

SZEMC-TRF-01 Rev. A/1 Report No.: SZCR231100354202

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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*

Keny Xu EMC Laboratory Manager

Ceny. Ku



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



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

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



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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)		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	47 CFR Part 15, Subpart C 15.247	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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General Information

4.1 Details of E.U.T.

Power supply:	DC 3.3V
	903.5MHz-926.5MHz (1MHz Channel Bandwidth)
Operation Frequency:	905MHz-925MHz (2MHz Channel Bandwidth)
	906MHz-922MHz (4MHz Channel Bandwidth)
Modulation Type:	OFDM with BPSK/QPSK/16QAM/64QAM
	24 Channels for 802.11ah(1MHz Channel Bandwidth)
Number of Channels:	11 Channels for 802.11ah(2MHz Channel Bandwidth)
	5 Channels for 802.11ah(4MHz Channel Bandwidth)
	0.15 to 3.0Mbps for 802.11ah(1MHz Channel Bandwidth)
Rate:	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	Channel list for 802.11ah			
Bandwidth	Low Channel	Middle Channel	High Channel	
(MHz)	(MHz)	(MHz)	(MHz)	
1	903.5	915.5	926.5	
2	905	915	925	
4	906	914	922	

Power Settin	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 tes	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 Ulab (lab Uncertainty) is less than Ucispr/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 I		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	RF Conducted Test						
Equipment	Manufacturer	Model No.	No. Inventory No. Ca		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	Manufacturer Model No. Inventory No.		Cal Date	Cal Due Date	
Loop Antonno	CTC Lindaron	GEO2	SEM003-08	2021-11-22	2023-11-21	
Loop Antenna	ETS-Lindgren	6502	SEIVI003-08	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	, AIIIIX		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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Radio Spectrum Technical Requirement 6

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.



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Radio Spectrum Matter Test Results 7

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

47 CFR Part 15, Subpart C 15.207 Test Requirement Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

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

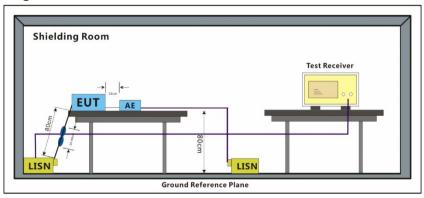
Operating Environment:

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





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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 + 50hm 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
- 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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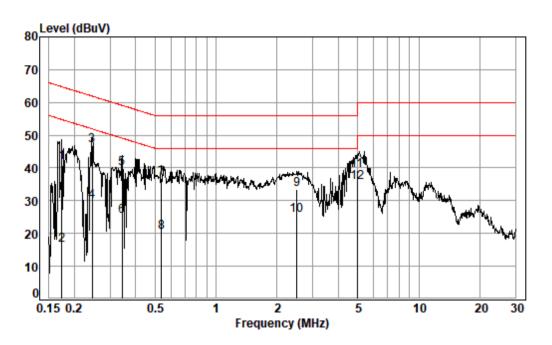


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Test Mode: 01; Line: Live line



Site : Shielding Room

Condition: Line Job No. : 03542AT

Test mode: 01

	mouc. or							
		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
	0.473		40.07	24 20	44 60	64.04	02.42	0.0
1	0.173	0.02	10.27	31.39	41.68	64.81	-23.13	QР
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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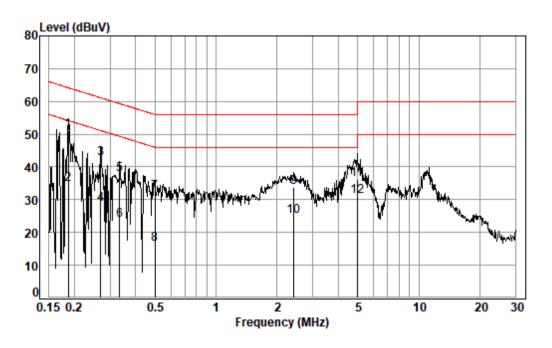


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Test Mode: 01: Line: Neutral Line



: Shielding Room

Condition: Neutral : 03542AT Job No.

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)			
	1 for ≥50 hopping channels			
902-928	0.25 for 25≤ hopping channels <50			
	1 for digital modulation			
	1 for ≥75 non-overlapping hopping channels			
2400-2483.5	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

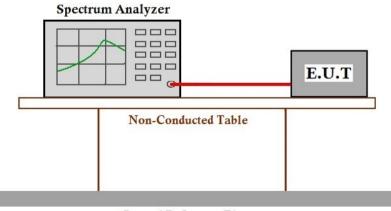
Operating Environment:

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



Ground Reference Plane



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7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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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

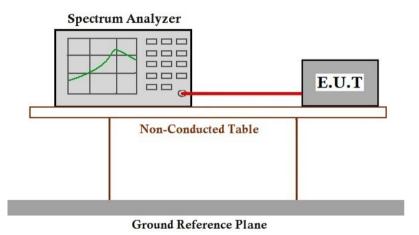
Operating Environment:

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

7.3.2 Test Mode Description

D /	Mode	·
Pre-scan / Final test	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



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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

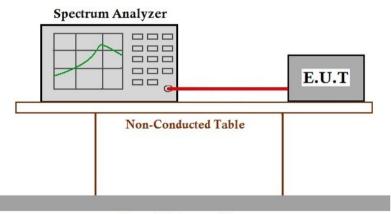
Operating Environment:

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



Ground Reference Plane

7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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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

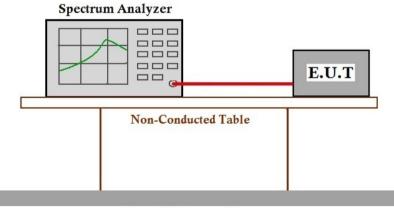
Operating Environment:

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

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

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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

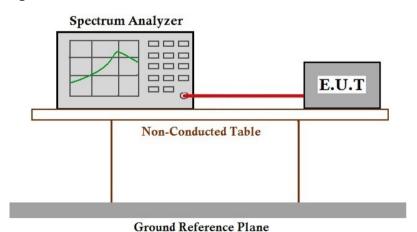
Operating Environment:

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

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



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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

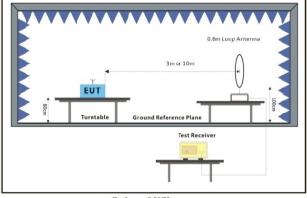
Operating Environment:

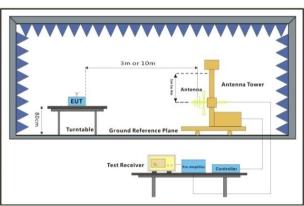
Temperature: 23.2 °C Humidity: 45.8 % RH Atmospheric Pressure: 1000 mbar

7.7.2 Test Mode Description

7.7.2 103010	17.2 Test mode bescription								
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.



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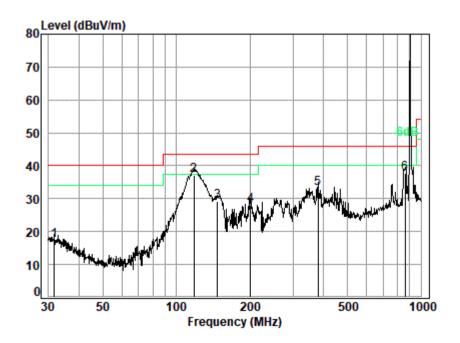
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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 03542AT

Test Mode: 01

	Freq	Ant Factor		Preamp Factor					Remark
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	31.731	20.39	0.66	27.80	24.01	17.26	40.00	-22.74	QP
2 q	118.186	11.18	1.29	27.54	52.29	37.22	43.50	-6.28	QP
3	147.404	12.73	1.45	27.44	42.34	29.08	43.50	-14.42	QP
4	200.688	14.15	1.73	27.25	39.39	28.02	43.50	-15.48	QP
5	379.914	20.91	2.47	27.25	36.95	33.08	46.00	-12.92	QP
6	863 056	27 52	3 99	27 31	33 42	37 62	46 99	-8 38	OP



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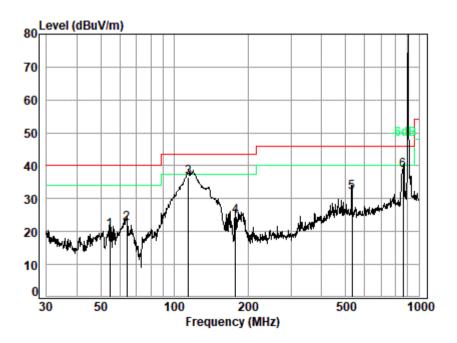


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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Low



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

Test Mode: 01

	Freq	Ant Factor		Preamp Factor					Remark
-	MHz	dB/m	dB	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	OP



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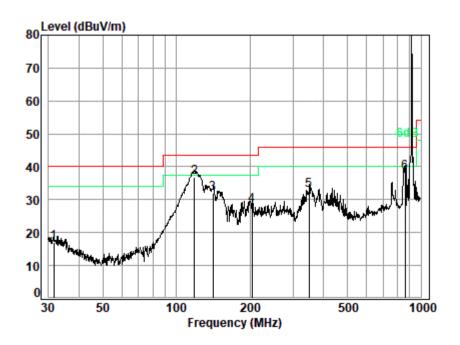


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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Middle



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 03542AT

Test Mode: 01

	Freq			Preamp Factor					Remark
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	31.510	20.50	0.66	27.80	23.78	17.14	40.00	-22.86	QP
2 q	118.601	11.16	1.29	27.54	51.96	36.87	43.50	-6.63	QP
3	141.330	11.96	1.41	27.46	46.06	31.97	43.50	-11.53	QP
4	204.238	14.49	1.75	27.23	39.15	28.16	43.50	-15.34	QP
5	349.250	19.88	2.36	27.11	37.67	32.80	46.00	-13.20	QP
6	863 056	27 52	3 99	27 31	3/1 11	38 31	46 99	-7 69	OP



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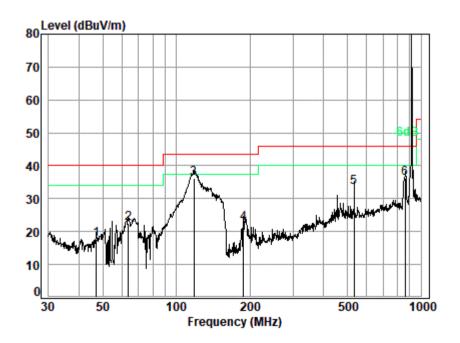


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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Middle



Site : chamber Condition: 3m VERTICAL

Job No. : 03542AT

Test Mode: 01

		Ant	Cable	Preamp	Read		Limit	0ver	
	Freq	Factor	Loss	Factor	Level	Level	Line	Limit	Remark
_	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
		•							
1	46.995	13.63	0.81	27.76	31.11	17.79	40.00	-22.21	QP
2	63.759	11.13	0.95	27.71	38.14	22.51	40.00	-17.49	QP
3 q	117.773	11.21	1.29	27.55	51.31	36.26	43.50	-7.24	QP
4	187.753	14.30	1.66	27.29	33.97	22.64	43.50	-20.86	QP
5	533.832								-
6	863.056	27.52	3.99	27.31	32.08	36.28	46.00	-9.72	QP



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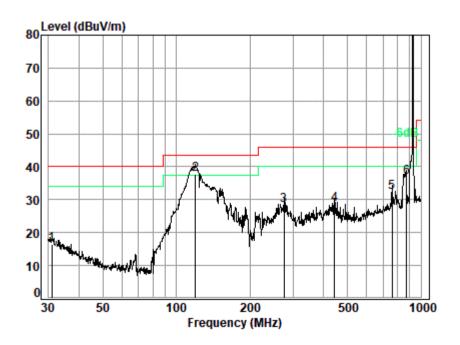
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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 03542AT

Test Mode: 01

		Ant	Cable	Preamp	Read		Limit	0ver	
	Freq	Factor	Loss	Factor	Level	Level	Line	Limit	Remark
_									
	MHz	dB/m	dB	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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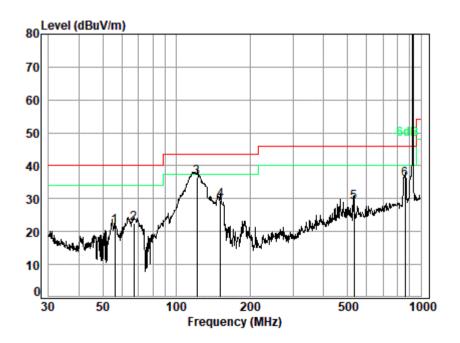


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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:High



Site : chamber Condition: 3m VERTICAL

Job No. : 03542AT Test Mode: 01

	Freq			Preamp Factor					Remark
-	MHz	dB/m	dB	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 99	-10 06	OP



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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

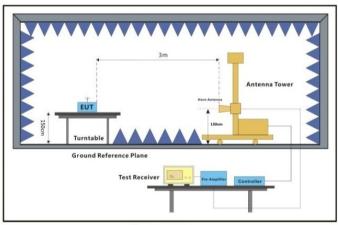
Operating Environment:

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

7.8.2 Test Mode Description

11012 100t mede 2000 phon										
Pre-scan / Final test	Mode Code	Description								
Final test	01	TX mode_Keep modulation(AP mo		EUT	in	continuously	transmitting	mode	with	OFDM
Pre-scan	02	TX mode_Keep modulation(Client			in	continuously	transmitting	mode	with	OFDM

7.8.3 Test Setup Diagram



Above 1GHz



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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.



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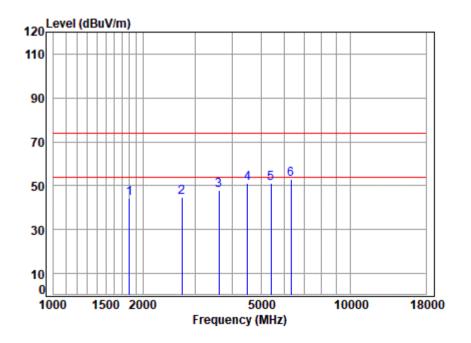


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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03542AT

Mode : 01

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	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	q 6317.500	8.42	34.97	35.12	44.84	53.11	74.00	-20.89	Peak



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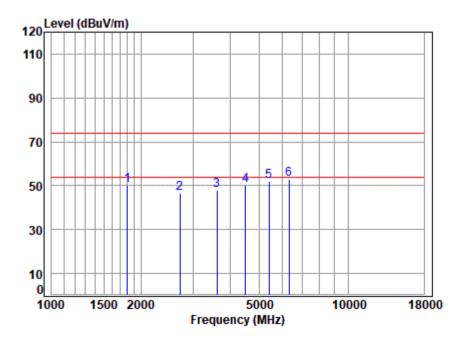


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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Low



Site : chamber

Condition: 3m VERTICAL

: 03542AT

Mode : 01

Job No

	Freq			Preamp Factor					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 0	6317 500	8 42	34 97	35 12	44 79	53 06	74 99	-20 94	Peak



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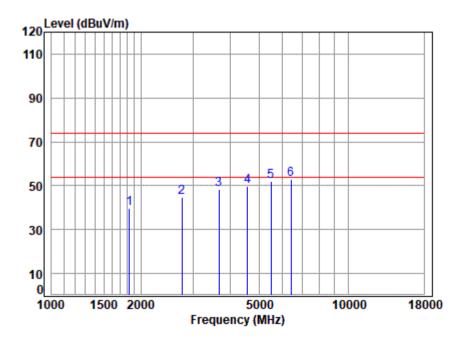
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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:Middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03542AT

Mode : 01

	Freq			Preamp Factor					Remark	
	MHz	dB		dB				——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	a 6/08 500	2 /19	35 25	35 19	11 59	53 1/	7/ 00	-20 86	Poak	



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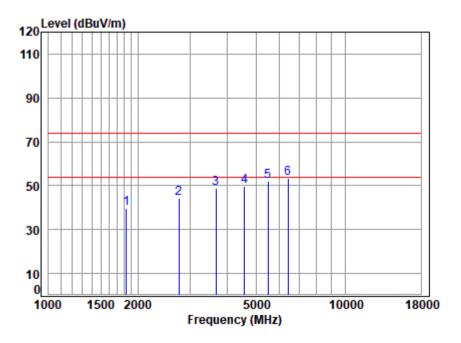


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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:Middle



Site : chamber

Condition: 3m VERTICAL

: 03542AT

Mode : 01

Job No

	Freq			Preamp Factor					Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
L	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	
1	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	
5	a 6408 500	8 49	35 25	35 19	44 76	53 31	74 99	-20 69	Peak	



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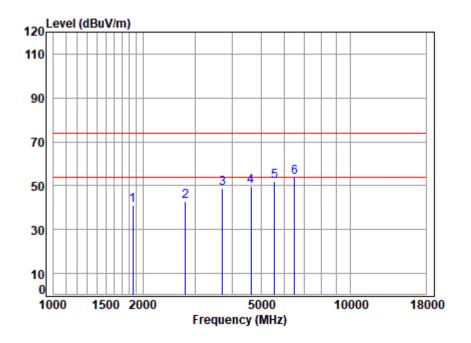
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Test Mode: 01; Polarity: Horizontal; Modulation:OFDM; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03542AT

Mode : 01

	Freq			Preamp Factor					Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	——dB		
1	1855.000	4.52	27.04	38.43	47.73	40.86	74.00	-33.14	Peak	
2	2782.500	5.41	29.76	36.57	44.44	43.04	74.00	-30.96	Peak	
3	3710.000	6.47	32.98	36.11	45.51	48.85	74.00	-25.15	Peak	
4	4637.500	7.21	33.38	35.63	44.90	49.86	74.00	-24.14	Peak	
5	5565.000	7.86	34.70	35.10	44.41	51.87	74.00	-22.13	Peak	
6 0	6492 500	8 55	35 58	35 24	44 83	53 72	74 99	-20 28	Peak	



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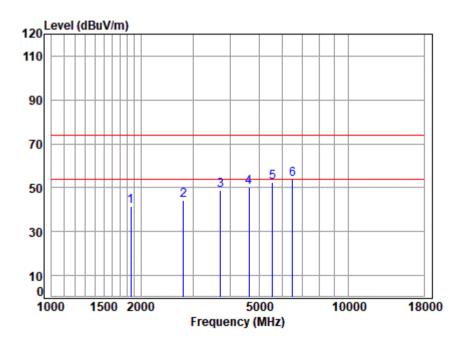


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Test Mode: 01; Polarity: Vertical; Modulation:OFDM; Channel:High



Site : chamber

Condition: 3m VERTICAL

: 03542AT

Mode : 01

Job No

	-			Preamp						
	Freq	Loss	Factor	Factor	revel	Level	Line	Limit	Kemark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
L	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	
1	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	
5 ,	a 6/92 500	8 55	35 58	35 24	11 78	53 67	7/ 00	-20 33	Poak	



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8 **Test Setup Photo**

Refer to Test Setup Photos for SZCR2311003542AT

EUT Constructional Details (EUT Photos) 9

Refer to External and Internal Photos for SZCR2311003542AT



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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 (%)				
		903.5	14.560	15.720	92.62	0.33	2.83				
1M	SISO	915.5	14.560	15.514	93.85	0.28	2.91				
		926.5	14.557	15.823	92.00	0.36	4.45				
		905	3.506	4.733	74.08	1.30	13.47				
2M	SISO	915	3.506	4.734	74.06	1.30	12.35				
		925	3.504	4.732	74.05	1.30	12.39				
		906	1.809	2.999	60.32	2.20	17.59				
4M	SISO	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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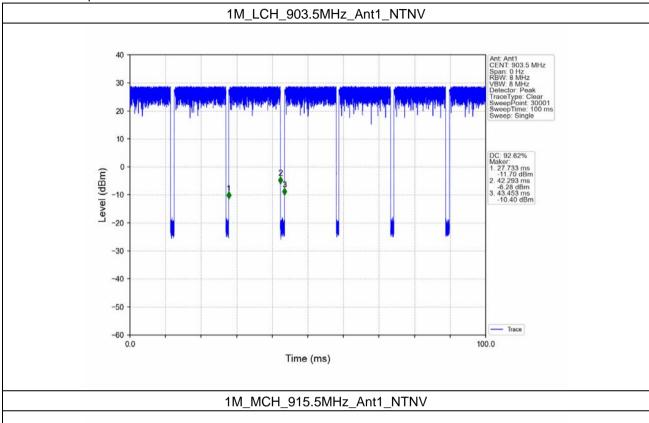


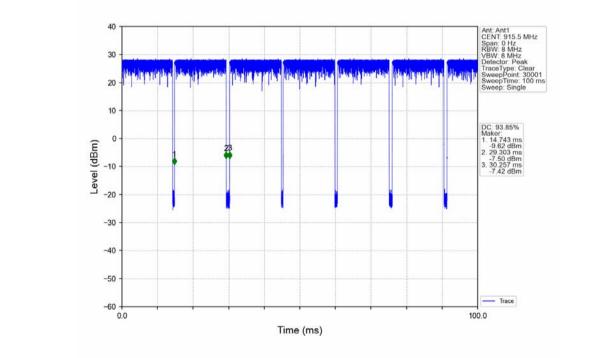
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1.1.2 Test Graph







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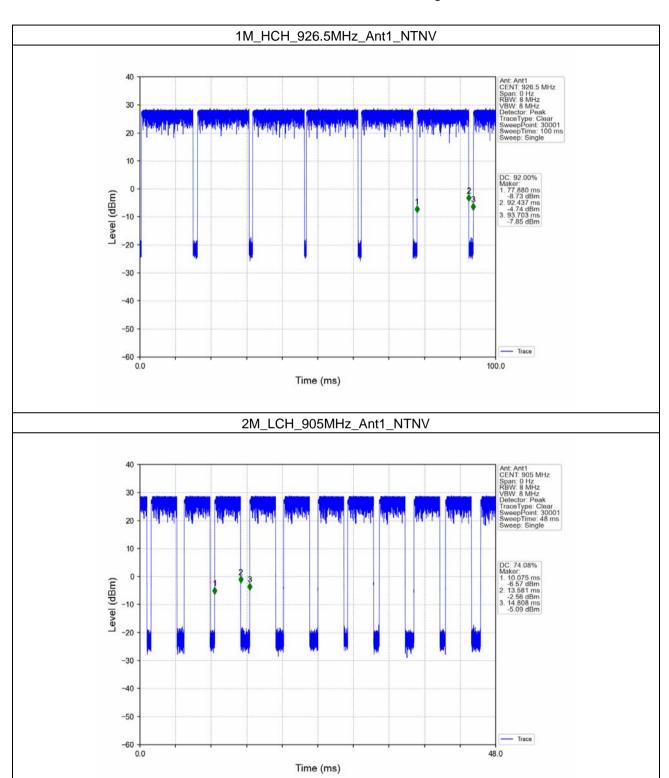
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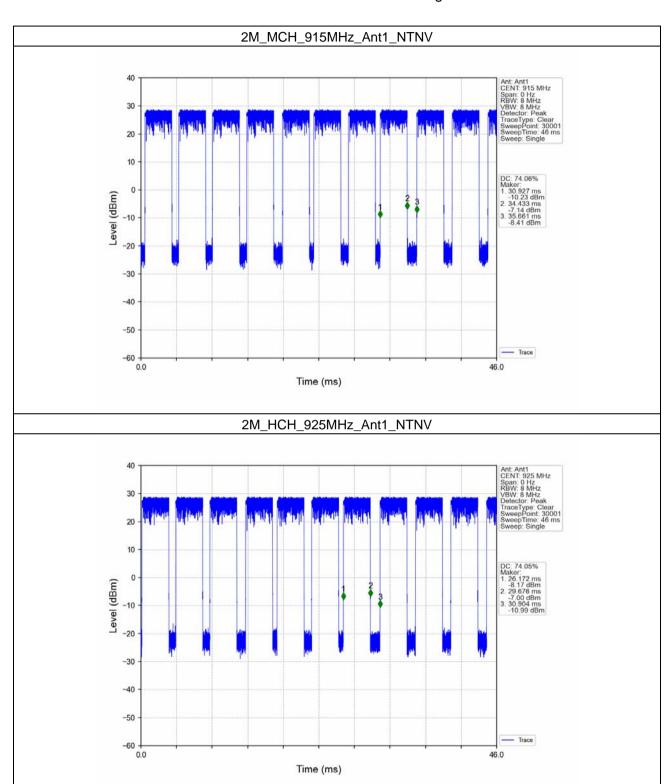
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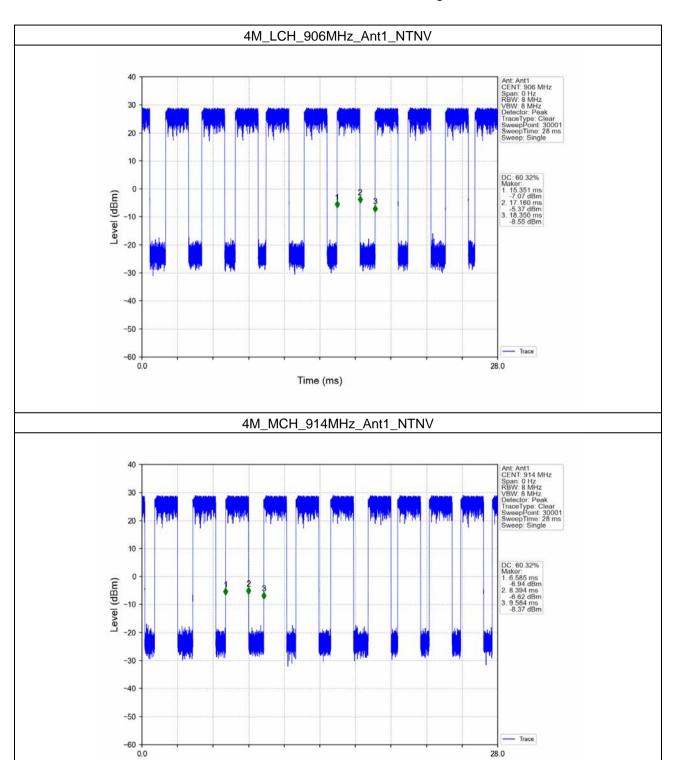
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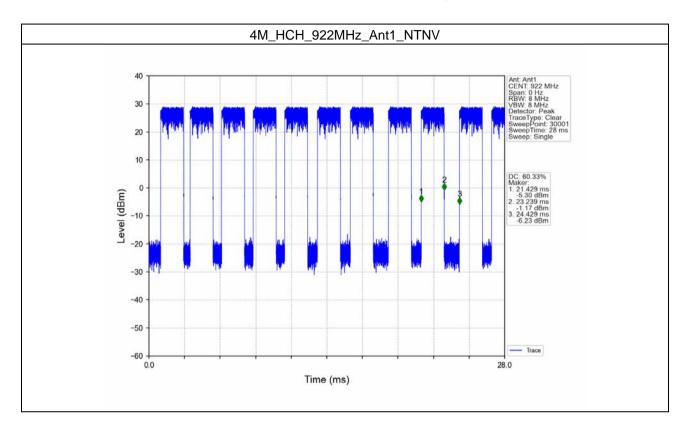
Time (ms)



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2. Bandwidth

2.1 6dB BW

2.1.1 Test Result

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



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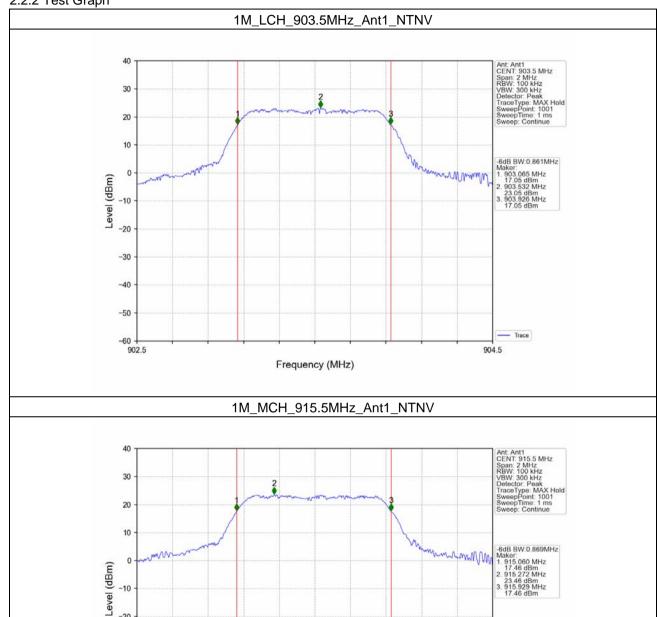
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2.2.2 Test Graph





-20

-30

-40

-50

-60 ↓ 914.5

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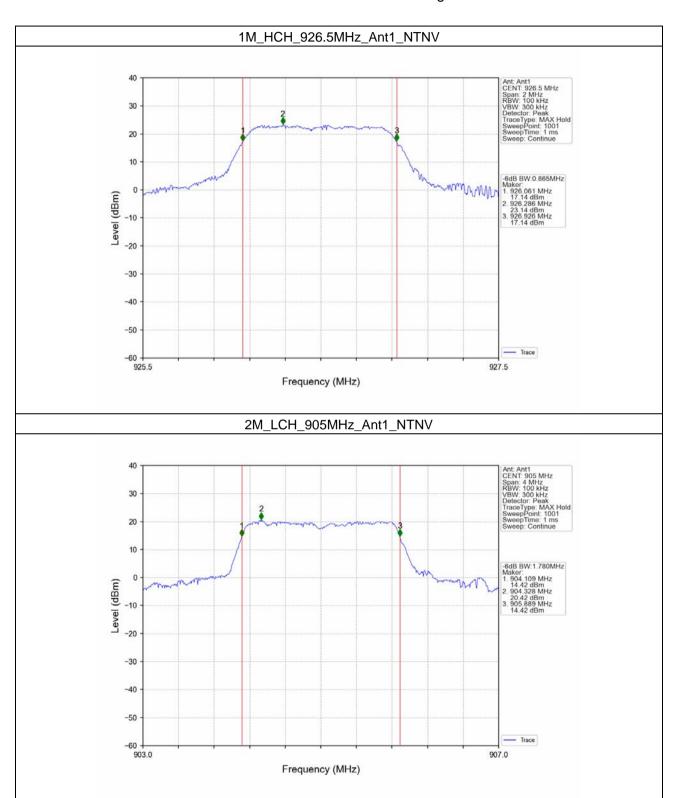
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Frequency (MHz)



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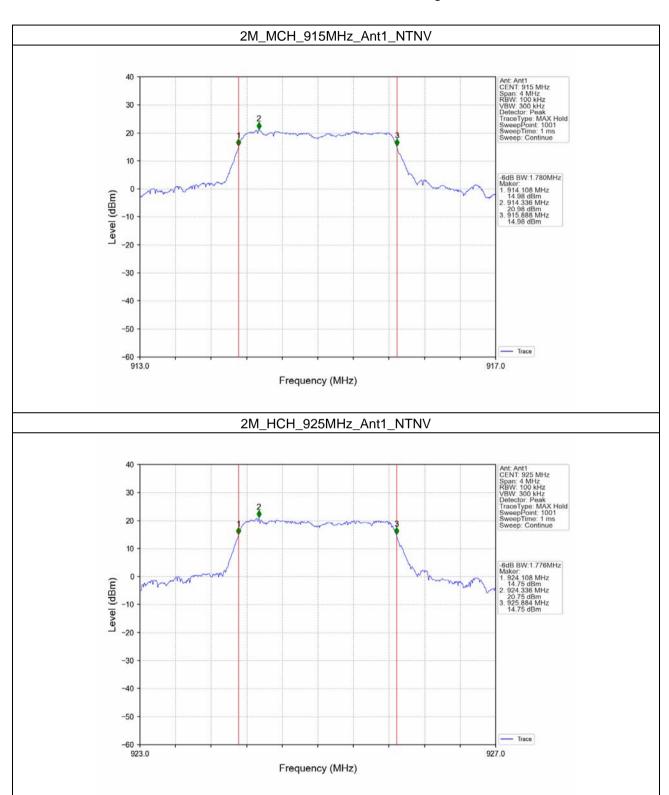
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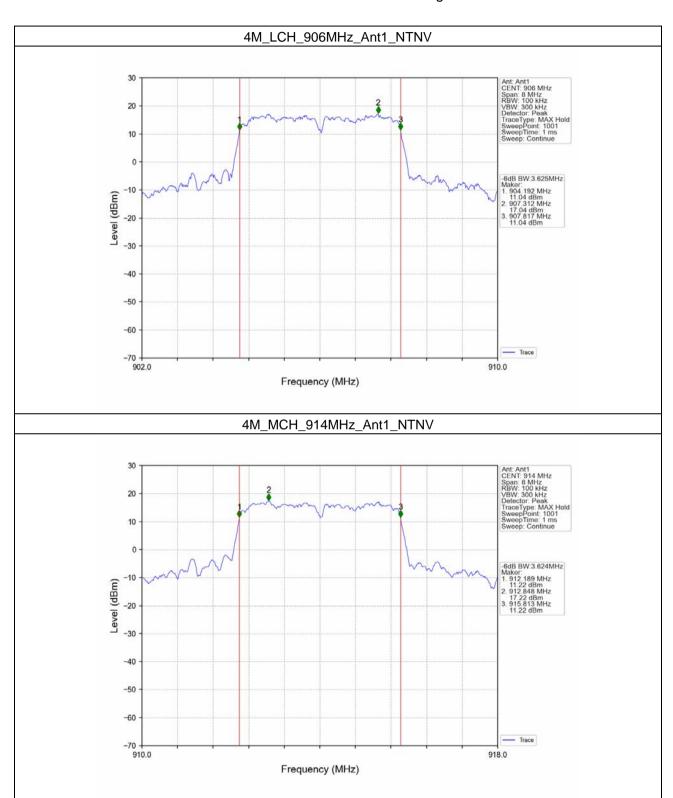
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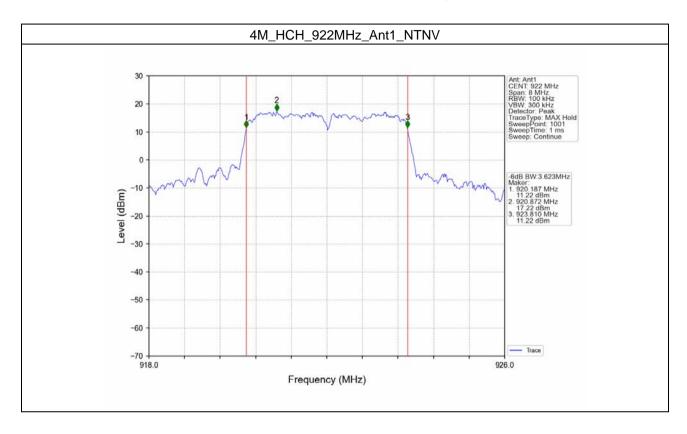
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3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX	Frequency	Maximum Average Condu	ucted Output Power (dBm)	Verdict		
Mode	Туре	(MHz)	ANT1	Limit	verdict		
		903.5	23.10	<=30	Pass		
1M	SISO	915.5	23.88	<=30	Pass		
		926.5	23.36	<=30	Pass		
	SISO	905	23.87	<=30	Pass		
2M		915	23.29	<=30	Pass		
		925	23.94	<=30	Pass		
				906	22.77	<=30	Pass
4M	SISO	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	Frequency	Maximum PS	D (dBm/3kHz)	Vardiet
Mode	Type	(MHz)	ANT1	Limit	Verdict
		903.5	2.30	<=8	Pass
1M	SISO	915.5	2.94	<=8	Pass
		926.5	2.65	<=8	Pass
	SISO	905	7.57	<=8	Pass
2M		915	7.97	<=8	Pass
		925	7.93	<=8	Pass
		906	4.42	<=8	Pass
4M	SISO	914	5.07	<=8	Pass
		922	5.25	<=8	Pass



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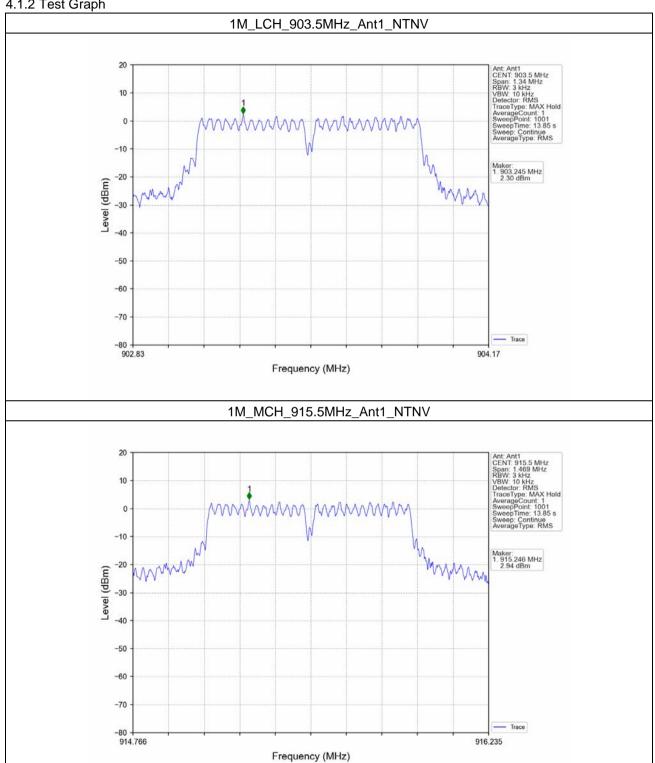


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4.1.2 Test Graph





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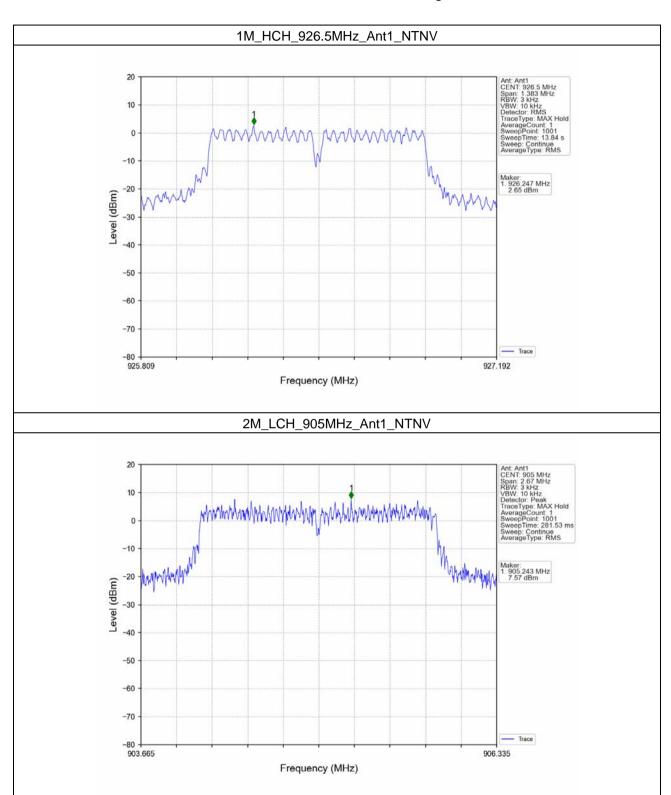
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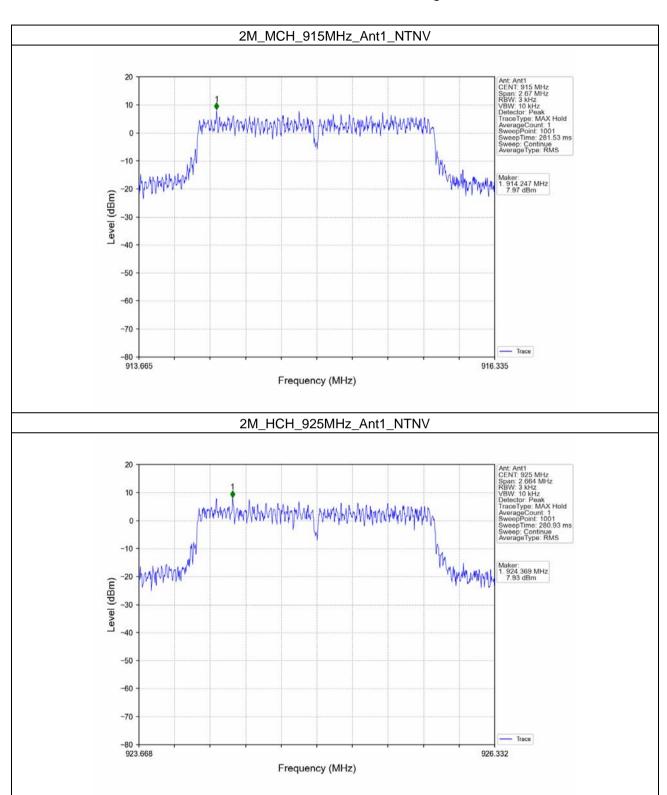
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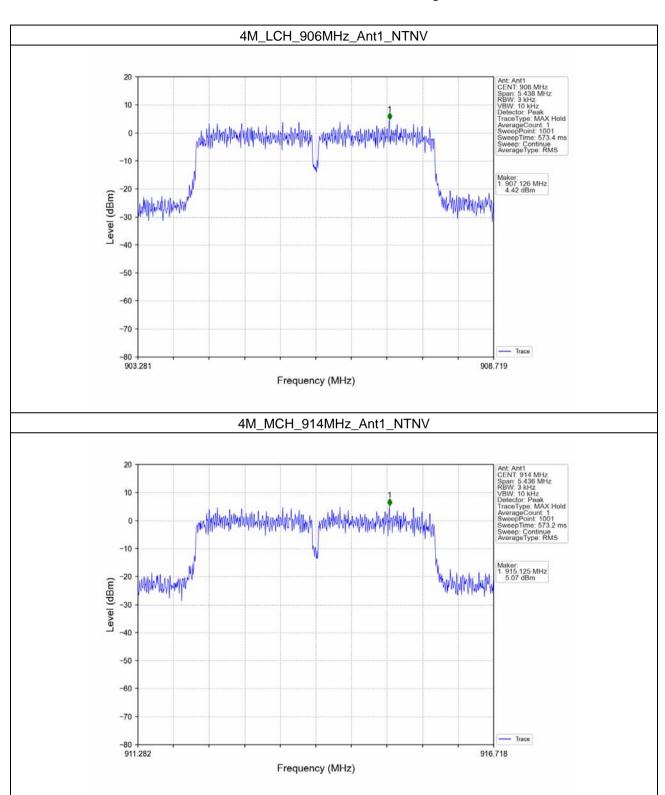
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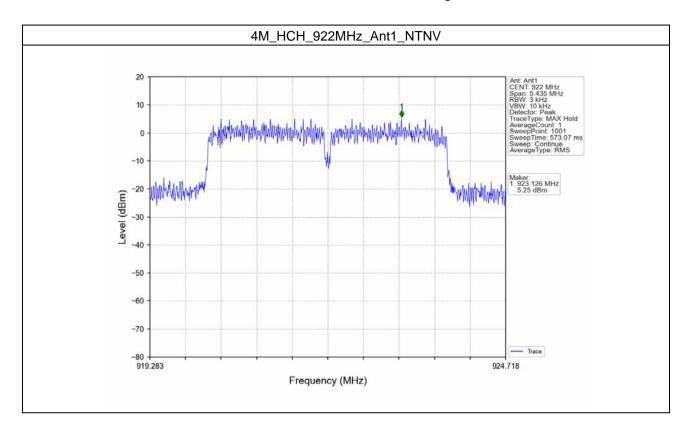
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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

5.1.1 Test Result

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



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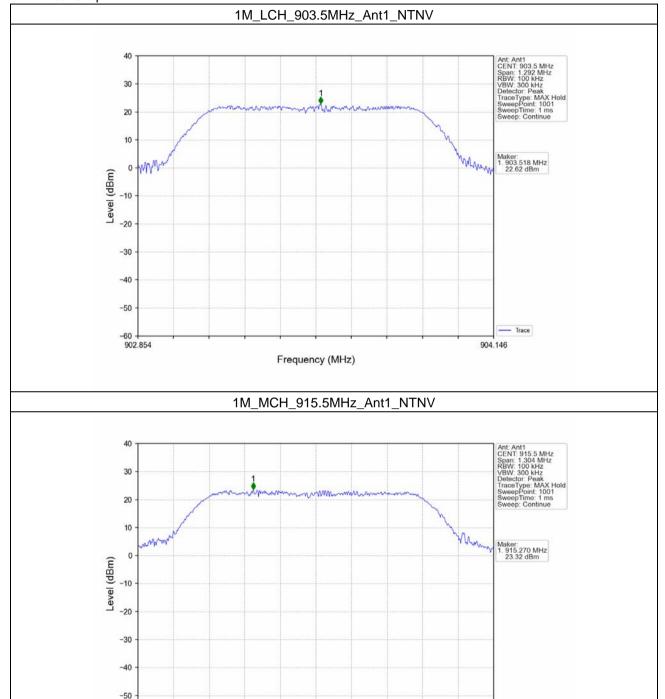


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5.1.2 Test Graph





-60 914.848

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Frequency (MHz)

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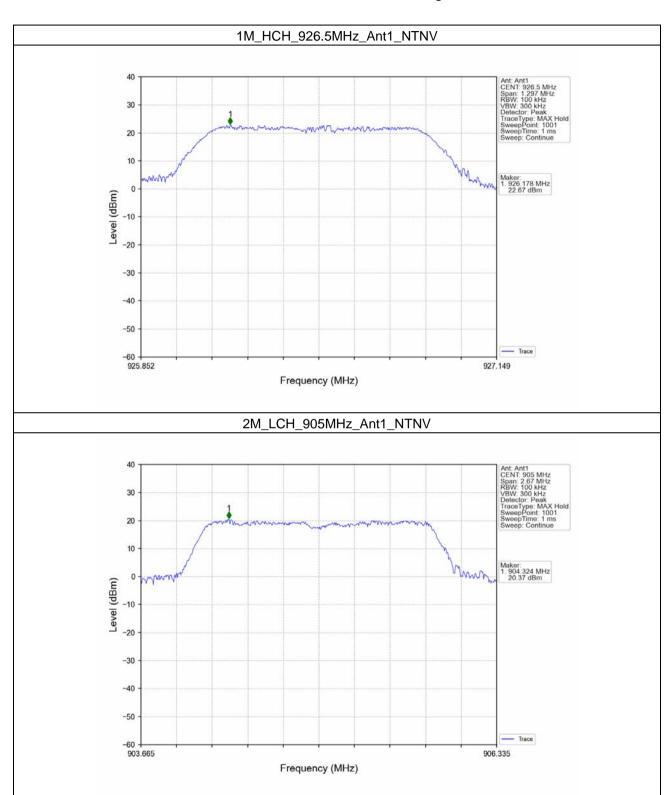
916.152



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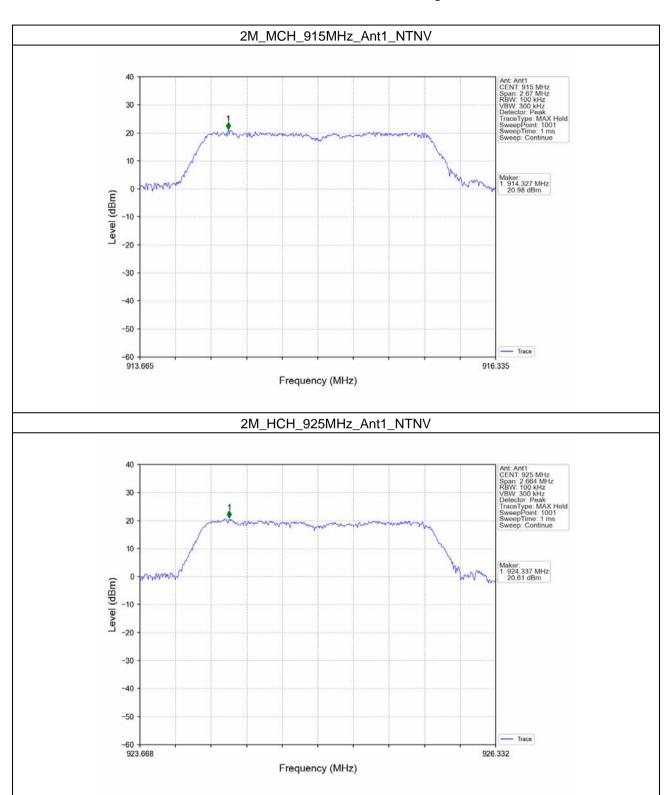
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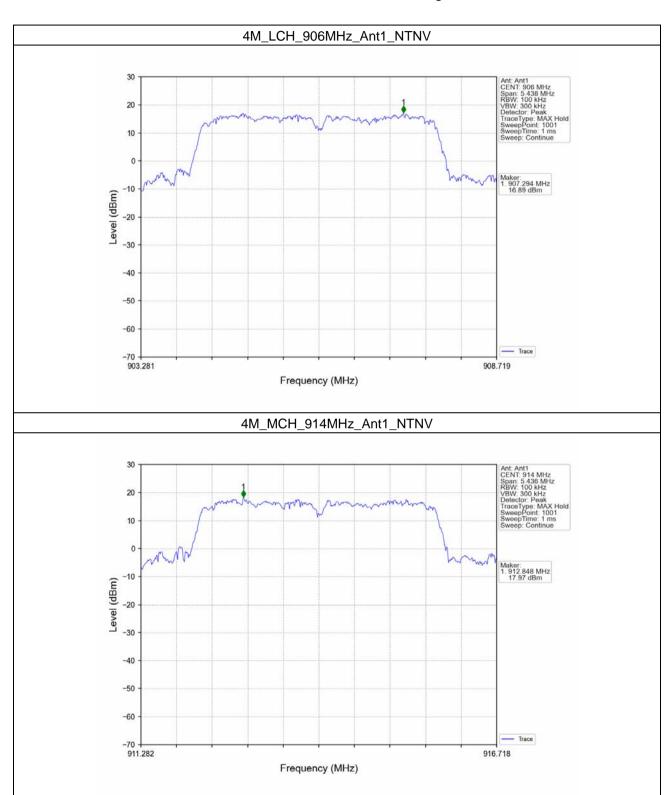
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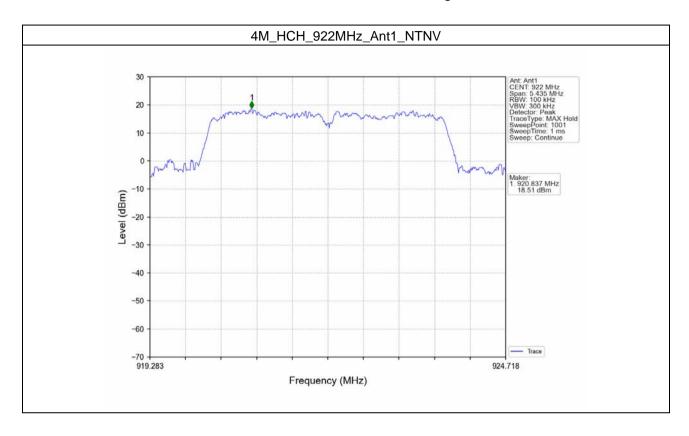
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5.2 CSE

5.2.1 Test Result

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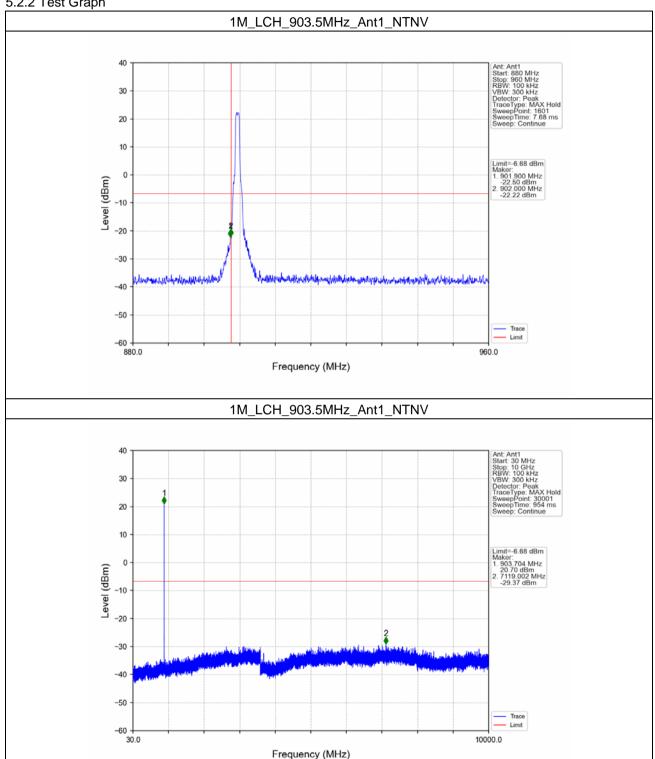


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5.2.2 Test Graph





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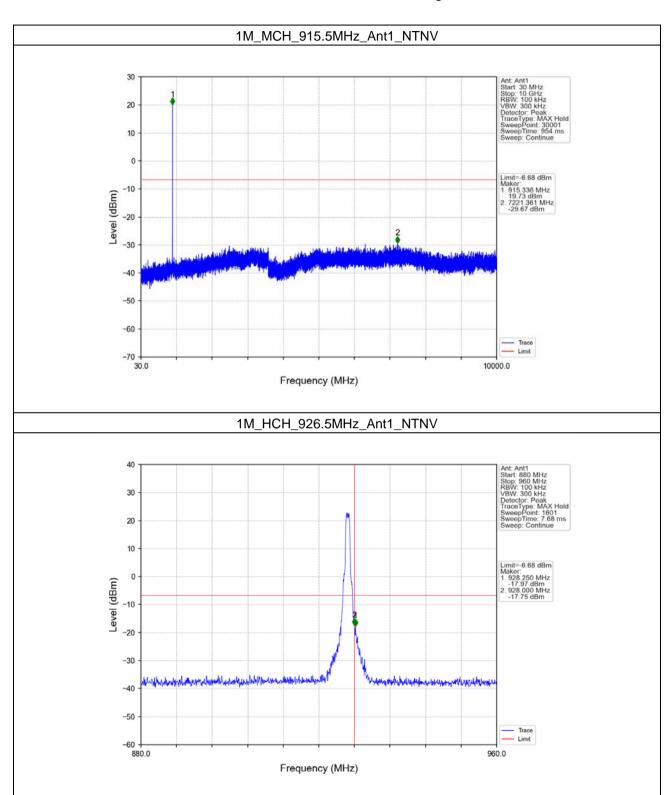
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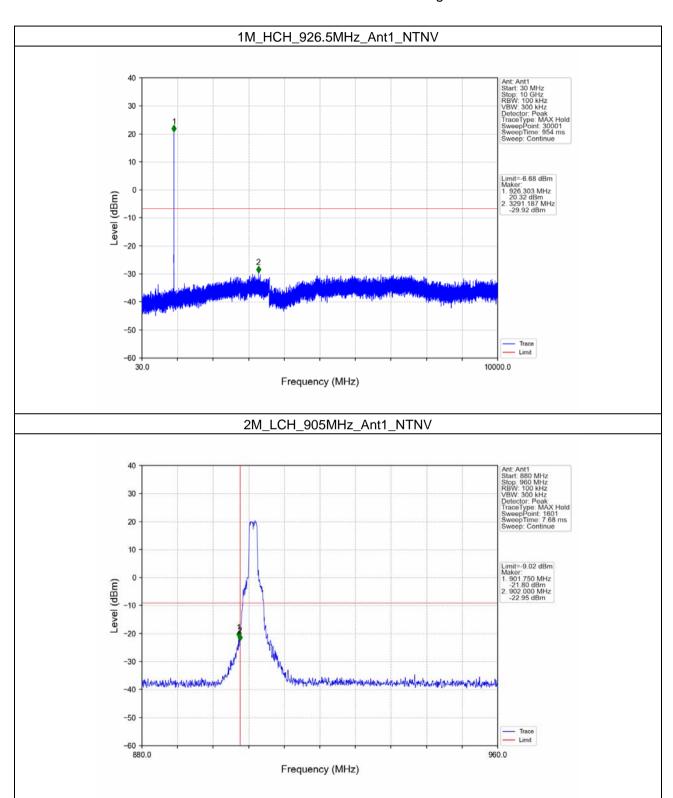
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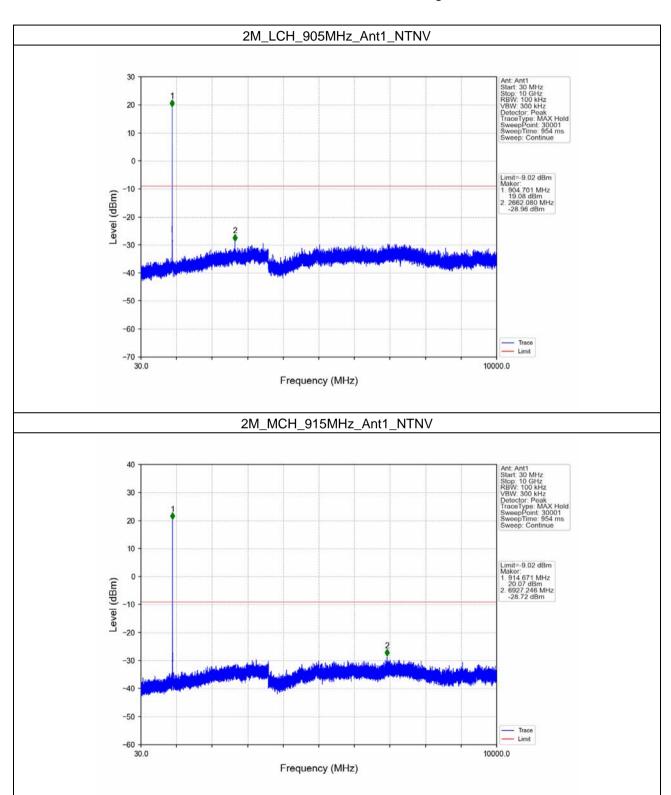
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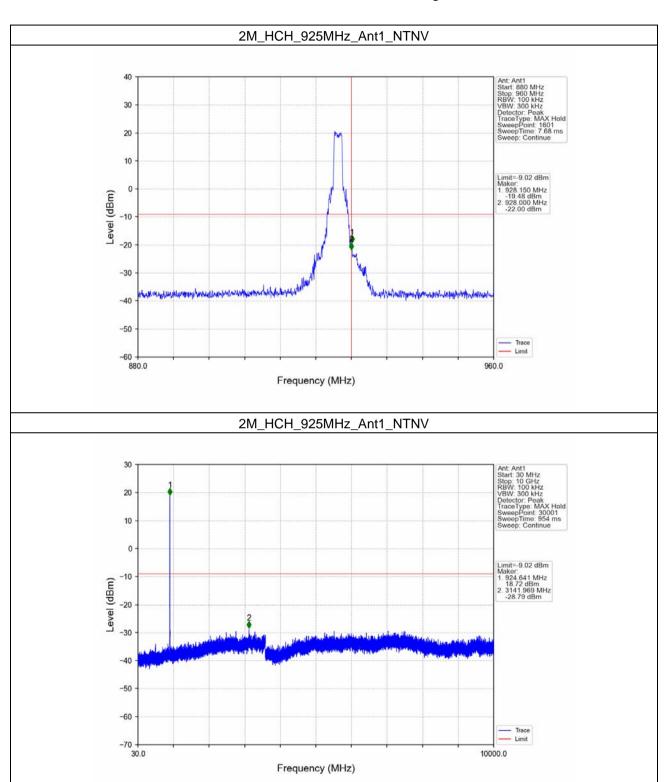
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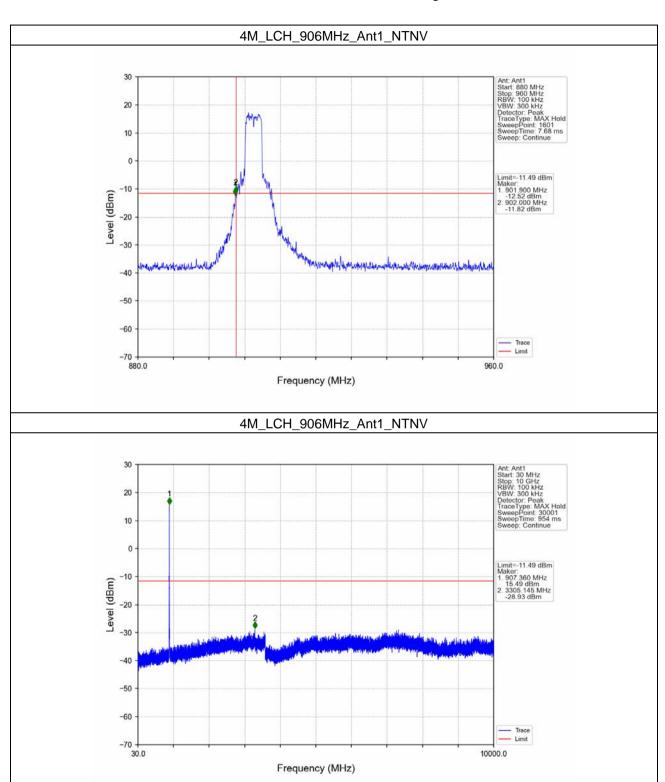
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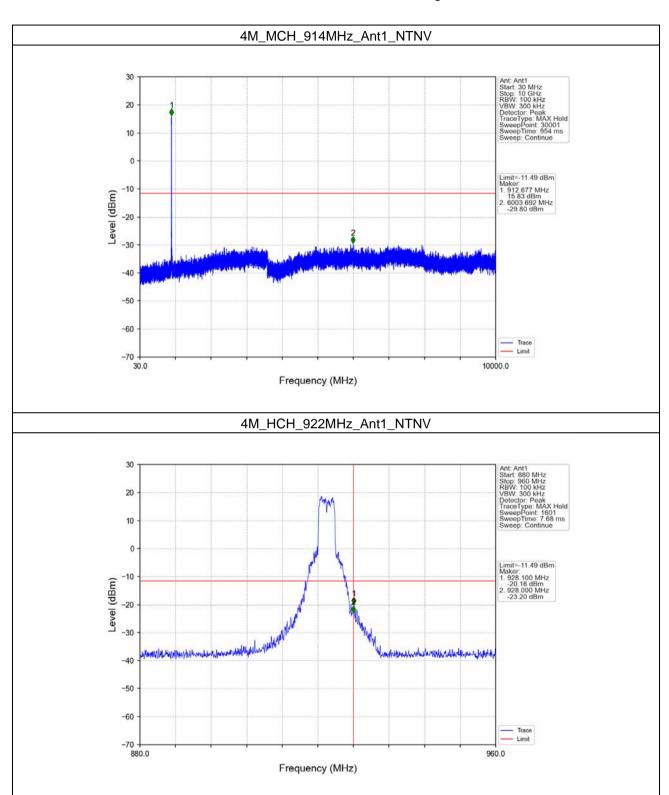
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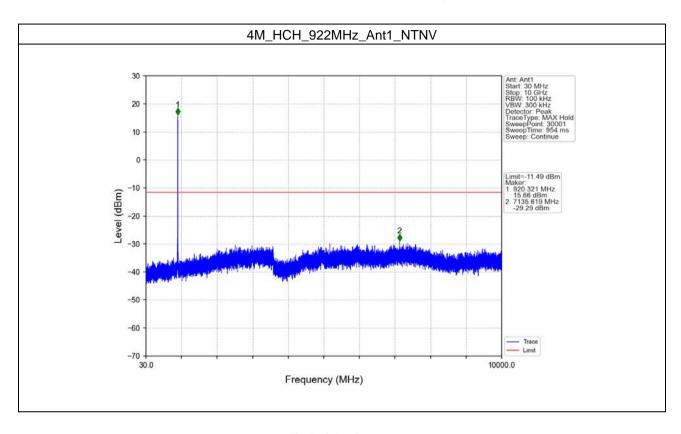
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