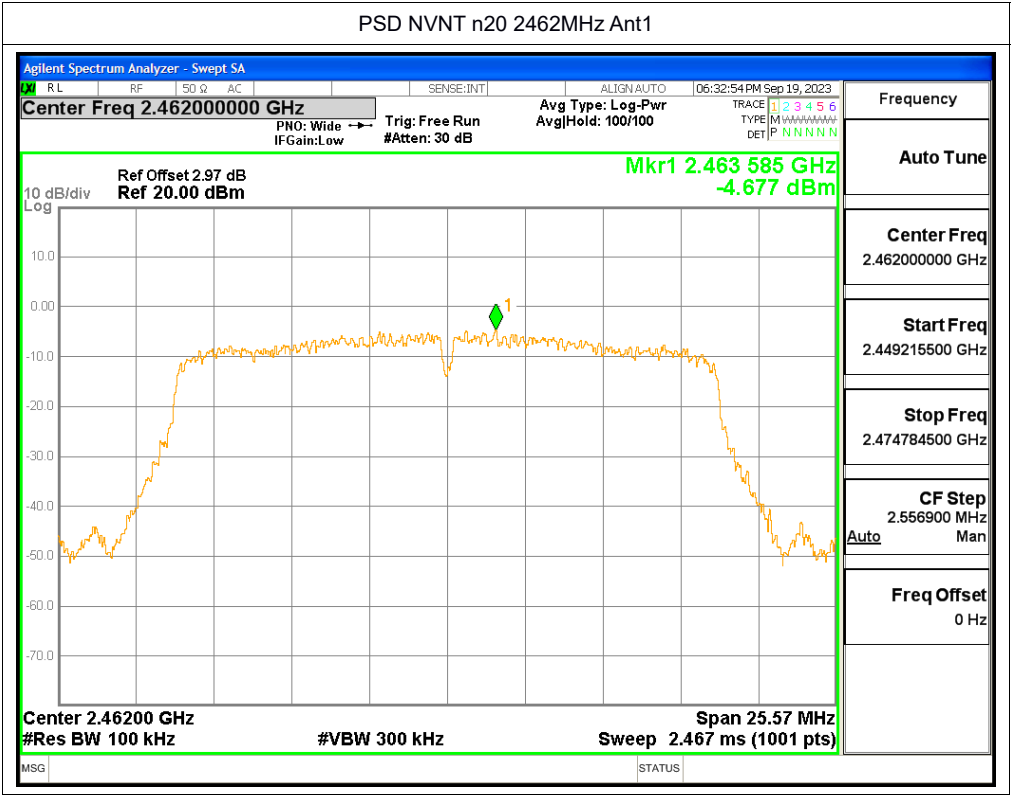
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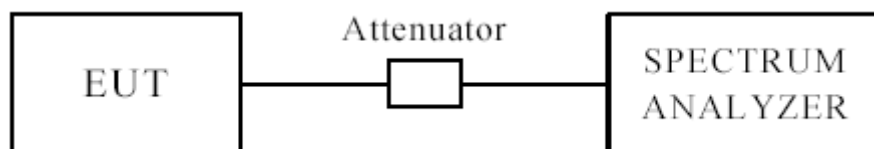
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## 10 Out of Band Measurement

### 10.1 Test Setup for band edge



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

### 10.2 Limits of Out of Band Emissions Measurement

1. Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### 10.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test. (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

For bandage test, the spectrum set as follows: RBW=100, VBW=300 kHz. A conducted measurement used

### 10.4 Test Result

Please see next pages

Note: 1. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

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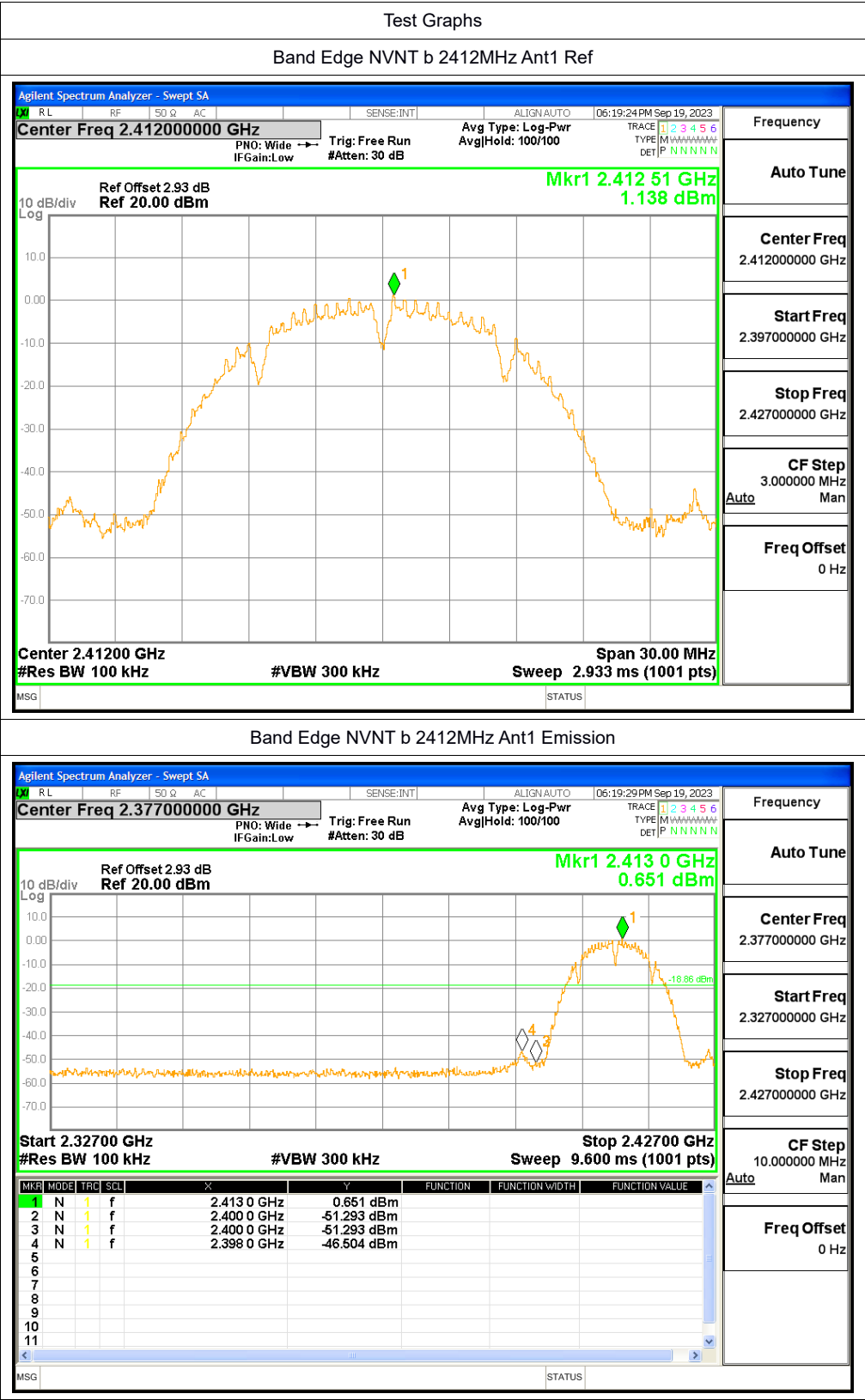
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## Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant1	-47.64	-20	Pass
		2462		-54.86	-20	Pass
	g	2412		-40.04	-20	Pass
		2462		-49.33	-20	Pass
	n20	2412		-39.14	-20	Pass
		2462		-47.83	-20	Pass

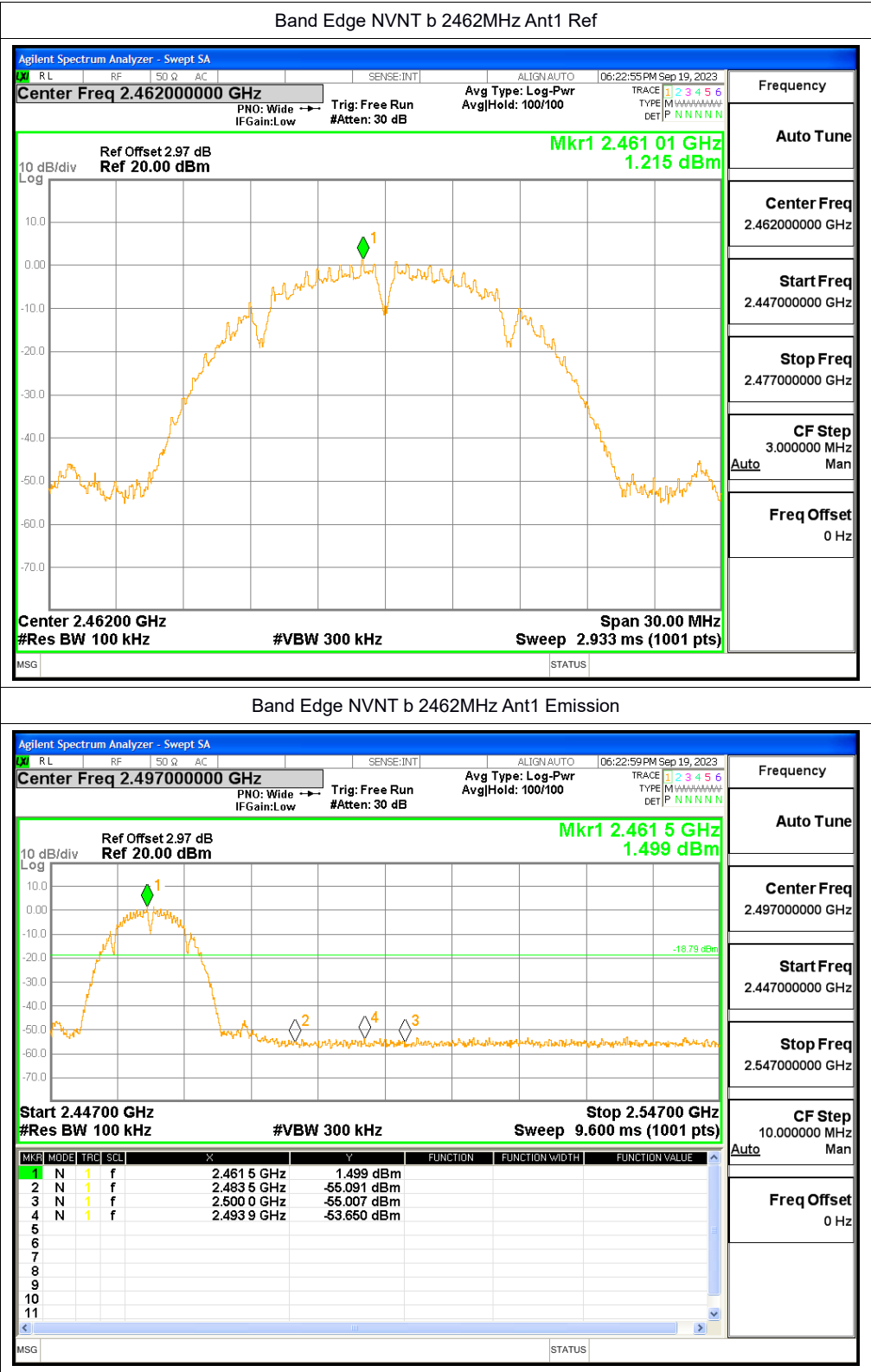
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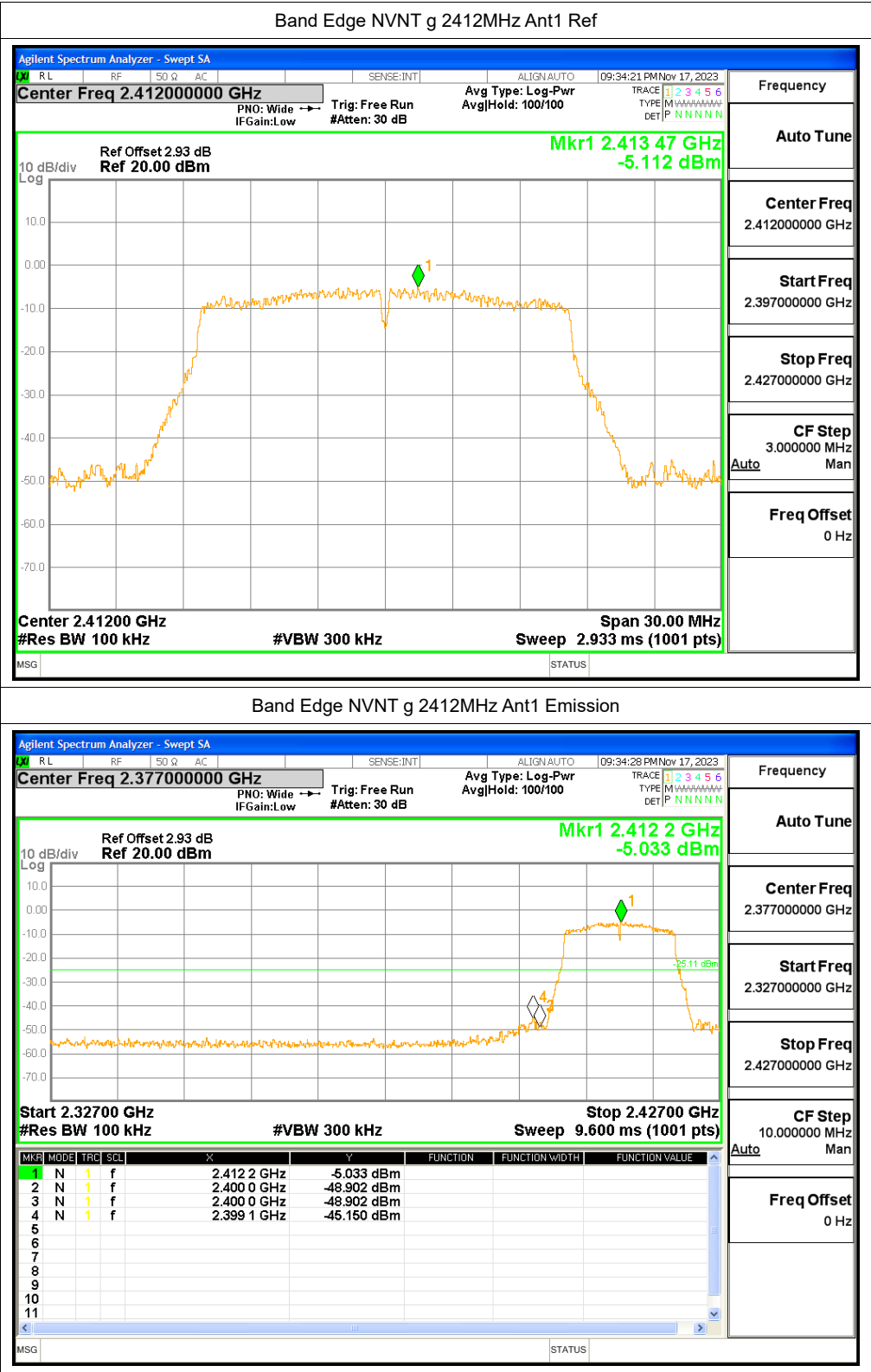
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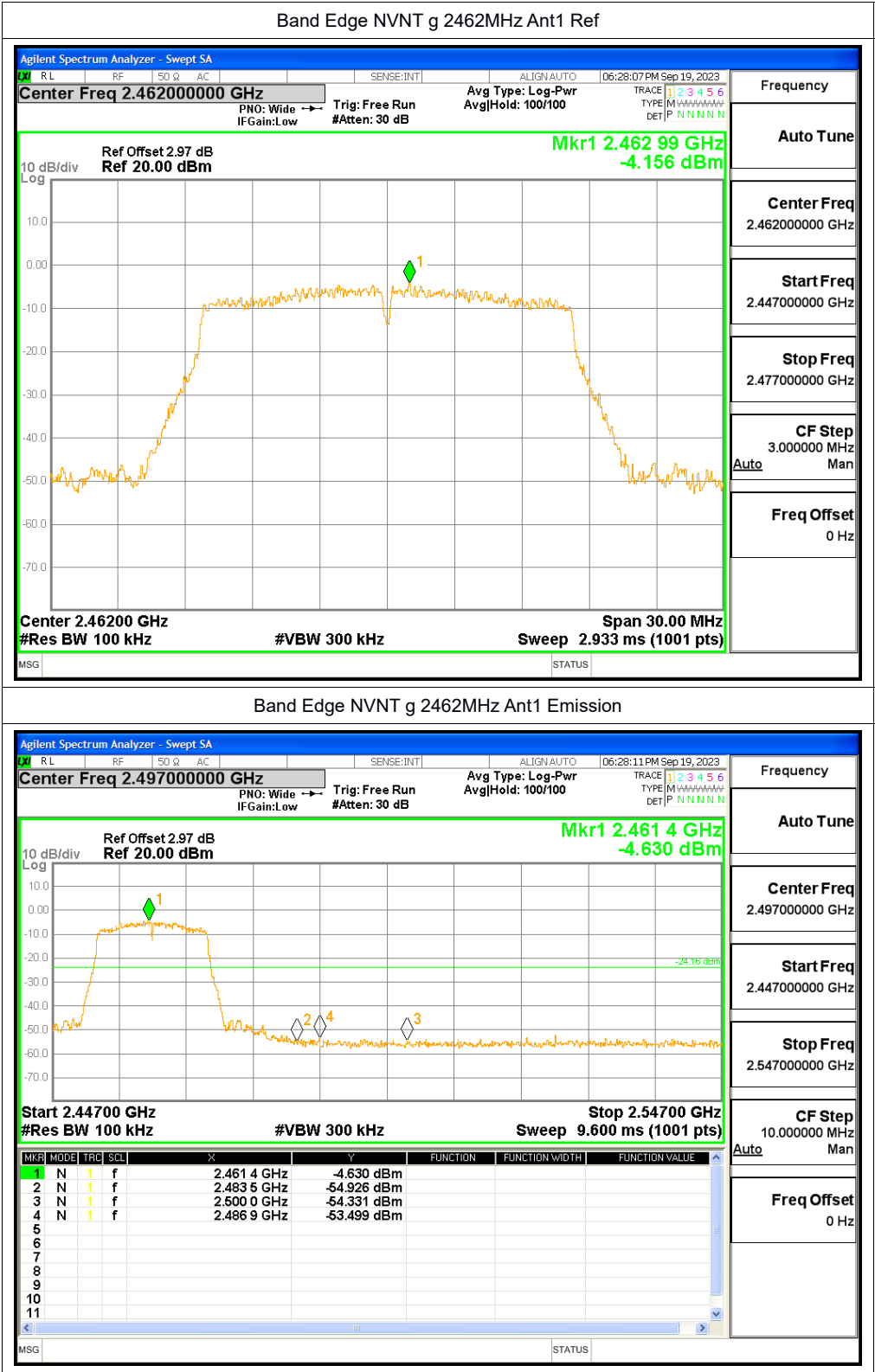


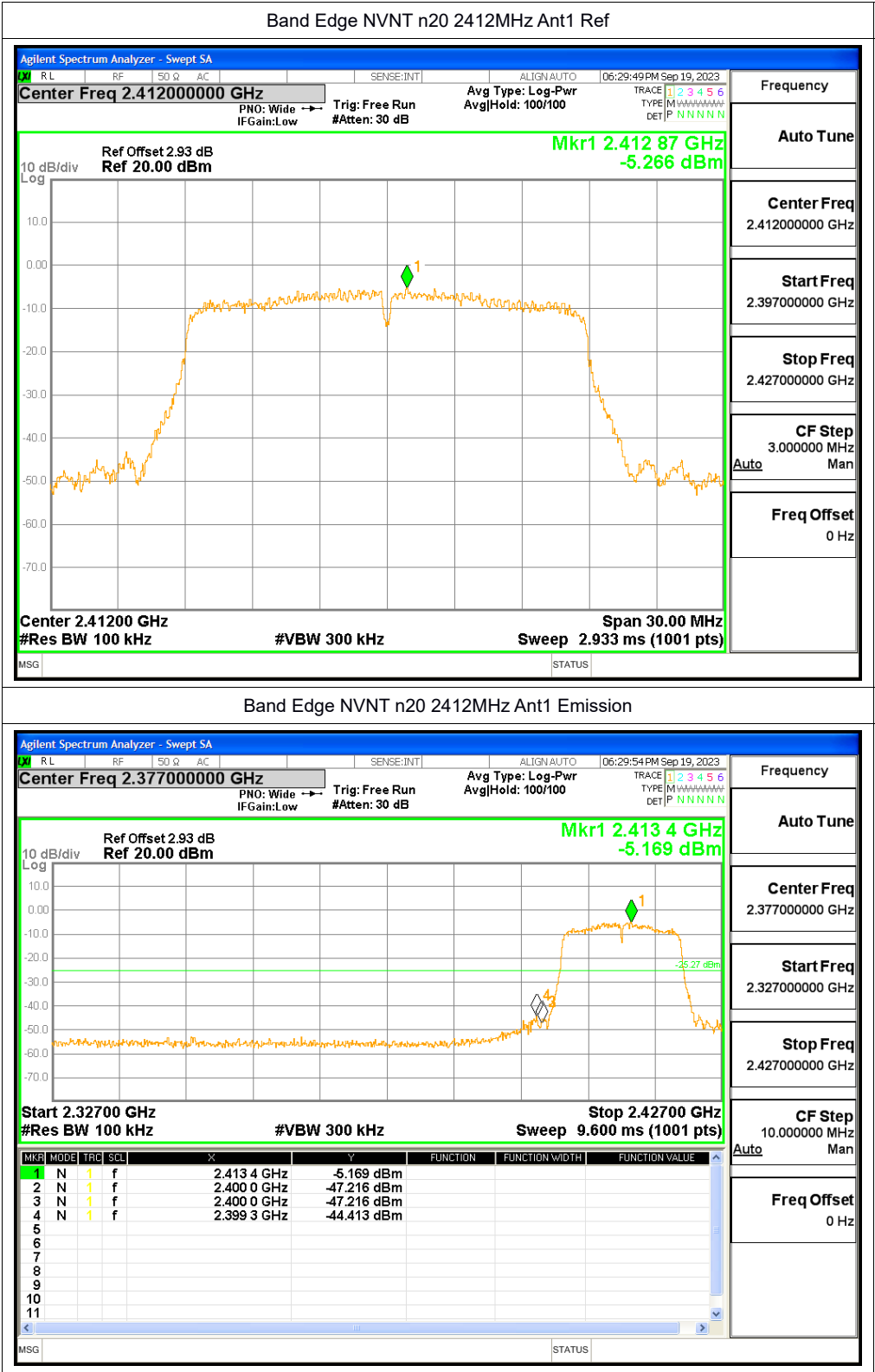
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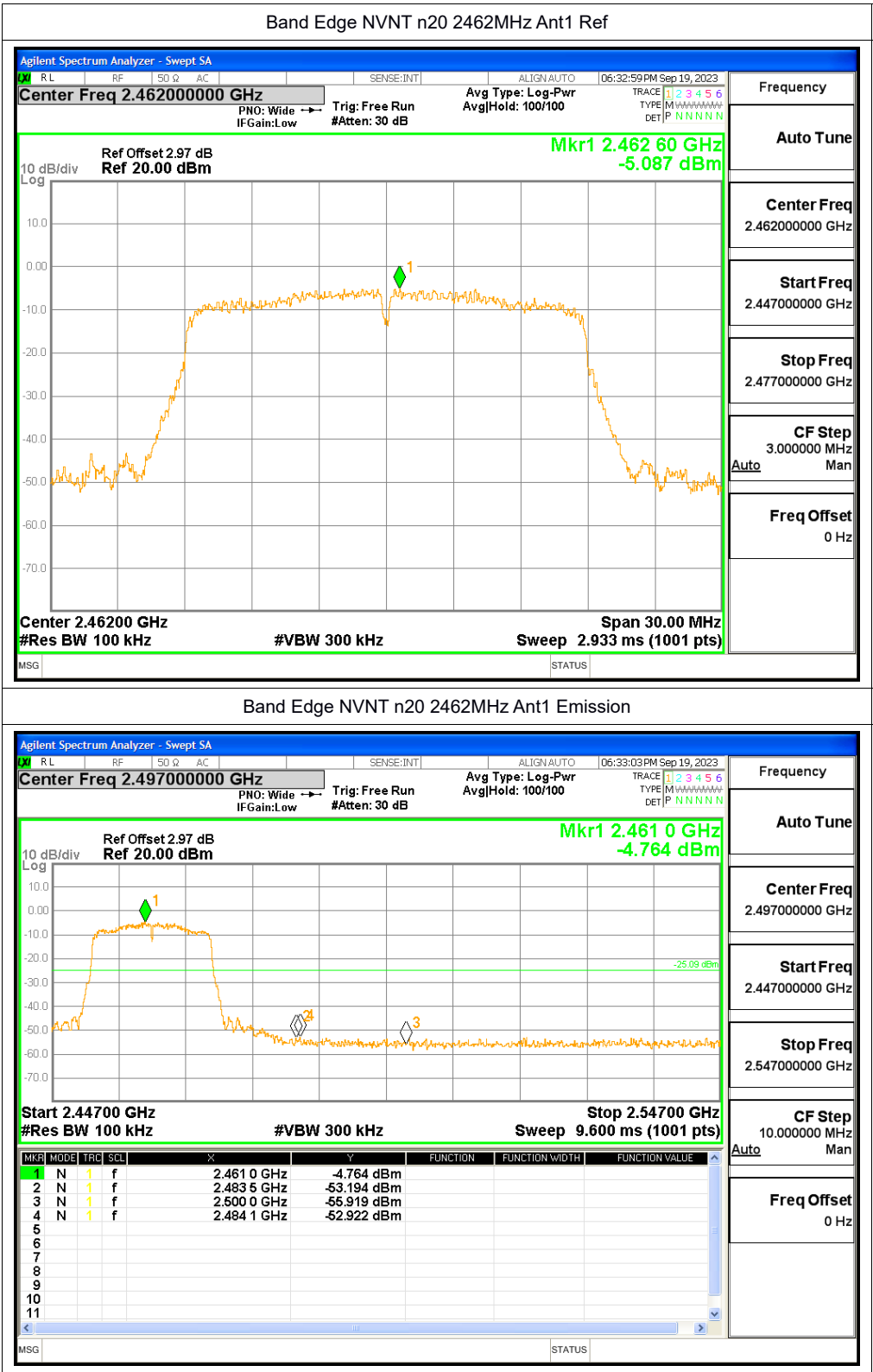




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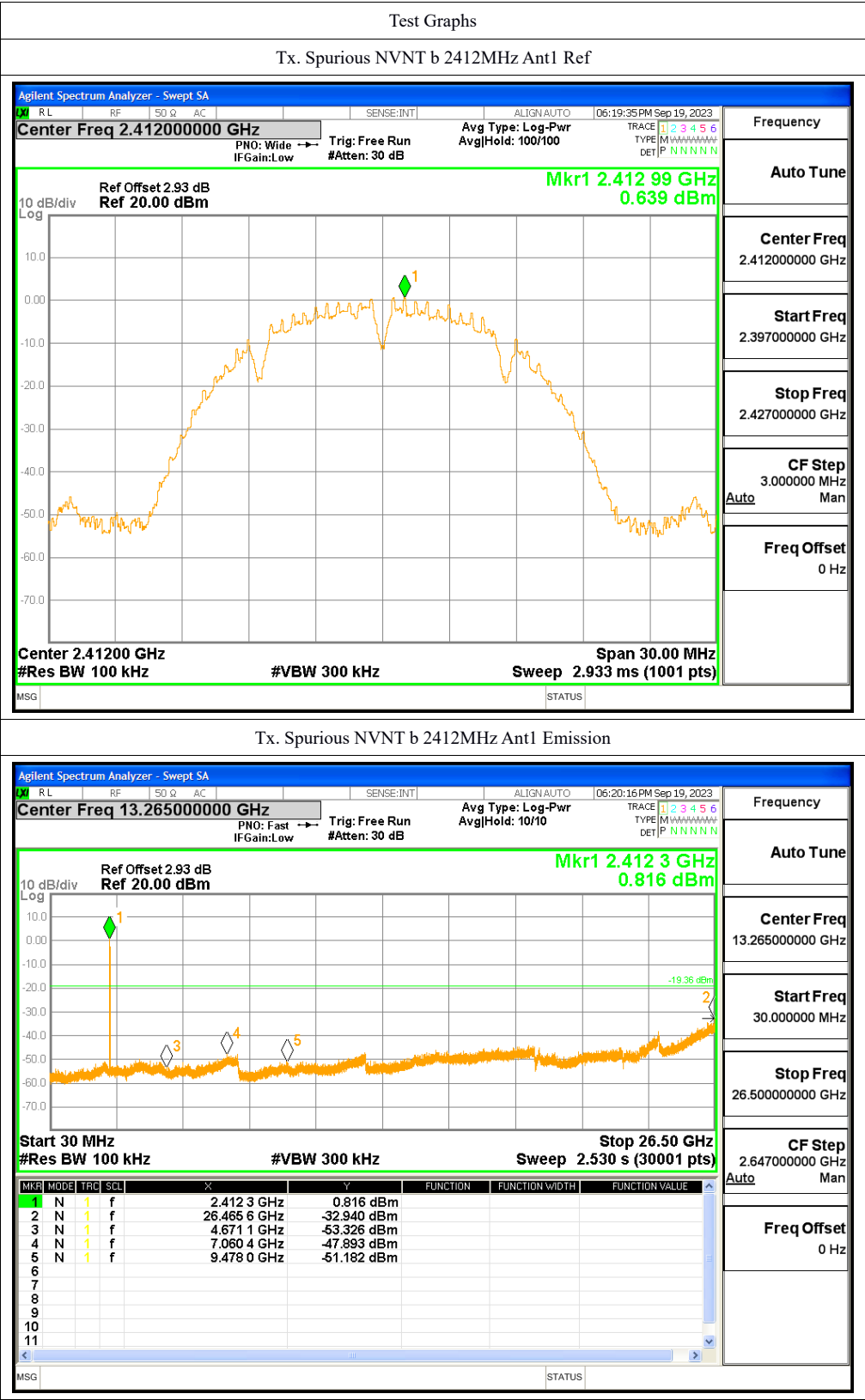
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Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant1	-33.57	-20	Pass
		2437		-35.15	-20	Pass
		2462		-34.29	-20	Pass
	g	2412		-29.23	-20	Pass
		2437		-29.91	-20	Pass
		2462		-29.83	-20	Pass
	n20	2412		-28.38	-20	Pass
		2437		-30.66	-20	Pass
		2462		-29.44	-20	Pass

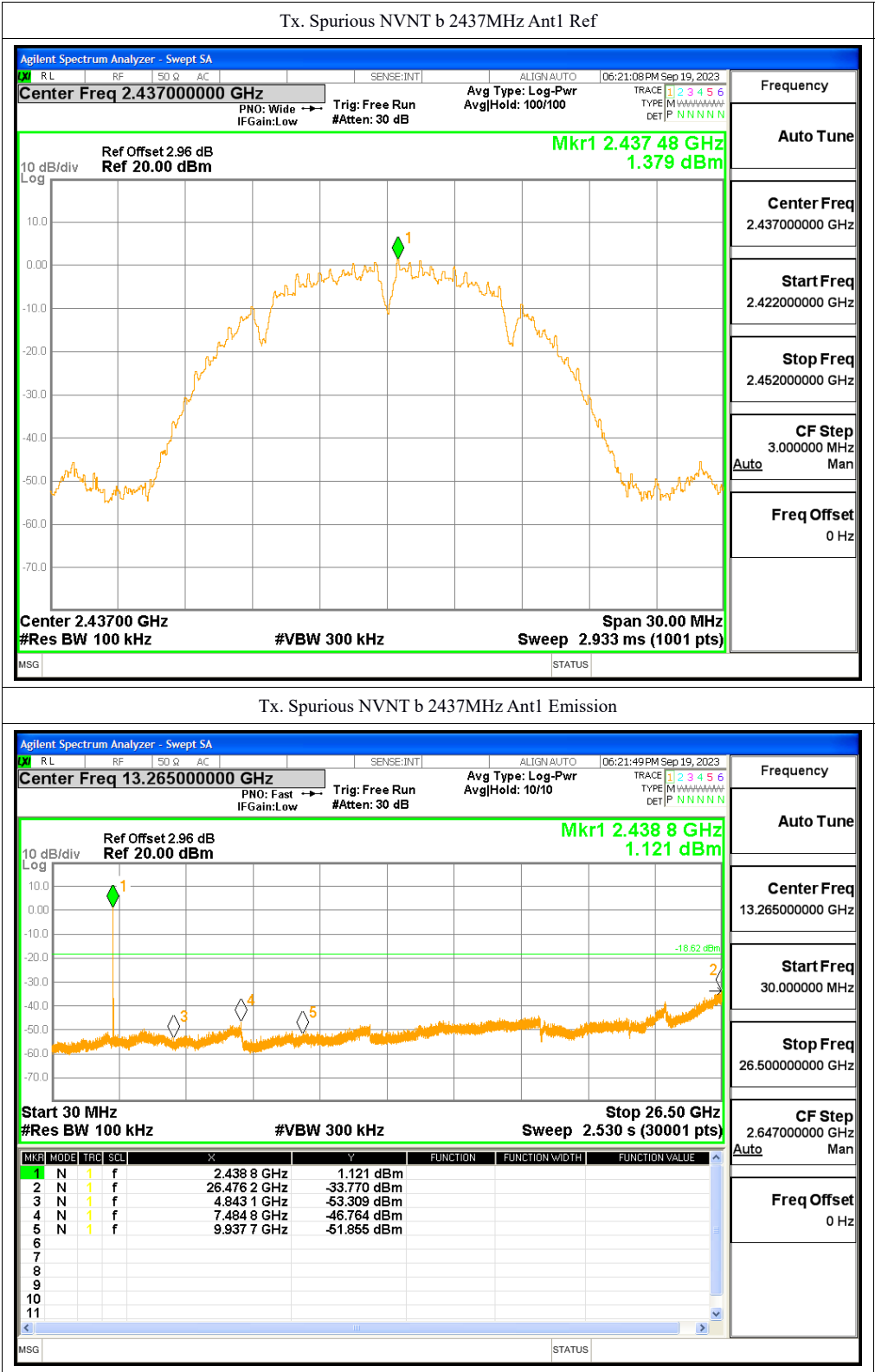
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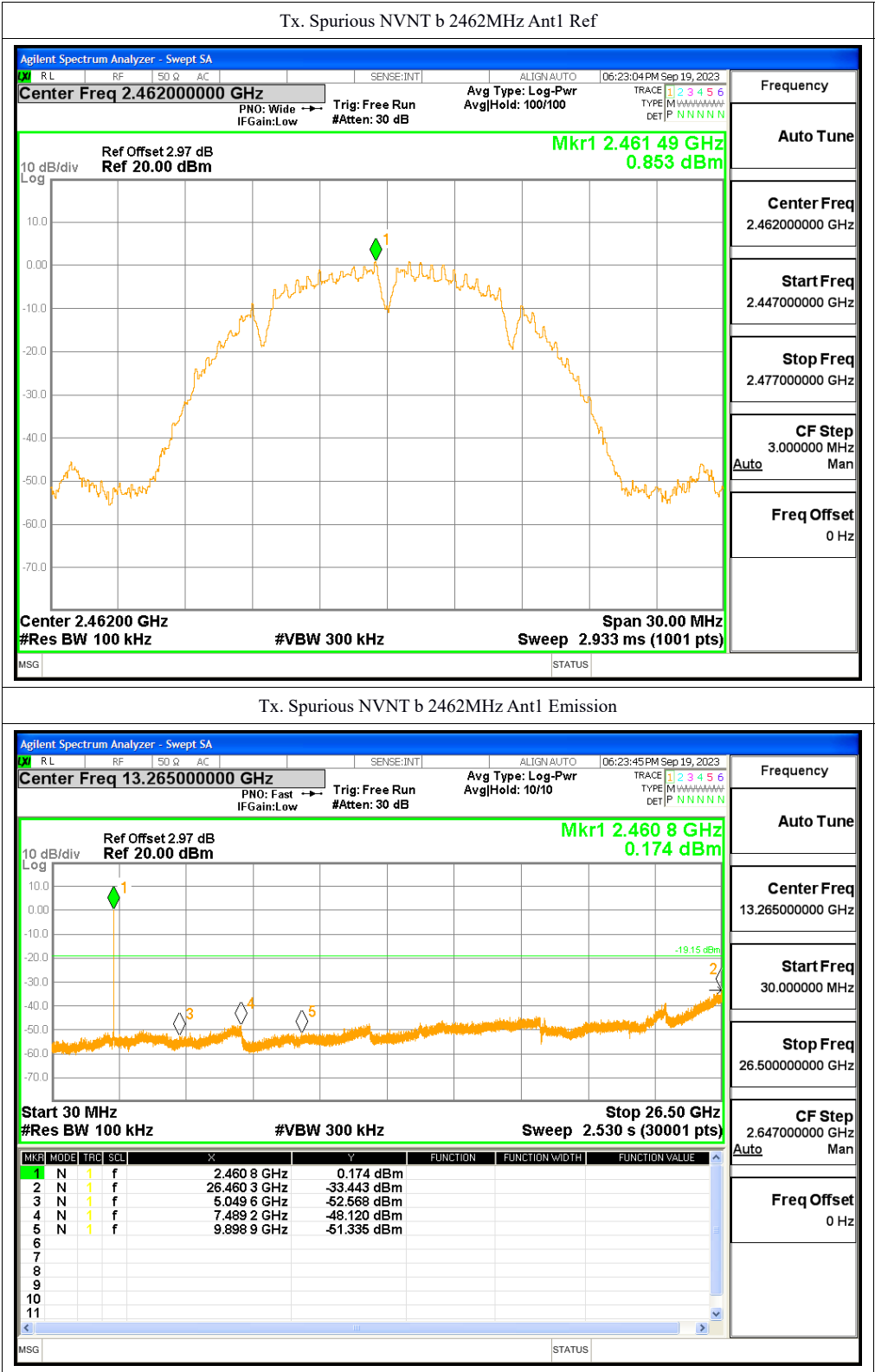
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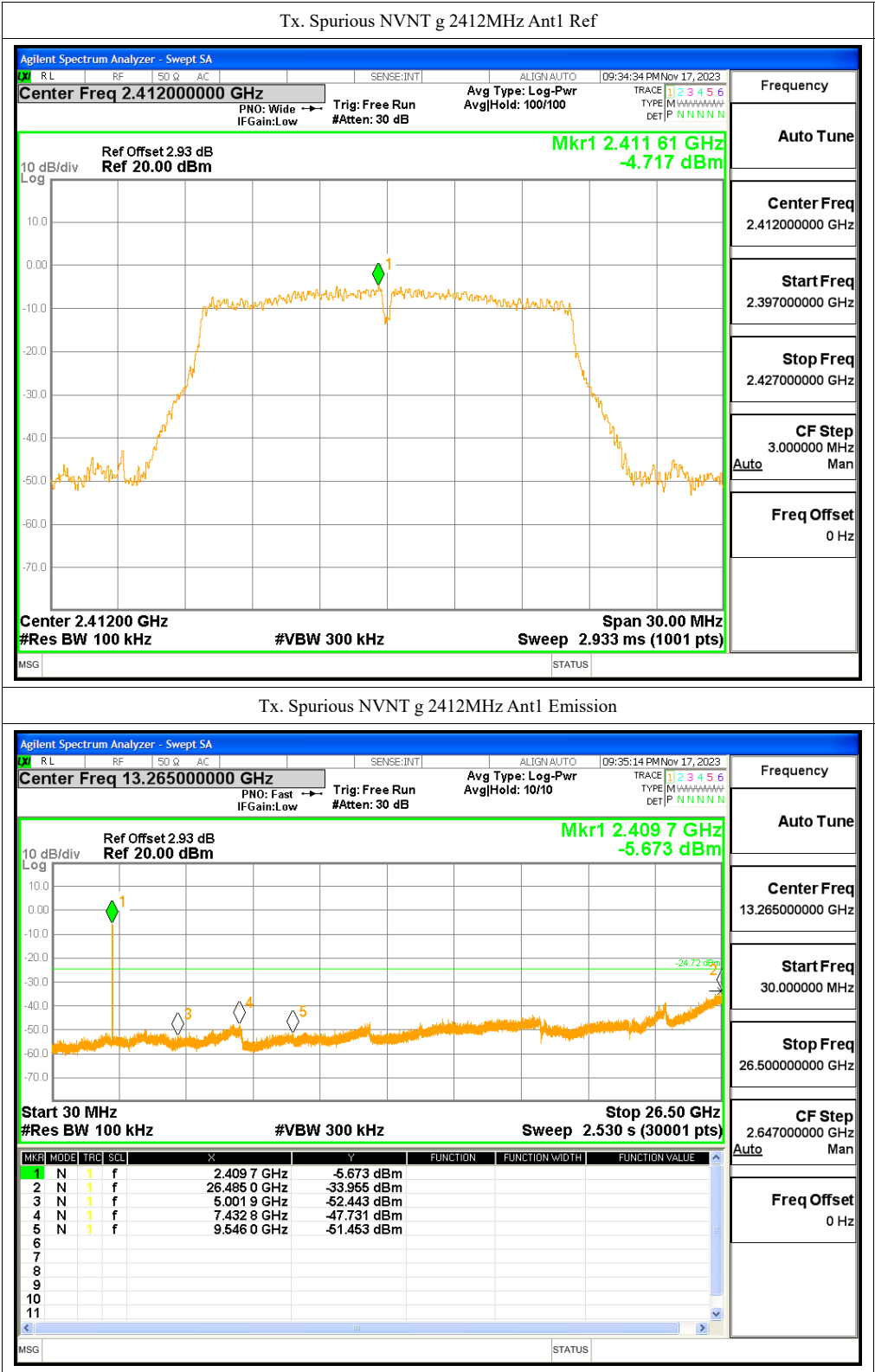
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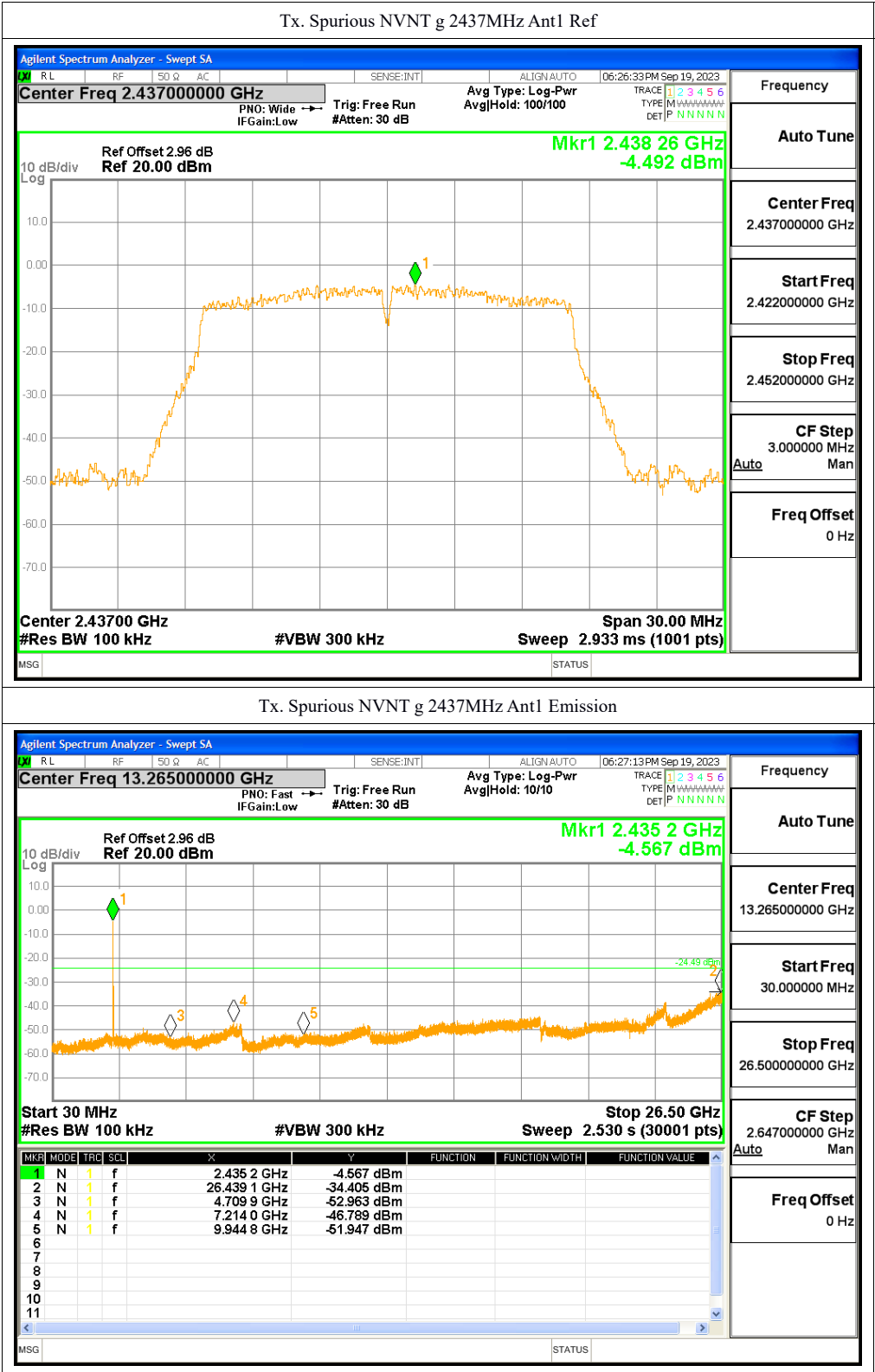


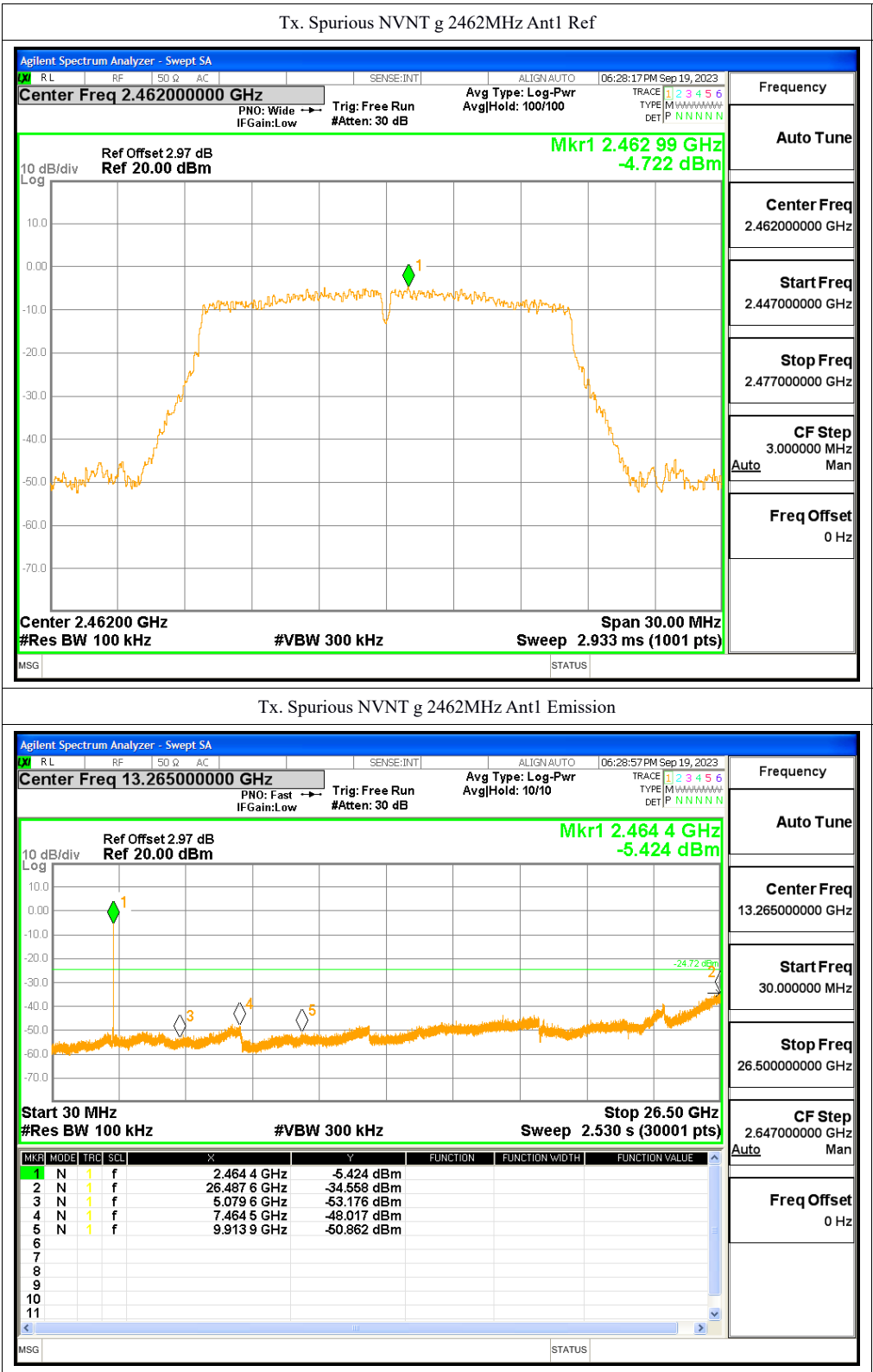
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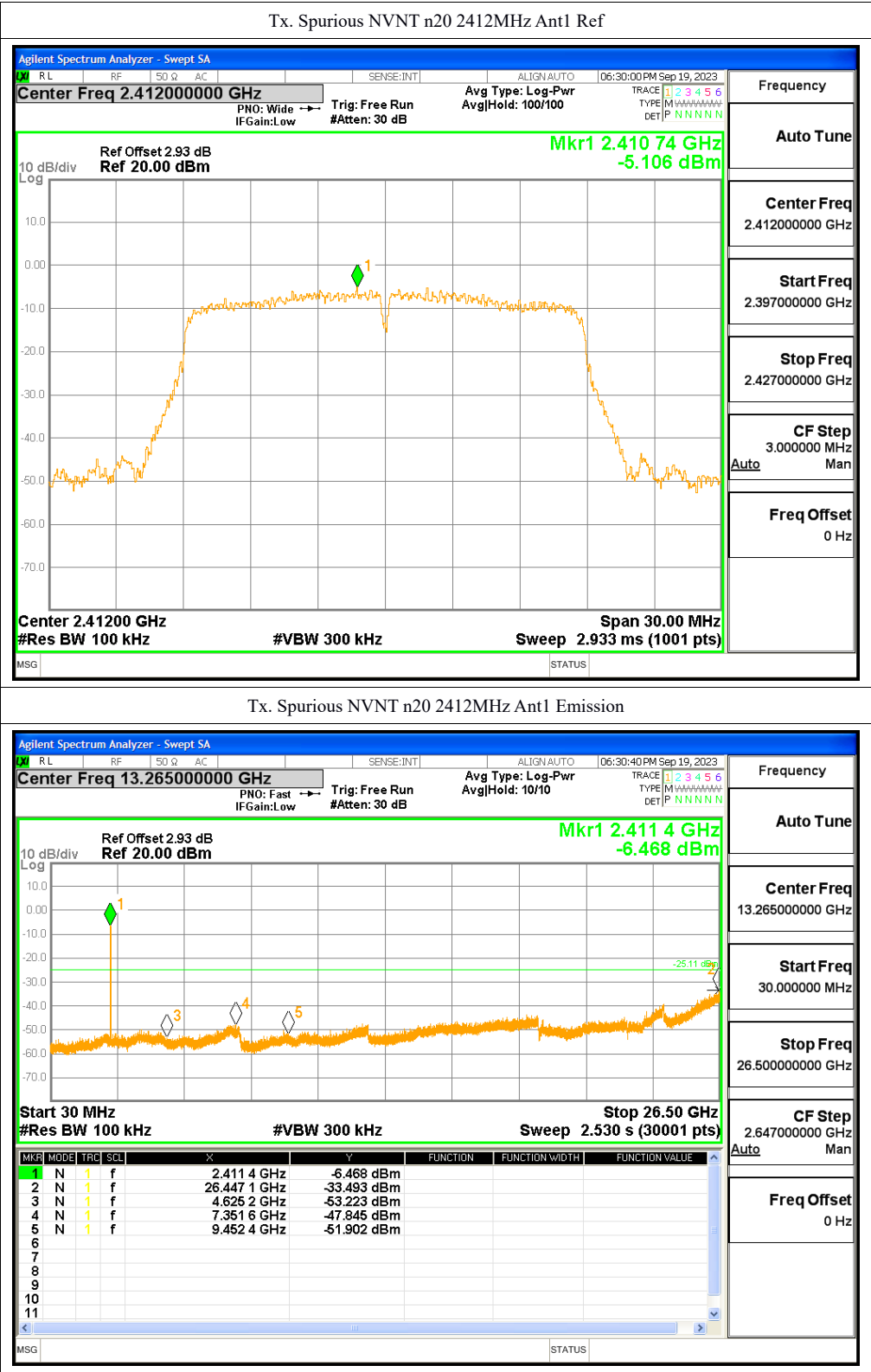




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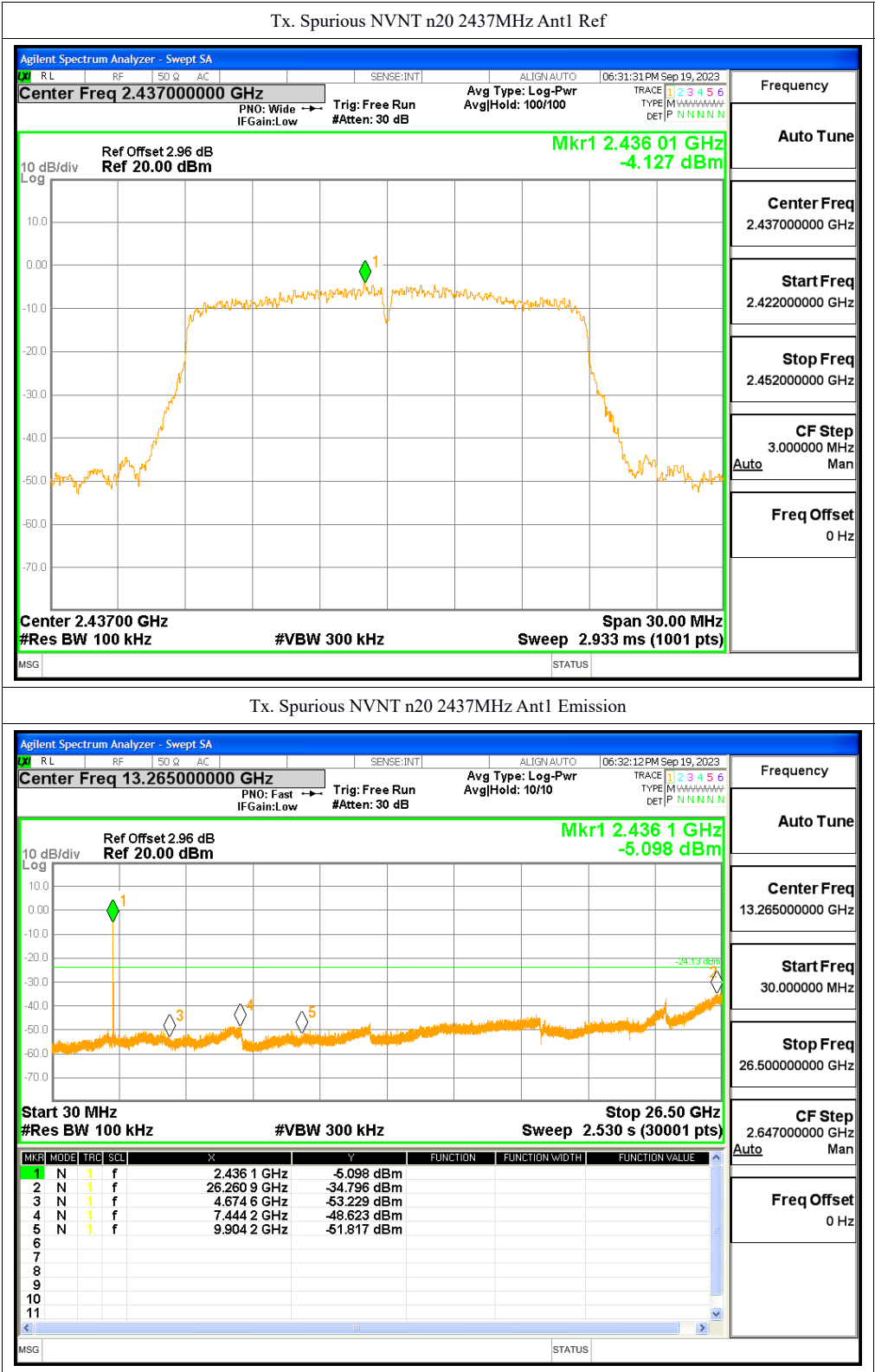
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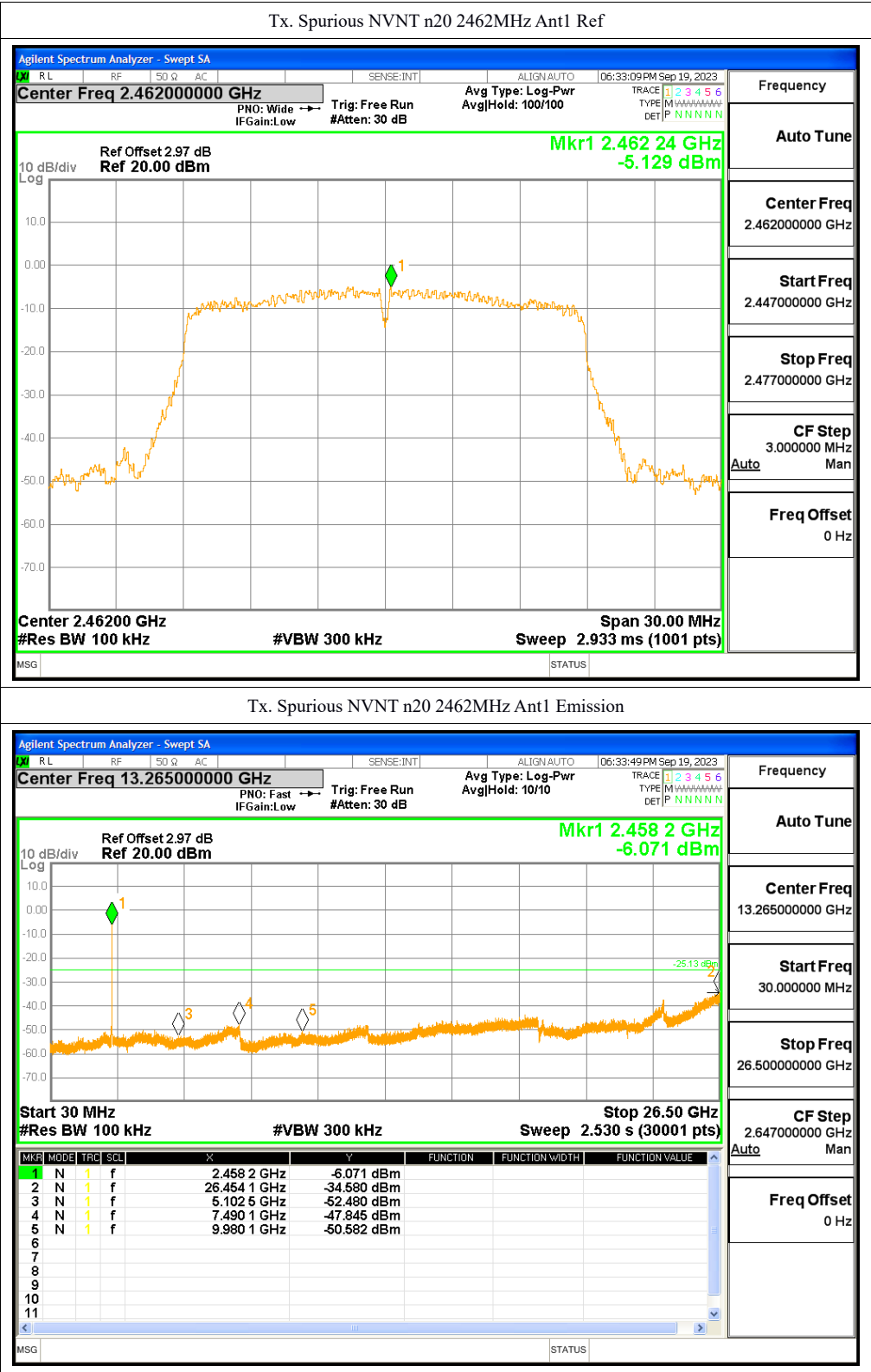
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#### 10.5 Restricted band Measurement

EUT	Singer Momento			Model	Momento
Mode	Keeping Transmitting			Test Voltage	120V~
Temperature	24 deg. C,			Humidity	56% RH
Test Result:	Pass			Detector	PK
802.11b mode, Low Channel, Horizontal					
2390	PK (dBμV/m)	43.37	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	
802.11b mode, Low Channel, Vertical					
2390	PK (dBμV/m)	39.23	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	

#### 10.5 Restricted band Measurement

EUT	Singer Momento		Model	Momento
Mode	Keeping Transmitting		Test Voltage	120V~
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
802.11b mode, High Channel, Horizontal				
2483.5	PK (dBμV/m)	41.87	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)
802.11b mode, High Channel, Vertical				
2483.5	PK (dBμV/m)	39.18	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)

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#### 10.5 Restricted band Measurement

EUT	Singer Momento			Model	Momento
Mode	Keeping Transmitting			Test Voltage	120V~
Temperature	24 deg. C,			Humidity	56% RH
Test Result:	Pass			Detector	PK
802.11g mode, Low Channel, Horizontal					
2390	PK (dBμV/m)	45.86	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	
802.11g mode, Low Channel Vertical					
2390	PK (dBμV/m)	43.63	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	

#### 10.5 Restricted band Measurement

EUT	Singer Momento			Model	Momento
Mode	Keeping Transmitting			Test Voltage	120V~
Temperature	24 deg. C,			Humidity	56% RH
Test Result:	Pass			Detector	PK
802.11g mode, High Channel, Horizontal					
2483.5	PK (dBμV/m)	47.15	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	
802.11g mode, High Channel, Vertical					
2483.5	PK (dBμV/m)	44.09	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	

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#### 10.5 Restricted band Measurement

EUT	Singer Momento			Model	Momento
Mode	Keeping Transmitting			Test Voltage	120V~
Temperature	24 deg. C,			Humidity	56% RH
Test Result:	Pass			Detector	PK
802.11n HT20 mode, Low Channel, Horizontal					
2390	PK (dBμV/m)	46.27	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	
802.11n HT20 mode, Low Channel Vertical					
2390	PK (dBμV/m)	43.67	Limit	74(dBμV/m)	
	AV (dBμV/m)	--		54(dBμV/m)	

#### 10.5 Restricted band Measurement

EUT	Singer Momento		Model	Momento
Mode	Keeping Transmitting		Test Voltage	120V~
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
802.11n HT20 mode, High Channel, Horizontal				
2483.5	PK (dBμV/m)	48.91	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)
802.11n HT20 mode, High Channel, Vertical				
2483.5	PK (dBμV/m)	45.33	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)

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## **11.0 Antenna Requirement**

### **11.1 Standard Applicable**

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

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **11.2 Antenna Connected construction**

PCB antenna with gain 1.42dBi Max (Get from the antenna specification)

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## 12.0 FCC ID Label

### FCC ID: 2BBQS-MOMENTO

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### Mark Location:



Label Location

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### 13.0 Photo of testing

Conducted Emission Test Setup:



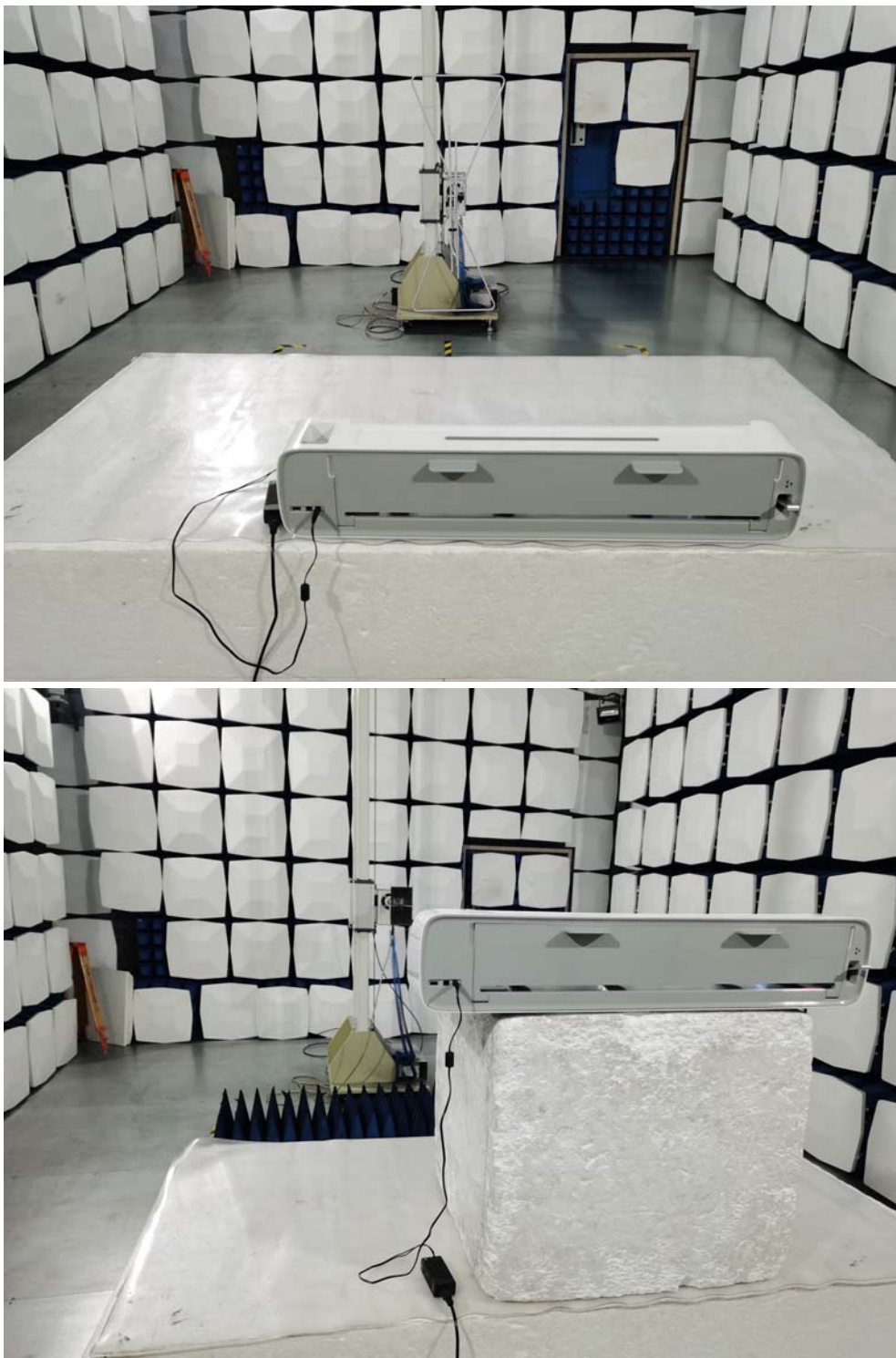
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Radiated Emission Test Setup:



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Outside View



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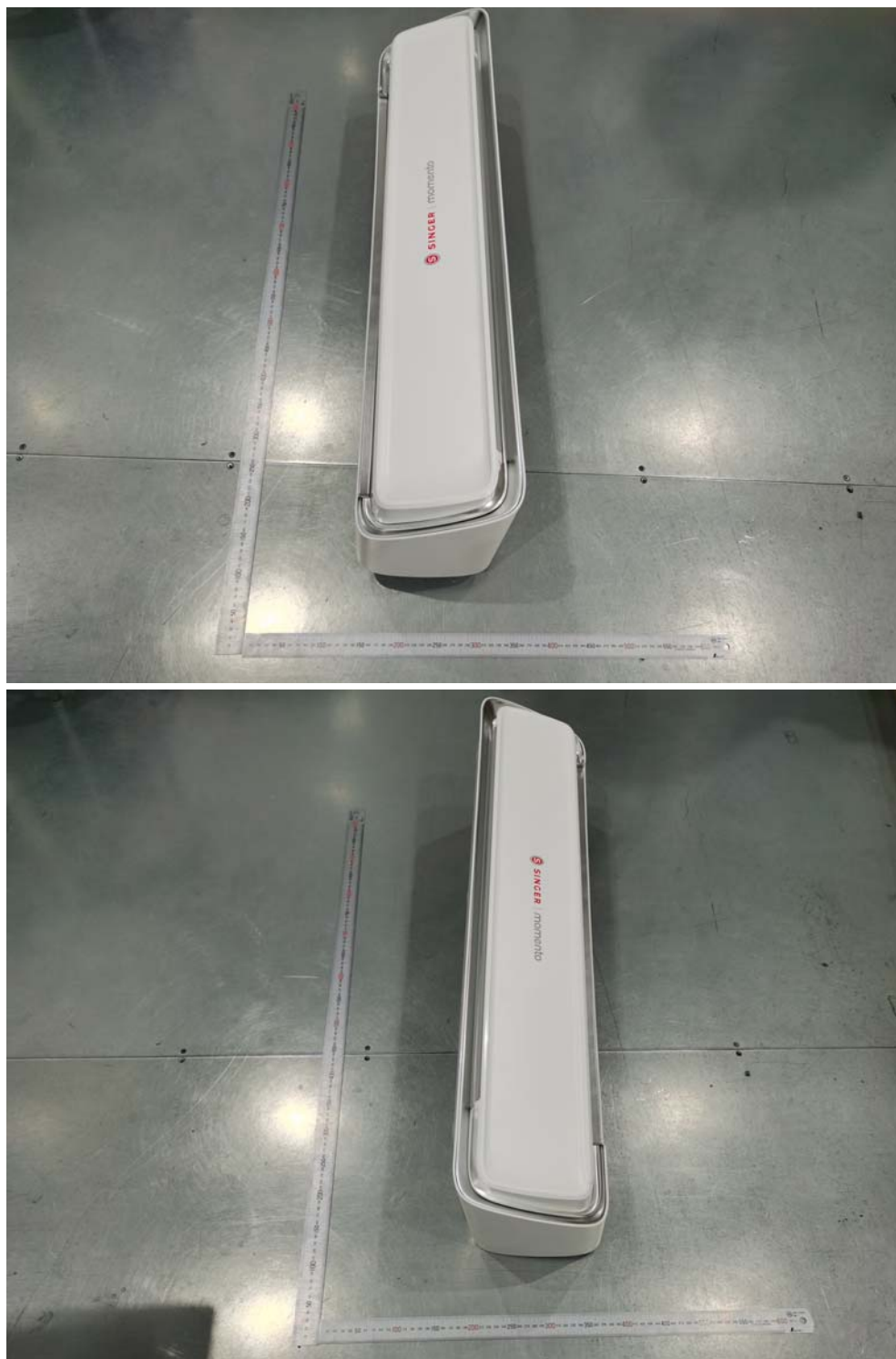
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### Power Supply



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Alternative Power Supply



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Inside view



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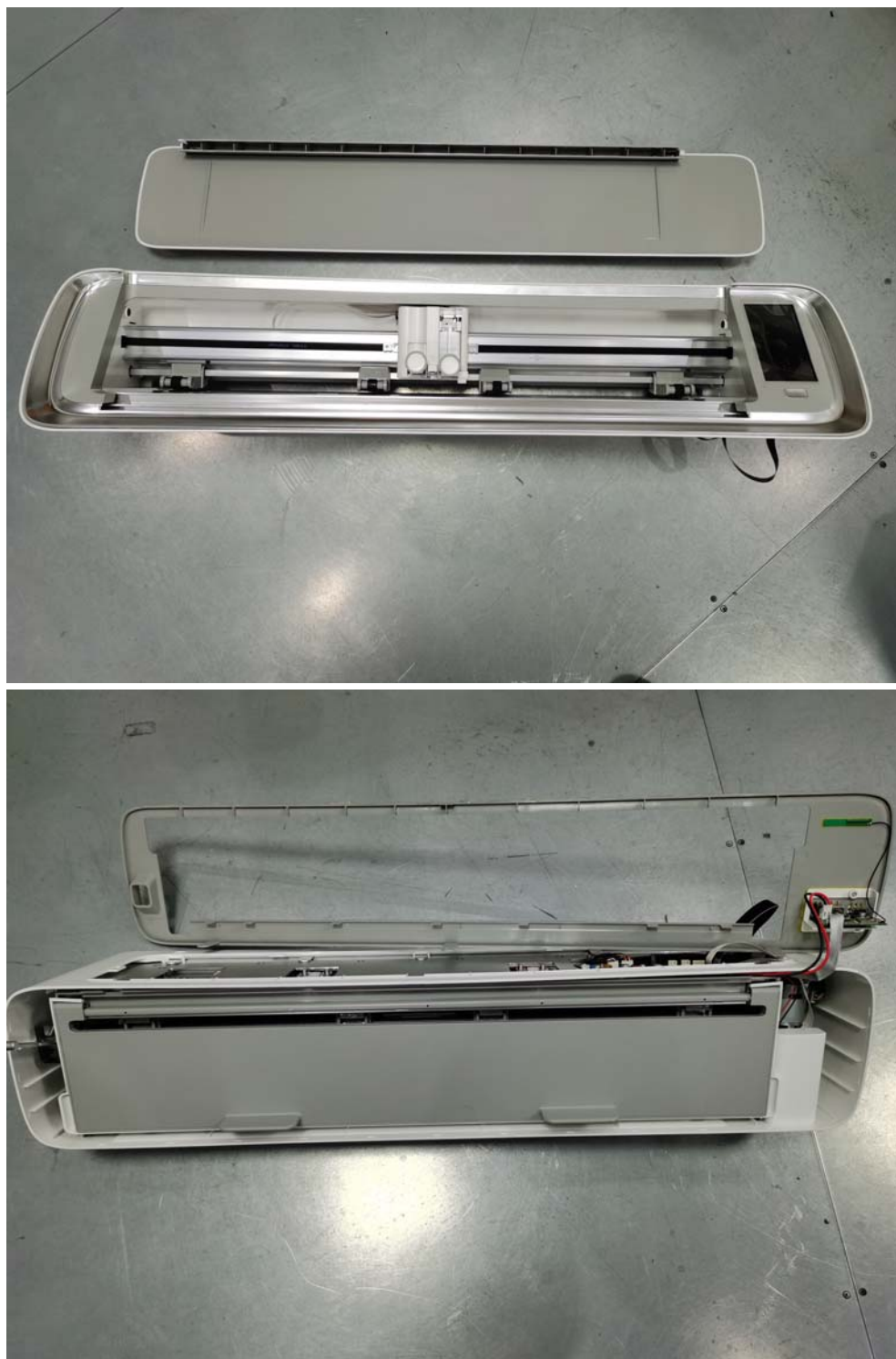
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Inside view



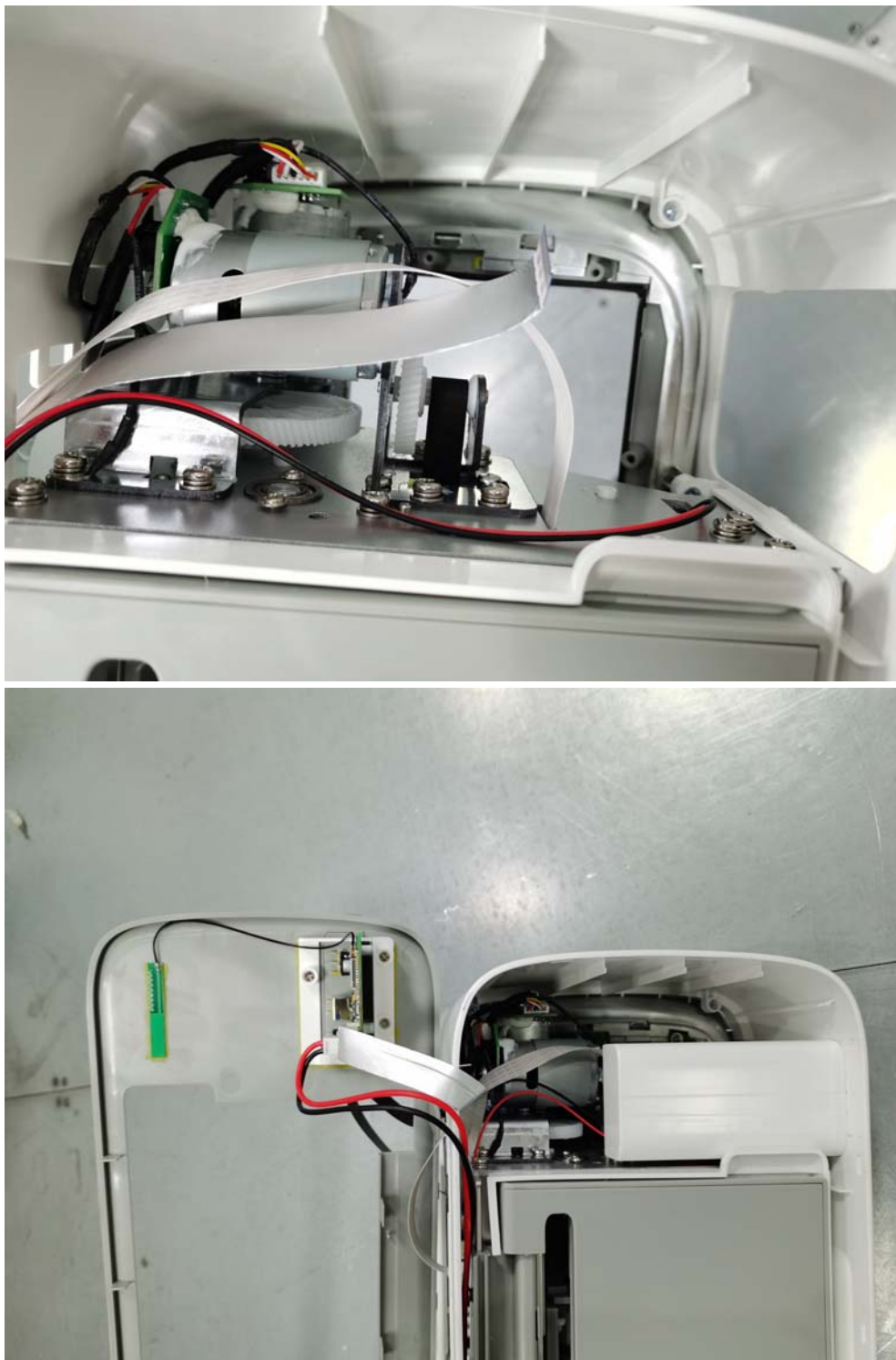
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Inside view



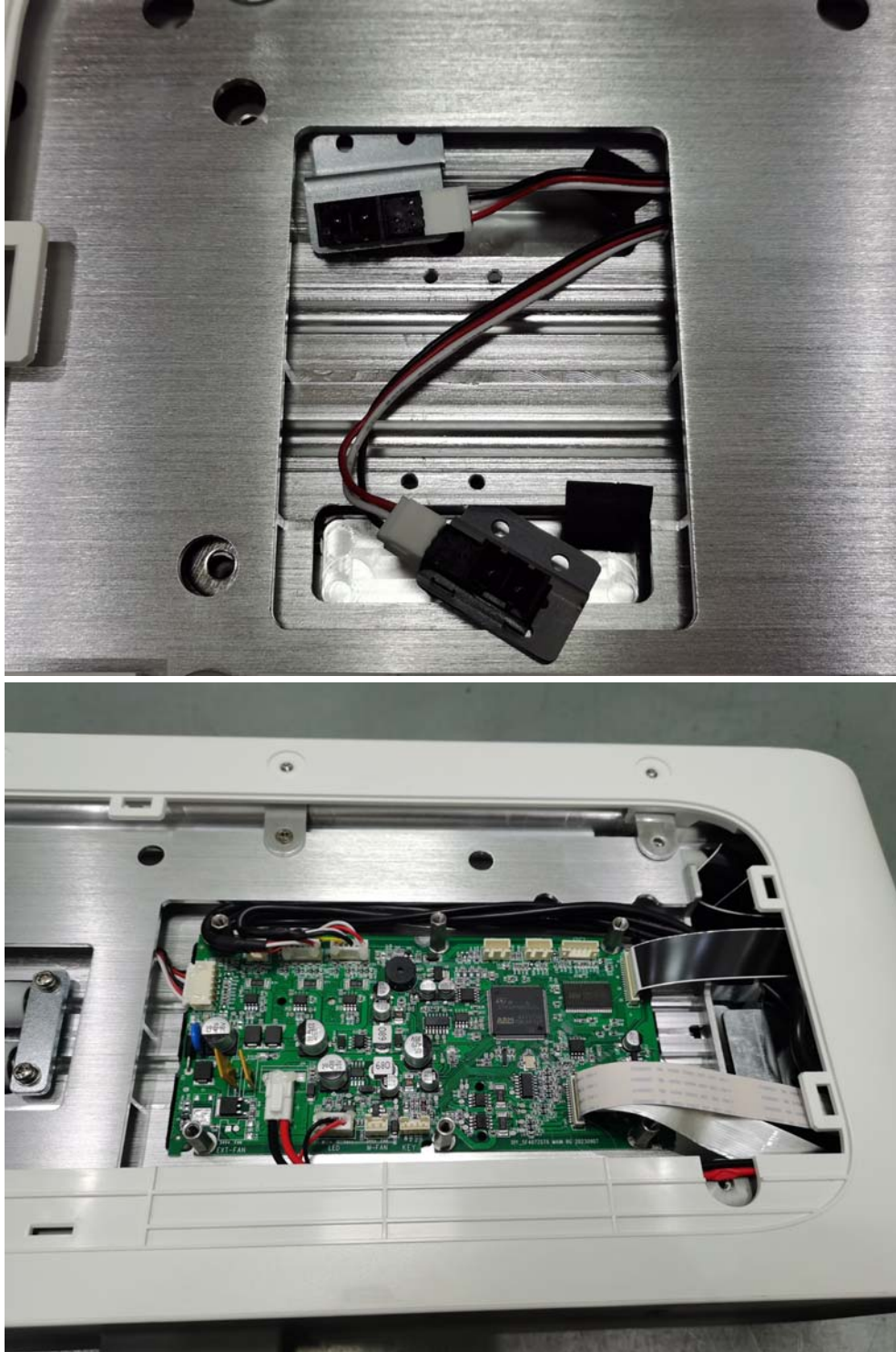
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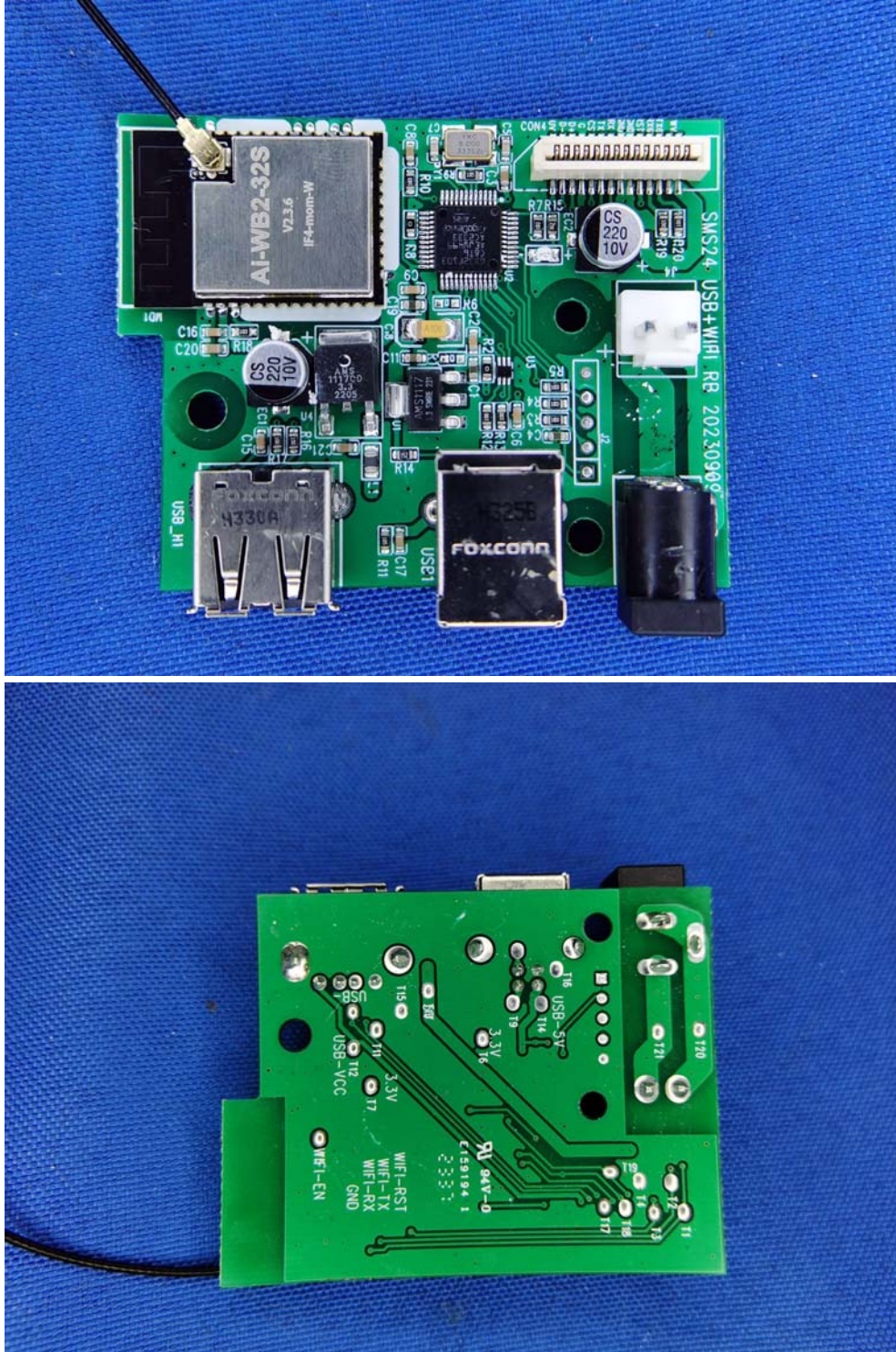


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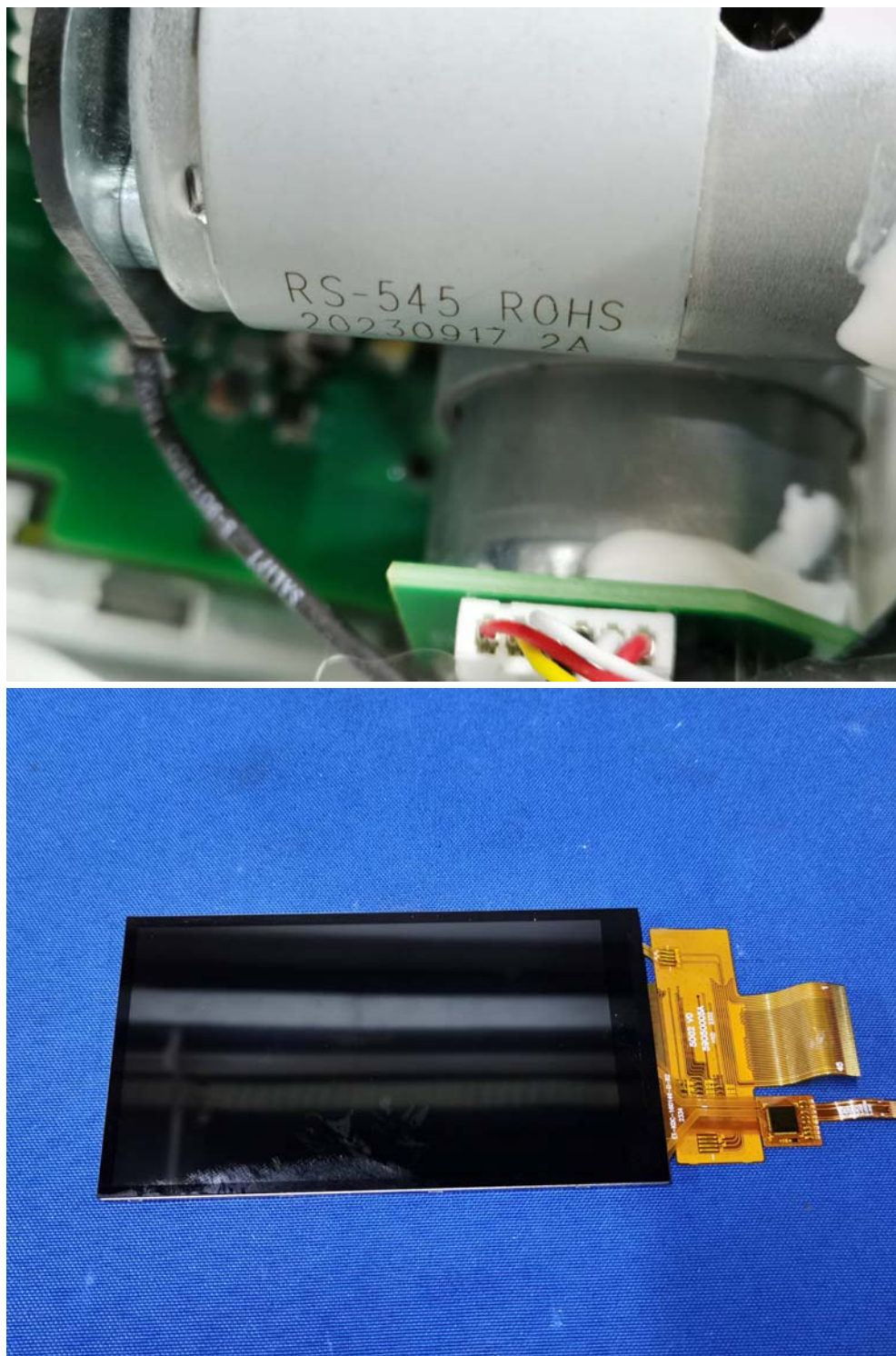


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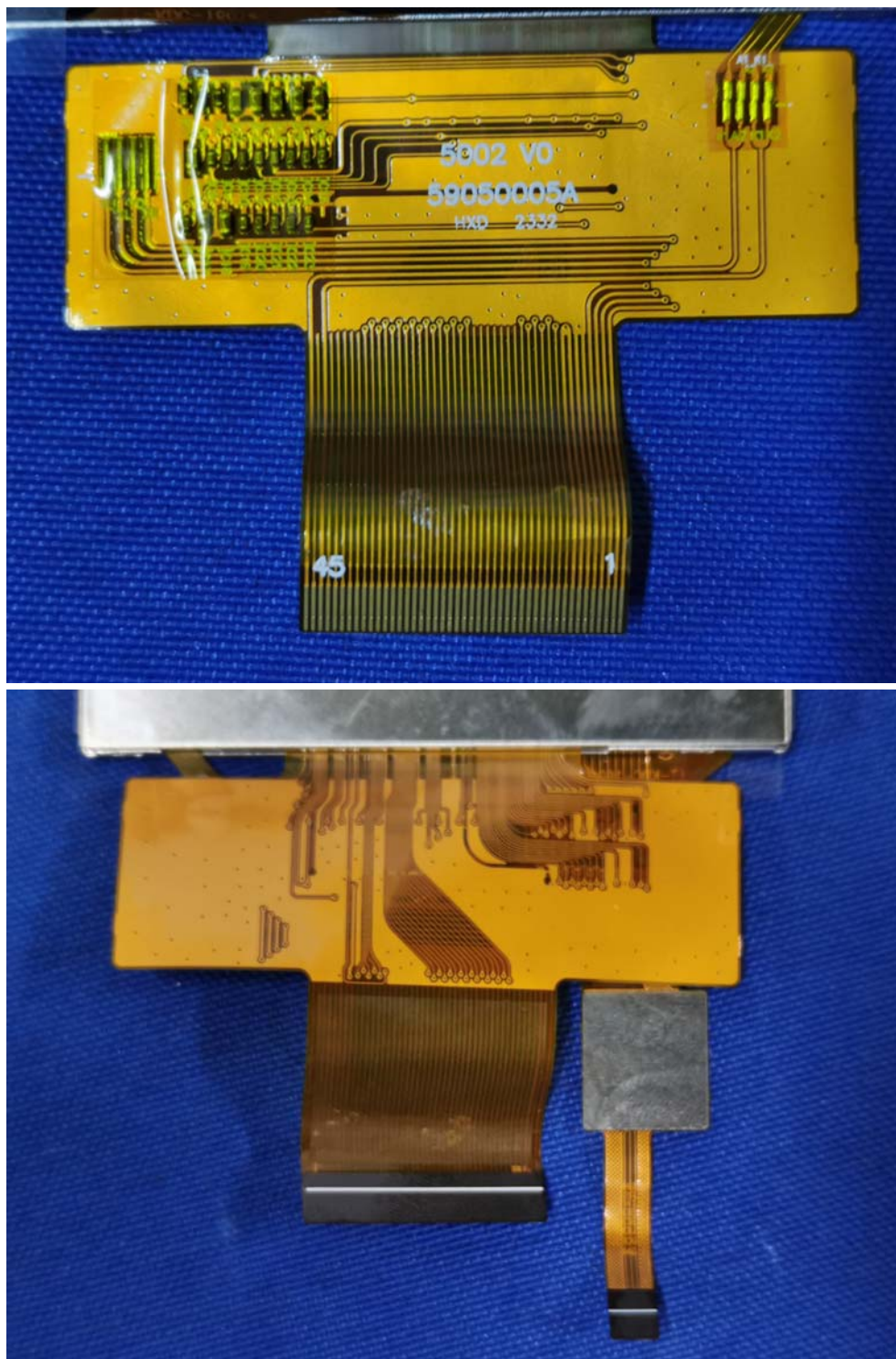
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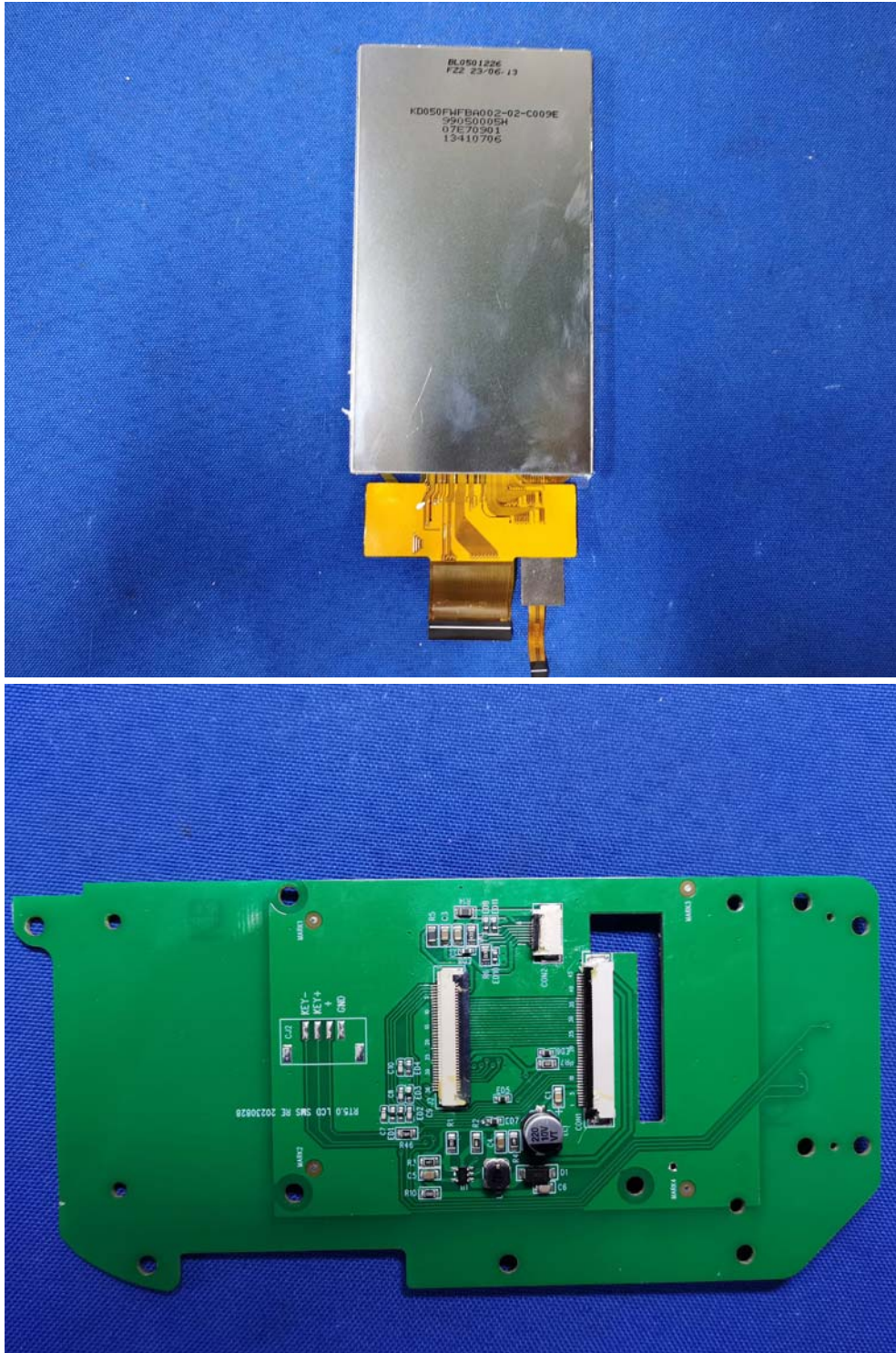
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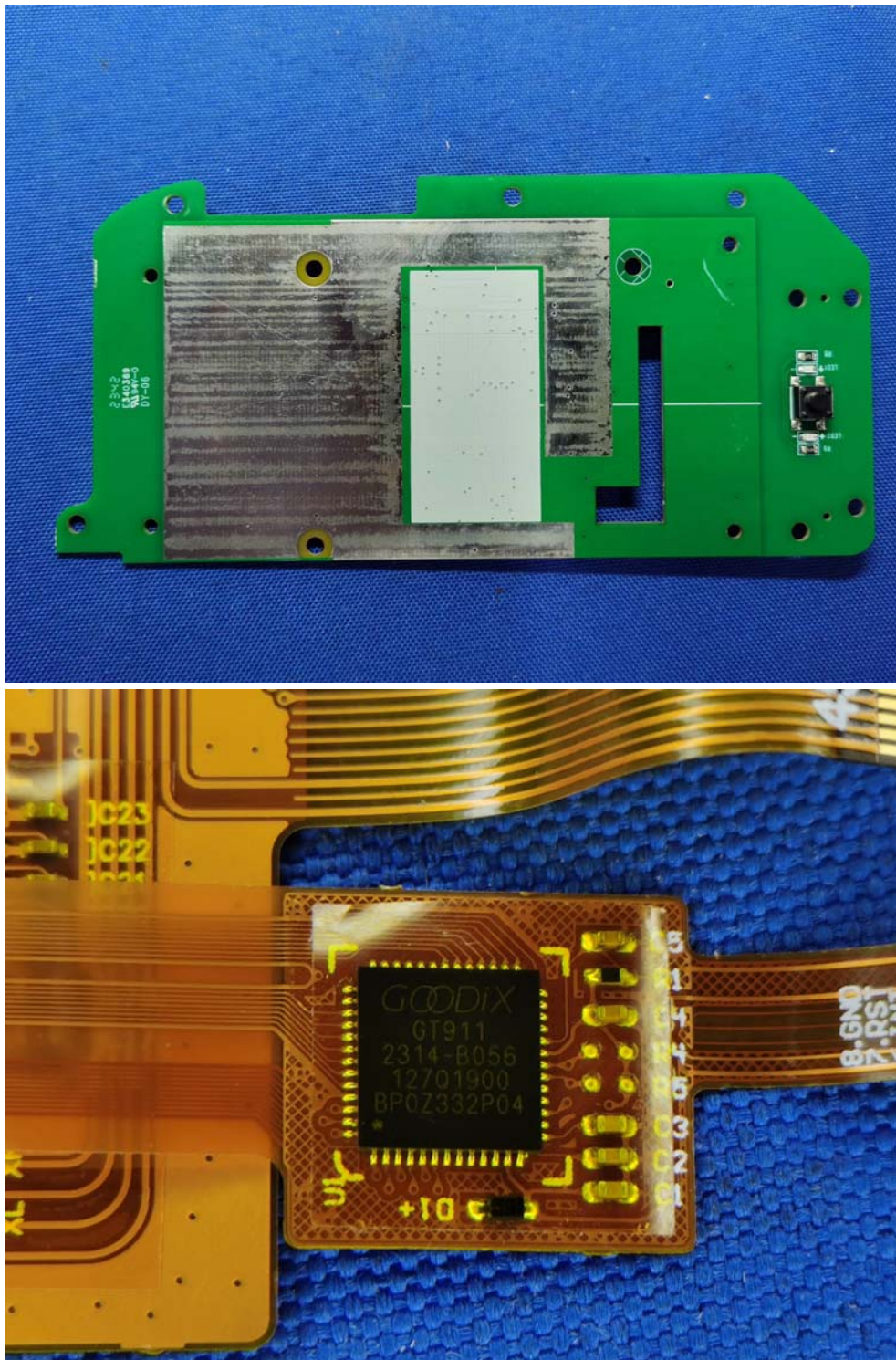
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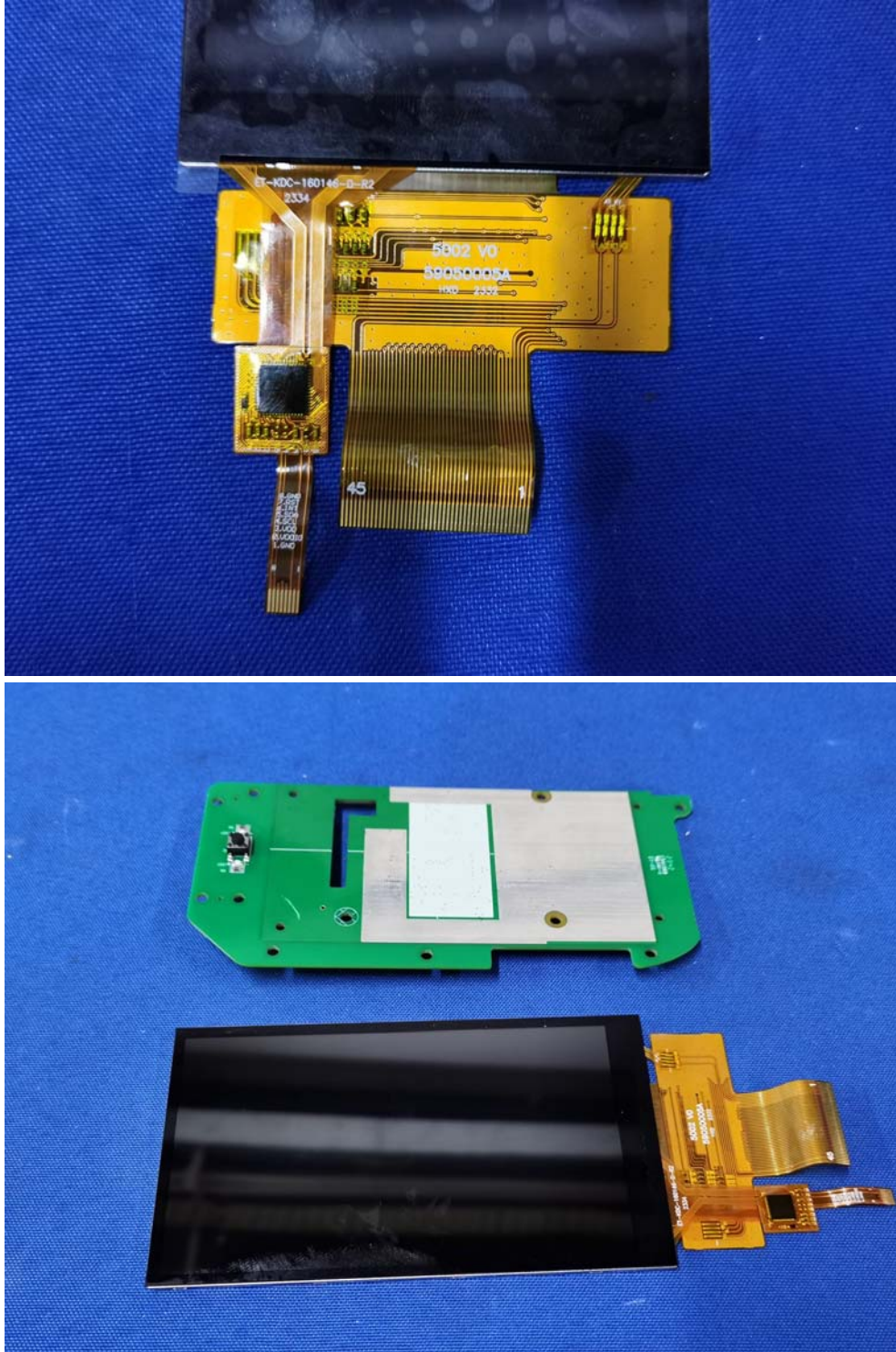
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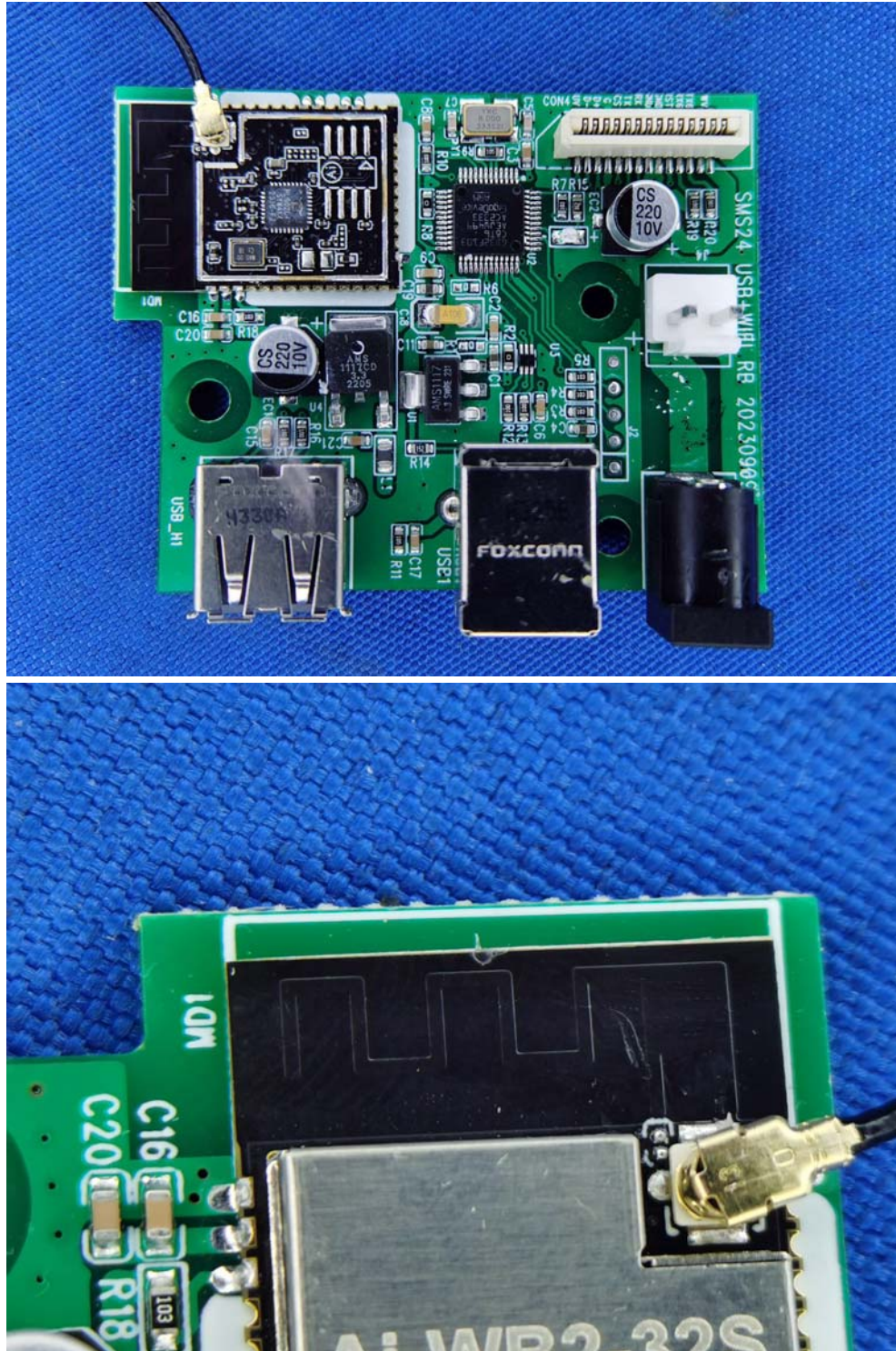
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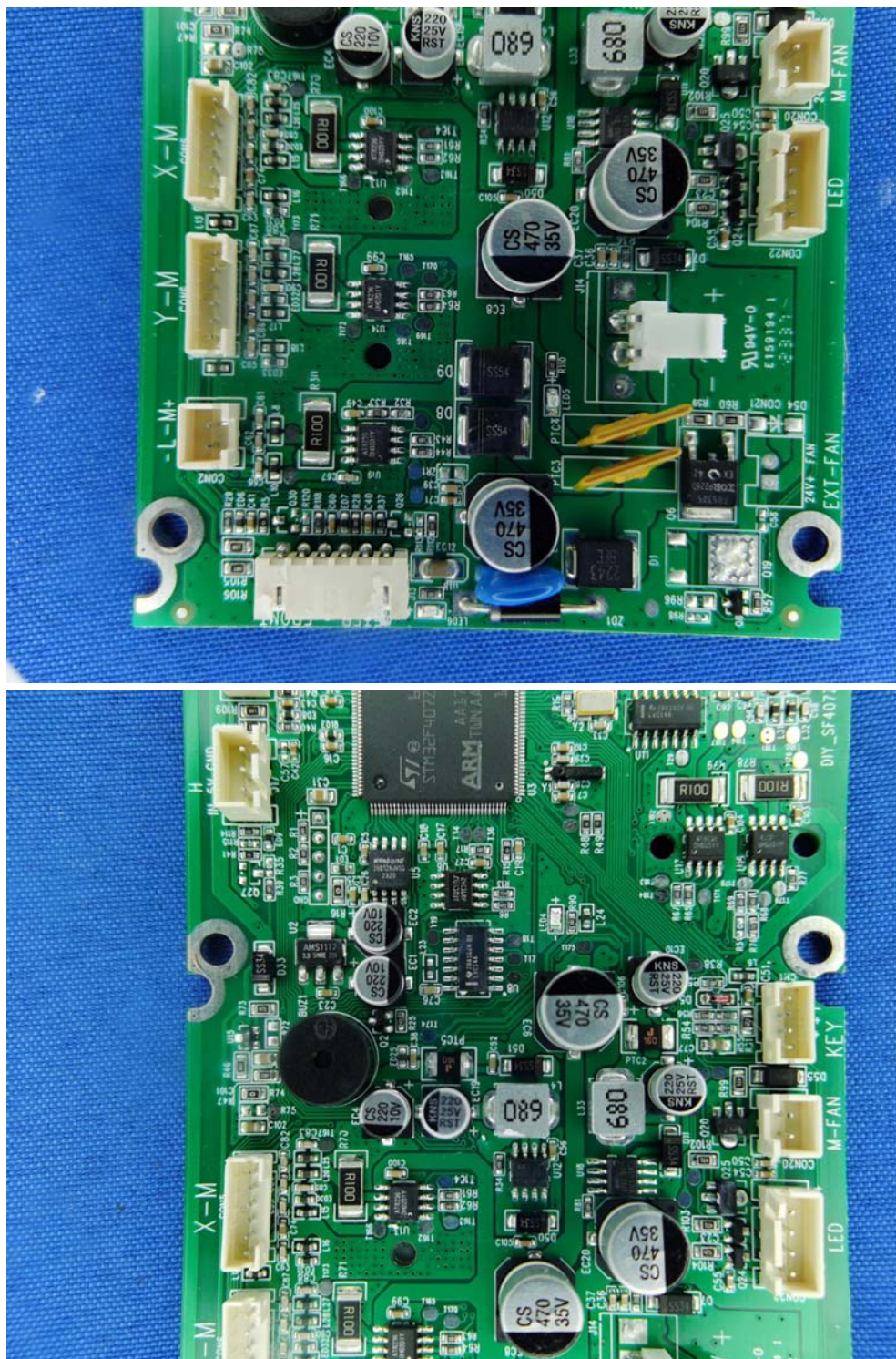
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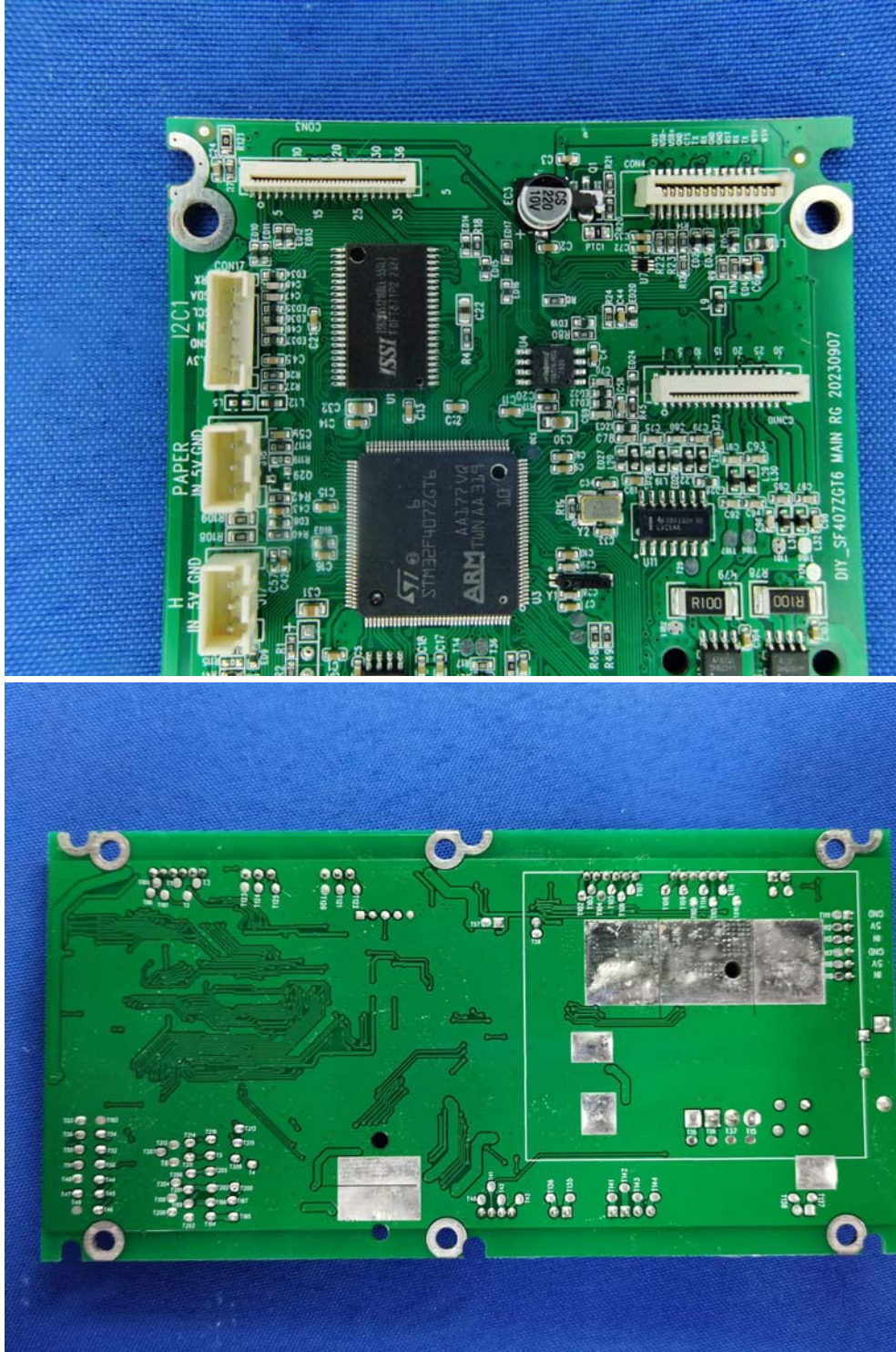
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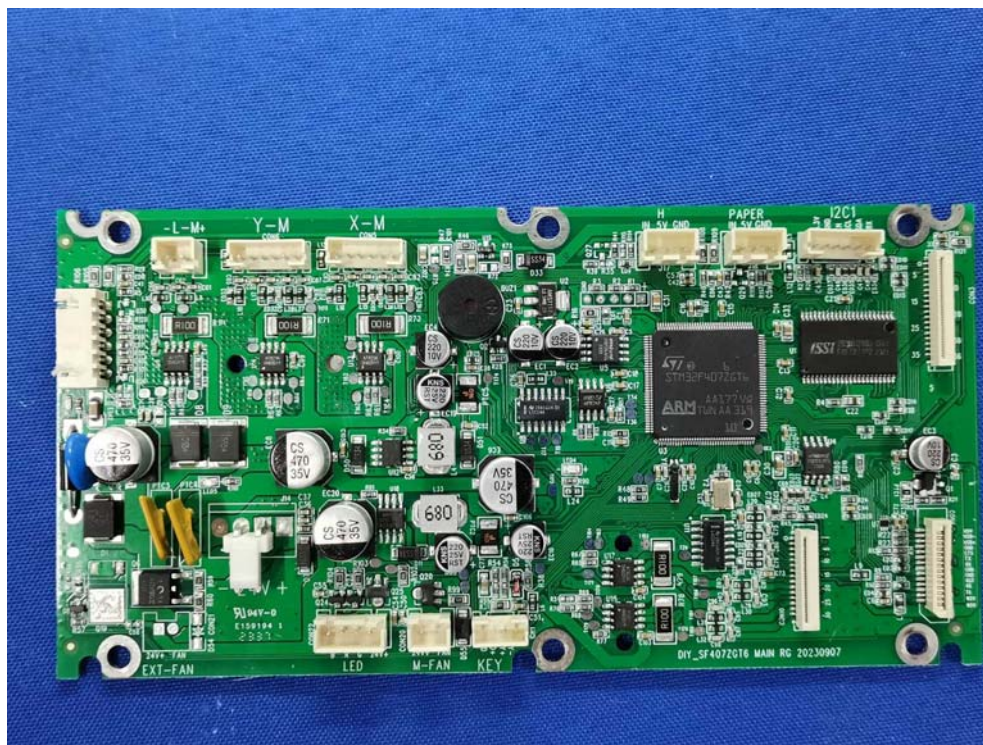
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