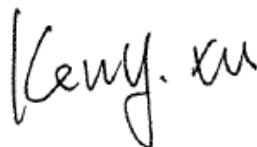


TEST REPORT

Application No.: SZCR2311003542AT
Applicant: Shanghai Sunmi Technology Co., Ltd.
Address of Applicant: Room 505, No.388, Song Hu Road, Yang Pu District, 200433 Shanghai, China
Manufacturer: Shanghai Sunmi Technology Co., Ltd.
Address of Manufacturer: Room 505, No.388, Song Hu Road, Yang Pu District, Shanghai, China
Equipment Under Test (EUT):
EUT Name: Hyper Wi-Fi Module
Model No.: NSC1-00
Trade Mark: SUNMI
FCC ID: 2AH25NSC100
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2023-11-06
Date of Test: 2023-11-07 to 2023-12-12
Date of Issue: 2023-12-12

Test Result:	Pass*
---------------------	--------------

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



Keny Xu
EMC Laboratory Manager



Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-12-12		Original

Authorized for issue by:			
		Edison Li	
		Edison Li/Project Engineer	
		Eric Fu	
		Eric Fu/Reviewer	



2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.2	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass



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3 Contents

	Page
1 Cover Page	1
2 Test Summary	3
3 Contents	4
4 General Information	6
4.1 Details of E.U.T.	6
4.2 Description of Support Units	7
4.3 Measurement Uncertainty	7
4.4 Test Location.....	8
4.5 Test Facility	8
4.6 Deviation from Standards.....	8
4.7 Abnormalities from Standard Conditions	8
5 Equipment List	9
6 Radio Spectrum Technical Requirement	11
6.1 Antenna Requirement	11
6.1.1 Test Requirement:	11
6.1.2 Conclusion	11
7 Radio Spectrum Matter Test Results	12
7.1 Conducted Emissions at AC Power Line (150kHz-30MHz).....	12
7.1.1 E.U.T. Operation	12
7.1.2 Test Mode Description	12
7.1.3 Test Setup Diagram	12
7.1.4 Measurement Procedure and Data.....	13
7.2 Conducted Peak Output Power.....	16
7.2.1 E.U.T. Operation	16
7.2.2 Test Mode Description	16
7.2.3 Test Setup Diagram	16
7.2.4 Measurement Procedure and Data.....	17
7.3 Minimum 6dB Bandwidth	18
7.3.1 E.U.T. Operation	18
7.3.2 Test Mode Description	18
7.3.3 Test Setup Diagram	18
7.3.4 Measurement Procedure and Data.....	18
7.4 Power Spectrum Density.....	19
7.4.1 E.U.T. Operation	19
7.4.2 Test Mode Description	19
7.4.3 Test Setup Diagram	19
7.4.4 Measurement Procedure and Data.....	19
7.5 Conducted Band Edges Measurement	20
7.5.1 E.U.T. Operation	20



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7.5.2 Test Mode Description20

7.5.3 Test Setup Diagram20

7.5.4 Measurement Procedure and Data.....21

7.6 Conducted Spurious Emissions22

7.6.1 E.U.T. Operation22

7.6.2 Test Mode Description22

7.6.3 Test Setup Diagram22

7.6.4 Measurement Procedure and Data.....23

7.7 Radiated Spurious Emissions Below 1GHz24

7.7.1 E.U.T. Operation24

7.7.2 Test Mode Description24

7.7.3 Test Setup Diagram24

7.7.4 Measurement Procedure and Data.....25

7.8 Radiated Spurious Emissions Above 1GHz.....32

7.8.1 E.U.T. Operation32

7.8.2 Test Mode Description32

7.8.3 Test Setup Diagram32

7.8.4 Measurement Procedure and Data.....33

8 Test Setup Photo40

9 EUT Constructional Details (EUT Photos)40

10 Appendix.....41



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3.3V
Operation Frequency:	903.5MHz-926.5MHz (1MHz Channel Bandwidth) 905MHz-925MHz (2MHz Channel Bandwidth) 906MHz-922MHz (4MHz Channel Bandwidth)
Modulation Type:	OFDM with BPSK/QPSK/16QAM/64QAM
Number of Channels:	24 Channels for 802.11ah(1MHz Channel Bandwidth) 11 Channels for 802.11ah(2MHz Channel Bandwidth) 5 Channels for 802.11ah(4MHz Channel Bandwidth)
Rate:	0.15 to 3.0Mbps for 802.11ah(1MHz Channel Bandwidth) 0.65 to 6.5Mbps for 802.11ah(2MHz Channel Bandwidth) 1.35 to 13.5Mbps for 802.11ah(4MHz Channel Bandwidth)
Antenna Type:	FPC Antenna
Antenna Gain:	3dBi

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

Channel list for 802.11ah			
Bandwidth (MHz)	Low Channel (MHz)	Middle Channel (MHz)	High Channel (MHz)
1	903.5	915.5	926.5
2	905	915	925
4	906	914	922

Power Setting for 802.11ah			
Bandwidth (MHz)	Low Channel	Middle Channel	High Channel
1	24	24	24
2	24	24	24
4	23	24	24

Selected test rate for 802.11ah			
Bandwidth (MHz)	Low Channel	Middle Channel	High Channel
1	MCS10	MCS10	MCS10
2	MCS0	MCS0	MCS0
4	MCS0	MCS0	MCS0



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4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	L480	REF. No.SEA18C00E
Mouse	Lenovo	M-U0025-O	REF. No.:SEA24A00
Type-C Cable	SGS	N/A	REF. No.SEA07B00
Test Motherboard	SGS	/	/
RF Cable	SGS	N/A(Cable loss:0.6dB)	N/A

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	± 3.1dB
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 3%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Spurious Emissions Below 1GHz	± 6.0dB for 3m; ± 5.0dB for 10m
Radiated Spurious Emissions Above 1GHz	± 4.6dB (1-18GHz); ± 4.8dB (18-40GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than U_{CISPR/ETSI} (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2022-05-14	2025-05-13
EMI Test Receiver	Rohde&Schwarz	ESCI	SEM004-02	2023-03-20	2024-03-19
Measurement Software	AUDIX	e3 V8.2014-6-27a	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2023-07-07	2024-07-06
LISN	Rohde&Schwarz	ENV216	SEM007-01	2023-09-19	2024-09-18
LISN	ETS-LINDGREN	3816/2	SEM007-02	2023-03-20	2024-03-19

RF Conducted Test					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Power Sensor	TST PASS	TSPS2023R	SEM009-26	2023-04-01	2024-03-31
Power Sensor	KEYSIGHT	U2021XA	SEM009-16	2023-03-21	2024-03-20
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2023-03-21	2024-03-20
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2023-03-31	2024-03-30

Radiated Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2021-11-22	2023-11-21
				2023-11-20	2025-11-19
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2023-10-19	2024-10-18
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2023-09-16	2025-09-15
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2023-03-20	2024-03-19
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2023-07-07	2024-07-06



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Radiated Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2023-04-01	2026-03-31
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2023-03-20	2024-03-19
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2023-03-20	2024-03-19

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2023-07-28	2024-07-27
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2023-07-28	2024-07-27
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2023-03-23	2024-03-22



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 3 dBi.

Antenna location: Refer to internal photo.



7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.
 Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

7.1.1 E.U.T. Operation

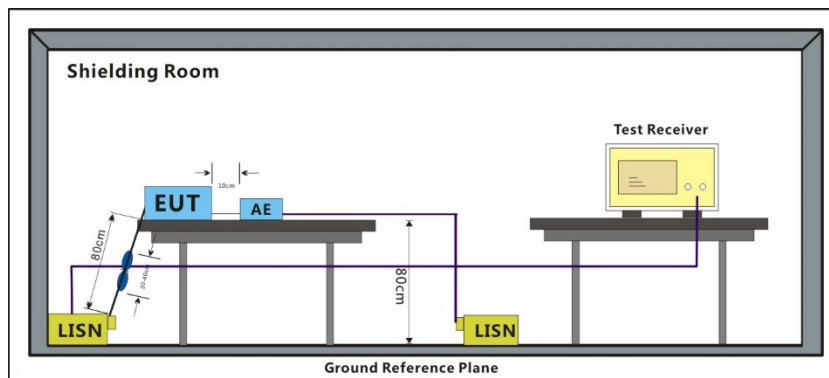
Operating Environment:

Temperature: 23.4 °C Humidity: 47.3 % RH Atmospheric Pressure: 1000 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

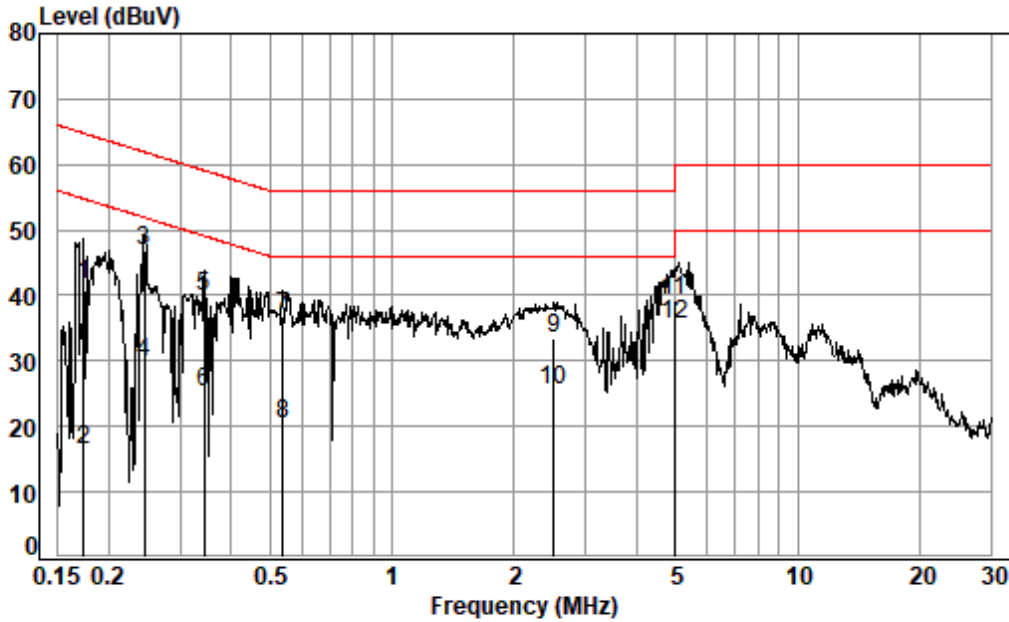
Remark: Level=Read Level+ Cable Loss+ LISN Factor



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Test Mode: 01; Line: Live line



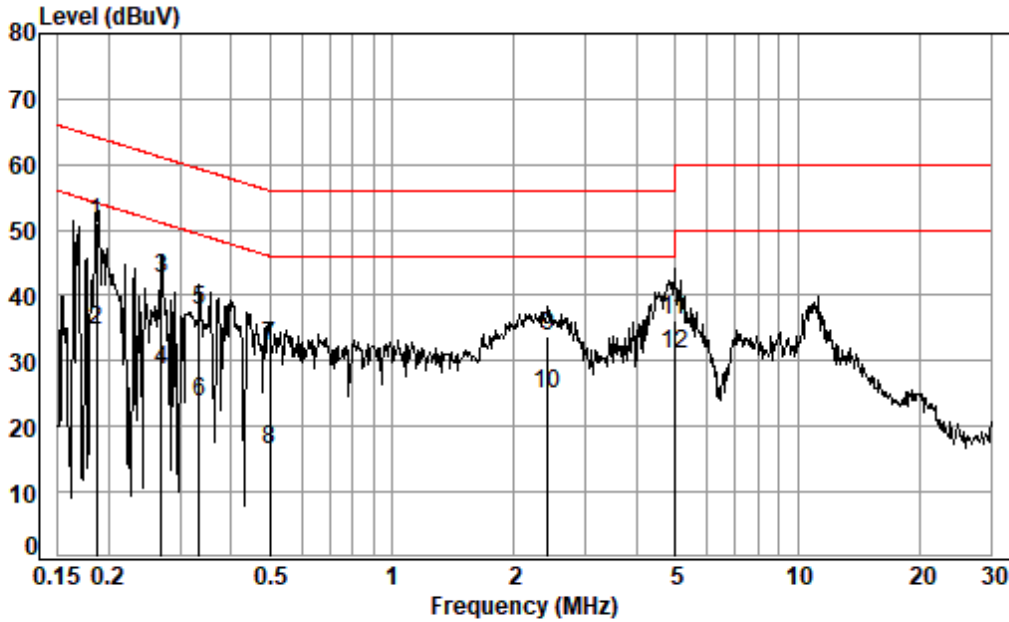
Site : Shielding Room
 Condition: Line
 Job No. : 03542AT
 Test mode: 01

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.173	0.02	10.27	31.39	41.68	64.81	-23.13	QP
2	0.173	0.02	10.27	6.25	16.54	54.81	-38.27	Average
3 *	0.246	0.03	10.30	36.66	46.99	61.91	-14.92	QP
4	0.246	0.03	10.30	19.57	29.90	51.91	-22.01	Average
5	0.345	0.03	10.32	29.62	39.97	59.09	-19.12	QP
6	0.345	0.03	10.32	14.78	25.13	49.09	-23.96	Average
7	0.538	0.04	10.35	26.43	36.82	56.00	-19.18	QP
8	0.538	0.04	10.35	9.88	20.27	46.00	-25.73	Average
9	2.513	0.07	10.53	22.84	33.44	56.00	-22.56	QP
10	2.513	0.07	10.53	14.94	25.54	46.00	-20.46	Average
11	4.978	0.09	10.72	28.28	39.09	56.00	-16.91	QP
12 *	4.978	0.09	10.72	24.84	35.65	46.00	-10.35	Average



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Test Mode: 01; Line: Neutral Line



Site : Shielding Room
 Condition: Neutral
 Job No. : 03542AT
 Test mode: 01

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 *	0.186	0.02	10.25	40.69	50.96	64.20	-13.24	QP
2	0.186	0.02	10.25	24.40	34.67	54.20	-19.53	Average
3	0.270	0.03	10.26	32.23	42.52	61.12	-18.60	QP
4	0.270	0.03	10.26	18.29	28.58	51.12	-22.54	Average
5	0.334	0.03	10.27	27.45	37.75	59.35	-21.60	QP
6	0.334	0.03	10.27	13.50	23.80	49.35	-25.55	Average
7	0.499	0.04	10.29	21.91	32.24	56.01	-23.77	QP
8	0.499	0.04	10.29	6.11	16.44	46.01	-29.57	Average
9	2.422	0.07	10.48	23.12	33.67	56.00	-22.33	QP
10	2.422	0.07	10.48	14.43	24.98	46.00	-21.02	Average
11	4.978	0.09	10.72	25.43	36.24	56.00	-19.76	QP
12 *	4.978	0.09	10.72	20.20	31.01	46.00	-14.99	Average



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7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.2

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.2 °C

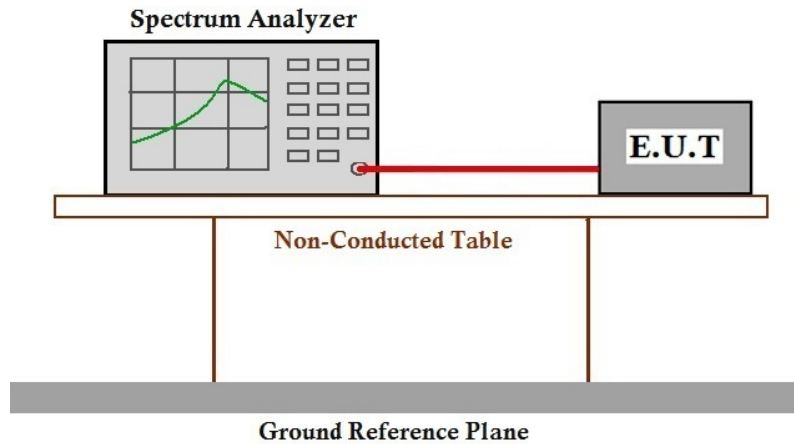
Humidity: 51.1 % RH

Atmospheric Pressure: 1000 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.2.3 Test Setup Diagram





SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR231100354202

Page: 17 of 73

7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch, SZEMC-TRF-01 Rev. A/1 Laboratory

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7.3 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)
 Test Method: ANSI C63.10 (2013) Section 11.8.1
 Limit: ≥500 kHz

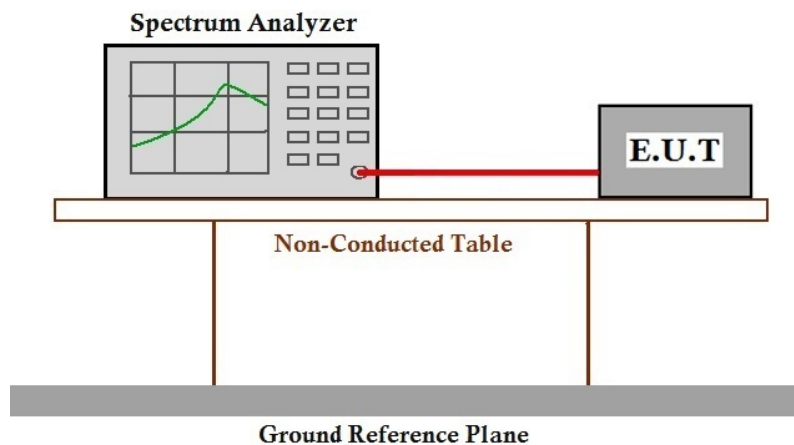
7.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.2 °C Humidity: 51.1 % RH Atmospheric Pressure: 1000 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details



7.4 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.2 °C

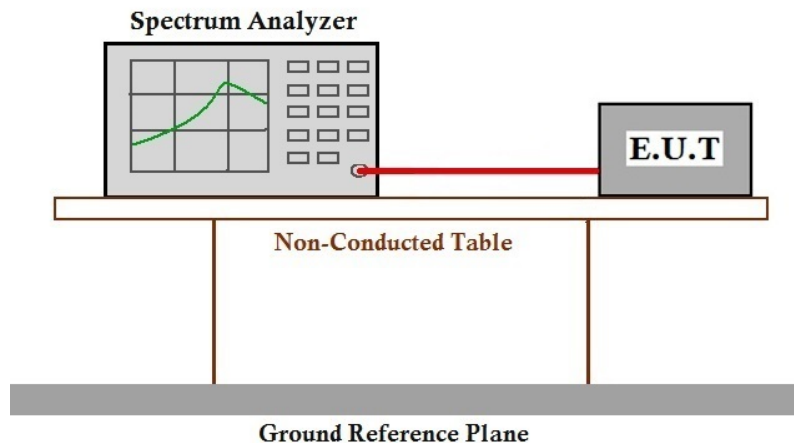
Humidity: 51.1 % RH

Atmospheric Pressure: 1000 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details



7.5 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
 Test Method: ANSI C63.10 (2013) Section 11.13.3.2
 Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

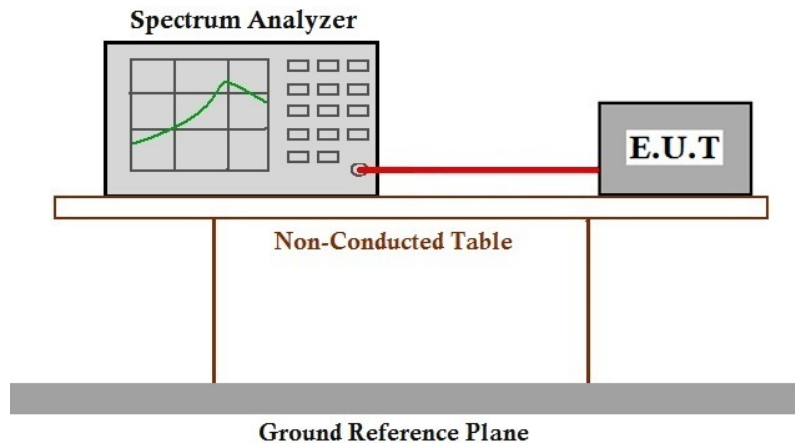
7.5.1 E.U.T. Operation

Operating Environment:
 Temperature: 23.5 °C Humidity: 47.6 % RH Atmospheric Pressure: 1000 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.5.3 Test Setup Diagram



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7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.6 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.6.1 E.U.T. Operation

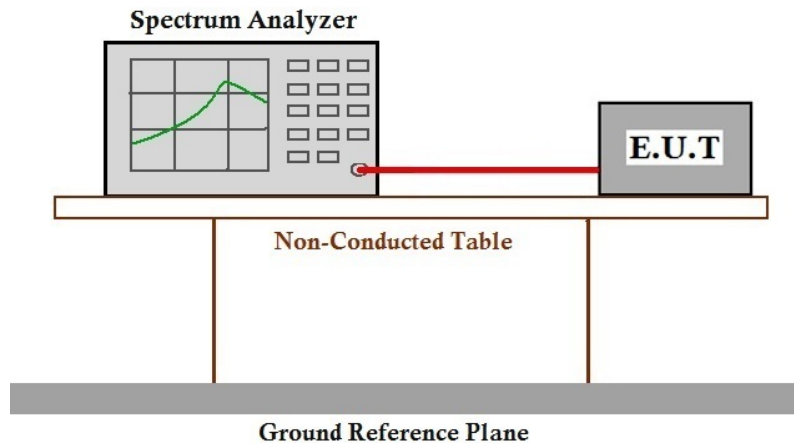
Operating Environment:

Temperature: 24.2 °C Humidity: 51.0 % RH Atmospheric Pressure: 1000 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.7 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
 Test Method: ANSI C63.10 (2013) Section 6.4,6.5
 Measurement Distance: 3m
 Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

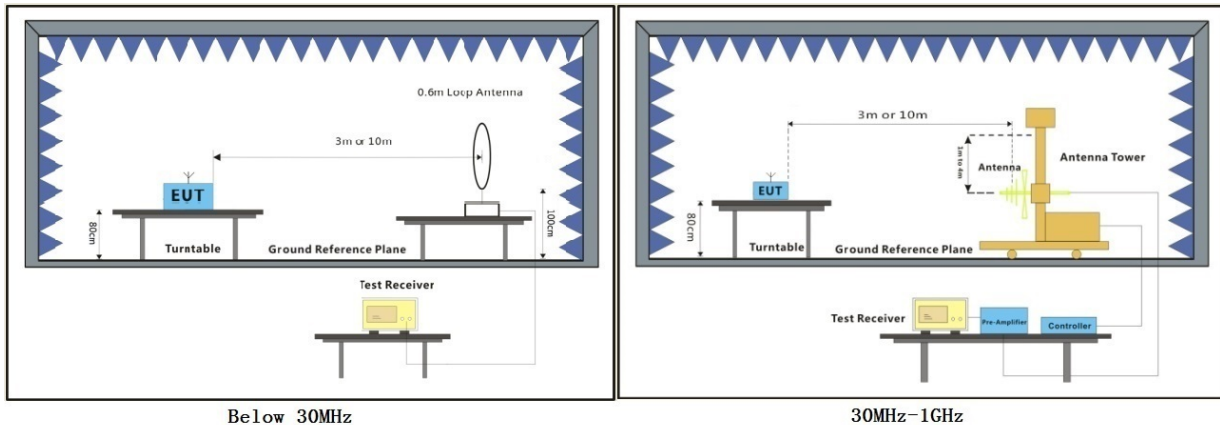
7.7.1 E.U.T. Operation

Operating Environment:
 Temperature: 23.2 °C Humidity: 45.8 % RH Atmospheric Pressure: 1000 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.7.3 Test Setup Diagram



Below 30MHz

30MHz-1GHz



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7.7.4 Measurement Procedure and Data

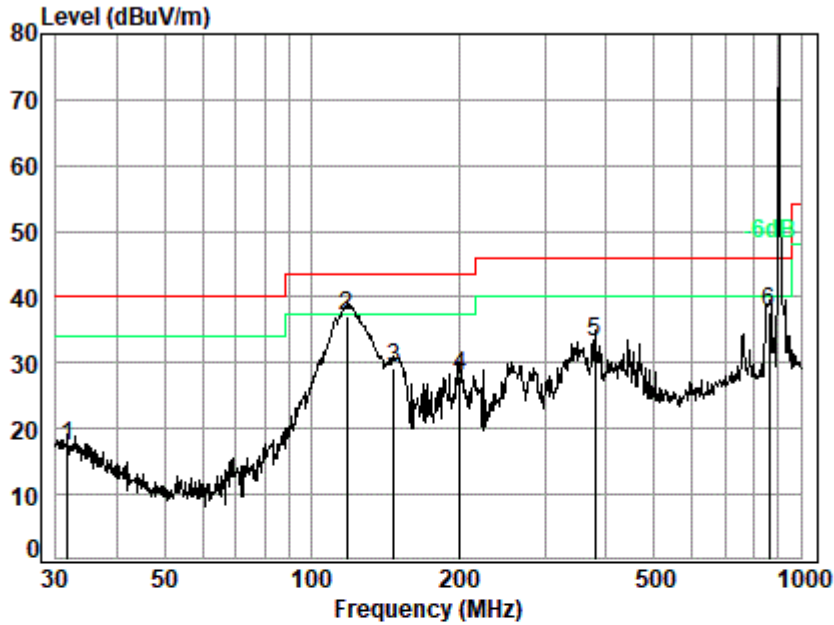
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna,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

Remark:

- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. All modes and channel bandwidths has been tested and we found 1MHz channel bandwidth has the worst test result, only record the worst test result.



Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Low



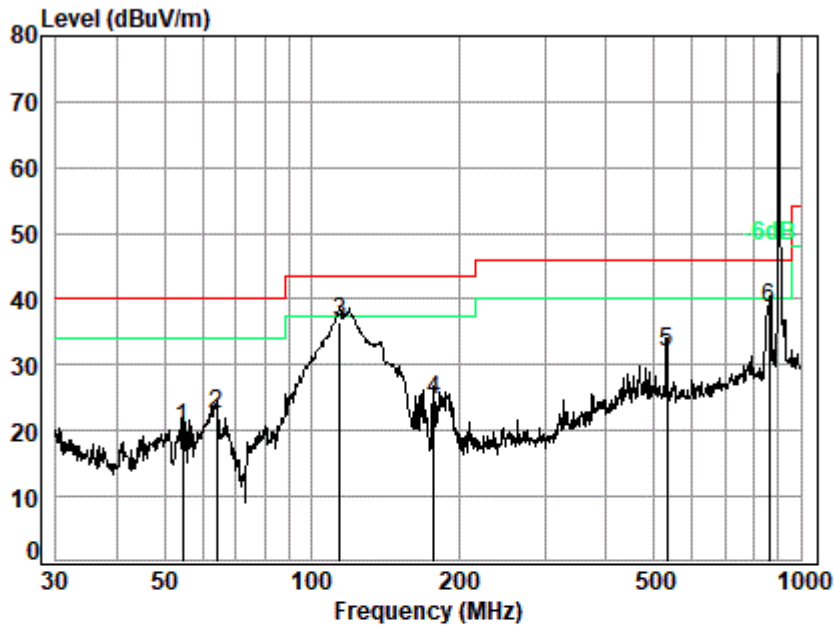
Site : chamber
 Condition: 3m HORIZONTAL
 Job No. : 03542AT
 Test Mode: 01

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.731	20.39	0.66	27.80	24.01	40.00	-22.74 QP
2 q	118.186	11.18	1.29	27.54	52.29	43.50	-6.28 QP
3	147.404	12.73	1.45	27.44	42.34	43.50	-14.42 QP
4	200.688	14.15	1.73	27.25	39.39	43.50	-15.48 QP
5	379.914	20.91	2.47	27.25	36.95	46.00	-12.92 QP
6	863.056	27.52	3.99	27.31	33.42	46.00	-8.38 QP



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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Low



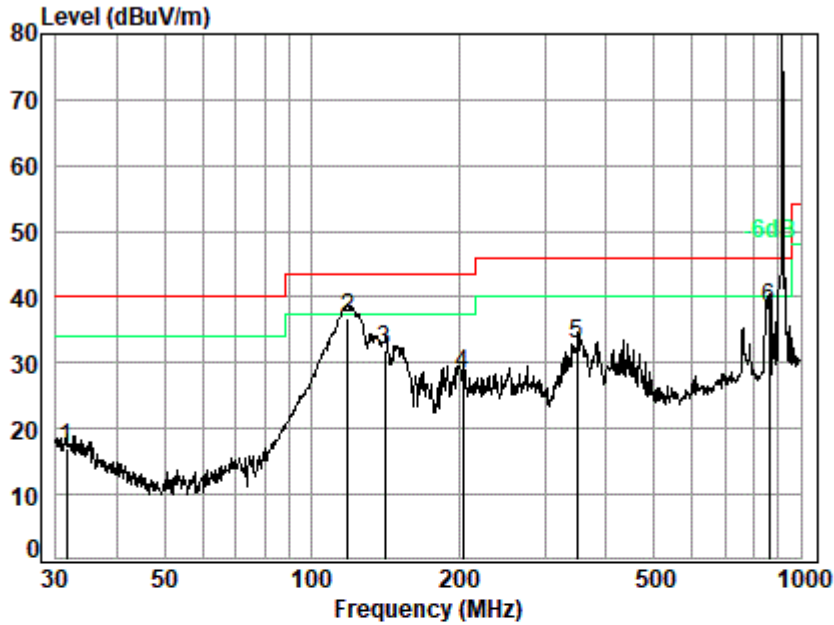
Site : chamber
 Condition: 3m VERTICAL
 Job No. : 03542AT
 Test Mode: 01

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Line	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	54.452	12.07	0.87	27.74	35.11	20.31	40.00 -19.69 QP
2	63.983	11.11	0.95	27.71	38.18	22.53	40.00 -17.47 QP
3 q	114.114	11.50	1.27	27.56	51.39	36.60	43.50 -6.90 QP
4	178.133	14.01	1.61	27.33	36.44	24.73	43.50 -18.77 QP
5	531.964	23.32	2.99	27.93	33.62	32.00	46.00 -14.00 QP
6	863.056	27.52	3.99	27.31	34.36	38.56	46.00 -7.44 QP



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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Middle



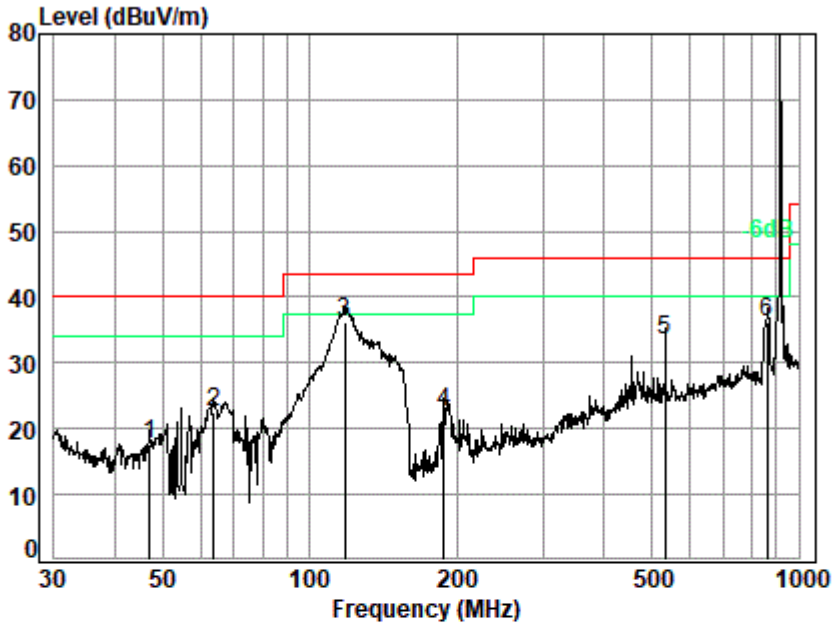
Site : chamber
 Condition: 3m HORIZONTAL
 Job No. : 03542AT
 Test Mode: 01

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Line	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.510	20.50	0.66	27.80	23.78	40.00	-22.86 QP
2 q	118.601	11.16	1.29	27.54	51.96	43.50	-6.63 QP
3	141.330	11.96	1.41	27.46	46.06	43.50	-11.53 QP
4	204.238	14.49	1.75	27.23	39.15	43.50	-15.34 QP
5	349.250	19.88	2.36	27.11	37.67	46.00	-13.20 QP
6	863.056	27.52	3.99	27.31	34.11	46.00	-7.69 QP



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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Middle



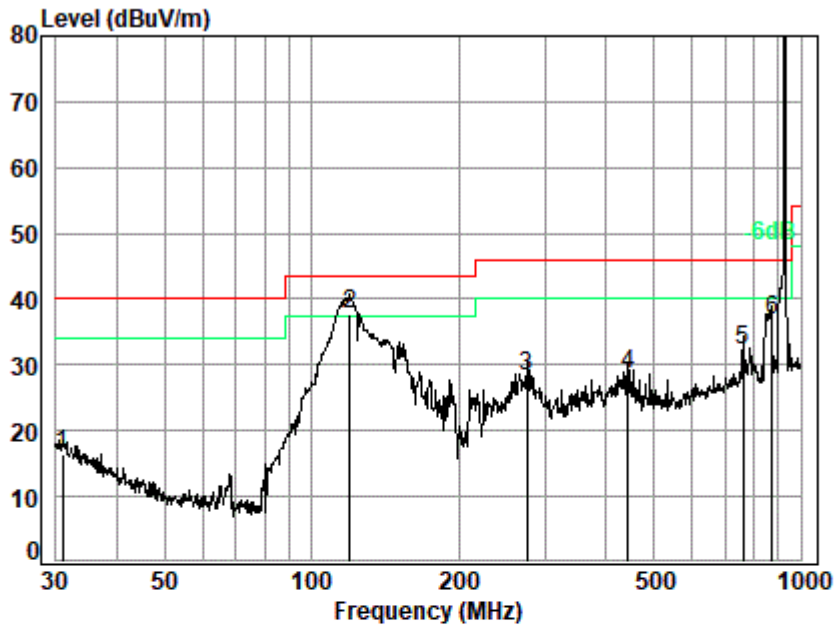
Site : chamber
 Condition: 3m VERTICAL
 Job No. : 03542AT
 Test Mode: 01

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Line	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	46.995	13.63	0.81	27.76	31.11	40.00	-22.21 QP
2	63.759	11.13	0.95	27.71	38.14	40.00	-17.49 QP
3 q	117.773	11.21	1.29	27.55	51.31	43.50	-7.24 QP
4	187.753	14.30	1.66	27.29	33.97	43.50	-20.86 QP
5	533.832	23.37	3.00	27.93	34.89	46.00	-12.67 QP
6	863.056	27.52	3.99	27.31	32.08	46.00	-9.72 QP



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Test Mode: 01; Polarity: Horizontal; Modulation: OFDM; Channel: High



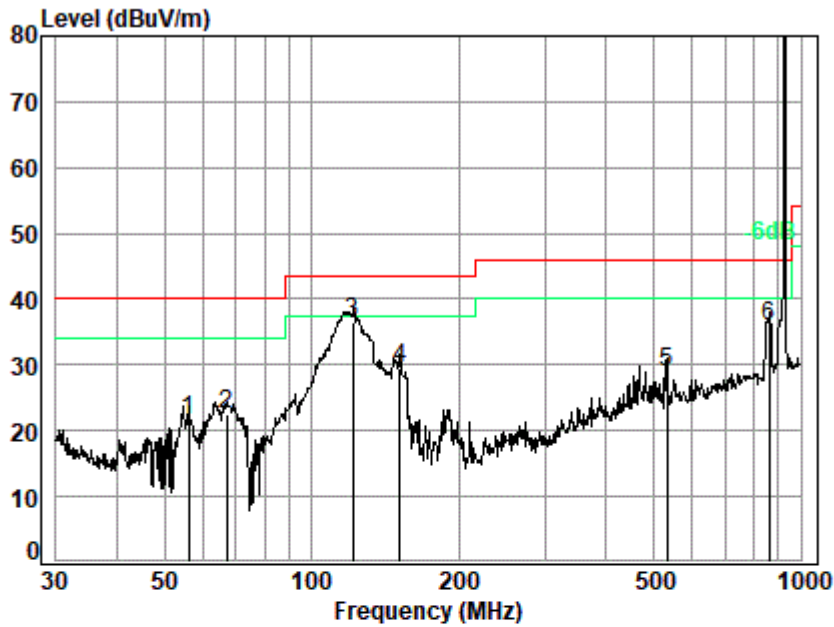
Site : chamber
 Condition: 3m HORIZONTAL
 Job No. : 03542AT
 Test Mode: 01

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Line	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.962	20.75	0.65	27.80	22.93	16.53	40.00 -23.47 QP
2 q	119.856	11.11	1.30	27.54	52.94	37.81	43.50 -5.69 QP
3	275.157	17.07	2.06	26.98	36.17	28.32	46.00 -17.68 QP
4	443.294	21.10	2.70	27.53	32.19	28.46	46.00 -17.54 QP
5	763.376	26.50	3.71	27.72	29.89	32.38	46.00 -13.62 QP
6	872.183	27.66	4.02	27.26	32.41	36.83	46.00 -9.17 QP



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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:High



Site : chamber
 Condition: 3m VERTICAL
 Job No. : 03542AT
 Test Mode: 01

	Ant Freq	Cable Factor	Preamp Loss	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	56.001	11.85	0.88	27.73	36.60	21.60	40.00 -18.40 QP
2	66.967	10.83	0.97	27.70	38.37	22.47	40.00 -17.53 QP
3 q	121.549	11.03	1.31	27.53	51.69	36.50	43.50 -7.00 QP
4	151.597	13.22	1.47	27.42	42.33	29.60	43.50 -13.90 QP
5	531.964	23.32	2.99	27.93	30.60	28.98	46.00 -17.02 QP
6	863.056	27.52	3.99	27.31	31.74	35.94	46.00 -10.06 QP



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7.8 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
 Test Method: ANSI C63.10 (2013) Section 6.6
 Measurement Distance: 3m
 Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

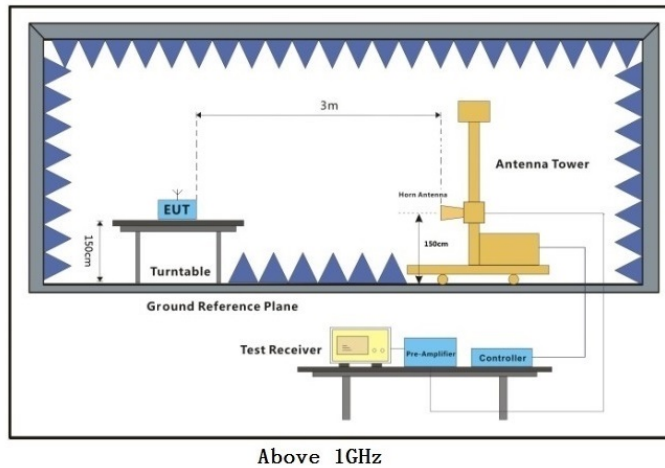
7.8.1 E.U.T. Operation

Operating Environment:
 Temperature: 20.5 °C Humidity: 53.4 % RH Atmospheric Pressure: 1000 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(AP mode).
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with OFDM modulation(Client mode).

7.8.3 Test Setup Diagram



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7.8.4 Measurement Procedure and Data

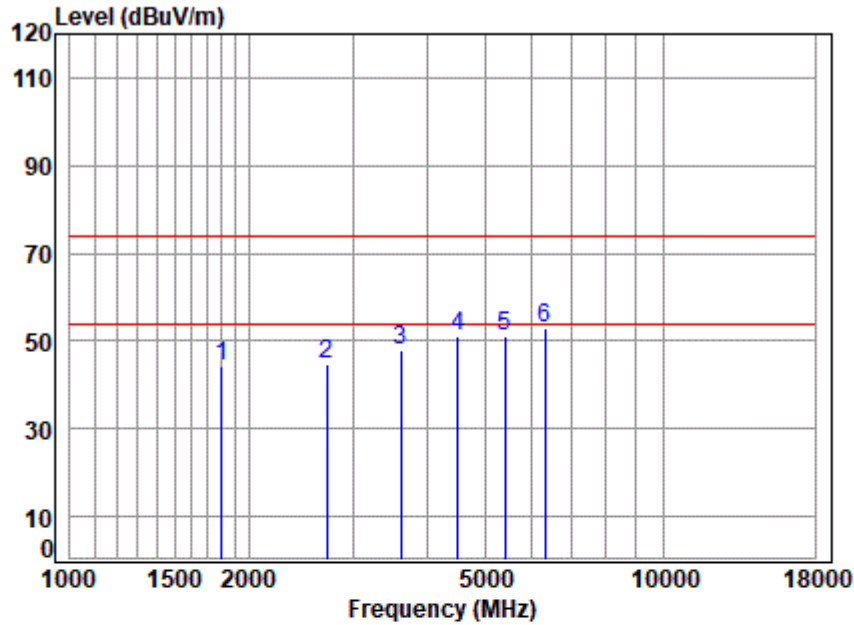
- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 4. All modes and channel bandwidths has been tested and we found 1MHz channel bandwidth has the worst test result, only record the worst test result.



Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Low



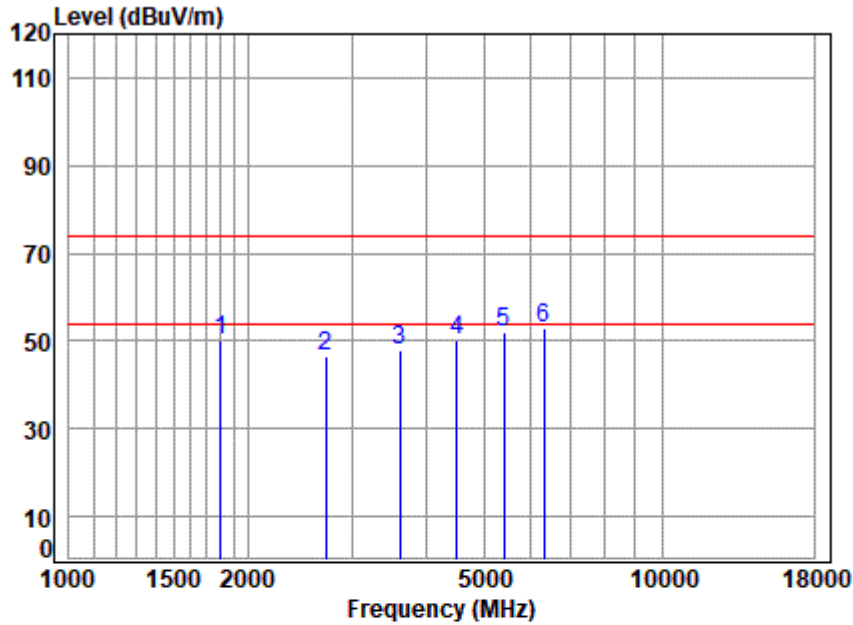
Site : chamber
 Condition: 3m HORIZONTAL
 Job No : 03542AT
 Mode : 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1805.000	4.46	27.00	38.43	51.35	44.38	74.00	-29.62	Peak
2	2707.500	5.35	29.70	36.72	46.53	44.86	74.00	-29.14	Peak
3	3610.000	6.35	32.22	36.11	45.28	47.74	74.00	-26.26	Peak
4	4512.500	7.13	33.52	35.72	46.00	50.93	74.00	-23.07	Peak
5	5415.000	7.75	34.63	35.18	44.08	51.28	74.00	-22.72	Peak
6	6317.500	8.42	34.97	35.12	44.84	53.11	74.00	-20.89	Peak



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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Low



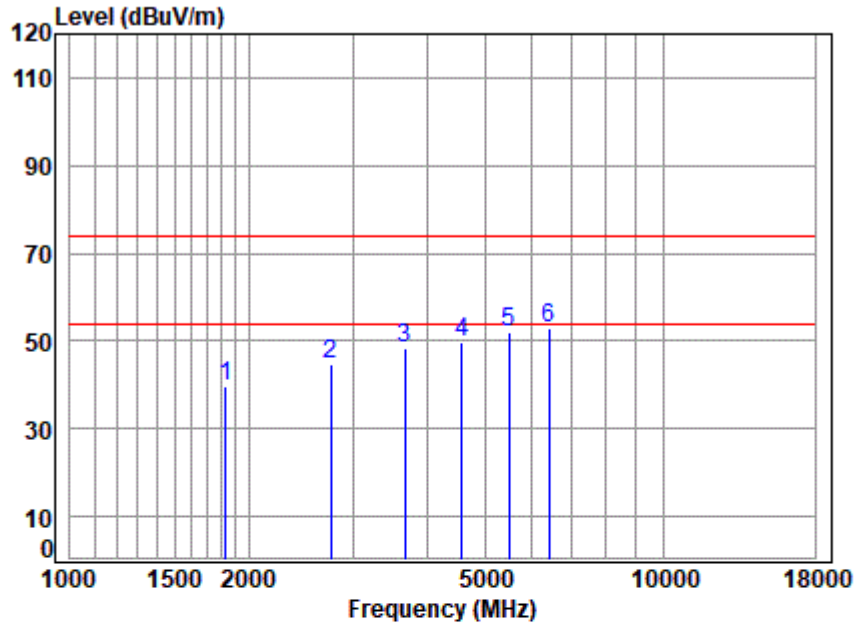
Site : chamber
 Condition: 3m VERTICAL
 Job No : 03542AT
 Mode : 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1805.000	4.46	27.00	38.43	57.23	50.26	74.00	-23.74	Peak
2	2707.500	5.35	29.70	36.72	48.01	46.34	74.00	-27.66	Peak
3	3610.000	6.35	32.22	36.11	45.53	47.99	74.00	-26.01	Peak
4	4512.500	7.13	33.52	35.72	45.07	50.00	74.00	-24.00	Peak
5	5415.000	7.75	34.63	35.18	44.79	51.99	74.00	-22.01	Peak
6	6317.500	8.42	34.97	35.12	44.79	53.06	74.00	-20.94	Peak



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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Middle



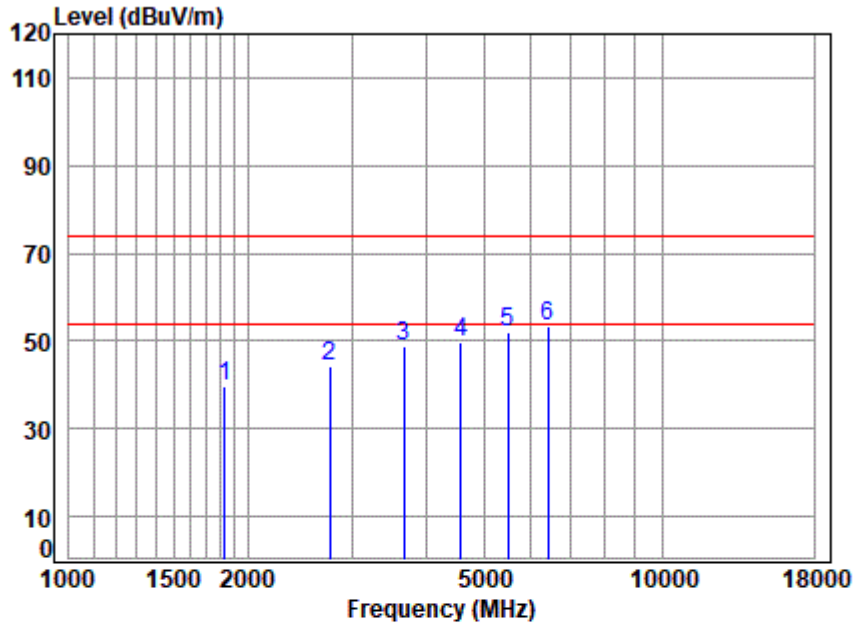
Site : chamber
 Condition: 3m HORIZONTAL
 Job No : 03542AT
 Mode : 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1831.000	4.49	27.00	38.43	46.84	39.90	74.00	-34.10	Peak
2	2746.500	5.38	29.70	36.64	46.18	44.62	74.00	-29.38	Peak
3	3662.000	6.41	32.77	36.11	45.30	48.37	74.00	-25.63	Peak
4	4579.250	7.17	33.30	35.67	44.92	49.72	74.00	-24.28	Peak
5	5493.000	7.81	34.53	35.14	44.82	52.02	74.00	-21.98	Peak
6	6408.500	8.49	35.25	35.19	44.59	53.14	74.00	-20.86	Peak



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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Middle



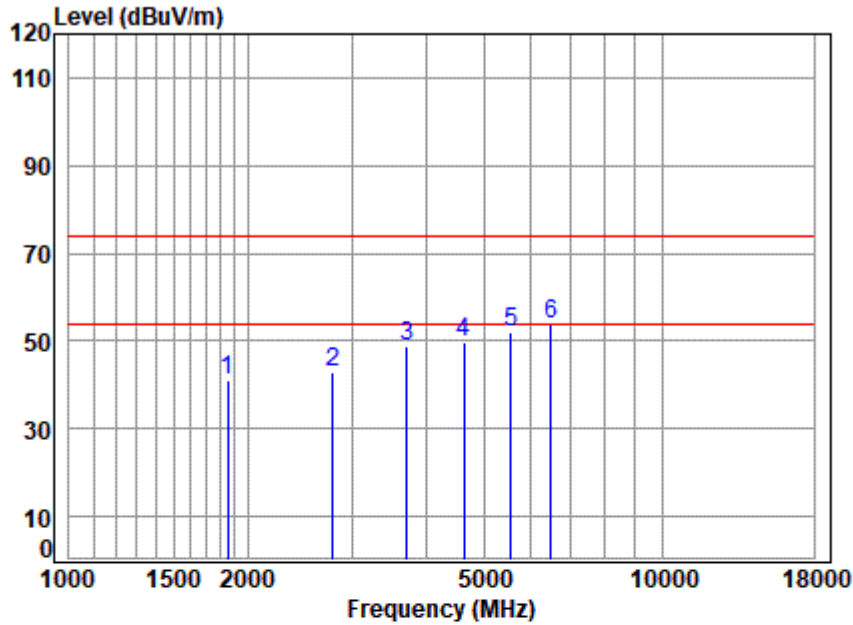
Site : chamber
 Condition: 3m VERTICAL
 Job No : 03542AT
 Mode : 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1831.000	4.49	27.00	38.43	46.64	39.70	74.00	-34.30	Peak
2	2746.500	5.38	29.70	36.64	45.76	44.20	74.00	-29.80	Peak
3	3662.000	6.41	32.77	36.11	45.62	48.69	74.00	-25.31	Peak
4	4579.250	7.17	33.30	35.67	44.87	49.67	74.00	-24.33	Peak
5	5493.000	7.81	34.53	35.14	44.88	52.08	74.00	-21.92	Peak
6	6408.500	8.49	35.25	35.19	44.76	53.31	74.00	-20.69	Peak



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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:High



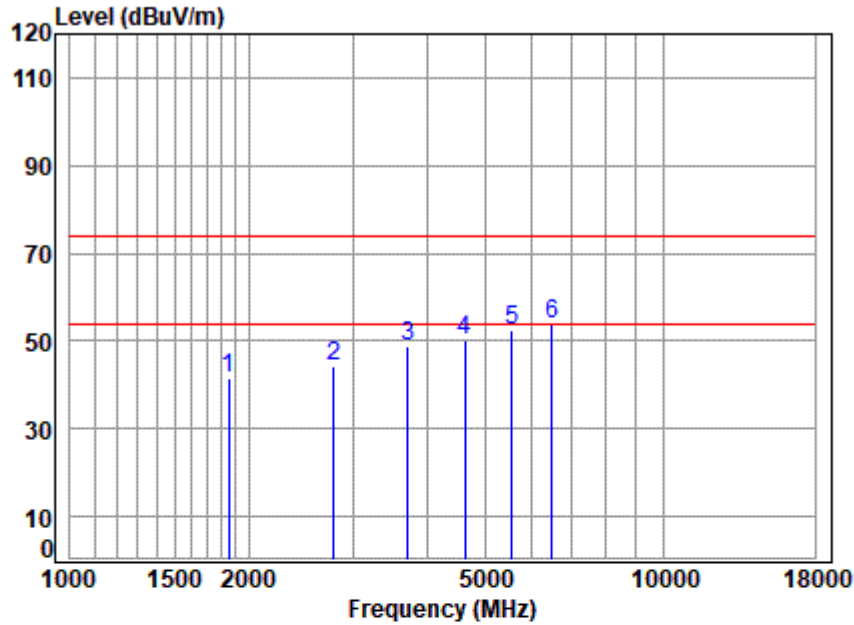
Site : chamber
 Condition: 3m HORIZONTAL
 Job No : 03542AT
 Mode : 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	
1	1855.000	4.52	27.04	38.43	47.73	74.00	-33.14	Peak
2	2782.500	5.41	29.76	36.57	44.44	74.00	-30.96	Peak
3	3710.000	6.47	32.98	36.11	45.51	74.00	-25.15	Peak
4	4637.500	7.21	33.38	35.63	44.90	74.00	-24.14	Peak
5	5565.000	7.86	34.70	35.10	44.41	74.00	-22.13	Peak
6 q	6492.500	8.55	35.58	35.24	44.83	74.00	-20.28	Peak



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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:High



Site : chamber
 Condition: 3m VERTICAL
 Job No : 03542AT
 Mode : 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1855.000	4.52	27.04	38.43	48.47	41.60	74.00	-32.40	Peak
2	2782.500	5.41	29.76	36.57	45.75	44.35	74.00	-29.65	Peak
3	3710.000	6.47	32.98	36.11	45.64	48.98	74.00	-25.02	Peak
4	4637.500	7.21	33.38	35.63	45.01	49.97	74.00	-24.03	Peak
5	5565.000	7.86	34.70	35.10	44.84	52.30	74.00	-21.70	Peak
6	6492.500	8.55	35.58	35.24	44.78	53.67	74.00	-20.33	Peak



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8 Test Setup Photo

Refer to Test Setup Photos for SZCR2311003542AT

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2311003542AT



10 Appendix

1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

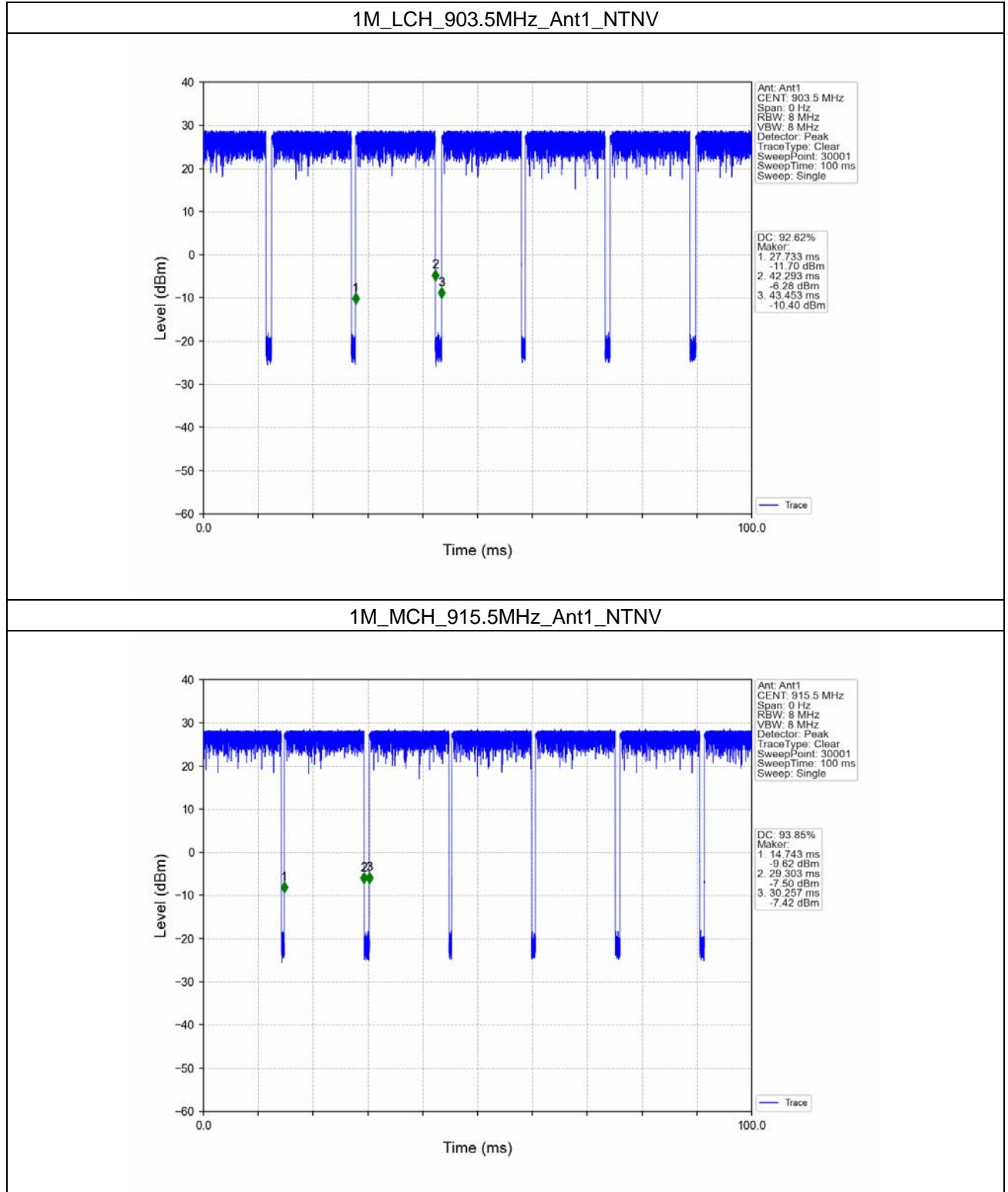
Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	903.5	14.560	15.720	92.62	0.33	2.83
		915.5	14.560	15.514	93.85	0.28	2.91
		926.5	14.557	15.823	92.00	0.36	4.45
2M	SISO	905	3.506	4.733	74.08	1.30	13.47
		915	3.506	4.734	74.06	1.30	12.35
		925	3.504	4.732	74.05	1.30	12.39
4M	SISO	906	1.809	2.999	60.32	2.20	17.59
		914	1.809	2.999	60.32	2.20	17.55
		922	1.810	3.000	60.33	2.19	17.59



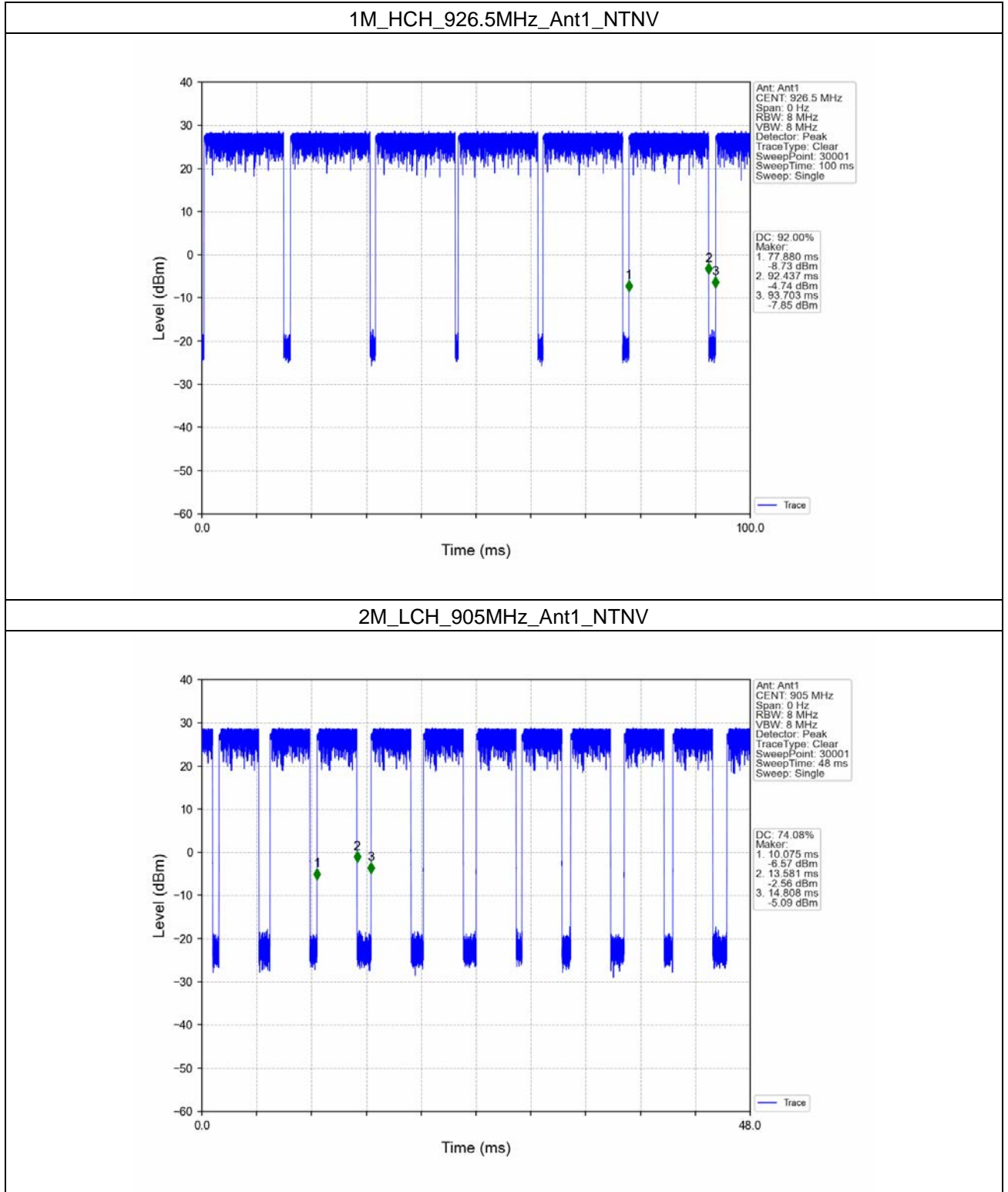
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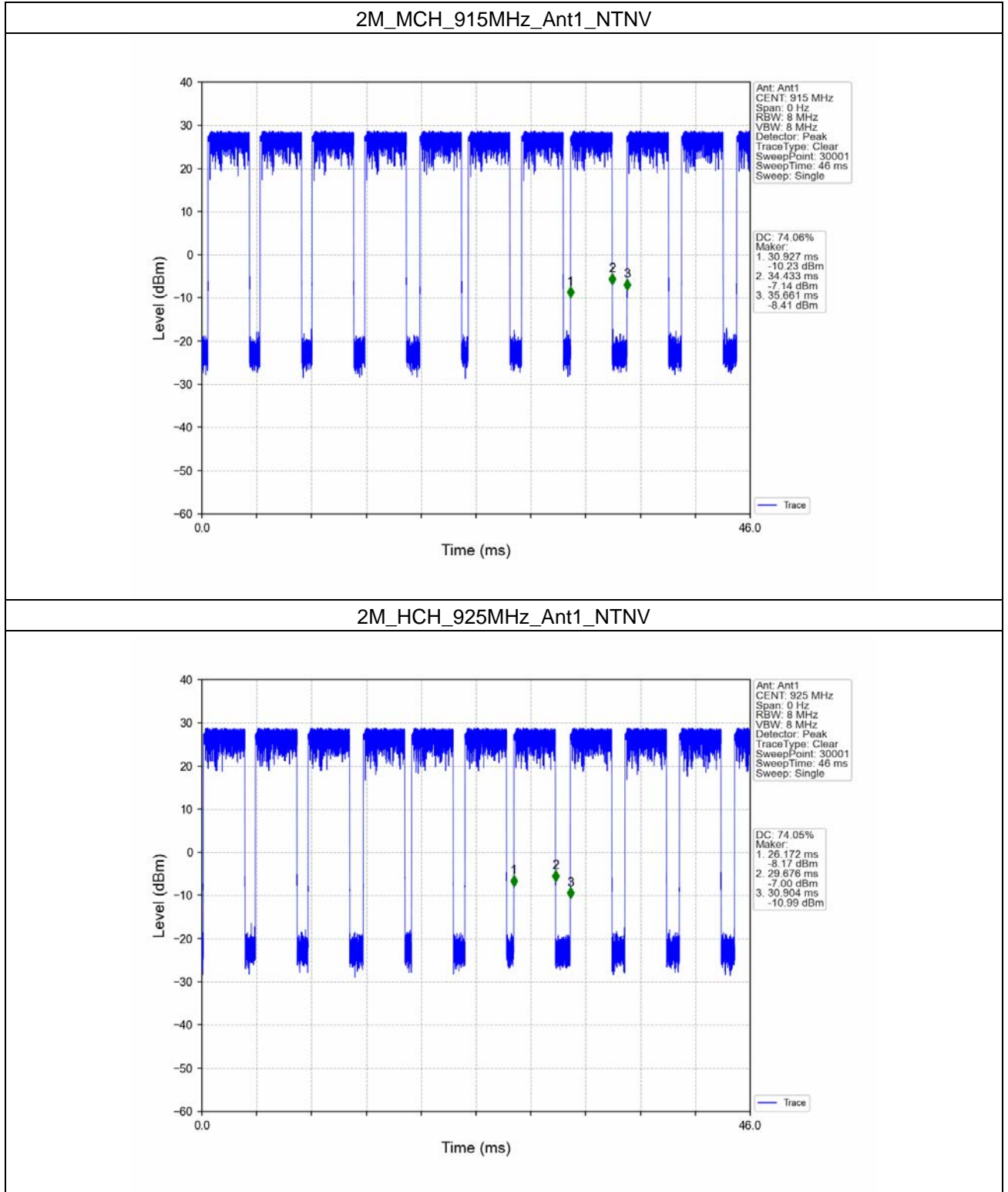
1.1.2 Test Graph



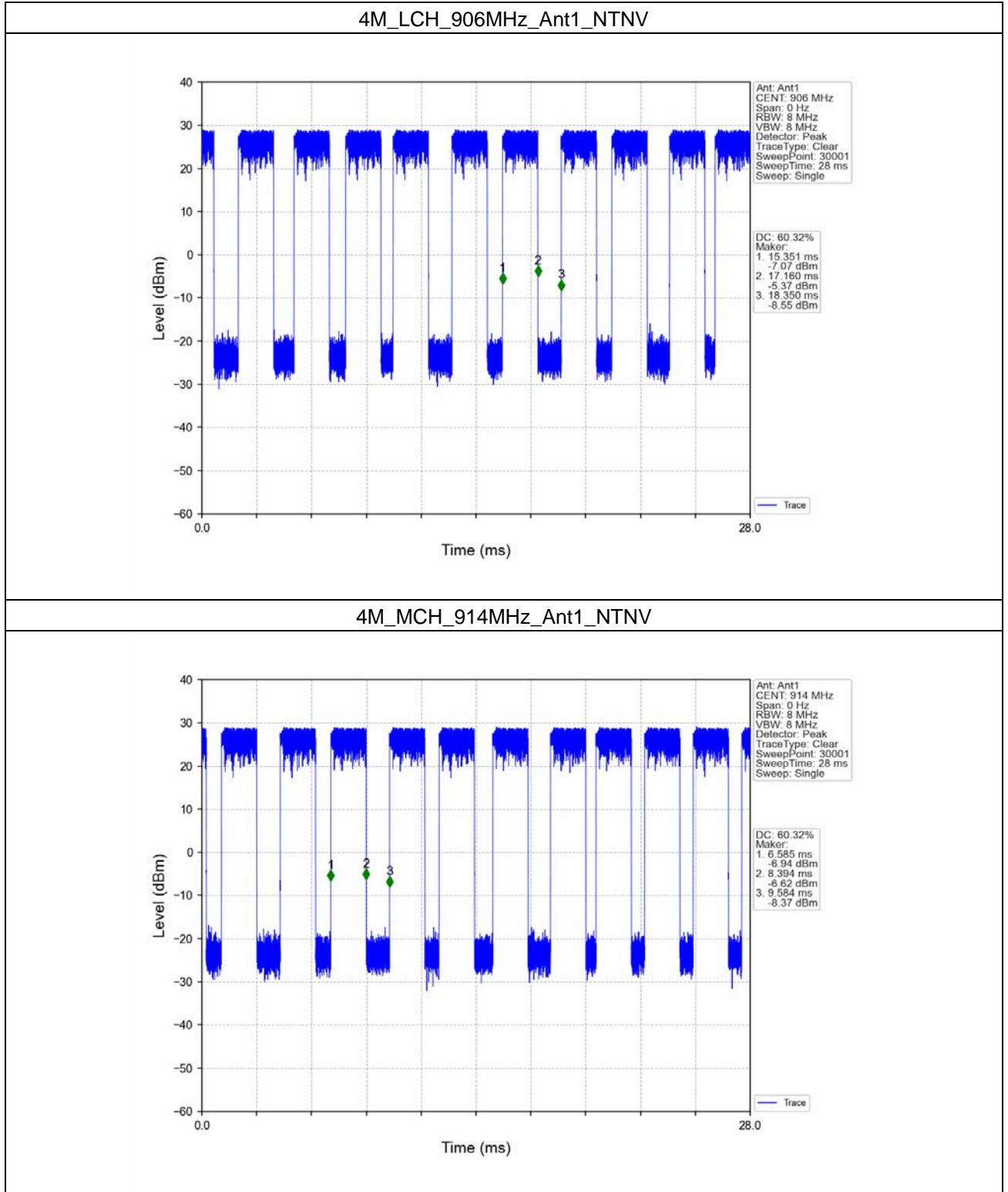
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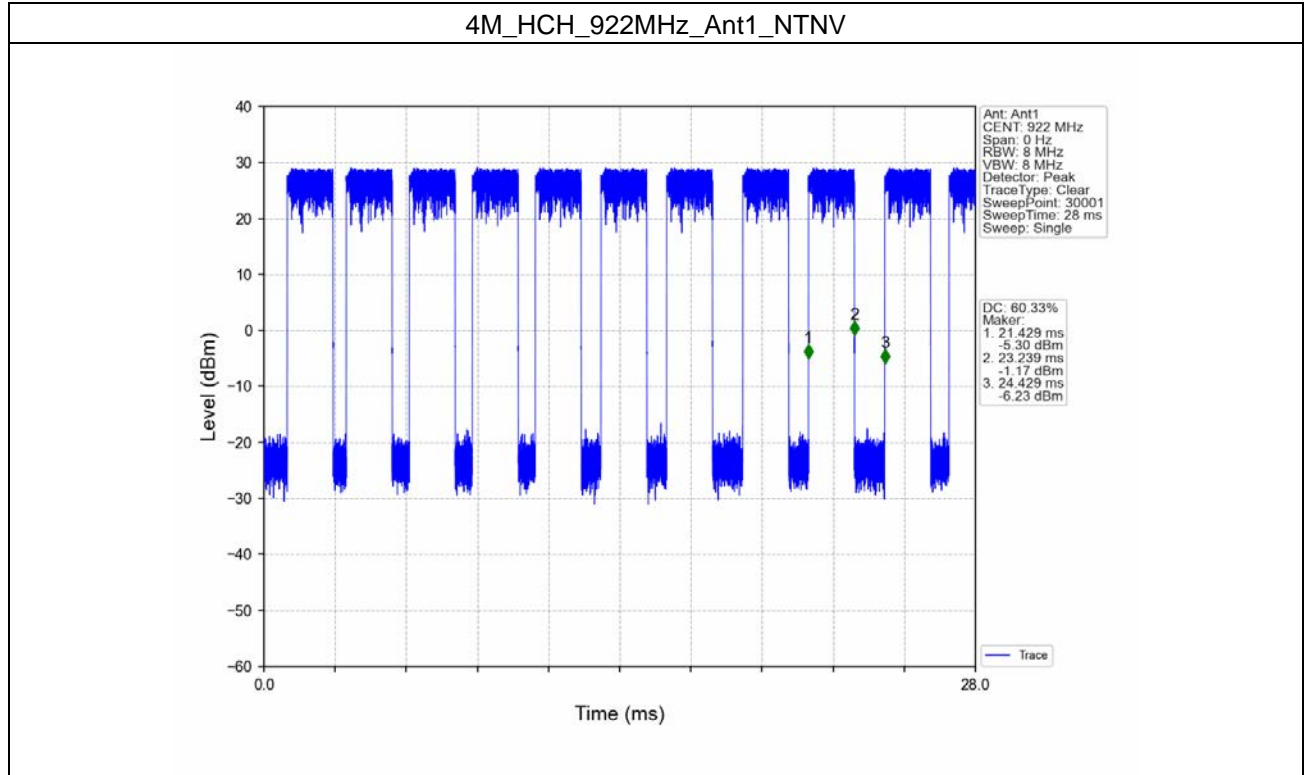
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 中国·广东·深圳市南山区科技园中区M-10栋1号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

2. Bandwidth

2.1 6dB BW

2.1.1 Test Result

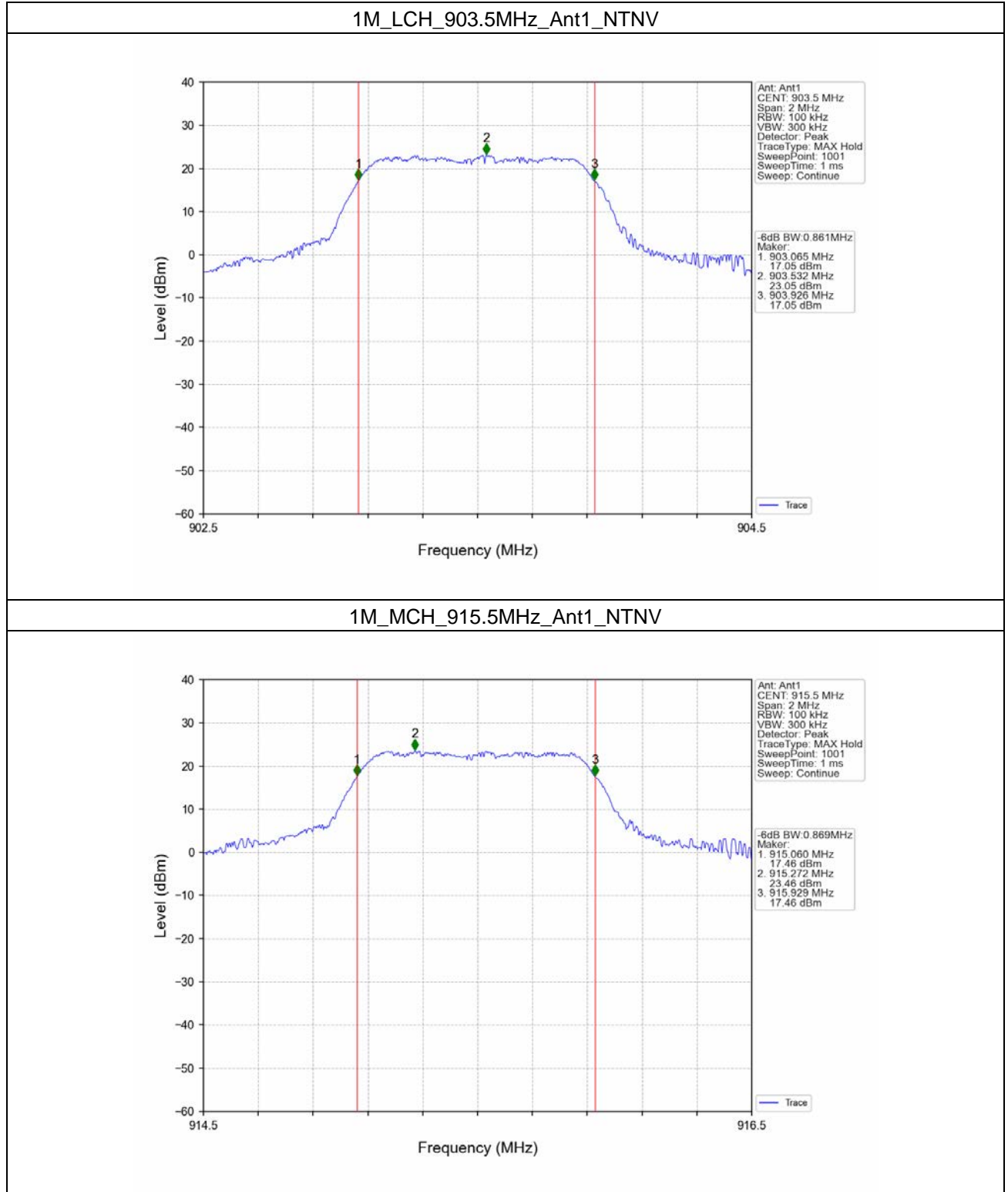
Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	903.5	1	0.861	>=0.5	Pass
		915.5	1	0.869	>=0.5	Pass
		926.5	1	0.865	>=0.5	Pass
2M	SISO	905	1	1.780	>=0.5	Pass
		915	1	1.780	>=0.5	Pass
		925	1	1.776	>=0.5	Pass
4M	SISO	906	1	3.625	>=0.5	Pass
		914	1	3.624	>=0.5	Pass
		922	1	3.623	>=0.5	Pass



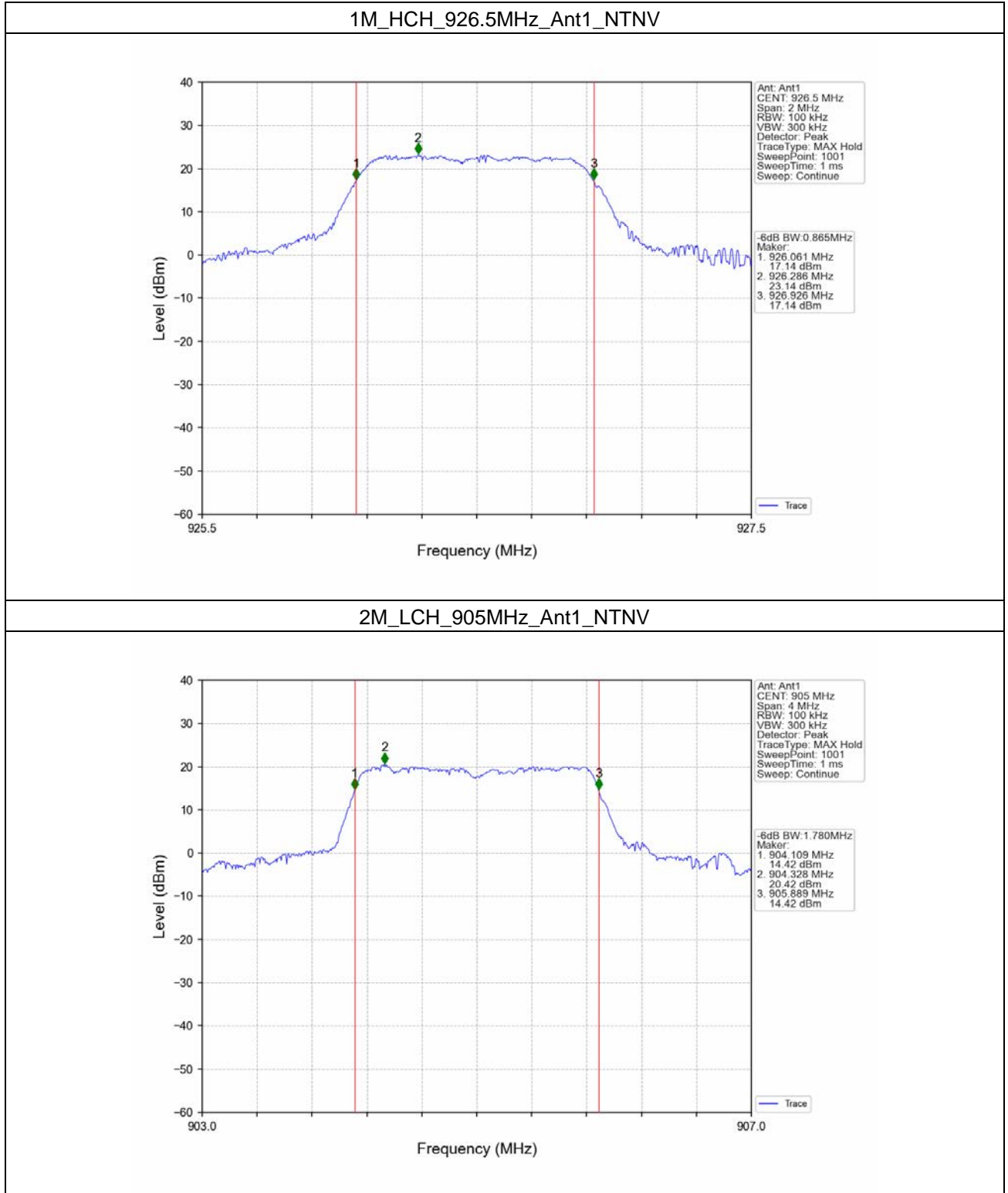
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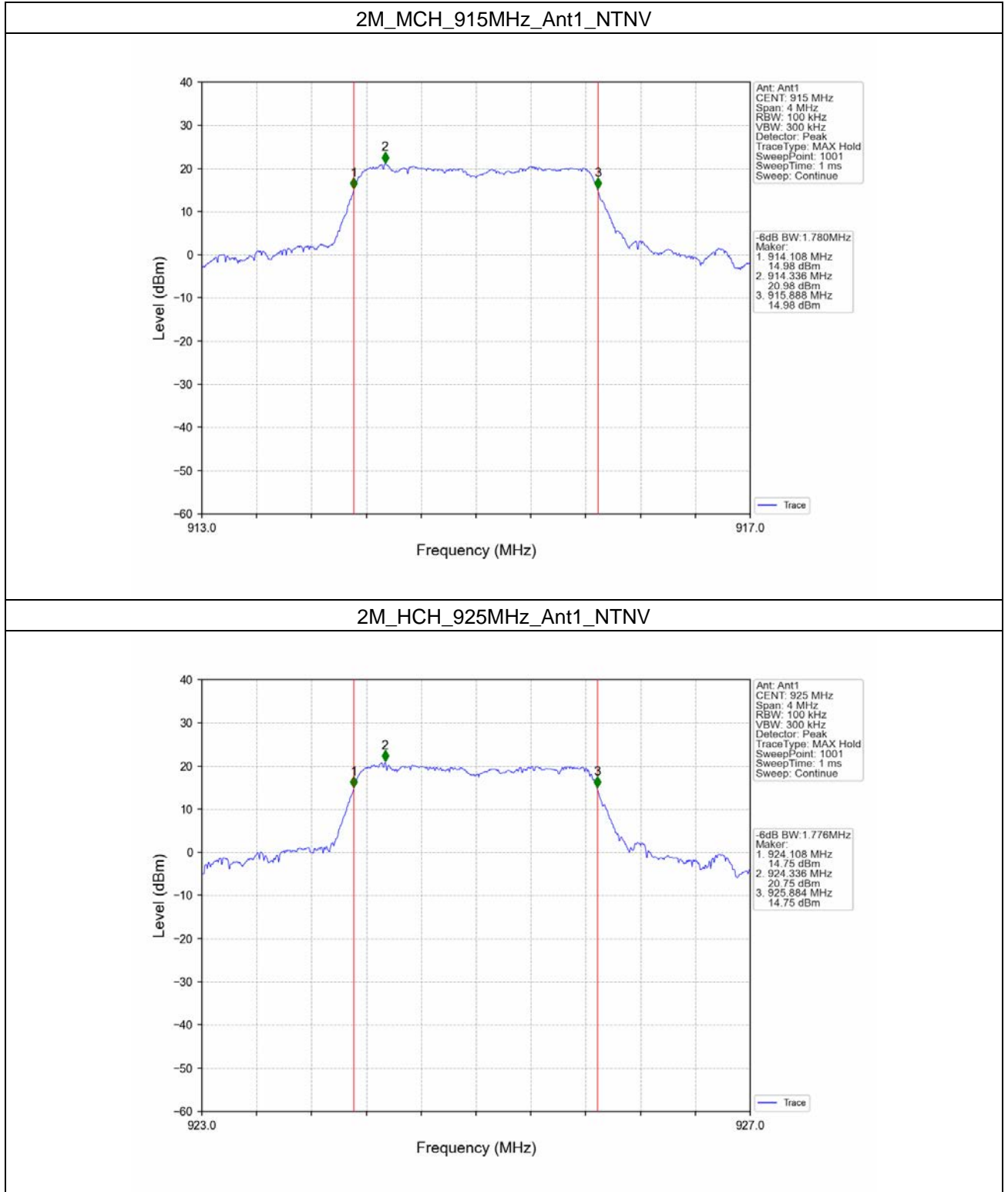
2.2.2 Test Graph



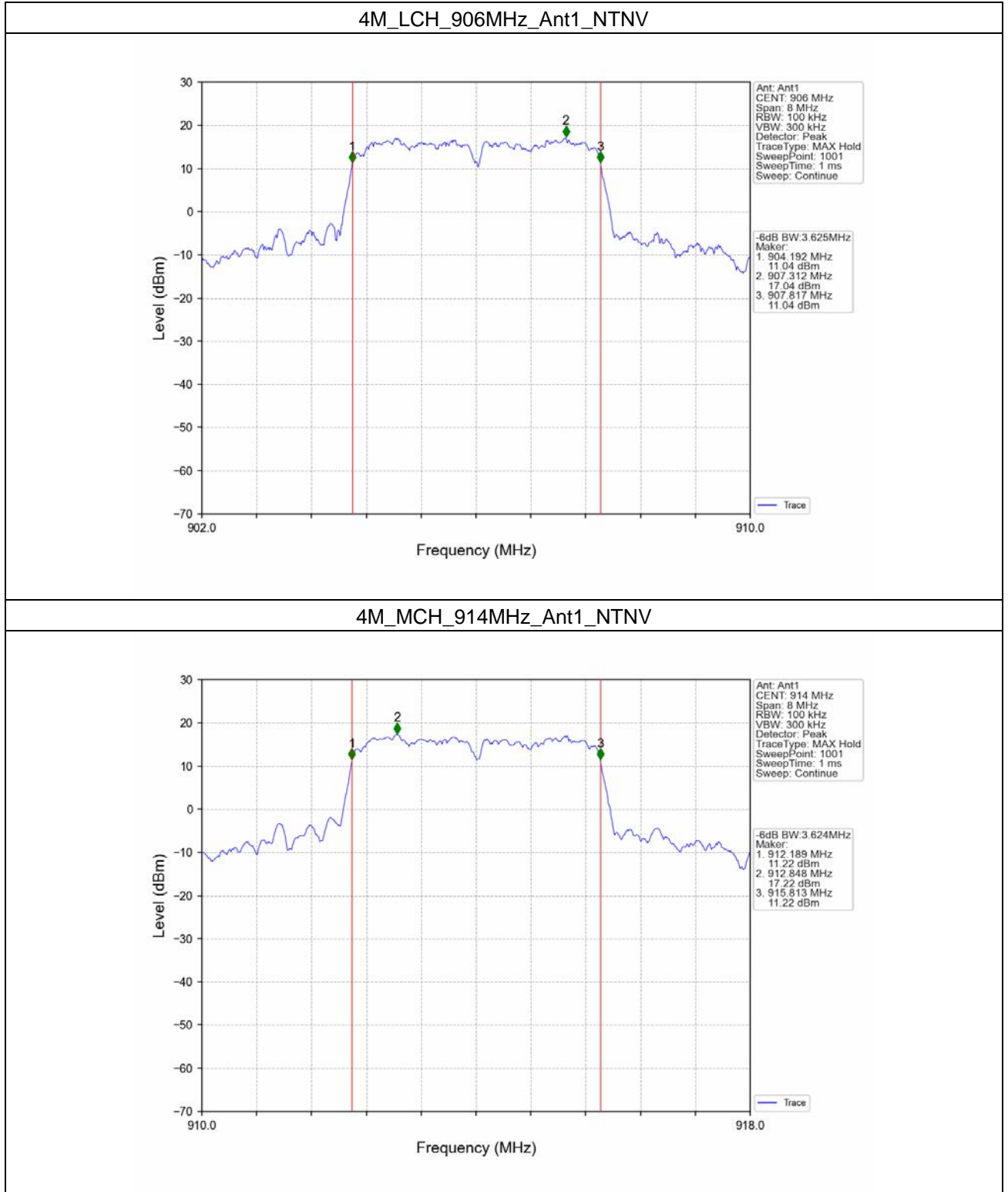
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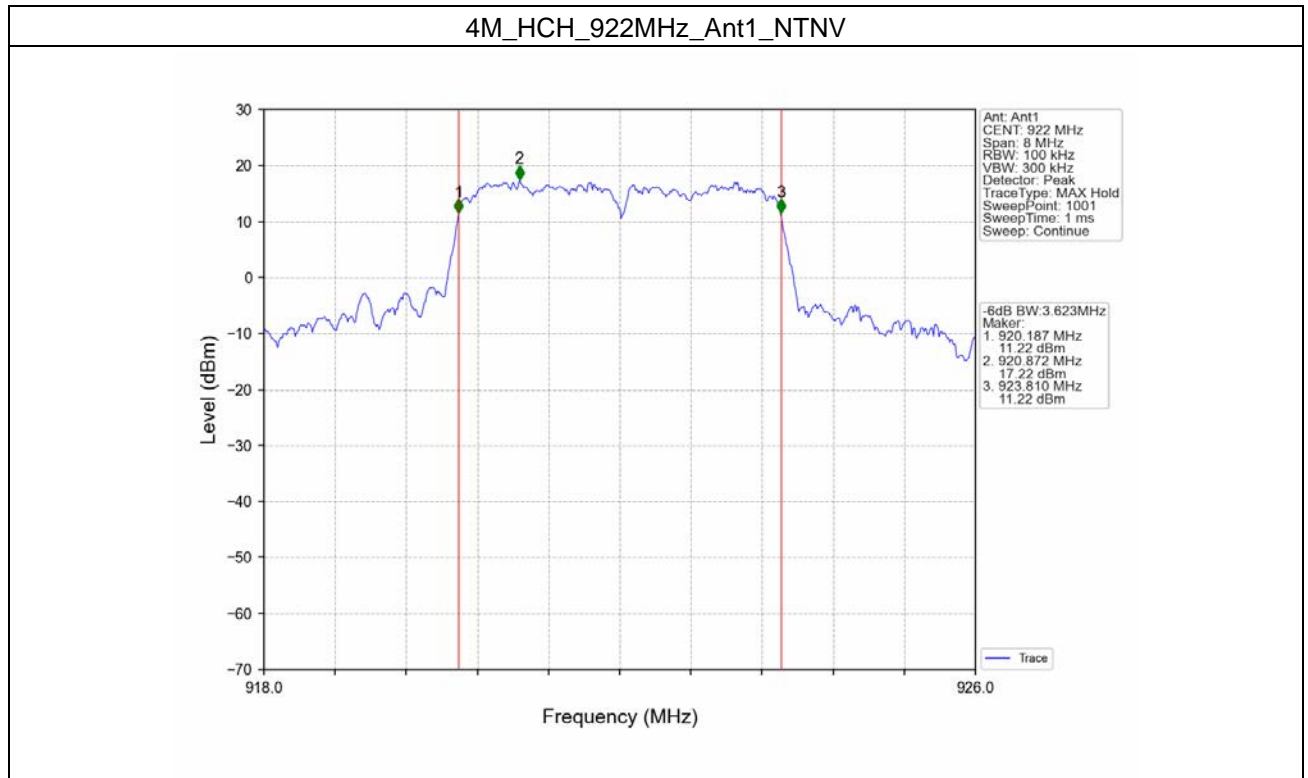
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3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	903.5	23.10	<=30	Pass
		915.5	23.88	<=30	Pass
		926.5	23.36	<=30	Pass
2M	SISO	905	23.87	<=30	Pass
		915	23.29	<=30	Pass
		925	23.94	<=30	Pass
4M	SISO	906	22.77	<=30	Pass
		914	22.49	<=30	Pass
		922	22.42	<=30	Pass

4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

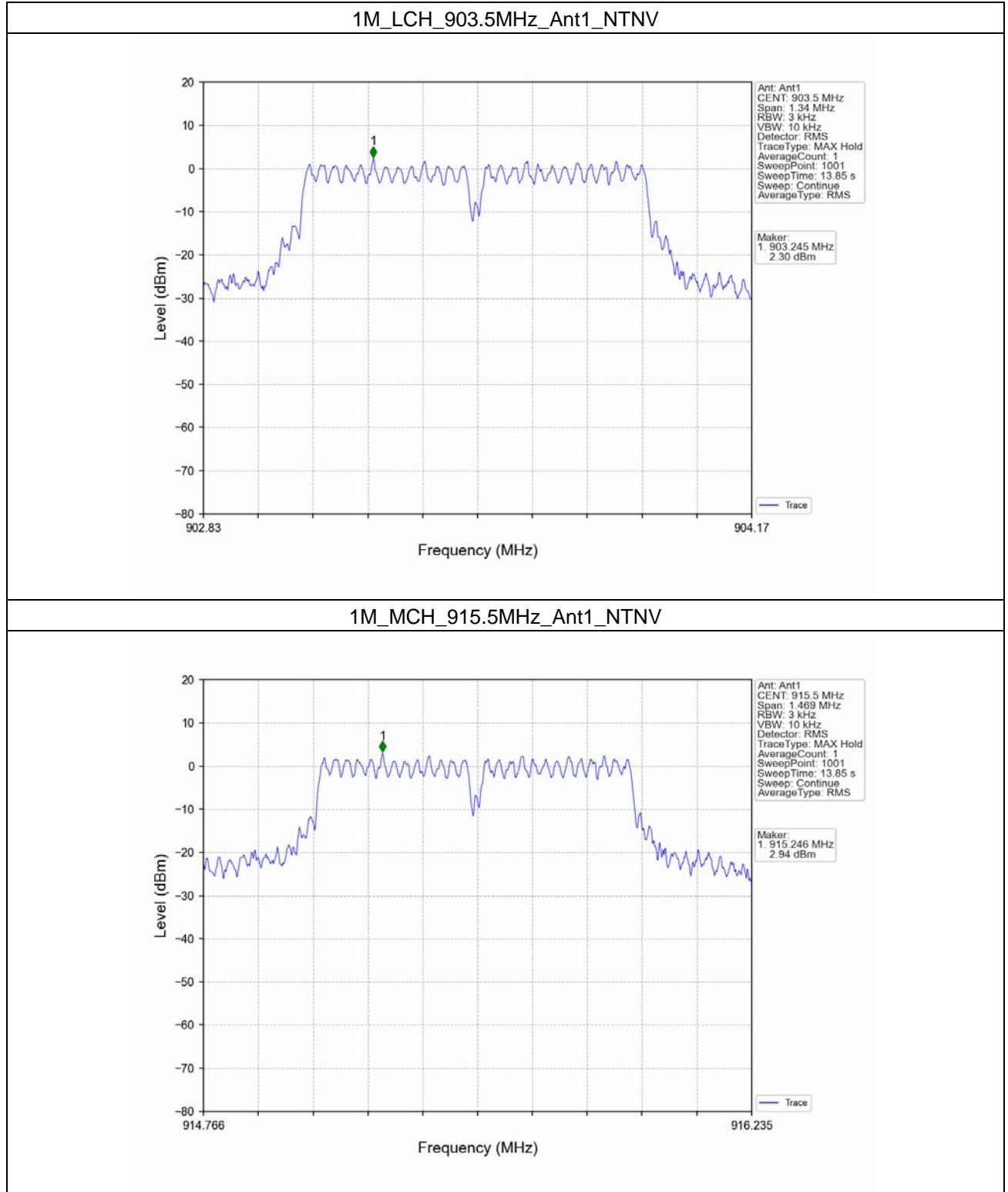
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	903.5	2.30	<=8	Pass
		915.5	2.94	<=8	Pass
		926.5	2.65	<=8	Pass
2M	SISO	905	7.57	<=8	Pass
		915	7.97	<=8	Pass
		925	7.93	<=8	Pass
4M	SISO	906	4.42	<=8	Pass
		914	5.07	<=8	Pass
		922	5.25	<=8	Pass



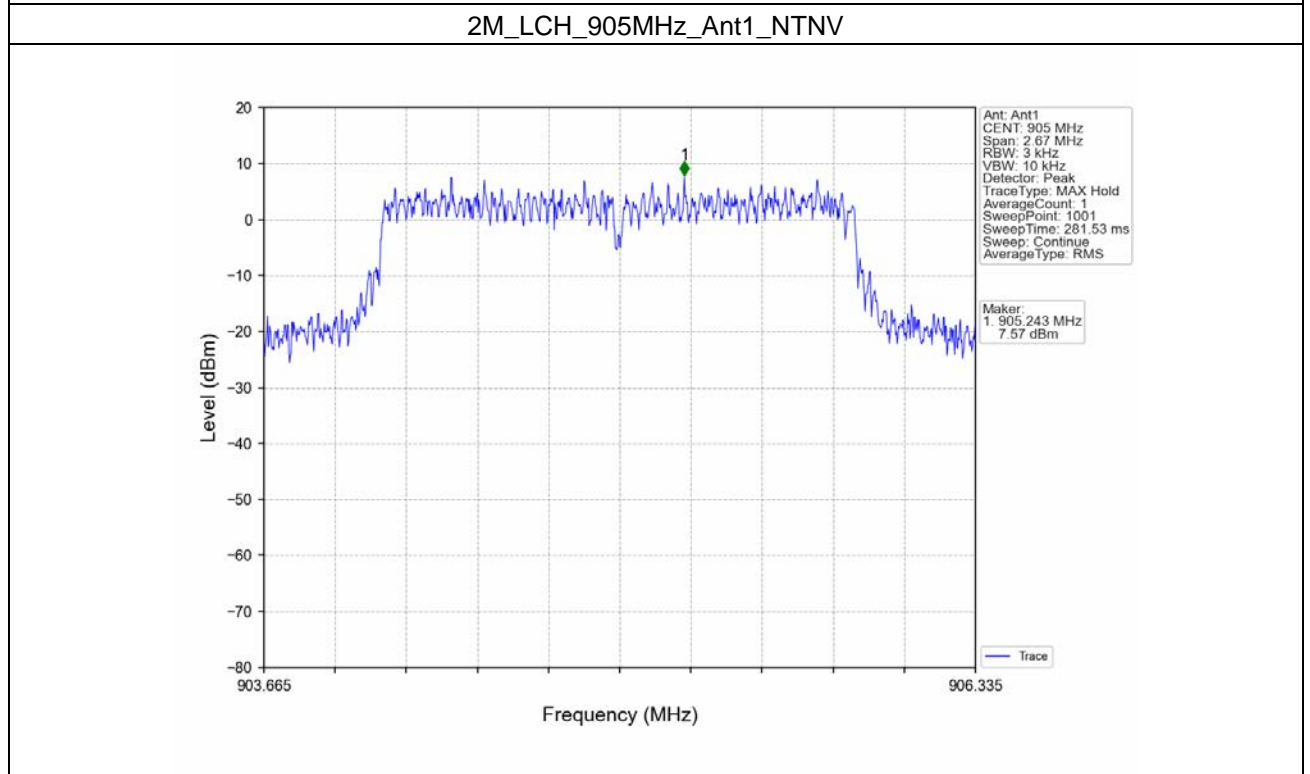
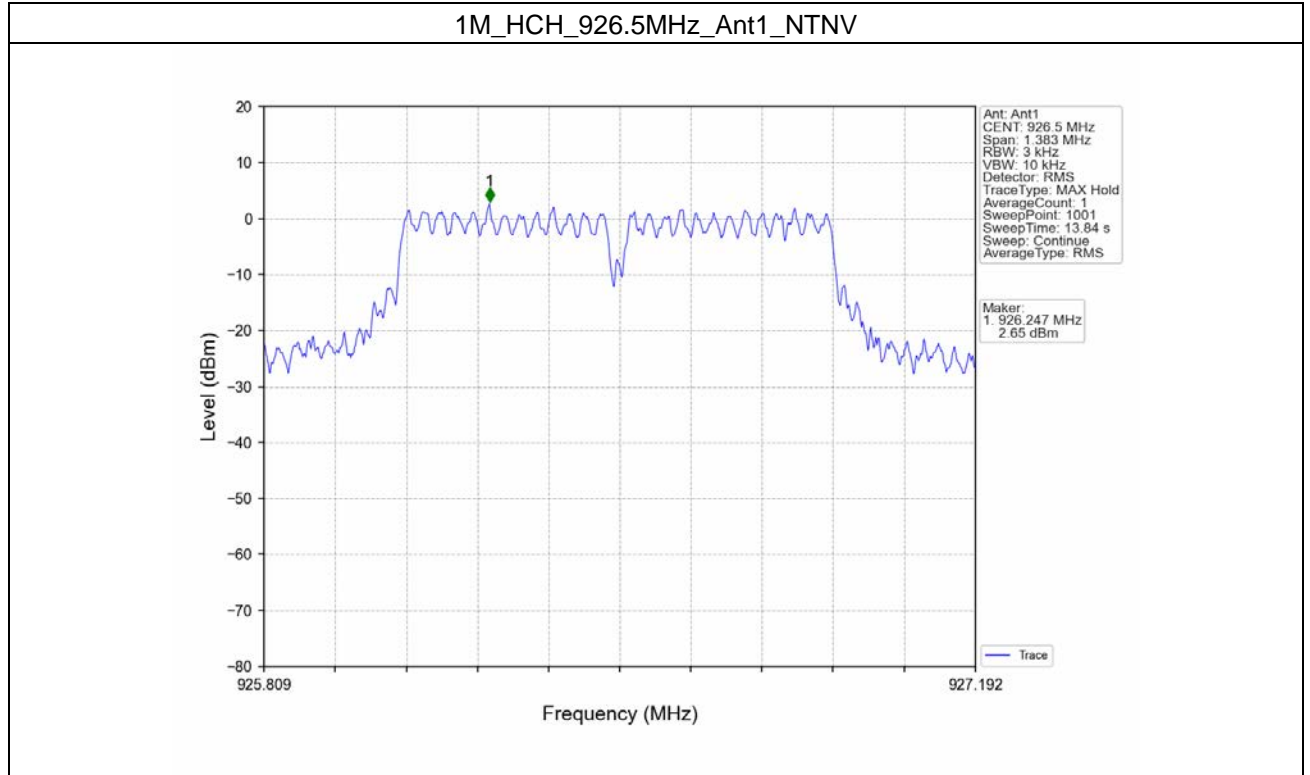
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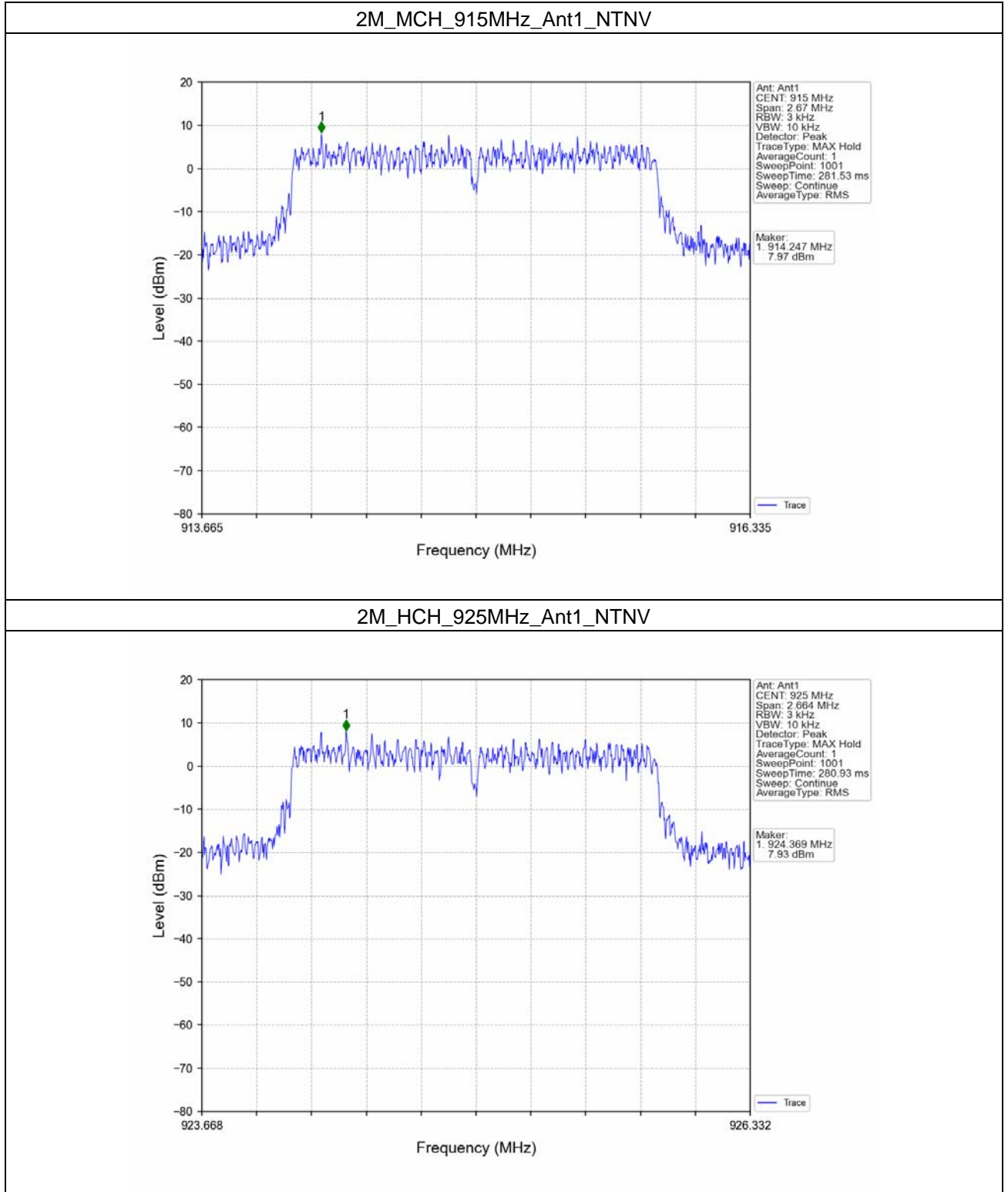
4.1.2 Test Graph



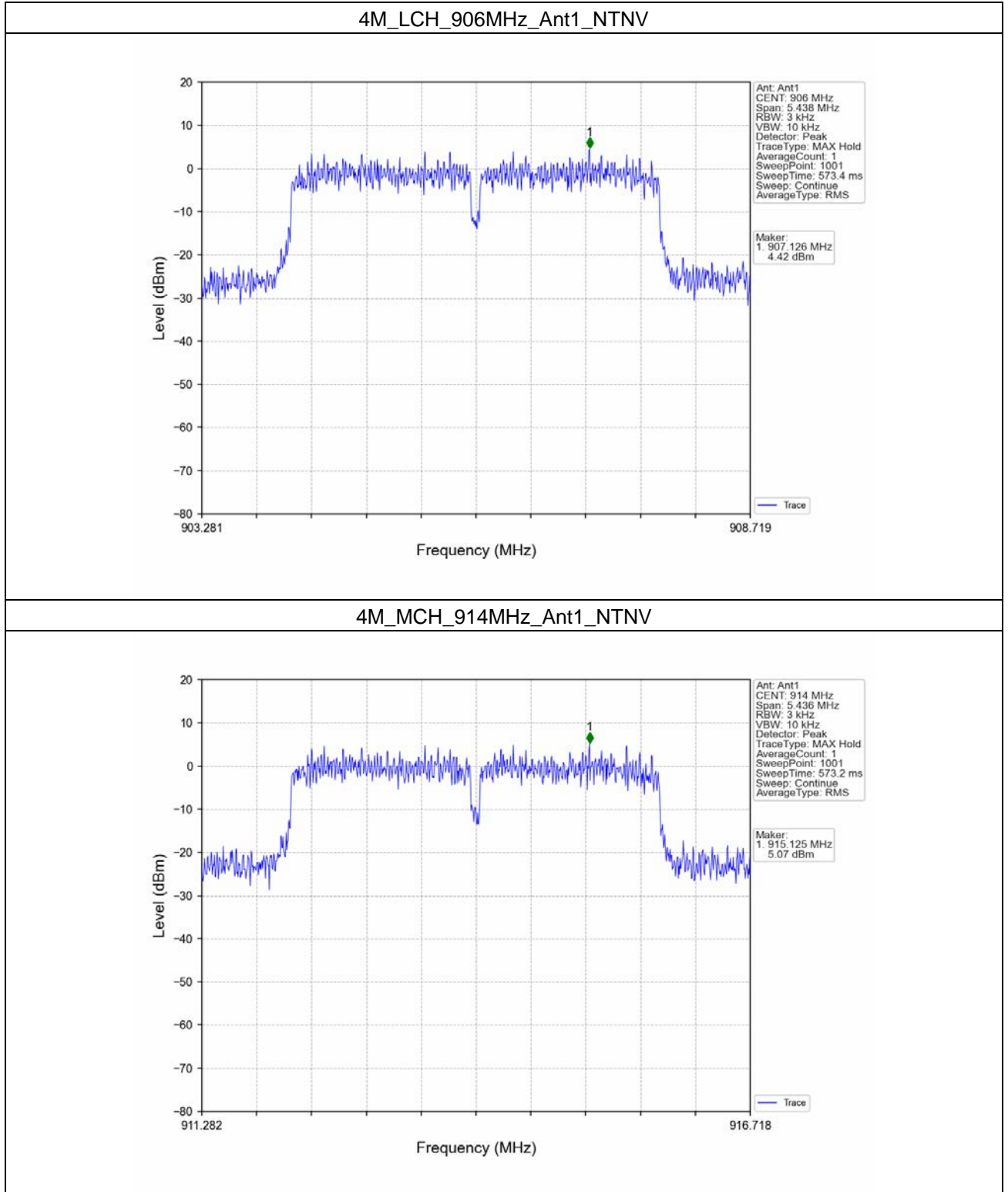
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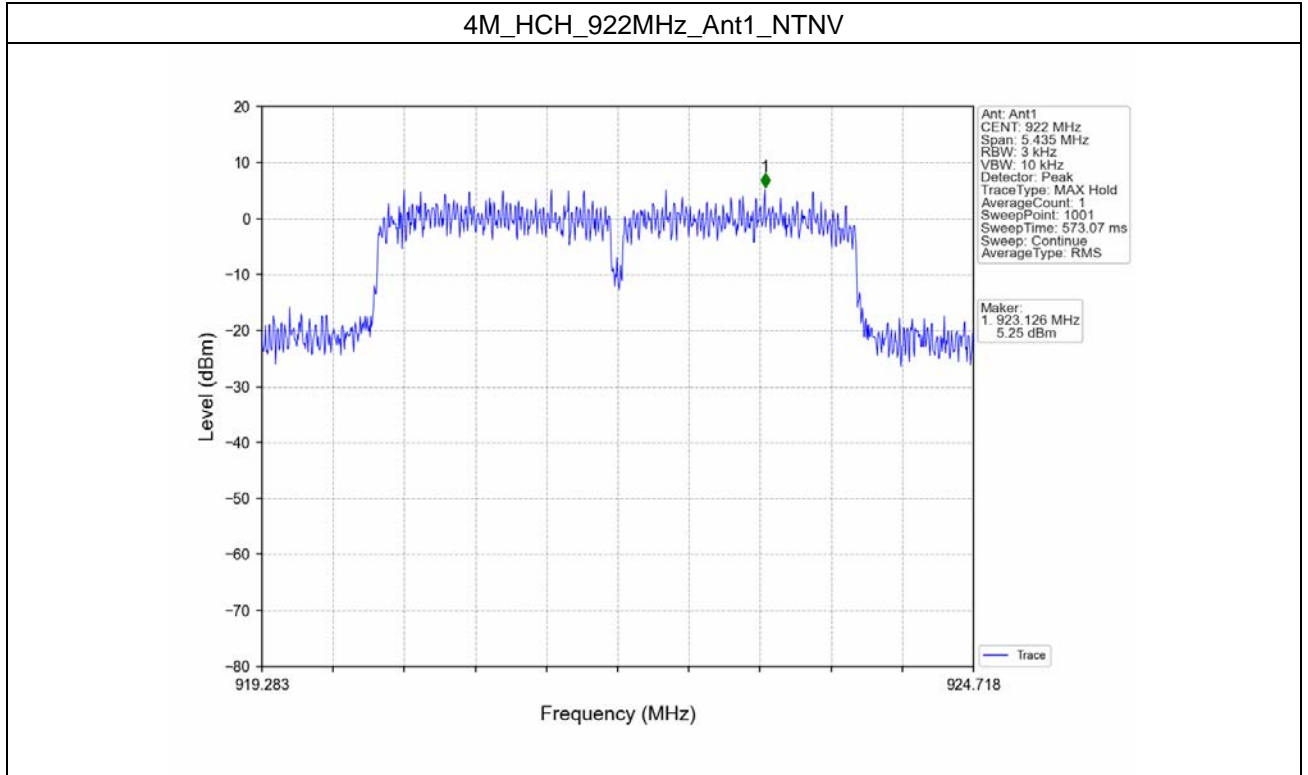
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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

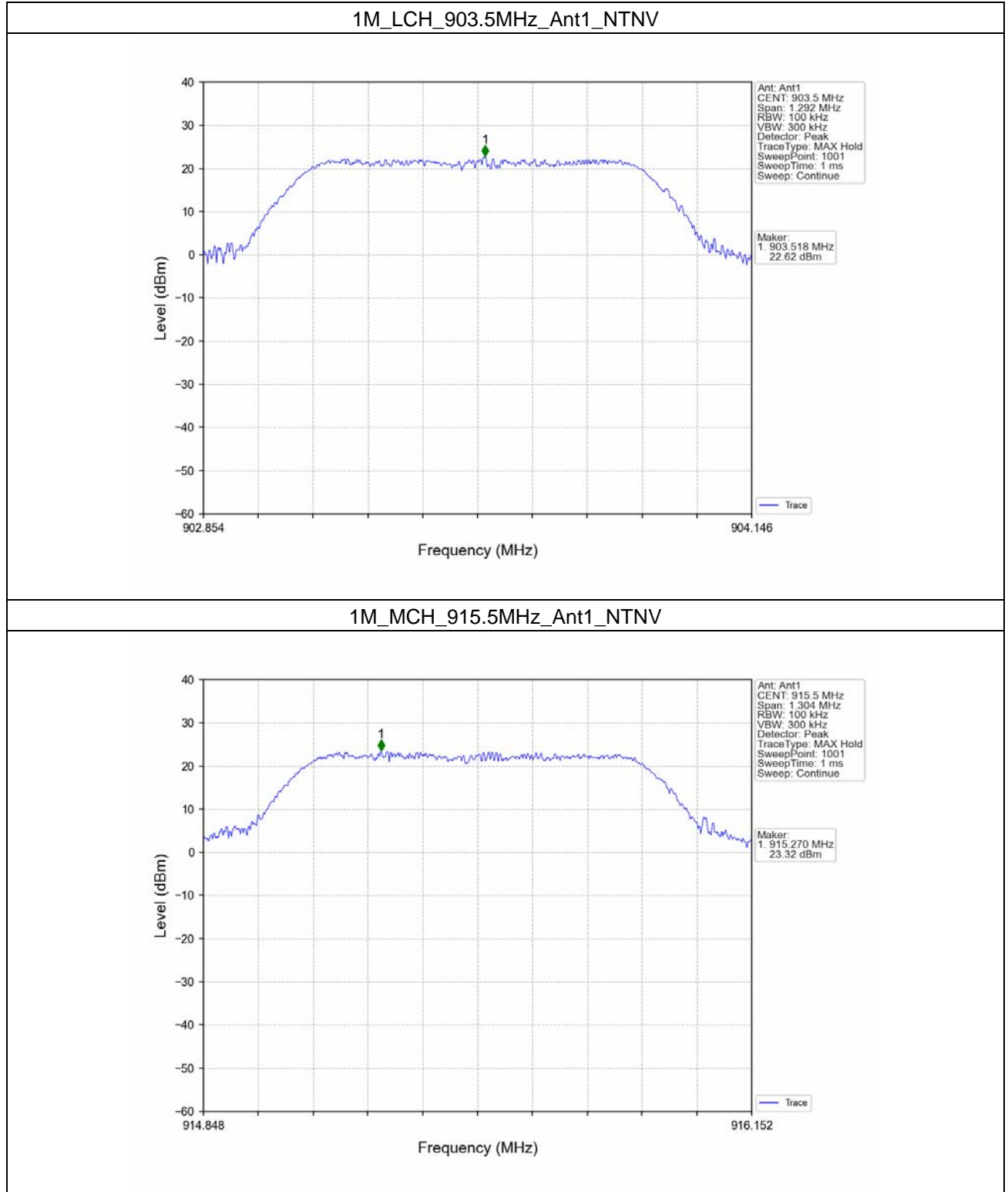
5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	903.5	1	22.62
		915.5	1	23.32
		926.5	1	22.67
2M	SISO	905	1	20.37
		915	1	20.98
		925	1	20.61
4M	SISO	906	1	16.89
		914	1	17.97
		922	1	18.51

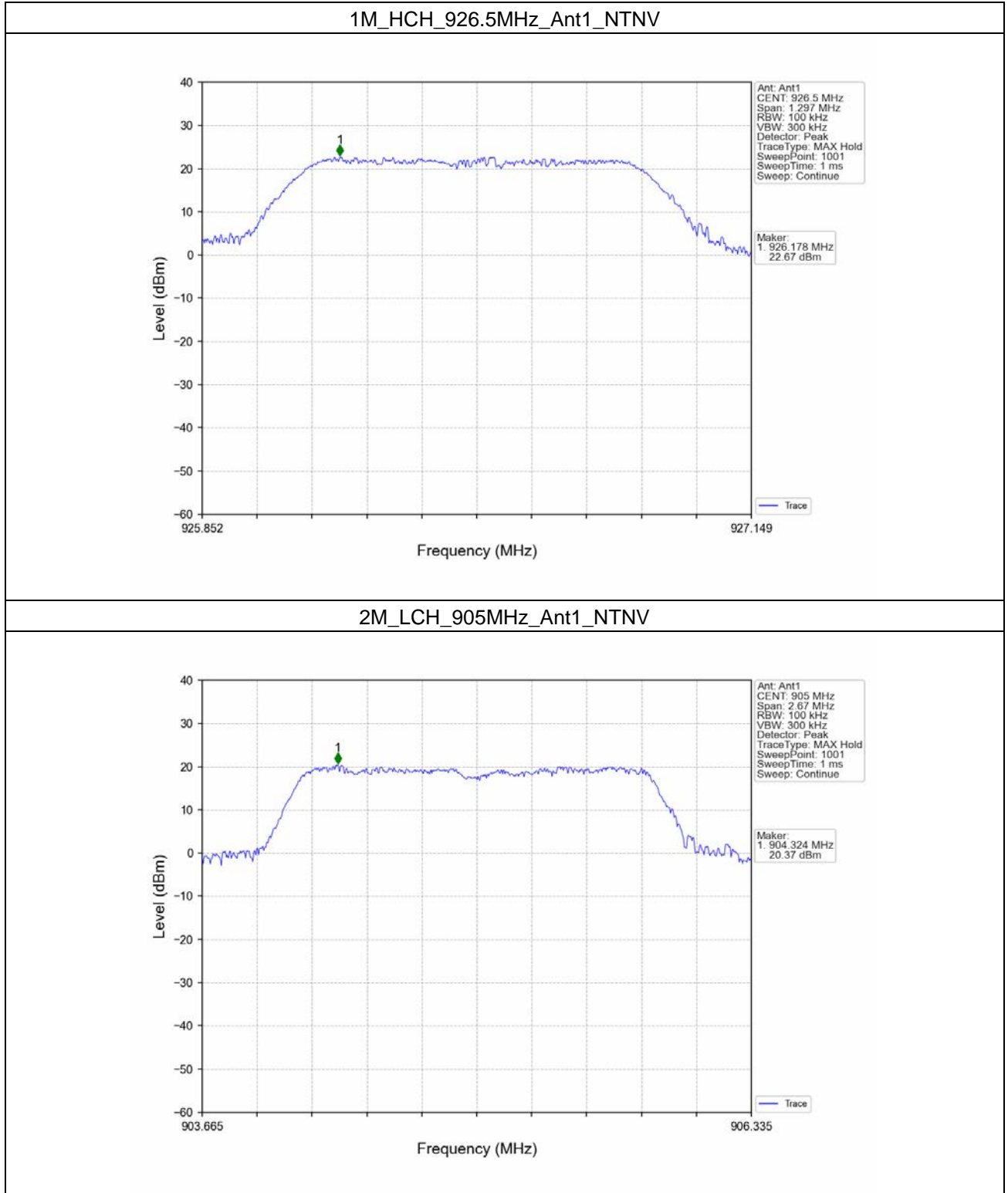
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



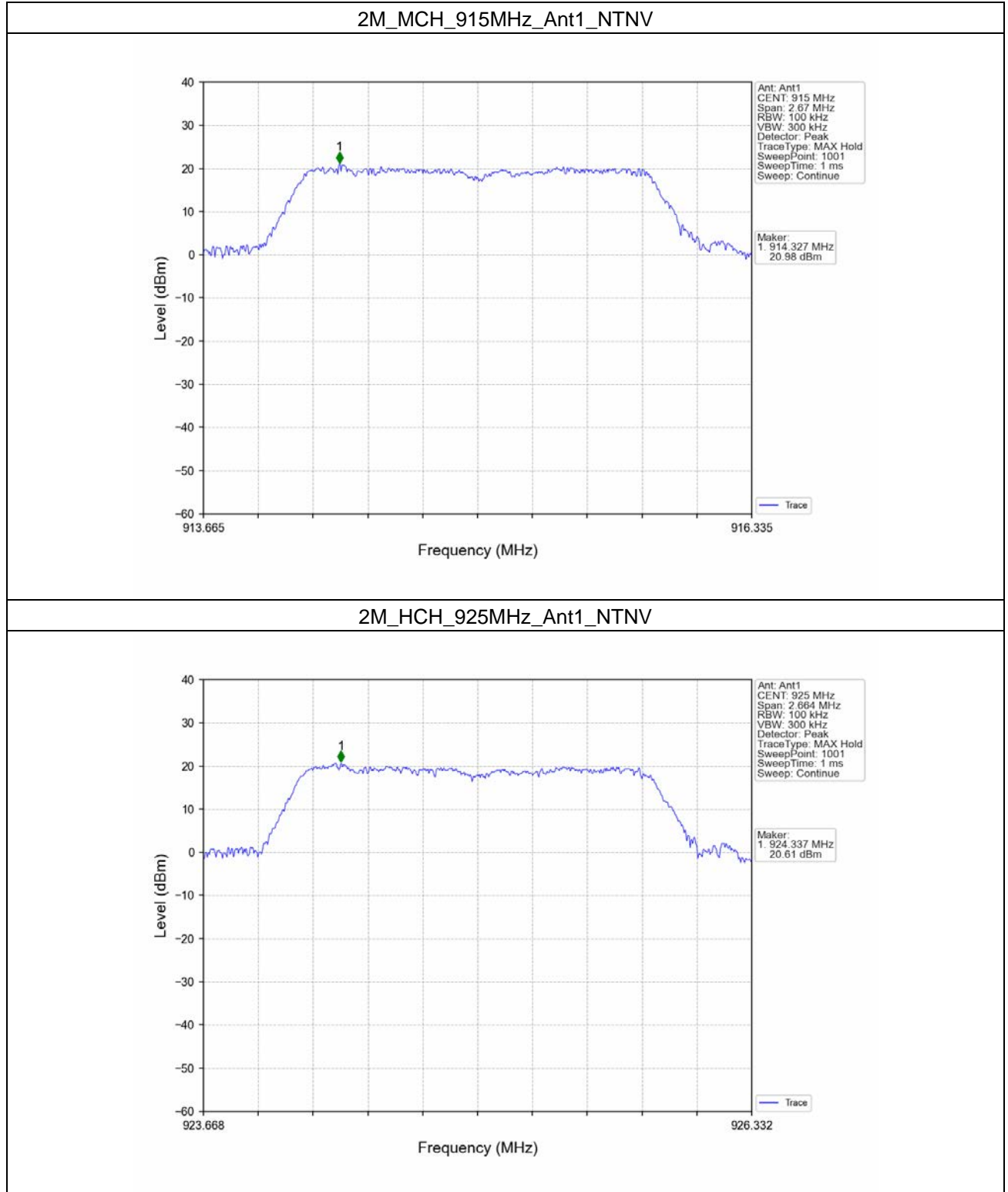
5.1.2 Test Graph



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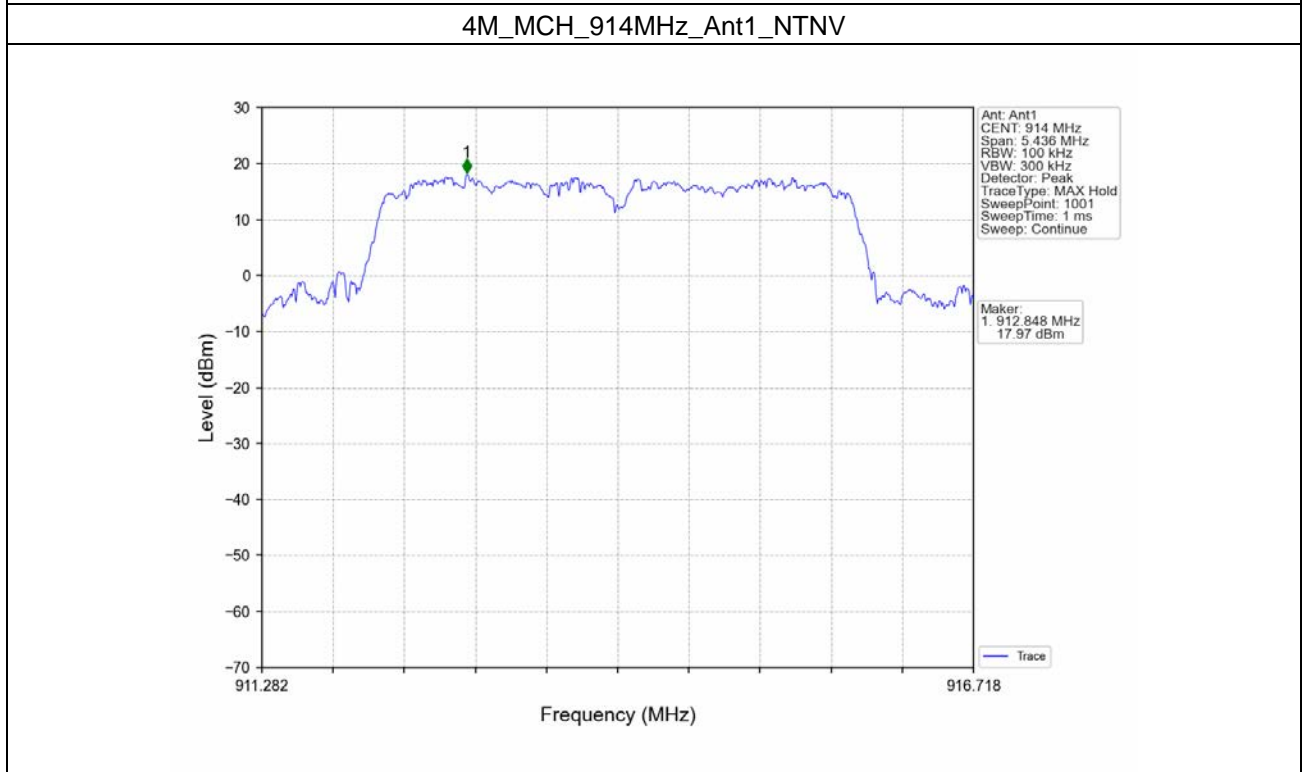
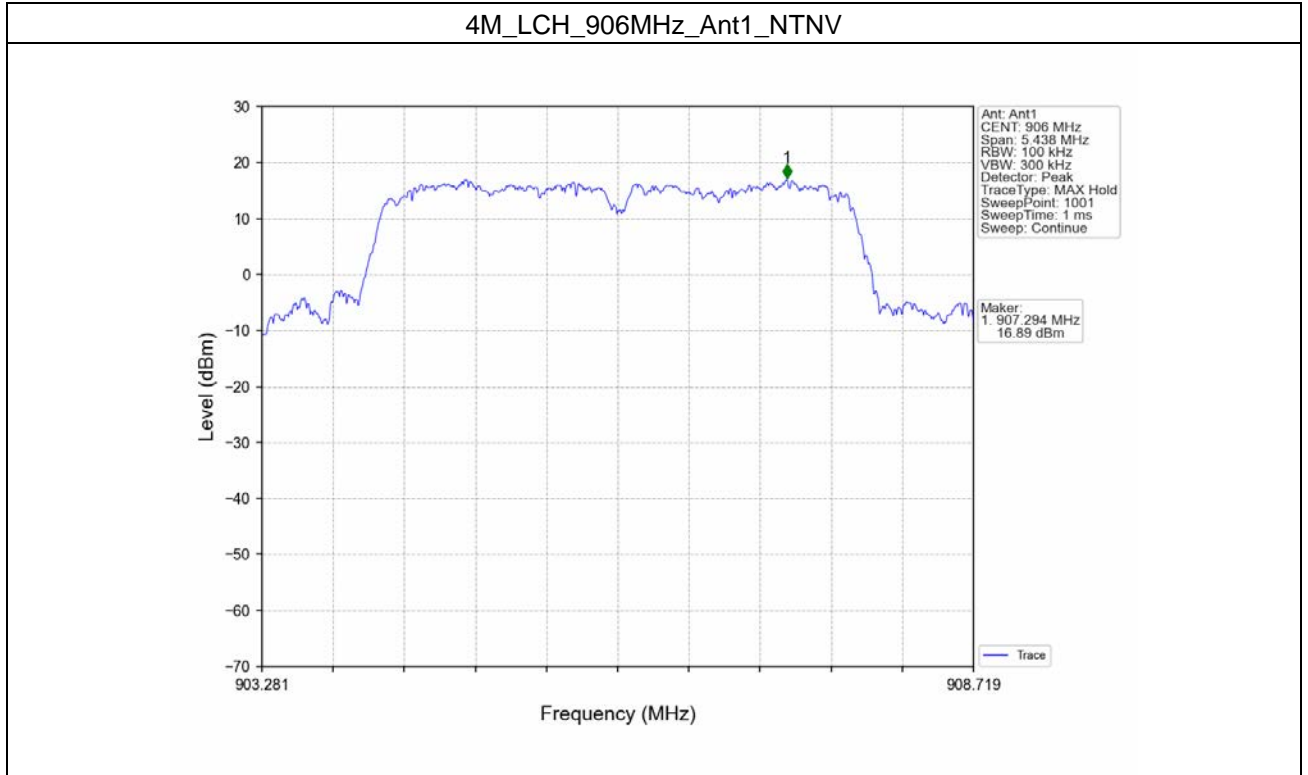


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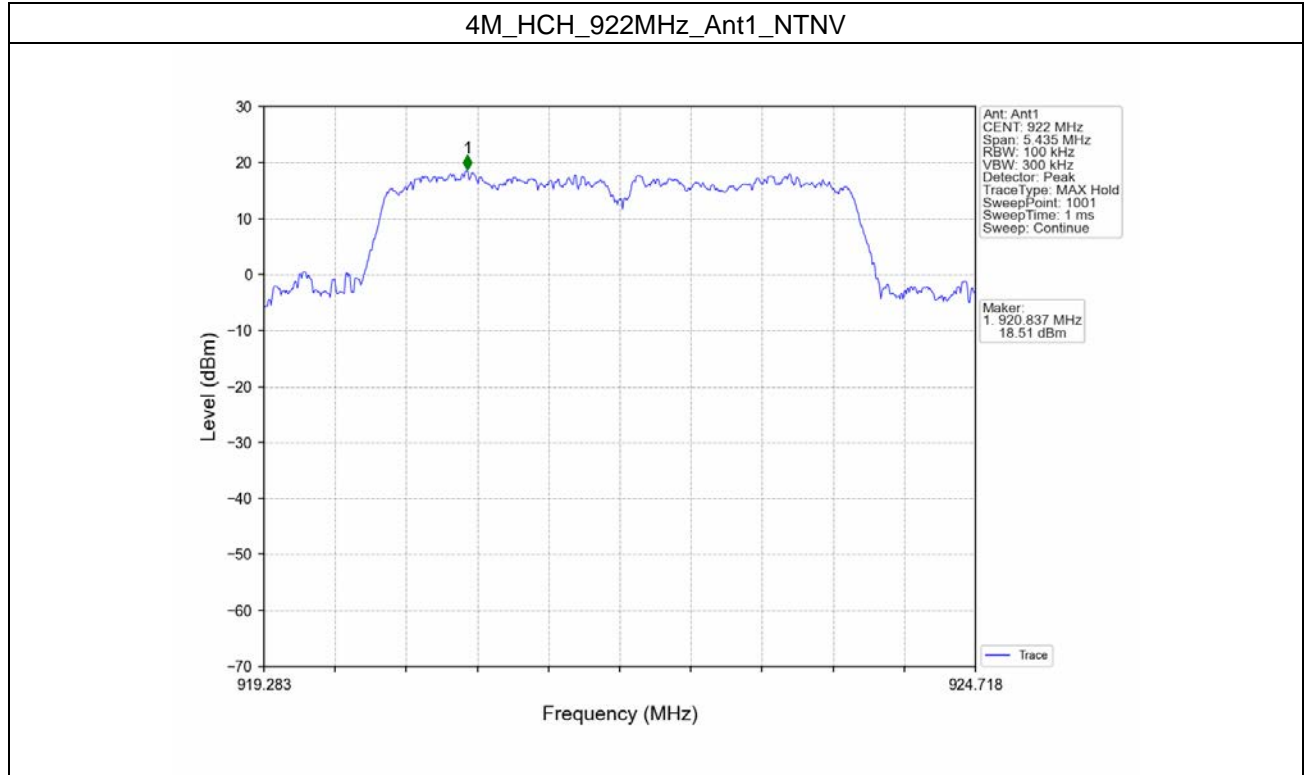


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5.2 CSE

5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	903.5	1	23.32	-6.68	Pass
		915.5	1	23.32	-6.68	Pass
		926.5	1	23.32	-6.68	Pass
2M	SISO	905	1	20.98	-9.02	Pass
		915	1	20.98	-9.02	Pass
		925	1	20.98	-9.02	Pass
4M	SISO	906	1	18.51	-11.49	Pass
		914	1	18.51	-11.49	Pass
		922	1	18.51	-11.49	Pass

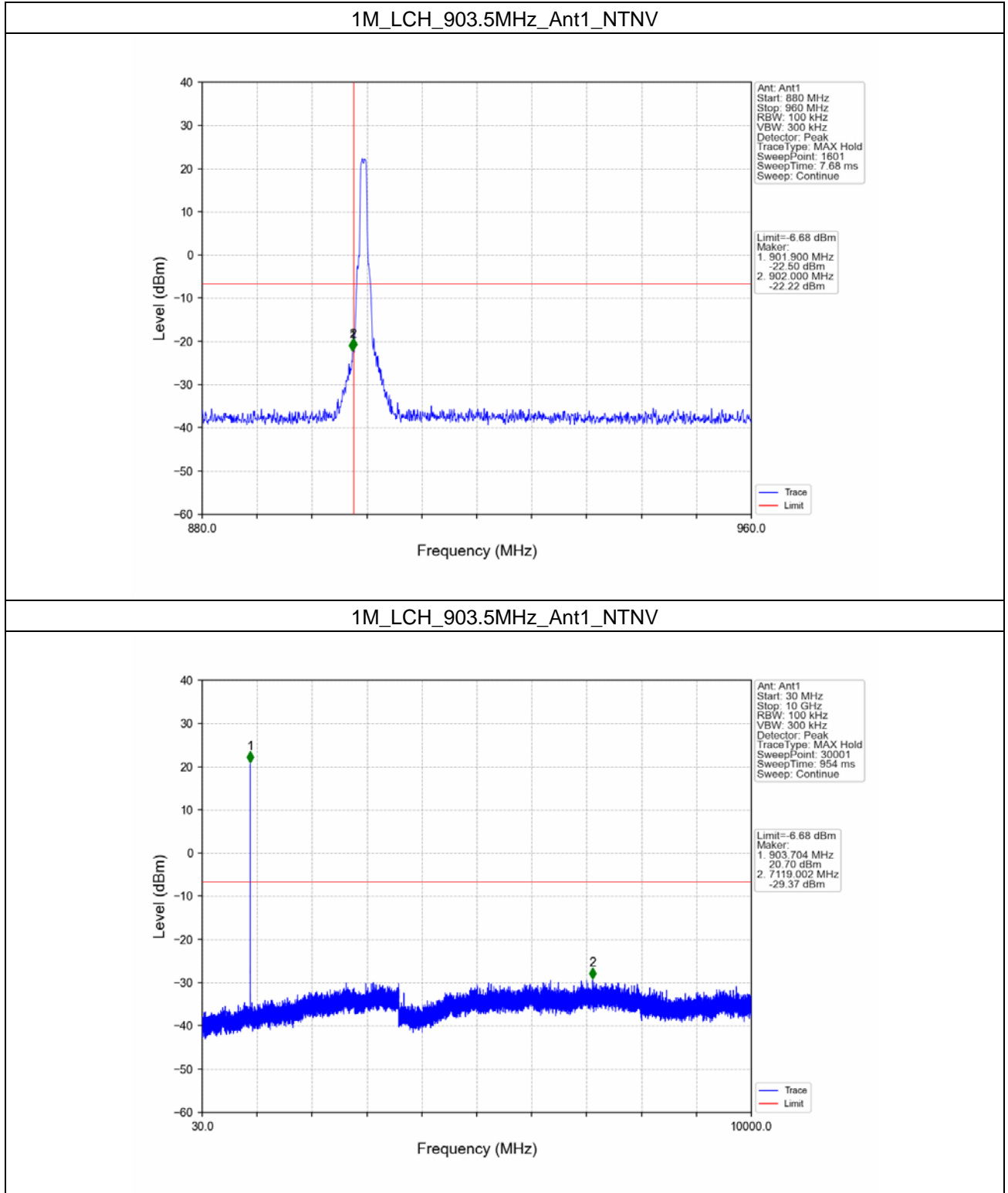
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



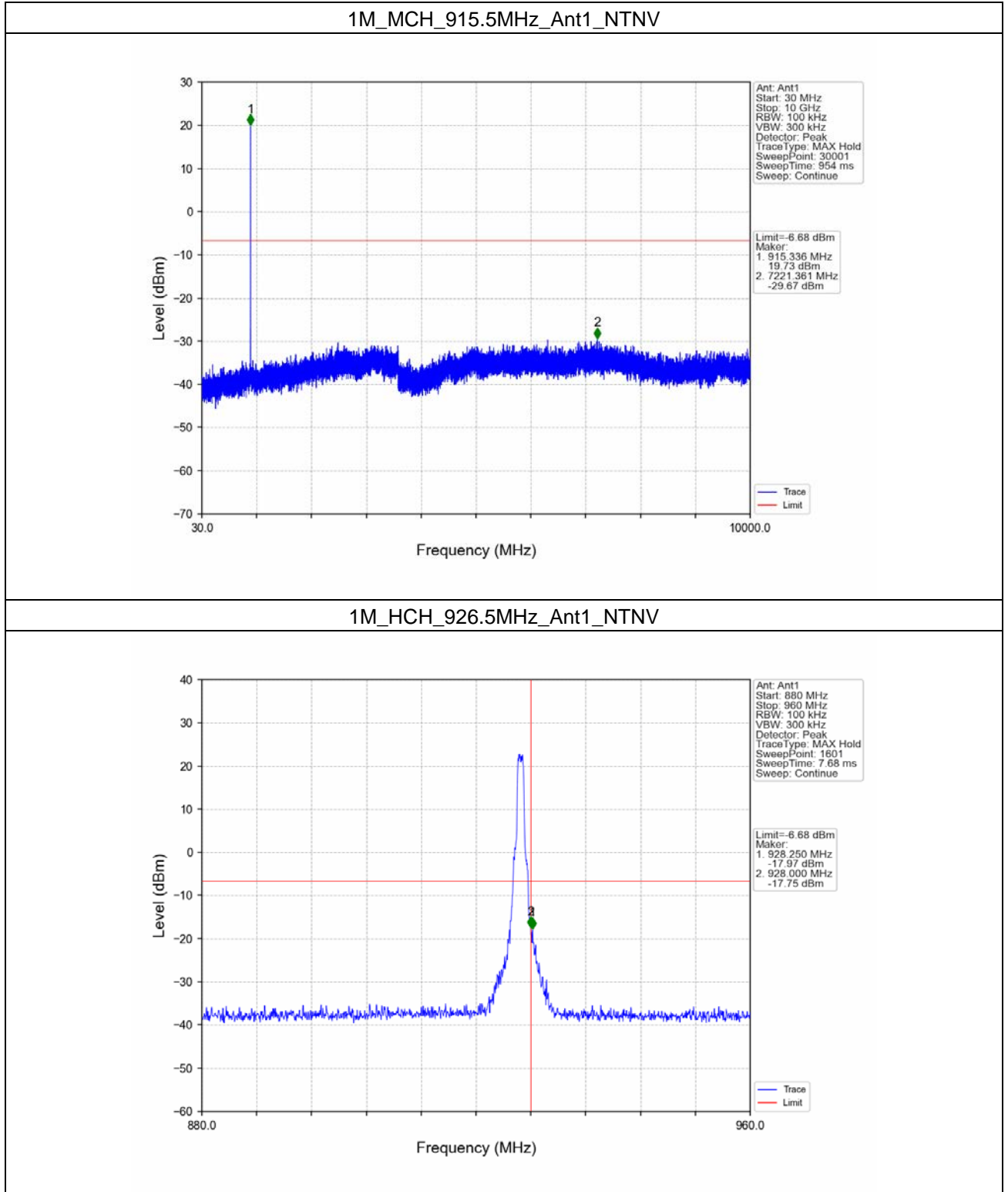
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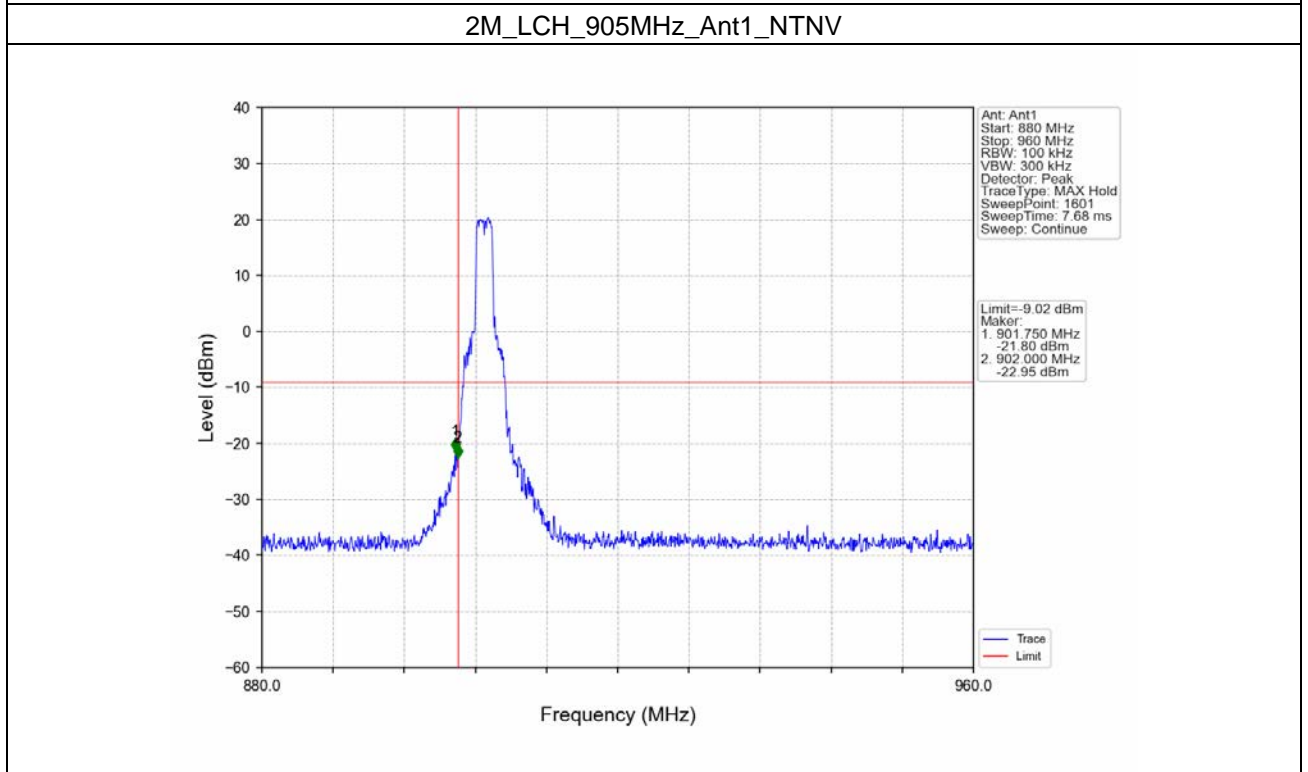
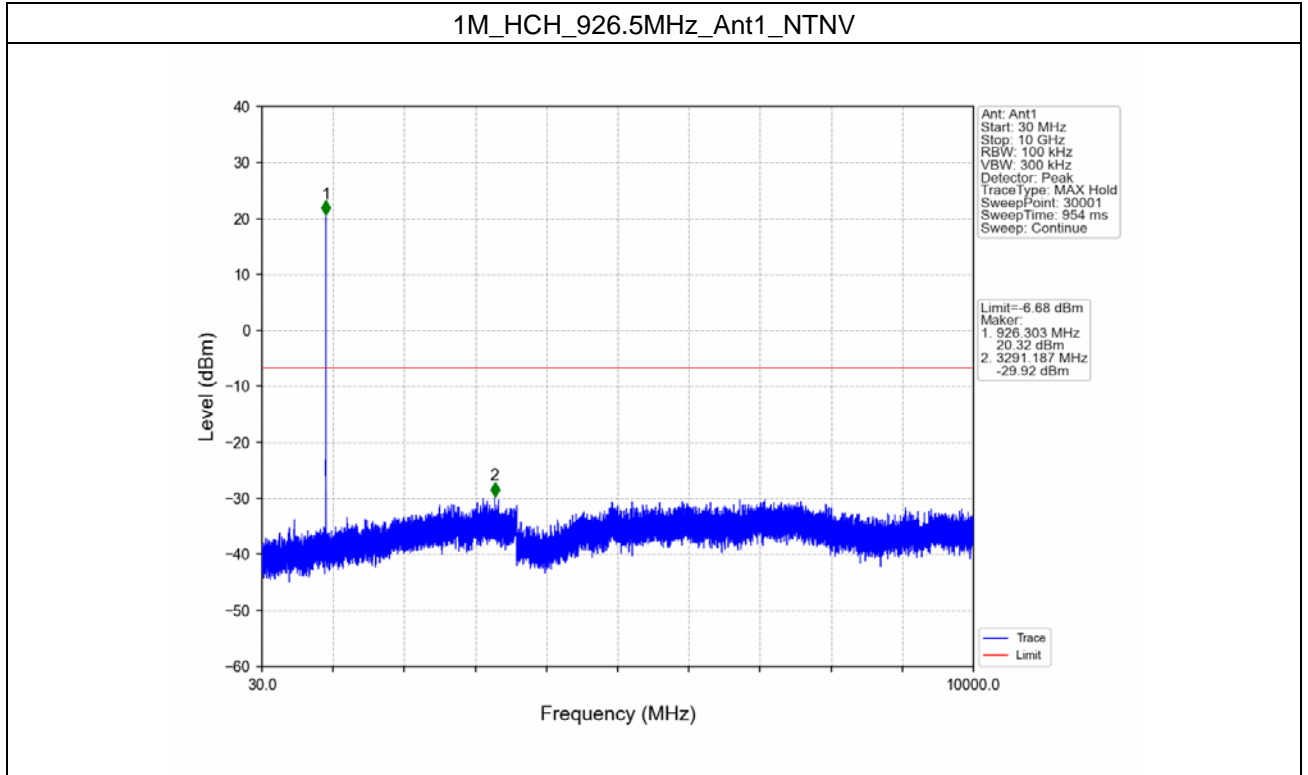
5.2.2 Test Graph



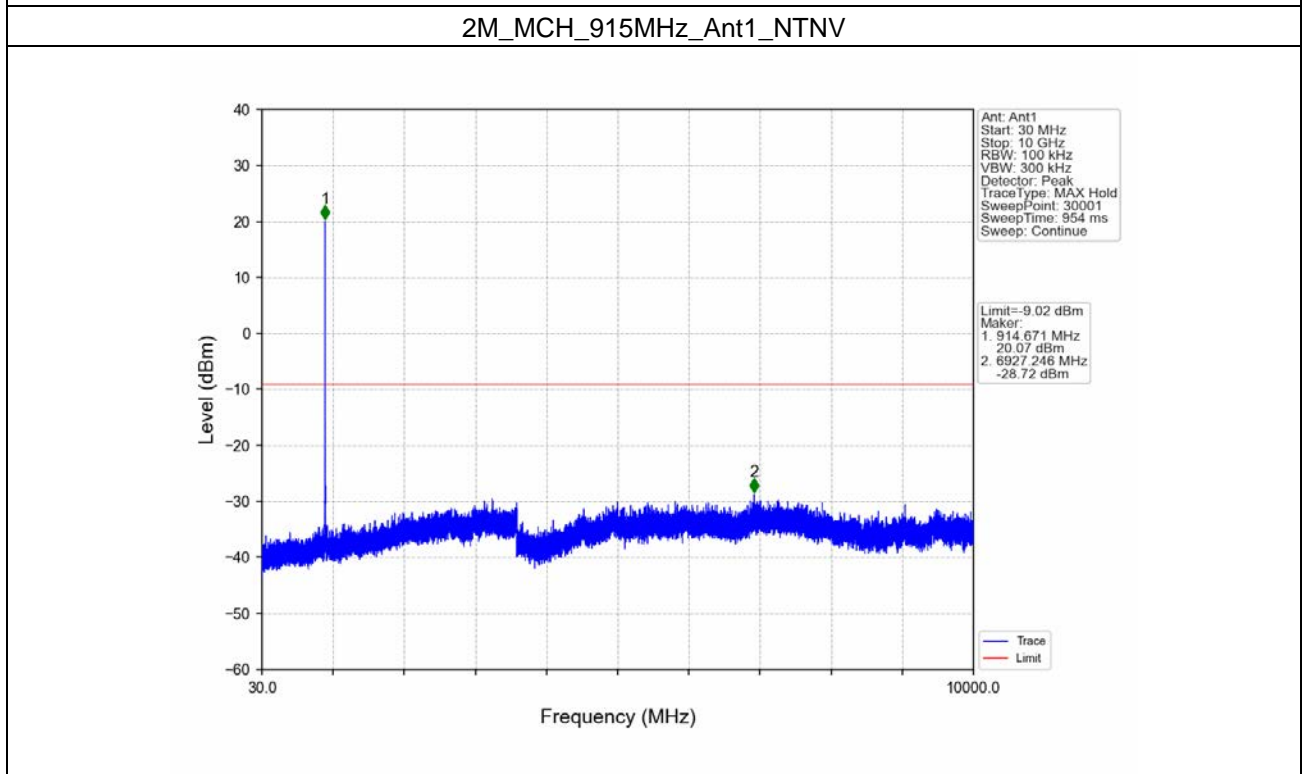
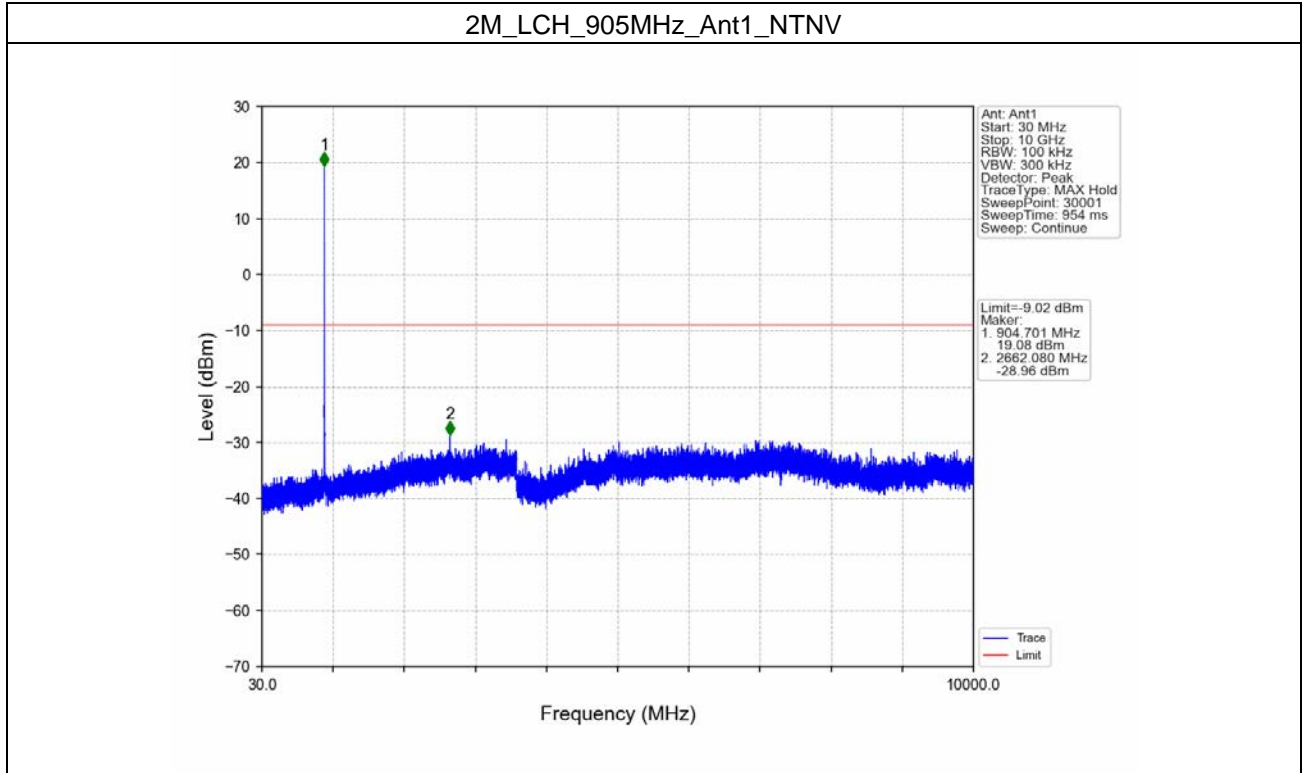
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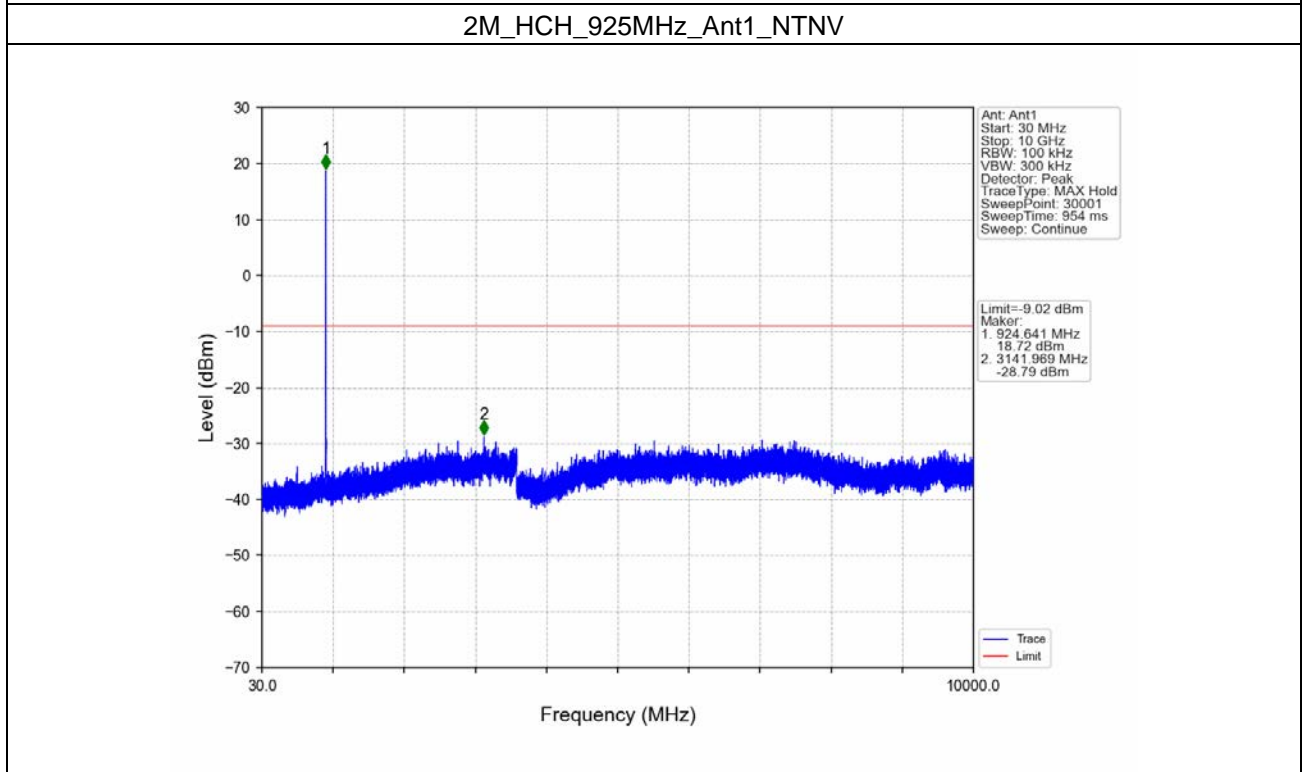
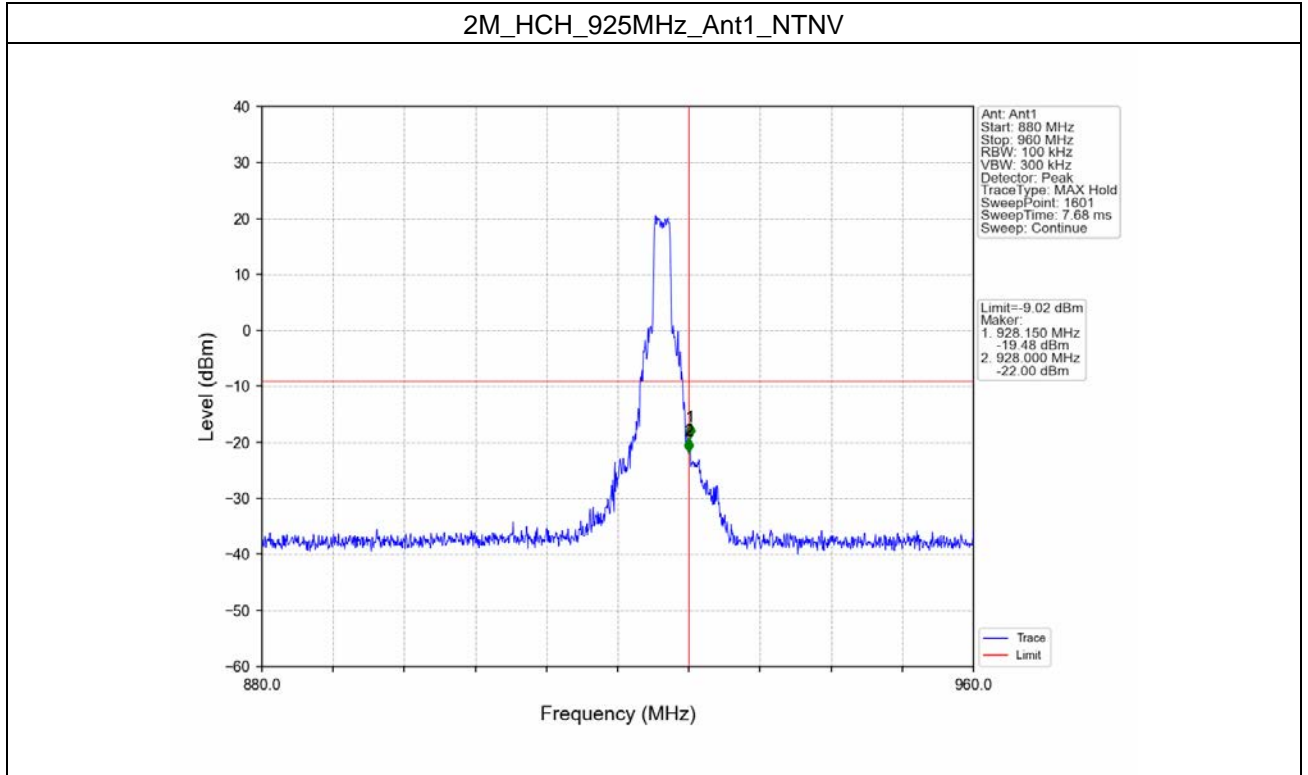
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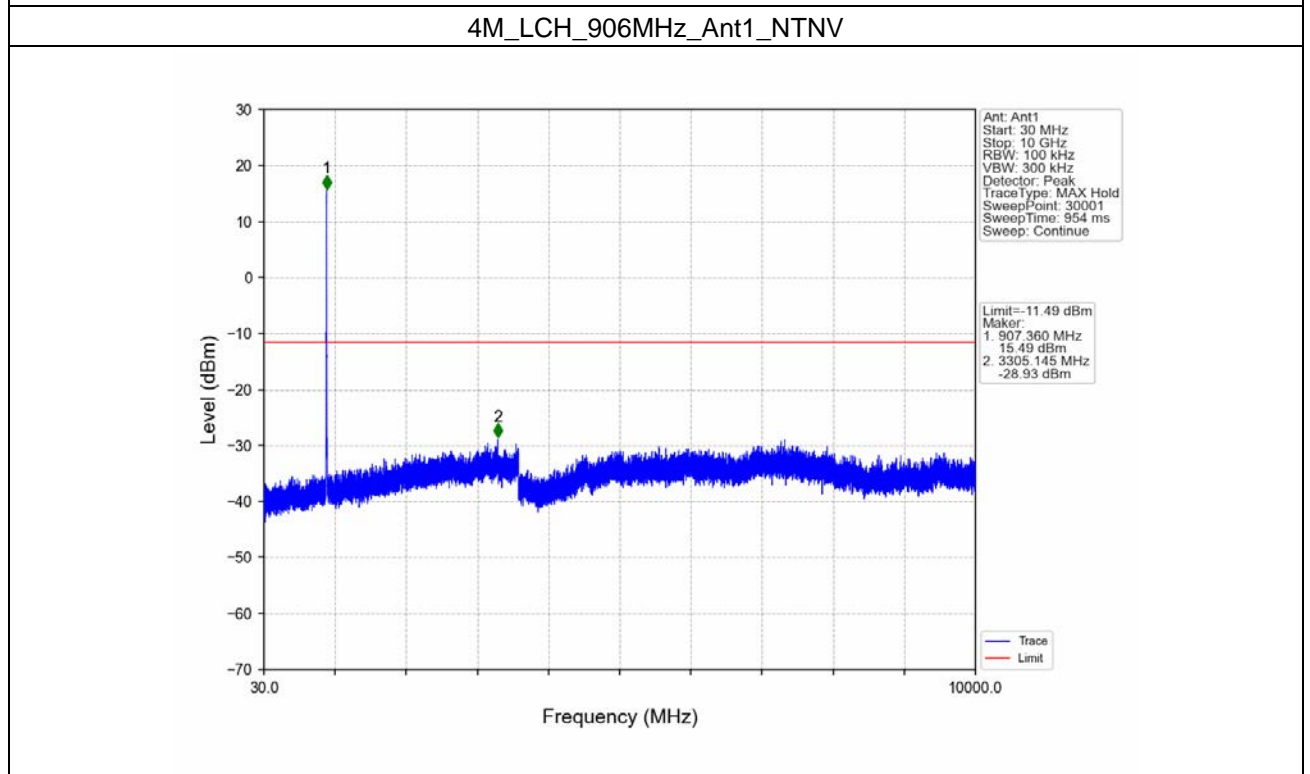
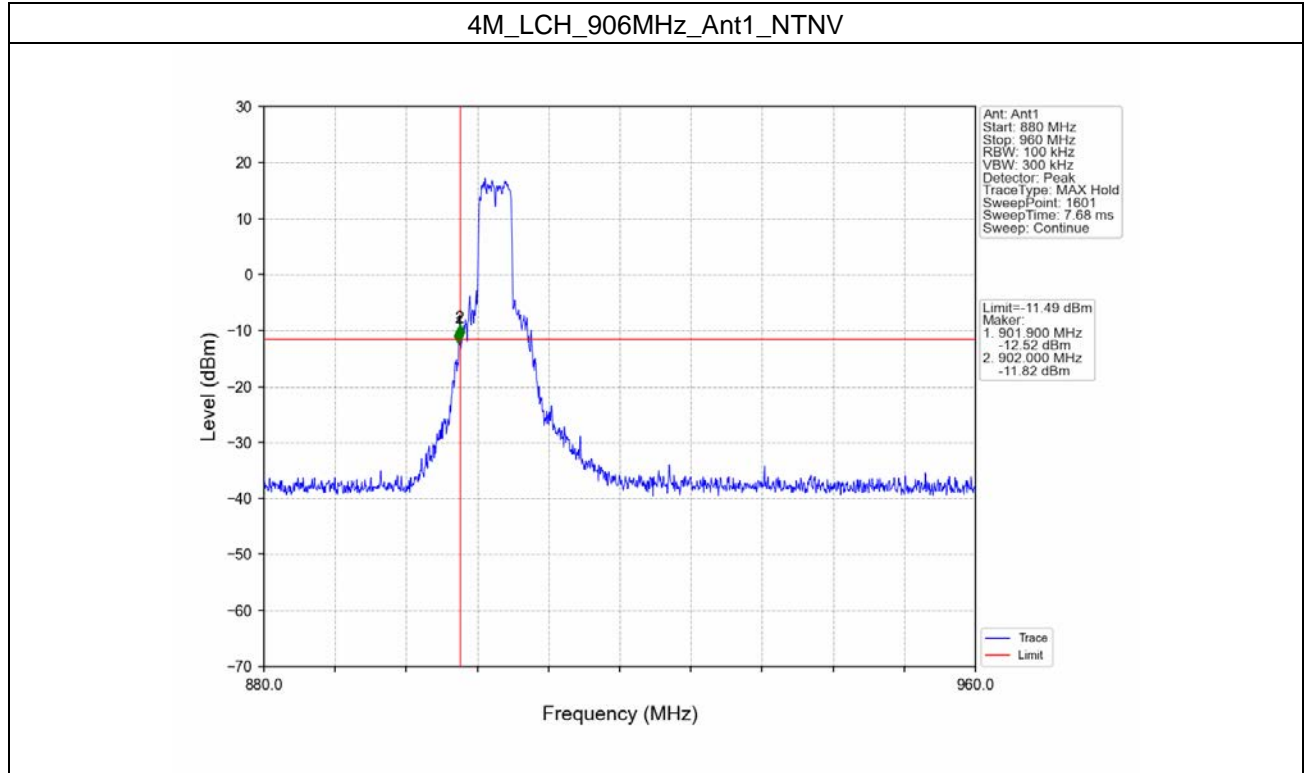
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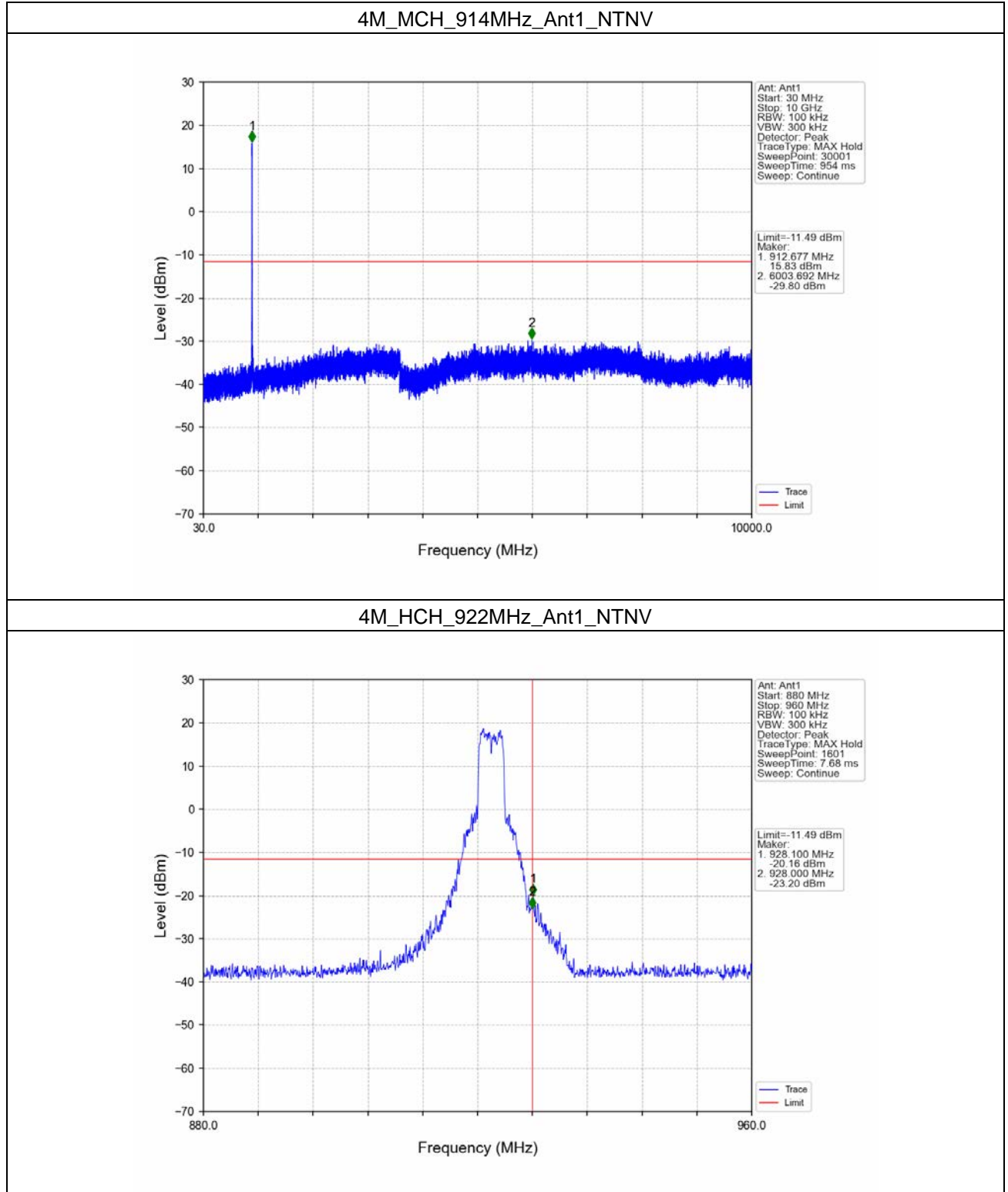
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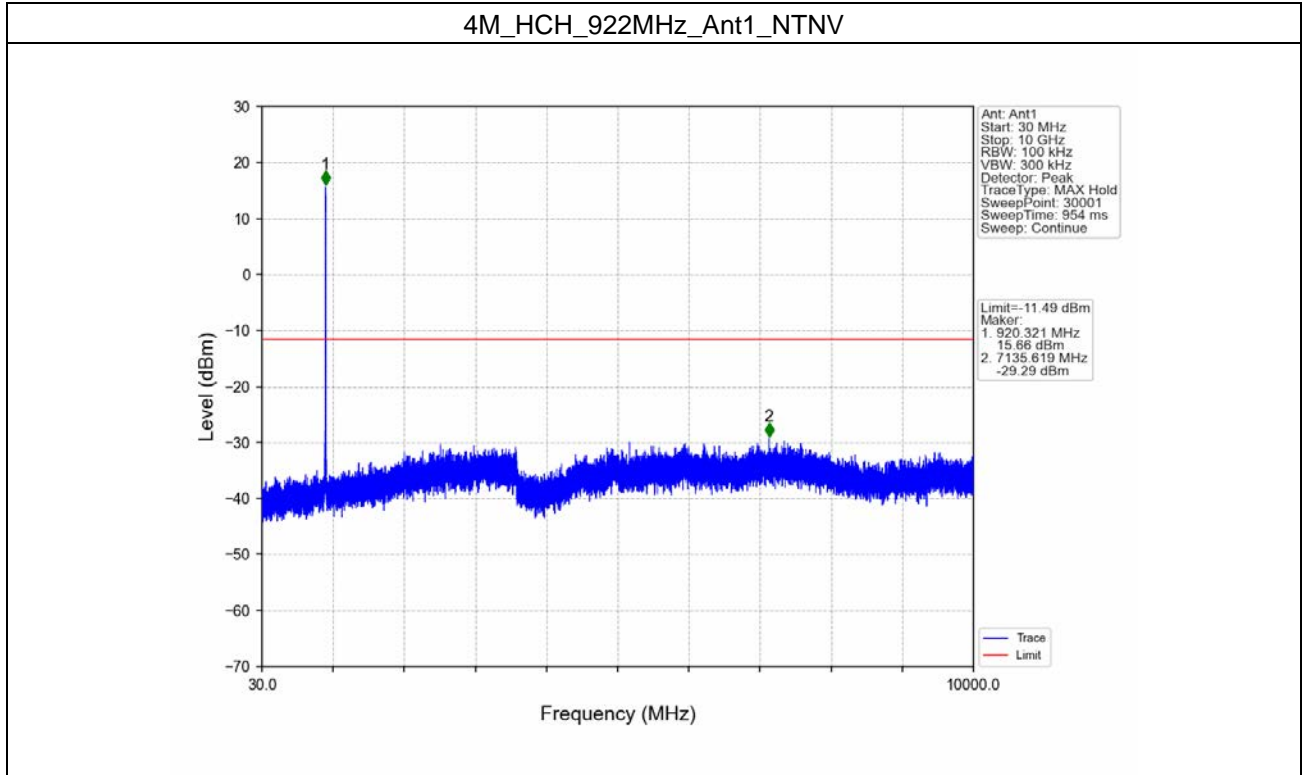
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- End of the Report -

