



# TEST REPORT

Applicant Name : Fanvil Technology Co., LTD.  
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North 2nd Road, Bao'an District, Shenzhen, 518101, China  
Report Number: RA230424-21726E-RF-00B  
FCC ID: 2APPZ-Y501WY

## Test Standard (s)

FCC PART 15.407

## Sample Description

Product Type: SIP Intercom/SIP Care Intercom  
Model No.: Y501W-Y  
Multiple Model(s) No.: Y501W,A10W,A10W-E  
Trade Mark: **Fanvil**  
Date Received: 2023/04/24  
Report Date: 2023/06/03

Test Result:	Pass*
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\* In the configuration tested, the EUT complied with the standards above.

## Prepared and Checked By:

*Andy Yu*

Andy Yu  
EMC Engineer

## Approved By:

*Candy Li*

Candy Li  
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "\*" .

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## DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RA230424-21726E-RF-00B	Original Report	2023/06/03

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Product Type	SIP Intercom/SIP Care Intercom
Model No.	Y501W-Y
Multiple Model(s) No.	Y501W, A10W, A10W-E (The model differences please refer to DOS)
Frequency Range	5G Wi-Fi: 5150~5250MHz ; 5725~5850 MHz
Mode	802.11a/n20/n40
Maximum Conducted Average Output Power(dBm)	5150-5250MHz: 15.62dBm 5725~5850 MHz: 15.81dBm
Modulation Technique	OFDM
Antenna Specification*	3.5dBi (provided by the applicant)
Voltage Range	DC 48V from POE or DC 12V
Sample serial number	251K_1 for Conducted and Radiated Emissions Test 251K_2 for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition

### Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

## Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082 \times 10^{-7}$
RF output power, conducted		0.71dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.06dB
	30MHz - 1GHz	5.08dB
	1GHz - 18GHz	4.96dB
	18GHz -26.5GHz	5.16dB
	26.5GHz -40GHz	4.64dB
Temperature		1°C
Humidity		6%
Supply voltages		0.4%

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 30241.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The device supports 802.11a/n20/n40 mode.

For 5150-5250MHz Band, 6 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240

For 802.11a, 802.11n20 mode: channel 36, 40, 48 were tested; For 802.11n40 mode: channel 38, 46 were tested.

For 5725-5850MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	159	5795
151	5755	161	5805
153	5765	165	5825
157	5785	/	/

For 802.11a, 802.11n20 mode: channel 149, 157, 165 were tested; For 802.11n40 mode: channel 151, 159 were tested.

### EUT Exercise Software

“SecureCRtportable.exe\*” software was used.

The device was tested with the worst case was performed as below:

U-NII	Mode	Data rate	Power Level*
5150 – 5250MHz	802.11a	6Mbps	90
	802.11n20	MCS0	90
	802.11n40	MCS0	90
5725 – 5850MHz	802.11a	6Mbps	90
	802.11n20	MCS0	90
	802.11n40	MCS0	90

The worse-case data rates are determined to be as follows for each mode based upon investigations by measuring the output power and PSD across all data rated bandwidths, and modulations.

The power level was provided by the applicant.

**Duty cycle**

Test Result: Compliant. Please refer to the Appendix Wi-Fi.

**Equipment Modifications**

No modification was made to the EUT tested.

**Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
Lenovo	NoteBook	T430	23447YC
GOSPELL	POE	G0720-480-050	212701319
Unknown	Battery(DC 12V)	Unknown	Unknown
TP-link	Adapter	T120100-2C1	N/A

**External I/O Cable**

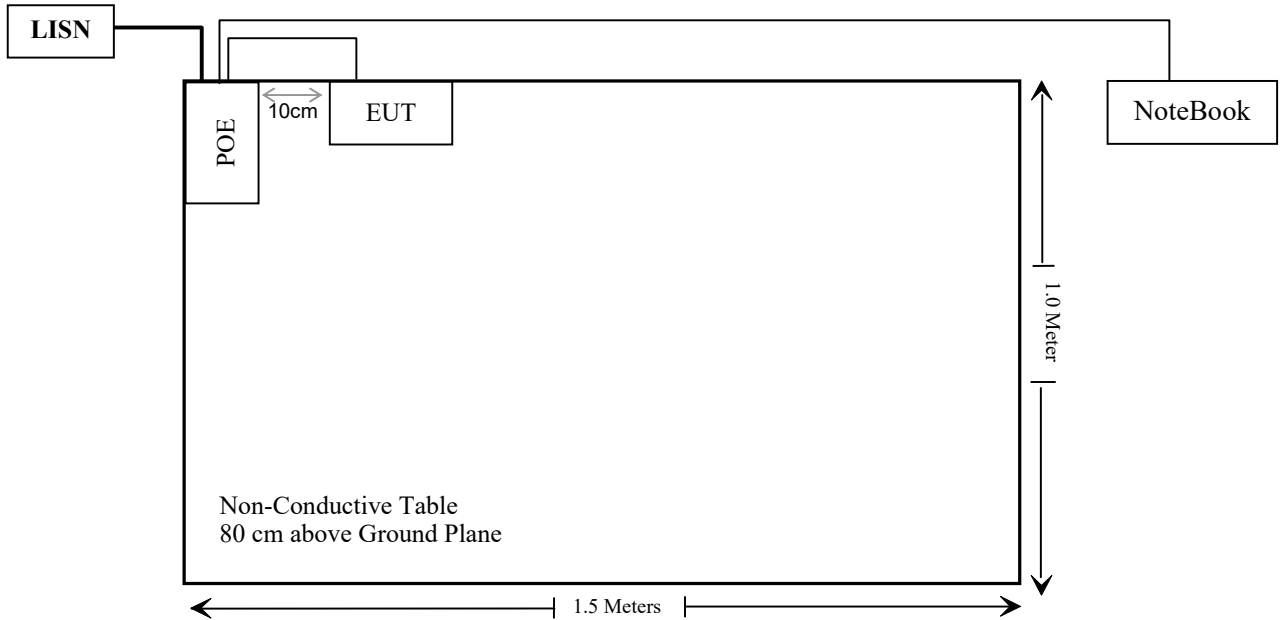
Cable Description	Length (m)	From/Port	To
Un-shielding Detachable AC Cable	1.0	LISN/ AC Mains	POE/ Receptacle
Un-shielding Detachable DC Cable	1.0	Adapter	EUT
Un-shielding Detachable network Cable	1.0	POE	EUT
Un-shielding Detachable network Cable	10.0	EUT/POE	NoteBook
Un-shielding Detachable DC Cable	1.5	Battery	EUT



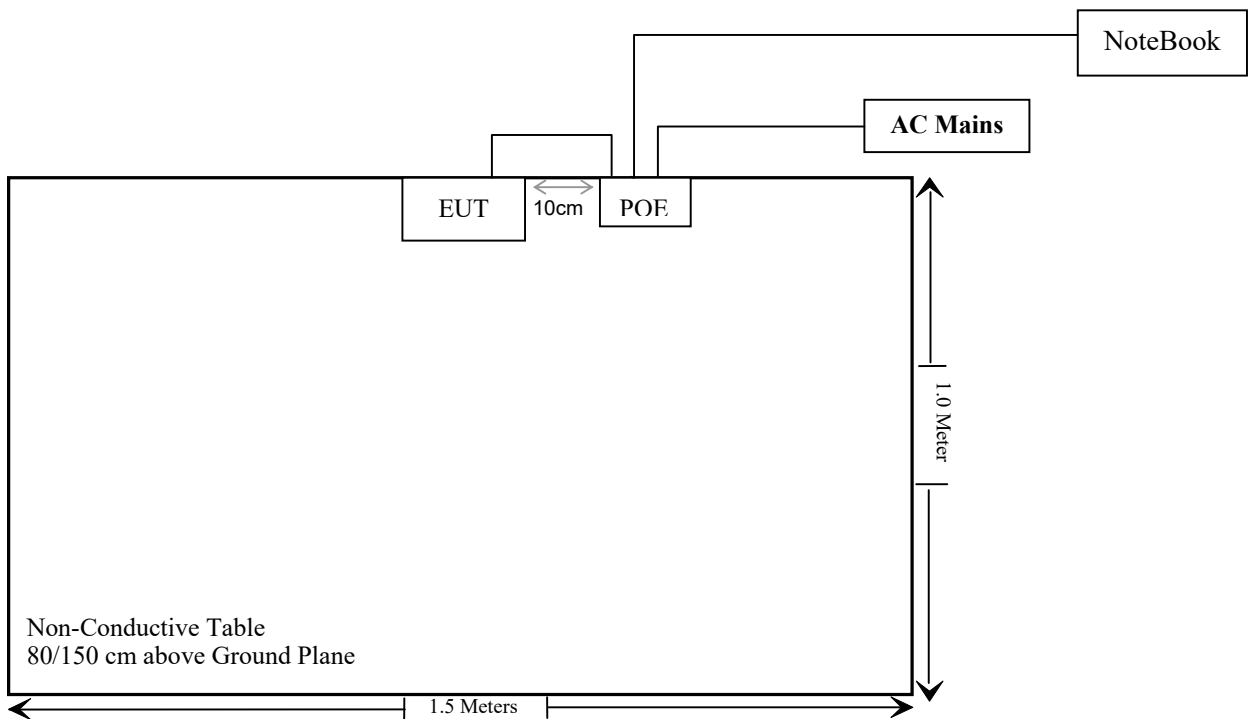
**Block Diagram of Test Setup**

Powered by POE

For conducted emission



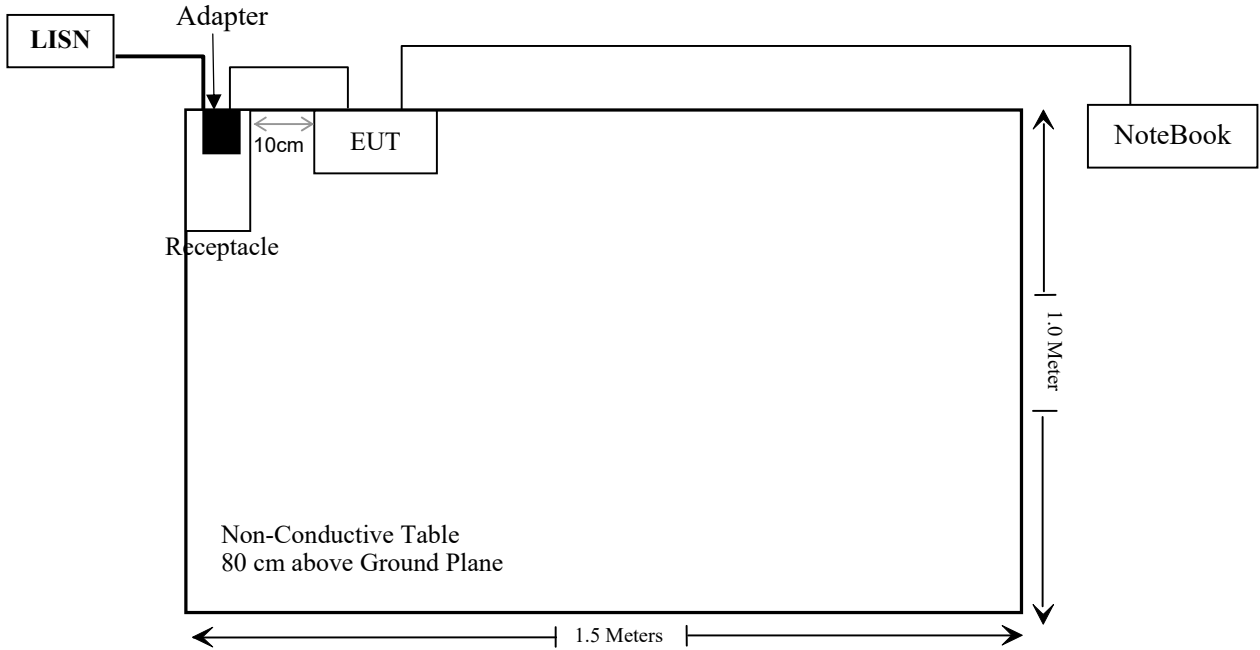
For Radiated Emissions:



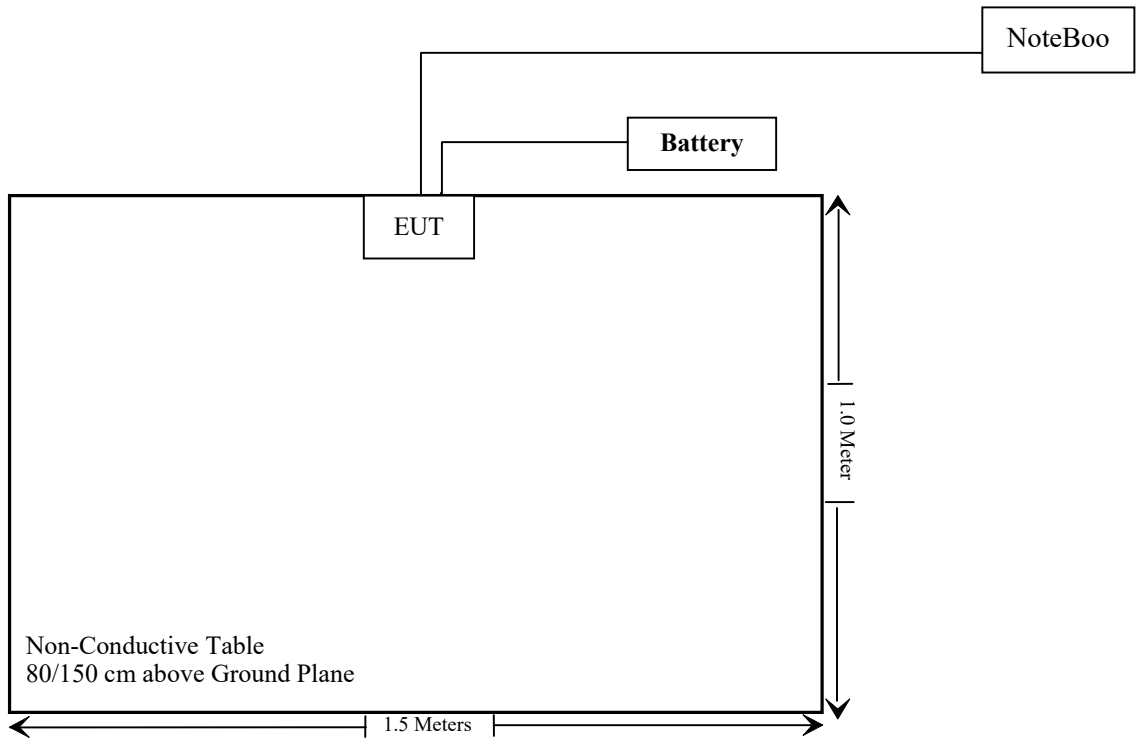
*Note: the support table edge was flush with center of turntable*

Powered from DC12V

For conducted emission



For Radiated Emissions:



*Note: the support table edge was flush with center of turntable*

## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (3) & §2.1091	MPE-BASED EXEMPTION	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(9)& §15.207(a)	Conducted Emissions	Compliant
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (e)	26 dB Emission Bandwidth& 6dB Bandwidth	Compliant
§15.407(a)	Conducted Transmitter Output Power	Compliant
§15.407 (a)	Power Spectral Density	Compliant
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Not Applicable

Not Applicable: the EUT not operating within DFS bands which was declared by the applicant.

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2022/11/25	2023/11/24
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2022/11/25	2023/11/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2022/12/07	2023/12/06
Unknown	RF Coaxial Cable	No.17	N0350	2022/11/25	2023/11/24
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2022/11/08	2023/11/07
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2022/11/08	2023/11/07
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	837	2023/02/22	2026/02/21
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2022/12/26	2025/12/25
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.11	N1000	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.15	N600	2022/11/25	2023/11/24
CD	Band Reject Filter	BRM-5.15/5.35g-45	075	2022/11/25	2023/11/24
CD	Band Reject Filter	BRM-5.725/5.875G-45	065	2022/11/25	2023/11/24
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101590	2022/11/25	2023/11/24
Tonscend	RF Control Unit	JS0806-2	19G8060182	2022/10/24	2023/10/23
Agilent	Power Sensor	U2021XA	MY5425003	2023/02/25	2024/02/24
Unknown	RF Coaxial Cable	No.31	RF-01	Each time	

\* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## **FCC §15.247 (I) & §1.1307 (B) (3) & §2.1091- MPE-BASED EXEMPTION**

### **Applicable Standard**

According to subpart 1.1307 (b) (3) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$ .
1.34-30	$3,450 R^2/f^2$ .
30-300	$3.83 R^2$ .
300-1,500	$0.0128 R^2 f$ .
1,500-100,000	$19.2 R^2$ .

R is the minimum separation distance in meters

f = frequency in MHz

### **Result**

Mode	Frequency (MHz)	Tune up conducted power	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
		(dBm)	(dBi)	(dBd)	(dBm)	(W)		
2.4G Wi-Fi	2412-2462	16.5	2.9	0.75	17.25	0.053	0.2	0.768
5G Wi-Fi	5150-5250	16.0	3.5	1.35	17.35	0.054	0.2	0.768
	5725-5850	16.0	3.5	1.35	17.35	0.054	0.2	0.768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.

2. The 2.4G/5G Wi-Fi cannot Simultaneous transmitting

3. 0dBd=2.15dBi

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

**Result: Compliant.**

## **FCC §15.203 – ANTENNA REQUIREMENT**

### **Applicable Standard**

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
  - b. Antenna must use a unique type of connector to attach to the EUT.
- Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **Antenna Connector Construction**

The EUT has one internal antenna arrangement for 5G Wi-Fi which were permanently attached. Please refer to the EUT photos.

Type	Antenna Gain	Impedance	Frequency Range
FPC	3.5dBi	50Ω	5150-5850MHz

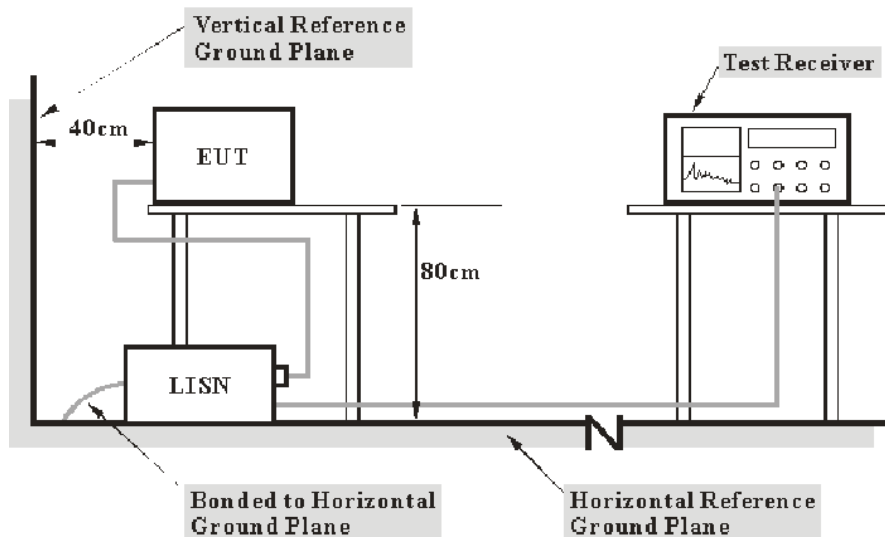
**Result:** Compliant.

## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207, §15.407(b) (6)

### EUT Setup



- Note: 1. Support units were connected to second LISN.  
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

### Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and Average detection mode.

## Factor & Over limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss}$$

The “**Over limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

$$\begin{aligned}\text{Over Limit} &= \text{Level} - \text{Limit} \\ \text{Level} &= \text{Read Level} + \text{Factor}\end{aligned}$$

## Test Data

### Environmental Conditions

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	49 %
<b>ATM Pressure:</b>	101.0 kPa

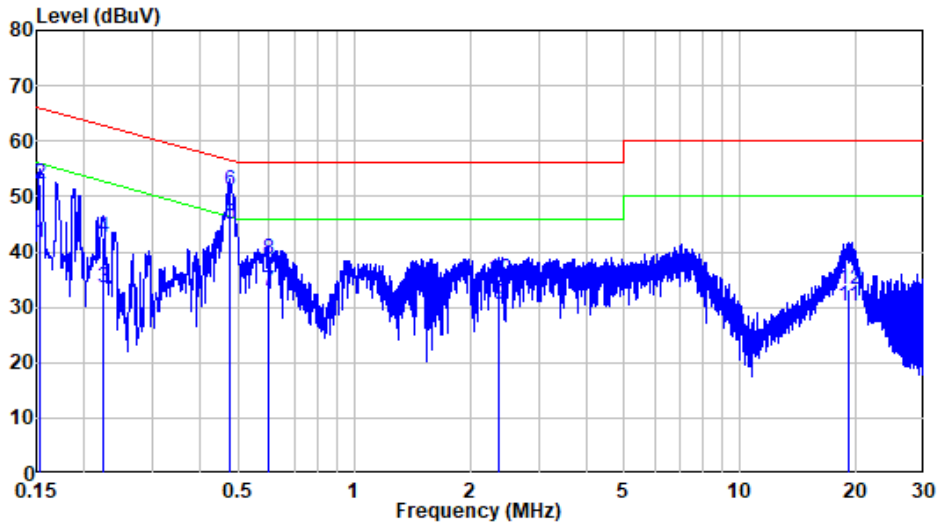
*The testing was performed by Jerry Wu on 2023-05-17 and 2023-06-02.*

*EUT operation mode: Transmitting (worst case is 802.11a, 5745MHz)*



Powered by POE:

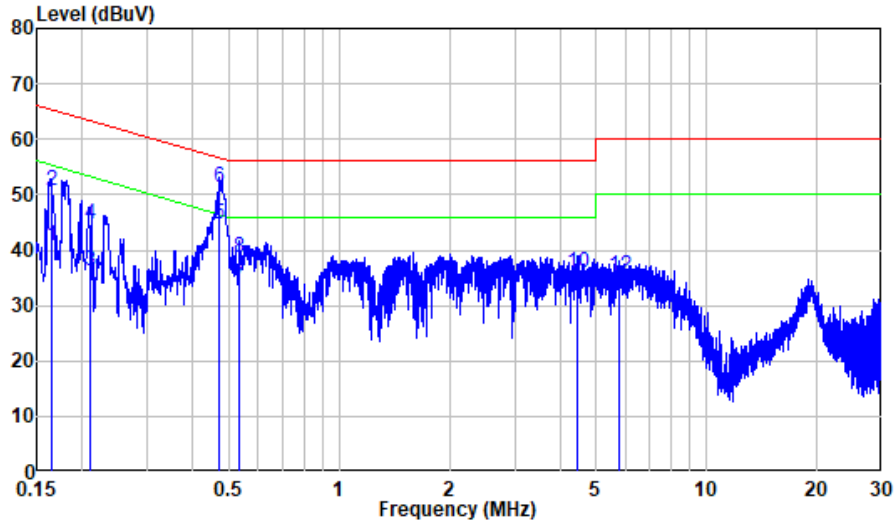
AC 120V/60 Hz, Line:



Site : Shielding Room  
 Condition: Line  
 Job No. : RA230424-21726E-RF  
 Mode : 5G WIFI Transmitting  
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.154	10.36	31.40	41.76	55.79	-14.03	Average
2	0.154	10.36	41.74	52.10	65.79	-13.69	QP
3	0.223	10.31	23.28	33.59	52.70	-19.11	Average
4	0.223	10.31	32.30	42.61	62.70	-20.09	QP
5	0.475	10.55	34.39	44.94	46.43	-1.49	Average
6	0.475	10.55	40.61	51.16	56.43	-5.27	QP
7	0.597	10.62	22.22	32.84	46.00	-13.16	Average
8	0.597	10.62	27.97	38.59	56.00	-17.41	QP
9	2.369	10.43	20.15	30.58	46.00	-15.42	Average
10	2.369	10.43	24.69	35.12	56.00	-20.88	QP
11	19.135	10.29	20.04	30.33	50.00	-19.67	Average
12	19.135	10.29	23.05	33.34	60.00	-26.66	QP

**AC 120V/60 Hz, Neutral:**

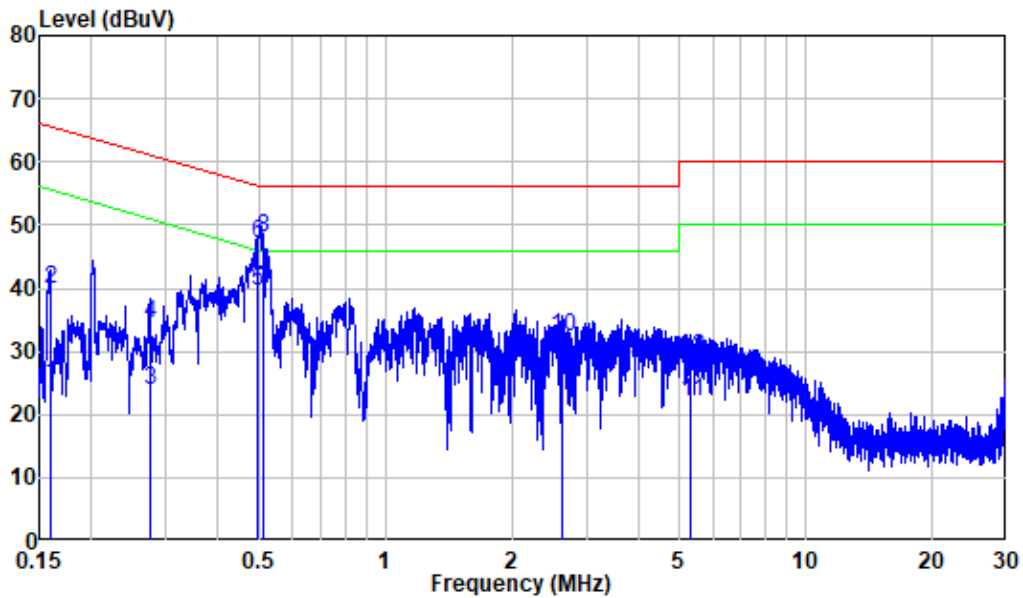


Site : Shielding Room  
 Condition: Neutral  
 Job No. : RA230424-21726E-RF  
 Mode : 5G WIFI Transmitting  
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.164	10.28	30.52	40.80	55.24	-14.44	Average
2	0.164	10.28	40.44	50.72	65.24	-14.52	QP
3	0.210	10.30	26.03	36.33	53.20	-16.87	Average
4	0.210	10.30	34.42	44.72	63.20	-18.48	QP
5	0.473	10.45	34.29	44.74	46.47	-1.73	Average
6	0.473	10.45	40.76	51.21	56.47	-5.26	QP
7	0.534	10.47	23.31	33.78	46.00	-12.22	Average
8	0.534	10.47	28.25	38.72	56.00	-17.28	QP
9	4.466	10.52	22.17	32.69	46.00	-13.31	Average
10	4.466	10.52	25.30	35.82	56.00	-20.18	QP
11	5.767	10.51	22.04	32.55	50.00	-17.45	Average
12	5.767	10.51	24.74	35.25	60.00	-24.75	QP

Powered by Adapter:

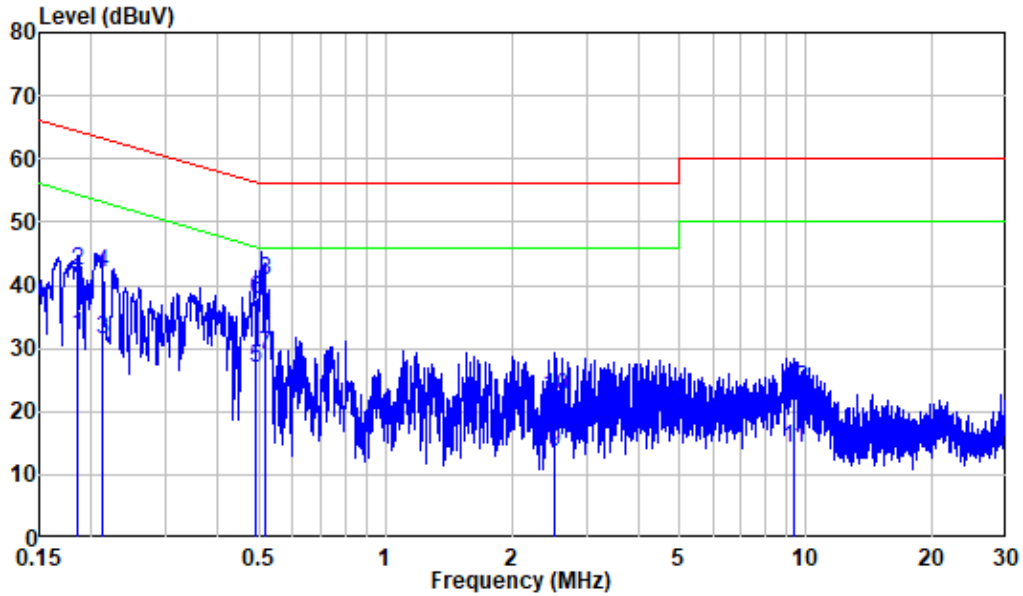
AC 120V/60 Hz, Line:



Site : Shielding Room  
 Condition: Line  
 Job No. : RA230424-21726E-RF  
 Mode : 5G WIFI Transmitting  
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB
1	0.159	10.36	14.37	24.73	55.50	-30.77 Average
2	0.159	10.36	29.47	39.83	65.50	-25.67 QP
3	0.275	10.38	13.62	24.00	50.96	-26.96 Average
4	0.275	10.38	23.90	34.28	60.96	-26.68 QP
5	0.498	10.57	29.09	39.66	46.03	-6.37 Average
6	0.498	10.57	36.44	47.01	56.03	-9.02 QP
7	0.512	10.58	29.21	39.79	46.00	-6.21 Average
8	0.512	10.58	37.41	47.99	56.00	-8.01 QP
9	2.620	10.46	15.24	25.70	46.00	-20.30 Average
10	2.620	10.46	21.95	32.41	56.00	-23.59 QP
11	5.326	10.56	11.60	22.16	50.00	-27.84 Average
12	5.326	10.56	18.54	29.10	60.00	-30.90 QP

**AC 120V/60 Hz, Neutral:**



Site : Shielding Room  
 Condition: Neutral  
 Job No. : RA230424-21726E-RF  
 Mode : 5G WIFI Transmitting  
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.185	10.28	21.64	31.92	54.24	-22.32	Average
2	0.185	10.28	31.94	42.22	64.24	-22.02	QP
3	0.212	10.30	20.98	31.28	53.13	-21.85	Average
4	0.212	10.30	31.56	41.86	63.13	-21.27	QP
5	0.490	10.47	16.25	26.72	46.16	-19.44	Average
6	0.490	10.47	27.22	37.69	56.16	-18.47	QP
7	0.518	10.47	18.49	28.96	46.00	-17.04	Average
8	0.518	10.47	30.29	40.76	56.00	-15.24	QP
9	2.520	10.51	3.11	13.62	46.00	-32.38	Average
10	2.520	10.51	11.86	22.37	56.00	-33.63	QP
11	9.346	10.68	3.52	14.20	50.00	-35.80	Average
12	9.346	10.68	12.94	23.62	60.00	-36.38	QP

## §15.205 & §15.209 & §15.407(B)– UNDESIRABLE EMISSION

### Applicable Standard

FCC §15.407 (b); §15.209; §15.205;

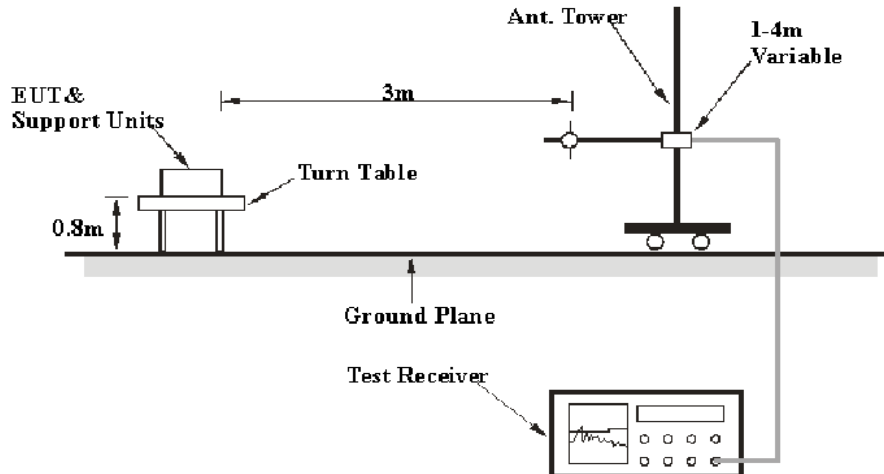
(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

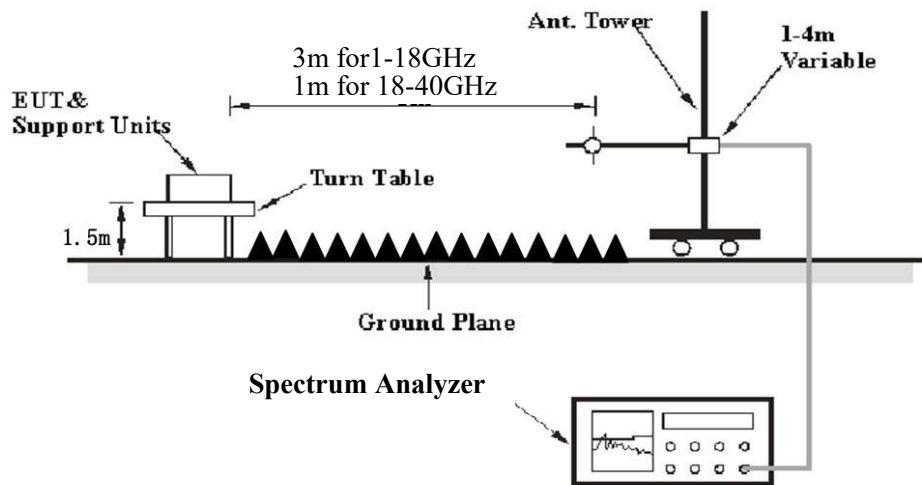
- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
  - (i) All emissions shall be limited to a level of  $-27$  dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

### EUT Setup

#### Below 1 GHz:



**Above 1 GHz:**

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

**EMI Test Receiver & Spectrum Analyzer Setup**

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz <sup>Note 1</sup>	/	Average
	1MHz	> 1/T <sup>Note 2</sup>	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

**Test Procedure****Radiated Spurious Emission**

During the radiated emission test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified, extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

$$E_{\text{SpecLimit}} = E_{\text{Meas}} + 20 \log \left( \frac{d_{\text{Meas}}}{d_{\text{SpecLimit}}} \right)$$

where

$E_{\text{SpecLimit}}$	is the field strength of the emission at the distance specified by the limit, in dB $\mu$ V/m
$E_{\text{Meas}}$	is the field strength of the emission at the measurement distance, in dB $\mu$ V/m
$d_{\text{Meas}}$	is the measurement distance, in m
$d_{\text{SpecLimit}}$	is the distance specified by the limit, in m

So the extrapolation factor of 1m is  $20 * \log(1/3) = -9.5$  dB, for 18-40GHz range, the limit of 1m distance was added by 9.5dB from limit of 3m to compared with the result measurement at 1m distance.

### Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Over Limit/Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

$$\begin{aligned} \text{Over Limit/Margin} &= \text{Level / Corrected Amplitude} - \text{Limit} \\ \text{Level / Corrected Amplitude} &= \text{Read Level} + \text{Factor} \end{aligned}$$

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	24~25.3℃
<b>Relative Humidity:</b>	51~56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Jimi Zheng on 2023-05-17 for below 1GHz, and Jimi Zheng on 2023-05-12 for above 1GHz.*

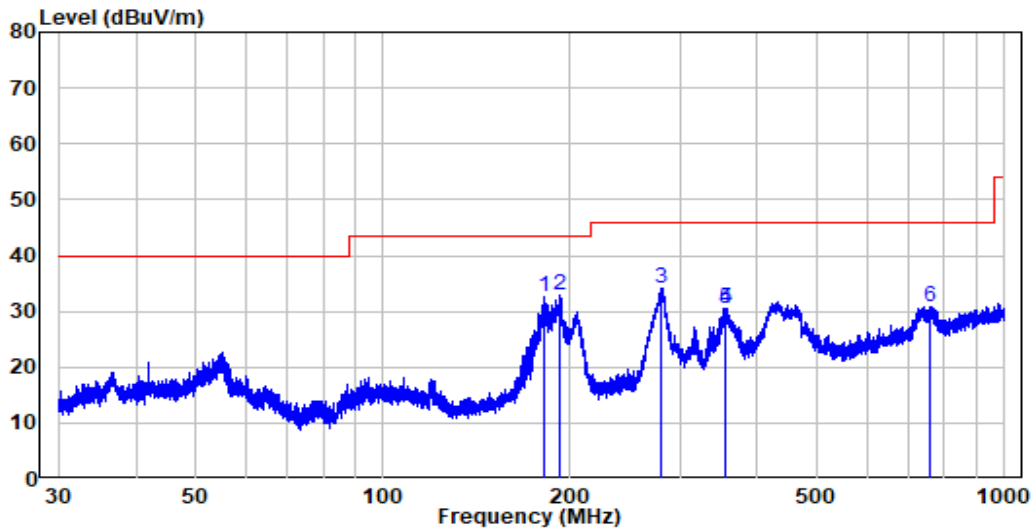
*EUT operation mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axes of orientation was recorded)*

**30 MHz – 1 GHz:** (worst case is 802.11a, 5825MHz)

Note: When the test result of Peak was more than 6dB below the limit of QP, just the Peak value was recorded.

Powered by POE:

Horizontal

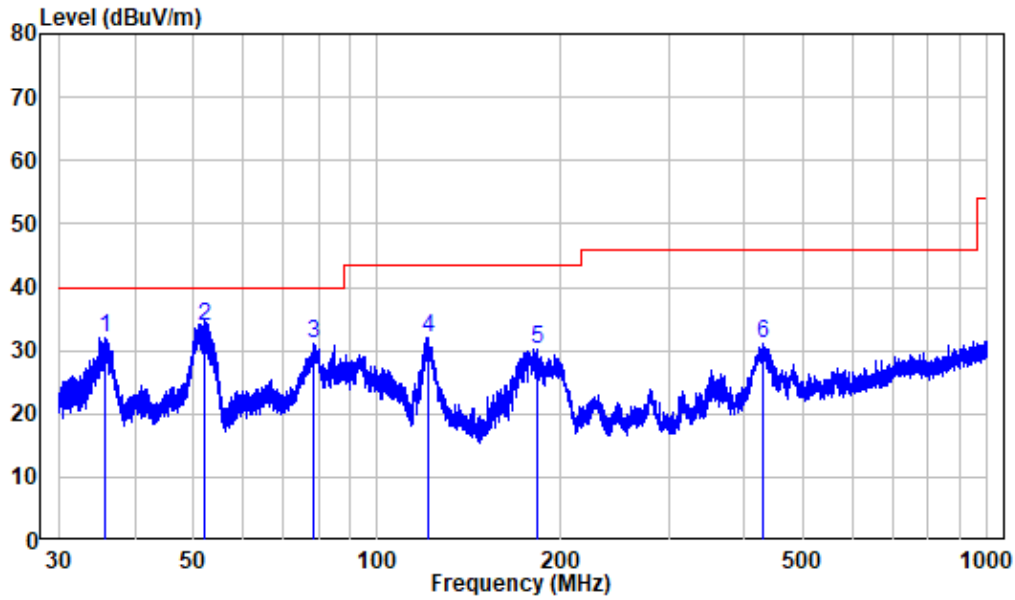


Site : chamber  
 Condition: 3m HORIZONTAL  
 Job No. : RA230424-21726E-RF  
 Test Mode: 5G WIFI Transmitting  
 Note : POE

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	181.761	-12.56	45.12	32.56	43.50	-10.94	Peak
2	192.503	-11.27	44.03	32.76	43.50	-10.74	Peak
3	280.884	-9.56	43.65	34.09	46.00	-11.91	Peak
4	355.116	-7.49	38.08	30.59	46.00	-15.41	Peak
5	355.116	-7.49	38.08	30.59	46.00	-15.41	Peak
6	757.709	-0.65	31.58	30.93	46.00	-15.07	Peak



Vertical

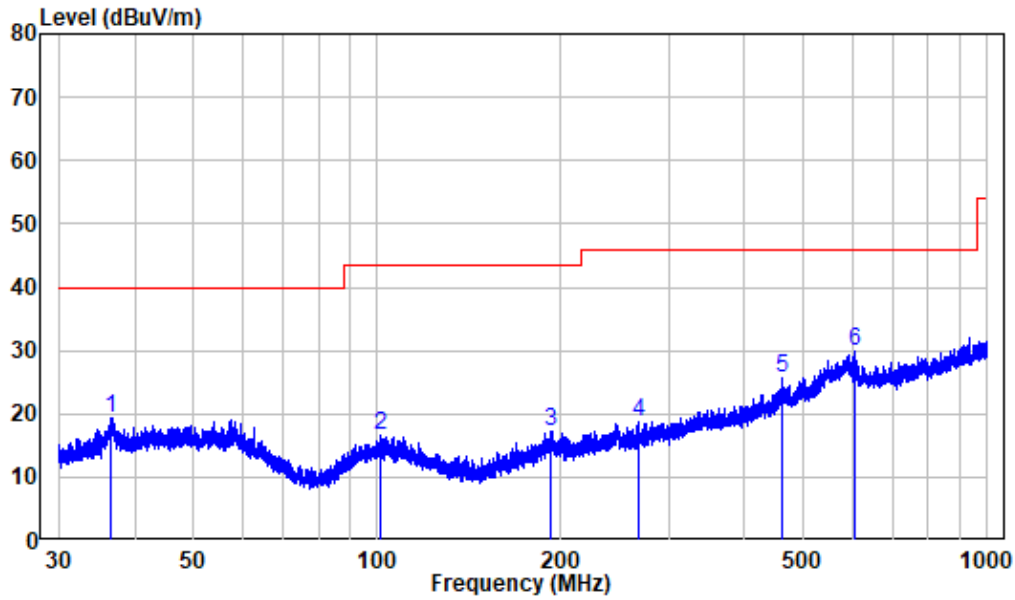


Site : chamber  
 Condition: 3m VERTICAL  
 Job No. : RA230424-21726E-RF  
 Test Mode: 5G WIFI Transmitting  
 Note : POE

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	35.765	-11.28	43.41	32.13	40.00	-7.87	Peak
2	52.116	-9.99	43.79	33.80	40.00	-6.20	QP
3	78.379	-16.64	47.61	30.97	40.00	-9.03	Peak
4	121.176	-13.77	45.83	32.06	43.50	-11.44	Peak
5	183.281	-12.38	42.70	30.32	43.50	-13.18	Peak
6	428.395	-5.81	36.93	31.12	46.00	-14.88	Peak

Powered by Battery:

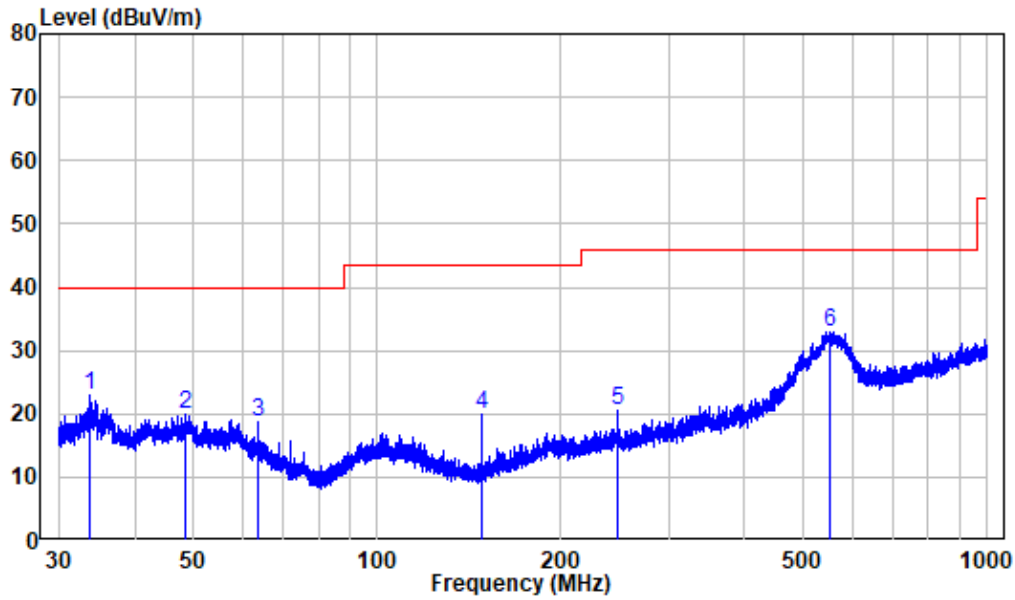
Horizontal



Site : chamber  
 Condition: 3m HORIZONTAL  
 Job No. : RA230424-21726E-RF  
 Test Mode: 5G WIFI Transmitting  
 Note : DC 12V

	Freq	Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	36.573	-11.09	30.42	19.33	40.00	-20.67	Peak
2	101.422	-11.64	28.11	16.47	43.50	-27.03	Peak
3	193.010	-11.28	28.53	17.25	43.50	-26.25	Peak
4	268.721	-10.29	29.07	18.78	46.00	-27.22	Peak
5	459.316	-5.42	30.99	25.57	46.00	-20.43	Peak
6	605.129	-2.30	32.27	29.97	46.00	-16.03	Peak

Vertical



Site : chamber  
 Condition: 3m VERTICAL  
 Job No. : RA230424-21726E-RF  
 Test Mode: 5G WIFI Transmitting  
 Note : DC 12V

	Freq	Factor	Read Level	Level	Limit	Over	Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB		
1	33.799	-11.88	34.78	22.90	40.00	-17.10	Peak	
2	48.544	-9.97	29.75	19.78	40.00	-20.22	Peak	
3	63.675	-12.04	30.78	18.74	40.00	-21.26	Peak	
4	148.311	-15.36	35.31	19.95	43.50	-23.55	Peak	
5	247.356	-10.65	31.28	20.63	46.00	-25.37	Peak	
6	553.126	-4.09	37.13	33.04	46.00	-12.96	Peak	

**Above 1GHz: (worst case POE)****5150-5250 MHz:**

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
	Reading (dB $\mu$ V)	PK/Ave.		Height (m)	Polar (H/V)				
802.11a									
5180MHz									
4500	65.93	PK	293	1.3	H	-6.44	59.49	74	-14.51
4500	54.22	AV	293	1.3	H	-6.44	47.78	54	-6.22
4500	65.81	PK	284	2.4	V	-6.44	59.37	74	-14.63
4500	54.10	AV	284	2.4	V	-6.44	47.66	54	-6.34
5150	68.87	PK	258	1.5	H	-4.91	63.96	74	-10.04
5150	55.38	AV	258	1.5	H	-4.91	50.47	54	-3.53
5150	68.76	PK	203	1.4	V	-4.91	63.85	74	-10.15
5150	55.27	AV	203	1.4	V	-4.91	50.36	54	-3.64
10360	55.31	PK	200	1.7	H	5.36	60.67	68.2	-7.53
10360	55.08	PK	289	1.7	V	5.36	60.44	68.2	-7.76
5200MHz									
10400	54.75	PK	78	1.5	H	5.66	60.41	68.2	-7.79
10400	54.53	PK	275	1.5	V	5.66	60.19	68.2	-8.01
5240MHz									
5350	66.37	PK	109	2.1	H	-3.89	62.48	74	-11.52
5350	51.71	AV	109	2.1	H	-3.89	47.82	54	-6.18
5350	66.26	PK	317	1.6	V	-3.89	62.37	74	-11.63
5350	51.60	AV	317	1.6	V	-3.89	47.71	54	-6.29
5460	63.57	PK	117	2.1	H	-3.24	60.33	74	-13.67
5460	50.24	AV	117	2.1	H	-3.24	47.00	54	-7.00
5460	63.46	PK	150	2.1	V	-3.24	60.22	74	-13.78
5460	50.13	AV	150	2.1	V	-3.24	46.89	54	-7.11
10480	54.81	PK	82	2.2	H	5.52	60.33	68.2	-7.87
10480	54.59	PK	48	2.2	V	5.52	60.11	68.2	-8.09

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11n20									
5180MHz									
4500	66.14	PK	175	1.5	H	-6.44	59.70	74	-14.30
4500	53.47	AV	175	1.5	H	-6.44	47.03	54	-6.97
4500	66.03	PK	320	2.5	V	-6.44	59.59	74	-14.41
4500	54.35	AV	320	2.5	V	-6.44	47.91	54	-6.09
5150	69.20	PK	272	1.2	H	-4.91	64.29	74	-9.71
5150	55.63	AV	272	1.2	H	-4.91	50.72	54	-3.28
5150	69.08	PK	105	1.3	V	-4.91	64.17	74	-9.83
5150	55.50	AV	105	1.3	V	-4.91	50.59	54	-3.41
10360	55.53	PK	356	2.3	H	5.36	60.89	68.2	-7.31
10360	55.30	PK	238	2.3	V	5.36	60.66	68.2	-7.54
5200MHz									
10400	54.92	PK	134	1.4	H	5.66	60.58	68.2	-7.62
10400	54.71	PK	144	1.4	V	5.66	60.37	68.2	-7.83
5240MHz									
5350	66.60	PK	347	2.1	H	-3.89	62.71	74	-11.29
5350	52.02	AV	347	2.1	H	-3.89	48.13	54	-5.87
5350	66.48	PK	252	1.3	V	-3.89	62.59	74	-11.41
5350	51.91	AV	252	1.3	V	-3.89	48.02	54	-5.98
5460	63.76	PK	294	1.5	H	-3.24	60.52	74	-13.48
5460	50.38	AV	294	1.5	H	-3.24	47.14	54	-6.86
5460	63.65	PK	146	2.1	V	-3.24	60.41	74	-13.59
5460	50.26	AV	146	2.1	V	-3.24	47.02	54	-6.98
10480	55.02	PK	195	2.5	H	5.52	60.54	68.2	-7.66
10480	54.81	PK	46	2.5	V	5.52	60.33	68.2	-7.87

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11n40									
5190MHz									
4500	66.43	PK	171	2.3	H	-6.44	59.99	74	-14.01
4500	54.58	AV	171	2.3	H	-6.44	48.14	54	-5.86
4500	66.32	PK	178	1.5	V	-6.44	59.88	74	-14.12
4500	54.47	AV	178	1.5	V	-6.44	48.03	54	-5.97
5150	69.53	PK	167	2.2	H	-4.91	64.62	74	-9.38
5150	55.78	AV	167	2.2	H	-4.91	50.87	54	-3.13
5150	69.42	PK	222	1.8	V	-4.91	64.51	74	-9.49
5150	55.67	AV	222	1.8	V	-4.91	50.76	54	-3.24
10380	54.97	PK	242	1.7	H	5.51	60.48	68.2	-7.72
10380	54.76	PK	35	1.7	V	5.51	60.27	68.2	-7.93
5230MHz									
5350	66.68	PK	265	1.1	H	-3.89	62.79	74	-11.21
5350	52.42	AV	265	1.1	H	-3.89	48.53	54	-5.47
5350	66.57	PK	80	1.1	V	-3.89	62.68	74	-11.32
5350	52.30	AV	80	1.1	V	-3.89	48.41	54	-5.59
5460	63.58	PK	296	1.8	H	-3.24	60.34	74	-13.66
5460	50.75	AV	296	1.8	H	-3.24	47.51	54	-6.49
5460	63.47	PK	344	2.3	V	-3.24	60.23	74	-13.77
5460	50.64	AV	344	2.3	V	-3.24	47.40	54	-6.60
10460	54.71	PK	125	1.7	H	5.51	60.22	68.2	-7.98
10460	54.52	PK	113	1.7	V	5.51	60.03	68.2	-8.17

**5725-5850 MHz:**

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
<b>802.11A</b>									
5745MHz									
5650	65.76	PK	12	1.3	H	-3.64	62.12	68.2	-6.08
5700	66.23	PK	263	1.9	H	-2.30	63.93	105.2	-41.27
5720	68.74	PK	52	1.5	H	-2.64	66.10	110.8	-44.70
5725	72.47	PK	1	1.1	H	-2.73	69.74	122.2	-52.46
5650	65.60	PK	238	2.3	V	-3.64	61.96	68.2	-6.24
5700	65.73	PK	110	1.1	V	-2.30	63.43	105.2	-41.77
5720	68.23	PK	152	1.8	V	-2.64	65.59	110.8	-45.21
5725	71.65	PK	170	2.2	V	-2.73	68.92	122.2	-53.28
11490	53.76	PK	354	1.4	H	7.00	60.76	74	-13.24
11490	40.58	AV	323	1.4	H	7.00	47.58	54	-6.42
11490	53.54	PK	327	1.4	V	7.00	60.54	74	-13.46
11490	40.37	AV	129	1.4	V	7.00	47.37	54	-6.63
5785MHz									
11570	54.22	PK	159	1.8	H	6.60	60.82	74	-13.18
11570	41.08	AV	84	1.8	H	6.60	47.68	54	-6.32
11570	54.01	PK	268	1.2	V	6.60	60.61	74	-13.39
11570	40.87	AV	93	1.2	V	6.60	47.47	54	-6.53
5825MHz									
5850	69.05	PK	222	1	H	-1.37	67.68	122.2	-54.52
5855	67.70	PK	146	1.2	H	-1.25	66.45	110.8	-44.35
5875	66.41	PK	287	1.1	H	-0.75	65.66	105.2	-39.54
5925	63.96	PK	128	2.4	H	-0.46	63.50	68.2	-4.70
5850	68.33	PK	99	2.1	V	-1.37	66.96	122.2	-55.24
5855	67.12	PK	169	2.2	V	-1.25	65.87	110.8	-44.93
5875	65.87	PK	243	1.9	V	-0.75	65.12	105.2	-40.08
5925	63.84	PK	159	1.6	V	-0.46	63.38	68.2	-4.82
11650	54.77	PK	330	2.3	H	5.55	60.32	74	-13.68
11650	41.63	AV	178	2.3	H	5.55	47.18	54	-6.82
11650	54.56	PK	9	1.9	V	5.55	60.11	74	-13.89
11650	41.44	AV	329	1.9	V	5.55	46.99	54	-7.01

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
<b>802.11n20</b>									
5745MHz									
5650	65.94	PK	268	1.3	H	-3.64	62.30	68.2	-5.90
5700	67.09	PK	91	1.7	H	-2.30	64.79	105.2	-40.41
5720	69.67	PK	218	2	H	-2.64	67.03	110.8	-43.77
5725	73.87	PK	213	1.8	H	-2.73	71.14	122.2	-51.06
5650	65.81	PK	303	1.8	V	-3.64	62.17	68.2	-6.03
5700	66.58	PK	151	1.1	V	-2.30	64.28	105.2	-40.92
5720	68.93	PK	134	1.1	V	-2.64	66.29	110.8	-44.51
5725	72.33	PK	47	1.1	V	-2.73	69.60	122.2	-52.60
11490	53.83	PK	295	2.3	H	7.00	60.83	74	-13.17
11490	40.65	AV	341	2.3	H	7.00	47.65	54	-6.35
11490	53.62	PK	45	2.2	V	7.00	60.62	74	-13.38
11490	40.44	AV	272	2.2	V	7.00	47.44	54	-6.56
5785MHz									
11570	54.20	PK	68	2.2	H	6.60	60.80	74	-13.20
11570	41.11	AV	217	2.2	H	6.60	47.71	54	-6.29
11570	53.98	PK	341	1.4	V	6.60	60.58	74	-13.42
11570	40.89	AV	305	1.4	V	6.60	47.49	54	-6.51
5825MHz									
5850	69.87	PK	329	1.7	H	-1.37	68.50	122.2	-53.70
5855	68.58	PK	7	1.7	H	-1.25	67.33	110.8	-43.47
5875	67.11	PK	128	1.3	H	-0.75	66.36	105.2	-38.84
5925	64.15	PK	278	1.2	H	-0.46	63.69	68.2	-4.51
5850	68.63	PK	187	1.3	V	-1.37	67.26	122.2	-54.94
5855	67.74	PK	17	1.5	V	-1.25	66.49	110.8	-44.31
5875	66.23	PK	252	1.1	V	-0.75	65.48	105.2	-39.72
5925	64.01	PK	302	1.9	V	-0.46	63.55	68.2	-4.65
11650	54.73	PK	356	2.3	H	5.55	60.28	74	-13.72
11650	41.60	AV	154	2.3	H	5.55	47.15	54	-6.85
11650	54.52	PK	78	1.1	V	5.55	60.07	74	-13.93
11650	41.38	AV	263	1.1	V	5.55	46.93	54	-7.07



Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
<b>802.11n 40</b>									
5755MHz									
5650	66.16	PK	281	2.2	H	-3.64	62.52	68.2	-5.68
5700	68.00	PK	77	1.3	H	-2.30	65.70	105.2	-39.50
5720	72.01	PK	237	1.4	H	-2.64	69.37	110.8	-41.43
5725	76.77	PK	153	1.8	H	-2.73	74.04	122.2	-48.16
5650	66.03	PK	334	2	V	-3.64	62.39	68.2	-5.81
5700	67.53	PK	34	1.9	V	-2.30	65.23	105.2	-39.97
5720	71.22	PK	217	2.5	V	-2.64	68.58	110.8	-42.22
5725	75.40	PK	112	1.8	V	-2.73	72.67	122.2	-49.53
11510	53.86	PK	37	1.6	H	7.06	60.92	74	-13.08
11510	41.21	AV	40	1.6	H	7.06	48.27	54	-5.73
11510	53.67	PK	29	1.5	V	7.06	60.73	74	-13.27
11510	41.00	AV	85	1.5	V	7.06	48.06	54	-5.94
5795MHz									
5850	72.05	PK	276	2.2	H	-1.37	70.68	122.2	-51.52
5855	69.74	PK	149	1.8	H	-1.25	68.49	110.8	-42.31
5875	68.20	PK	320	1.3	H	-0.75	67.45	105.2	-37.75
5925	64.33	PK	122	1.1	H	-0.46	63.87	68.2	-4.33
5850	70.43	PK	151	2.2	V	-1.37	69.06	122.2	-53.14
5855	68.90	PK	346	1.5	V	-1.25	67.65	110.8	-43.15
5875	67.44	PK	41	1.7	V	-0.75	66.69	105.2	-38.51
5925	64.20	PK	351	2.4	V	-0.46	63.74	68.2	-4.46
11590	54.45	PK	163	1.1	H	6.43	60.88	74	-13.12
11590	41.78	AV	222	1.1	H	6.43	48.21	54	-5.79
11590	54.23	PK	275	2.3	V	6.43	60.66	74	-13.34
11590	41.57	AV	4	2.3	V	6.43	48.00	54	-6.00

**Note:**

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

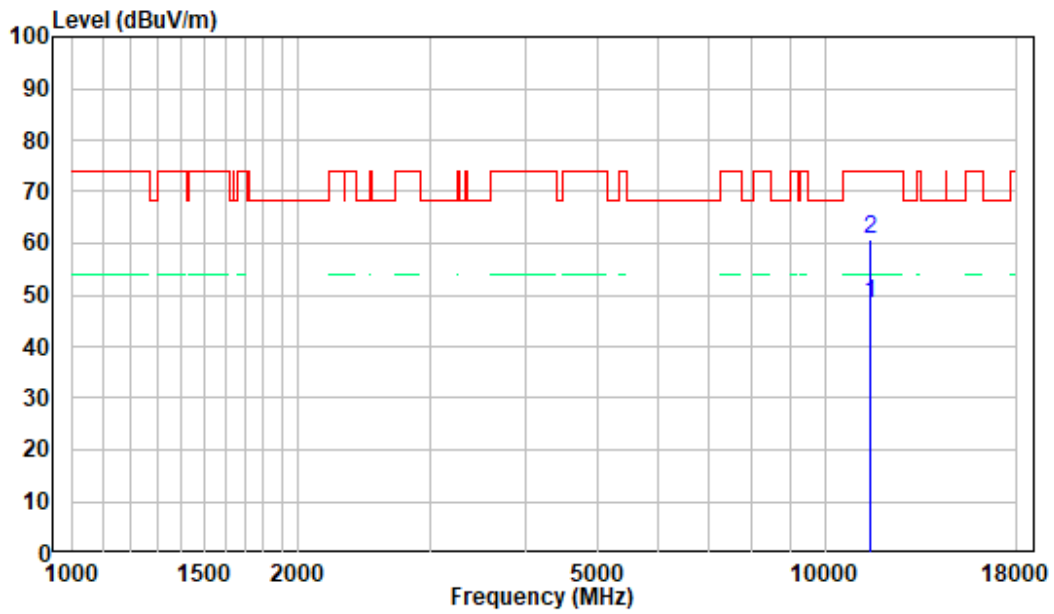
Corrected Amplitude = Corrected Factor + Reading

Margin = Corrected. Amplitude - Limit

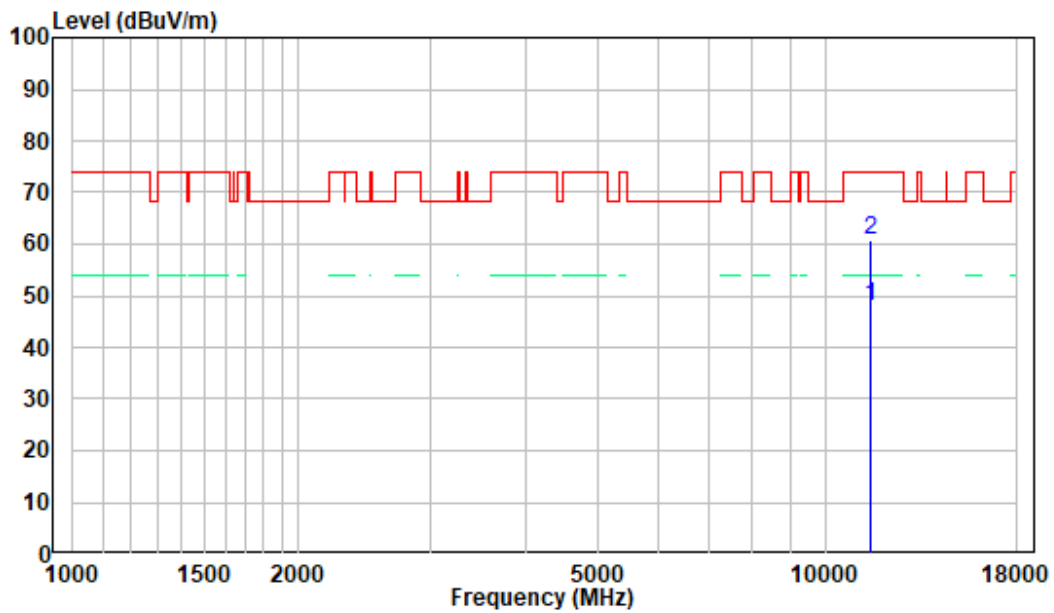
The other spurious emission which is in the noise floor level was not recorded.

1 GHz - 18 GHz: (Pre-Scan plots)

802.11 n40, 5755MHz  
Horizontal

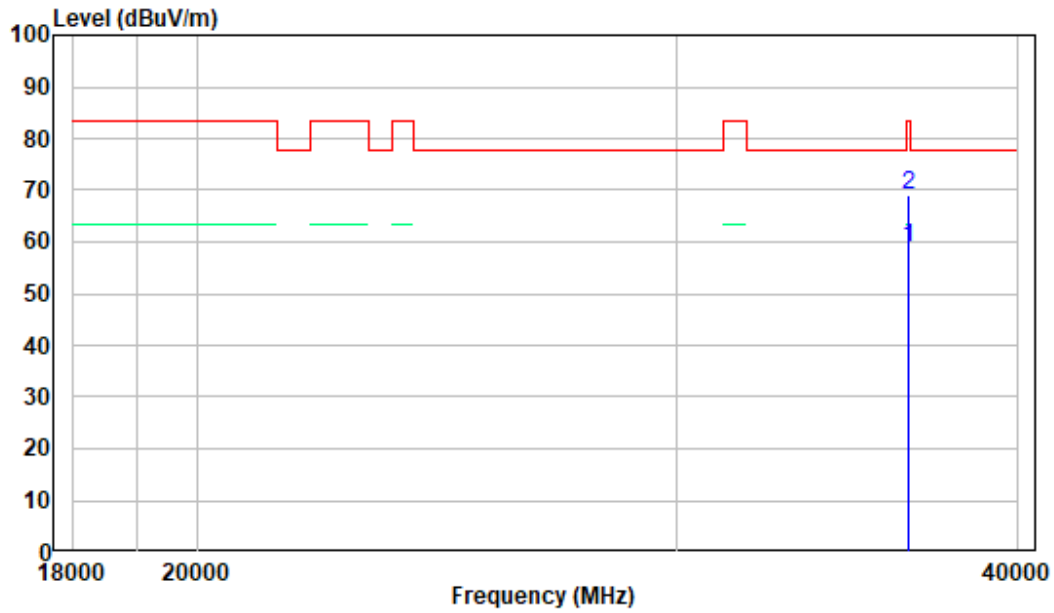


Vertical

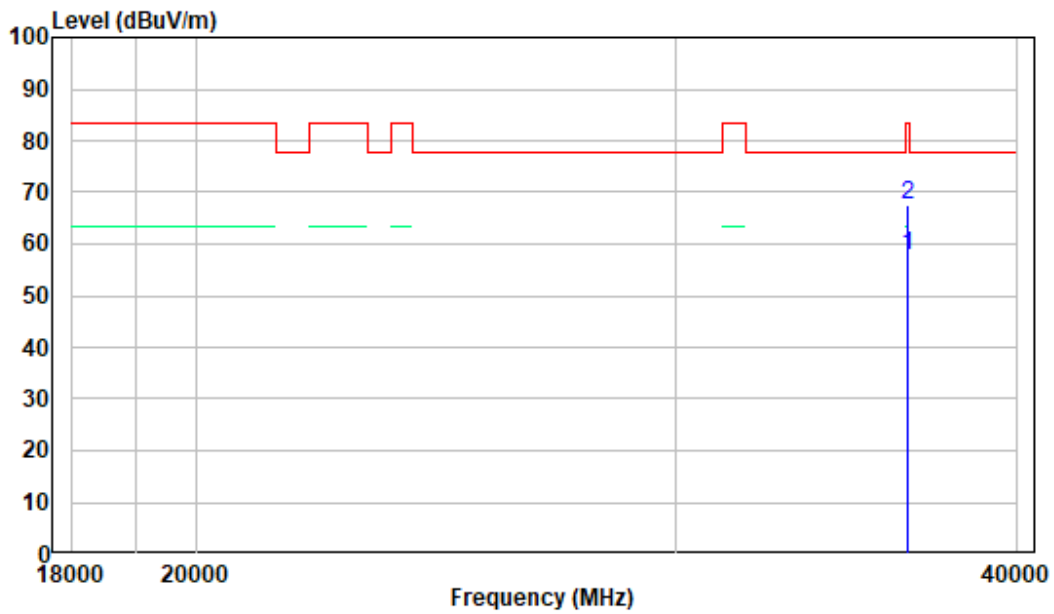


18-40GHz: (Pre-Scan plots)

802.11 n40, 5755MHz  
Horizontal



Vertical



## FCC §15.407(a),(e) – 26 dB & 6dB EMISSION BANDWIDTH

### Applicable Standard

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### Test Procedure

According to KDB789033 D02 section II.C and section II.D

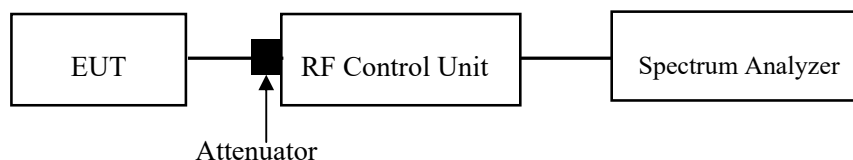
#### 1. Emission Bandwidth (EBW)

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

#### 2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



**Test Data****Environmental Conditions**

<b>Temperature:</b>	23.3 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Jacob Huang on 2023-05-13.*

*EUT operation mode: Transmitting*

**Test Result: Pass**

*Please refer to the Appendix.*

## FCC §15.407(a) – CONDUCTED TRANSMITTER OUTPUT POWER

### Applicable Standard

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

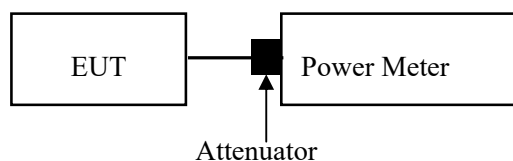
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

### Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 should be applied

- 1: Place the EUT on a bench and set it in transmitting mode.
- 2: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.



**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	23.3 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Jacob Huang on 2023-05-13.*

*EUT operation mode: Transmitting*

**Test Result: Pass**

*Please refer to the Appendix.*

## FCC §15.407(a) - POWER SPECTRAL DENSITY

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

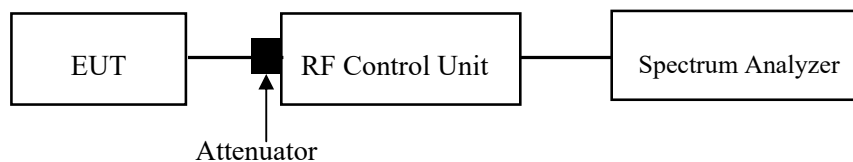
### Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 should be applied

- a) Set RBW=1MHz or 500 kHz. VBW>3 RBW
- b) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz RBW) to the measured result. Where as RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- c) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (<1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement. f) Detector=power averaging(1ms)
- d) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and ILF 5.d. since RBW=100 kHz is available on nearly all spectrum analyzers.

- h) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.





**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	26.8 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Jacob Huang on 2023-05-13.*

*EUT operation mode: Transmitting*

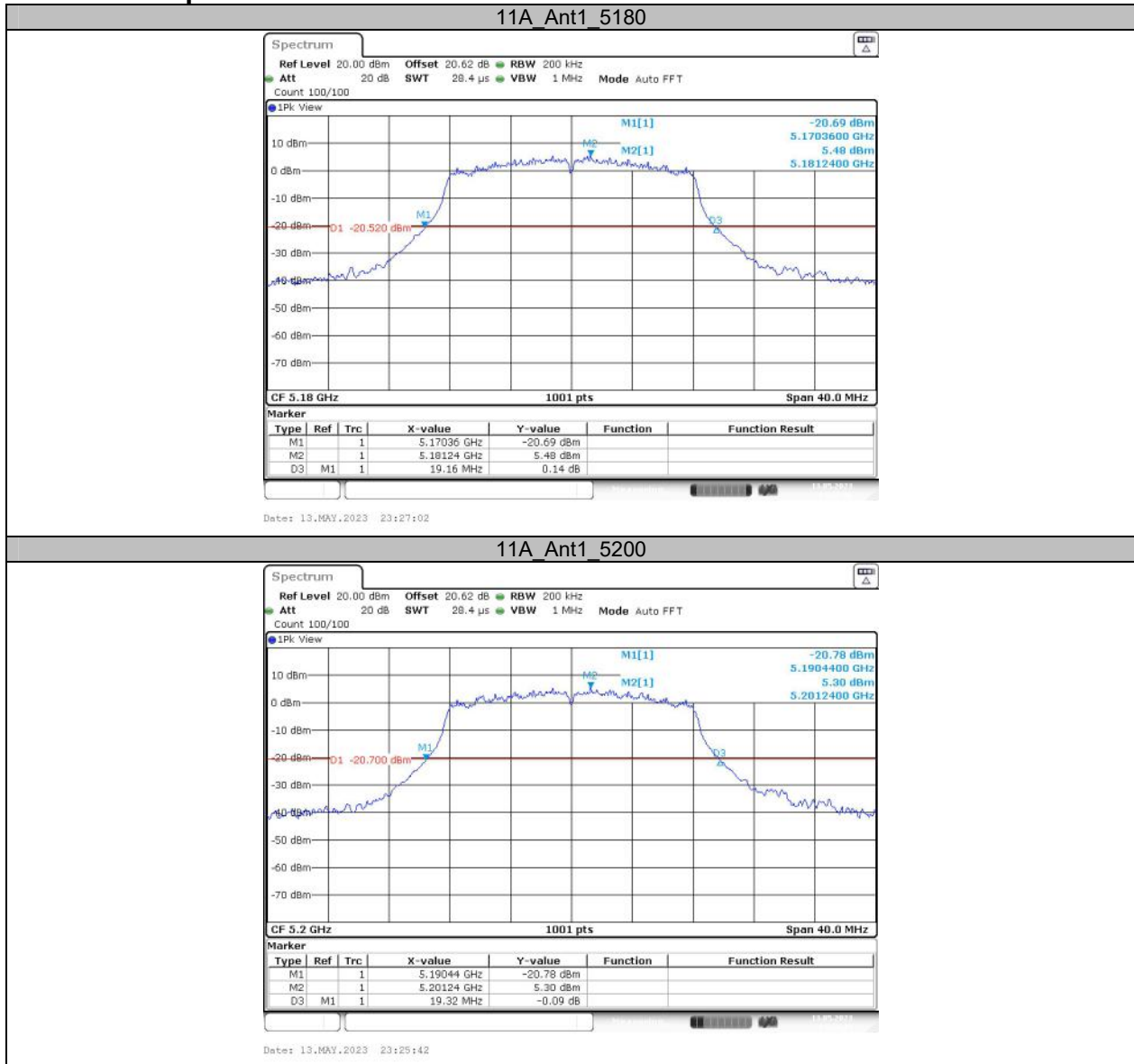
**Test Result: Pass**

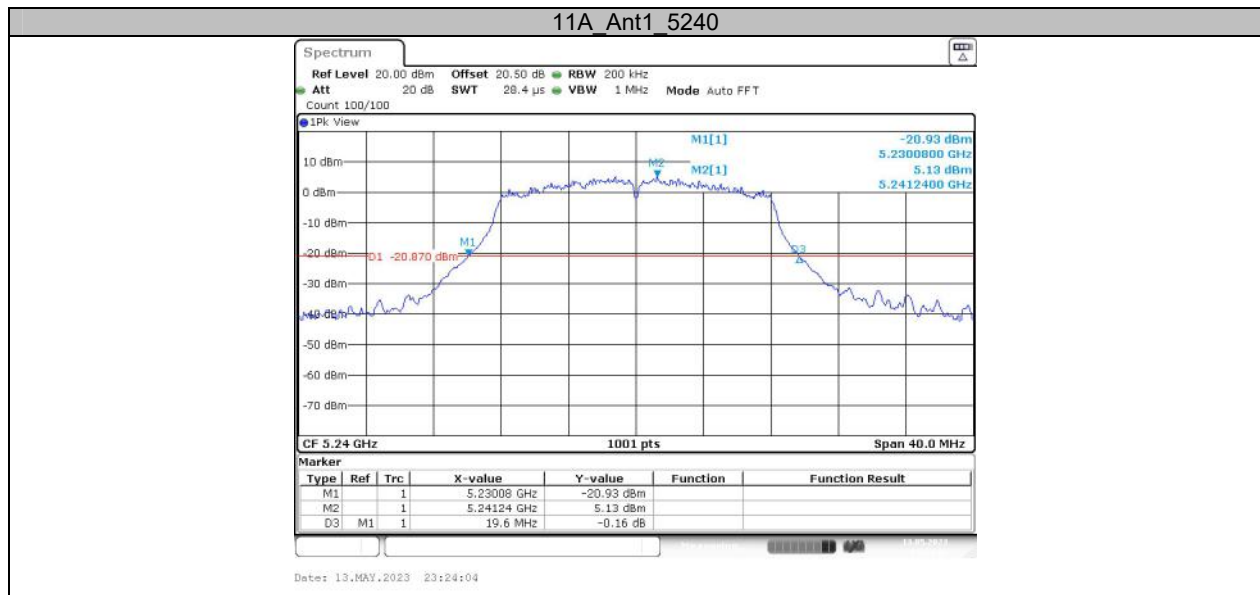
*Please refer to the Appendix.*

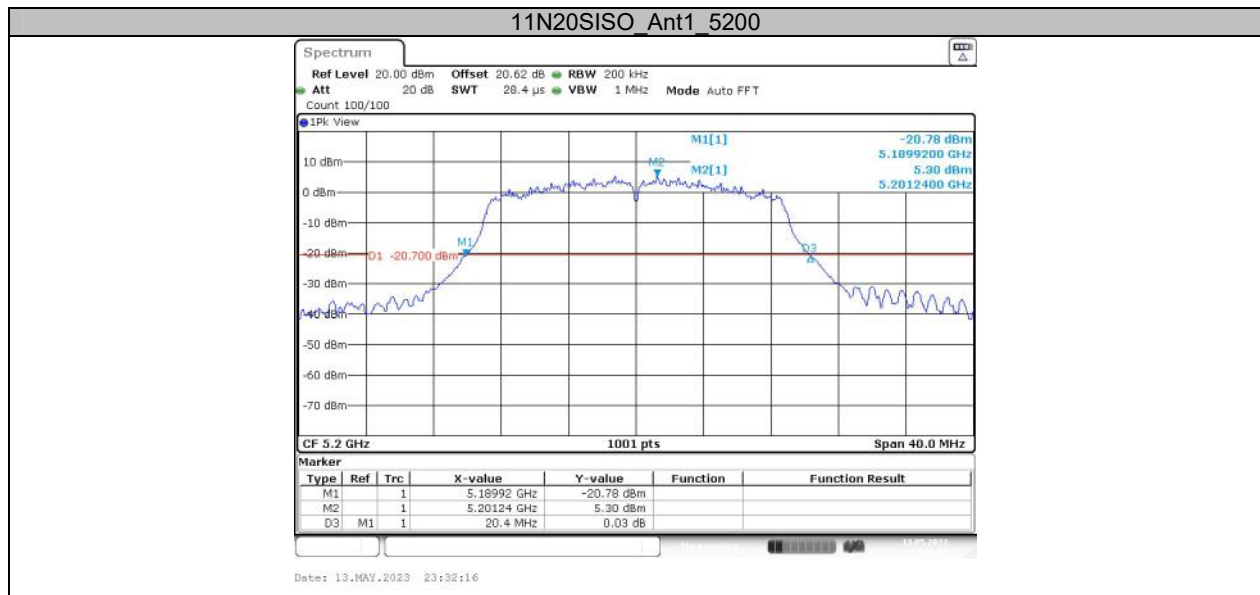
**APPENDIX****Appendix A1: Emission Bandwidth  
Test Result**

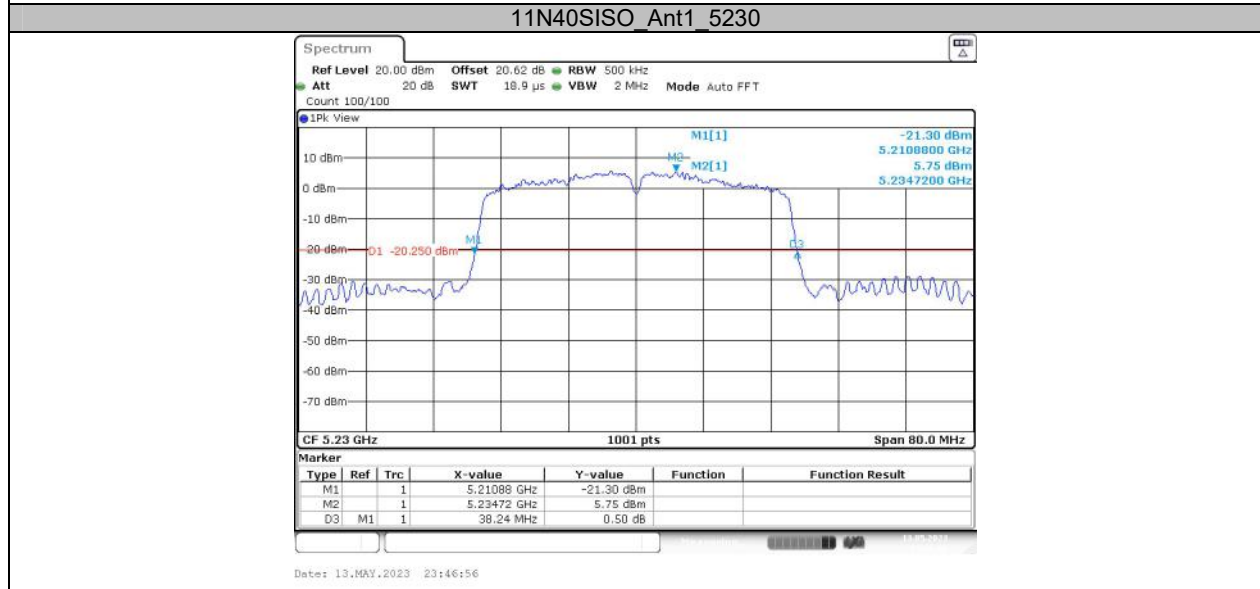
Test Mode	Antenna	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	19.16	5170.36	5189.52	---	---
		5200	19.32	5190.44	5209.76	---	---
		5240	19.60	5230.08	5249.68	---	---
11N20SISO	Ant1	5180	20.28	5170.04	5190.32	---	---
		5200	20.40	5189.92	5210.32	---	---
		5240	20.40	5229.76	5250.16	---	---
11N40SISO	Ant1	5190	38.48	5170.80	5209.28	---	---
		5230	38.24	5210.88	5249.12	---	---

### Test Graphs







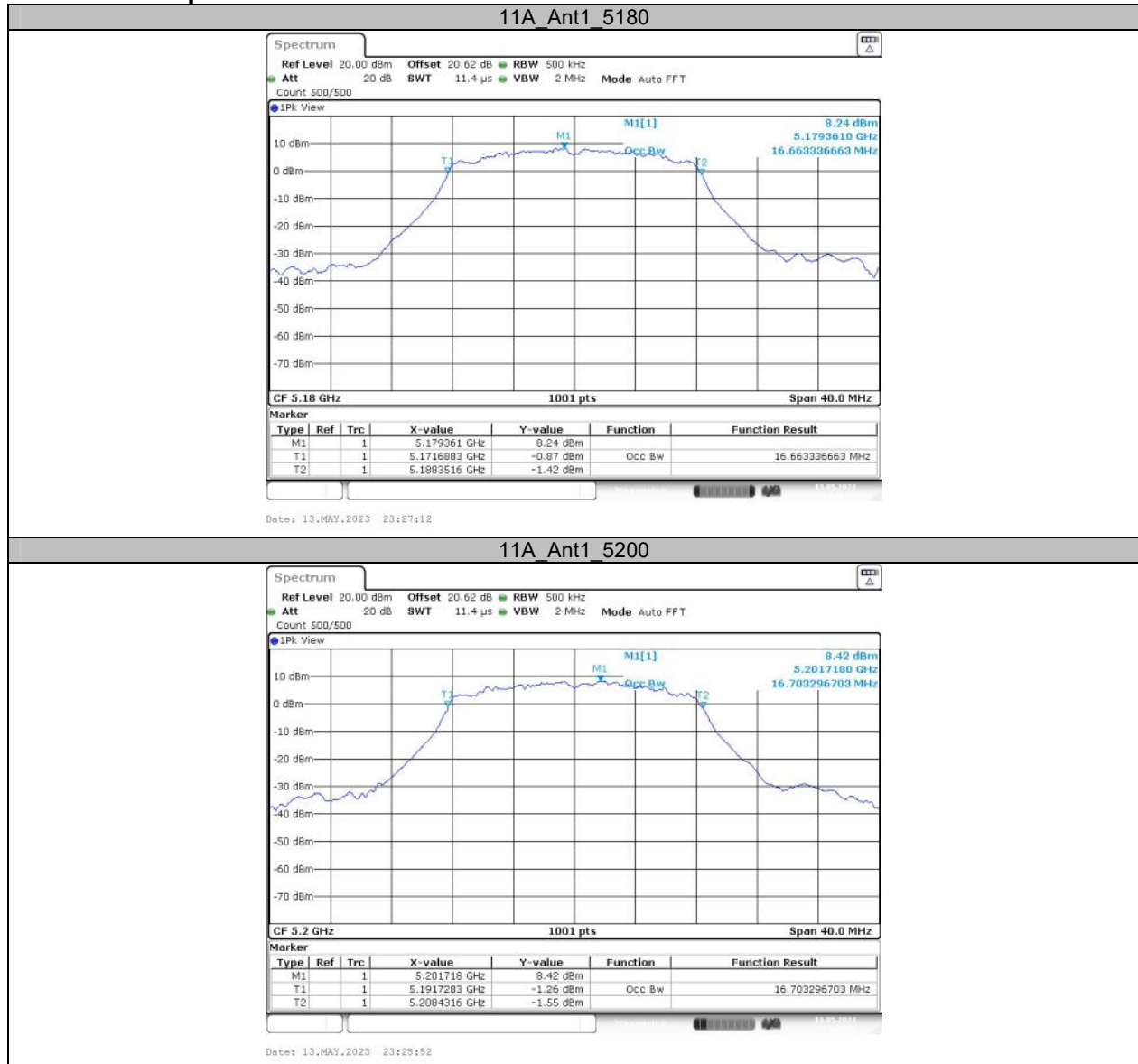


## Appendix A2: Occupied channel bandwidth Test Result

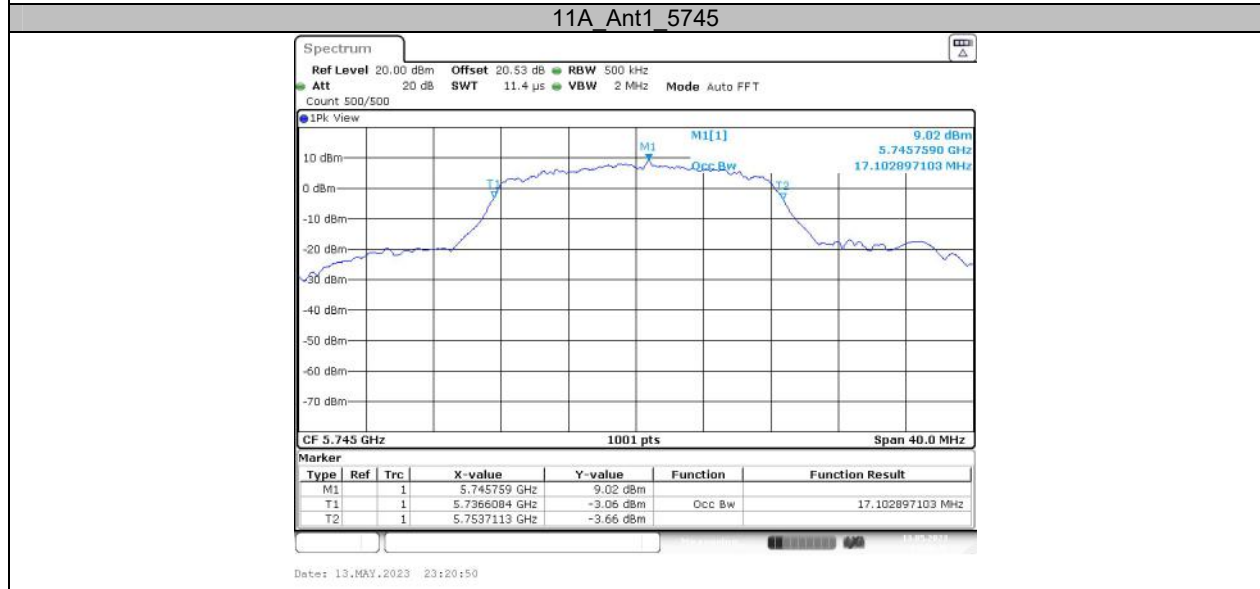
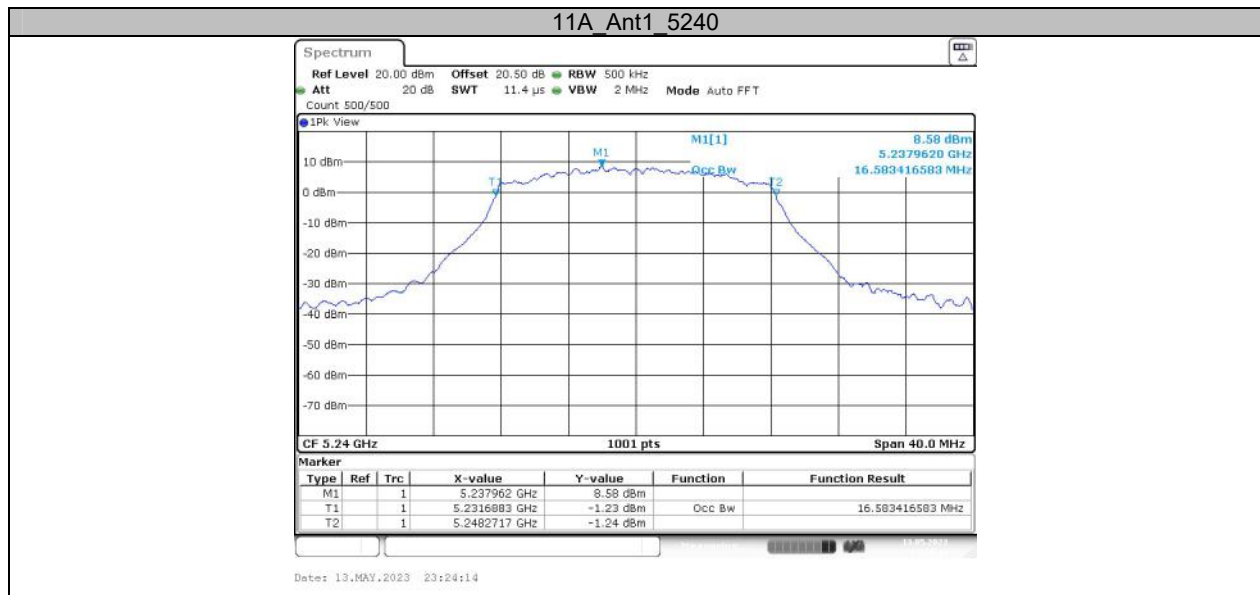
Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	16.663	5171.688	5188.352	---	---
		5200	16.703	5191.728	5208.432	---	---
		5240	16.583	5231.688	5248.272	---	---
		5745	17.103	5736.608	5753.711	---	---
		5785	17.143	5776.489	5793.631	---	---
		5825	17.782	5815.969	5833.751	---	---
11N20SISO	Ant1	5180	17.782	5171.129	5188.911	---	---
		5200	17.702	5191.169	5208.871	---	---
		5240	17.862	5231.009	5248.871	---	---
		5745	17.902	5736.129	5754.031	---	---
		5785	18.102	5775.969	5794.071	---	---
		5825	18.541	5816.009	5834.550	---	---
11N40SISO	Ant1	5190	35.245	5172.418	5207.662	---	---
		5230	35.325	5212.338	5247.662	---	---
		5755	35.644	5737.258	5772.902	---	---
		5795	35.644	5777.258	5812.902	---	---

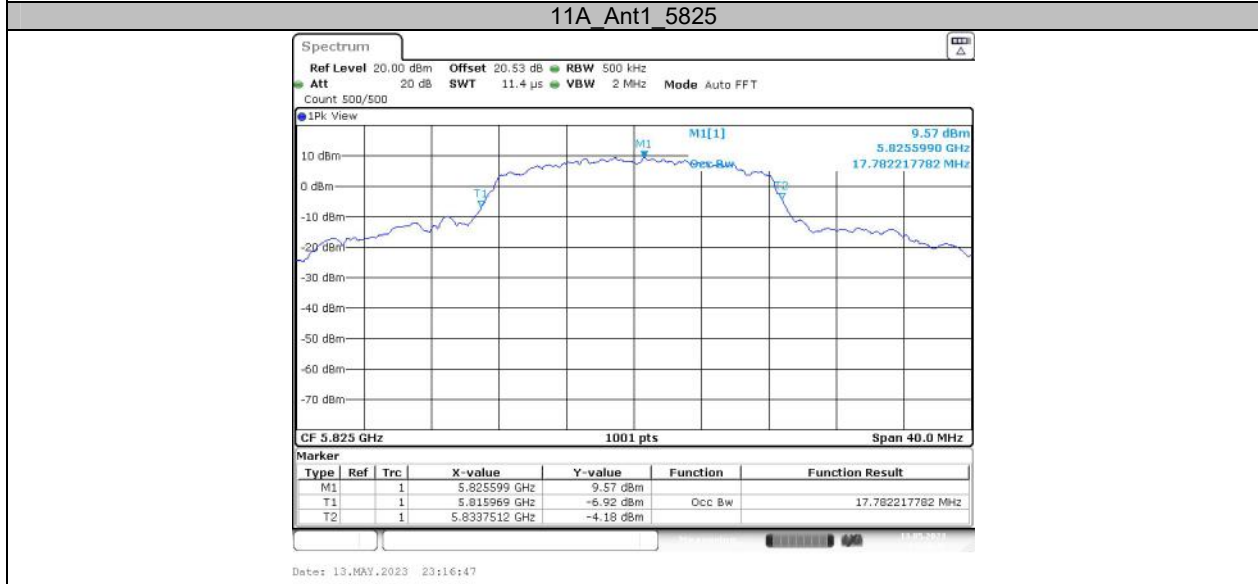
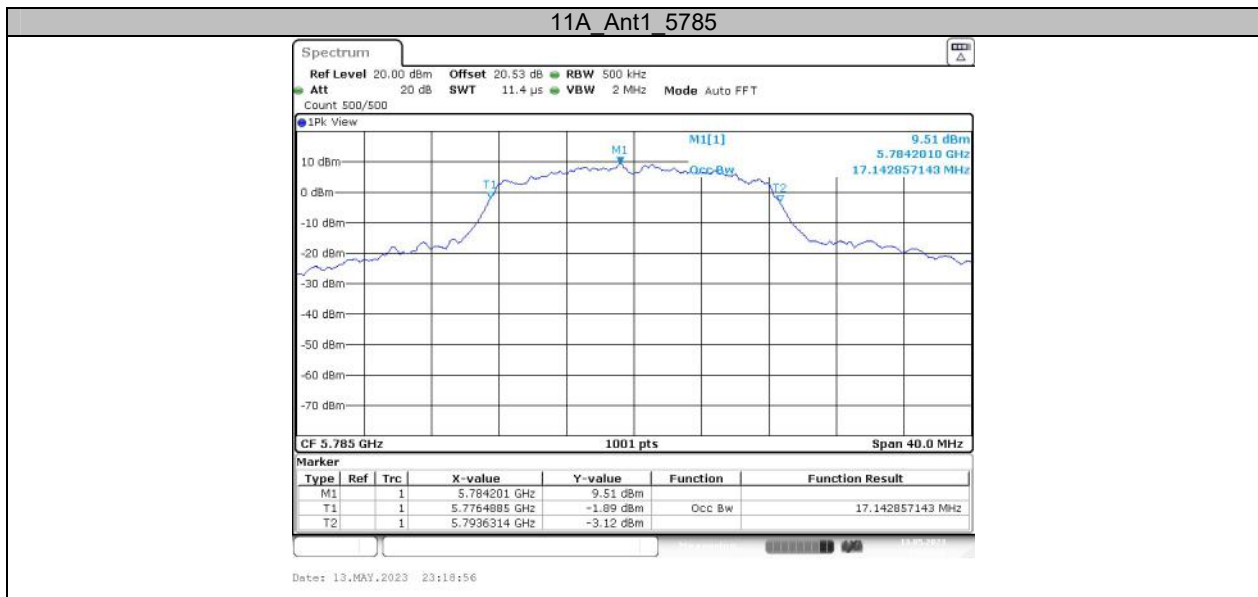
Note: the device not operate with any part of OBW fall within 5250-5350MHz and 5470-5725MHz range.

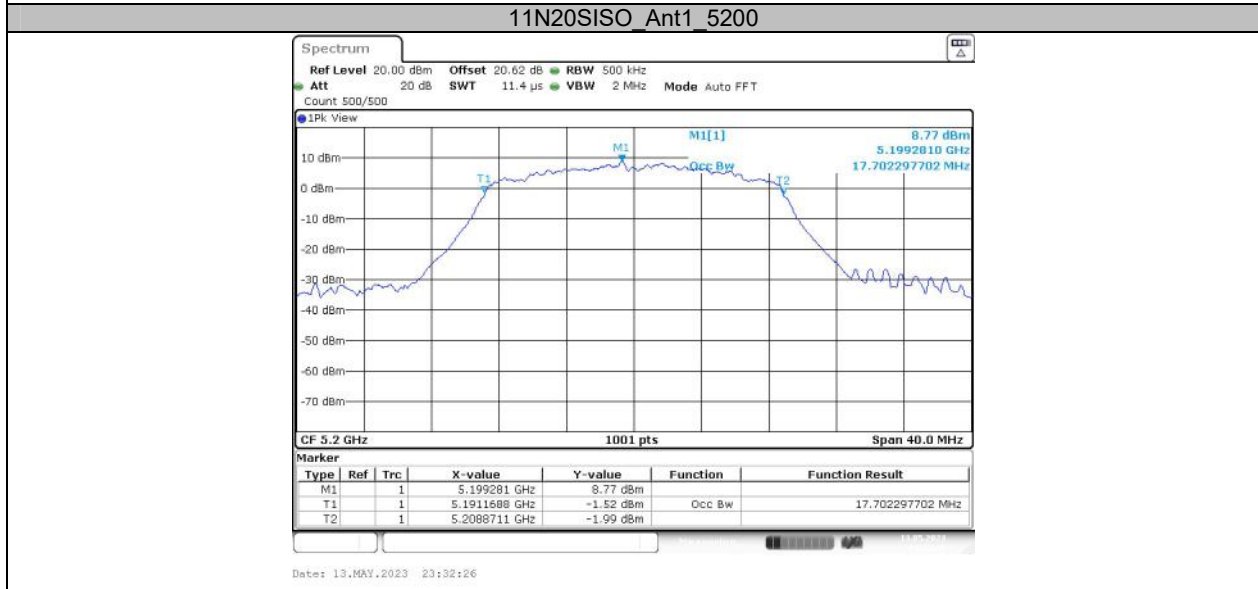
### Test Graphs



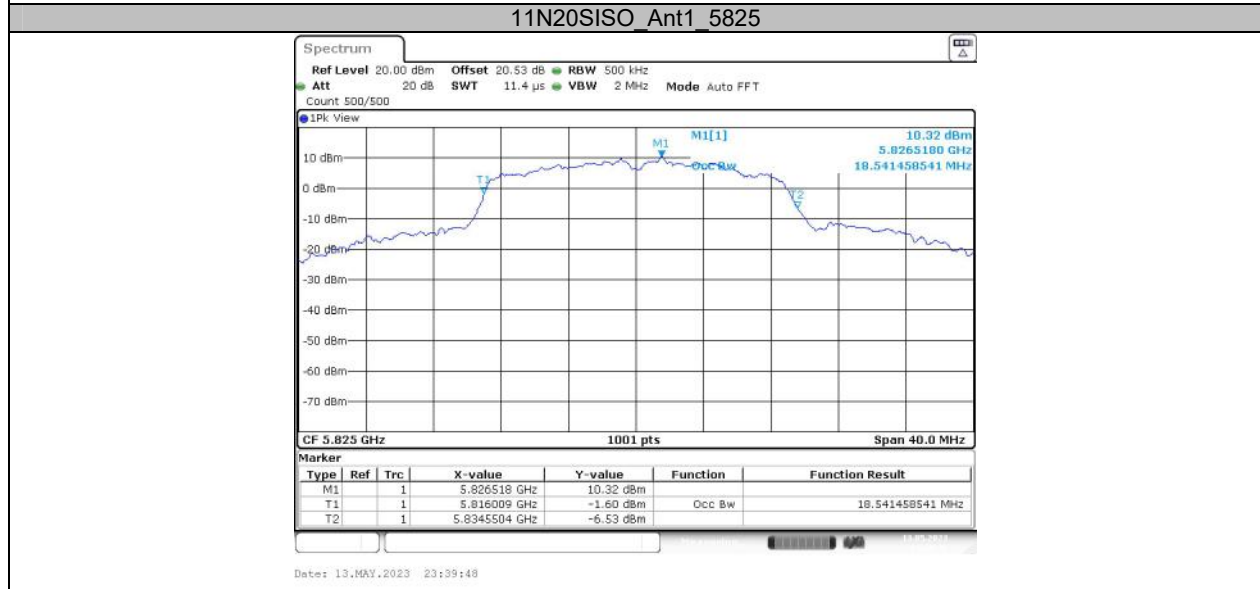












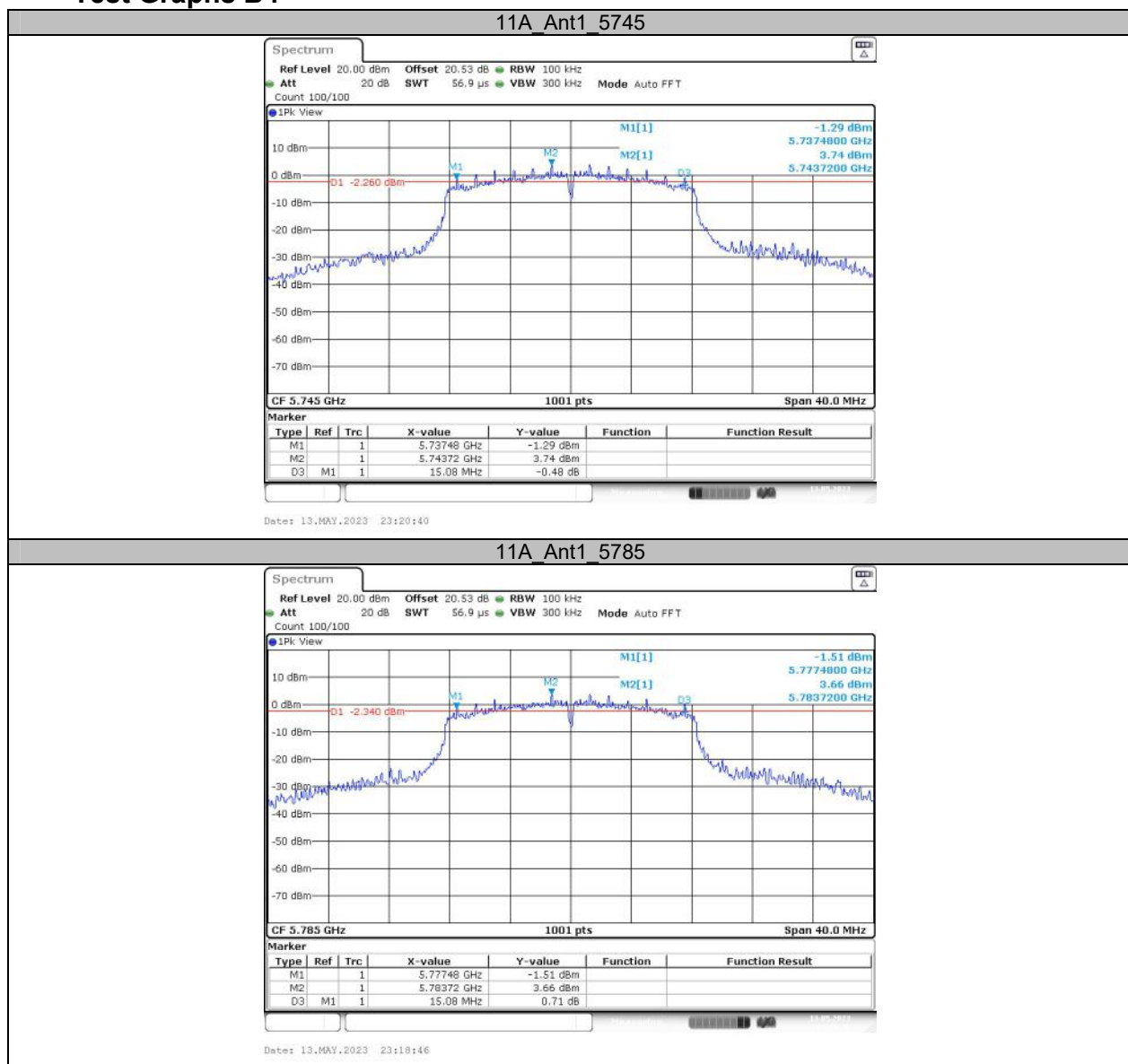




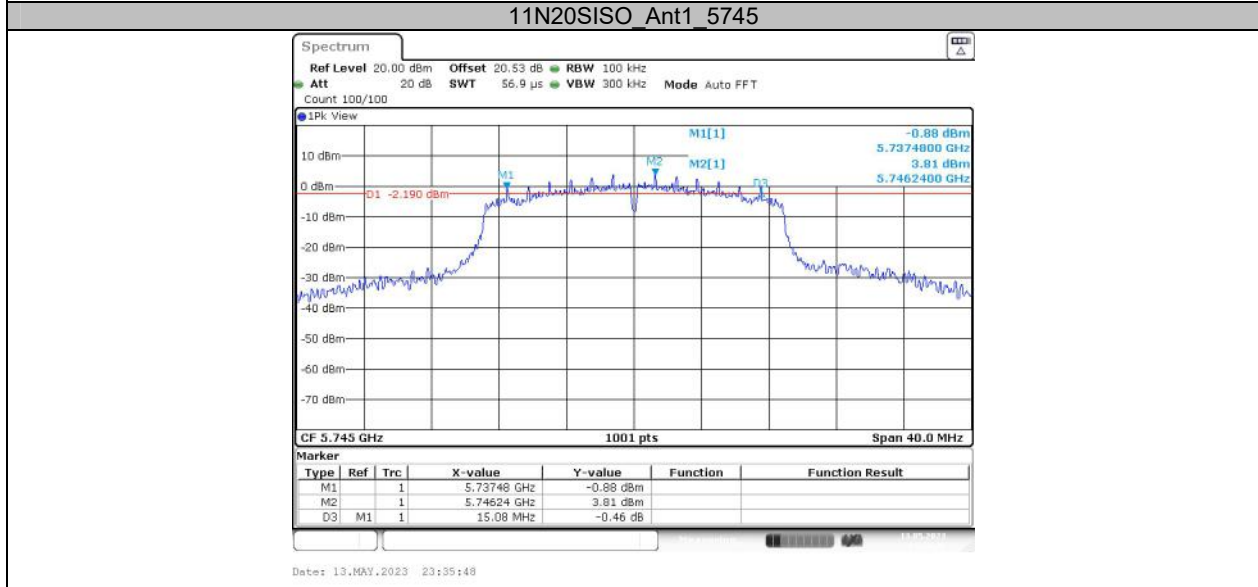
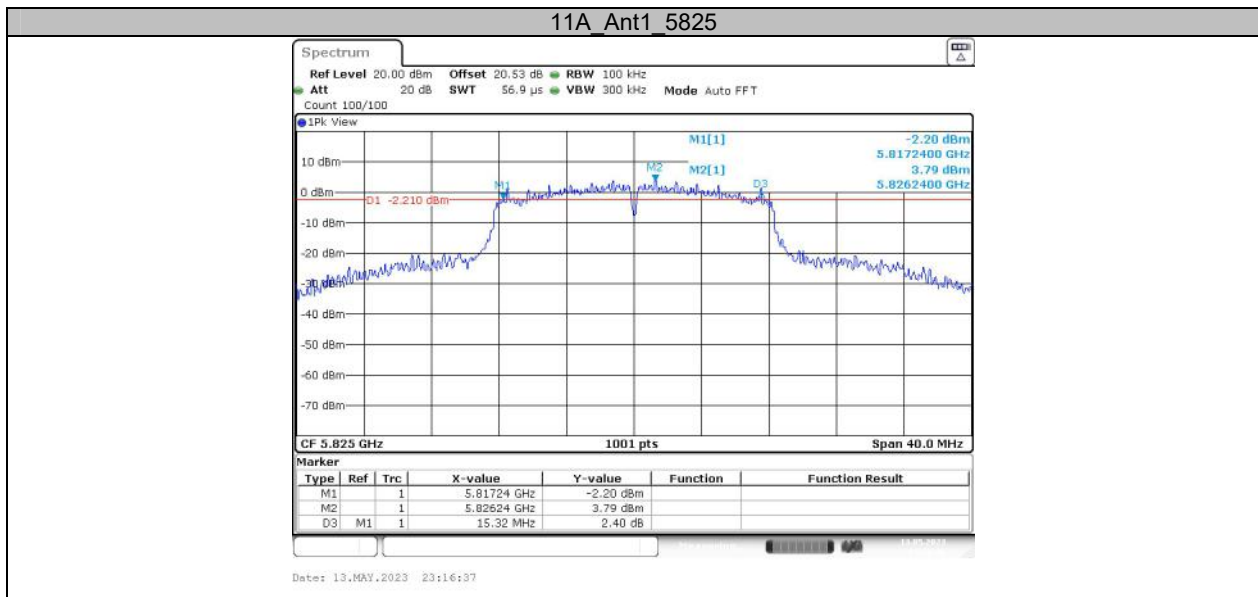
**Appendix A3: Min emission bandwidth  
Test Result B4**

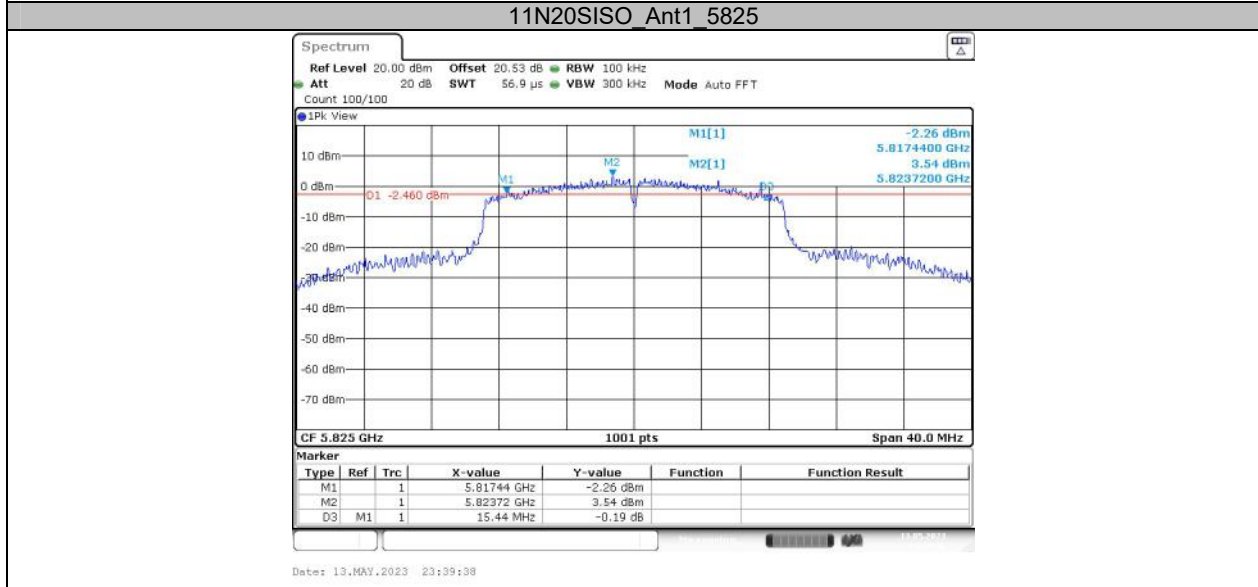
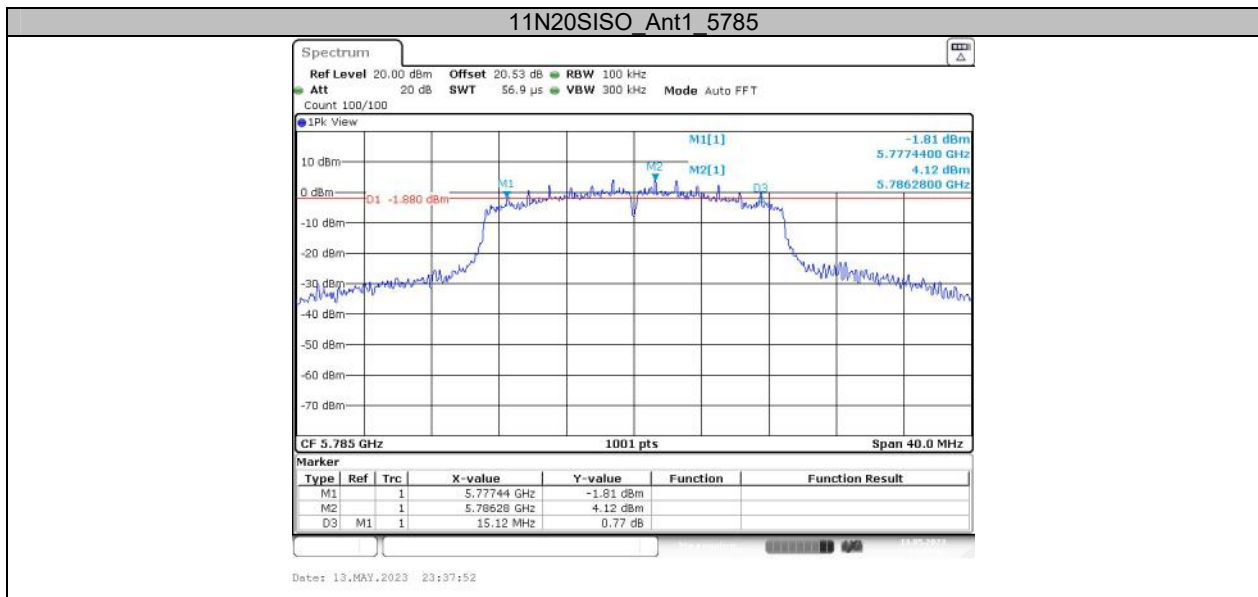
Test Mode	Antenna	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	15.08	5737.48	5752.56	0.5	PASS
		5785	15.08	5777.48	5792.56	0.5	PASS
		5825	15.32	5817.24	5832.56	0.5	PASS
11N20SISO	Ant1	5745	15.08	5737.48	5752.56	0.5	PASS
		5785	15.12	5777.44	5792.56	0.5	PASS
		5825	15.44	5817.44	5832.88	0.5	PASS
11N40SISO	Ant1	5755	30.08	5739.96	5770.04	0.5	PASS
		5795	32.64	5778.68	5811.32	0.5	PASS

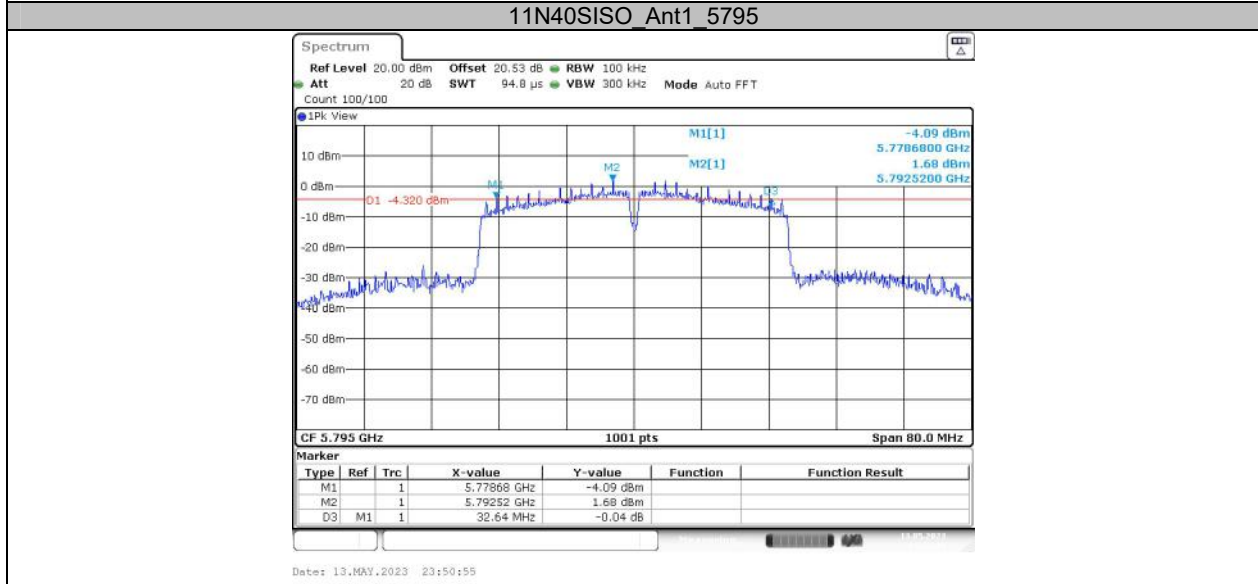
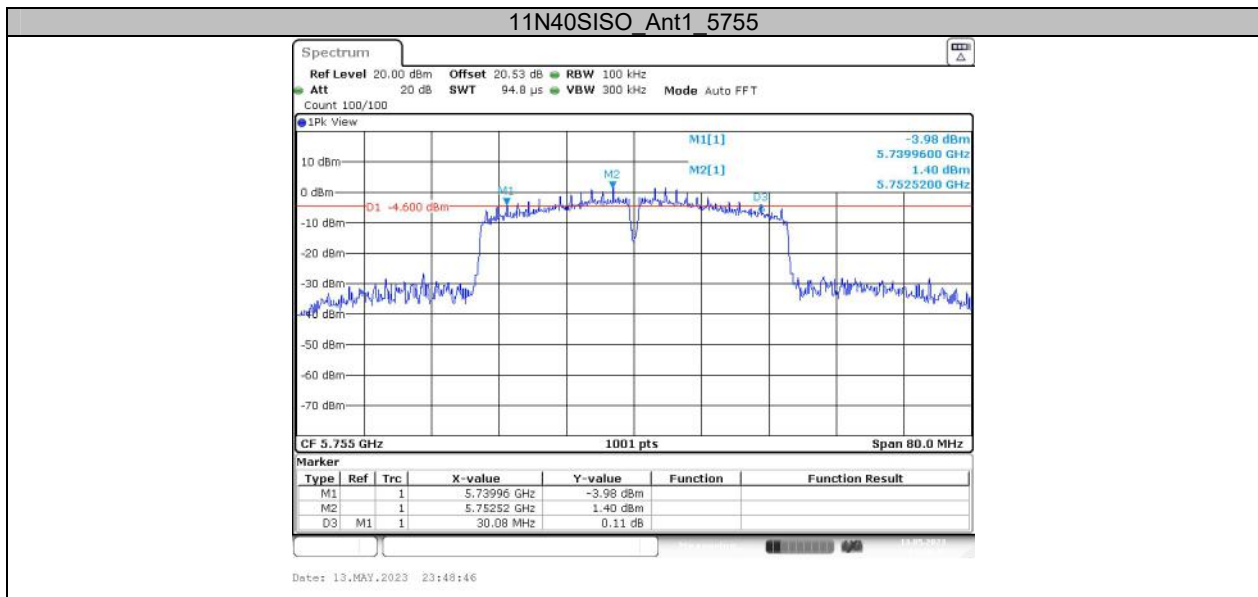
**Test Graphs B4**









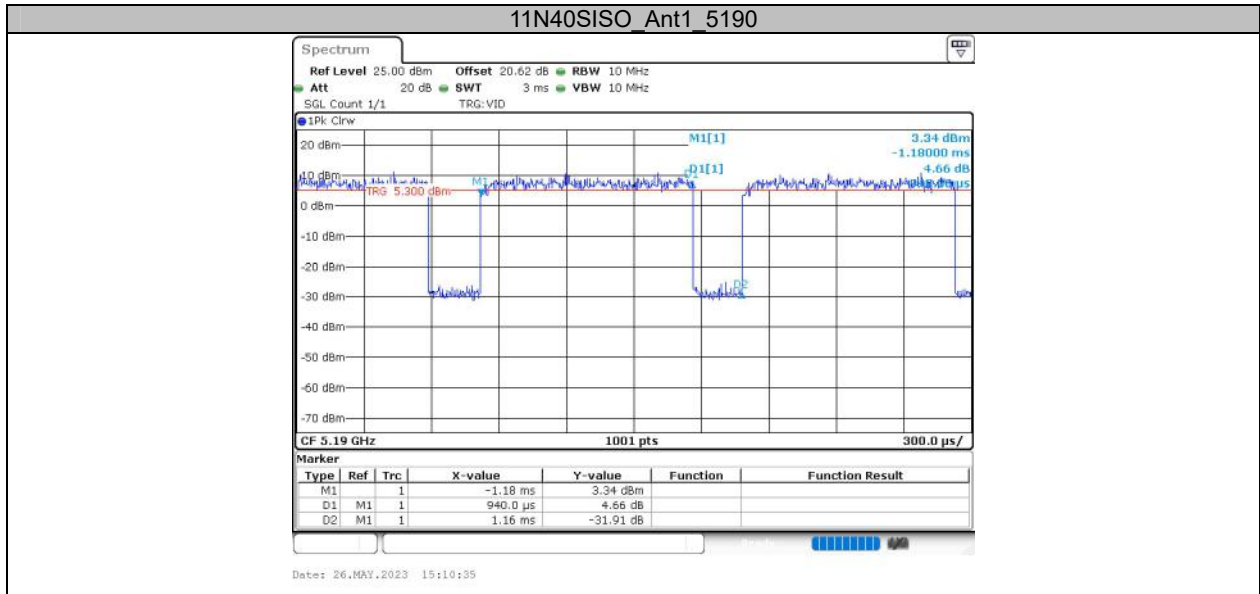


### Appendix B: Duty Cycle Test Result

Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]	1/T Minimum VBW (kHz)
11A	Ant1	5200	2.06	2.23	92.38	0.34	0.49
11N20SISO	Ant1	5200	1.92	2.12	90.57	0.43	0.52
11N40SISO	Ant1	5190	0.94	1.16	81.03	0.91	1.06

### Test Graphs





**Appendix C: Maximum conducted output power**

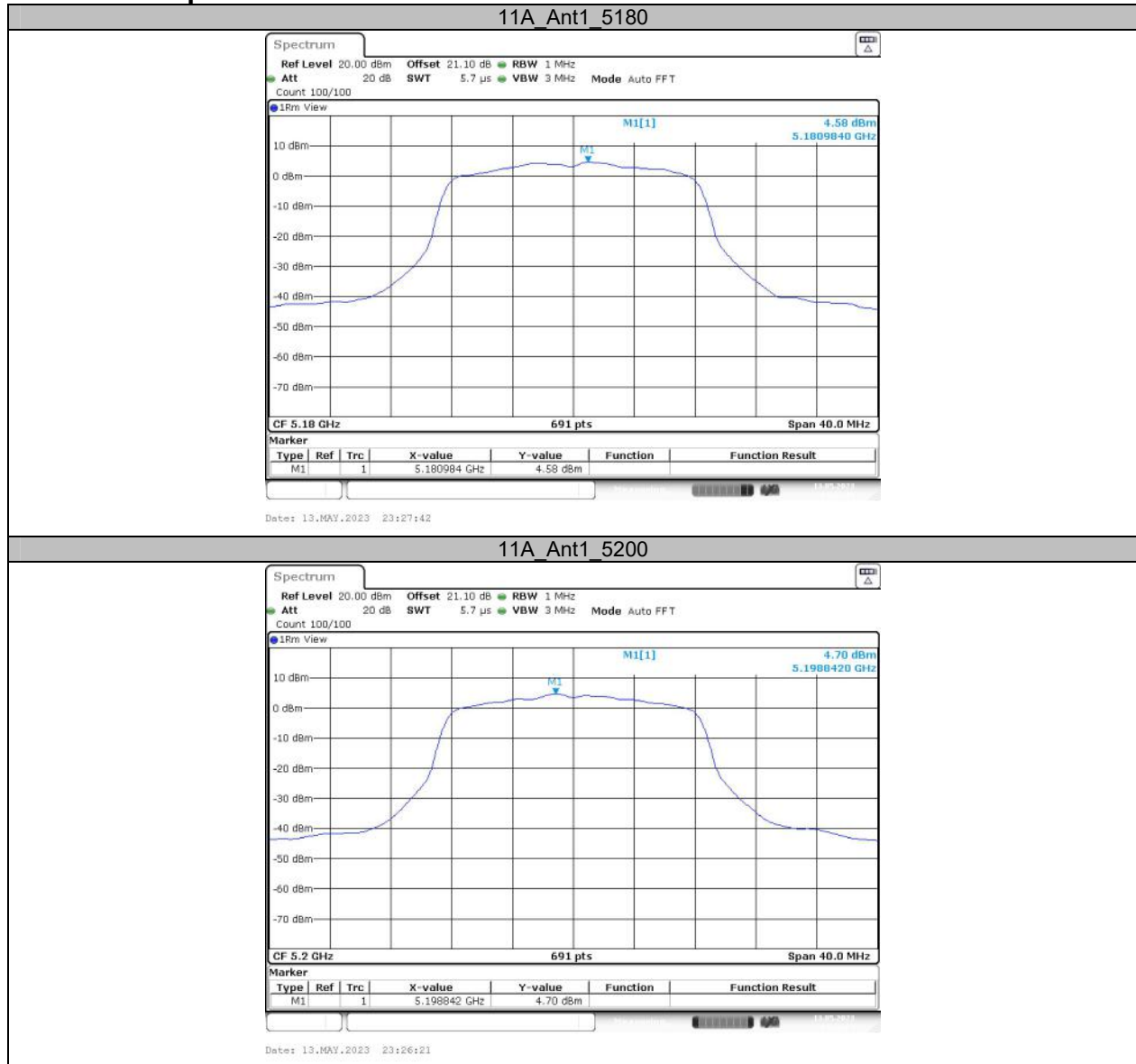
Test Mode	Antenna	Frequency[MHz]	Result [dBm]	Limit [dBm]	Verdict
11A	Ant1	5180	14.56	≤23.98	PASS
		5200	14.48	≤23.98	PASS
		5240	14.34	≤23.98	PASS
		5745	14.30	≤30.00	PASS
		5785	14.78	≤30.00	PASS
		5825	<b>15.81</b>	≤30.00	PASS
11N20SISO	Ant1	5180	<b>15.62</b>	≤23.98	PASS
		5200	14.29	≤23.98	PASS
		5240	14.17	≤23.98	PASS
		5745	14.20	≤30.00	PASS
		5785	14.55	≤30.00	PASS
11N40SISO	Ant1	5825	15.61	≤30.00	PASS
		5190	14.41	≤23.98	PASS
		5230	14.52	≤23.98	PASS
		5755	14.87	≤30.00	PASS
		5795	14.91	≤30.00	PASS

### Appendix D: Maximum power spectral density Test Result

Test Mode	Antenna	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	4.58	≤11.00	PASS
		5200	4.70	≤11.00	PASS
		5240	4.24	≤11.00	PASS
		5745	1.36	≤30.00	PASS
		5785	2.18	≤30.00	PASS
		5825	2.32	≤30.00	PASS
11N20SISO	Ant1	5180	5.81	≤11.00	PASS
		5200	3.79	≤11.00	PASS
		5240	3.57	≤11.00	PASS
		5745	1.37	≤30.00	PASS
		5785	1.73	≤30.00	PASS
		5825	2.53	≤30.00	PASS
11N40SISO	Ant1	5190	2.00	≤11.00	PASS
		5230	1.85	≤11.00	PASS
		5755	-1.42	≤30.00	PASS
		5795	-0.76	≤30.00	PASS

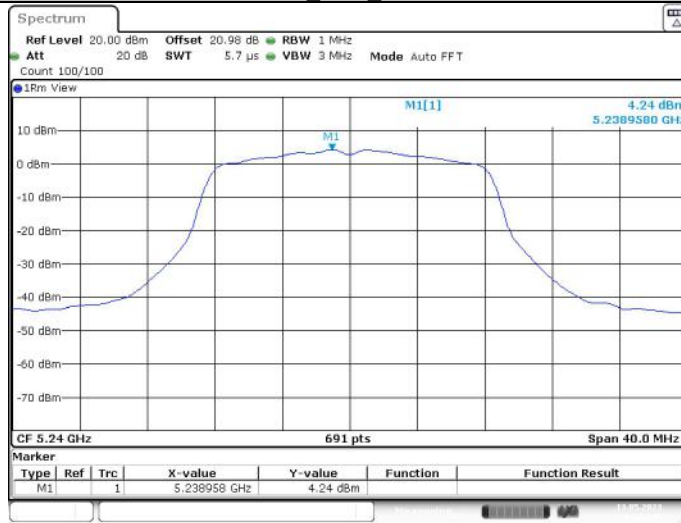
Note: 1. The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.  
2. The Duty Cycle Factor is compensated in the graph.

### Test Graphs



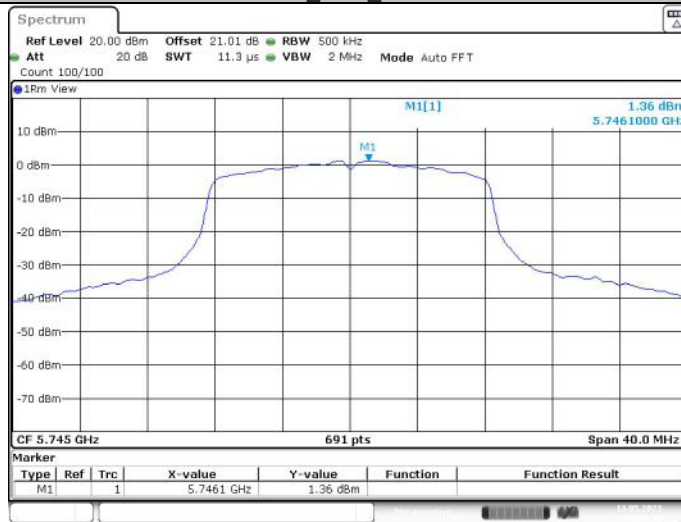


11A\_Ant1\_5240

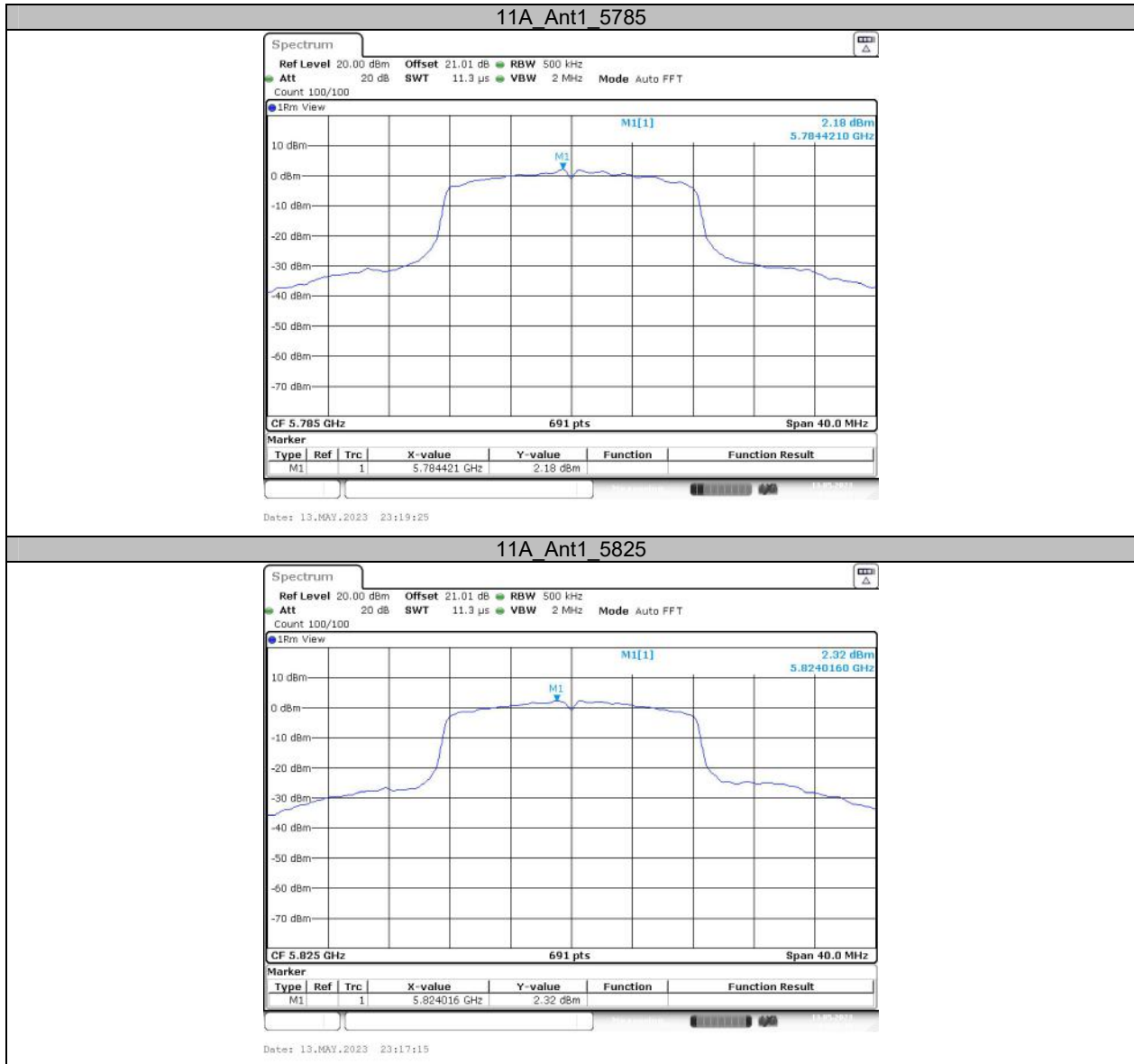


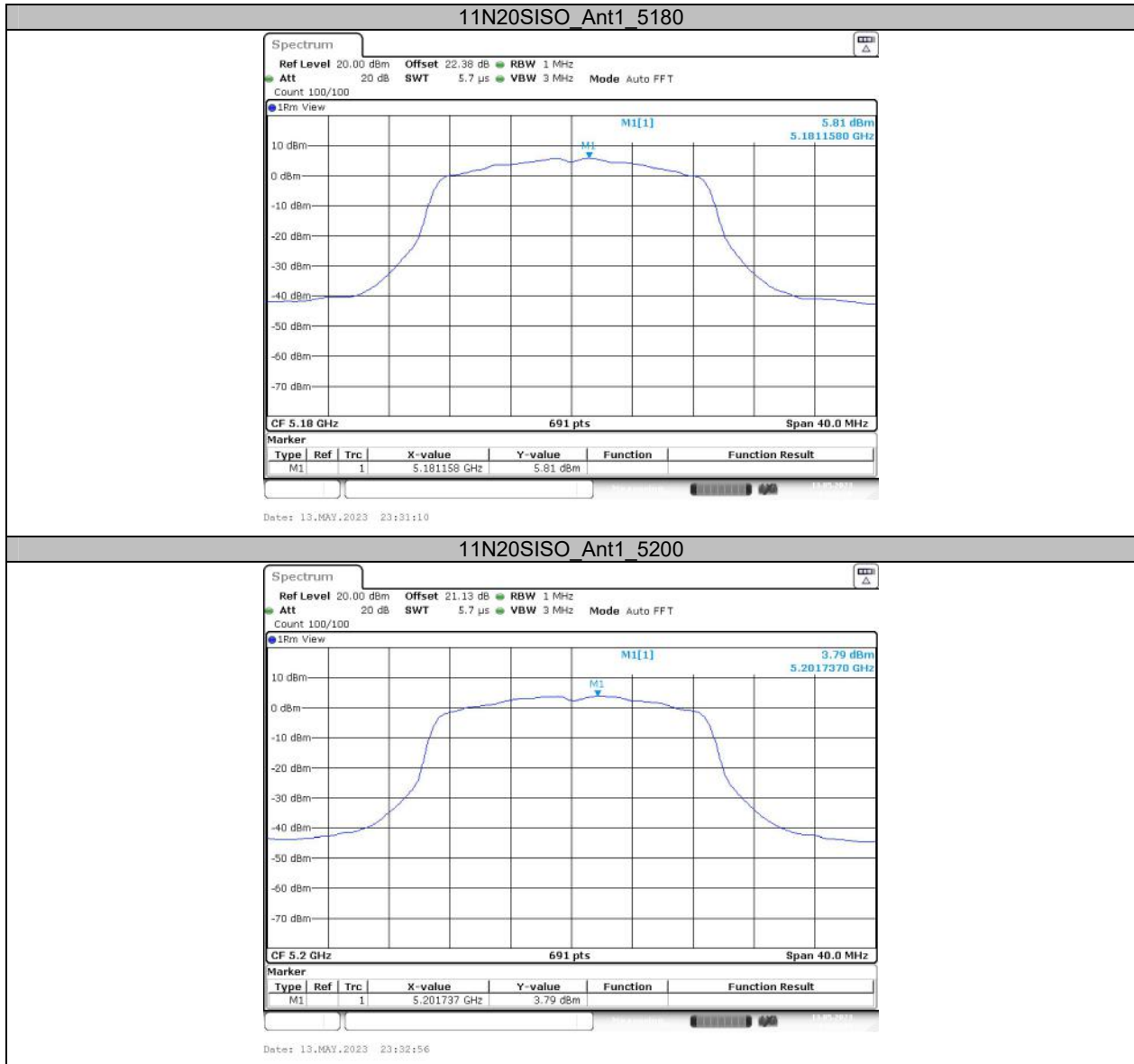
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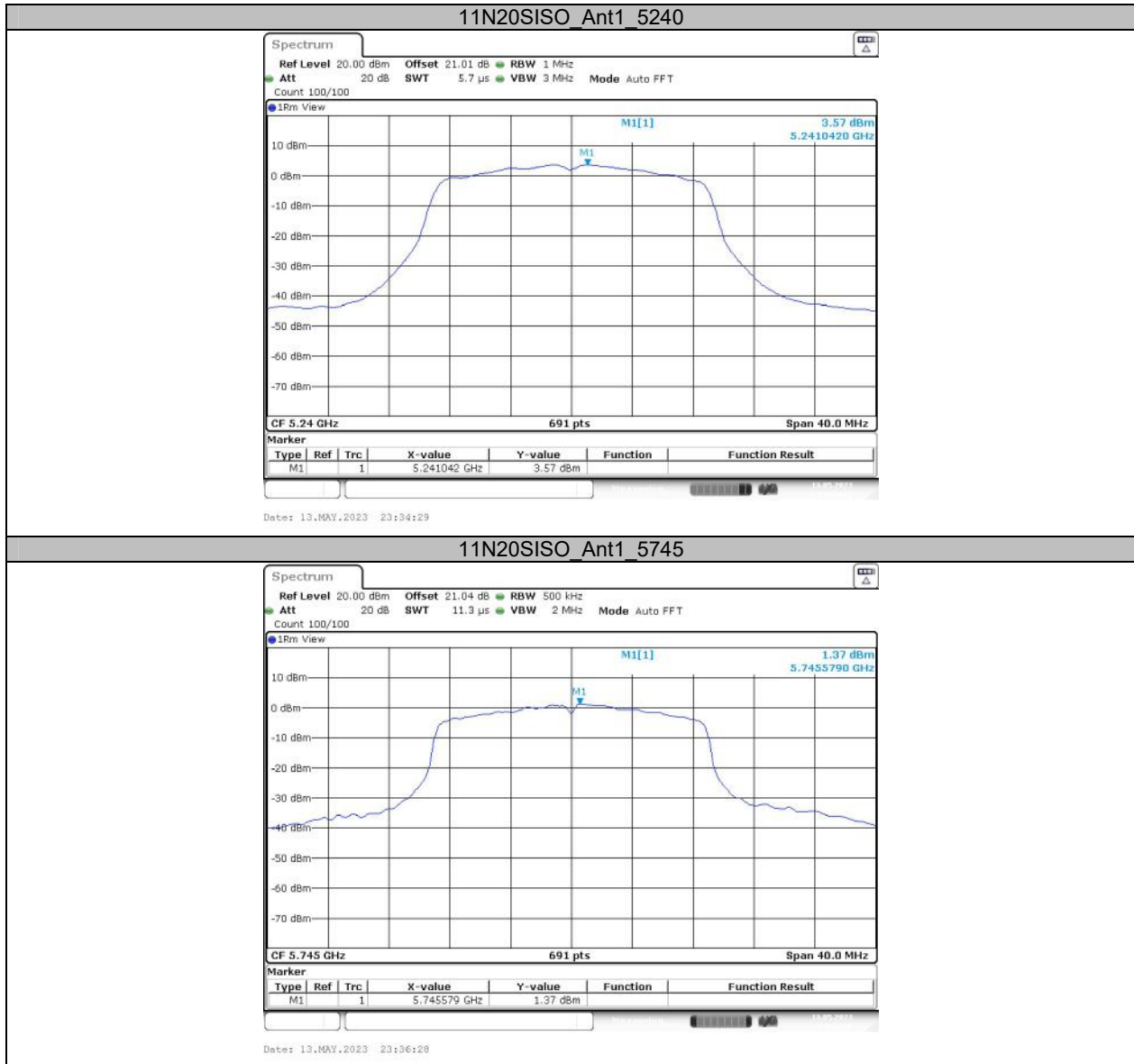
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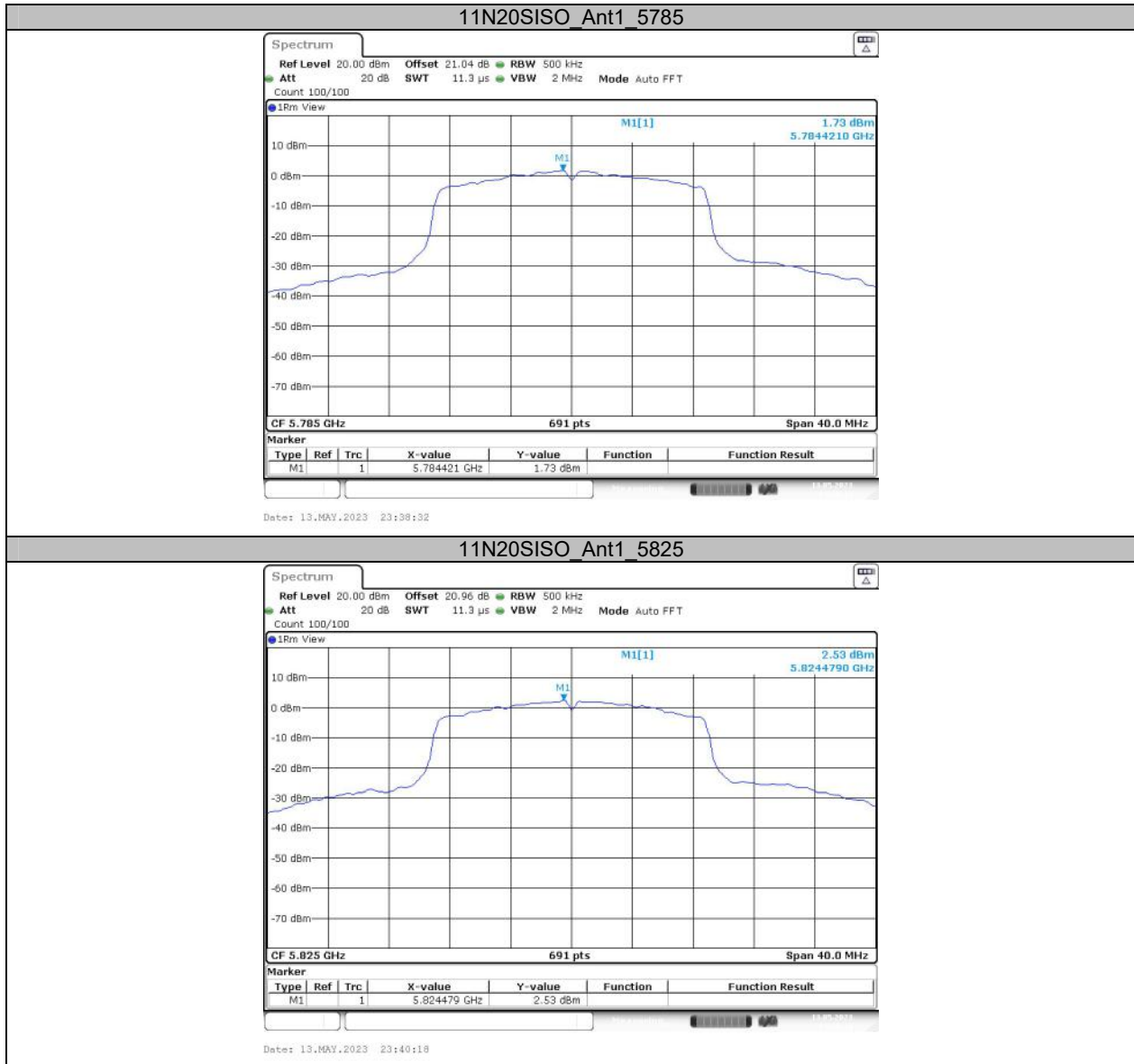


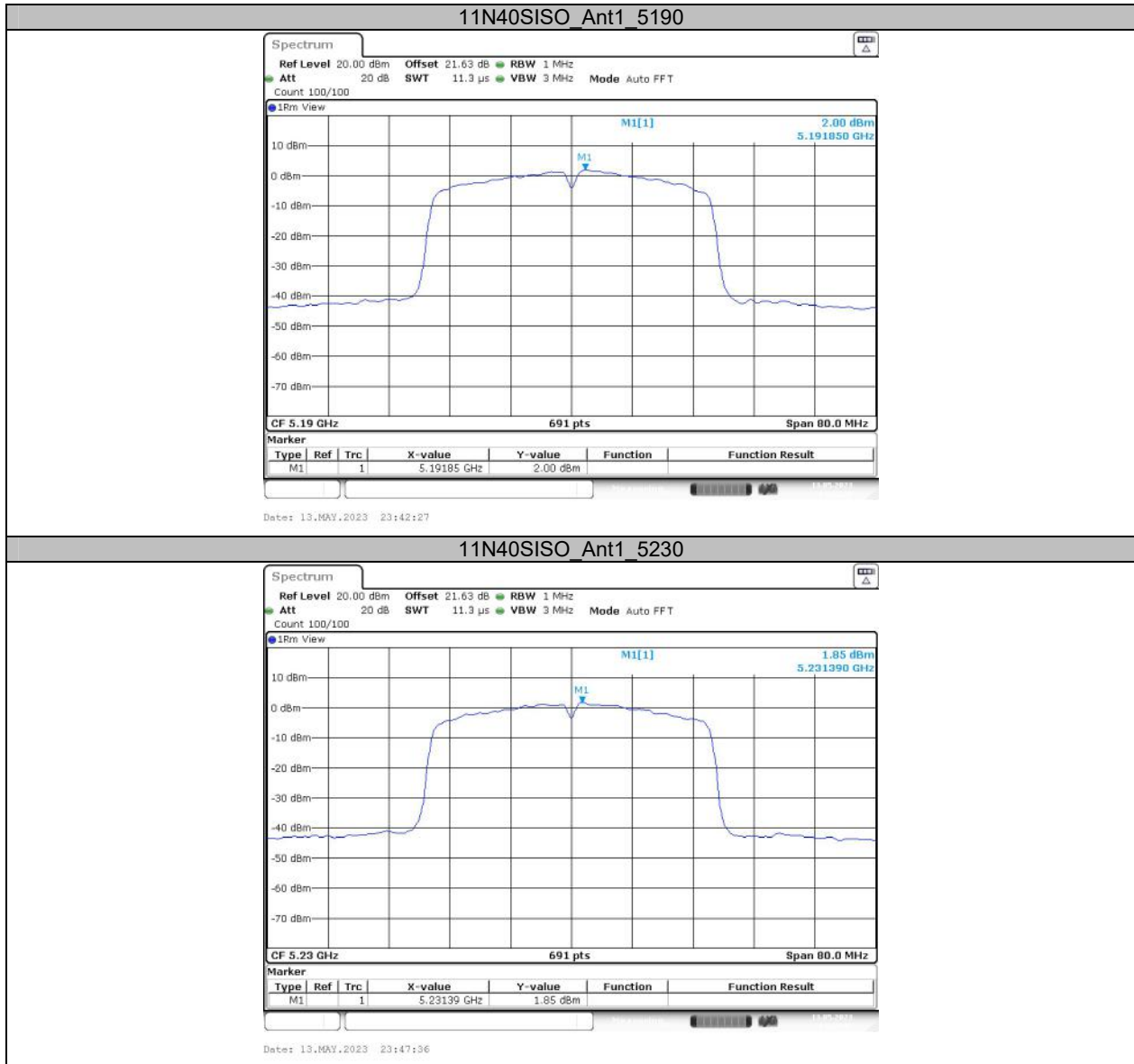
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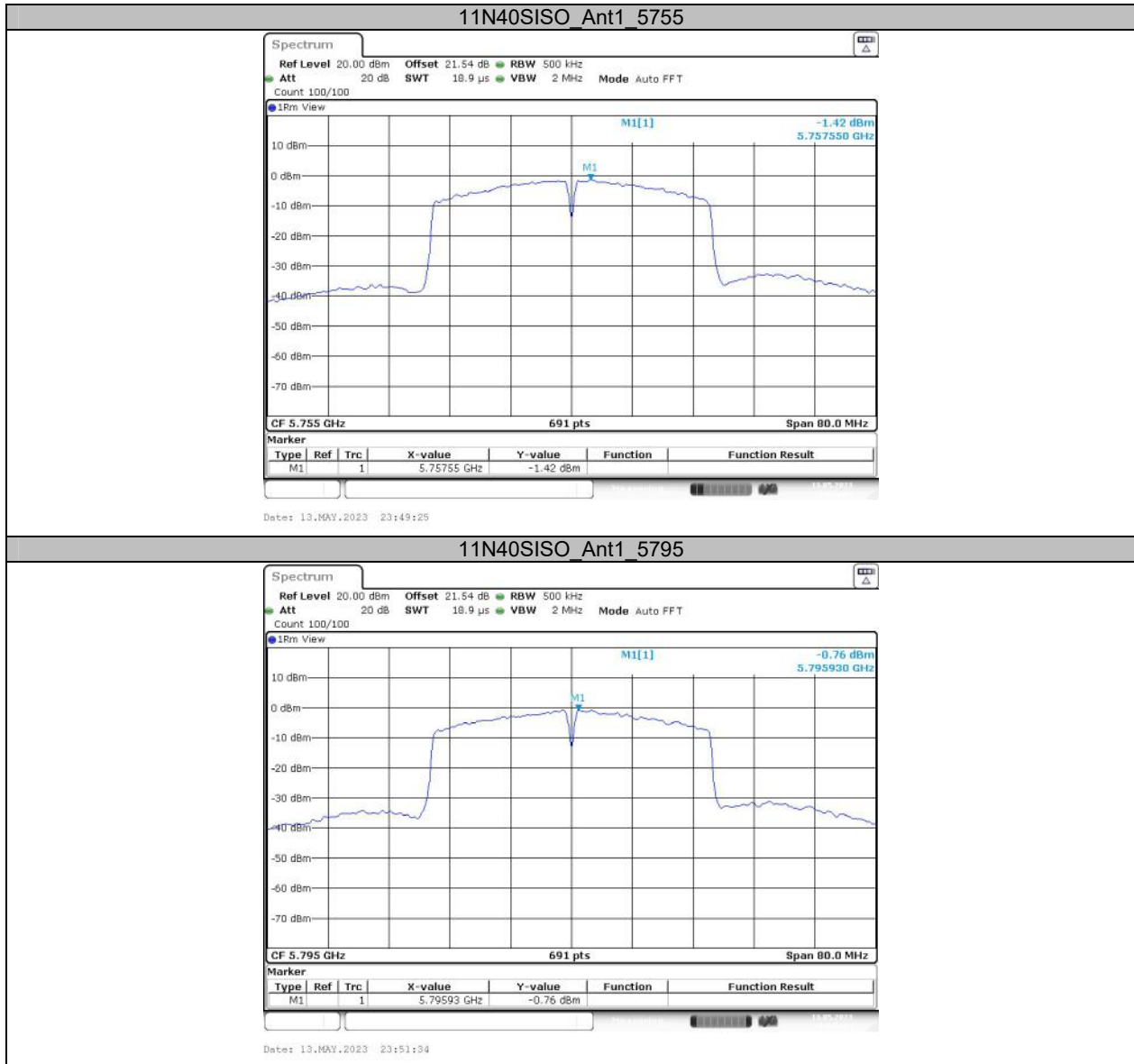












**\*\*\*\*\* END OF REPORT \*\*\*\*\***