

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240700127301

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TEST REPORT

Application No.: KSCR2407001273AT

FCC ID: 2BDFF-FR5404

Applicant: Anyid Technology (Shanghai) Co.,Ltd

Address of Applicant: 4/F Area C No. 2588 Jinhai Road Caolu Town Pudong New Area Shanghai,

China

Manufacturer: Anyid Technology (Shanghai) Co.,Ltd

Address of Manufacturer: 4/F Area C No. 2588 Jinhai Road Caolu Town Pudong New Area Shanghai,

China

Factory: Anyid Technology (Shanghai) Co.,Ltd

Address of Factory: 4/F Area C No. 2588 Jinhai Road Caolu Town Pudong New Area Shanghai,

China

Equipment Under Test (EUT):

EUT Name: UHF RFID Reader

Model No.: FR5404-1208SC,FR5408-1208SC,FR5404E-1208SC,FR5408E-1208SC,

R5404-1208SC,R5408-1208SC,FR540XY-1205S,FR540XY-1208S,

FR5404XY-1208SC,FR5408XY-1208SC,R540XY,

(The "X" is alphabet A-Z or number 0-9 or blank, "Y" is alphabet A-Z or

number 0-9 or blank), "X,Y" means user-defined protocol

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Trade Mark: ANYID

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

Date of Receipt: 2024-03-19

Date of Test: 2024-04-01 to 2024-04-11

Date of Issue: 2024-07-09

Test Result: Pass*

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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



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Revision Record				
Version	Description	Date	Remark	
00	Original	2024-07-09	/	

Authorized for issue by:		
Tested By	Tomnie Tang	
	Tommie_Tang/Project Engineer	
Approved By	Verry Hou	
	Terry Hou /Reviewer	



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2 Test Summary

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

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 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 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

Only the model FR5404-1208SC was tested.

There are series models mentioned in this report, and they are identical in electrical and electronic characters. Only the model FR5404-1208SC was tested since their differences were the model number and user-defined protocol.



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 24V by adapter
	Adapter Model: GST18A24
	INPUT: 100-240VAC,50/60Hz,0.5A
	OUTPUT: 24V,0.75A,18W MAX.
Test Voltage:	AC 120V/60Hz
Operation Frequency:	902.5-927.5MHz
Modulation Type:	FSK
Number of Channels:	51
Channel Spacing:	500KHz
	Antenna 1: External Antenna
Antonno Typo:	Antenna 2: External Antenna
Antenna Type:	Antenna 3: External Antenna
	Antenna 4: External Antenna
	Antenna 1: -8dBi (Provided by manufacturer)
Antenna Gain:	Antenna 2: -8dBi (Provided by manufacturer)
Antenna Gain.	Antenna 3: -8dBi (Provided by manufacturer)
	Antenna 4: -8dBi (Provided by manufacturer)

4.2 Power level setting using in test

Channel	Ant 1	Ant 2	Ant 3	Ant 4
902.5	29	29	29	29
915.0	29	29	29	29
927.5	29	29	29	29

4.3 Description of Support Units

Description	Description Manufacturer		Serial No.
Notebook	LENOVO	K27	/



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4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10 ⁻⁸
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
0	DE Dadieted Deves	5.2dB (Below 1GHz)
8	RF Radiated Power	5.9dB (Above 1GHz)
		4.2dB (Below 30MHz)
0	De l'ate d'Ou de la Fade de Tant	4.5dB (30MHz-1GHz)
9	Radiated Spurious Emission Test —	5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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4.5 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

- 1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
- 2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).
- 3. Sample source: sent by customer.

4.6 Test Facility

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

A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
Condu	cted Emission at Mains Ter	minals		•		
1	EMI Test Receive	R&S	ESCI	KS301101	01/15/2024	01/14/2025
2	LISN	R&S	ENV216	KS301197	01/15/2024	01/14/2025
3	LISN	Schwarzbeck	NNLK 8129	KS301091	01/15/2024	01/14/2025
4	Pulse Limiter	R&S	ESH3-Z2	KUS1902E001	01/15/2024	01/14/2025
5	CE test Cable	Thermax	/	CZ301102	01/15/2024	01/14/2025
6	Test Software	Farad	EZ-EMC	/	N.C.R	N.C.R
RF Co	nducted Test					
1	Spectrum Analyzer	Keysight	N9020A	KUS1911E004-2	08/24/2023	08/23/2024
2	Spectrum Analyzer	Keysight	N9020A	KUS2001M001-2	08/24/2023	08/23/2024
3	Spectrum Analyzer	Keysight	N9030B	KSEM021-1	01/15/2024	01/14/2025
4	Signal Generator	R&S	SMBV100B	KSEM032	03/19/2024	03/18/2025
5	Signal Generator	R&S	SMW200A	KSEM020-1	08/24/2023	08/23/2024
6	Signal Generator	Agilent	N5182A	KUS2001M001-1	08/24/2023	08/23/2024
7	Radio Communication Test Station	Anritsu	MT8000A	KSEM001-1	08/24/2023	08/23/2024
8	Radio Communication Analyzer	Anritsu	MT8821C	KSEM002-1	03/19/2024	03/18/2025
9	Universal Radio Communication Tester	R&S	CMW500	KUS1911E004-1	08/24/2023	08/23/2024
10	Switcher	TST	FY562	KUS2001M001-4	01/15/2024	01/14/2025
11	AC Power Source	EXTECH	6605	KS301178	N.C.R	N.C.R
12	DC Power Supply	Aglient	E3632A	KS301180	N.C.R	N.C.R
13	Conducted Test Cable	Thermax	RF01-RF04	CZ301111- CZ301120	01/15/2024	01/14/2025
14	Temp. / Humidity Chamber	TERCHY	MHK-120AK	KS301190	08/24/2023	08/23/2024
15	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-5	03/19/2024	03/18/2025
16	Software	BST	TST-PASS	/	NCR	NCR
	diated Test		Т		1 1	
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	08/24/2023	08/23/2024
2	Universal Radio Communication Tester	R&S	CMW500	KSEM009-1	03/19/2024	03/18/2025
3	Signal Generator	Agilent	E8257C	KS301066	08/24/2023	08/23/2024
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	03/18/2023	03/17/2025
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2023	06/28/2025
6	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E006	03/19/2024	03/18/2025
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	KS301079	08/24/2023	08/23/2024
8	Horn-antenna(1-18GHz)	ETS- LINDGREN	3117	KS301186	04/07/2023	04/06/2025
9	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	01/07/2024	01/06/2026
10	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/15/2024	01/14/2025
11	Amplifier(18~40GHz)	PANSHAN TECHNOLOGY	LNA180400G40	KSEM038	08/24/2023	08/23/2024
12	RE Test Cable	REBES MICROWAVE	1	CZ301097	08/24/2023	08/23/2024
13	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	03/19/2024	03/18/2025
14	Software	Faratronic	EZ_EMC-v 3A1	/	NCR	NCR
15	Software	ESE	E3_V 6.111221a	1	NCR	NCR



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

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

6.1.2 Conclusion

Standard Requirement:

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

15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is External antenna and no consideration of replacement. The best case gain of the antenna 1:-8dBi, antenna 2:-8dBi, antenna 3:-8dBi, antenna 4:-8dBi.

Antenna location: Refer to internal photo.



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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	Conducted limit(dBµV)			
emission(MHz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		
*Decreases with the logarithm of the frequency.				
Detector: Peak for pre-scan (9k	Hz resolution bandwidth) 0.15M	to 30MHz		

7.1.1 E.U.T. Operation

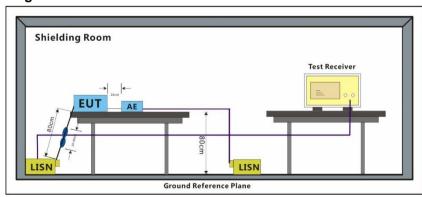
Operating Environment:

Temperature: 23.2 °C Humidity: 50.1 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description				
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.				

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 $50 \text{ohm}/50 \mu\text{H} + 5 \text{ohm}$ 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

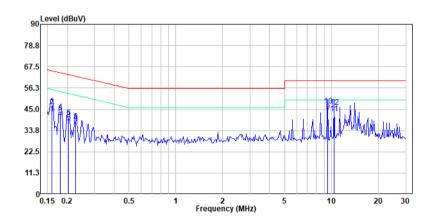


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Test Mode: 00; Line: Live line



Condition: Line

No.	Freq	Read level	LISN Factor	Level	Limit	Over Limit	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.167	23.14	19.56	42.70	55.47	-12.77	Average
2	0.167	27.12	19.56	46.68	65.47	-18.79	QP
3	0.182	21.34	19.56	40.90	54.42	-13.52	Average
4	0.182	24.14	19.56	43.70	64.42	-20.72	QP
5	0.205	18.33	19.56	37.89	53.45	-15.56	Average
6	0.305	21.34	19.56	40.90	63.45	-22.55	QP _
7	0.233	16.32	19.56	35.88	52.57	-16.69	Average
8	0.233	19.23	19.56	38.79	62.57	-23.78	QP
9	9.450	24.14	19.75	43.89	50.00	-6.11	Average
10	9.450	27.12	19.75	46.87	60.00	-13.13	QP
11	10.407	23.14	19.76	42.90	50.00	-7.10	Average
12	10.407	26.37	19.76	46.13	60.00	-13.87	OP

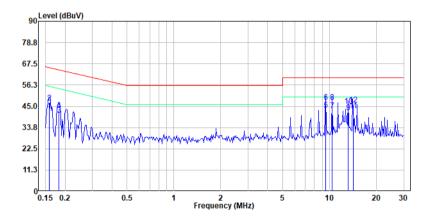


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Test Mode: 00; Line: Neutral Line



Condition: Neutral

No.	Freq	Read level	LISN Factor	Level	Limit	Over Limit	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.164	23.12	19.54	42.66	55.56	-12.90	Average
2	0.164	27.34	19.54	46.88	65.56	-18.68	QP
3	0.181	20.89	19.55	40.44	54.33	-13.89	Average
4	0.181	23.16	19.55	42.71	64.33	-21.62	QP
5	9.455	23.34	19.75	43.09	50.00	-6.91	Average
6	9.455	27.34	19.75	47.09	60.00	-12.91	QP
7	10.402	23.13	19.76	42.89	50.00	-7.11	Average
8	10.402	27.34	19.76	47.10	60.00	-12.90	QP
9	13.137	22.13	19.77	41.90	50.00	-8.10	Average
10	13.137	25.42	19.77	45.19	60.00	-14.81	QP
11	14.148	23.12	19.78	42.90	50.00	-7.10	Average
12	14.148	26.12	19.78	45.90	60.00	-14.10	OP



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7.2 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

7.2.1 E.U.T. Operation

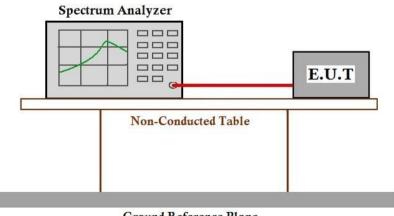
Operating Environment:

23.4 °C Temperature: Humidity: 50.6 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

	· · · · · · · · · · · · · · · · · · ·			
Pre-scan / Final test	Mode Code	Description		
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.		

7.2.3 Test Setup Diagram



Ground Reference Plane

7.2.4 Measurement Procedure and Data

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



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7.3 20dB Bandwidth

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

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.

7.3.1 E.U.T. Operation

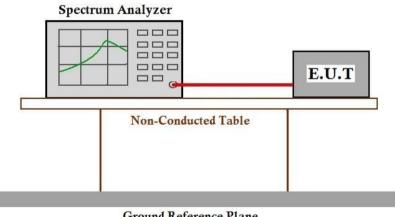
Operating Environment:

23.6 °C Humidity: 50.7 % RH Atmospheric Pressure: 1010 mbar Temperature:

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK 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 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

7.4.1 E.U.T. Operation

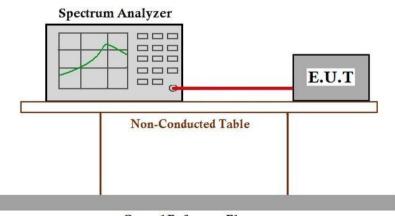
Operating Environment:

Temperature: 23.4 °C Humidity: 50.6 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

7.4.3 Test Setup Diagram



Ground Reference Plane

7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.5 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)
002.020	50 for 20dB bandwidth <250kHz
902-928	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.5.1 E.U.T. Operation

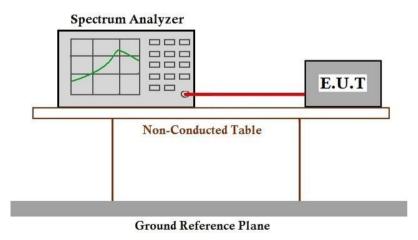
Operating Environment:

Temperature: 23.4 °C Humidity: 50.3 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.6 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
002.028	0.4S within a 20S period(20dB bandwidth<250kHz)
902-928	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400 2402 5	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

7.6.1 E.U.T. Operation

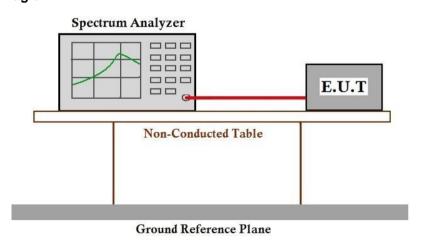
Operating Environment:

Temperature: 23.3 °C Humidity: 50.4 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

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 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).

7.7.1 E.U.T. Operation

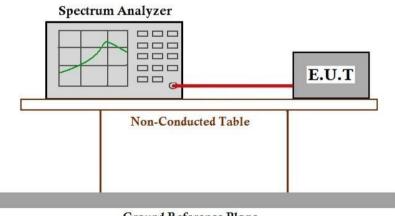
Operating Environment:

23.6 °C Temperature: Humidity: 50.8 % RH Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

	711 1 1 0 0 1 1 1 0 0 1 1 1 1 1 1 1 1 1		
Pre-scan / Final test	Mode Code	Description	
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.	

7.7.3 Test Setup Diagram



Ground Reference Plane

7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.8 Conducted Spurious Emissions

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

7.8.1 E.U.T. Operation

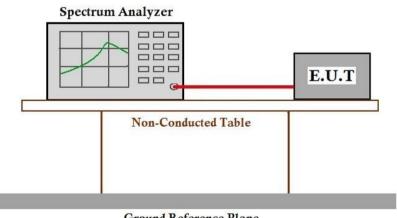
Operating Environment:

23.4 °C Temperature: Humidity: 50.8 % RH Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

7.8.3 Test Setup Diagram



Ground Reference Plane

7.8.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.9 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.

7.9.1 E.U.T. Operation

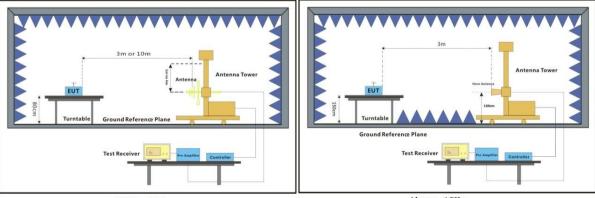
Operating Environment:

Temperature: 22.6 °C Humidity: 51.2 % RH Atmospheric Pressure: 1010 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

7.9.3 Test Setup Diagram



30MHz-1GHz Above 1GHz



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7.9.4 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: This test item was investigated while operating on antenna 1, antenna 2, antenna 3 and antenna 4, however, it was determined that antenna 2 produced the worst result. So the test results produced from other antennas are not recorded in report.

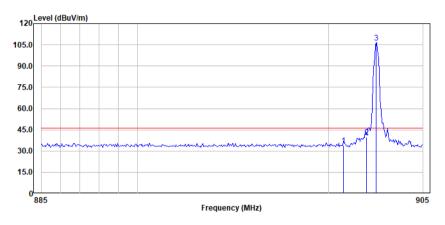


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Test Mode: 00; Polarity: Horizontal; Modulation:FSK; Channel:Low



Antenna Polarity :Horizontal

NO.	Freq (MHz)		Factor	Loss	Level (dBuV/m)	Line		Remark
1	900.80	4.52	27.07	2.50	34.09	46.00	-11.91	QP
2	902.00	10.36	27.06	2.50	39.92	46.00	-6.08	QP
3	902.52	77.07	27.04	2.50	106.61	46.00	60.61	QP

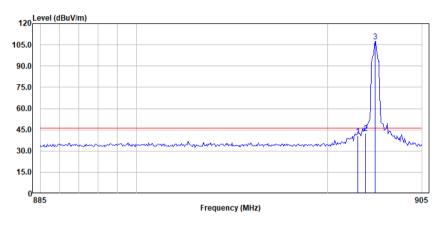


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Test Mode: 00; Polarity: Vertical; Modulation:FSK; Channel:Low



Antenna Polarity :Vertical

NO.	Freq (MHz)	Factor	Loss	Level (dBuV/m)	Line		Remark
1		 27.06 27.06	2.50	40.62 42.60		-5.38 -3.40	QP OP
3	902.52	 	2.50	107.41	46.00	61.41	QP QP

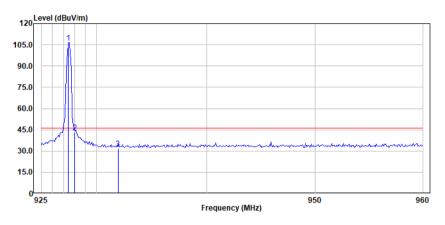


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Test Mode: 00; Polarity: Horizontal; Modulation:FSK; Channel:High



Antenna Polarity :Horizontal

NO.	Freq (MHz)		Factor	Loss	Level (dBuV/m)	Line	Limit	Remark
2	927.45 928.00 931.93	14.03	26.40	2.53		46.00 46.00 46.00	60.41 -3.04 -14.29	QP QP QP

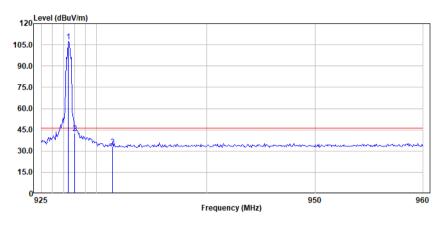


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Test Mode: 00; Polarity: Vertical; Modulation:FSK; Channel:High



Antenna Polarity :Vertical

NO.	Freq (MHz)		Factor	Loss	Level (dBuV/m)	Line	Limit	Remark
1	927.45	78.18	26.41	2.53	107.12	46.00	61.12	QP
2	928.00	13.71	26.40	2.53	42.64	46.00	-3.36	QP
3	931.44	4.20	26.46	2.54	33.20	46.00	-12.80	QP



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7.10 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

7.10.1 E.U.T. Operation

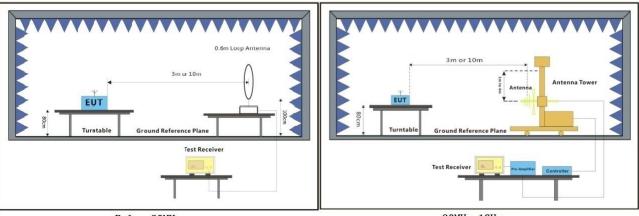
Operating Environment:

Temperature: 22.6 °C Humidity: 51.2 % RH Atmospheric Pressure: 1010 mbar

7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

7.10.3 Test Setup Diagram



Below 30MHz 30MHz-1GHz



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7.10.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete. Remark:
- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3: This test item was investigated while operating on antenna 1, antenna 2, antenna 3 and antenna 4, however, it was determined that antenna 2 produced the worst result. So the test results produced from other antennas are not recorded in report.

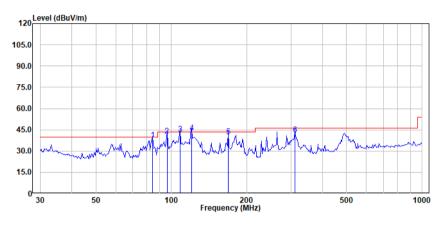


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Test Mode: 00; Polarity: Horizontal



Antenna Polarity :Horizontal

NO.	Freq (MHz)	Read level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1	84.11	24.01	13.30	0.77	38.08	40.00	-1.92	QP
2	96.10	24.48	15.61	0.75	40.84	43.50	-2.66	QР
3	108.27	23.67	17.41	0.87	41.95	43.50	-1.55	QP
4	120.28	23.55	18.47	0.95	42.97	43.50	-0.53	QP
5	168.41	23.40	15.95	1.15	40.50	43.50	-3.00	QP
6	312.18	20.85	19.59	1.28	41.72	46.00	-4.28	QР

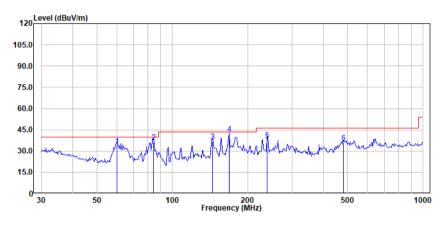


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Test Mode: 00; Polarity: Vertical



Antenna Polarity :Vertical

NO.	•	Freq (MHz)	Read level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
	1	60.07	18.72	14.21	0.77	33.70	40.00	-6.30	QP
	2	84.11	22.02	13.30	0.77	36.09	40.00	-3.91	QР
	3	144.34	18.42	17.04	1.11	36.57	43.50	-6.93	QР
	4	168.41	24.86	15.95	1.15	41.96	43.50	-1.54	QР
	5	239.15	19.04	17.38	1.20	37.62	46.00	-8.38	QP
	6	482.22	10.61	23.22	2.05	35.88	46.00	-10.12	ÕР



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7.11 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

7.11.1 E.U.T. Operation

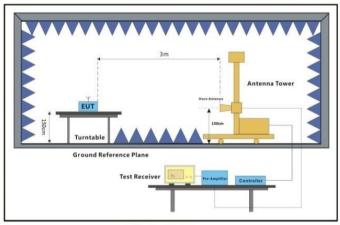
Operating Environment:

Temperature: 24.3 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.11.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with FSK modulation.

7.11.3 Test Setup Diagram



Above 1GHz



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7.11.4 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. This test item was investigated while operating on antenna 1, antenna 2, antenna 3 and antenna 4, however, it was determined that antenna 2 produced the worst result. So the test results produced from other antennas are not recorded in report.

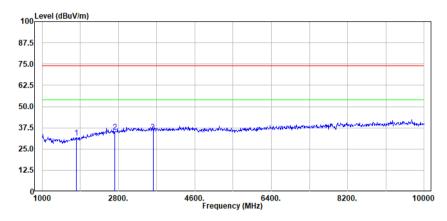


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Test Mode: 00; Polarity: Horizontal; Modulation:FSK; Channel:Low



Antenna Polarity :Horizontal

No.			Antenna Factor						Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
			30.02 32.26						
			32.75						

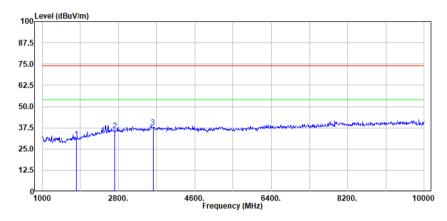


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Test Mode: 00; Polarity: Vertical; Modulation:FSK; Channel:Low



Antenna Polarity : Vertical

No			Antenna Factor						Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2707.50	55.37	30.02 32.26 32.75	3.98	55.90	35.71	74.00	-38.29	Peak Peak

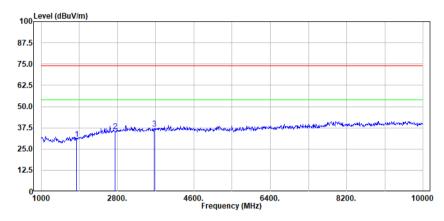


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Test Mode: 00; Polarity: Horizontal; Modulation:FSK; Channel:middle



Antenna Polarity :Horizontal

No.			Antenna Factor						Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
			30.23 32.29						Peak Peak
			32.84						Peak

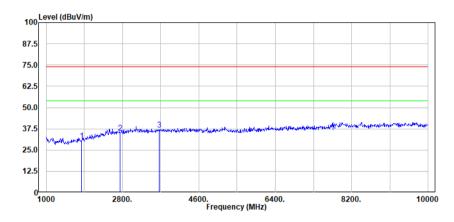


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Test Mode: 00; Polarity: Vertical; Modulation:FSK; Channel:middle



Antenna Polarity :Vertical

MHz dBuv	dB/m dB	dB	dBuv/m	dBuv/m	dB	
2745.00 54.66	30.23 3.26 32.29 4.01 32.84 4.71	55.88	35.08		-38.92	Peak Peak

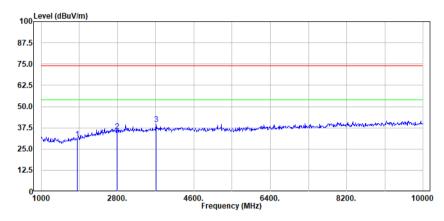


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Test Mode: 00; Polarity: Horizontal; Modulation:FSK; Channel:High



Antenna Polarity :Horizontal

No.	Freq					Emission Level			Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
_		53.39 55.07	30.43 32.29			30.84 35.55			
3	710.00	57.47	32.98	4.74	55.49	39.70	74.00	-34.30	Peak

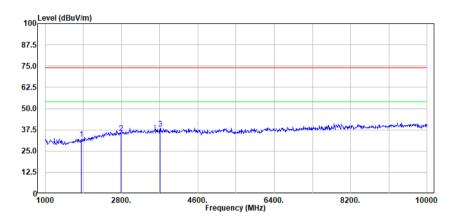


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Test Mode: 00; Polarity: Vertical; Modulation:FSK; Channel:High



Antenna Polarity :Vertical

No.	Freq					Emission Level			Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2	782.50	55.15	32.29	4.04	55.85	31.93 35.63 38.05	74.00	-38.37	Peak Peak



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2407001273AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2407001273AT



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10 Appendix

1. Bandwidth

1.1 OBW

1.1.1 Test Result

Mada	TX	Frequency (MHz)	ANIT	99% Occupied B	Vordict	
Mode	Type		ANT	Result	Limit	Verdict
			1	0.067	/	Pass
		000.5	2	0.067	/	Pass
		902.5	3	0.068	/	Pass
			4	0.068 /		Pass
		915	1	0.068	1	Pass
FSK	SISO		2	0.067	1	Pass
ron	3130		3	0.069	1	Pass
			4	0.068	1	Pass
			1	0.068	/	Pass
		927.5	2	0.068	/	Pass
			3	0.067	/	Pass
			4	0.068	/	Pass

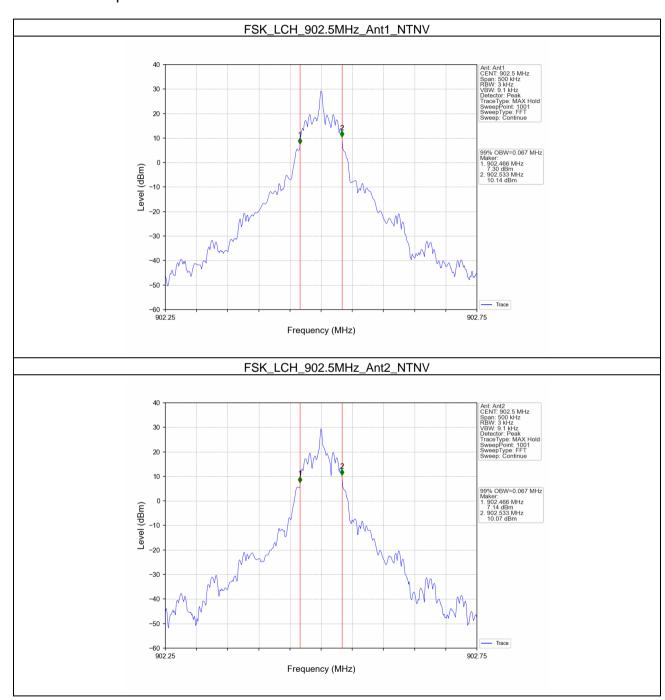


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1.1.2 Test Graph

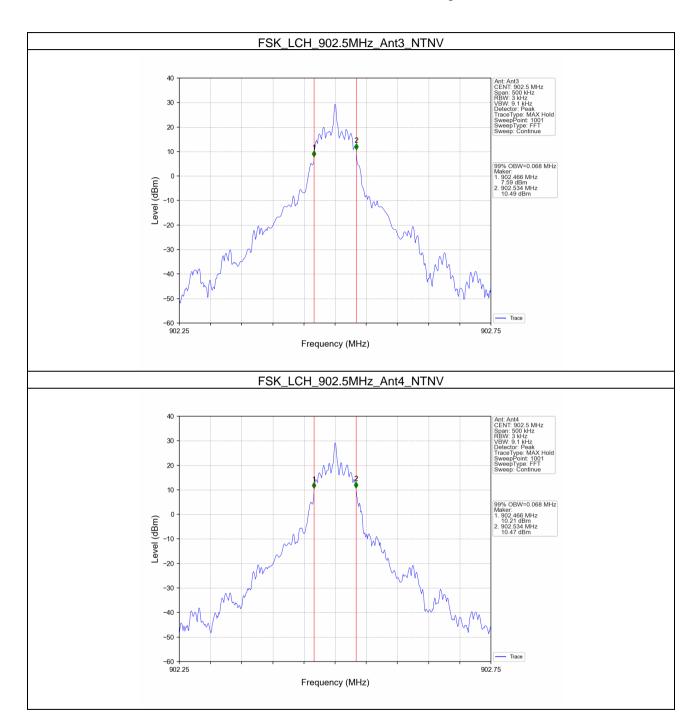




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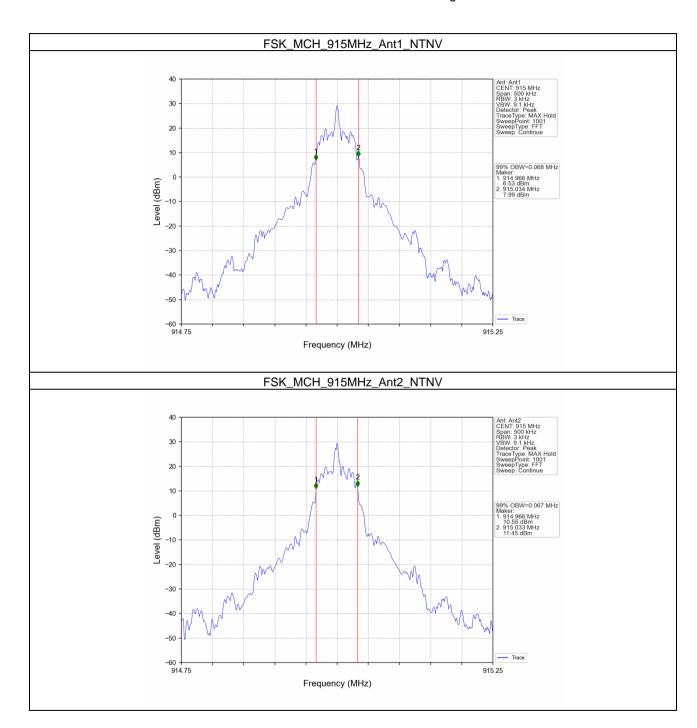




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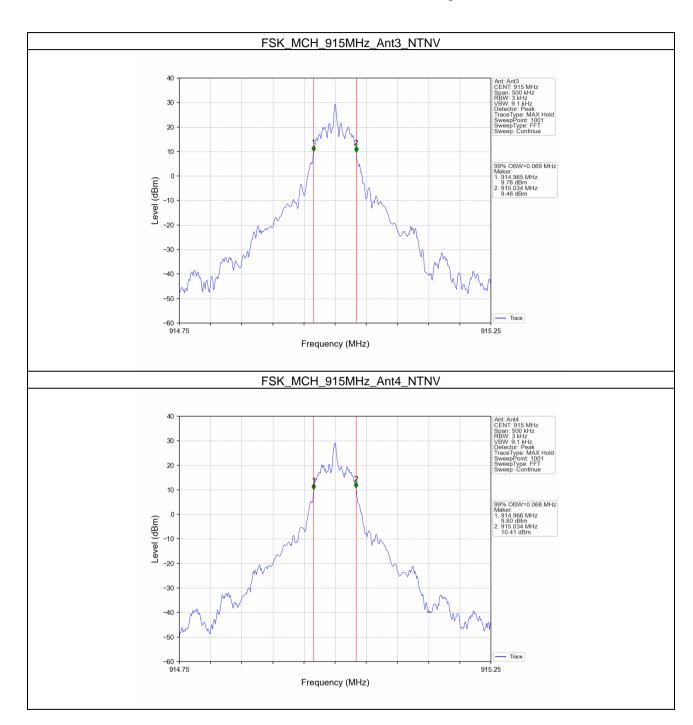




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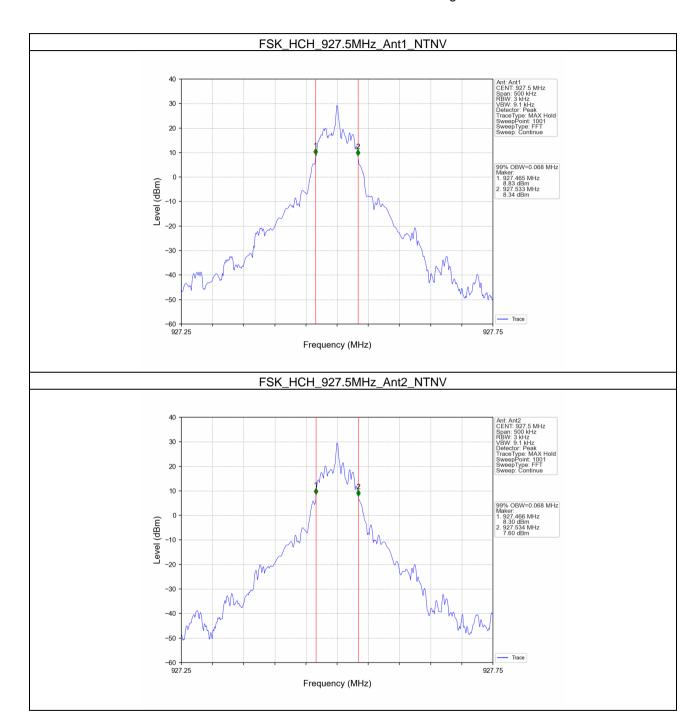




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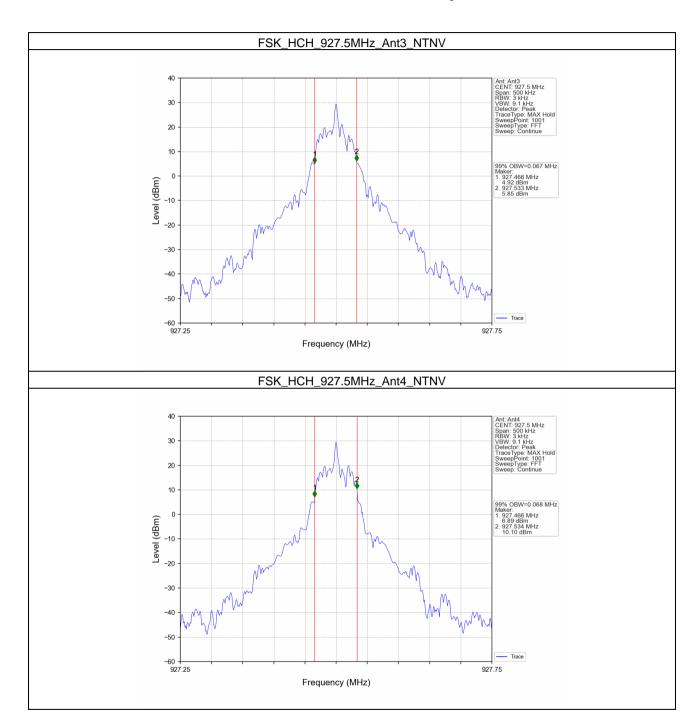




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1.2 20dB BW

1.2.1 Test Result

Mada	TX	Frequency	ANIT	20dB Band	width (MHz)	Verdict	
Mode	Type	(MHz)	ANT	Result	Limit	verdict	
			1	0.067	/	Pass	
		000 5	2	0.067	/	Pass	
		902.5	3	0.068	/	Pass	
	SISO		4	0.068	/	Pass	
		915	1	0.068	/	Pass	
FOK			2	0.067	/	Pass	
FSK			3	0.068	/	Pass	
			4	0.067	/	Pass	
		927.5	1	0.061	/	Pass	
			2	0.066	/	Pass	
			3	0.068	/	Pass	
			4	0.067	/	Pass	

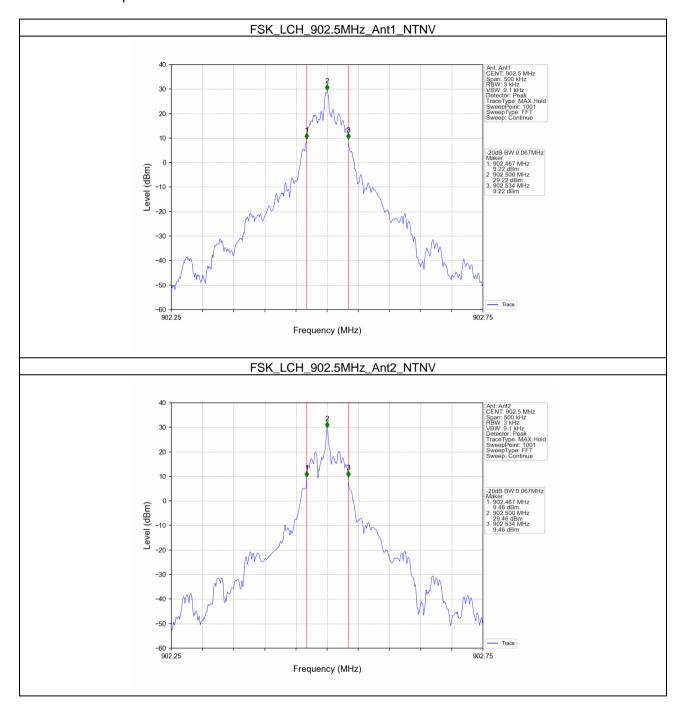


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1.2.2 Test Graph

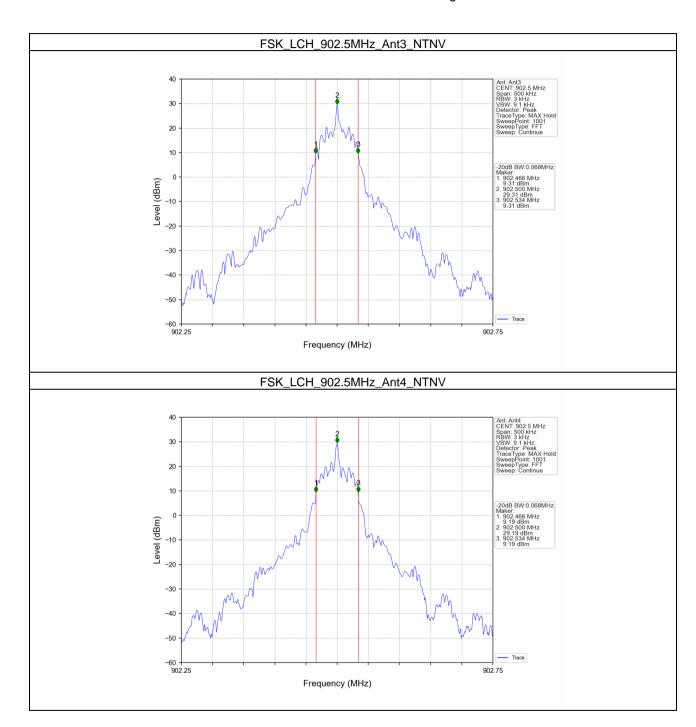




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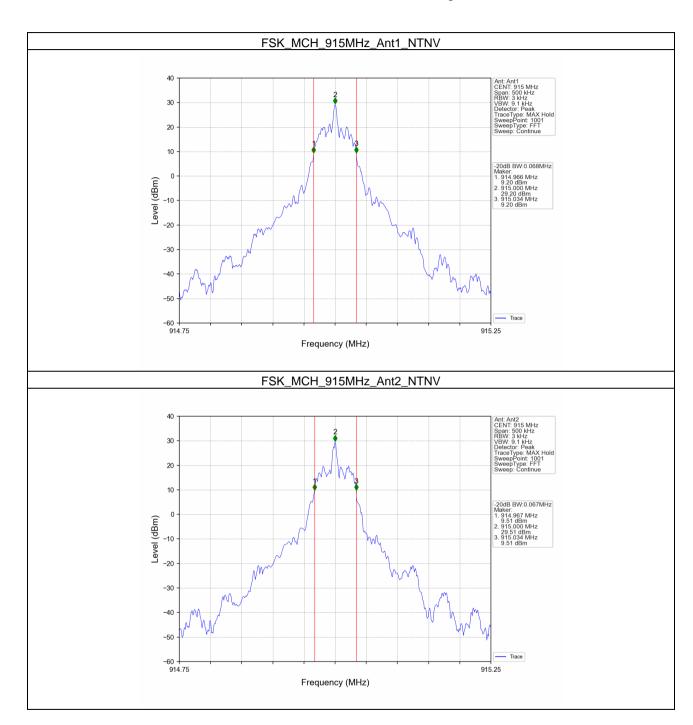




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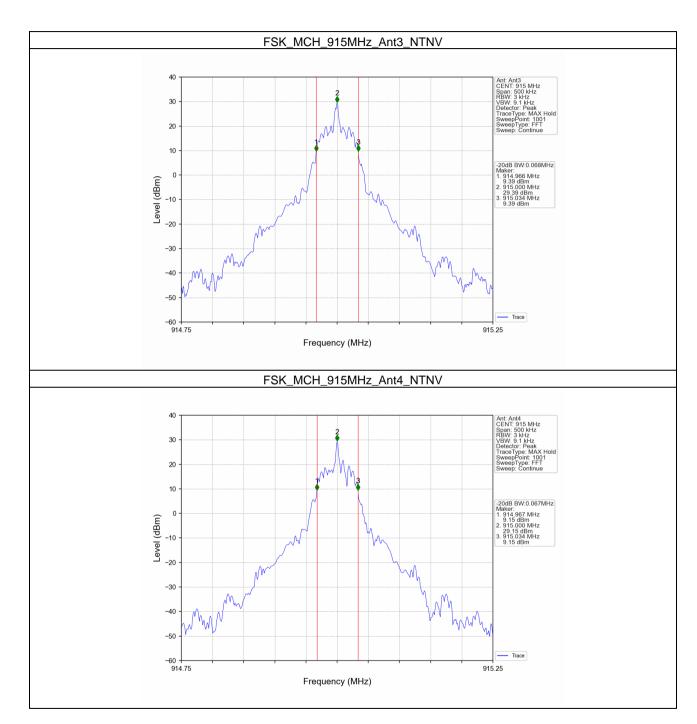




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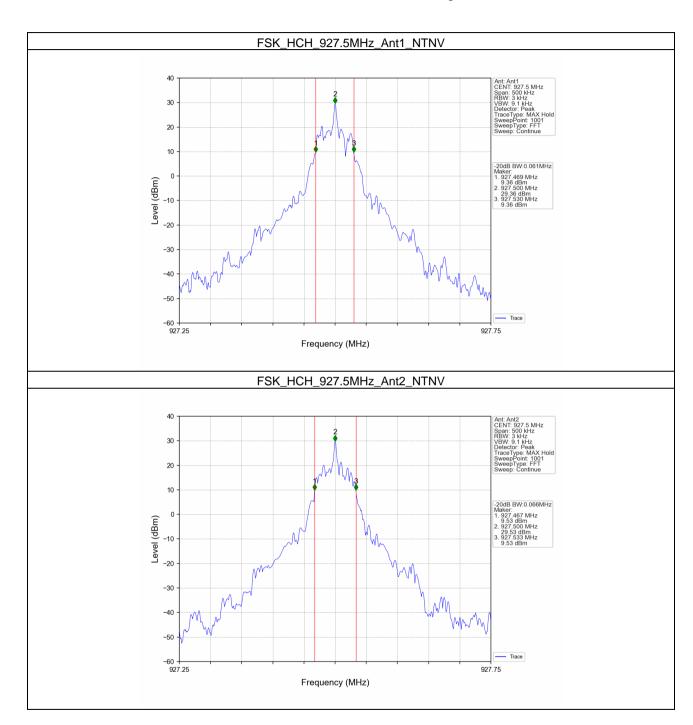




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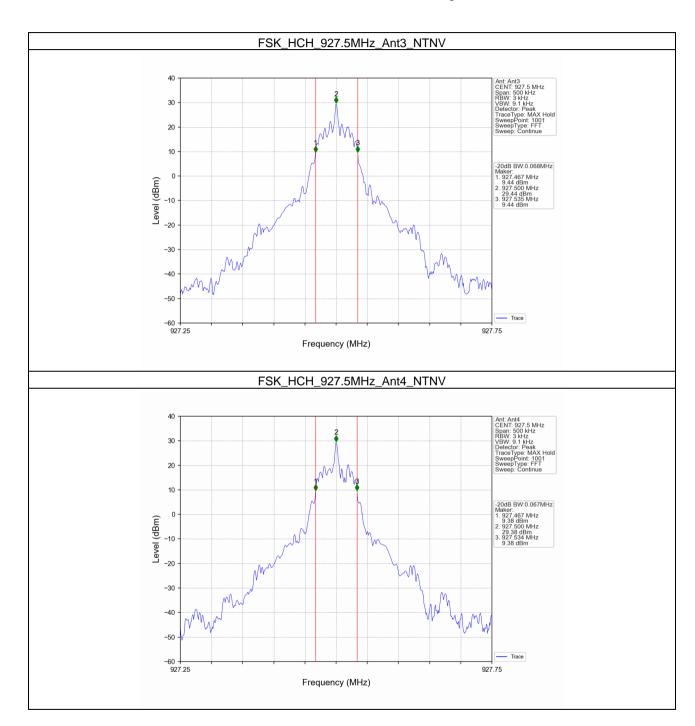




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2. Maximum Conducted Output Power

2.1 Power

2.1.1 Test Result

Mada	TX	Frequency	Maxi	mum Average	Conducted O	utput Power (dBm)	\/amaliat
Mode	Type	(MHz)	ANT1	ANT2	ANT3	ANT4	Limit	Verdict
		902.5	29.10	29.24	29.14	29.10	<=30	Pass
FSK	SISO	915	28.99	29.26	29.19	28.98	<=30	Pass
		927.5	29.65	29.84	29.73	29.63	<=30	Pass

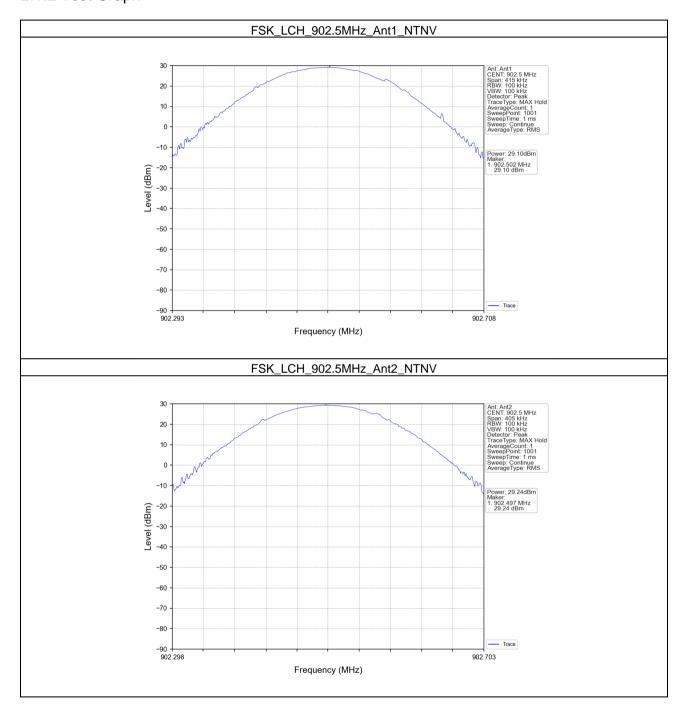


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2.1.2 Test Graph

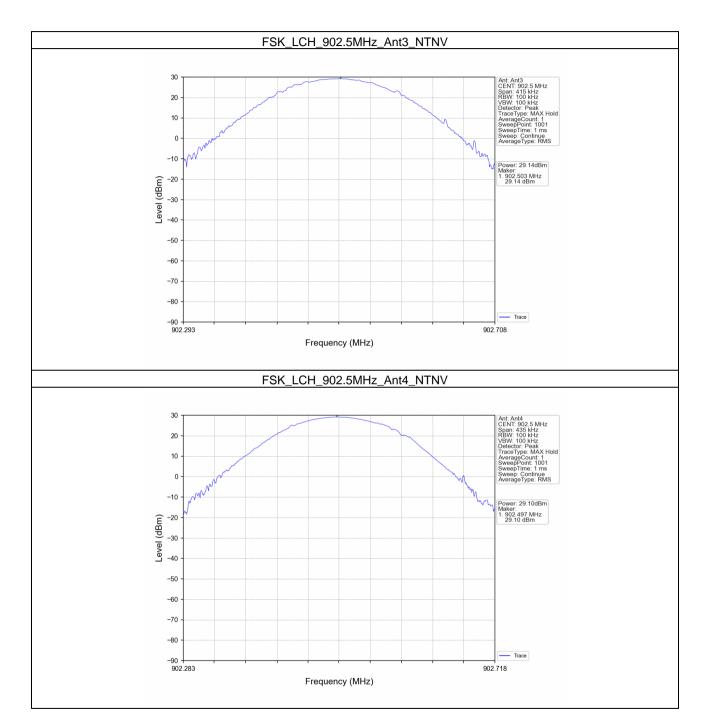




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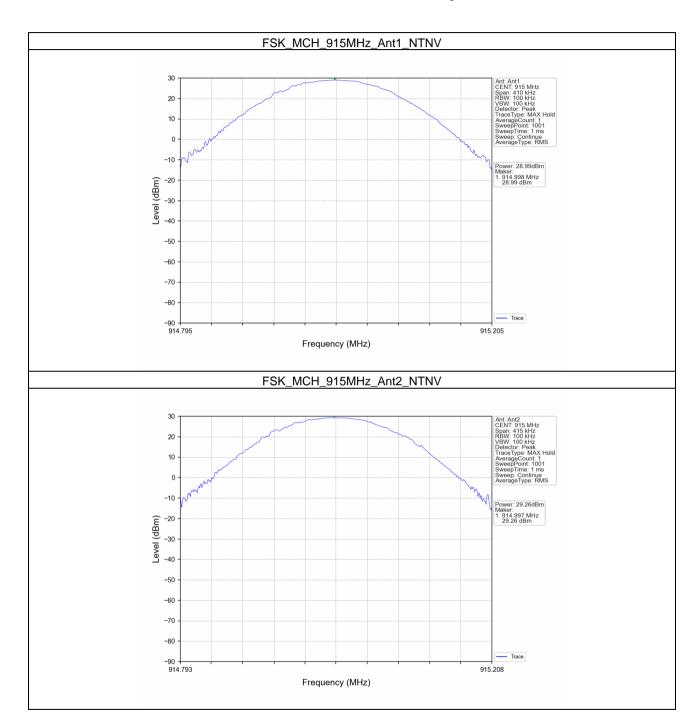




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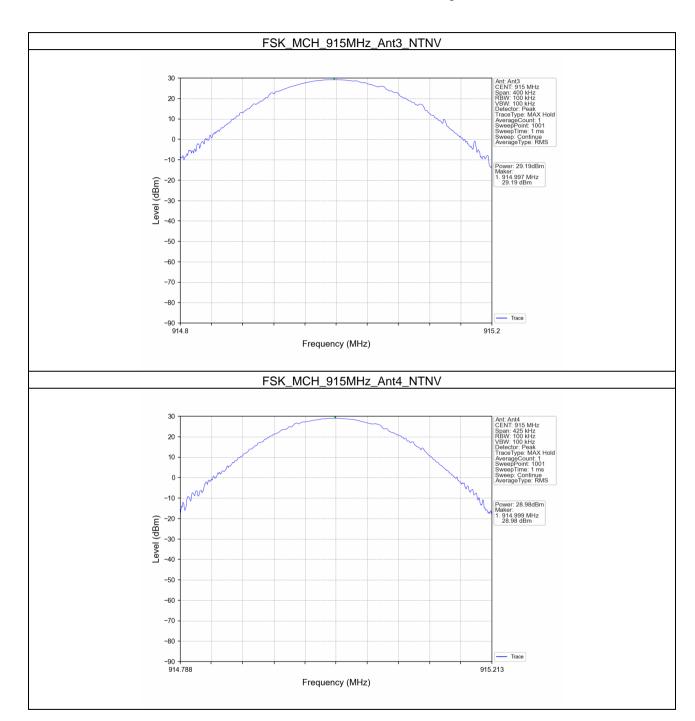




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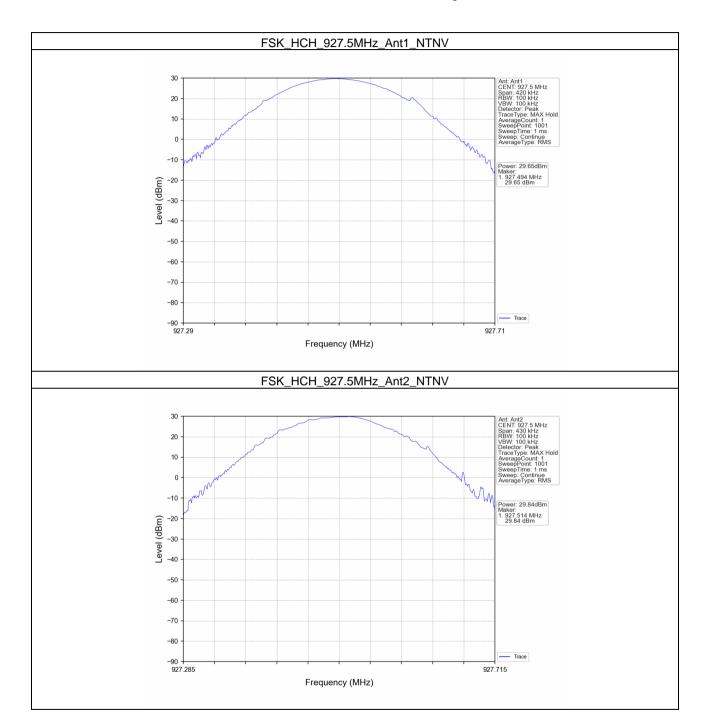




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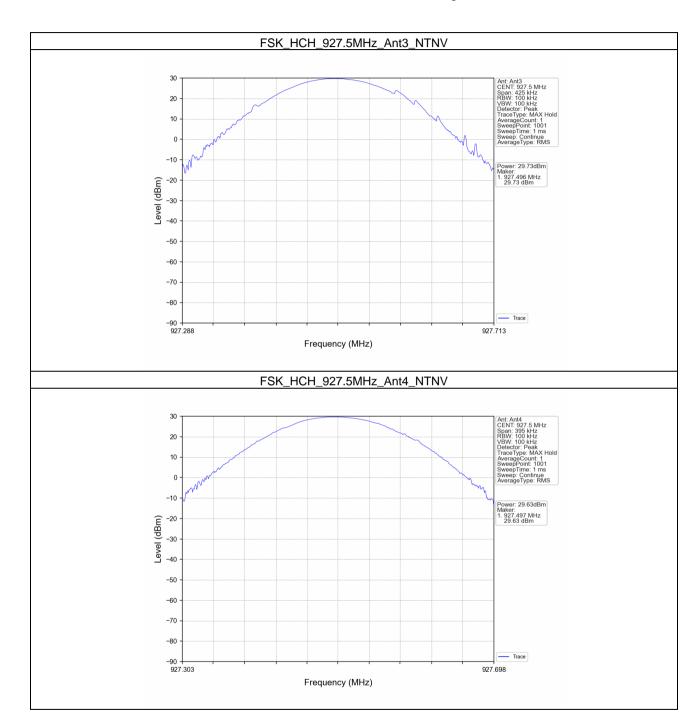




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3. Carrier Frequency Separation

3.1 Ant2

3.1.1 Test Result

	Ant2										
Mode	TX Type	Frequency (MHz)	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict					
FSK	SISO	HOPP	0.500	0.068	>=0.068	Pass					

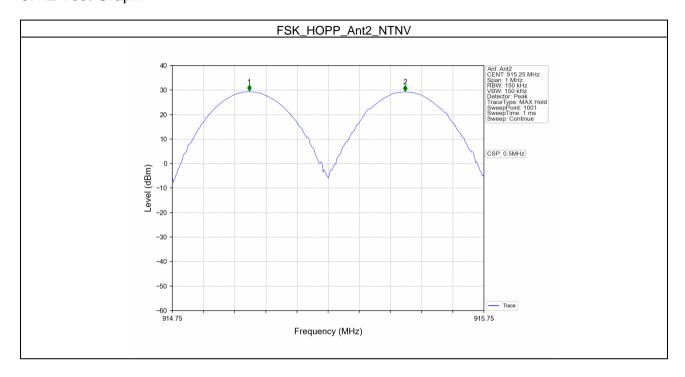


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3.1.2 Test Graph





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4. Number of Hopping Frequencies

4.1 HoppNum

4.1.1 Test Result

Mada	TX	Frequency	Num of Hoppir	ng Frequencies	\	
Mode	Type	(MHz)	ANT2	Limit	Verdict	
FSK	SISO	HOPP	51	>=50	Pass	

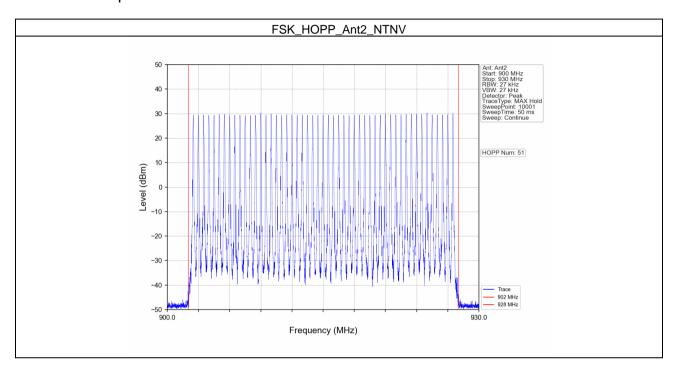


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4.1.2 Test Graph





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5. Time of Occupancy (Dwell Time)

5.1 Ant2

5.1.1 Test Result

	Ant2										
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			
FSK	SISO	HOPP	19.749	20.000	1	19.749	<=400	Pass			

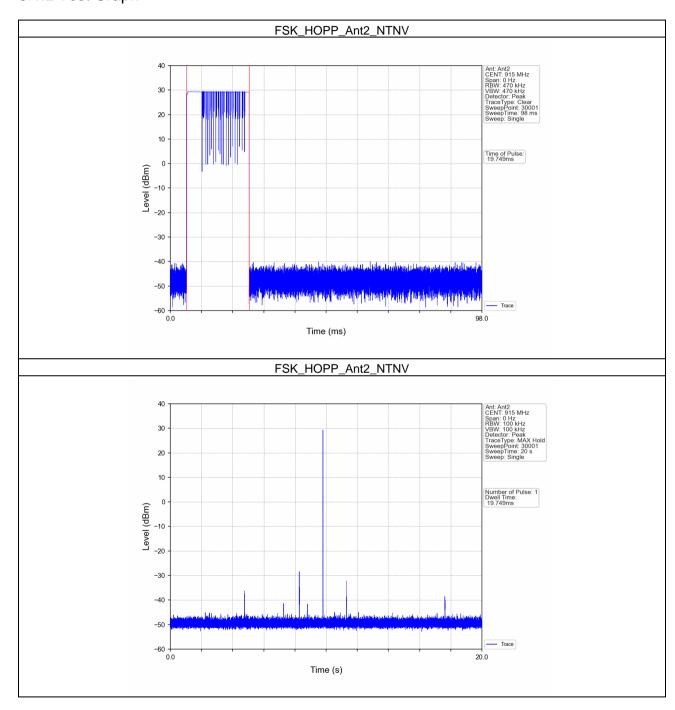


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5.1.2 Test Graph





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6. Unwanted Emissions In Non-restricted Frequency Bands

6.1 Ref

6.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
	SISO	902.5	2	29.42
FSK		915	2	29.25
		927.5	2	29.96

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.

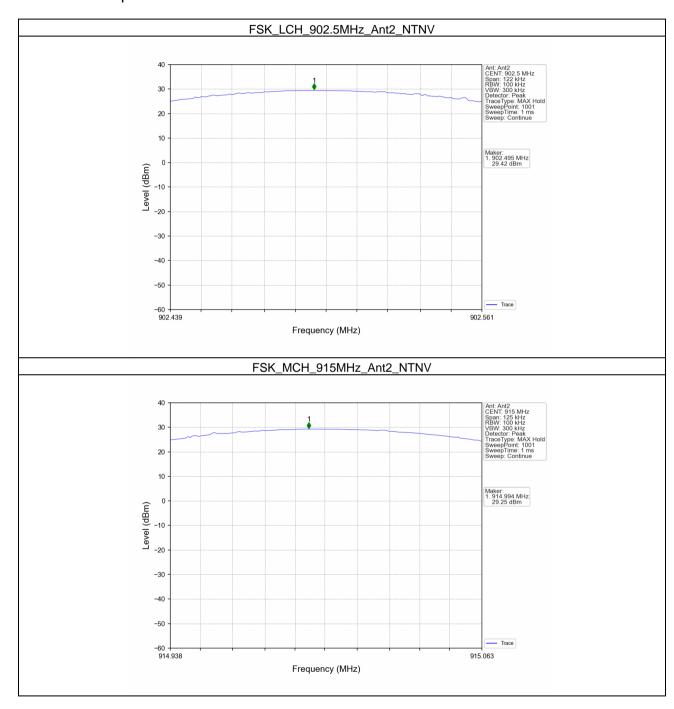


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6.1.2 Test Graph

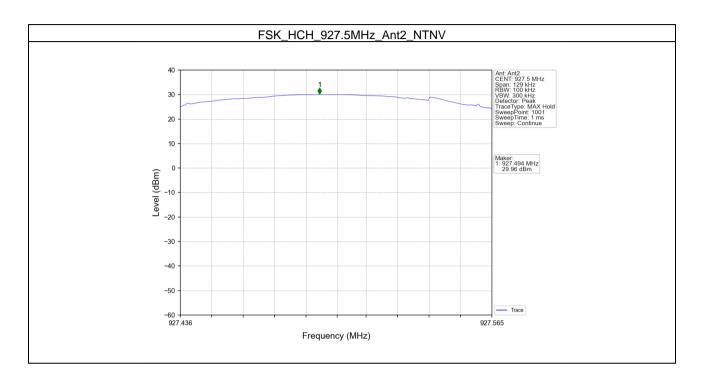




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6.2 CSE

6.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
		902.5	2	29.96	9.96	Pass
	SISO	915	2	29.96	9.96	Pass
FSK		927.5	2	29.96	9.96	Pass
		НОРР	2	29.96	9.96	Pass
				29.96	9.96	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.

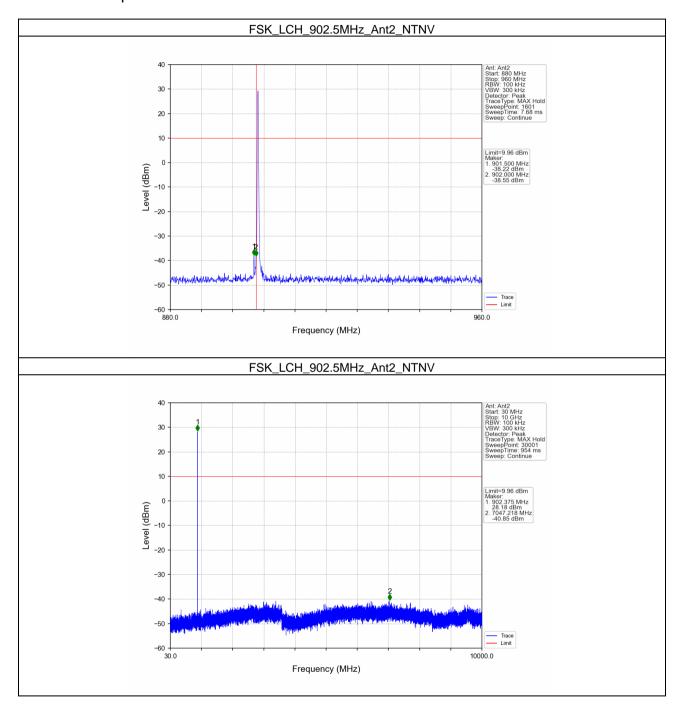


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6.2.2 Test Graph

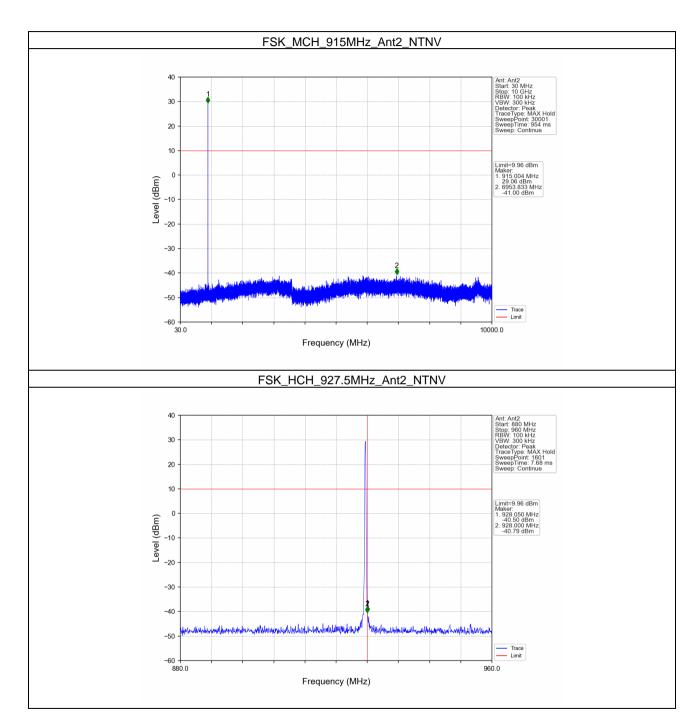




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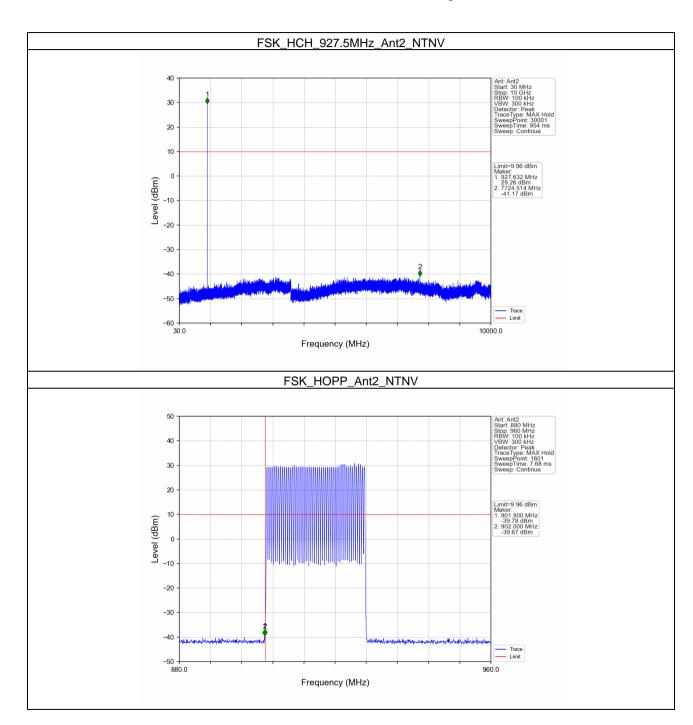




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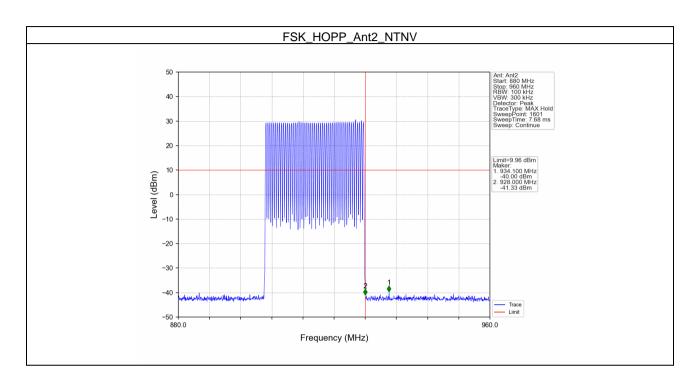




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