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TEST REPORT

Application No.: SZCR2104020436AT

Applicant: AJAX SYSTEMS CYPRUS HOLDINGS LTD **Address of Applicant:** Ifigeneias, 17, Strovolos, 2007, Nicosia Cyprus

Manufacturer: AJAX SYSTEMS MANUFACTURING LIMITED LIABILITY COMPANY

Address of Manufacturer: Sklyarenka, 5, Kyiv, 04073, Ukraine

Factory: AJAX SYSTEMS MANUFACTURING LIMITED LIABILITY COMPANY

Address of Factory: Sklyarenka, 5, Kyiv, 04073, Ukraine

Equipment Under Test (EUT):

EUT Name: Leak detector

Model No.: Ajax LeaksProtect (9NA)

Trade Mark: AJAX

FCC ID: 2AX5VLEAPRO-NA

Standard(s): 47 CFR Part 15, Subpart C 15.247

Date of Receipt: 2021-04-08

Date of Test: 2021-04-08 to 2021-04-26

Date of Issue: 2021-04-29

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		2021-04-29		Original			

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



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Test Summary

Radio Spectrum Technical Requirement							
Item	Standard	Method	Requirement	Result			
Antenna Requirement		N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass			
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	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 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	47 CFR Part 15,	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(i)	Pass				
Conducted Band Edges Measurement	Subpart C 15.247	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				
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 3V
Internal Source:	More than 108MHz
Operation Frequency:	905MHz to 926.5MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK
Number of Channels:	The number of available frequency hopping channels of this device is 103, only 101 channels are used in normal operation and constantly involved, 2 is reserve in case of jamming.
Antenna Type:	Helical
Antenna Gain:	-4dBi

Channel Lists:

Ch.	Freq.								
	(MHz)								
1	916.05	26	921.05	51	915.65	76	910.65	101	915.85
2	916.25	27	921.25	52	915.45	77	910.45	102	905
3	916.45	28	921.45	53	915.25	78	910.25	103	926.5
4	916.65	29	921.65	54	915.05	79	910.05		
5	916.85	30	921.85	55	914.85	80	909.85		
6	917.05	31	922.05	56	914.65	81	909.65		
7	917.25	32	922.25	57	914.45	82	909.45		
8	917.45	33	922.45	58	914.25	83	909.25		
9	917.65	34	922.65	59	914.05	84	909.05		
10	917.85	35	922.85	60	913.85	85	908.85		
11	918.05	36	923.05	61	913.65	86	908.65		
12	918.25	37	923.25	62	913.45	87	908.45		
13	918.45	38	923.45	63	913.25	88	908.25		
14	918.65	39	923.65	64	913.05	89	908.05		
15	918.85	40	923.85	65	912.85	90	907.85		
16	919.05	41	924.05	66	912.65	91	907.65		
17	919.25	42	924.25	67	912.45	92	907.45		
18	919.45	43	924.45	68	912.25	93	907.25		
19	919.65	44	924.65	69	912.05	94	907.05		
20	919.85	45	924.85	70	911.85	95	906.85		
21	920.05	46	925.05	71	911.65	96	906.65		
22	920.25	47	925.25	72	911.45	97	906.45		



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23	920.45	48	925.45	73	911.25	98	906.25	
24	920.65	49	925.65	74	911.05	99	906.05	
25	920.85	50	925.85	75	910.85	100	905.85	

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 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
Radiated Spurious Emissions Below 1GHz	± 4.5dB
Radiated Spurious Emissions Above 1GHz	± 4.8dB



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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, 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

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. 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: CN1178

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

Designation Number: CN1178. Test Firm Registration Number: 406779.

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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Equipment List

RF Conducted Test	RF Conducted Test								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12				
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22				
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2021-03-24	2022-03-23				
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020-09-23	2021-09-22				
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09				
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2020-05-21	2021-05-20				

Radiated Emissions					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	LETS-LINDGBEN I		SEM001-01	2020-07-19	2023-07-18
MXE EMI receiver(3Hz- 3.6GHz)	KEYSIGHT	N9038A	SEM004-15	2020-11-02	2021-11-01
BiConiLog Antenna (26-3000MHz) ETS-LINDGRE		3142C	SEM003-02	2019-05-24	2022-05-23
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2021-03-24	2022-03-23
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09

Radiated Spurious Emissions						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25	
EXA Signal Analyzer (10Hz-44GHz)	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31	
Horn Antenna	Rohde & Schwarz	HF906	SHEM009-2	2020-07-27	2021-07-26	
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22	
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09	



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General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2020-09-15	2021-09-14
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2020-09-15	2021-09-14
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2021-03-30	2022-03-29



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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)

Limit:

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 -4dBi.

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)

Limit:

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

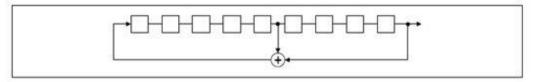
An example of Pseudorandom Frequency Hopping Sequence as follow:





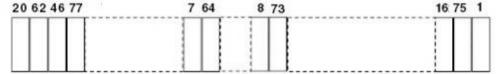
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Linear Feedback Shift Register for Generation of the PRBS sequence

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.

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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Radio Spectrum Matter Test Results 7

7.1 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)
	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

7.1.1 E.U.T. Operation

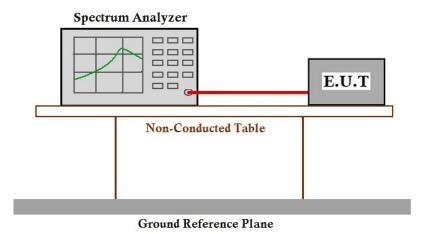
Operating Environment:

Temperature: 23.0 °C Humidity: 56.1 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description	
Final test	01	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.	

7.1.3 Test Setup Diagram





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7.1.4 Measurement Procedure and Data

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7.2 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	hopping frequencies
<250KHz	≥50
≥250KHz	≥25

7.2.1 E.U.T. Operation

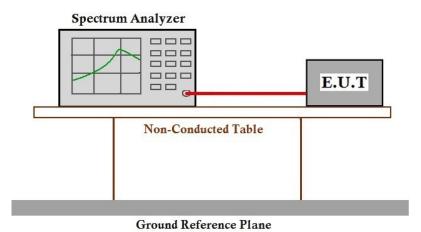
Operating Environment:

Humidity: 56.1 % RH Temperature: 23.0 °C Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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7.3 Carrier Frequencies Separation

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

Limit: Frequency hopping systems shall have hopping channel carrier frequencies

separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping

channel, whichever is greater.

7.3.1 E.U.T. Operation

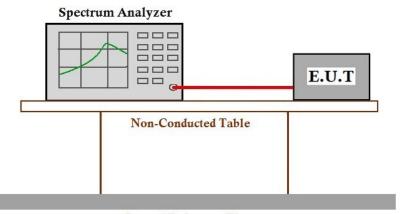
Operating Environment:

Temperature: 23.0 °C Humidity: 56.1 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

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

7.3.3 Test Setup Diagram



Ground Reference Plane

7.3.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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7.4 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

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
902-928	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.4.1 E.U.T. Operation

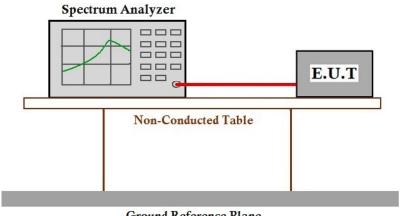
Operating Environment:

Temperature: 23.0 °C Humidity: 56.1 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

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

7.4.3 Test Setup Diagram



Ground Reference Plane

7.4.4 Measurement Procedure and Data

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7.5 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
002 028	0.4S within a 20S period(20dB bandwidth<250kHz)
902-928	0.4S within a 10S period(20dB bandwidth≥250kHz)
0400 0400 F	0.4S within a period of 0.4S multiplied by the number
2400-2483.5	of hopping channels
5725-5850	0.4S within a 30S period

7.5.1 E.U.T. Operation

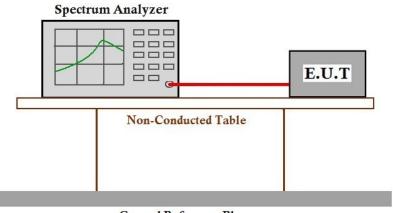
Operating Environment:

23.0 °C Temperature: Humidity: 56.1 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

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

7.5.3 Test Setup Diagram



Ground Reference Plane

7.5.4 Measurement Procedure and Data

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7.6 Conducted Band Edges Measurement

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

7.6.1 E.U.T. Operation

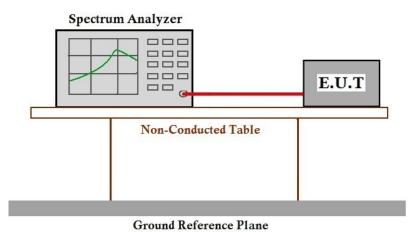
Operating Environment:

23.0 °C Humidity: Temperature: 56.1 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

7.0.2 .000	Total Total Mode Booth Priori											
Pre-scan / Final test	Mode Code	Description										
Final test	01	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.										
Final test	02	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation.										

7.6.3 Test Setup Diagram





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7.6.4 Measurement Procedure and Data

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7.7 Conducted Spurious Emissions

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

In any 100 kHz bandwidth outside the frequency band in which the spread Limit:

> 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).

7.7.1 E.U.T. Operation

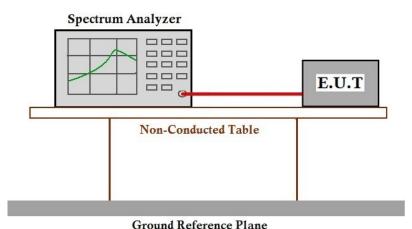
Operating Environment:

Temperature: 23.0 °C Humidity: 56.1 % RH Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.7.3 Test Setup Diagram





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7.7.4 Measurement Procedure and Data

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7.8 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209 Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

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.

7.8.1 E.U.T. Operation

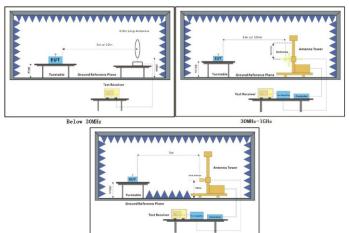
Operating Environment:

Temperature: 25 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

7.0.2 1.000 11	Tiol2 Took mode becomption											
Pre-scan / Final test	Mode Code	Description										
Pre-scan	01	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.										

7.8.3 Test Setup Diagram





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7.8.4 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) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and 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.
- 4) 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.



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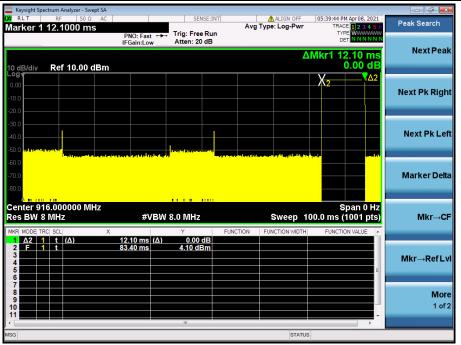


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Duty Cycle:

On time(ms)	T(ms)	Duty Cycle(%)	Duty Factor
12.10	100	0.1210	-18.34



Note:

Average Level=Peak Level + Duty Factor Duty Factor=20*log(Duty Cycle) Duty Cycle=On Time/T

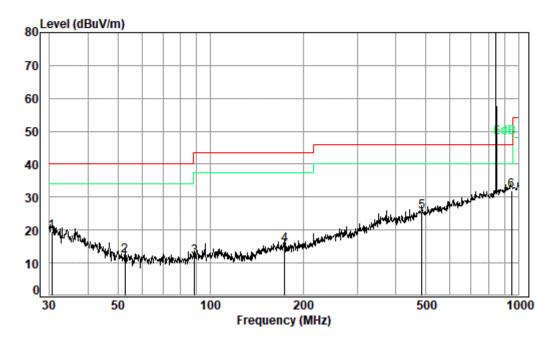




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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Condition: 3m HORIZONTAL

Job No. : 20436AT

Test Mode: 01

	Erea			Preamp Factor					Remark
	rreq	2033	i ac coi	ractor	rever	rever	LINE	LIMIC	Kelliai K
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.53	0.61	22.59	27.73	23.95	19.42	40.00	-20.58	QP
2	52.76	0.73	13.50	27.68	25.75	12.30	40.00	-27.70	QP
3	88.65	1.29	12.97	27.62	25.13	11.77	43.50	-31.73	QP
4	174.42	1.18	15.51	27.24	25.97	15.42	43.50	-28.08	QP
5	485.61	2.47	24.30	27.75	26.39	25.41	46.00	-20.59	QP
6 pp	948.76	3.55	29.33	26.91	26.04	32.01	46.00	-13.99	QP



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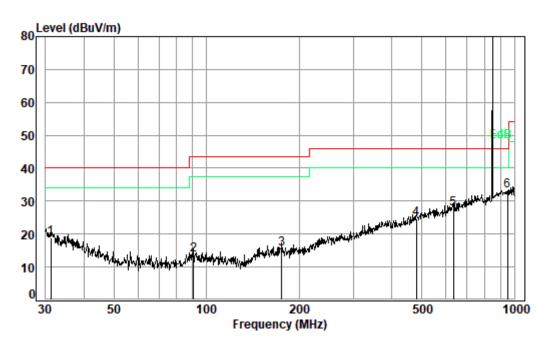
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Condition: 3m VERTICAL Job No. : 20436AT

Test 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	31.18	0.61	22.10	27.73	24.00	18.98	40.00	-21.02	QP
2	90.86	1.28	13.27	27.62	26.67	13.60	43.50	-29.90	QP
3	175.65	1.18	15.49	27.23	25.98	15.42	43.50	-28.08	QP
4	480.53	2.46	24.30	27.73	25.67	24.70	46.00	-21.30	QP
5	633.91	2.77	26.38	28.05	26.48	27.58	46.00	-18.42	QP
6 рр	948.76	3.55	29.33	26.91	27.13	33.10	46.00	-12.90	QP



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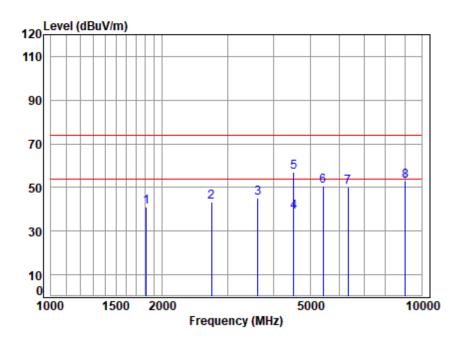
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL Job No : 20436AT/20437AT

Mode : 905 TX SE

Note

	5	Cable		Preamp	Read		Limit		Damada
	Freq	LOSS	Factor	Factor	rever	rever	Line	Limit	Kemark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1810.000	3.51	27.11	40.11	50.58	41.09	74.00	-32.91	Peak
2	2715.000	4.67	29.70	40.58	49.75	43.54	74.00	-30.46	Peak
3	3620.000	5.71	31.95	41.16	48.58	45.08	74.00	-28.92	Peak
4	4525.000	6.79	33.63	41.90	40.30	38.82	54.00	-15.18	Average
5	4525.000	6.79	33.63	41.90	58.64	57.16	74.00	-16.84	Peak
6	5430.000	8.06	34.55	42.35	50.36	50.62	74.00	-23.38	Peak
7	6335.000	8.27	35.44	42.15	48.80	50.36	74.00	-23.64	Peak
8	9050.000	10.36	37.24	38.76	43.94	52.78	74.00	-21.22	Peak



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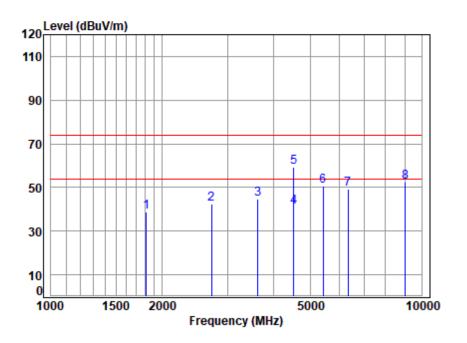
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 20436AT/20437AT

Mode : 905 TX SE

Note :

	Freq	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1810.000	3.51	27.11	40.11	48.06	38.57	74.00	-35.43	Peak
2	2715.000	4.67	29.70	40.58	48.82	42.61	74.00	-31.39	Peak
3	3620.000	5.71	31.95	41.16	48.21	44.71	74.00	-29.29	Peak
4	4525.000	6.79	33.63	41.90	42.51	41.03	54.00	-12.97	Average
5	4525.000	6.79	33.63	41.90	60.85	59.37	74.00	-14.63	Peak
6	5430.000	8.06	34.55	42.35	50.49	50.75	74.00	-23.25	Peak
7	6335.000	8.27	35.44	42.15	47.80	49.36	74.00	-24.64	Peak
8	9050.000	10.36	37.24	38.76	43.41	52.25	74.00	-21.75	Peak



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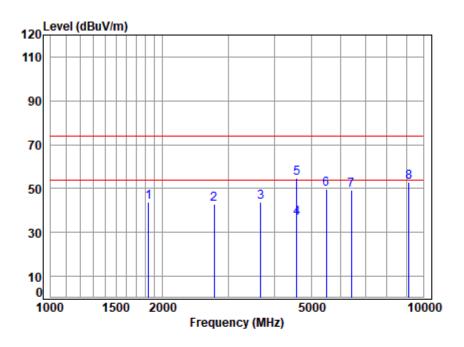
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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber

Condition: 3m HORIZONTAL Job No : 20436AT/20437AT Mode : 915.85 TX SE

Note

	_								
		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	1831.700	3.53	27.19	40.12	53.19	43.79	74.00	-30.21	Peak
2	2747.550	4.70	29.84	40.59	49.07	43.02	74.00	-30.98	Peak
3	3663.400	5.78	32.04	41.19	47.39	44.02	74.00	-29.98	Peak
4	4579.250	6.85	33.70	41.95	38.01	36.61	54.00	-17.39	Average
5	4579.250	6.85	33.70	41.95	56.35	54.95	74.00	-19.05	Peak
6	5495.100	8.17	34.60	42.35	49.24	49.66	74.00	-24.34	Peak
7	6410.950	8.28	35.51	42.10	47.58	49.27	74.00	-24.73	Peak
8	9158,500	10.47	37.33	38.56	43.68	52.92	74.00	-21.08	Peak



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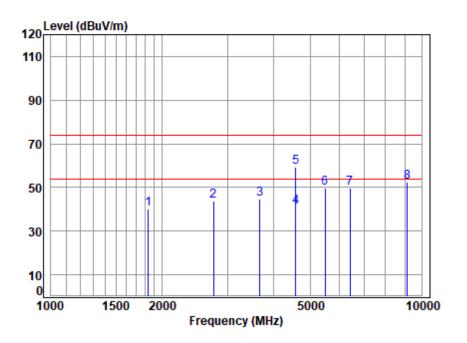
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m VERTICAL

Job No : 20436AT/20437AT Mode : 915.85 TX SE

Note

	Frea	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
4	1031 700	2 52	27.40	40.42	40.40	40.00	74.00	74.00	DI-
1	1831.700	3.53	27.19	40.12	49.40	40.00	74.00	-34.00	reak
2	2747.550	4.70	29.84	40.59	49.83	43.78	74.00	-30.22	Peak
3	3663.400	5.78	32.04	41.19	48.11	44.74	74.00	-29.26	Peak
4	4579.250	6.85	33.70	41.95	42.32	40.92	54.00	-13.08	Average
5	4579.250	6.85	33.70	41.95	60.66	59.26	74.00	-14.74	Peak
6	5495.100	8.17	34.60	42.35	49.09	49.51	74.00	-24.49	Peak
7	6410.950	8.28	35.51	42.10	47.86	49.55	74.00	-24.45	Peak
8	9158.500	10.47	37.33	38.56	43.15	52.39	74.00	-21.61	Peak



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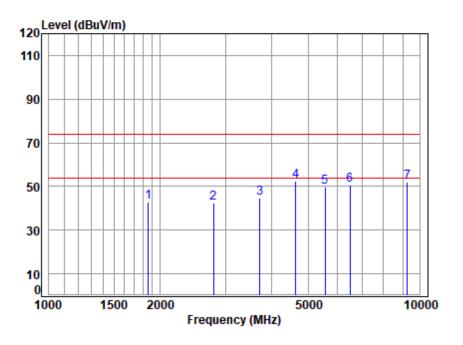
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL
Job No : 20436AT/20437AT

Mode : 926.5 TX SE

Note :

	_	Cable		Preamp					
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1853.000	3.55	27.27	40.13	52.38	43.07	74.00	-30.93	Peak
2	2779.500	4.72	29.98	40.61	48.15	42.24	74.00	-31.76	Peak
3	3706.000	5.85	32.13	41.21	47.92	44.69	74.00	-29.31	Peak
4	4632.500	6.91	33.77	41.99	53.56	52.25	74.00	-21.75	Peak
5	5559.000	8.19	34.66	42.36	49.30	49.79	74.00	-24.21	Peak
6	6485.500	8.28	35.59	42.05	48.78	50.60	74.00	-23.40	Peak
7	9265.000	10.59	37.41	38.37	42.43	52.06	74.00	-21.94	Peak



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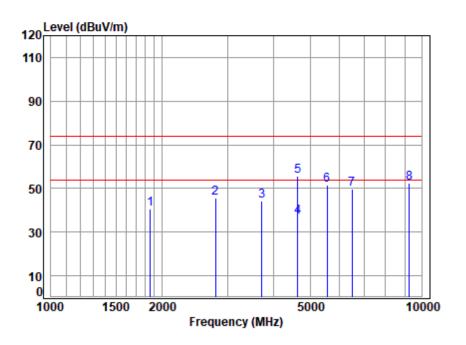
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m VERTICAL

Job No : 20436AT/20437AT

Mode : 926.5 TX SE

Note

	5	Cable		Preamp	Read		Limit	0ver	Daniel
	Freq	LOSS	Factor	Factor	rever	rever	Line	Limit	Kemark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1853.000	3.55	27.27	40.13	49.84	40.53	74.00	-33.47	Peak
2	2779.500	4.72	29.98	40.61	51.33	45.42	74.00	-28.58	Peak
3	3706.000	5.85	32.13	41.21	47.61	44.38	74.00	-29.62	Peak
4	4632.500	6.91	33.77	41.99	38.44	37.13	54.00	-16.87	Average
5	4632.500	6.91	33.77	41.99	56.78	55.47	74.00	-18.53	Peak
6	5559.000	8.19	34.66	42.36	51.04	51.53	74.00	-22.47	Peak
7	6485.500	8.28	35.59	42.05	47.75	49.57	74.00	-24.43	Peak
8	9265.000	10.59	37.41	38.37	42.98	52.61	74.00	-21.39	Peak



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Test Setup Photo 8

Refer to setup photos for SZCR2104020436AT

EUT Constructional Details (EUT Photos) 9

Refer to external and internal photos for SZCR2104020436AT



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10 Appendix for 15.247

1. Bandwidth

1.1 Test Result

Toot Mode	Frequency (MHz)	ТХ Туре	ANT No.	20dB Bandwidth	Verdict	
Test Mode				Test Result (MHz)		
	905	SISO	1	0.092	PASS	
TX	915.85	SISO	1	0.094	PASS	
	926.5	SISO	1	0.095	PASS	

Toot Mode	Frequency (MHz)	ТХ Туре	ANT No.	99% Occupied Bandwidth		
Test Mode				Test Result (MHz)		
	905	SISO	1	0.086	Only for Report Use	
TX	915.85	SISO	1	0.091	Only for Report Use	
	926.5	SISO	1	0.090	Only for Report Use	



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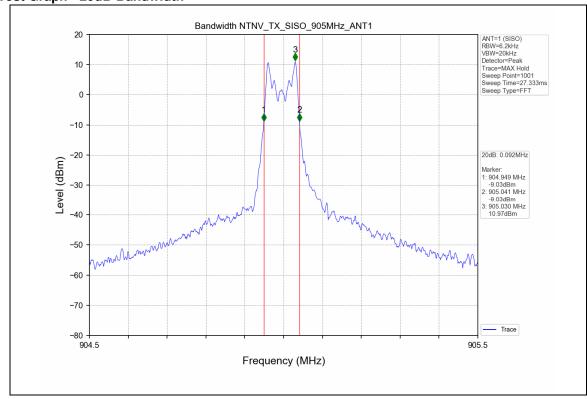
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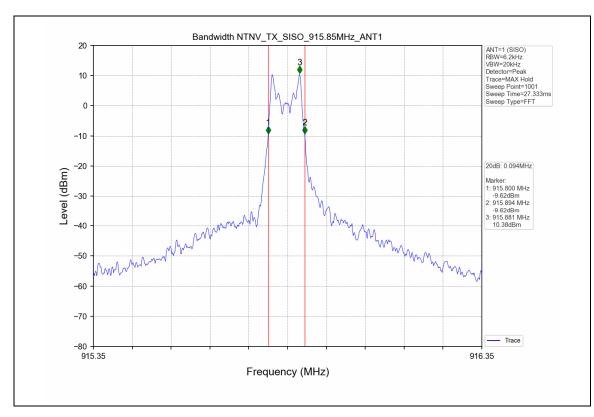


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1.2 Test Graph - 20dB Bandwidth







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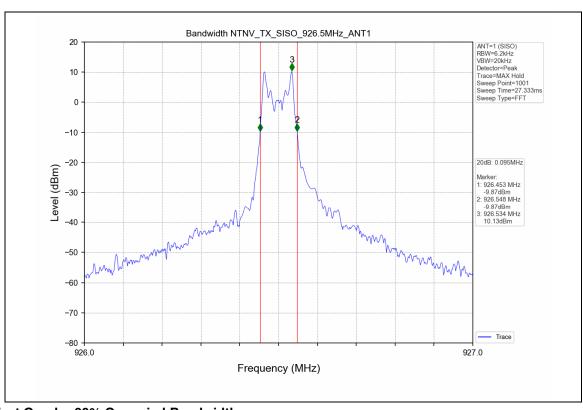
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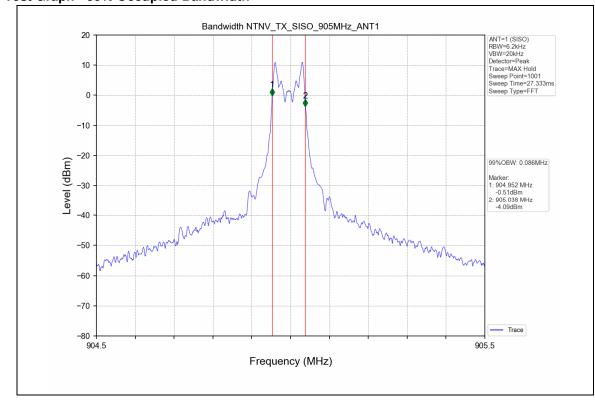
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1.3 Test Graph - 99% Occupied Bandwidth





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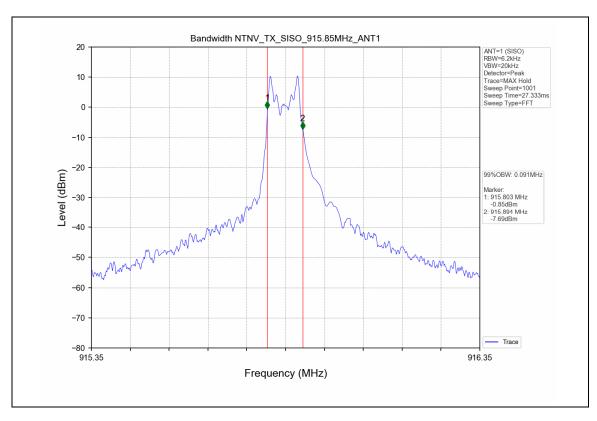
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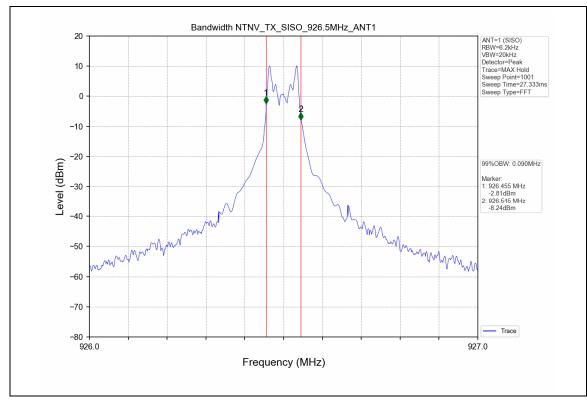


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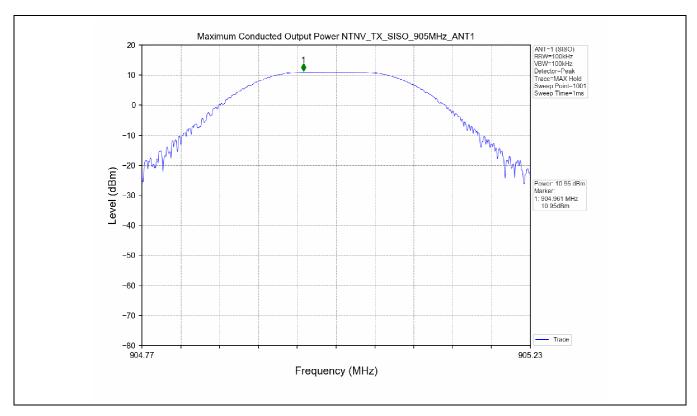
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2. Maximum Conducted Output Power

2.1 Test Result

Test Mode		Frequency (MHz)	Тх Туре	Measured Peak Output Power (dBm) Ant 1	Limits (dBm)	Verdict	
Т		905	SISO	10.95	30	PASS	
	TX	915.85	SISO	10.37	30	PASS	
		926.5	SISO	10.12	30	PASS	

2.2 Test Graph





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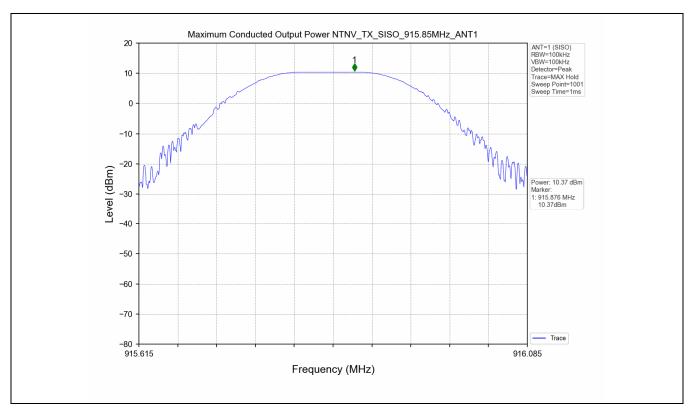
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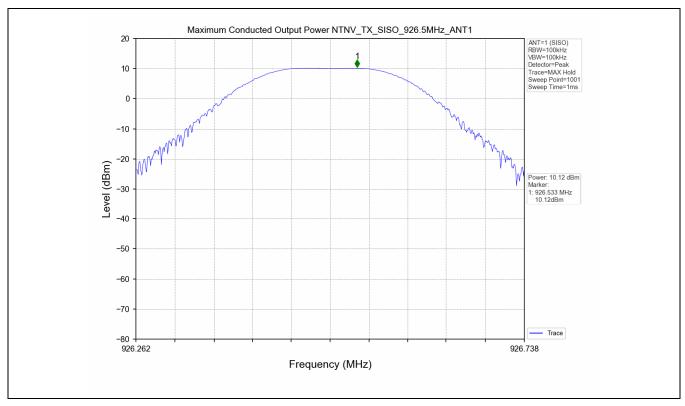
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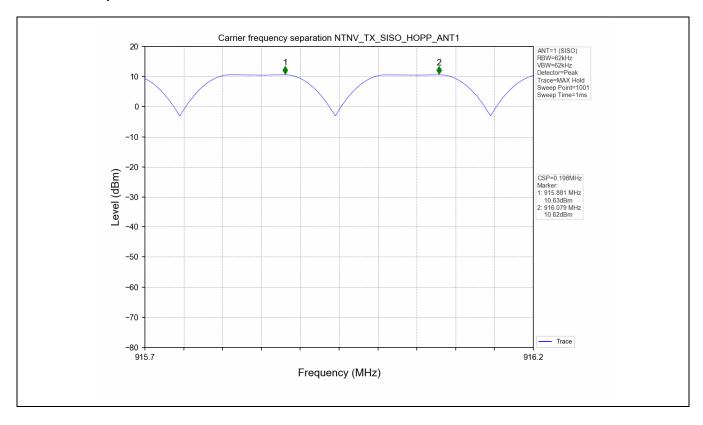
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3. Carrier frequency separation

3.1 Test Result

Test Mode	TX Type	ANT No.	Channel Separation (MHz)	Limits (MHz)	Verdict	
TX	SISO	1	0.198	≥0.095	PASS	

3.2 Test Graph





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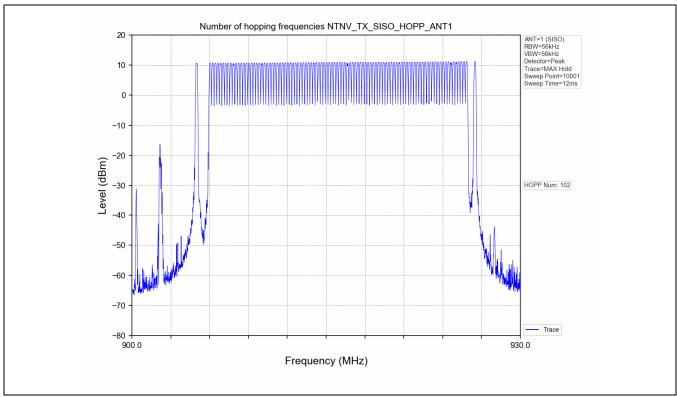
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4. Number of hopping frequencies

4.1 Test Result

Test Mode	TX Type	ANT No.	Num of Hopping Frequencies	Limits	Verdict
TX	SISO	1	102	≥50	PASS

4.2 Test Graph



Note: The number of available frequency hopping channels of this device is 103, only 101 channels are used in normal operation and constantly involved, 2 is reserve in case of jamming.



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5. Time of Occupancy (Dwell Time)

5.1 Test Result

Test Mode		TX Type	ANT No.	Duration of Single Pulse (ms)	ation Poriod	Num of Pulse in Observation Period	Dwell Time (ms)	Limits (ms)	Verdict
TX	NoPT	SISO	1	21.795	20	10	217.950	≤400	PASS

Dwell Time (ms)= Duration of Single Pulse (ms)* Num of Pulse in Observation Period



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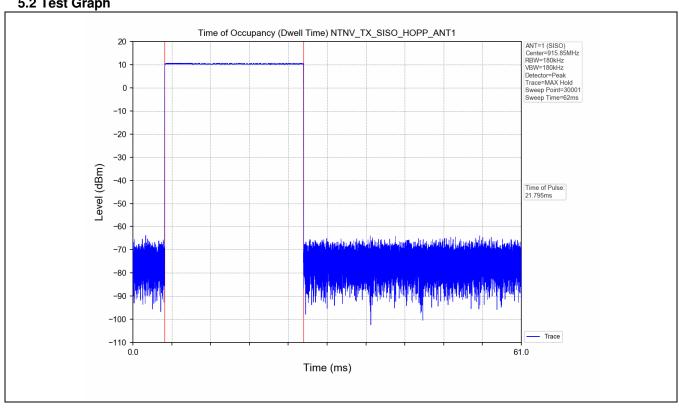
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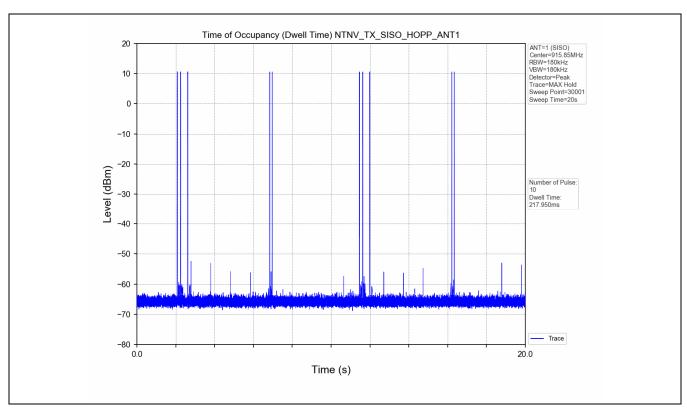


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5.2 Test Graph







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6. Unwanted Emissions in Non-restricted Frequency Bands

6.1 Test Result

Test Mode	Frequency (MHz)	TX Type	ANT No.	Spurious Conducted Emission (dBm)	Limits (dBm)	Verdict
	905	SISO	1	Refer to test graph	-9.06	PASS
TV	915.85	SISO	1	Refer to test graph	-9.06	PASS
TX	926.5	SISO	1	Refer to test graph	-9.06	PASS
	Hopping	SISO	1	Refer to test graph	-9.06	PASS



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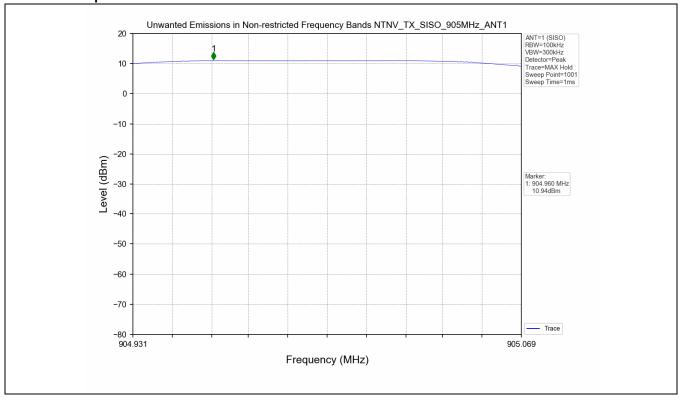
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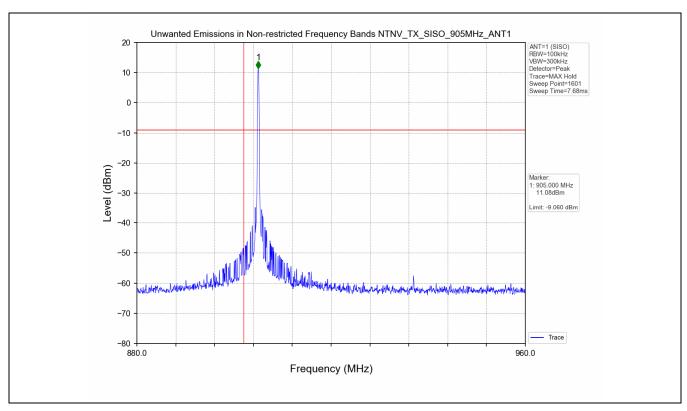


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6.2 Test Graph







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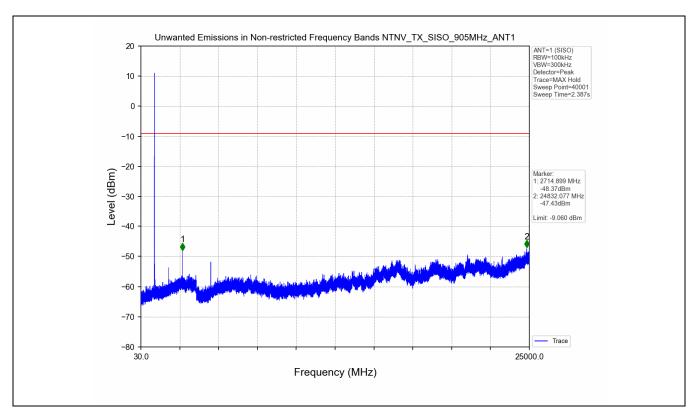
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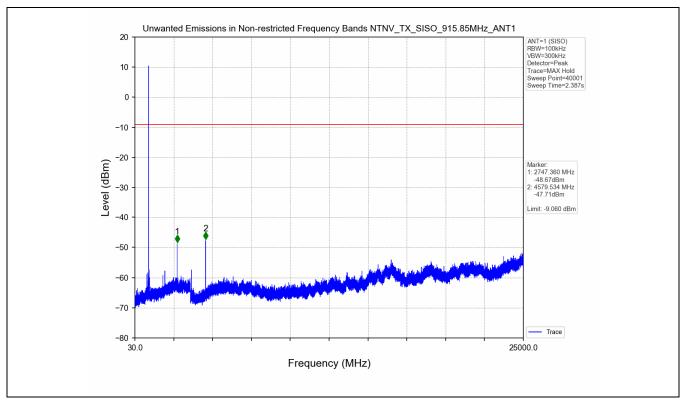
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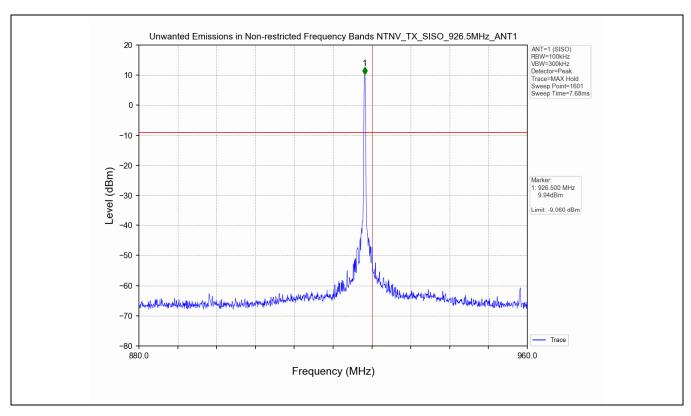
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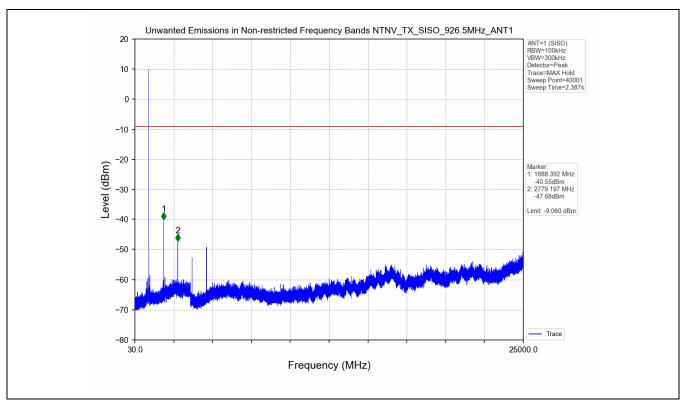
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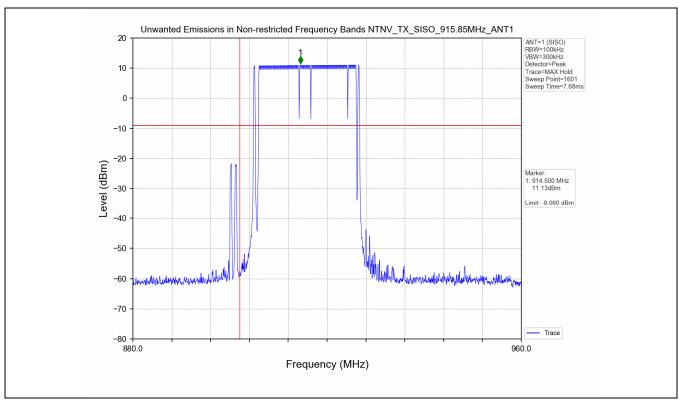
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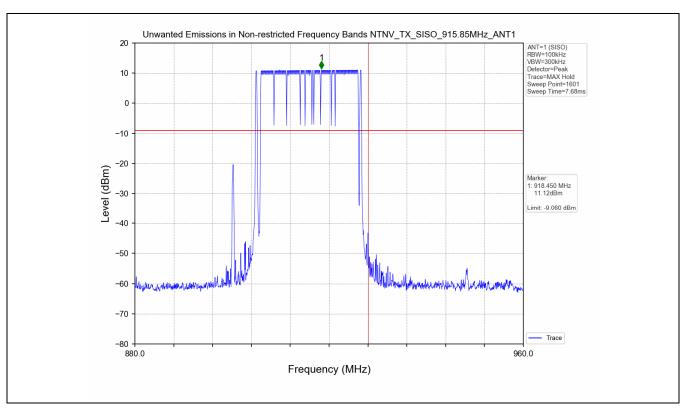
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- End of the Report -



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