TEST REPORT

Application No.:	SZCR2506002333AT
Applicant:	Shenzhen Mammotion Innovation Co., Limited
Address of Applicant:	9th Floor,Building A3, Nanshan Zhiyuan,No.1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen
Manufacturer:	Shenzhen Mammotion Innovation Co., Limited
Address of Manufacturer:	9th Floor,Building A3, Nanshan Zhiyuan,No.1001 Xueyuan Avenue, Changyuan Community, Taoyuan Street, Nanshan District, Shenzhen
Factory:	DONGGUAN SHINGI ELECTRONICS CO.,LTD
Address of Factory:	No.1 Yadi South Road, Qiaotou Town, Dongguan City, Guangdong Province, China.
Equipment Under Test (EUT):	
EUT Name:	Robotic Lawn Mower
Model No.:	YMVS1、YMVH1、YMVS2、YMVH2♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark:	MAMMOTION
FCC ID:	2BFWS-YMVSH
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2025-06-09
Date of Test:	2025-06-10 to 2025-06-20
Date of Issue:	2025-06-23
Test Result:	**Pass***

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

Keny Xu
EMC Laboratory Manager

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2025-06-23*		*Original*

Authorized for issue by:				
		Stone Liu **Stone Liu/Project Engineer**		
		Eric Fu **Eric Fu/Reviewer**		

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Inspection & Testing Services
SGS-CSTC Standards Technical Services Co.,Ltd. Shenzhen Branch Testing Center LLC Laboratory.

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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
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence		N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	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
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	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
Conducted Peak Output Power		ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(2)	Pass
20dB Bandwidth		ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation		ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number		ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(i)	Pass
Dwell Time		ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(i)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass

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Declaration of EUT Family Grouping:

Model No.: YMVS1、YMVH1、YMVS2、YMVH2

Only the model YMVS1 was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used, internal wiring and functions were identical for all the above models, with only difference as below:

a. YMVS2 and YMVH2 use the same battery which model is MWBT06S02P-01;

b. YMVS1 and YMVH1 use the same battery which model is MWBT06S02P-03;

c. YMVS1 and YMVS2 has the same cutting height; YMVH1 and YMVSH2 has the same cutting height. The cutting height of YMVS1/YMVS2 and YMVH1/YMVH2 is different, the cutting height is adjusted by the same structure, Adjust by knob.

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4 General Information

4.1 Details of E.U.T.

Power supply:	Powered by rechargeable Li-ion Battery. Battery 1 information Model:MWBT06S02P-01 Nominal Voltage:21.6Vdc Rated Capacity:6.1Ah/131.76Wh Battery 2 information Model:MWBT06S02P-03 Nominal Voltage:21.6Vdc Rated Capacity:4.5Ah/97.2Wh Charging Station Information Model:CHG2310 Input:27Vdc,81W Output:27Vdc,3A Charging Station adapter Information Model:TS-A081-2703002 Input:100-240V~50/60Hz,2A Max Output 27Vdc/3A,81W
Cable(s):	AC cable of adapter: 86cm unshielded DC cable of adapter to EUT: 28cm unshielded
Cable Loss (for RF conducted test):	0.5dBi
Operation Frequency:	902.7-926.625MHz
Modulation Type:	Lora (FHSS)
Number of Channels:	25
Antenna Type:	PIFA Antenna
Antenna Gain:	1.6dBi

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Frequency:

0	902.700MHz
1	903.625MHz
2	904.625MHz
3	905.625MHz
4	906.625MHz
5	907.625MHz
6	908.625MHz
7	909.625MHz
8	910.625MHz
9	911.625MHz
10	912.625MHz
11	913.625MHz
12	914.625MHz
13	915.625MHz
14	916.625MHz
15	917.625MHz
16	918.625MHz
17	919.625MHz
18	920.625MHz
19	921.625MHz
20	922.625MHz
21	923.625MHz
22	924.625MHz
23	925.625MHz
24	926.625MHz

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4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	± 3.1dB
Radiated Emissions which fall in the restricted bands	± 6.0dB (Below 1GHz);± 4.6dB (Above 1GHz)
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)
Conducted Peak Output Power	± 0.75dB
20dB Bandwidth	± 3%
Carrier Frequencies Separation	± 7.25 x 10-8
Hopping Channel Number	± 7.25 x 10-8
Dwell Time	± 0.37%
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
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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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 Port					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2025-05-07	2028-05-06
EMI Test Receiver	Rohde&Schwarz	ESR	SZ-WRG-M-047	2025-01-08	2026-01-07
Measurement Software	AUDIX	e3 V8.2014-6-27a	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2024-07-06	2025-07-05
LISN	Rohde&Schwarz	ENV216	SEM007-01	2024-08-15	2025-08-14
LISN	ETS-LINDGREN	3816/2	SEM007-02	2025-03-03	2026-03-02

Radiated Spurious Emissions Below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Loop Antenna	ETS-Lindgren	6502	SEM003-08	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	2024-08-14	2025-08-13
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2023-09-16	2025-09-15
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2025-03-04	2026-03-03
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2024-07-06	2025-07-05

Radiated Emissions (Above 1GHz)					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
MXE EMI receiver (3Hz-3.6GHz)	KEYSIGHT	N9038B	SEM004-29	2024/08/14	2025/08/13
Signal &Spectrum Analyzer	Rohde & Schwarz	FSV	SZ-WRG-M-048	2025/01/07	2026/01/06
Pre-amplifier (30MHz-1GHz)	SGS	AMP30M1G30	SEM005-33	2025/03/04	2026/03/03
Low Noise Amplifier 30M-8GHz	Tonscend	TAP30M8G30	SZ-WRG-M-050	2025/01/07	2026/01/06
Low Noise Amplifier 1G-18GHz	Tonscend	TAP01018050	SZ-WRG-M-051	2025/01/07	2026/01/06
Low Noise Amplifier 18G-40GHz	Tonscend	TAP18040048	SZ-WRG-M-052	2025/01/07	2026/01/06
Active Loop Antenna 9kHz-30MHz	SCHWARZBECK	FMZB 1519B	SZ-WRG-M-053	2023/12/25	2025/12/24

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TRILOG Breitband Antenne 30MHz-1GHz	SCHWARZBECK	VULB 9168	SZ-WRG-M-054	2023/12/25	2025/12/24
Double Ridge Horn Antenna 1GHz-18GHz	SCHWARZBECK	BBHA 9120 D	SZ-WRG-M-055	2023/12/21	2025/12/20
SHF-EHF Horn 15GHz-40GHz	SCHWARZBECK	BBHA 9170	SZ-WRG-M-056	2023/12/25	2025/12/24
RSE Test Software	Tonscend	JS32-RSE V4.0.0	SZ-WRG-M-058	NCR	NCR
RE Test Software	Tonscend	JS32-RE V4.0.0	SZ-WRG-M-059	NCR	NCR
Measurement Software	AUDIX	e3 V8.2014-6-27	NCR	NCR	NCR
Chamber	CRTSGSSAC966	N/A	SZ-WRG-C-063	2025/01/07	2026/01/06
Spectrum Analyzer	Keysight	N9020A	SZ-WRG-M-002	2024/08/17	2025/08/16
Radio Communication Tester	Anriesu	MT8821C	SZ-WRG-M-014	2024/08/19	2025/08/18

RF Conducted Test

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Power Sensor	TST PASS	TSPS2023R	SEM009-26	2025-03-04	2026-03-03
Power Sensor	KEYSIGHT	U2021XA	SEM009-16	2025-03-04	2026-03-03
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2024-08-14	2025-08-13
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2025-03-04	2026-03-03
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2024-07-06	2025-07-05
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2025-03-03	2026-03-02

General used equipment

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2024-07-24	2025-07-23
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2024-07-24	2025-07-23
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2025-03-03	2026-03-02

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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

15.203 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.

EUT Antenna:

The antenna is integrated on the interior of the device and no consideration of replacement. The best case gain of the antenna is 1.6dBi.

Antenna location: Refer to internal photos

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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: 29 -1 = 511 bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

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Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

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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		

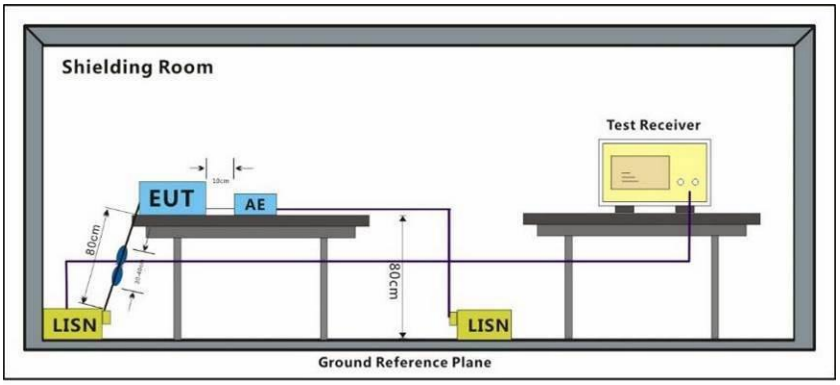
7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 23.5 °C Humidity: 45.5 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX_Hop mode_Keep the EUT in charging and continuously transmitting 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 + 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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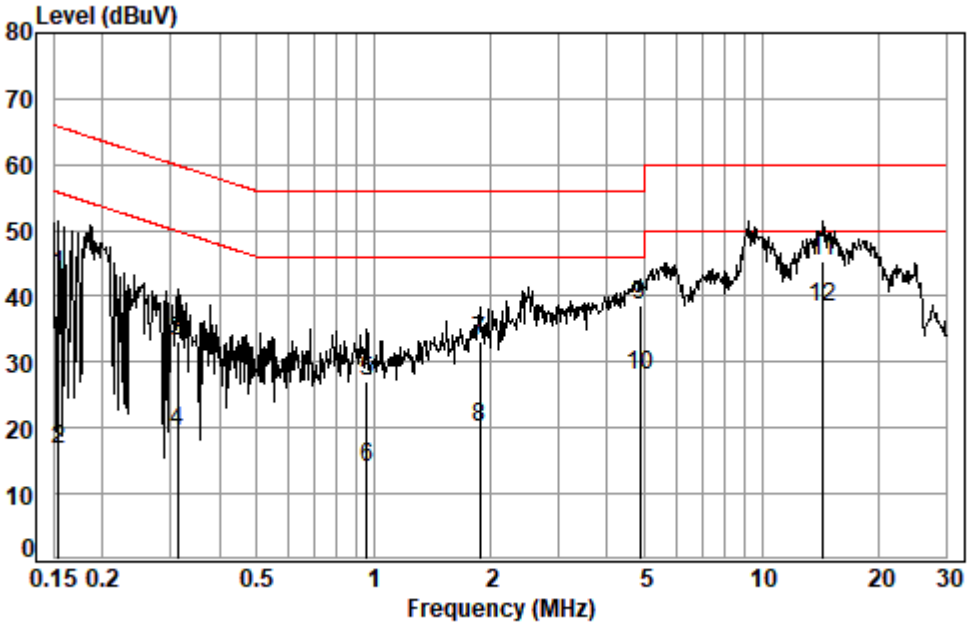
Test Mode: 04; Line: Live line



Site : Shielding Room
Condition: Line
Job No. : 02333AT/02334AT
Test mode: 04

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1540	0.06	10.19	32.84	43.09	65.78	-22.69	QP
2	0.1540	0.06	10.19	6.40	16.65	55.78	-39.13	Average
3	0.3133	0.07	9.82	23.36	33.25	59.88	-26.63	QP
4	0.3133	0.07	9.82	9.51	19.40	49.88	-30.48	Average
5	0.9582	0.09	9.59	17.42	27.10	56.00	-28.90	QP
6	0.9582	0.09	9.59	4.35	14.03	46.00	-31.97	Average
7	1.8779	0.10	9.58	23.45	33.13	56.00	-22.87	QP
8	1.8779	0.10	9.58	10.30	19.98	46.00	-26.02	Average
9	4.8480	0.12	9.66	28.77	38.55	56.00	-17.45	QP
10	4.8480	0.12	9.66	18.33	28.11	46.00	-17.89	Average
11 *	14.3641	0.25	9.90	35.19	45.34	60.00	-14.66	QP
12 *	14.3641	0.25	9.90	28.33	38.48	50.00	-11.52	Average

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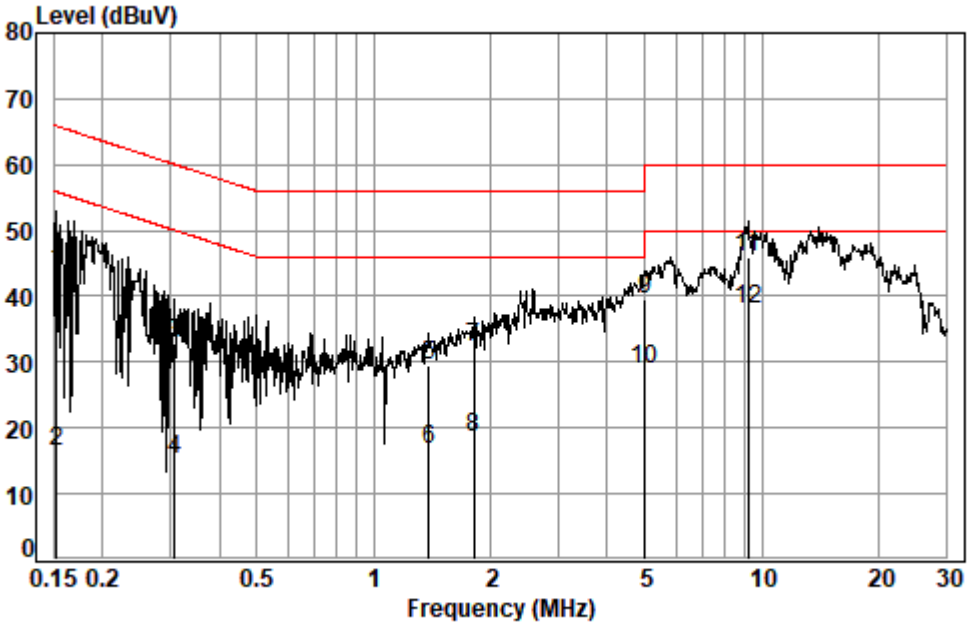
Test Mode: 04; Line: Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 02333AT/02334AT
Test mode: 04

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1524	0.06	10.15	33.49	43.70	65.87	-22.17	QP
2	0.1524	0.06	10.15	6.13	16.34	55.87	-39.53	Average
3	0.3067	0.07	9.77	22.99	32.83	60.06	-27.23	QP
4	0.3067	0.07	9.77	5.40	15.24	50.06	-34.82	Average
5	1.3884	0.10	9.54	19.78	29.42	56.00	-26.58	QP
6	1.3884	0.10	9.54	6.97	16.61	46.00	-29.39	Average
7	1.8096	0.10	9.55	22.50	32.15	56.00	-23.85	QP
8	1.8096	0.10	9.55	9.05	18.70	46.00	-27.30	Average
9	5.0046	0.12	9.56	29.93	39.61	60.00	-20.39	QP
10	5.0046	0.12	9.56	19.27	28.95	50.00	-21.05	Average
11 *	9.2043	0.19	9.60	36.17	45.96	60.00	-14.04	QP
12 *	9.2043	0.19	9.60	28.19	37.98	50.00	-12.02	Average

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7.2 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.10.5
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
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.		

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C Humidity: 45.8 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting mode.

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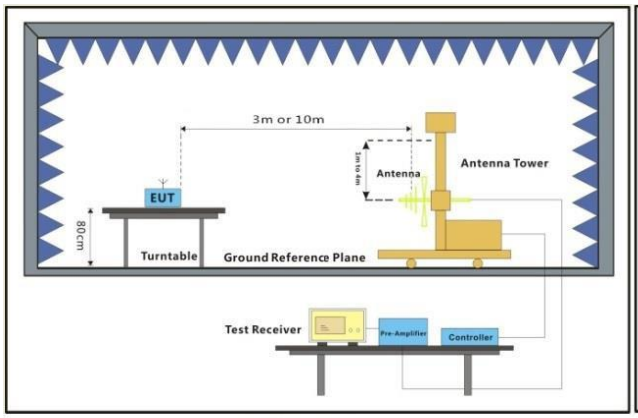
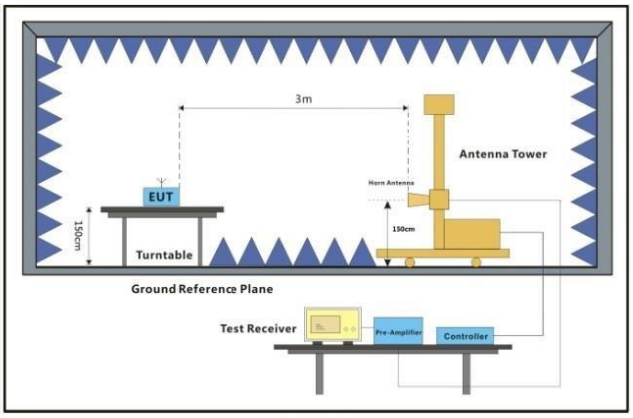
7.2.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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7.2.4 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. 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.

c. 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.

d. 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.

e. 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.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. 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, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. 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.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: 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.

Remark 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

Remark 4:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥1/T (Duty cycle＜98%) or 10Hz (Duty cycle≥98%) for Average detection (AV) at frequency above 1GHz.

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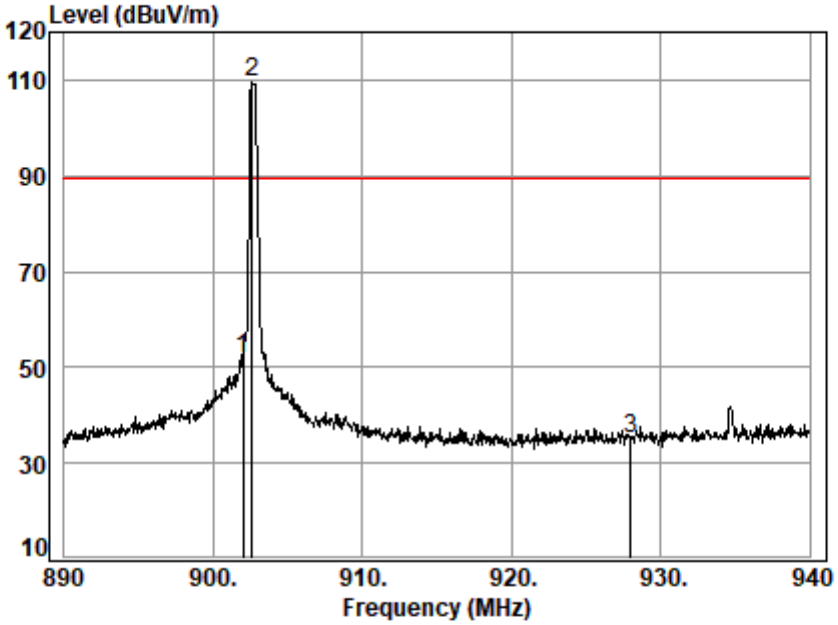
Test Mode: 03; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 02333AT/02334AT
Test mode: 902.7M

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	902.000	27.82	4.13	26.95	46.67	51.67	89.51	-37.84	
2	902.600	27.81	4.13	26.95	104.52	109.51	89.51	20.00	
3	928.000	28.18	4.20	26.80	29.62	35.20	89.51	-54.31	

Freq (MHz)	Read_Level (dBuV)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamp_Gain (dB)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)
902	46.67	27.82	4.13	26.95	51.67	89.51	-37.84
902.6	104.52	27.81	4.13	26.95	109.51	89.51	20
928	29.62	28.18	4.2	26.8	35.2	89.51	-54.31

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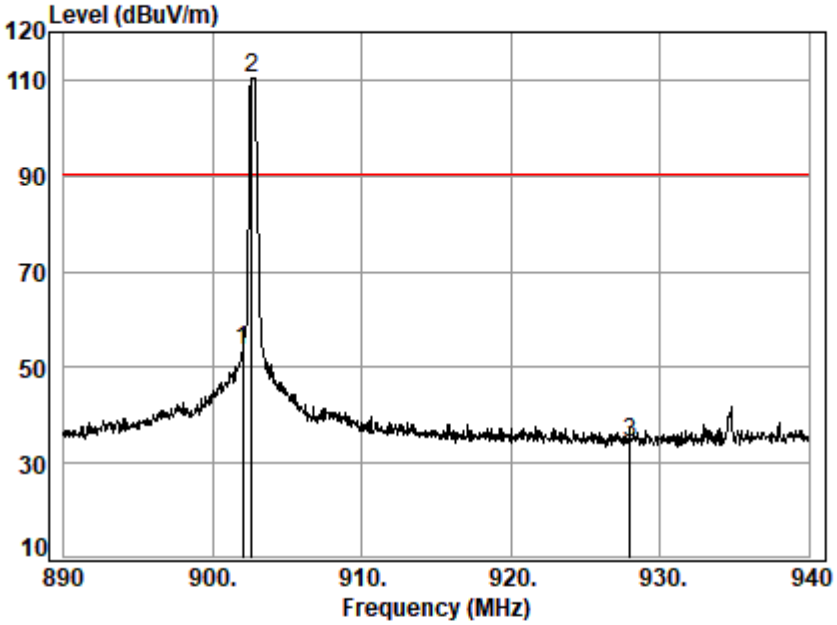
Test Mode: 03; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : 02333AT/02334AT
Test mode: 902.7M

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	902.000	27.82	4.13	26.95	48.47	53.47	90.51	-37.04	
2	902.600	27.81	4.13	26.95	105.52	110.51	90.51	20.00	
3	928.000	28.18	4.20	26.80	28.56	34.14	90.51	-56.37	

Freq (MHz)	Read_Level (dBuV)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamp_Gain (dB)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)
902	48.47	27.82	4.13	26.95	53.47	90.51	-37.04
902.6	105.52	27.81	4.13	26.95	110.51	90.51	20
928	28.56	28.18	4.2	26.8	34.14	90.51	-56.37

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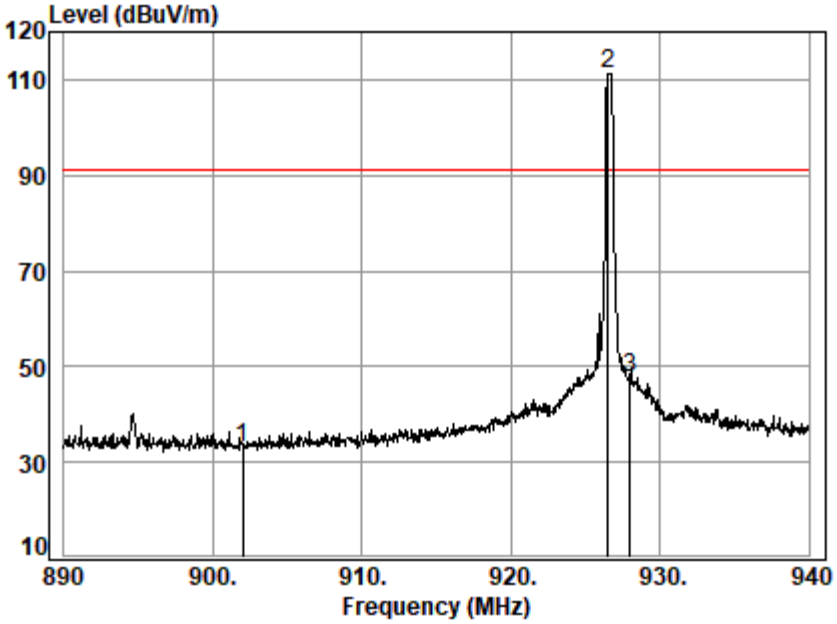
Test Mode: 03; Polarity: Horizontal



Site : chamber
Condition: 3m VERTICAL
Job No. : 02333AT/02334AT
Test mode: 926.625M

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	902.000	27.82	4.13	26.95	28.15	33.15	91.33	-58.18	
2	926.550	28.14	4.19	26.81	105.81	111.33	91.33	20.00	
3	928.000	28.18	4.20	26.80	42.02	47.60	91.33	-43.73	

Freq (MHz)	Read_Level (dBuV)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamp_Gain (dB)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)
902	28.15	27.82	4.13	26.95	33.15	91.33	-58.18
926.55	105.81	28.14	4.19	26.81	111.33	91.33	20
928	42.02	28.18	4.2	26.8	47.6	91.33	-43.73

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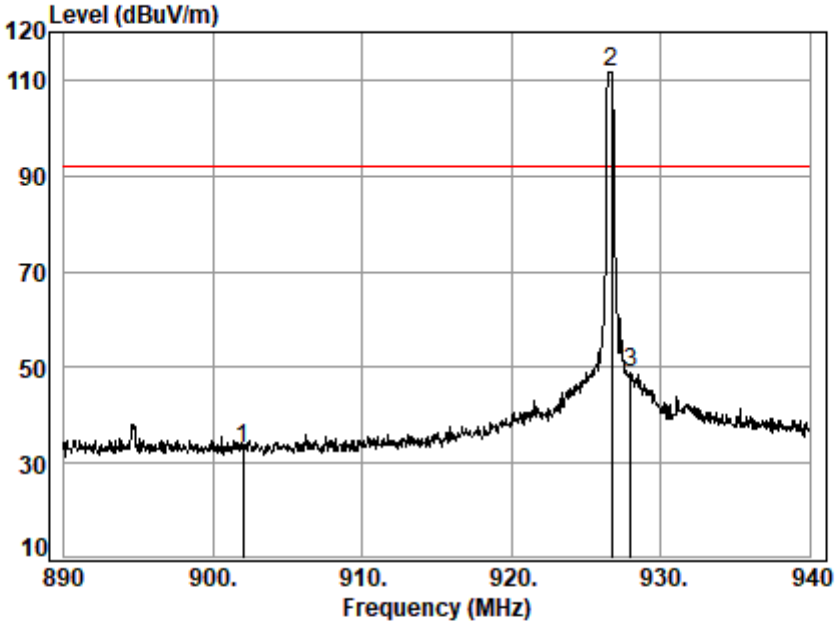
Test Mode: 03; Polarity: Vertical



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 02333AT/02334AT
Test mode: 926.625M

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	902.000	27.82	4.13	26.95	27.99	32.99	91.79	-58.80	
2	926.750	28.14	4.19	26.81	106.27	111.79	91.79	20.00	
3	928.000	28.18	4.20	26.80	43.45	49.03	91.79	-42.76	

Freq (MHz)	Read_Level (dBuV)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamp_Gain (dB)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)
902	27.99	27.82	4.13	26.95	32.99	91.79	-58.8
926.75	106.27	28.14	4.19	26.81	111.79	91.79	20
928	43.45	28.18	4.2	26.8	49.03	91.79	-42.76

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7.3 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

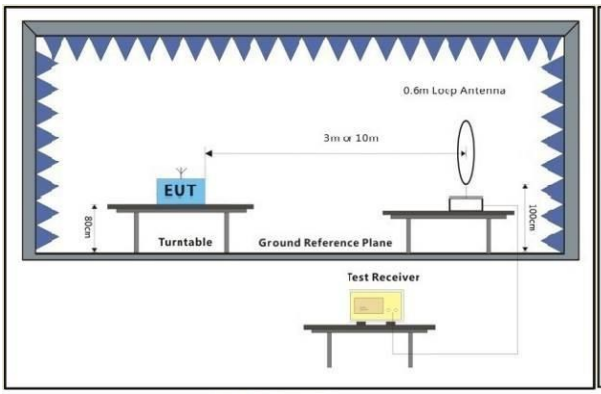
7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 23.2 °C Humidity: 45.8 % RH Atmospheric Pressure: 1020 mbar

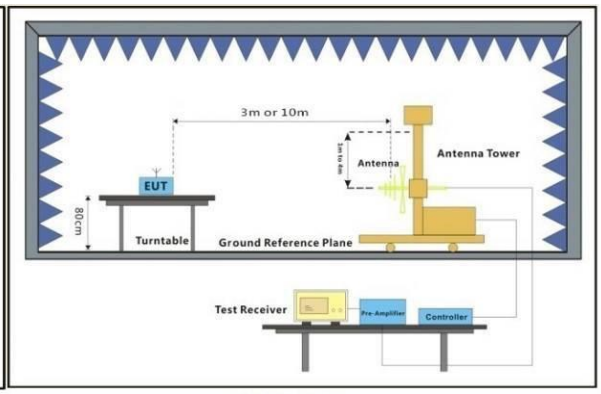
7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting mode. (Only worst case battery 1 was recorded in the report)

7.3.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz

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7.3.4 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.

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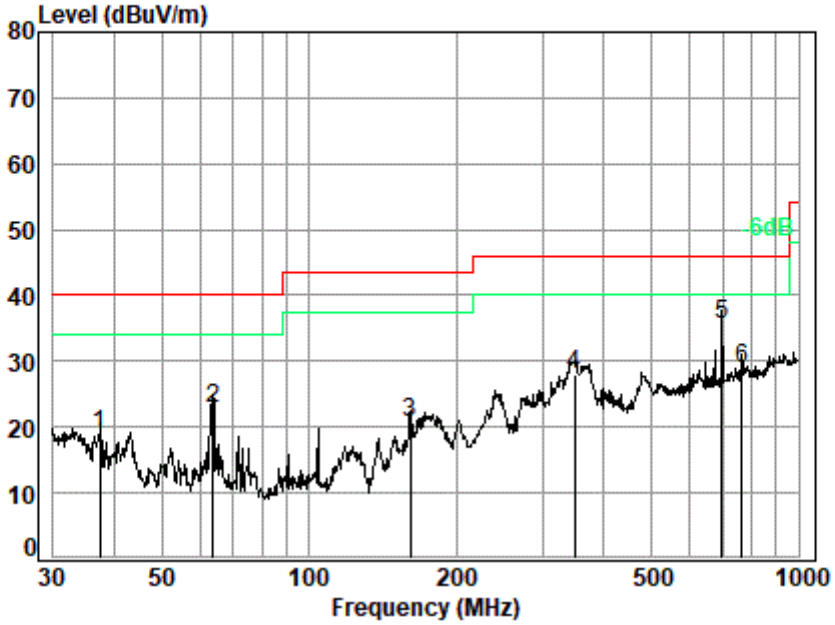
Test Mode: 03; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 02333AT/02334AT
Test Mode: CH L RSE TX
: L

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.416	17.59	0.75	27.64	28.13	18.83	40.00	-21.17	QP
2	63.759	11.13	0.98	27.62	38.42	22.91	40.00	-17.09	QP
3	160.909	13.52	1.59	27.74	33.17	20.54	43.50	-22.96	QP
4	348.027	19.80	2.40	27.63	33.47	28.04	46.00	-17.96	QP
5 q	696.857	25.87	3.53	27.84	34.12	35.68	46.00	-10.32	QP
6	766.057	26.54	3.76	27.68	26.35	28.97	46.00	-17.03	QP

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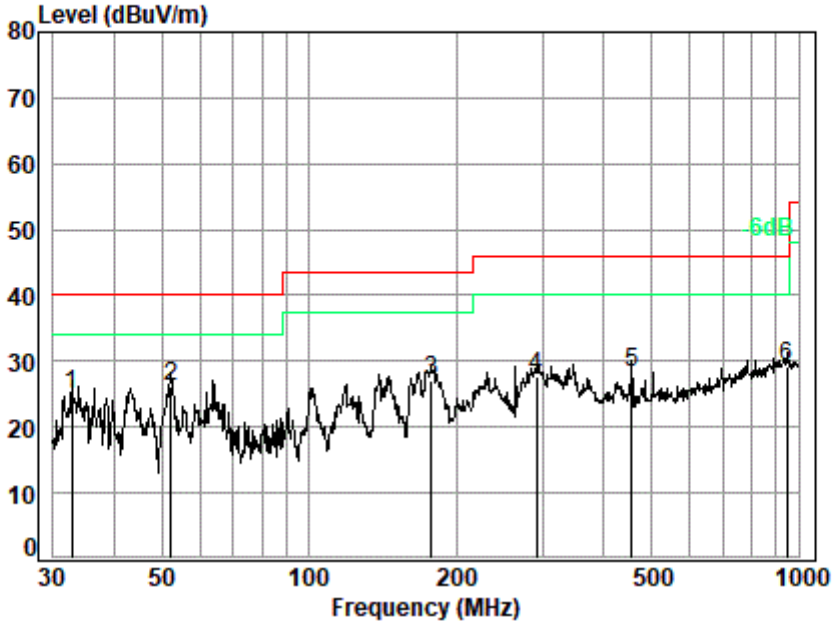
Test Mode: 03; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : 02333AT/02334AT
Test Mode: CH L RSE TX
: L

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	32.749	19.96	0.70	27.65	31.98	24.99	40.00	-15.01	QP
2 q	52.208	12.43	0.88	27.63	40.59	26.27	40.00	-13.73	QP
3	178.133	14.01	1.67	27.77	39.26	27.17	43.50	-16.33	QP
4	291.036	17.10	2.17	27.52	35.90	27.65	46.00	-18.35	QP
5	455.906	21.25	2.78	27.86	32.02	28.19	46.00	-17.81	QP
6	948.761	28.23	4.25	26.68	23.54	29.34	46.00	-16.66	QP

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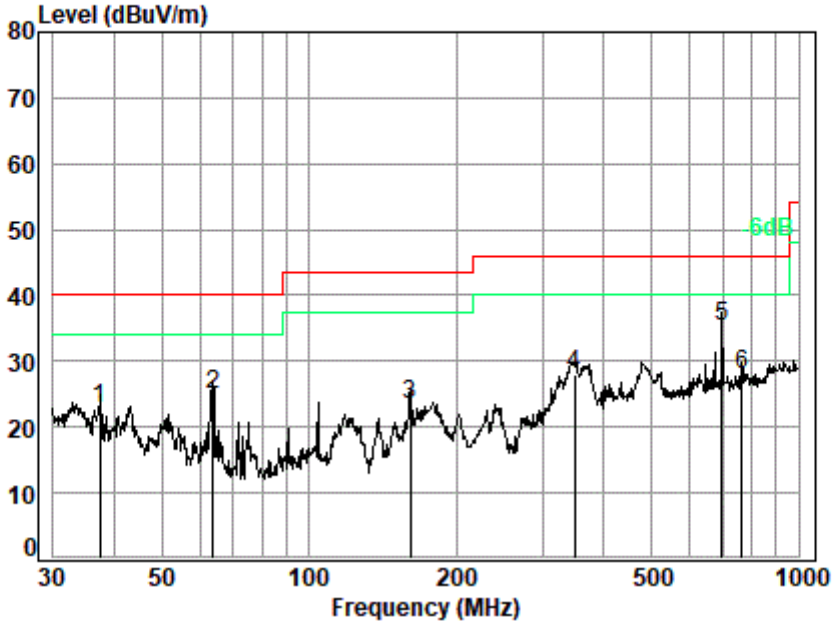
Test Mode: 03; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 02333AT/02334AT
Test Mode: CH M RSE TX
: M

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.416	17.59	0.75	27.64	32.13	22.83	40.00	-17.17	QP
2	63.759	11.13	0.98	27.62	40.42	24.91	40.00	-15.09	QP
3	160.909	13.52	1.59	27.74	36.17	23.54	43.50	-19.96	QP
4	348.027	19.80	2.40	27.63	33.37	27.94	46.00	-18.06	QP
5 q	696.857	25.87	3.53	27.84	33.72	35.28	46.00	-10.72	QP
6	766.057	26.54	3.76	27.68	25.25	27.87	46.00	-18.13	QP

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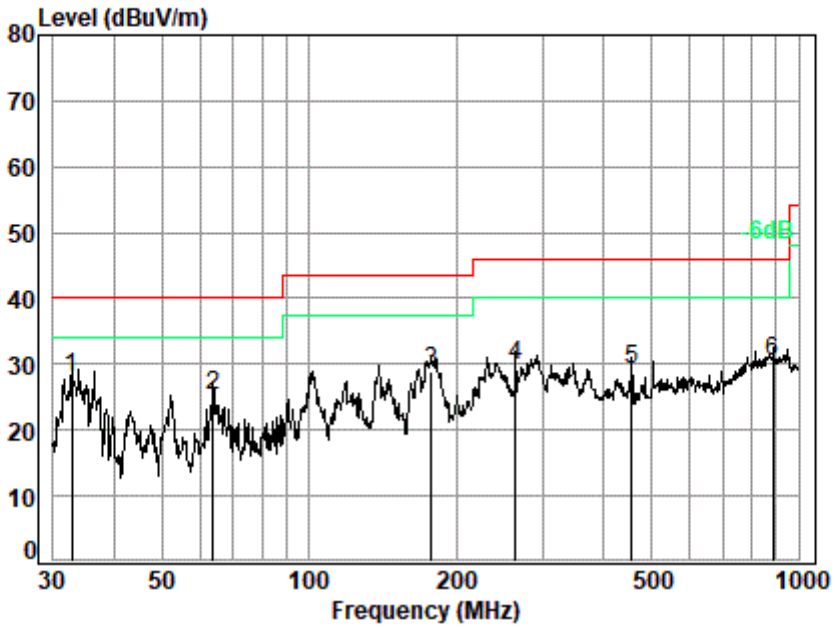
Test Mode: 03; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : 02333AT/02334AT
Test Mode: CH M RSE TX
: M

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1 q	32.749	19.96	0.70	27.65	34.98	27.99	40.00	-12.01	QP
2	63.759	11.13	0.98	27.62	40.62	25.11	40.00	-14.89	QP
3	178.133	14.01	1.67	27.77	41.06	28.97	43.50	-14.53	QP
4	263.819	17.10	2.06	27.60	38.39	29.95	46.00	-16.05	QP
5	455.906	21.25	2.78	27.86	32.92	29.09	46.00	-16.91	QP
6	887.610	27.96	4.09	27.04	25.51	30.52	46.00	-15.48	QP

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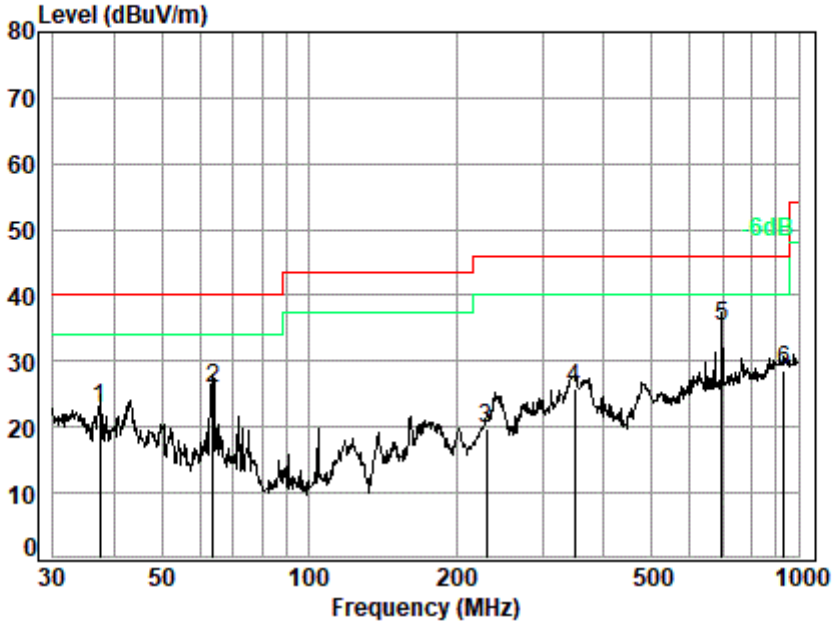
Test Mode: 03; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : 02333AT/02334AT
Test Mode: CH H RSE TX
: H

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.416	17.59	0.75	27.64	32.13	22.83	40.00	-17.17	QP
2	63.759	11.13	0.98	27.62	41.42	25.91	40.00	-14.09	QP
3	230.099	16.47	1.91	27.70	29.19	19.87	46.00	-26.13	QP
4	348.027	19.80	2.40	27.63	31.27	25.84	46.00	-20.16	QP
5 q	696.857	25.87	3.53	27.84	33.82	35.38	46.00	-10.62	QP
6	935.546	28.15	4.22	26.76	23.06	28.67	46.00	-17.33	QP

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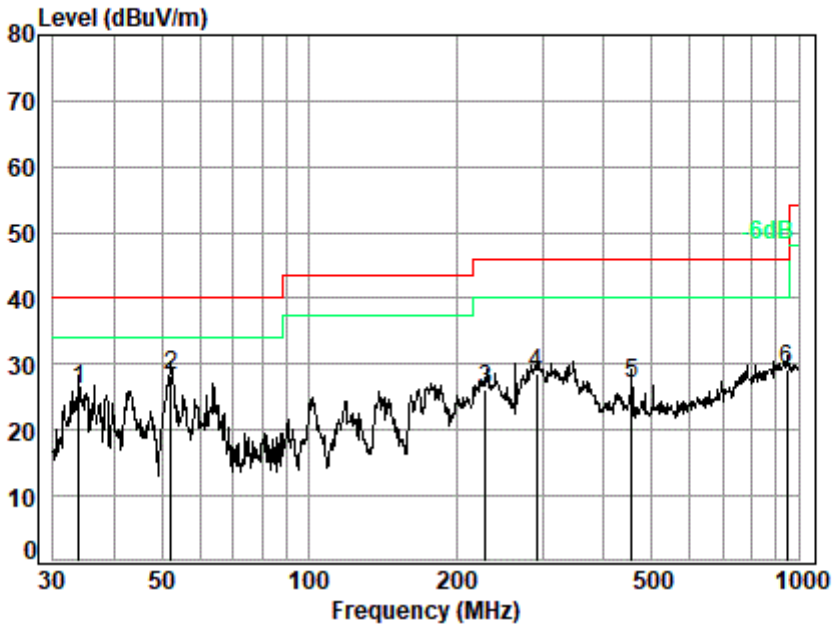

Site : chamber
Condition: 3m VERTICAL
Job No. : 02333AT/02334AT
Test Mode: CH H RSE TX
: H

	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	33.917	19.46	0.72	27.65	33.75	26.28	40.00	-13.72	QP
2 q	52.208	12.43	0.88	27.63	42.59	28.27	40.00	-11.73	QP
3	229.293	16.34	1.91	27.70	35.55	26.10	46.00	-19.90	QP
4	291.036	17.10	2.17	27.52	36.80	28.55	46.00	-17.45	QP
5	455.906	21.25	2.78	27.86	30.92	27.09	46.00	-18.91	QP
6	948.761	28.23	4.25	26.68	23.54	29.34	46.00	-16.66	QP

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7.4 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

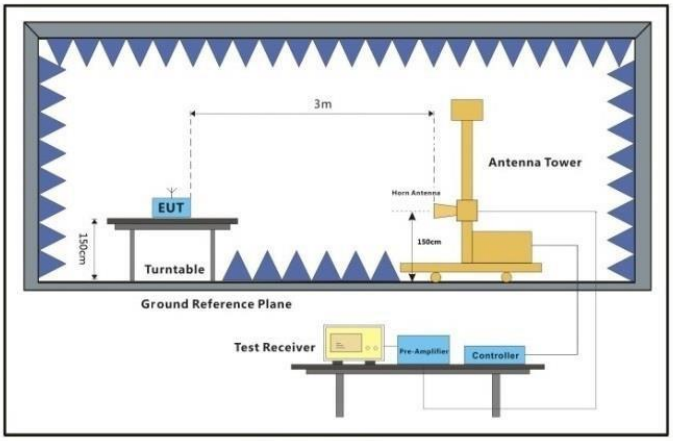
7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 22.4 °C Humidity: 61.7 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting mode.

7.4.3 Test Setup Diagram



Above 1GHz

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7.4.4 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: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

5:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥1/T (Duty cycle＜98%) or 10Hz (Duty cycle≥98%) for Average detection (AV) at frequency above 1GHz.

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Inspection & Testing Services
SGS-CSTC Standards Technical Services Co.,Ltd. Shenzhen Branch Testing Center LLC Laboratory.

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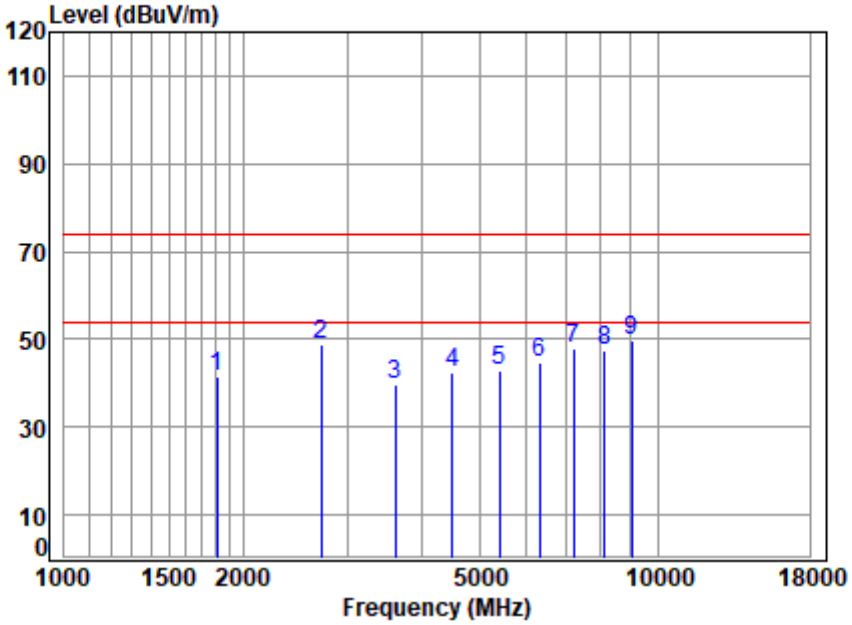
Test Mode: 03; Polarity: Horizontal; Channel: Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 02333AT/02334AT
Mode : CH L RSE TX

	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	1805.400	5.00	27.00	54.86	64.31	41.45	74.00	-32.55	Peak
2	2708.100	5.67	29.70	54.97	68.55	48.95	74.00	-25.05	Peak
3	3610.800	6.39	32.23	54.55	55.80	39.87	74.00	-34.13	Peak
4	4513.500	7.15	33.52	54.25	56.17	42.59	74.00	-31.41	Peak
5	5416.200	8.19	34.63	53.72	53.97	43.07	74.00	-30.93	Peak
6	6318.900	8.81	34.96	53.13	54.06	44.70	74.00	-29.30	Peak
7	7221.600	8.53	35.70	53.18	56.84	47.89	74.00	-26.11	Peak
8	8124.300	9.18	36.50	53.17	55.16	47.67	74.00	-26.33	Peak
9 p	9027.000	10.57	36.90	53.59	55.86	49.74	74.00	-24.26	Peak

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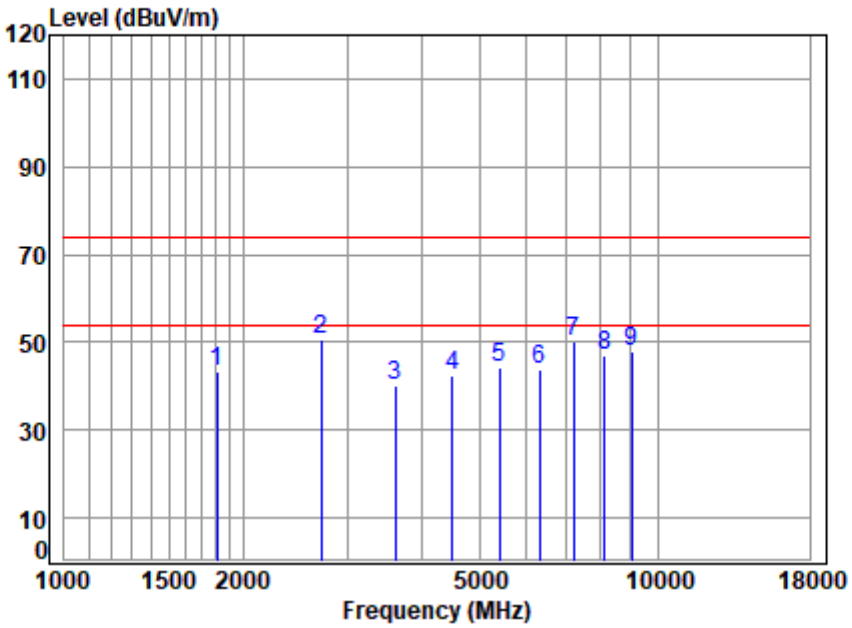
Test Mode: 03; Polarity: Vertical; Channel: Low



Site : chamber
Condition: 3m VERTICAL
Job No : 02333AT/02334AT
Mode : CH L RSE TX

	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	1805.400	5.00	27.00	54.86	66.14	43.28	74.00	-30.72	Peak
2 p	2708.100	5.67	29.70	54.97	70.14	50.54	74.00	-23.46	Peak
3	3610.800	6.39	32.23	54.55	55.95	40.02	74.00	-33.98	Peak
4	4513.500	7.15	33.52	54.25	55.96	42.38	74.00	-31.62	Peak
5	5416.200	8.19	34.63	53.72	55.18	44.28	74.00	-29.72	Peak
6	6318.900	8.81	34.96	53.13	53.01	43.65	74.00	-30.35	Peak
7	7221.600	8.53	35.70	53.18	58.92	49.97	74.00	-24.03	Peak
8	8124.300	9.18	36.50	53.17	54.53	47.04	74.00	-26.96	Peak
9	9027.000	10.57	36.90	53.59	54.16	48.04	74.00	-25.96	Peak

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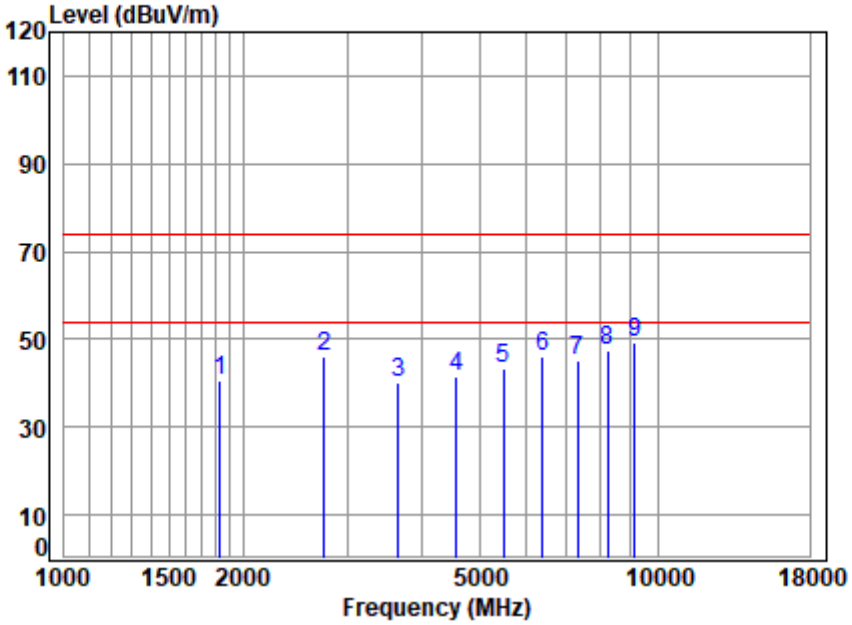
Test Mode: 03; Polarity: Horizontal; Channel: Middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 02333AT/02334AT
Mode : CH M RSE TX

	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	1829.250	5.01	27.00	54.86	63.37	40.52	74.00	-33.48	Peak
2	2743.875	5.71	29.70	54.98	65.74	46.17	74.00	-27.83	Peak
3	3658.500	6.44	32.75	54.52	55.29	39.96	74.00	-34.04	Peak
4	4573.125	7.22	33.30	54.24	55.37	41.65	74.00	-32.35	Peak
5	5487.750	8.28	34.55	53.64	54.18	43.37	74.00	-30.63	Peak
6	6402.375	8.82	35.21	53.14	55.07	45.96	74.00	-28.04	Peak
7	7317.000	8.50	35.70	53.17	53.91	44.94	74.00	-29.06	Peak
8	8231.625	9.32	36.66	53.22	54.75	47.51	74.00	-26.49	Peak
9 p	9146.250	10.59	37.00	53.54	55.13	49.18	74.00	-24.82	Peak

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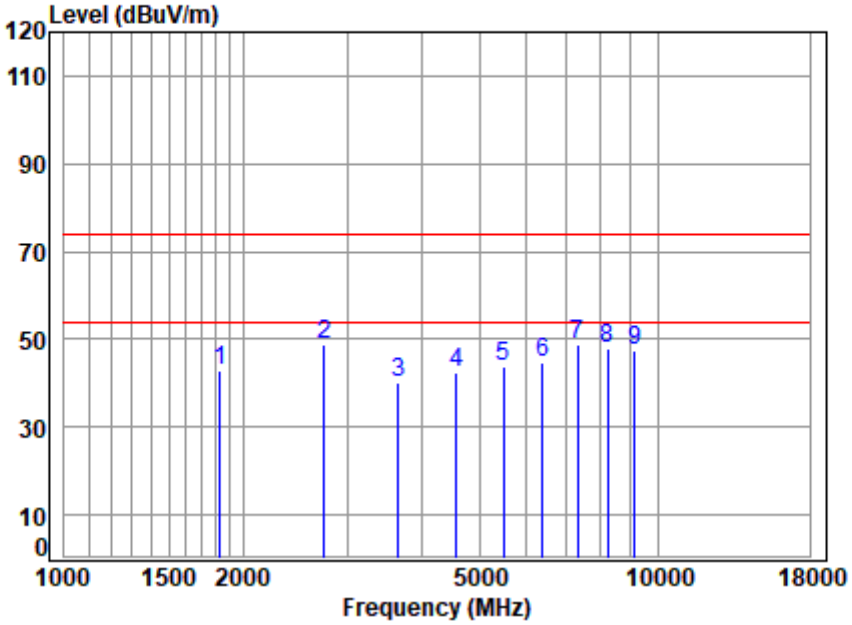
Test Mode: 03; Polarity: Vertical; Channel: Middle



Site : chamber
Condition: 3m VERTICAL
Job No : 02333AT/02334AT
Mode : CH M RSE TX

	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	1829.250	5.01	27.00	54.86	65.72	42.87	74.00	-31.13	Peak
2 p	2743.875	5.71	29.70	54.98	68.43	48.86	74.00	-25.14	Peak
3	3658.500	6.44	32.75	54.52	55.44	40.11	74.00	-33.89	Peak
4	4573.125	7.22	33.30	54.24	55.93	42.21	74.00	-31.79	Peak
5	5487.750	8.28	34.55	53.64	54.66	43.85	74.00	-30.15	Peak
6	6402.375	8.82	35.21	53.14	53.75	44.64	74.00	-29.36	Peak
7	7317.000	8.50	35.70	53.17	57.62	48.65	74.00	-25.35	Peak
8	8231.625	9.32	36.66	53.22	55.25	48.01	74.00	-25.99	Peak
9	9146.250	10.59	37.00	53.54	53.38	47.43	74.00	-26.57	Peak

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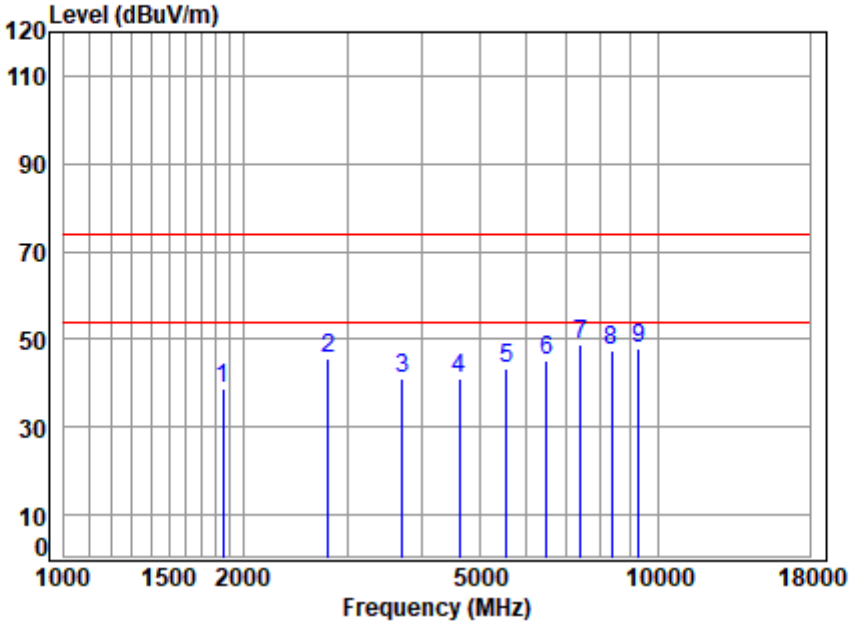
Test Mode: 03; Polarity: Horizontal; Channel: High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 02333AT/02334AT
Mode : CH H RSE TX

	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	1853.250	5.01	27.03	54.87	61.54	38.71	74.00	-35.29	Peak
2	2779.875	5.74	29.76	54.98	64.96	45.48	74.00	-28.52	Peak
3	3706.500	6.49	32.99	54.49	55.98	40.97	74.00	-33.03	Peak
4	4633.125	7.28	33.37	54.23	54.61	41.03	74.00	-32.97	Peak
5	5559.750	8.36	34.70	53.56	53.85	43.35	74.00	-30.65	Peak
6	6486.375	8.83	35.57	53.15	53.84	45.09	74.00	-28.91	Peak
7 p	7413.000	8.47	35.85	53.16	57.44	48.60	74.00	-25.40	Peak
8	8339.625	9.45	36.70	53.28	54.41	47.28	74.00	-26.72	Peak
9	9266.250	10.61	37.26	53.49	53.70	48.08	74.00	-25.92	Peak

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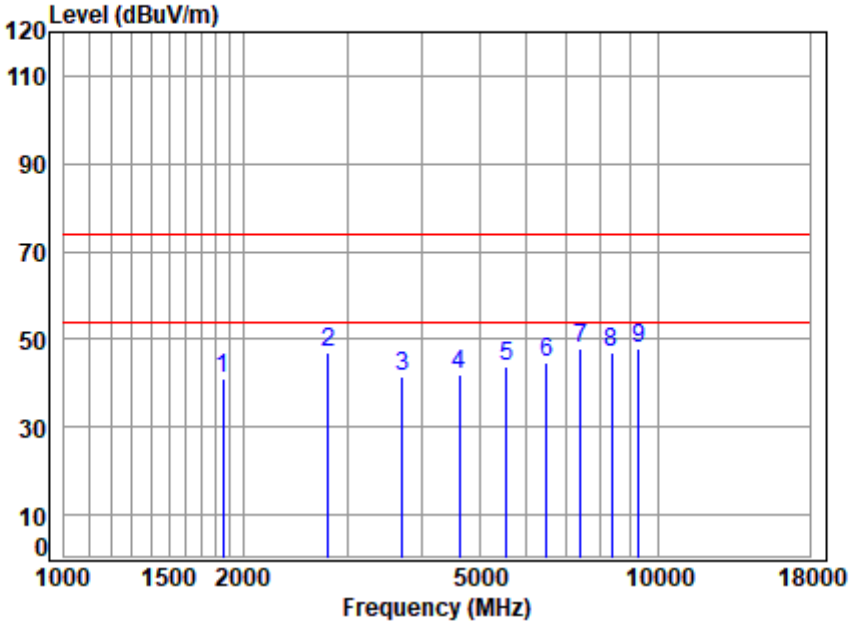
Test Mode: 03; Polarity: Vertical; Channel: High



Site : chamber
Condition: 3m VERTICAL
Job No : 02333AT/02334AT
Mode : CH H RSE TX

	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	1853.250	5.01	27.03	54.87	64.09	41.26	74.00	-32.74	Peak
2	2779.875	5.74	29.76	54.98	66.33	46.85	74.00	-27.15	Peak
3	3706.500	6.49	32.99	54.49	56.45	41.44	74.00	-32.56	Peak
4	4633.125	7.28	33.37	54.23	55.66	42.08	74.00	-31.92	Peak
5	5559.750	8.36	34.70	53.56	54.46	43.96	74.00	-30.04	Peak
6	6486.375	8.83	35.57	53.15	53.49	44.74	74.00	-29.26	Peak
7	7413.000	8.47	35.85	53.16	56.65	47.81	74.00	-26.19	Peak
8	8339.625	9.45	36.70	53.28	54.30	47.17	74.00	-26.83	Peak
9 p	9266.250	10.61	37.26	53.49	53.48	47.86	74.00	-26.14	Peak

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7.5 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(2)
Test Method: ANSI C63.10 (2013) Section 7.8.5

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

7.5.1 E.U.T. Operation

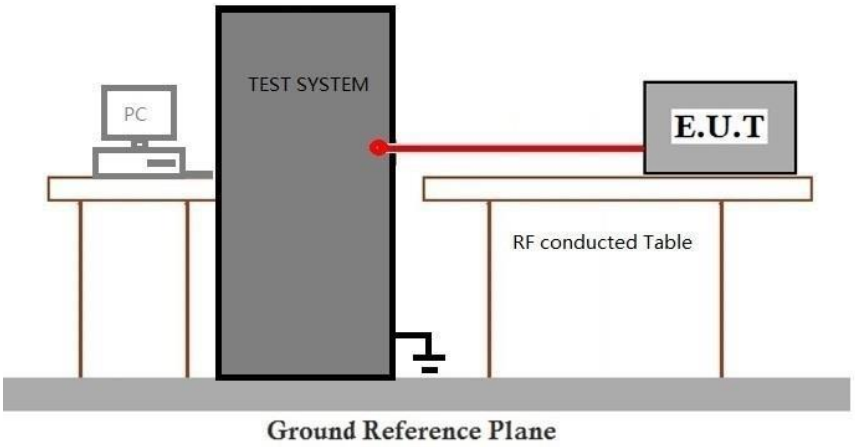
Operating Environment:

Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting mode.

7.5.3 Test Setup Diagram



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7.5.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details

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7.6 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.7

Limit:

20 dB bandwidth of the hopping channel	Hopping frequencies	Average time of occupancy
less than 250 kHz	least 50 hopping frequencies	shall not be greater than 0.4 seconds within a 20 second period
250 kHz to 500kHz	least 25 hopping frequencies	shall not be greater than 0.4 seconds within a 10 second period.

7.6.1 E.U.T. Operation

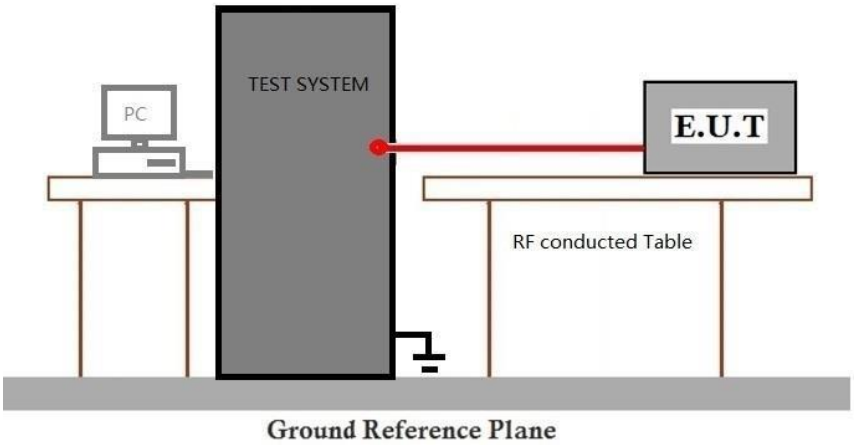
Operating Environment:

Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting 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 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)
Test Method: ANSI C63.10 (2013) Section 7.8.2

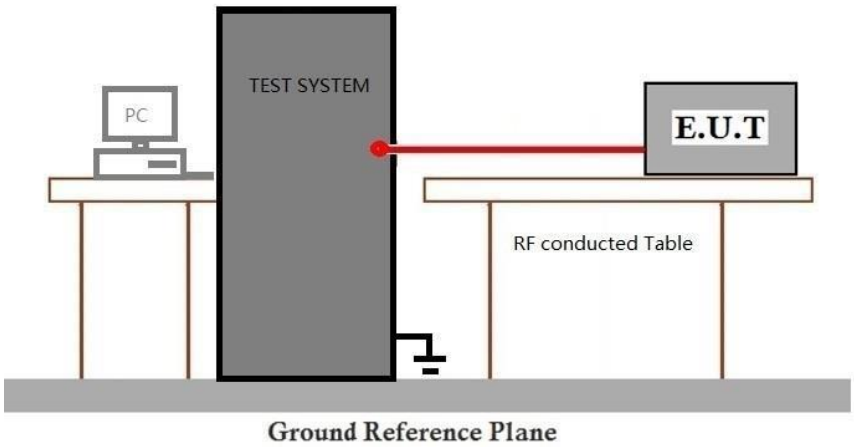
7.7.1 E.U.T. Operation

Operating Environment:
Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_Hop mode_Keep the EUT in frequency hopping mode.

7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

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7.8 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(i)
Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

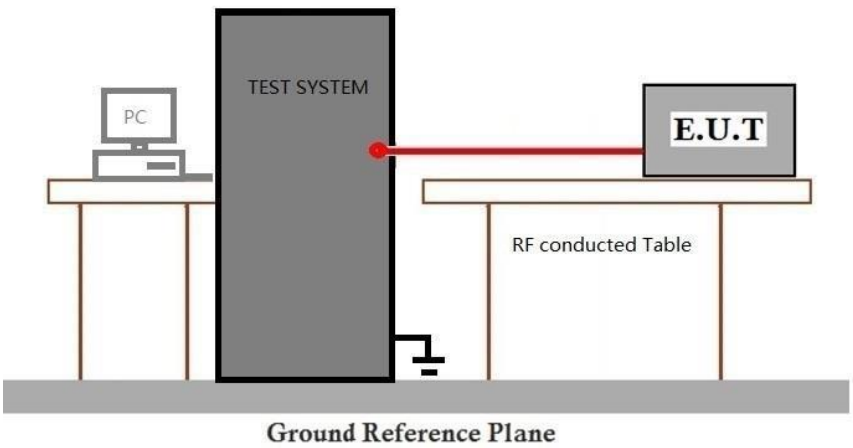
7.8.1 E.U.T. Operation

Operating Environment:
Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_Hop mode_Keep the EUT in frequency hopping mode.

7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

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7.9 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(i)
Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

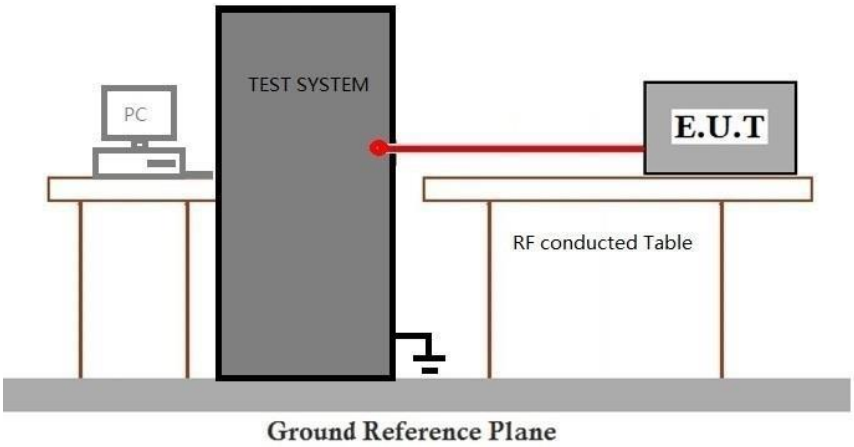
7.9.1 E.U.T. Operation

Operating Environment:
Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_Hop mode_Keep the EUT in frequency hopping mode.

7.9.3 Test Setup Diagram



7.9.4 Measurement Procedure and Data

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7.10 Conducted Band Edges Measurement

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

Test Method: ANSI C63.10 (2013) Section 7.8.6

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).

7.10.1 E.U.T. Operation

Operating Environment:

Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_Hop mode_Keep the EUT in frequency hopping mode.
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting mode.

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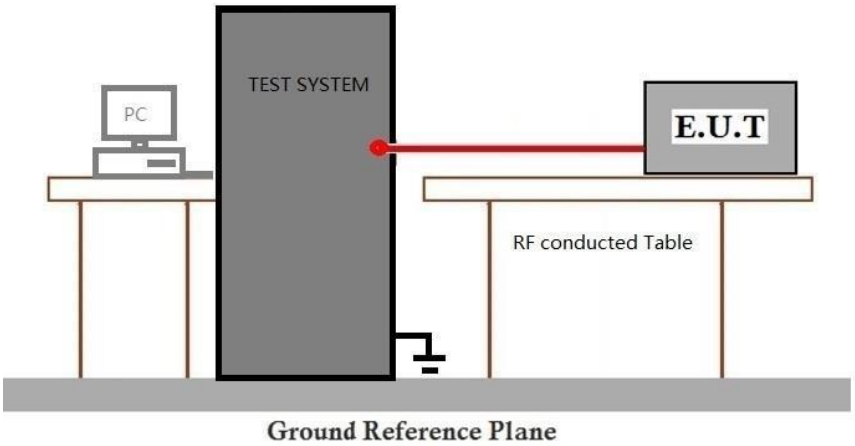
7.10.3 Test Setup Diagram



7.10.4 Measurement Procedure and Data

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7.11 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 7.8.8

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).

7.11.1 E.U.T. Operation

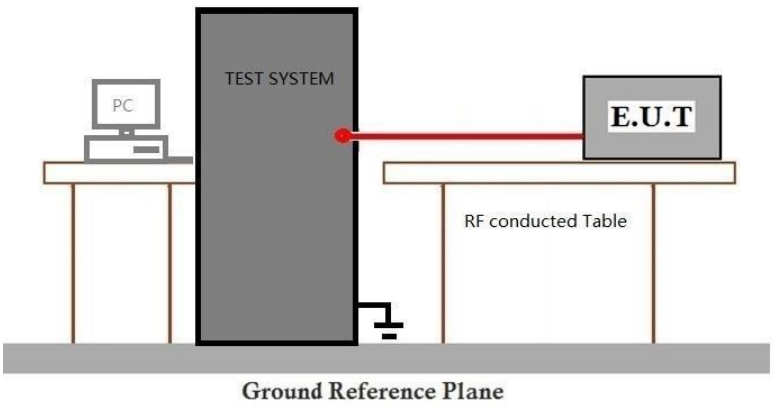
Operating Environment:

Temperature: 24.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

7.11.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode_Keep the EUT in continuously transmitting mode.

7.11.3 Test Setup Diagram



7.11.4 Measurement Procedure and Data

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8 Test Setup Photo

Refer to Appendix – Test Setup Photos for SZCR2506002333AT

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2506002333AT

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10 Appendix

1. Duty Cycle

1.1 Test Result

1.1.1 nt1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
LORA	SISO	902.7	35.050	39.950	87.73	0.57	0.00
		914.625	35.050	39.960	87.71	0.57	0.00
		926.625	35.050	39.963	87.71	0.57	0.00

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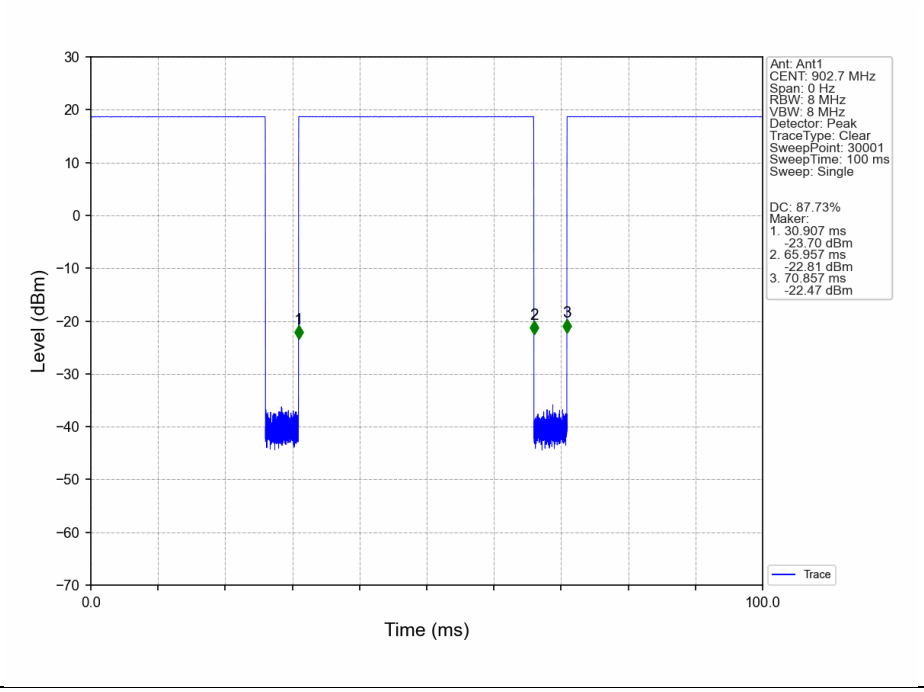
1.2 Test Graph

1.2.1 nt1

LORA_LCH_902.7MHz_Ant1_NTNV



LORA_MCH_914.625MHz_Ant1_NTNV

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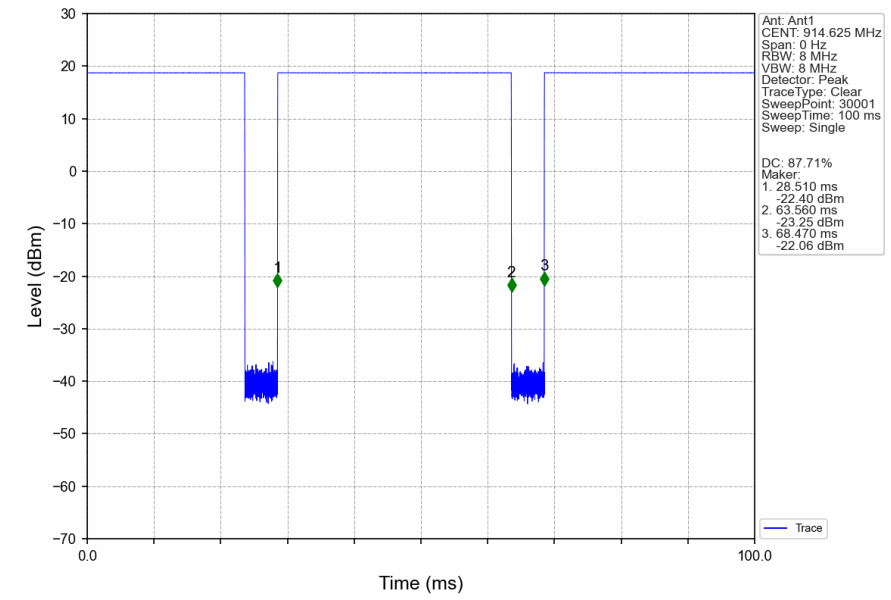

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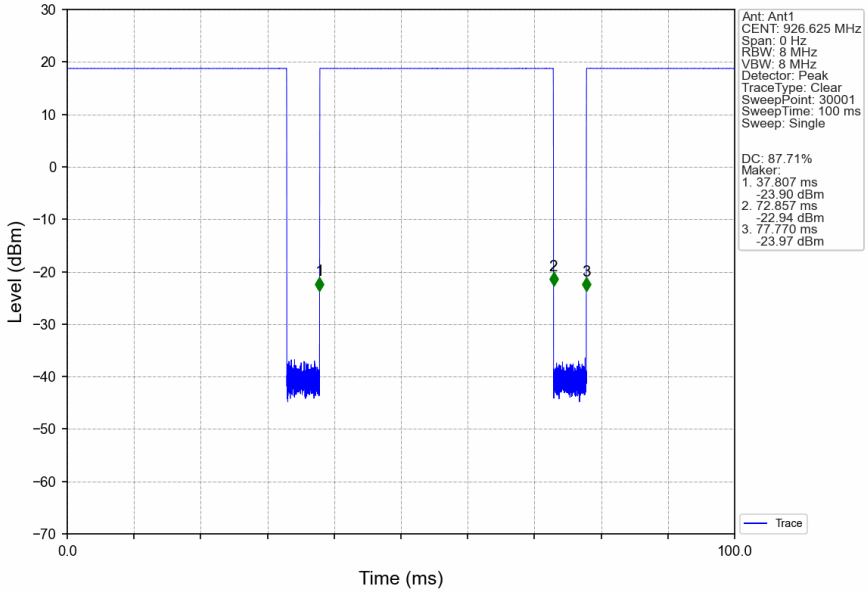
LORA_HCH_926.625MHz_Ant1_NTNV



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2. Bandwidth

2.1 Test Result

2.1.1 BW

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
LORA	SISO	902.7	1	0.266	/	Pass
		914.625	1	0.266	/	Pass
		926.625	1	0.263	/	Pass

2.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	ANT	20dB Bandwidth (MHz)		Verdict
				Result	Limit	
LORA	SISO	902.7	1	0.309	0.5	Pass
		914.625	1	0.307	0.5	Pass
		926.625	1	0.302	0.5	Pass

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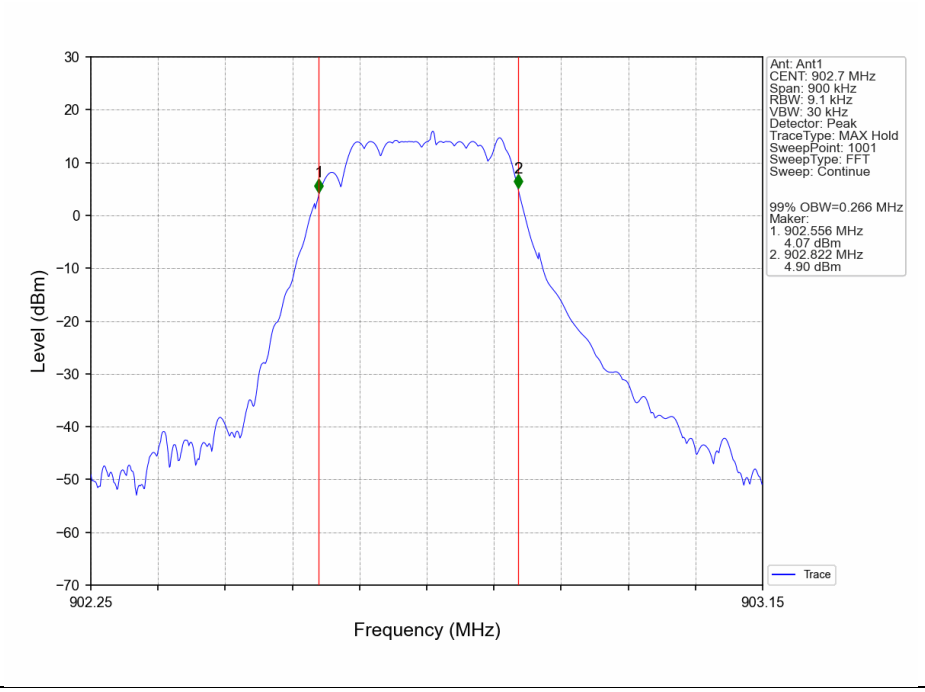
2.2 Test Graph

2.2.1 BW

LORA_LCH_902.7MHz_Ant1_NTNV



LORA_MCH_914.625MHz_Ant1_NTNV

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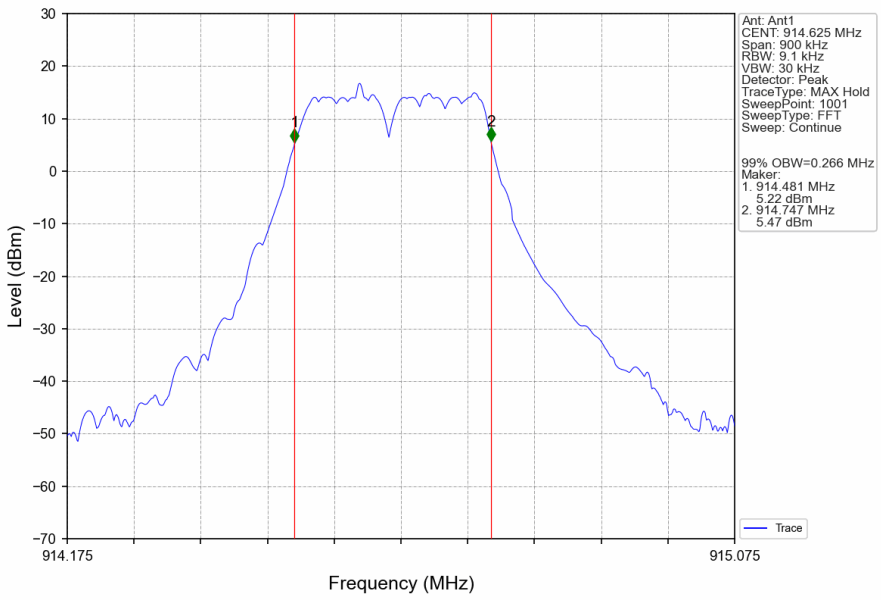

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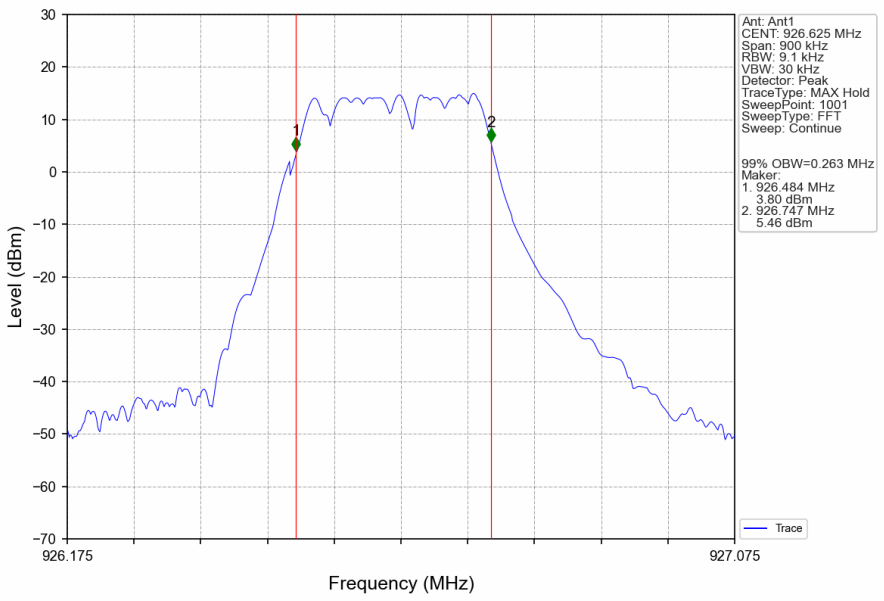

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2.2.2 20dB BW

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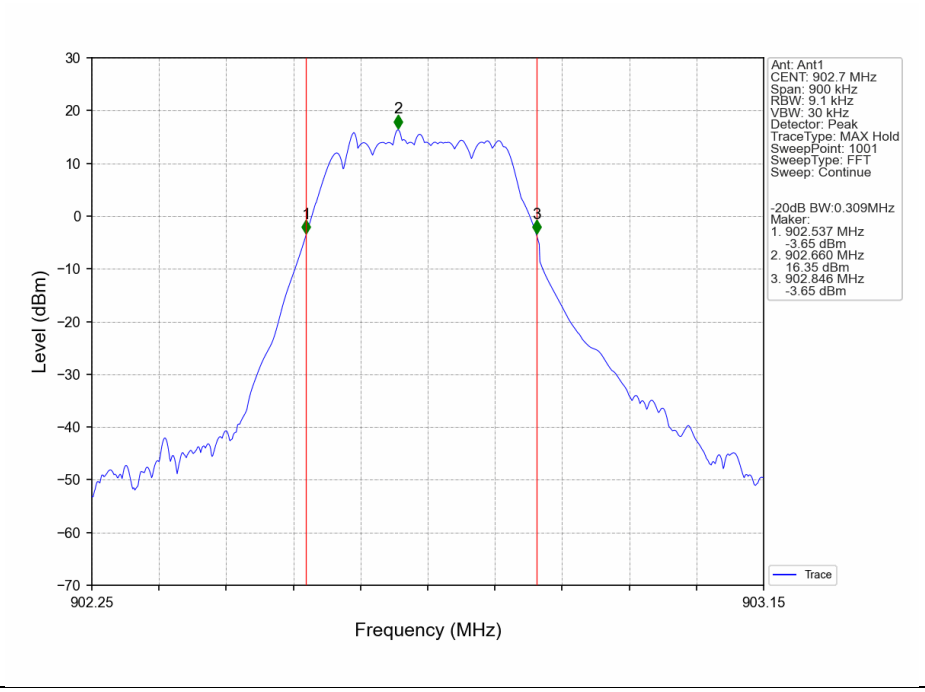

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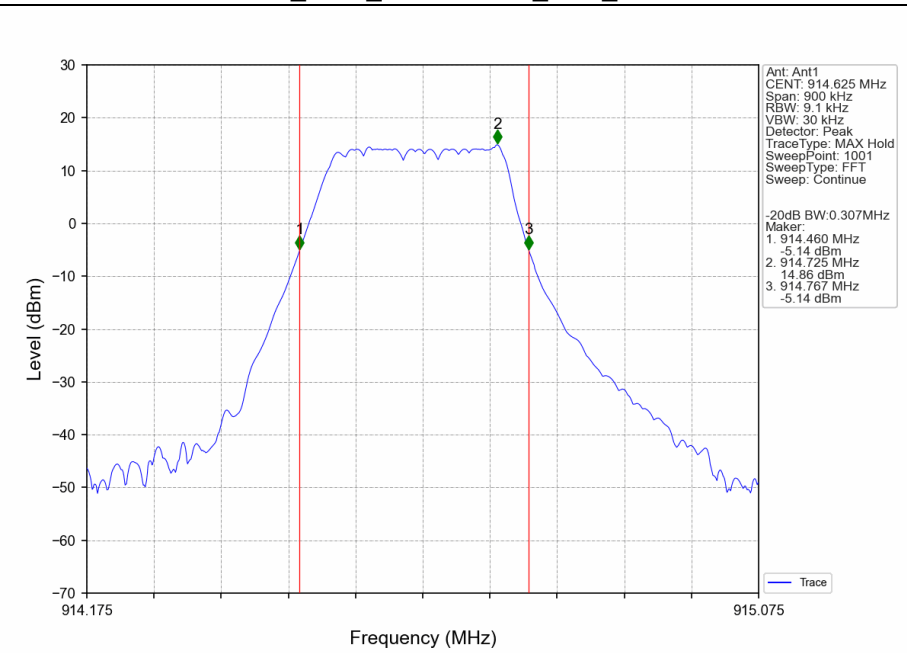

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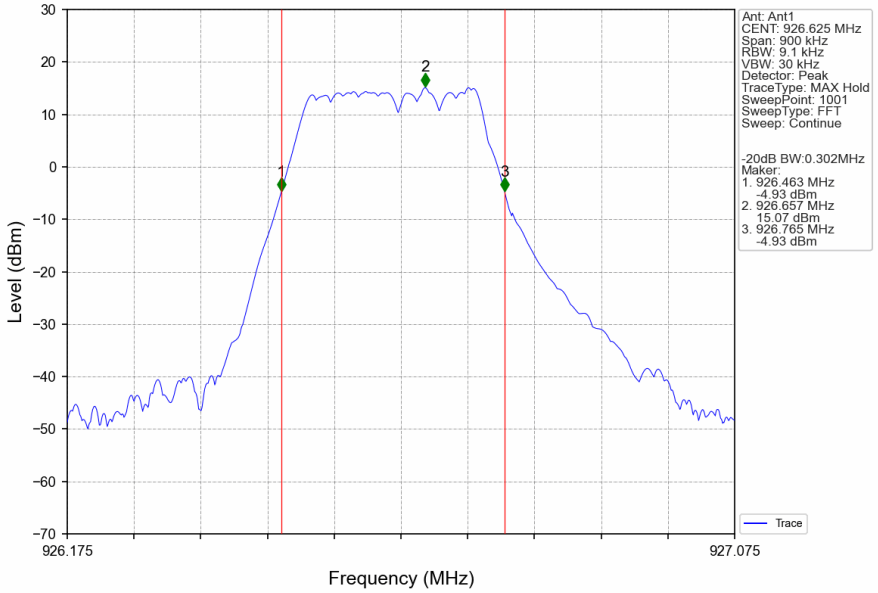

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3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 wer

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
LORA	SISO	902.7	18.60	<=23.98	Pass
		914.625	18.69	<=23.98	Pass
		926.625	18.78	<=23.98	Pass
Note1: Antenna Gain: Ant1: 1.60dBi;					

4. Carrier Frequency Separation

4.1 Test Result

4.1.1 nt1

Ant1						
Mode	TX Type	Frequency (MHz)	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
LORA	SISO	HOPP	1.000	0.309	>=0.309	Pass

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4.2 Test Graph

4.2.1 nt1

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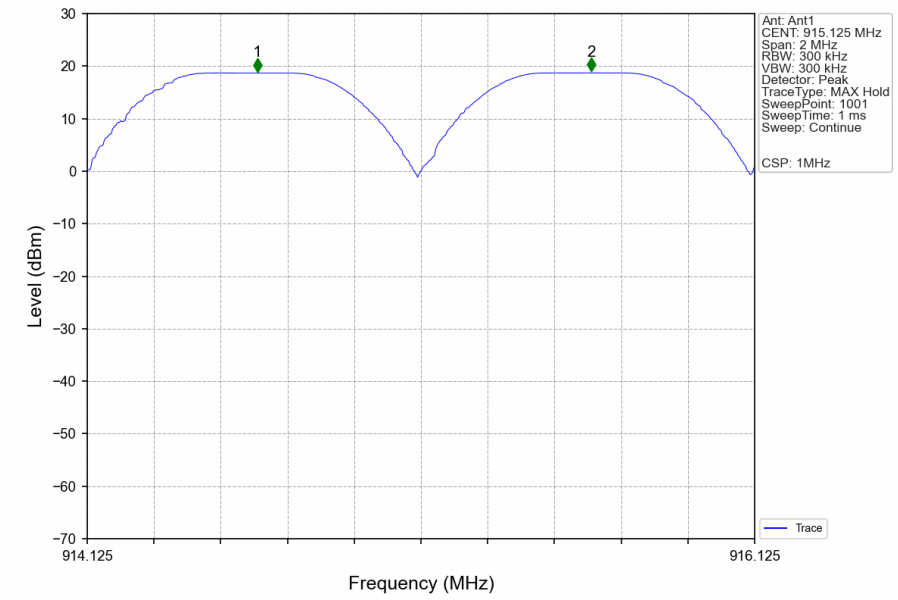

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5. Number of Hopping Frequencies

5.1 Test Result

5.1.1 ppNum

Mode	TX Type	Frequency (MHz)	Num of Hopping Frequencies		Verdict
			ANT1	Limit	
LORA	SISO	HOPP	25	>=25	Pass

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5.2 Test Graph

5.2.1 ppNum

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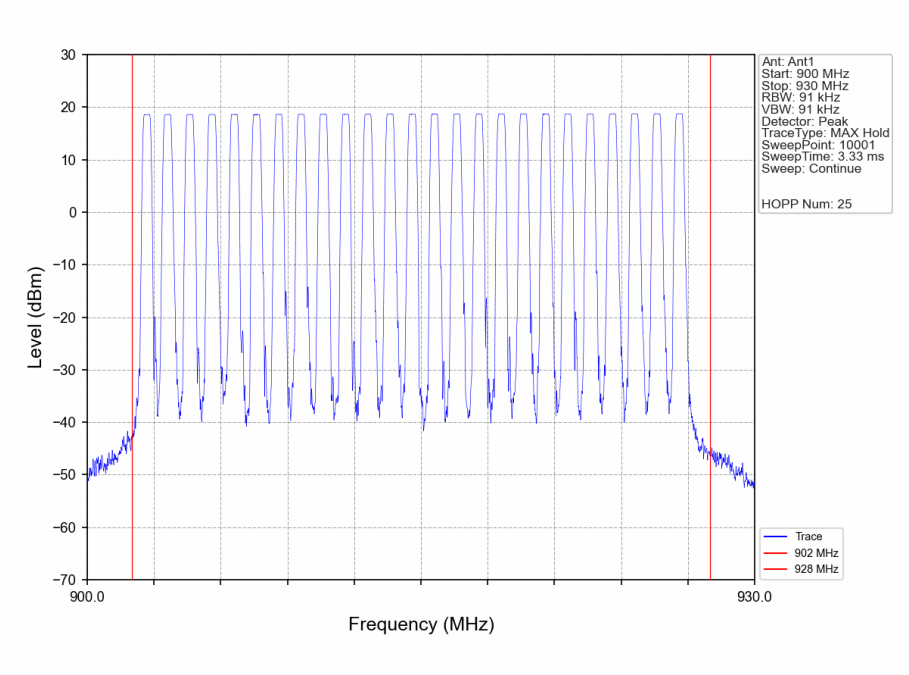

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6. Time of Occupancy (Dwell Time)

6.1 Test Result

6.1.1 nt1

Ant1								
Mode	TX Type	Frequency (MHz)	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
LORA	SISO	HOPP	35.055	10.000	1	35.055	<=400	Pass

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6.2 Test Graph

6.2.1 nt1

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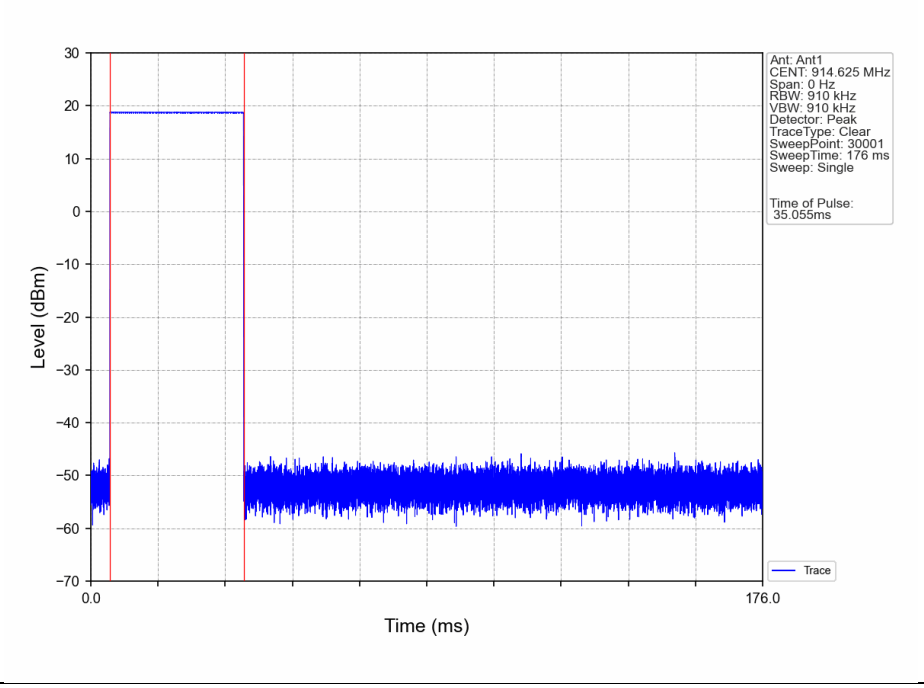

LORA_HOPP_Ant1_NTNV

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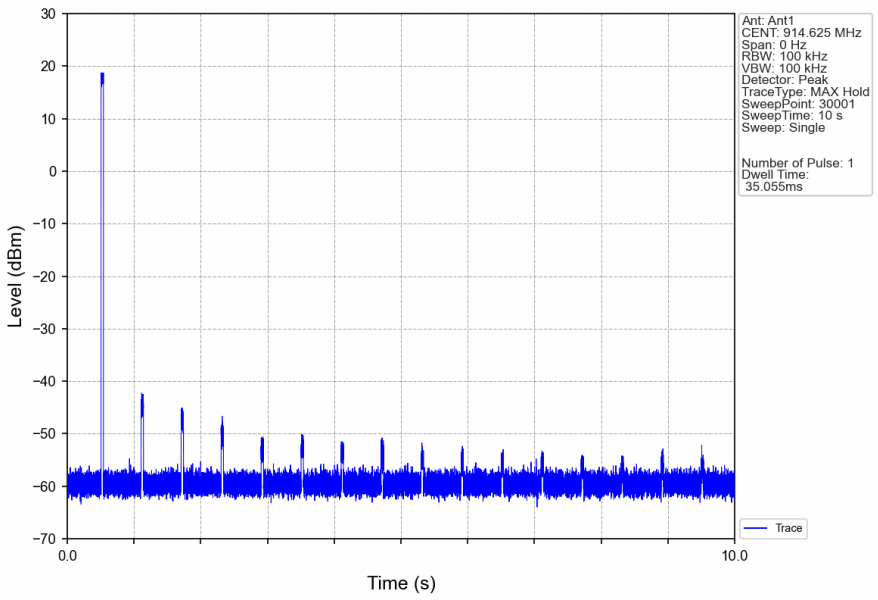

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7. Unwanted Emissions In Non-restricted Frequency Bands

7.1 Test Result

7.1.1 7.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
LORA	SISO	902.7	1	18.51
		914.625	1	18.59
		926.625	1	18.68
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.				

7.1.2 7.1.2 CSE

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
LORA	SISO	902.7	1	18.68	-1.32	Pass
		914.625	1	18.68	-1.32	Pass
		926.625	1	18.68	-1.32	Pass
		HOPP	1	18.68	-1.32	Pass
				18.68	-1.32	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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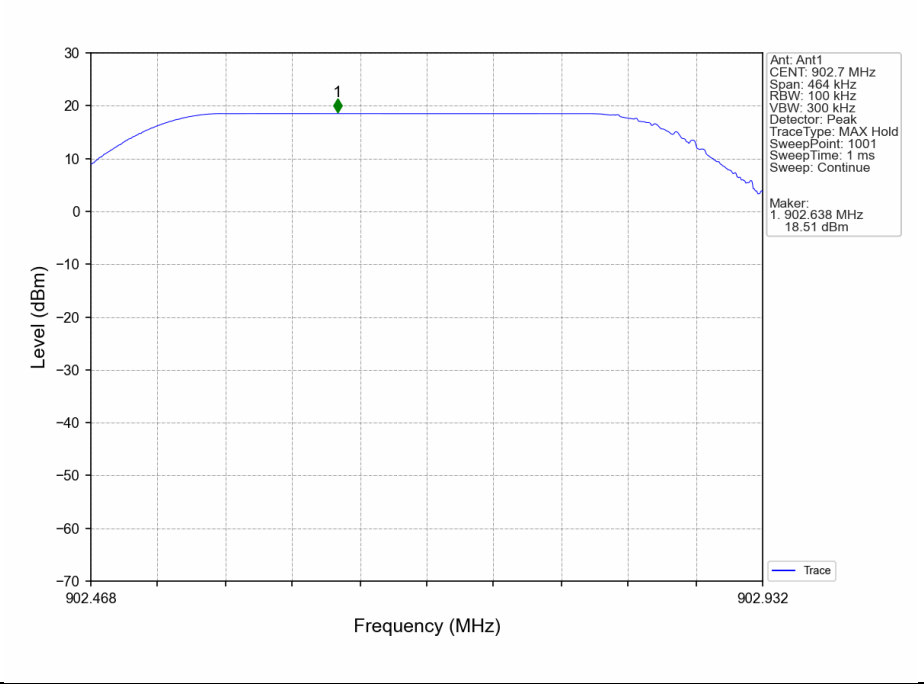
7.2 Test Graph

7.2.1 7.2.1 Ref

LORA_LCH_902.7MHz_Ant1_NTNV



LORA_MCH_914.625MHz_Ant1_NTNV

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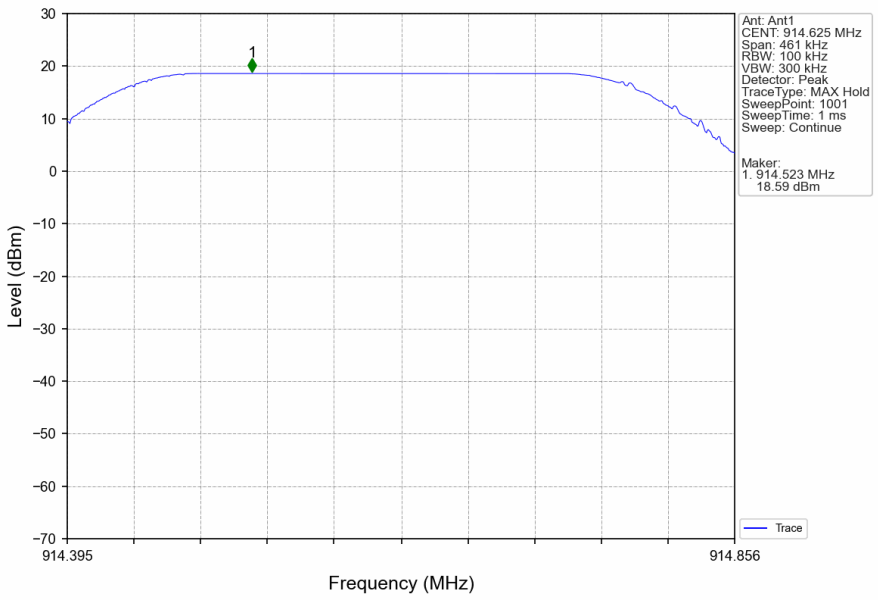

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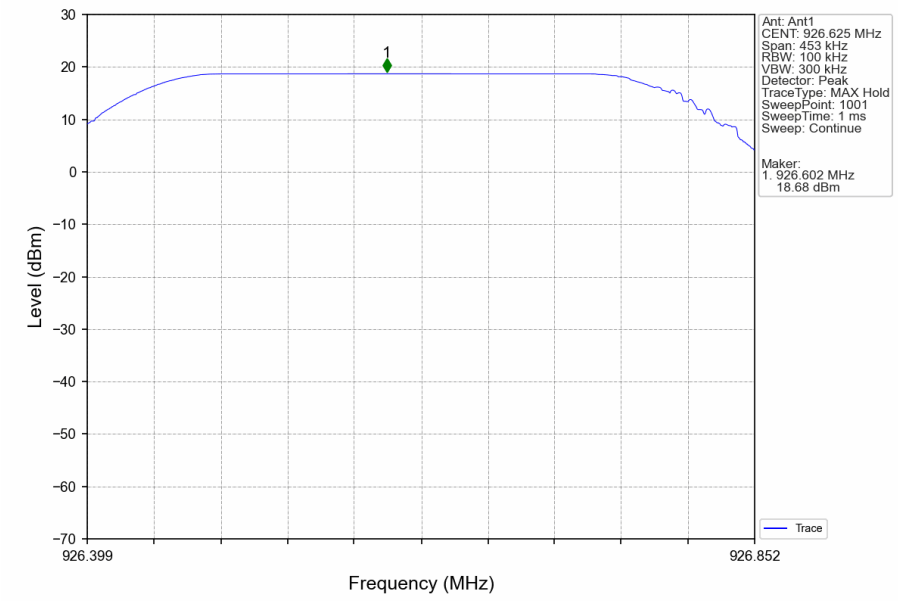
LORA_HCH_926.625MHz_Ant1_NTNV



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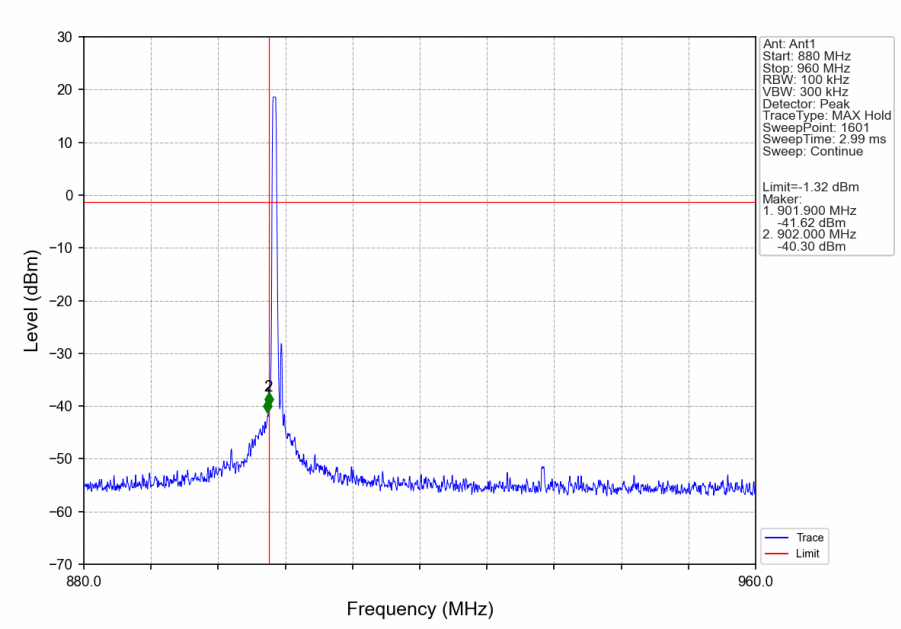
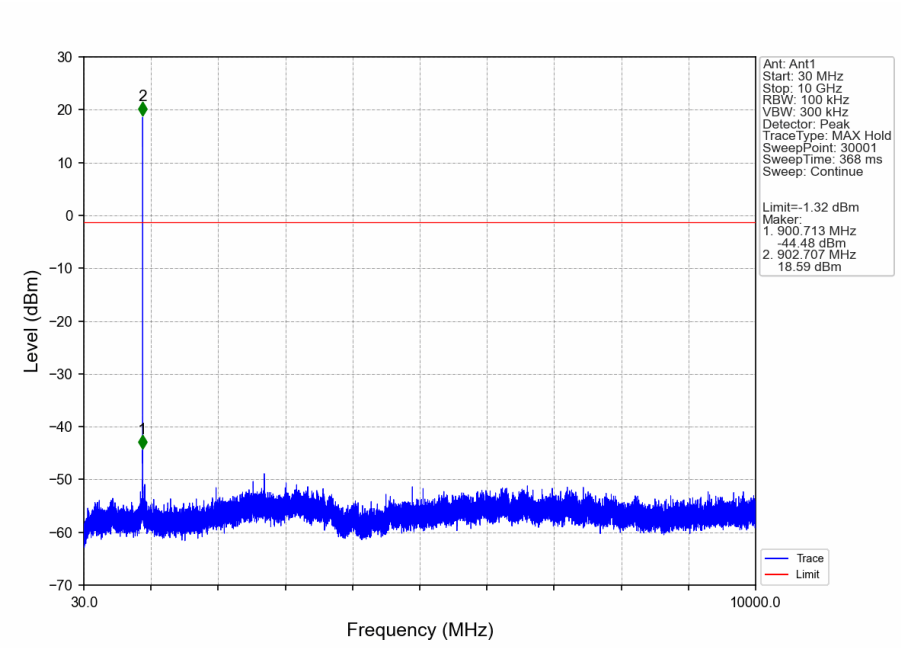
7.2.2 7.2.2 CSE

LORA_LCH_902.7MHz_Ant1_NTNV



LORA_LCH_902.7MHz_Ant1_NTNV



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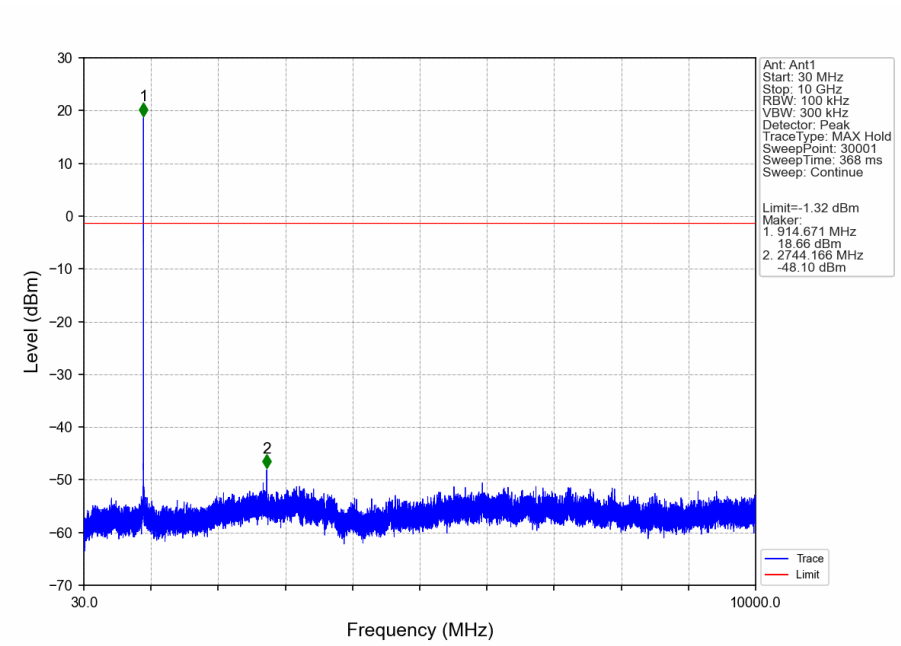
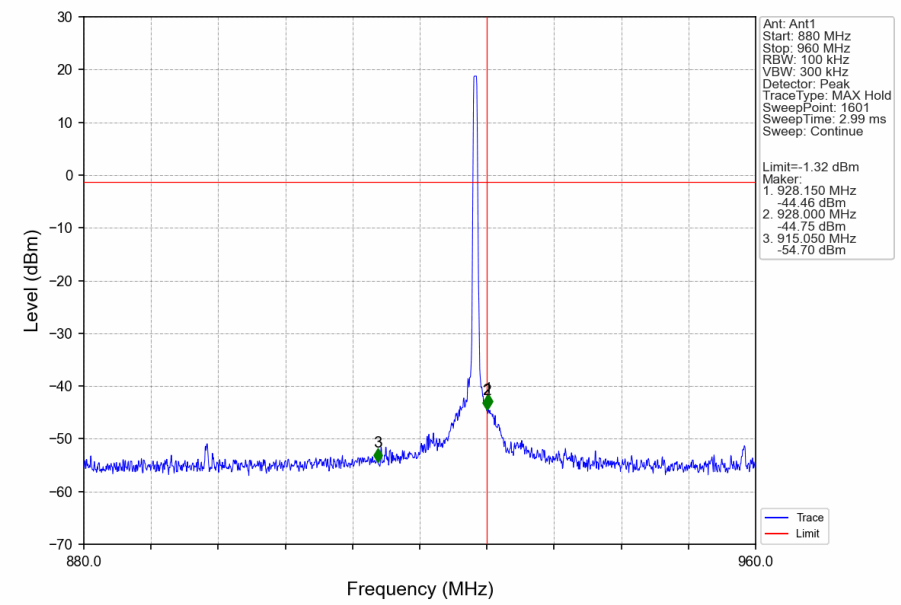


LORA_HCH_926.625MHz_Ant1_NTNV



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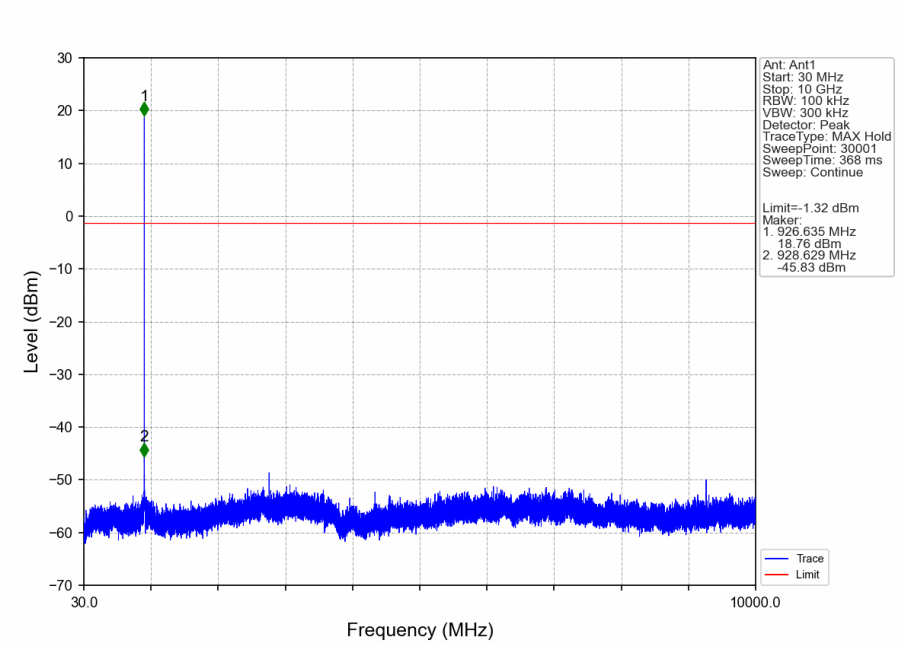
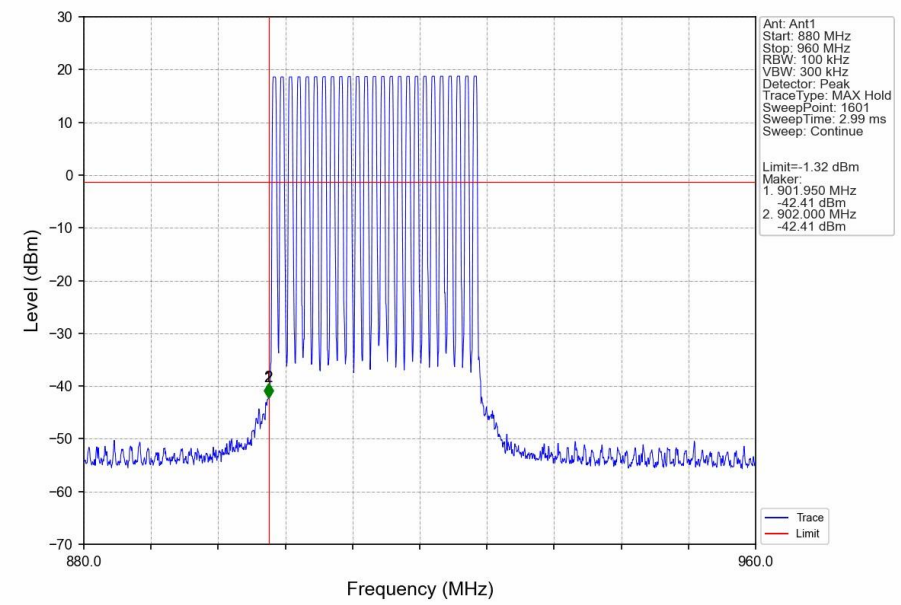


LORA_HOPP_Ant1_NTNV



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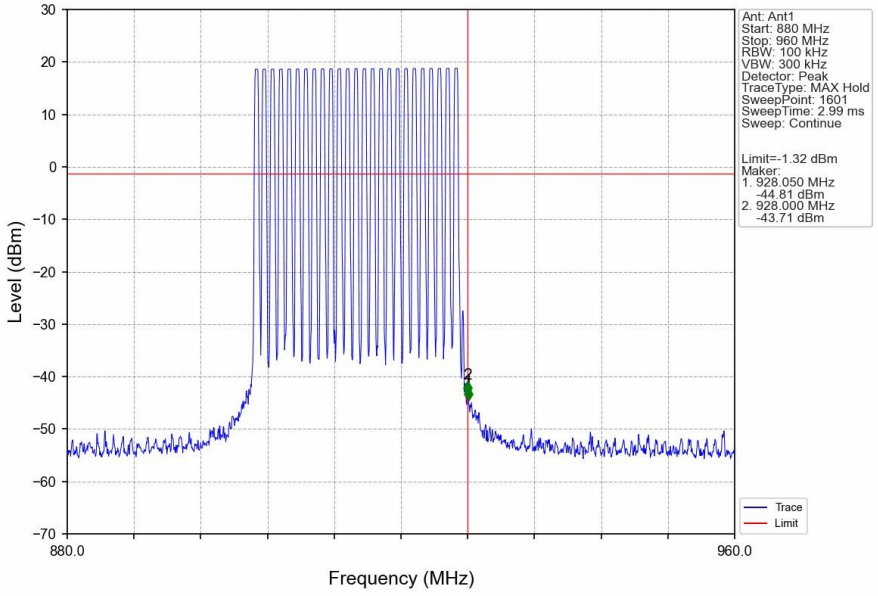

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