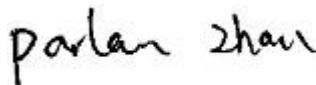


**TEST REPORT**

**Application No.:** SHCR2211002381AT  
**FCC ID:** 2A92M-E310B  
**Applicant:** Shanghai Inlay Link Inc.  
**Address of Applicant:** No.164, XuanChun Road, Pudong New Area,Shanghai, China  
**Manufacturer:** Shanghai Inlay Link Inc.  
**Address of Manufacturer:** No.164, XuanChun Road, Pudong New Area,Shanghai, China  
**Factory:** Shanghai Inlay Link Inc.  
**Address of Factory:** No.164, XuanChun Road, Pudong New Area,Shanghai, China  
**Equipment Under Test (EUT):**  
**EUT Name:** RFID Module  
**Model No.:** E310B  
**Trade Mark:** Inlaylink  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.247  
**Date of Receipt:** 2022-11-03  
**Date of Test:** 2022-11-03 to 2023-01-05  
**Date of Issue:** 2023-01-11

<b>Test Result:</b>	<b>Pass*</b>
---------------------	--------------

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



Parlam Zhan  
Laboratory Manager



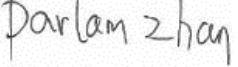
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Revision Record			
Version	Description	Date	Remark
00	Original	2023-01-11	/

Authorized for issue by:			
		 _____ <b>Wade Zhang/Project Engineer</b>	
		 _____ <b>Parlam Zhan/Reviewer</b>	

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## 2 Test Summary

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

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(2)	Pass
20dB Bandwidth		ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation		ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number		ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(i)	Pass
Dwell Time		ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(i)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
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

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## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	DC 5V from USB port
Operation Frequency:	902.75MHz ~ 927.25MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK
Number of Channels:	50
Channel Spacing:	500KHz
Antenna Type:	PCB Antenna
Antenna Gain:	-15dBi

Power level setting using in test:

Channel	Power setting
Low	27
Middle	27
High	27

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	LENOVO	L460	-
Adapter	LENOVO	ADLX45NCC3A	/

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## 4.3 Measurement Uncertainty &amp; Decision Rule

No.	Item	Measurement Uncertainty
1	Radio Frequency	$8.4 \times 10^{-8}$
2	Timeout	2s
3	Duty cycle	0.4%
4	Occupied Bandwidth	3%
5	RF conducted power	0.6dB
6	RF power density	2.9dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious emission test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-6GHz)
		5.4dB (6GHz-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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### 4.4 Test Location

All tests were performed at:

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588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

Note:

- SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc ) is provided by the applicant. (if applicable).
- 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).

### 4.5 Test Facility

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

- A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 8617A

- VCCI (Member No.: 3061)**

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### 4.6 Deviation from Standards

None

### 4.7 Abnormalities from Standard Conditions

None

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## 5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
<b>RF Conducted Test</b>					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2021-12-20	2022-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2022-12-20	2023-12-19
Spectrum Analyzer	Keysight	N9020B	SHEM241-1	2021-12-20	2022-12-19
Spectrum Analyzer	Keysight	N9020B	SHEM241-1	2022-12-20	2023-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2022-08-02	2023-08-01
Signal Generator	R&S	SMR20	SHEM006-1	2022-08-02	2023-08-01
Signal Generator	Agilent	N5182A	SHEM182-1	2022-08-02	2023-08-01
Communication Tester	R&S	CMW270	SHEM183-1	2022-07-25	2023-07-24
Communication Tester	R&S	CMW500	SHEM268-1	2022-07-25	2023-07-24
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2022-08-02	2023-08-01
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2022-11-08	2024-11-07
AC Power Stabilizer	APC	KDF-31020T-V0-F0	SHEM216-1	2021-12-20	2022-12-19
AC Power Stabilizer	APC	KDF-31020T-V0-F0	SHEM216-1	2022-12-20	2023-12-19
DC Power Supply	MCH	MCH-303A	SHEM210-1	2021-12-20	2022-12-19
DC Power Supply	MCH	MCH-303A	SHEM210-1	2022-12-20	2023-12-19
Conducted test Cable	/	RF01~RF04	/	2021-12-20	2022-12-19
Conducted test Cable	/	RF01~RF04	/	2022-12-20	2023-12-19
Switcher	Tonscend	JS0806	SHEM184-1	2022-08-02	2023-08-01
Test software	Tonscend	JS Tonscend BT/WIFI System	Version: 2.6	/	/
Coaxial Cable	TST		SHEM263-1	2022-08-02	2023-08-01
Test software	TST	TST PASS	Version: 2.0	/	/
<b>RF Radiated Test</b>					
EMI test Receiver	R&S	ESU40	SHEM051-1	2021-12-20	2022-12-19
EMI test Receiver	R&S	ESU40	SHEM051-1	2022-12-20	2023-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2021-12-20	2022-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2022-12-20	2023-12-19
Communication Tester	R&S	CMW500	SHEM268-1	2022-07-25	2023-07-24
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2021-12-20	2022-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2022-12-20	2023-12-19
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2021-09-11	2023-09-10
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM202-1	2021-05-07	2023-05-06
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2022-08-11	2024-08-10
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2021-09-18	2023-09-17
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2021-09-18	2023-09-17
Pre-Amplifier	HP	8447D	SHEM236-1	2022-08-02	2023-08-01
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2021-12-20	2022-12-19
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2022-12-20	2023-12-19
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/

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Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
RE test Cable	/	RE01, RE02, RE06	/	2022-01-07	2023-01-06
Test software	ESE	E3	Version: 6.111221a	/	/

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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 PCB Antenna and no consideration of replacement. The best case gain of the antenna is -15dBi dBi.

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 emission(MHz)	Conducted limit(dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

#### 7.1.1 E.U.T. Operation

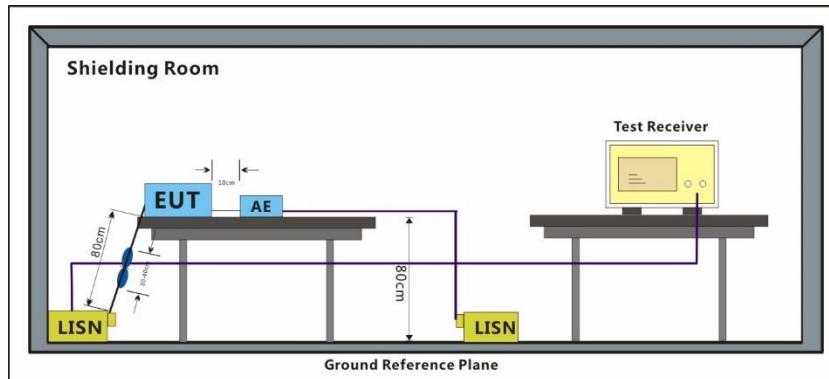
Operating Environment:

Temperature: 22 °C      Humidity: 57 % RH      Atmospheric Pressure: 1010 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	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**

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

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

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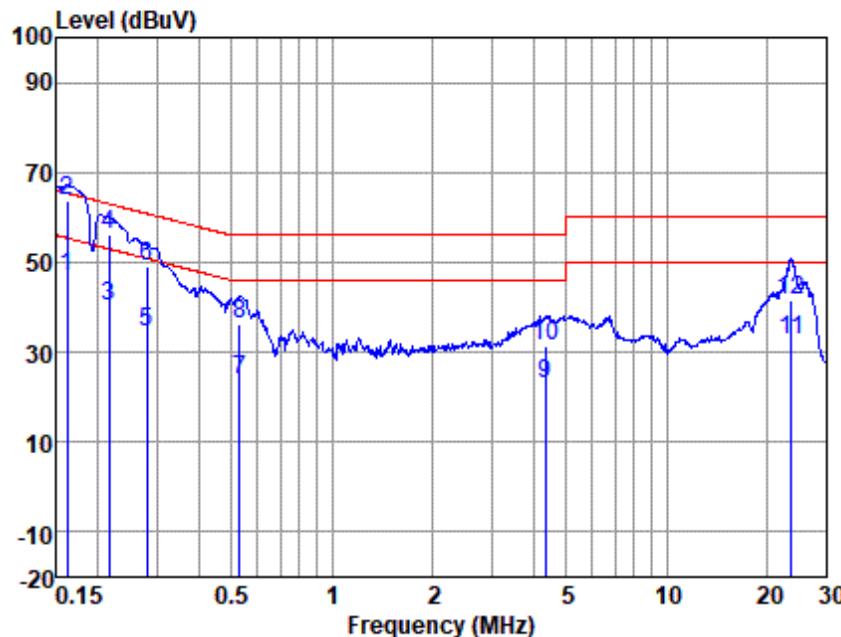


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Test Mode: 04; Line: Live line



**LISN** : LINE  
**EUT/Project No** : 02381AT  
**Test Mode** : 04

Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Over Limit (dBuV)	Over Limit (dB)	Remark
1 0.16	36.56	0.13	10.02	46.71	55.38	-8.67	Average
2 0.16	53.67	0.13	10.02	63.82	65.38	-1.56	QP
3 0.22	30.30	0.10	10.03	40.43	53.01	-12.58	Average
4 0.22	46.18	0.10	10.03	56.31	63.01	-6.70	QP
5 0.28	24.21	0.10	10.05	34.36	50.81	-16.45	Average
6 0.28	39.01	0.10	10.05	49.16	60.81	-11.65	QP
7 0.53	13.55	0.10	10.08	23.73	46.00	-22.27	Average
8 0.53	26.01	0.10	10.08	36.19	56.00	-19.81	QP
9 4.34	12.73	0.18	10.22	23.13	46.00	-22.87	Average
10 4.34	20.84	0.18	10.22	31.24	56.00	-24.76	QP
11 23.64	21.44	0.90	10.39	32.73	50.00	-17.27	Average
12 23.64	30.26	0.90	10.39	41.55	60.00	-18.45	QP

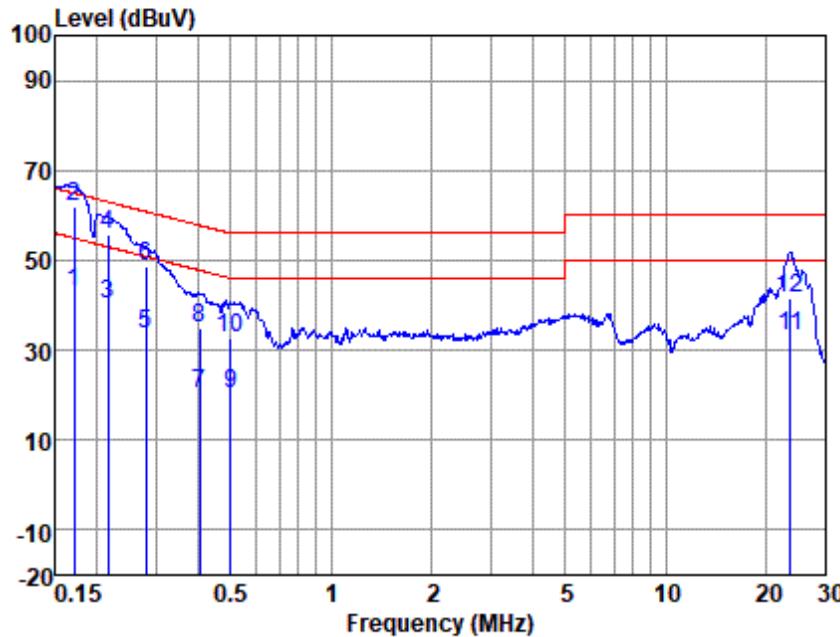
Notes: Emission Level = Read Level + LISN Factor + Cable loss



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Test Mode: 04; Line: Neutral Line



LISN : NEUTRAL  
EUT/Project No : 02381AT  
Test Mode : 04

Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Over Limit (dBuV)	Over Limit (dB)	Remark
1 0.17	32.75	0.10	10.02	42.87	54.94	-12.07	Average
2 0.17	51.71	0.10	10.02	61.83	64.94	-3.11	QP
3 0.22	30.23	0.10	10.03	40.36	53.01	-12.65	Average
4 0.22	45.73	0.10	10.03	55.86	63.01	-7.15	QP
5 0.28	23.45	0.10	10.05	33.60	50.81	-17.21	Average
6 0.28	38.33	0.10	10.05	48.48	60.81	-12.33	QP
7 0.41	10.28	0.10	10.07	20.45	47.73	-27.28	Average
8 0.41	24.63	0.10	10.07	34.80	57.73	-22.93	QP
9 0.50	10.00	0.10	10.08	20.18	46.01	-25.83	Average
10 0.50	22.40	0.10	10.08	32.58	56.01	-23.43	QP
11 23.64	22.09	0.73	10.39	33.21	50.00	-16.79	Average
12 23.64	30.33	0.73	10.39	41.45	60.00	-18.55	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss



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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)
902-928	1 for $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

### **7.2.1 E.U.T. Operation**

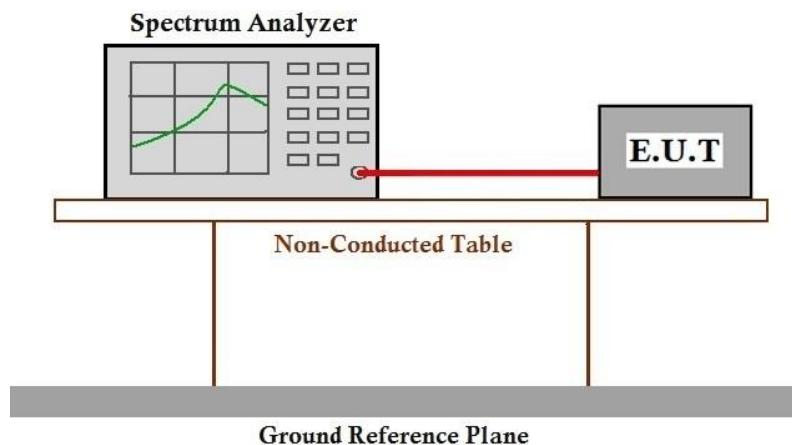
## Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	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

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

Please Refer to Appendix for Details



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### 7.3 20dB Bandwidth

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

Test Method: ANSI C63.10 (2013) Section 7.8.7

Limit:

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

### 7.3.1 E.U.T. Operation

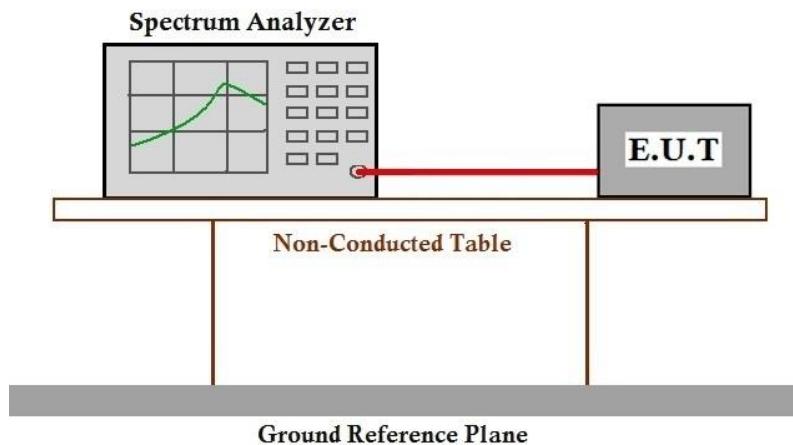
## Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.3.3 Test Setup Diagram



### 7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.4 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

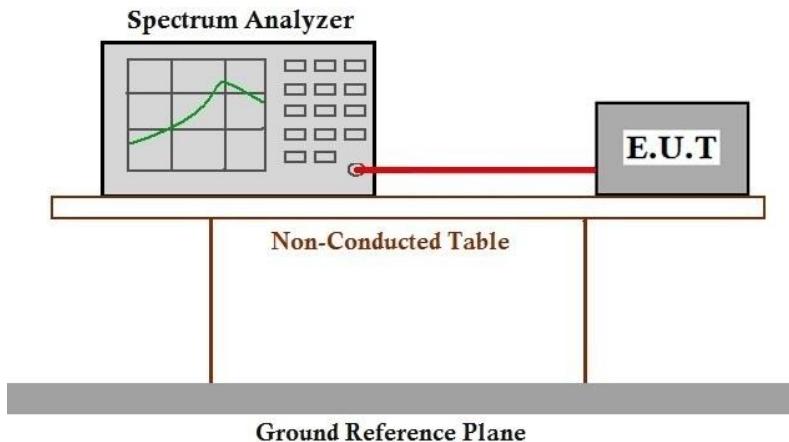
Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation.

### 7.4.3 Test Setup Diagram



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

### 7.5.1 E.U.T. Operation

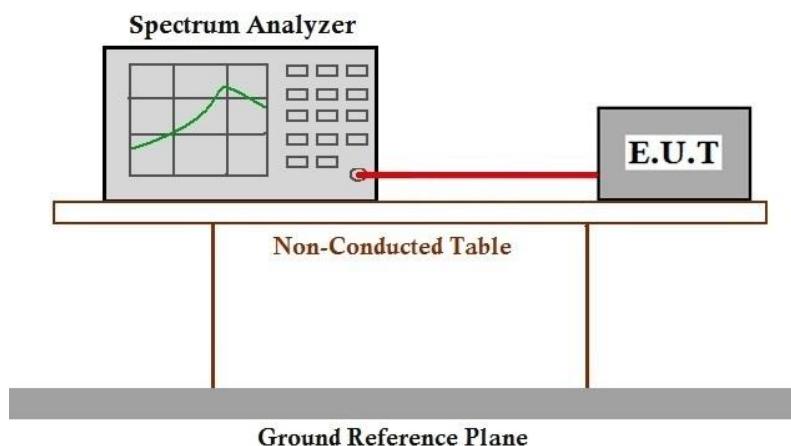
Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK 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
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

### **7.6.1 E.U.T. Operation**

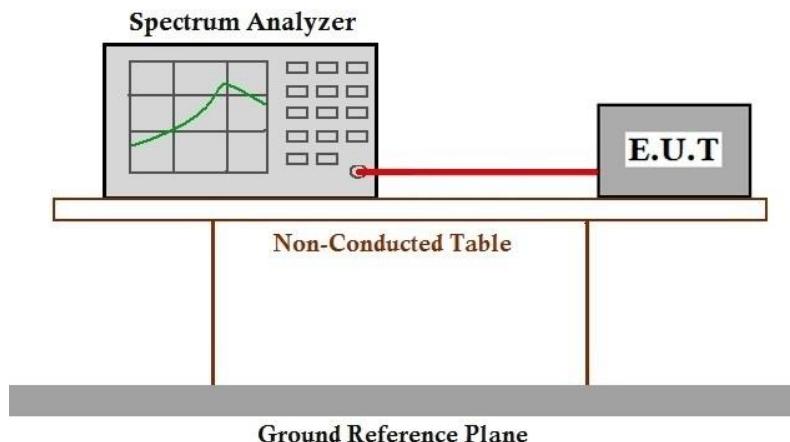
## Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

## 7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK 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

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

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

Limit:

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

### 7.7.1 E.U.T. Operation

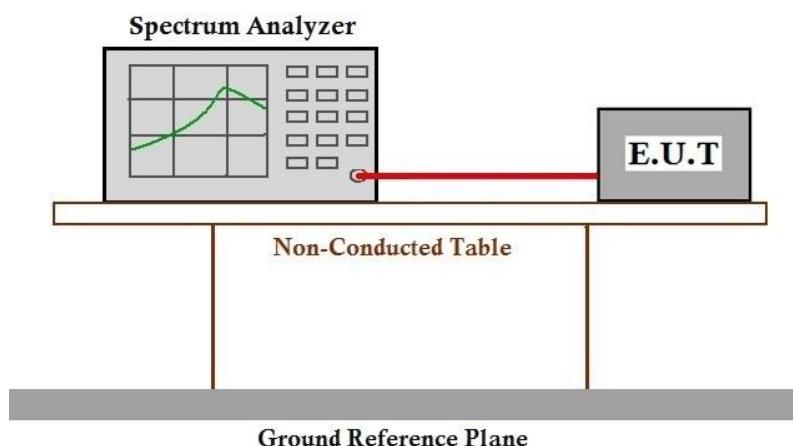
## Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

### 7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation.
Final test	04	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.7.3 Test Setup Diagram



#### 7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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### 7.8 Conducted Spurious Emissions

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

Test Method: ANSI C63.10 (2013) Section 7.8.8

Limit:

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

#### 7.8.1 E.U.T. Operation

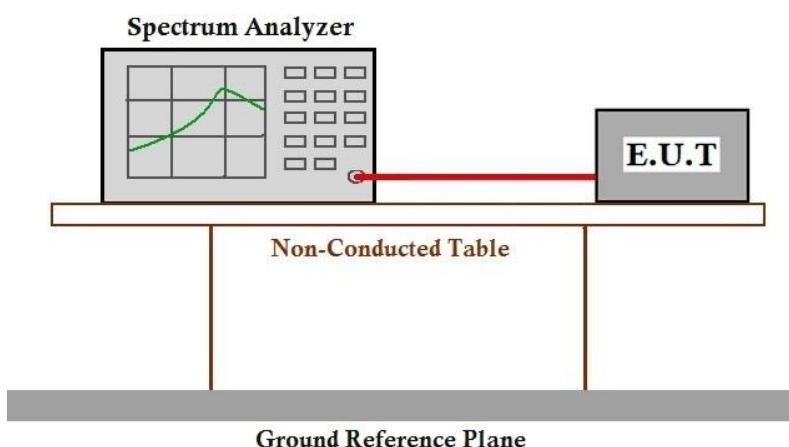
Operating Environment:

Temperature: 22 °C      Humidity: 56 % RH      Atmospheric Pressure: 1010 mbar

#### 7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

#### 7.8.3 Test Setup Diagram



#### 7.8.4 Measurement Procedure and Data

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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: 23 °C      Humidity: 55 % RH      Atmospheric Pressure: 1010 mbar

### 7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.



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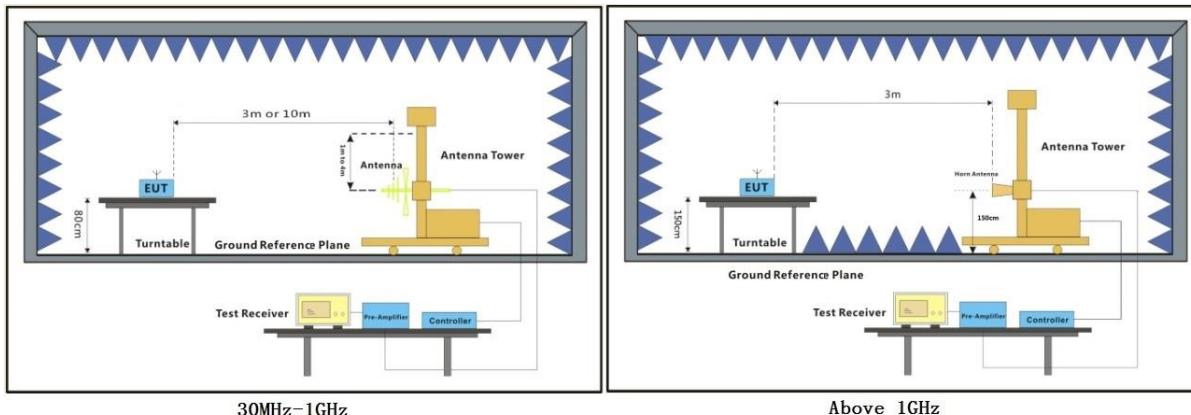
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## 7.9.3 Test Setup Diagram



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.



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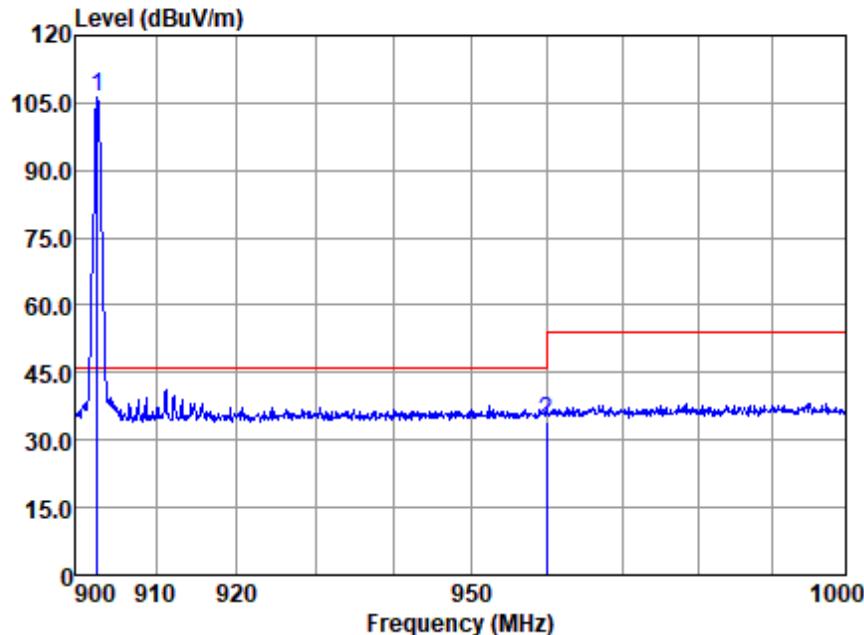
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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity : VERTICAL  
EUT/Project : 2381AT  
Test mode : 902.75

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	902.659	104.33	23.94	5.34	27.47	106.14	46.00	60.14	Peak
2	960.000	31.42	23.85	5.54	26.78	34.03	46.00	-11.97	QP

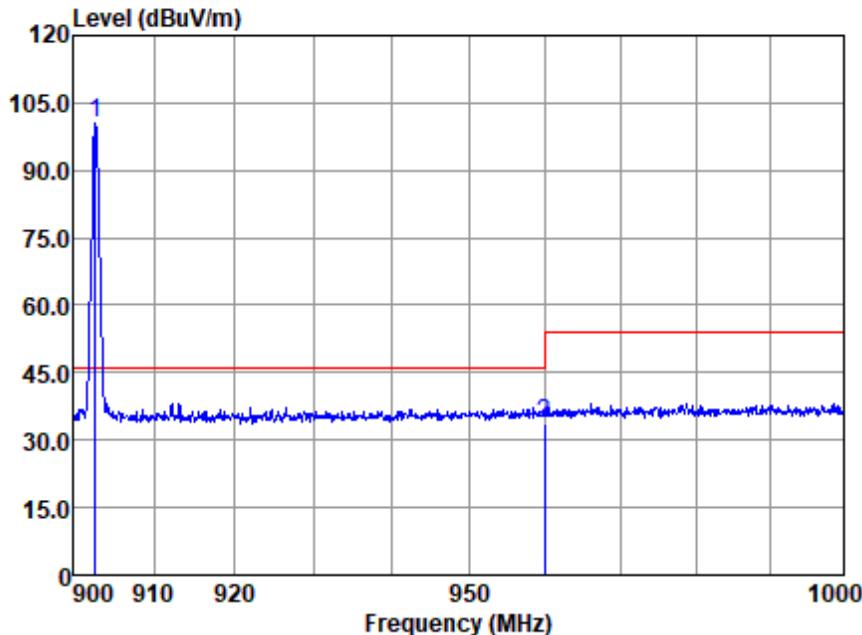
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :HORIZONTAL

EUT/Project :2381AT

Test mode :902.75

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	902.659	98.50	23.94	5.34	27.47	100.31	46.00	54.31	Peak
2	960.000	31.06	23.85	5.54	26.78	33.67	46.00	-12.33	QP

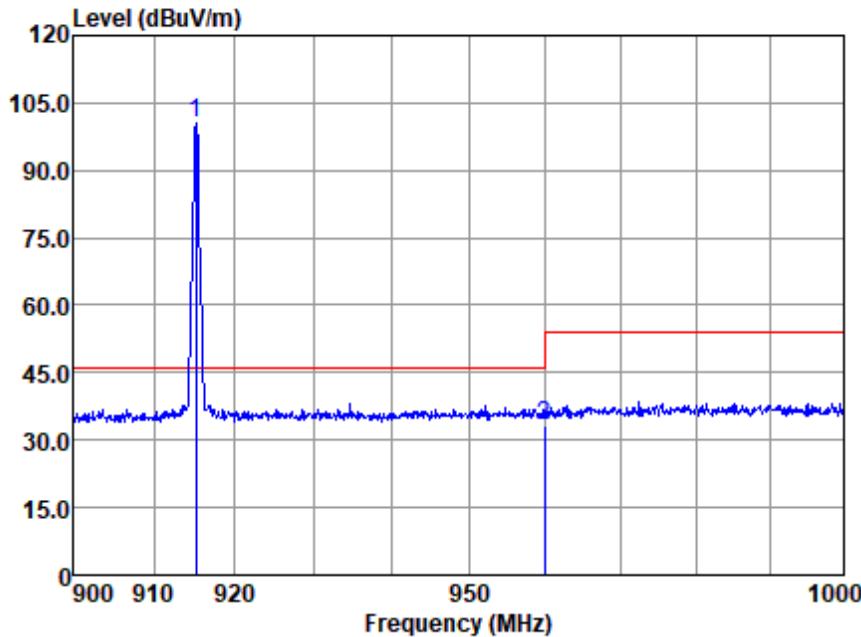
Note: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Antenna Polarity :HORIZONTAL

EUT/Project :2381AT

Test mode :915.25

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	915.204	98.42	23.96	5.39	27.31	100.46	46.00	54.46	Peak
2	960.000	30.64	23.85	5.54	26.78	33.25	46.00	-12.75	QP

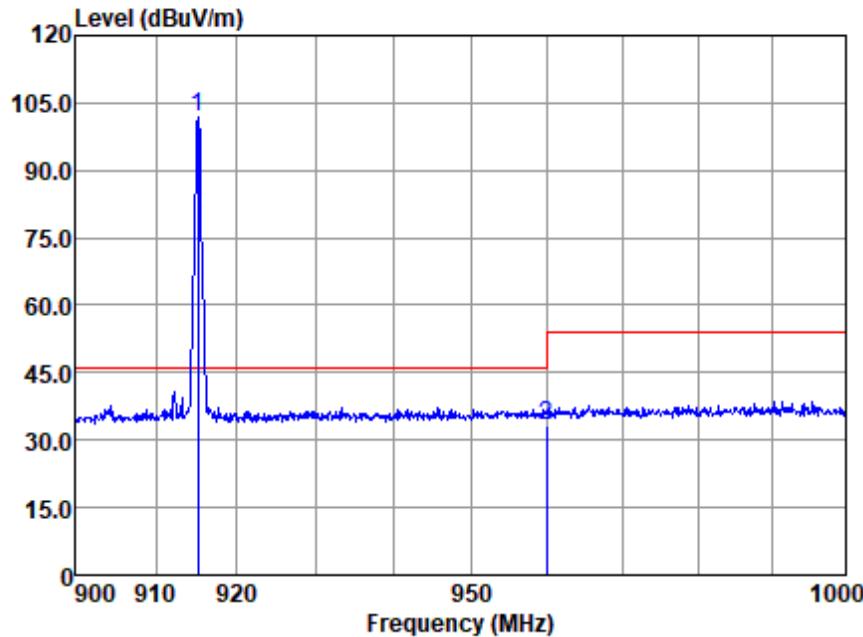
Note: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:middle



Antenna Polarity : VERTICAL

EUT/Project : 2381AT

Test mode : 915.25

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit	Over Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB	
1	915.204	99.75	23.96	5.39	27.31	101.79	46.00	55.79	Peak	
2	960.000	30.41	23.85	5.54	26.78	33.02	46.00	-12.98	QP	

Note: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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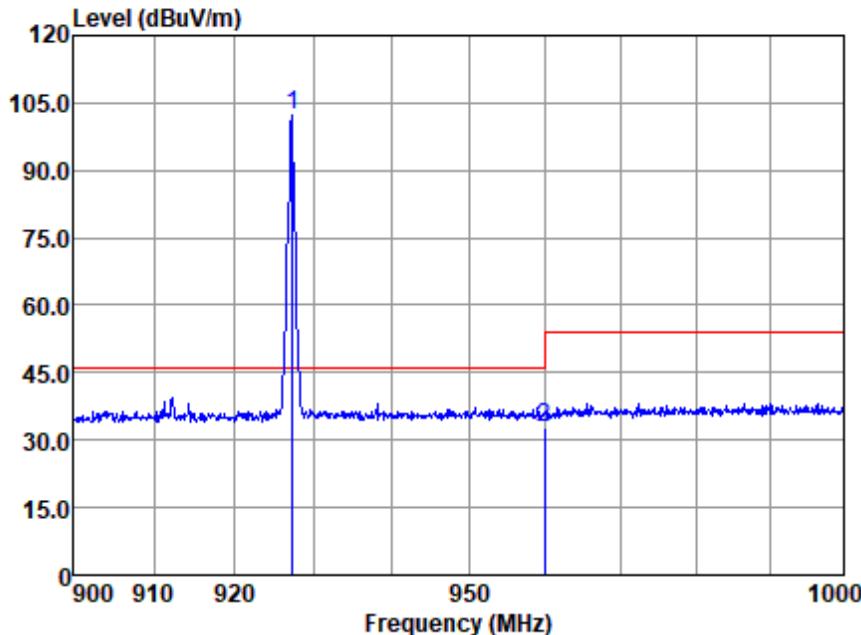
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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity : VERTICAL

EUT/Project : 2381AT

Test mode : 927.25

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	927.337	100.00	23.91	5.43	27.15	102.19	46.00	56.19	Peak
2	960.000	30.09	23.85	5.54	26.78	32.70	46.00	-13.30	QP

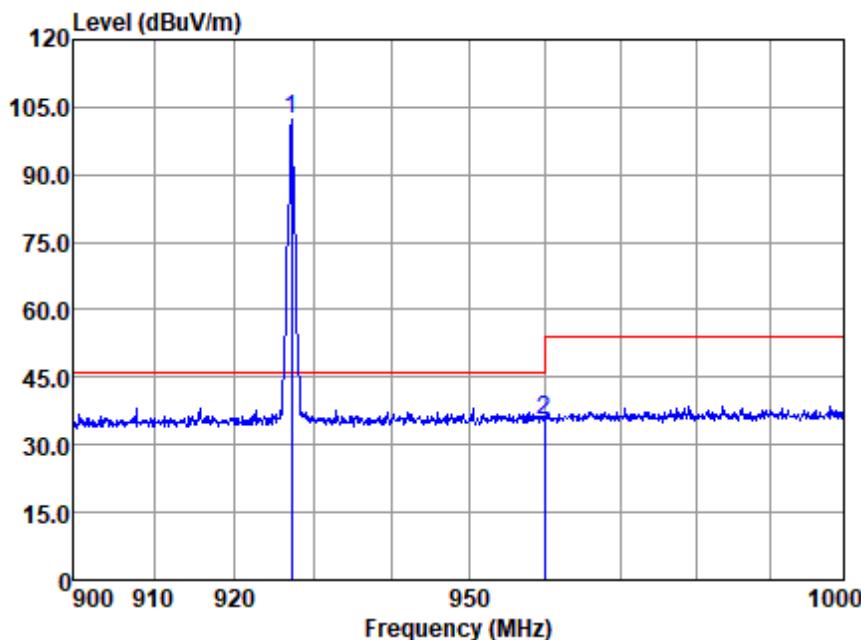
Note: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :HORIZONTAL

EUT/Project :2381AT

Test mode :927.25

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	927.239	100.31	23.91	5.43	27.15	102.50	46.00	56.50	Peak
2	960.000	32.92	23.85	5.54	26.78	35.53	46.00	-10.47	QP

Note: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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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

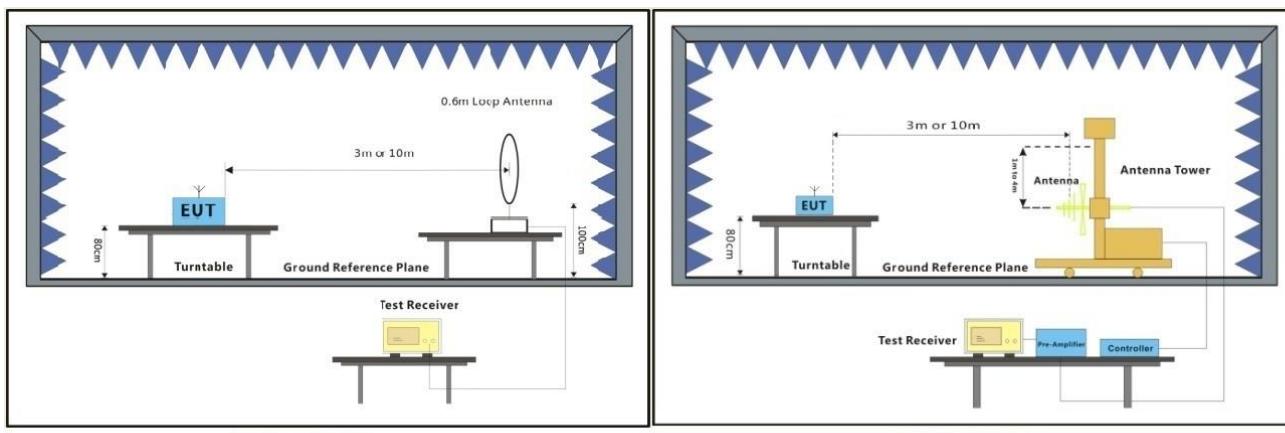
Operating Environment:

Temperature: 23 °C Humidity: 55 % RH Atmospheric Pressure: 1010 mbar

### 7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.10.3 Test Setup Diagram



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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. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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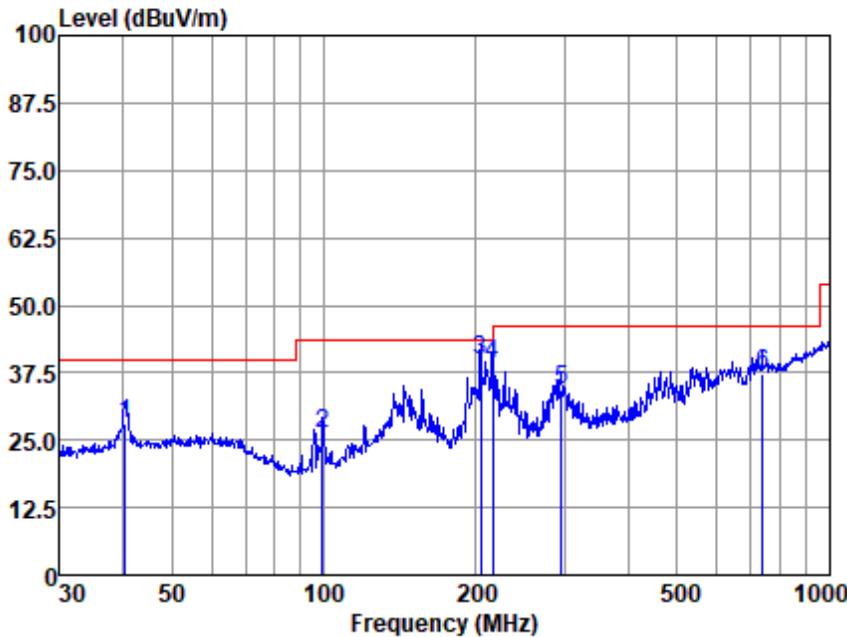
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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :HORIZONTAL

EUT/Project :2381AT

Test mode :902.75

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	40.417	39.60	13.40	1.12	26.20	27.92	40.00	-12.08	QP
2	99.528	42.53	8.88	1.74	27.08	26.07	43.50	-17.43	QP
3	204.238	53.96	9.93	2.51	26.71	39.69	43.50	-3.81	QP
4	216.024	53.39	9.81	2.58	26.75	39.03	46.00	-6.97	QP
5	295.147	44.77	13.38	2.97	26.62	34.50	46.00	-11.50	QP
6	737.071	37.61	22.13	4.82	27.39	37.17	46.00	-8.83	QP

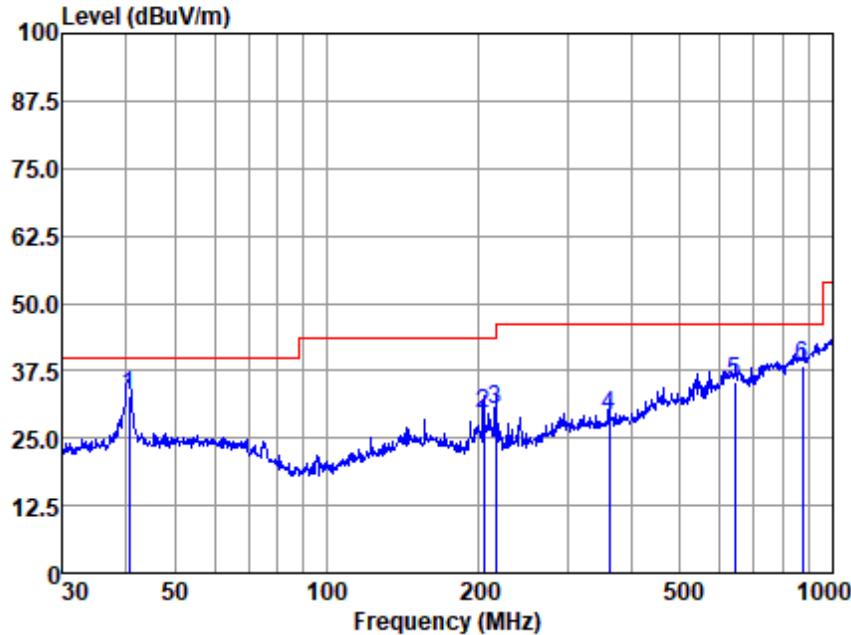
Note: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity : VERTICAL  
EUT/Project : 2381AT  
Test mode : 902.75

Freq	Read	Antenna	Cable	Preamp	Emission	Limit	Over	Remark	
	Level	Factor	Loss	Factor	Level	Line	Limit		
1	40.559	44.68	13.41	1.12	26.20	33.01	40.00	-6.99	QP
2	204.238	43.94	9.93	2.51	26.71	29.67	43.50	-13.83	QP
3	216.024	44.62	9.81	2.58	26.75	30.26	46.00	-15.74	QP
4	361.714	37.72	14.82	3.26	26.72	29.08	46.00	-16.92	QP
5	642.861	37.66	20.63	4.44	27.20	35.53	46.00	-10.47	QP
6	875.247	36.71	23.49	5.25	27.25	38.20	46.00	-7.80	QP

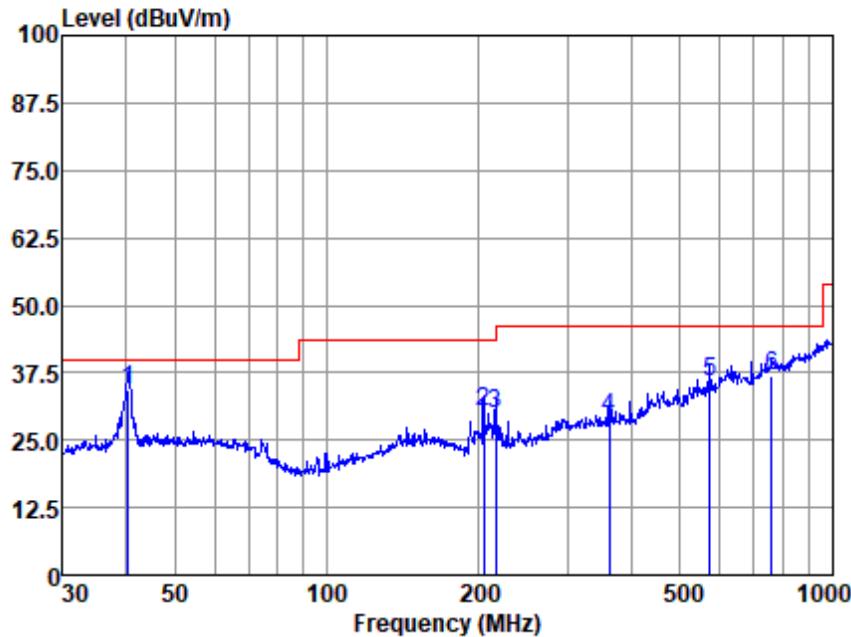
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:middle



Antenna Polarity :VERTICAL  
EUT/Project :2381AT  
Test mode :915.25

Freq	Read	Antenna	Cable	Preamp	Emission	Limit	Over	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 40.417	46.16	13.40	1.12	26.20	34.48	40.00	-5.52	QP
2 204.238	44.48	9.93	2.51	26.71	30.21	43.50	-13.29	QP
3 216.024	44.08	9.81	2.58	26.75	29.72	46.00	-16.28	QP
4 361.714	37.89	14.82	3.26	26.72	29.25	46.00	-16.75	QP
5 572.614	39.90	19.07	4.20	27.54	35.63	46.00	-10.37	QP
6 760.704	37.08	22.34	4.84	27.33	36.93	46.00	-9.07	QP

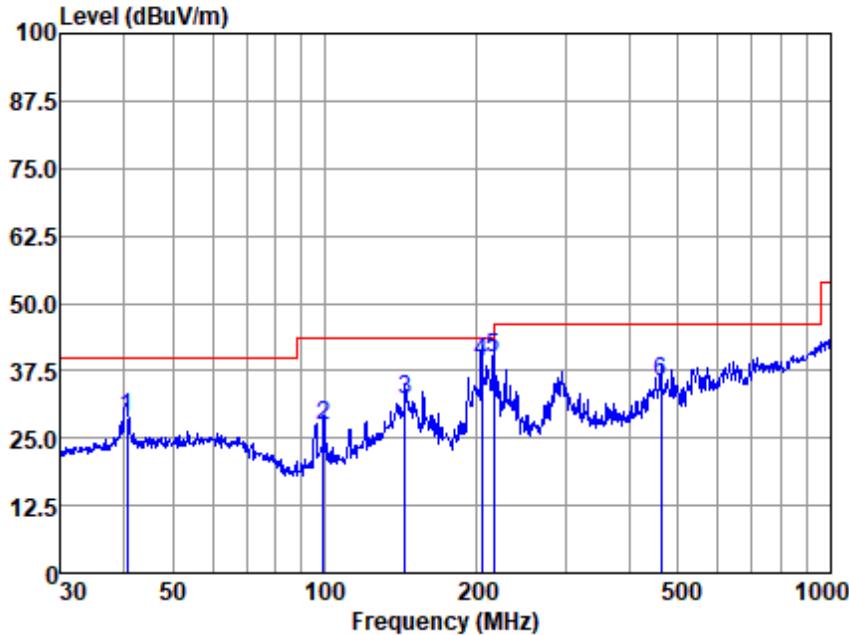
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Antenna Polarity :HORIZONTAL

EUT/Project : 2381AT

Test mode :915.25

Freq	Read	Antenna	Cable	Preamp	Emission	Limit	Over	Remark	
	Level	Factor	Loss	Factor	Level	Line	Limit		
1	40.702	40.30	13.43	1.12	26.20	28.65	40.00	-11.35	QP
2	99.528	43.78	8.88	1.74	27.08	27.32	43.50	-16.18	QP
3	144.335	44.26	12.98	2.06	27.10	32.20	43.50	-11.30	QP
4	204.238	53.49	9.93	2.51	26.71	39.22	43.50	-4.28	QP
5	216.024	54.12	9.81	2.58	26.75	39.76	46.00	-6.24	QP
6	462.346	41.15	17.24	3.85	26.77	35.47	46.00	-10.53	QP

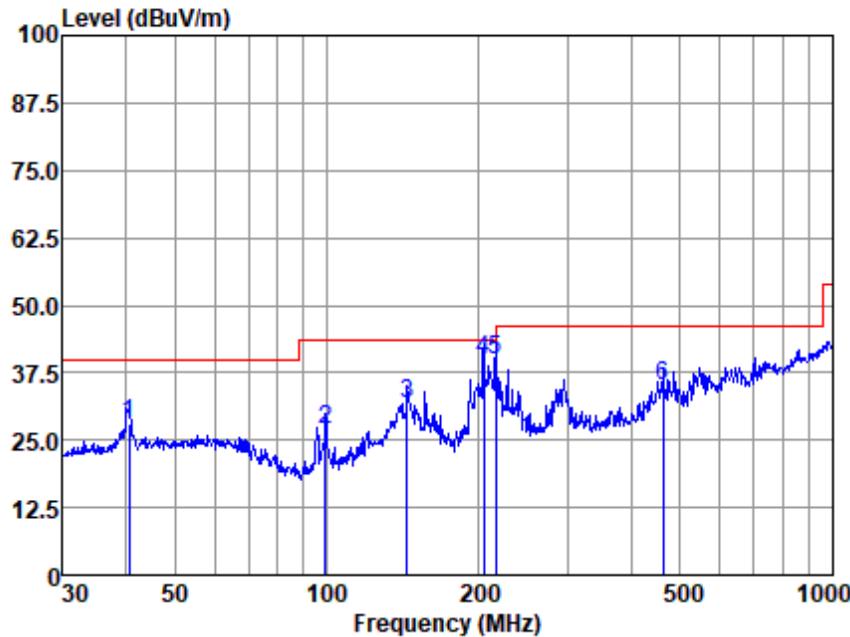
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :HORIZONTAL

EUT/Project : 2381AT

Test mode :927-25

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	40.702	39.86	13.43	1.12	26.20	28.21	40.00	-11.79
2	99.528	43.41	8.88	1.74	27.08	26.95	43.50	-16.55
3	144.335	43.96	12.98	2.06	27.10	31.90	43.50	-11.60
4	204.238	53.96	9.93	2.51	26.71	39.69	43.50	-3.81
5	216.024	54.19	9.81	2.58	26.75	39.83	46.00	-6.17
6	462.346	40.65	17.24	3.85	26.77	34.97	46.00	-11.03

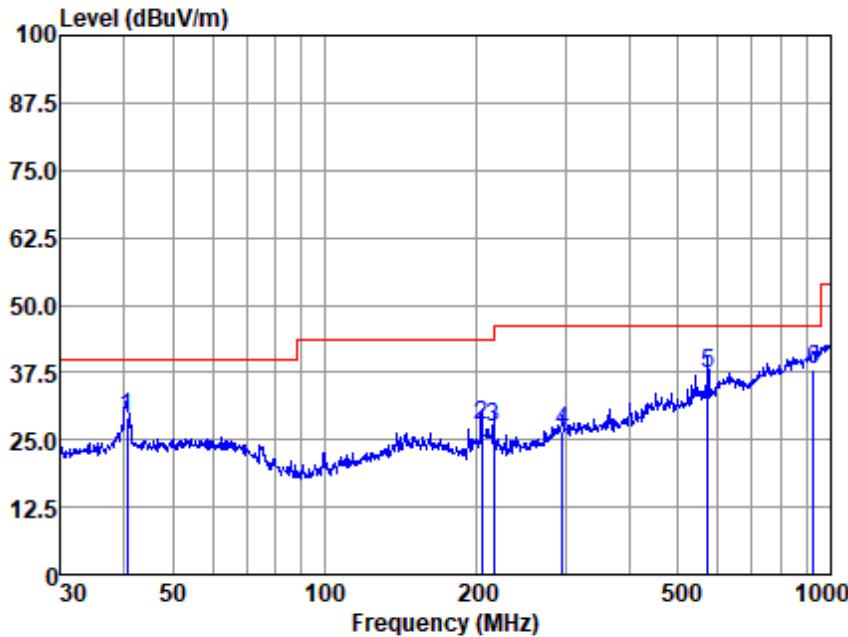
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity :VERTICAL  
EUT/Project :2381AT  
Test mode :927.25

Freq	Read	Antenna	Cable	Preamp	Emission	Limit	Over	Remark	
	Level	Factor	Loss	Factor	Level	Line	Limit		
1	40.559	40.93	13.41	1.12	26.20	29.26	40.00	-10.74	QP
2	204.238	41.95	9.93	2.51	26.71	27.68	43.50	-15.82	QP
3	216.024	41.70	9.81	2.58	26.75	27.34	46.00	-18.66	QP
4	295.147	36.77	13.38	2.97	26.62	26.50	46.00	-19.50	QP
5	572.614	41.56	19.07	4.20	27.54	37.29	46.00	-8.71	QP
6	925.756	36.04	23.91	5.39	27.15	38.19	46.00	-7.81	QP

Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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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

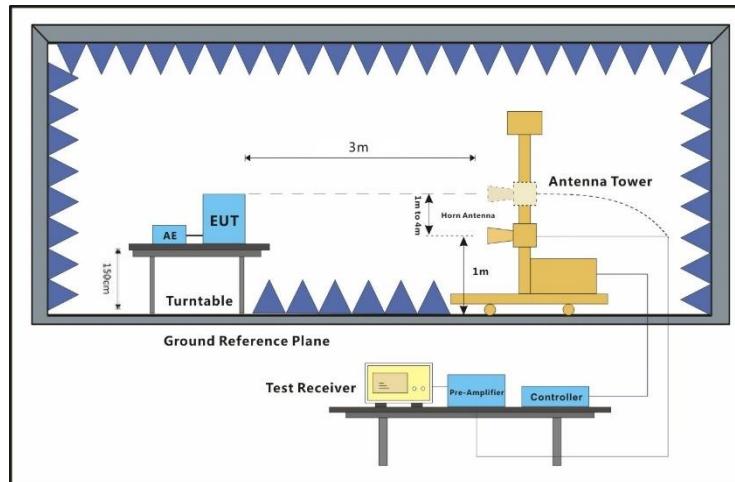
Operating Environment:

Temperature: 23 °C      Humidity: 55 % RH      Atmospheric Pressure: 1010 mbar

### 7.11.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.11.3 Test Setup Diagram



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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.



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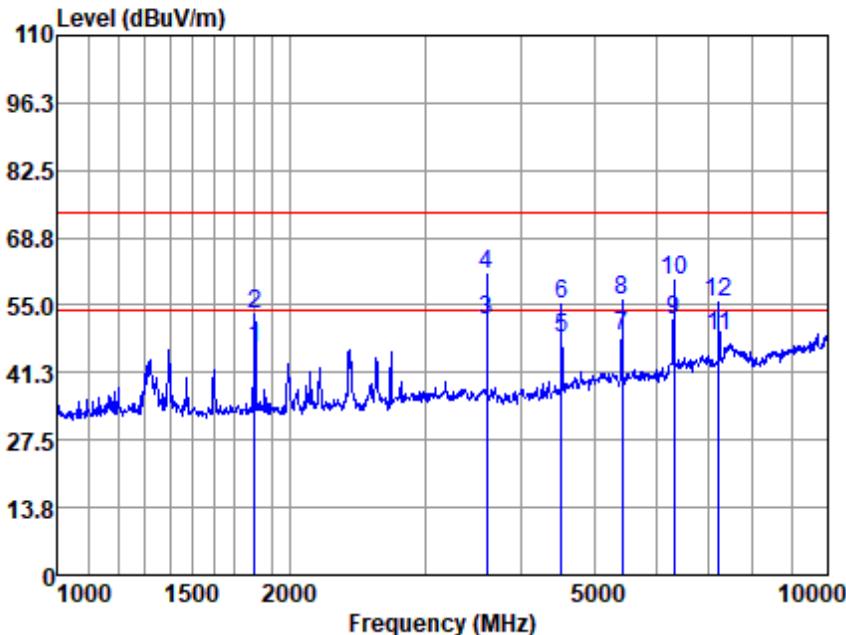
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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity : VERTICAL

EUT/Project : 2381AT

Test mode : 902.75

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1803.018	54.13	25.55	7.86	41.30	46.24	54.00	-7.76	Average
2	1803.018	61.13	25.55	7.86	41.30	53.24	74.00	-20.76	Peak
3	3614.099	53.88	28.88	11.77	42.40	52.13	54.00	-1.87	Average
4	3614.099	62.88	28.88	11.77	42.40	61.13	74.00	-12.87	Peak
5	4518.560	46.61	30.65	13.38	42.40	48.24	54.00	-5.76	Average
6	4518.560	53.61	30.65	13.38	42.40	55.24	74.00	-18.76	Peak
7	5420.009	45.05	31.85	14.47	42.48	48.89	54.00	-5.11	Average
8	5420.009	52.05	31.85	14.47	42.48	55.89	74.00	-18.11	Peak
9	6324.119	45.44	33.96	15.21	42.56	52.05	54.00	-1.95	Average
10	6324.119	53.44	33.96	15.21	42.56	60.05	74.00	-13.95	Peak
11	7227.698	39.12	36.40	15.76	42.75	48.53	54.00	-5.47	Average
12	7227.698	46.12	36.40	15.76	42.75	55.53	74.00	-18.47	Peak

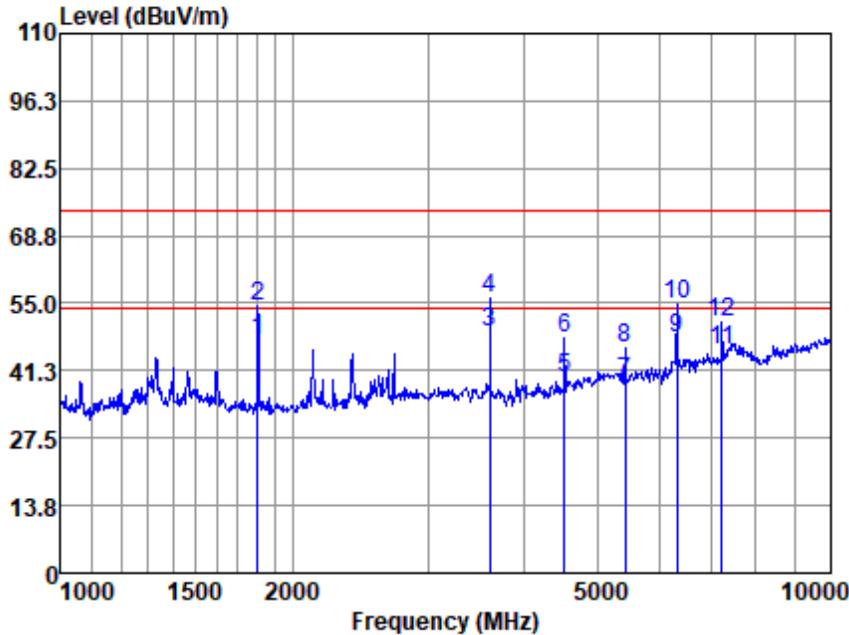
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor

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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :HORIZONTAL

EUT/Project : 2381AT

Test mode :902.75

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1803.018	55.36	25.55	7.86	41.30	47.47	54.00	-6.53	Average
2	1803.018	62.36	25.55	7.86	41.30	54.47	74.00	-19.53	Peak
3	3614.099	50.78	28.88	11.77	42.40	49.03	54.00	-4.97	Average
4	3614.099	57.78	28.88	11.77	42.40	56.03	74.00	-17.97	Peak
5	4518.560	38.11	30.65	13.38	42.40	39.74	54.00	-14.26	Average
6	4518.560	46.11	30.65	13.38	42.40	47.74	74.00	-26.26	Peak
7	5420.009	35.07	31.85	14.47	42.48	38.91	54.00	-15.09	Average
8	5420.009	42.07	31.85	14.47	42.48	45.91	74.00	-28.09	Peak
9	6324.119	41.24	33.96	15.21	42.56	47.85	54.00	-6.15	Average
10	6324.119	48.24	33.96	15.21	42.56	54.85	74.00	-19.15	Peak
11	7227.698	35.89	36.40	15.76	42.75	45.30	54.00	-8.70	Average
12	7227.698	41.89	36.40	15.76	42.75	51.30	74.00	-22.70	Peak

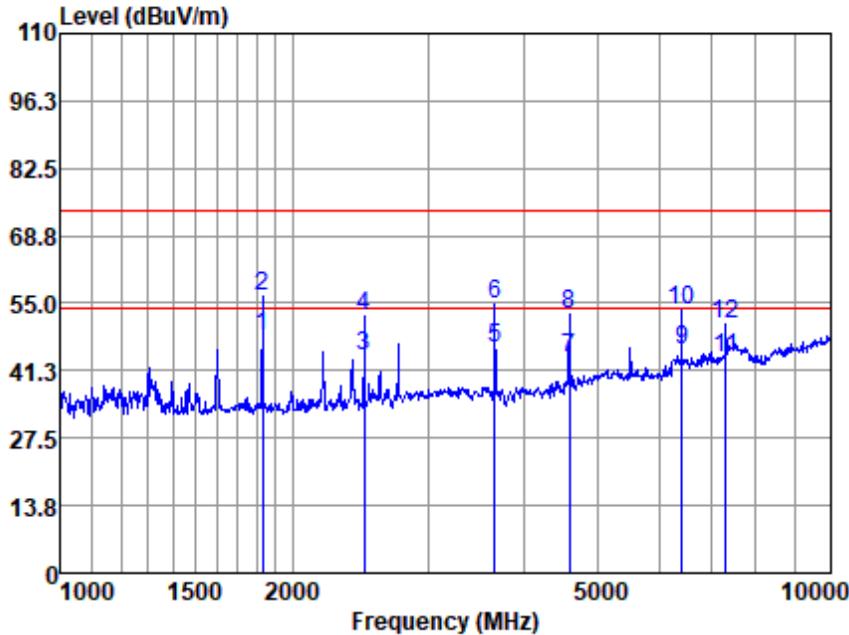
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Antenna Polarity :HORIZONTAL

EUT/Project : 2381AT

Test mode :915.25

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1828.100	56.06	25.58	7.88	41.30	48.22	54.00	-5.78	Average
2	1828.100	64.06	25.58	7.88	41.30	56.22	74.00	-17.78	Peak
3	2483.133	50.01	27.55	9.19	42.40	44.35	54.00	-9.65	Average
4	2483.133	58.01	27.55	9.19	42.40	52.35	74.00	-21.65	Peak
5	3664.376	47.25	28.97	11.91	42.40	45.73	54.00	-8.27	Average
6	3664.376	56.25	28.97	11.91	42.40	54.73	74.00	-19.27	Peak
7	4581.419	42.13	30.79	13.28	42.40	43.80	54.00	-10.20	Average
8	4581.419	51.13	30.79	13.28	42.40	52.80	74.00	-21.20	Peak
9	6412.096	38.57	34.28	15.24	42.58	45.51	54.00	-8.49	Average
10	6412.096	46.57	34.28	15.24	42.58	53.51	74.00	-20.49	Peak
11	7328.245	34.04	36.67	15.79	42.77	43.73	54.00	-10.27	Average
12	7328.245	41.04	36.67	15.79	42.77	50.73	74.00	-23.27	Peak

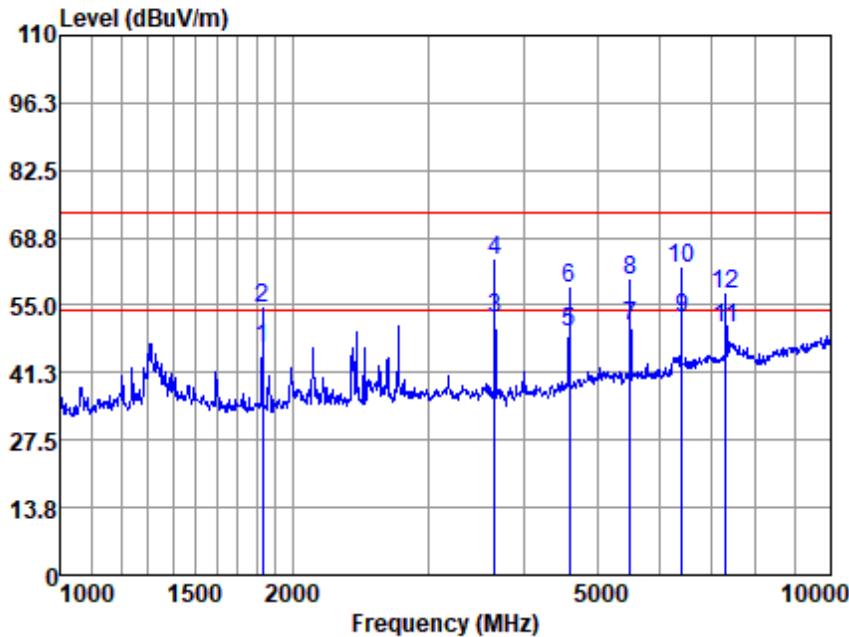
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:middle



Antenna Polarity : VERTICAL

EUT/Project : 2381AT

Test mode :915.25

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1828.100	54.11	25.58	7.88	41.30	46.27	54.00	-7.73	Average
2	1828.100	62.11	25.58	7.88	41.30	54.27	74.00	-19.73	Peak
3	3664.376	53.84	28.97	11.91	42.40	52.32	54.00	-1.68	Average
4	3664.376	65.84	28.97	11.91	42.40	64.32	74.00	-9.68	Peak
5	4581.419	47.86	30.79	13.28	42.40	49.53	54.00	-4.47	Average
6	4581.419	56.86	30.79	13.28	42.40	58.53	74.00	-15.47	Peak
7	5495.409	46.89	31.90	14.62	42.50	50.91	54.00	-3.09	Average
8	5495.409	55.89	31.90	14.62	42.50	59.91	74.00	-14.09	Peak
9	6412.096	45.56	34.28	15.24	42.58	52.50	54.00	-1.50	Average
10	6412.096	55.56	34.28	15.24	42.58	62.50	74.00	-11.50	Peak
11	7328.245	40.61	36.67	15.79	42.77	50.30	54.00	-3.70	Average
12	7328.245	47.61	36.67	15.79	42.77	57.30	74.00	-16.70	Peak

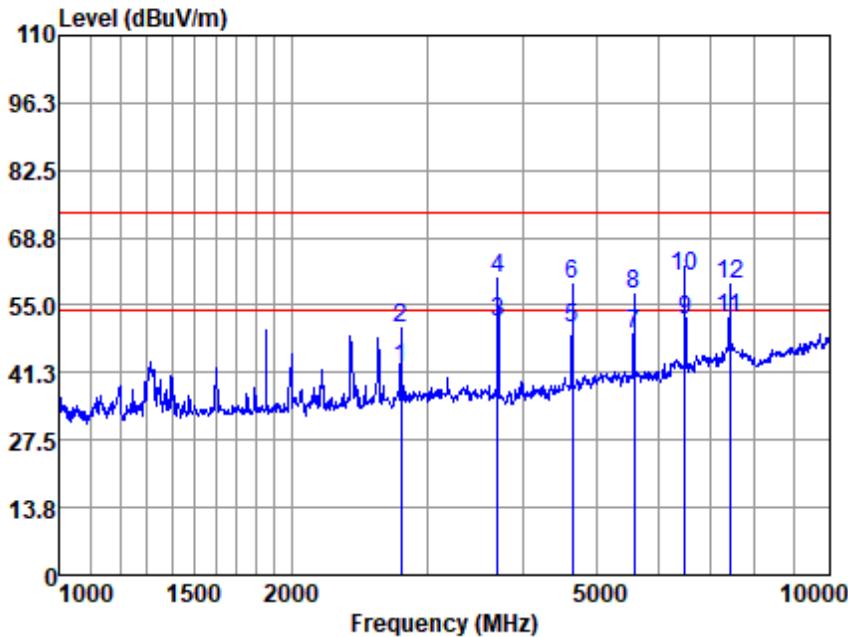
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity : VERTICAL

EUT/Project : 2381AT

Test mode :927.25

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Emission Factor	Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2779.713	46.31	28.19	10.29	42.40	42.39	54.00	-11.61	Average
2	2779.713	54.31	28.19	10.29	42.40	50.39	74.00	-23.61	Peak
3	3706.807	52.25	29.07	12.57	42.40	51.49	54.00	-2.51	Average
4	3706.807	61.25	29.07	12.57	42.40	60.49	74.00	-13.51	Peak
5	4634.469	48.46	30.90	13.28	42.40	50.24	54.00	-3.76	Average
6	4634.469	57.46	30.90	13.28	42.40	59.24	74.00	-14.76	Peak
7	5571.857	44.98	32.02	14.66	42.50	49.16	54.00	-4.84	Average
8	5571.857	52.98	32.02	14.66	42.50	57.16	74.00	-16.84	Peak
9	6501.297	44.74	34.60	15.28	42.60	52.02	54.00	-1.98	Average
10	6501.297	53.74	34.60	15.28	42.60	61.02	74.00	-12.98	Peak
11	7430.191	42.20	36.94	15.86	42.79	52.21	54.00	-1.79	Average
12	7430.191	49.20	36.94	15.86	42.79	59.21	74.00	-14.79	Peak

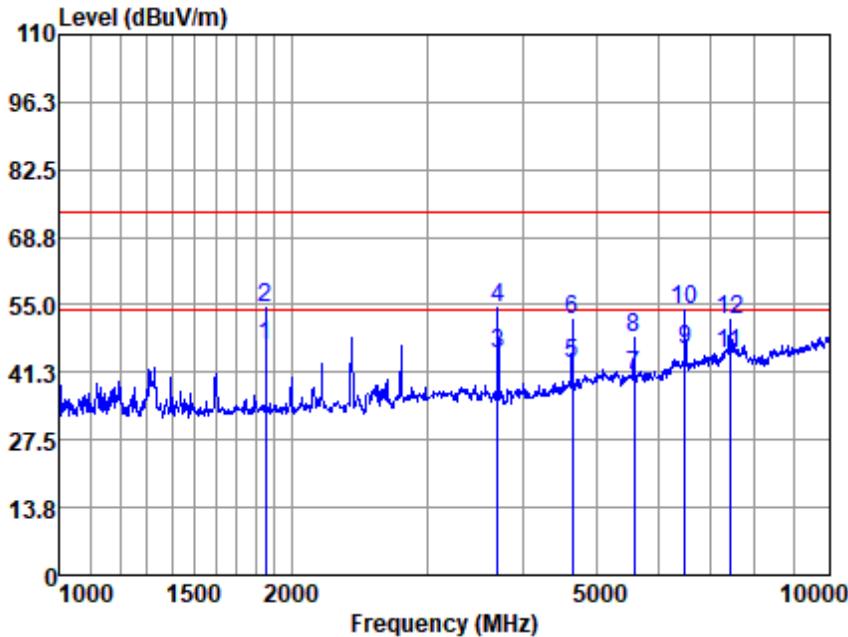
Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :HORIZONTAL

EUT/Project : 2381AT

Test mode :927.25

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1853.532	54.37	25.61	7.85	41.30	46.53	54.00	-7.47	Average
2	1853.532	62.37	25.61	7.85	41.30	54.53	74.00	-19.47	Peak
3	3706.807	45.97	29.07	12.57	42.40	45.21	54.00	-8.79	Average
4	3706.807	54.97	29.07	12.57	42.40	54.21	74.00	-19.79	Peak
5	4634.469	41.36	30.90	13.28	42.40	43.14	54.00	-10.86	Average
6	4634.469	50.36	30.90	13.28	42.40	52.14	74.00	-21.86	Peak
7	5571.857	36.24	32.02	14.66	42.50	40.42	54.00	-13.58	Average
8	5571.857	44.24	32.02	14.66	42.50	48.42	74.00	-25.58	Peak
9	6501.297	38.54	34.60	15.28	42.60	45.82	54.00	-8.18	Average
10	6501.297	46.54	34.60	15.28	42.60	53.82	74.00	-20.18	Peak
11	7430.191	35.02	36.94	15.86	42.79	45.03	54.00	-8.97	Average
12	7430.191	42.02	36.94	15.86	42.79	52.03	74.00	-21.97	Peak

Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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## 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SHCR2211002381HS

## 9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for SHCR2211002381HS

## 10 Appendix

### 10.1 Appendix A: 20dB Emission Bandwidth

#### 10.1.1 Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
Tx_Non Hop	Ant1	902.75	0.092	902.707	902.799	≤0.5	PASS
		915.25	0.091	915.205	915.296	≤0.5	PASS
		927.25	0.092	927.202	927.294	≤0.5	PASS



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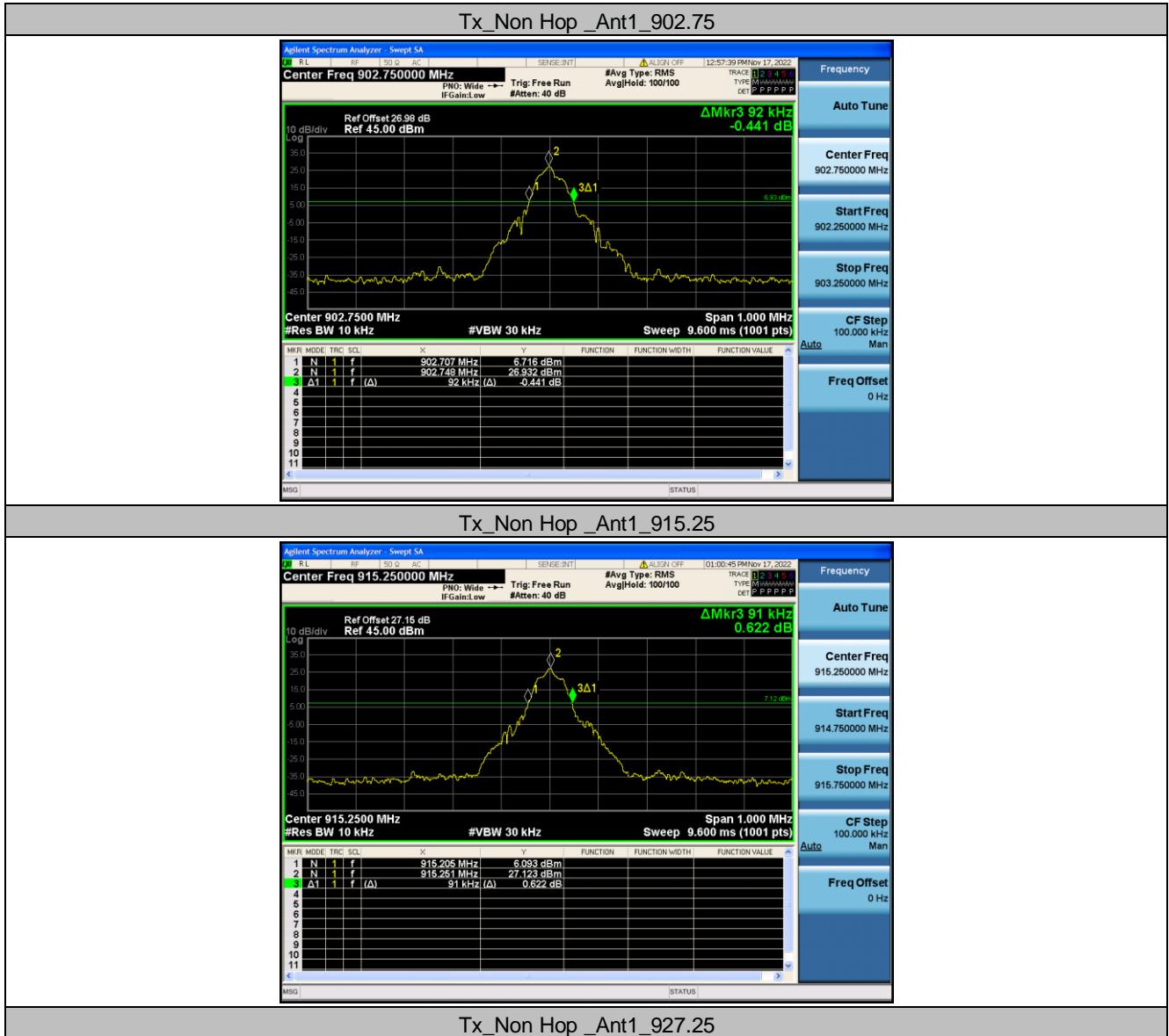
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## 10.1.2 Test Graphs



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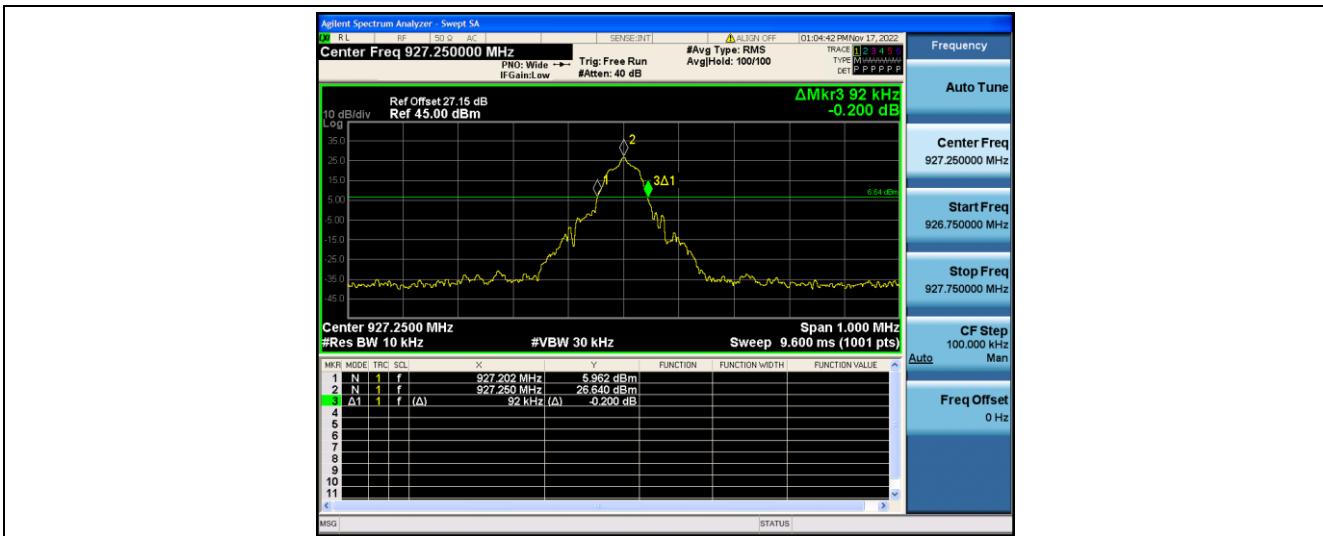
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**10.2 Appendix B: Occupied Channel Bandwidth****10.2.1 Test Result**

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
Tx_Non Hop	Ant1	902.75	0.081892	902.708	902.790	---	---
		915.25	0.081615	915.206	915.288	---	---
		927.25	0.082370	927.204	927.286	---	---

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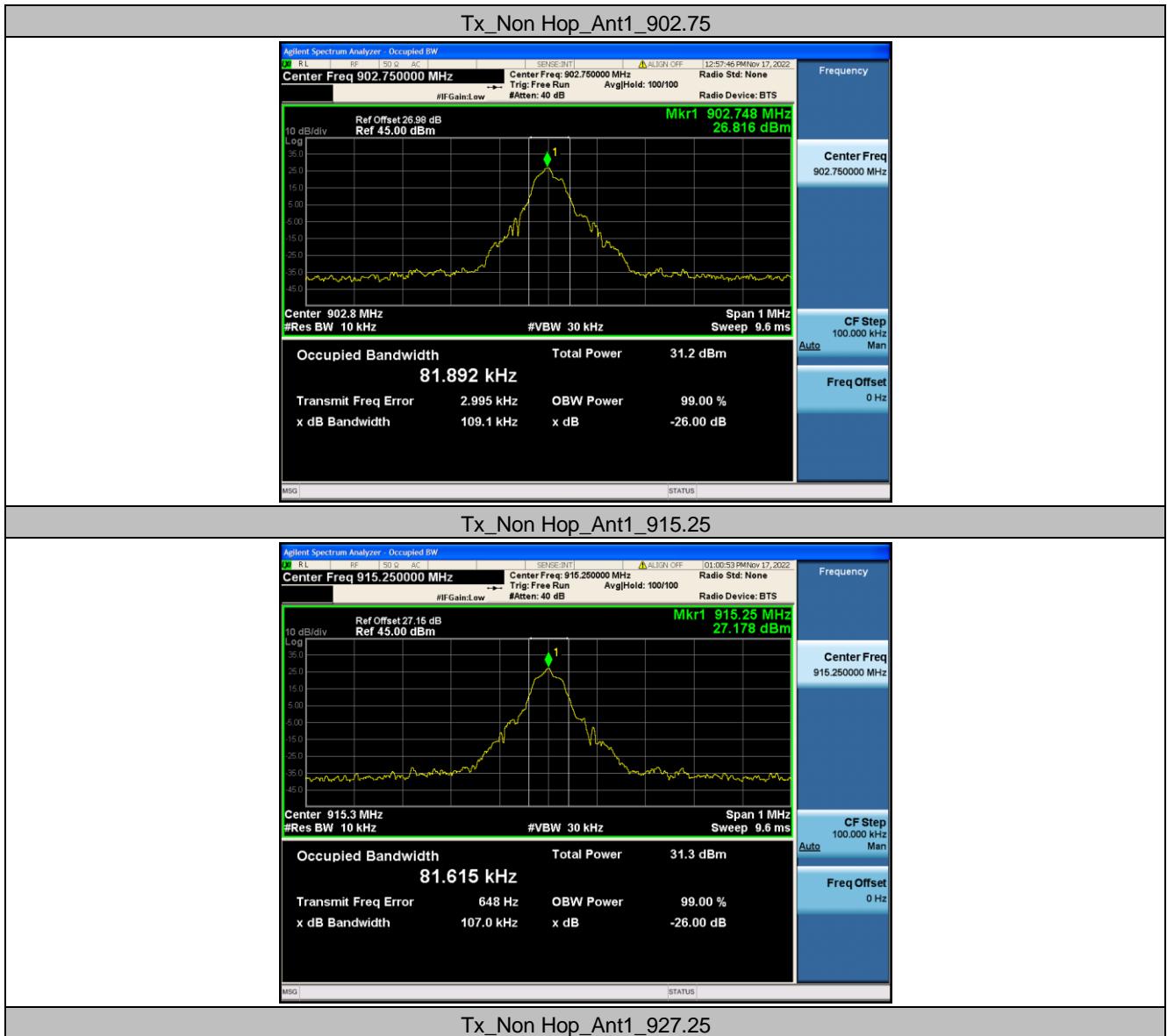
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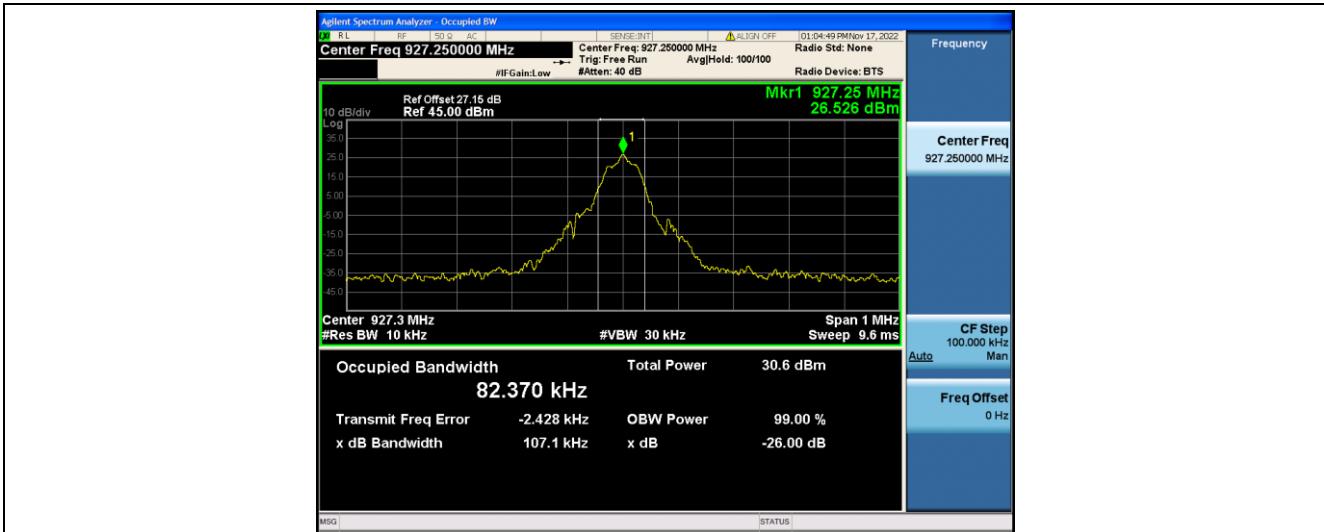
## 10.2.2 Test Graphs



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### 10.3 Appendix C: Maximum conducted output power

### 10.3.1 Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
Tx_Non Hop	Ant1	902.75	27.042	≤30	PASS
		915.25	27.370	≤30	PASS
		927.25	27.130	≤30	PASS

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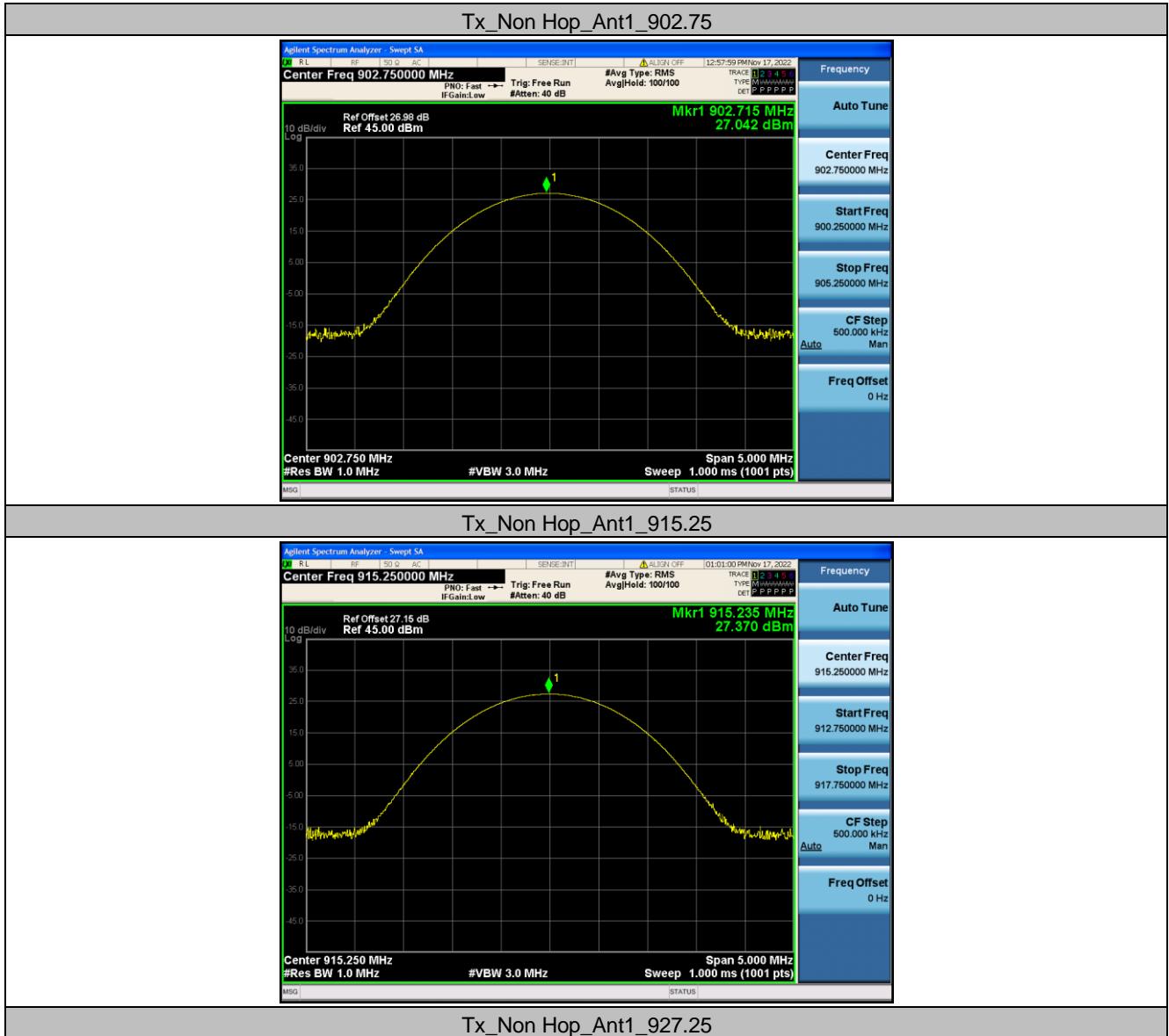
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## 10.3.2 Test Graphs



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**10.4 Appendix D: Carrier frequency separation****10.4.1 Test Result**

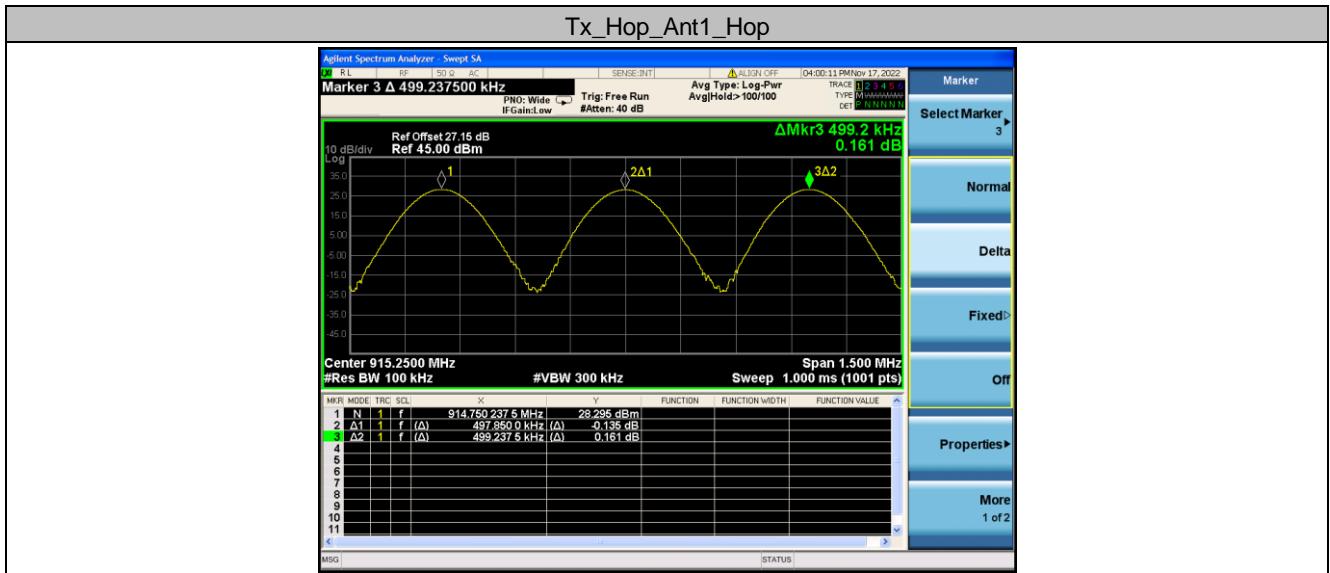
TestMode	Antenna	Channel	Result[KHz]	Limit[KHz]	Verdict
Tx_Hop	Ant1	Hop	497.850	≥92	PASS
	Ant1	Hop	499.238	≥92	PASS

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**10.5 Appendix E: Time of occupancy****10.5.1 Test Result**

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
Tx_Hop	Ant1	Hop	204	1	0.204	≤0.4	PASS

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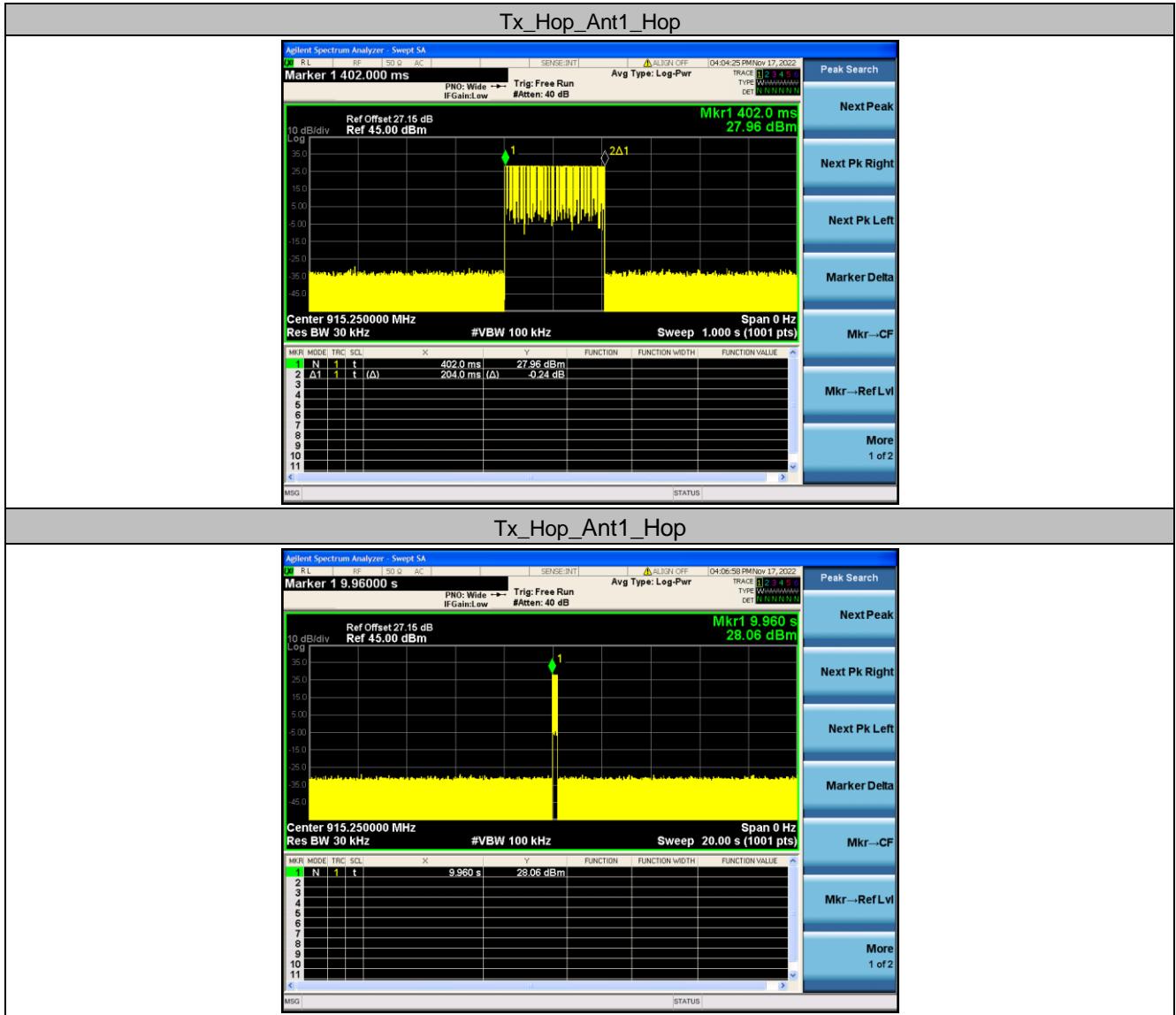


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**10.6 Appendix F: Number of hopping channels****10.6.1 Test Result**

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
Tx_Hop	Ant1	Hop	50	≥50	PASS

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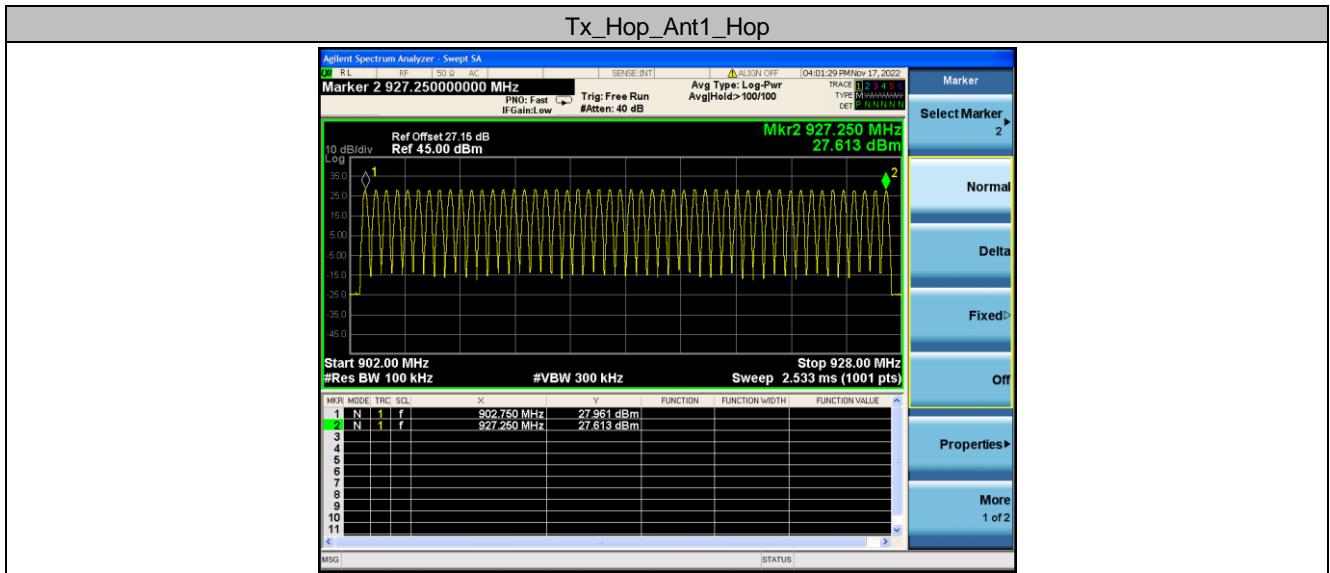


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## 10.7 Appendix G: Band edge measurements

### 10.7.1 Test Result

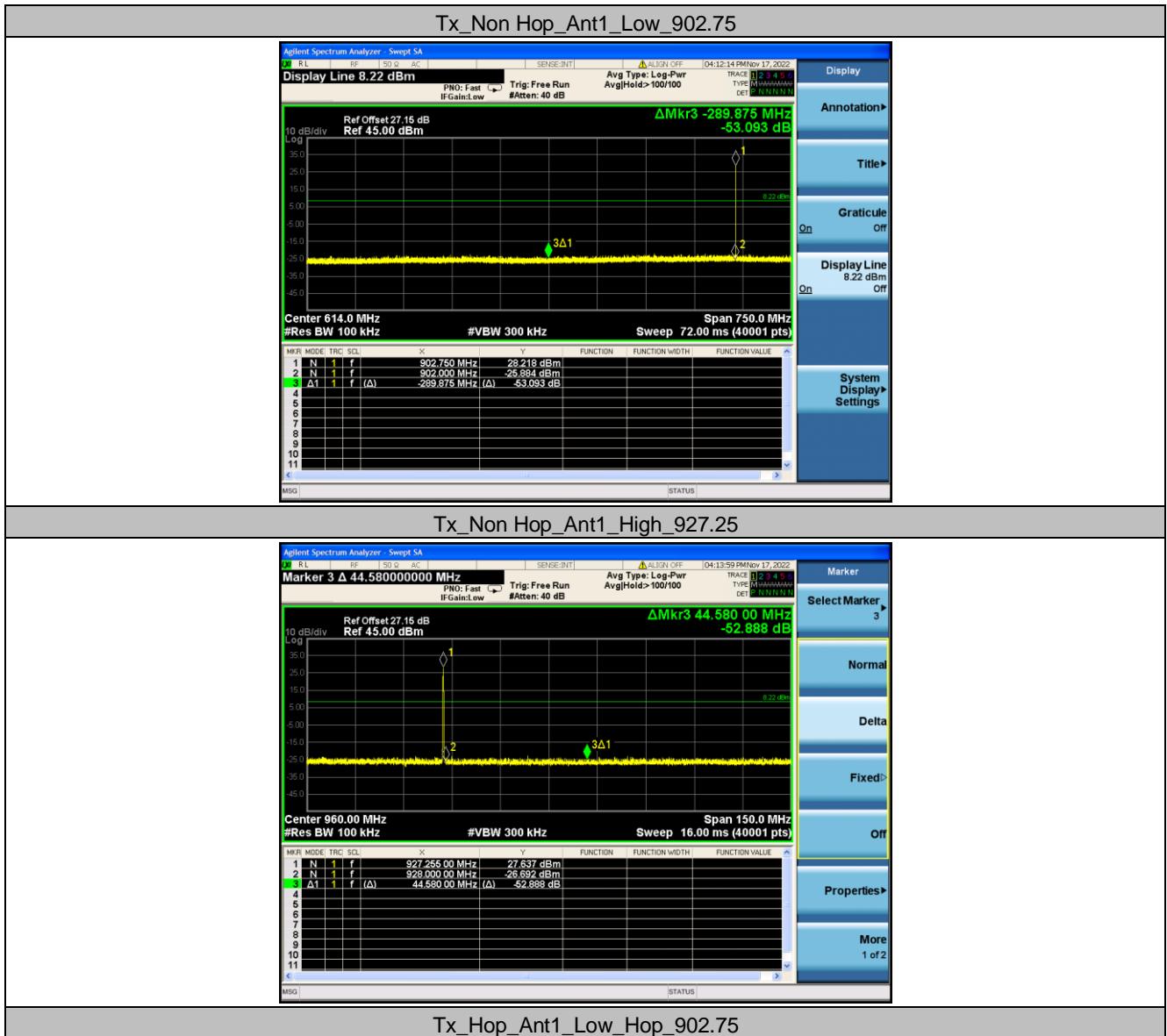
TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
Tx_Non Hop& Tx_Hop	Ant1	Low	902.75	28.218	-24.875	≤8.218	PASS
		High	927.25	27.637	-25.251	≤7.637	PASS
		Low	Hop_902.75	28.292	-23.255	≤8.292	PASS
		High	Hop_927.25	28.183	-23.916	≤8.183	PASS

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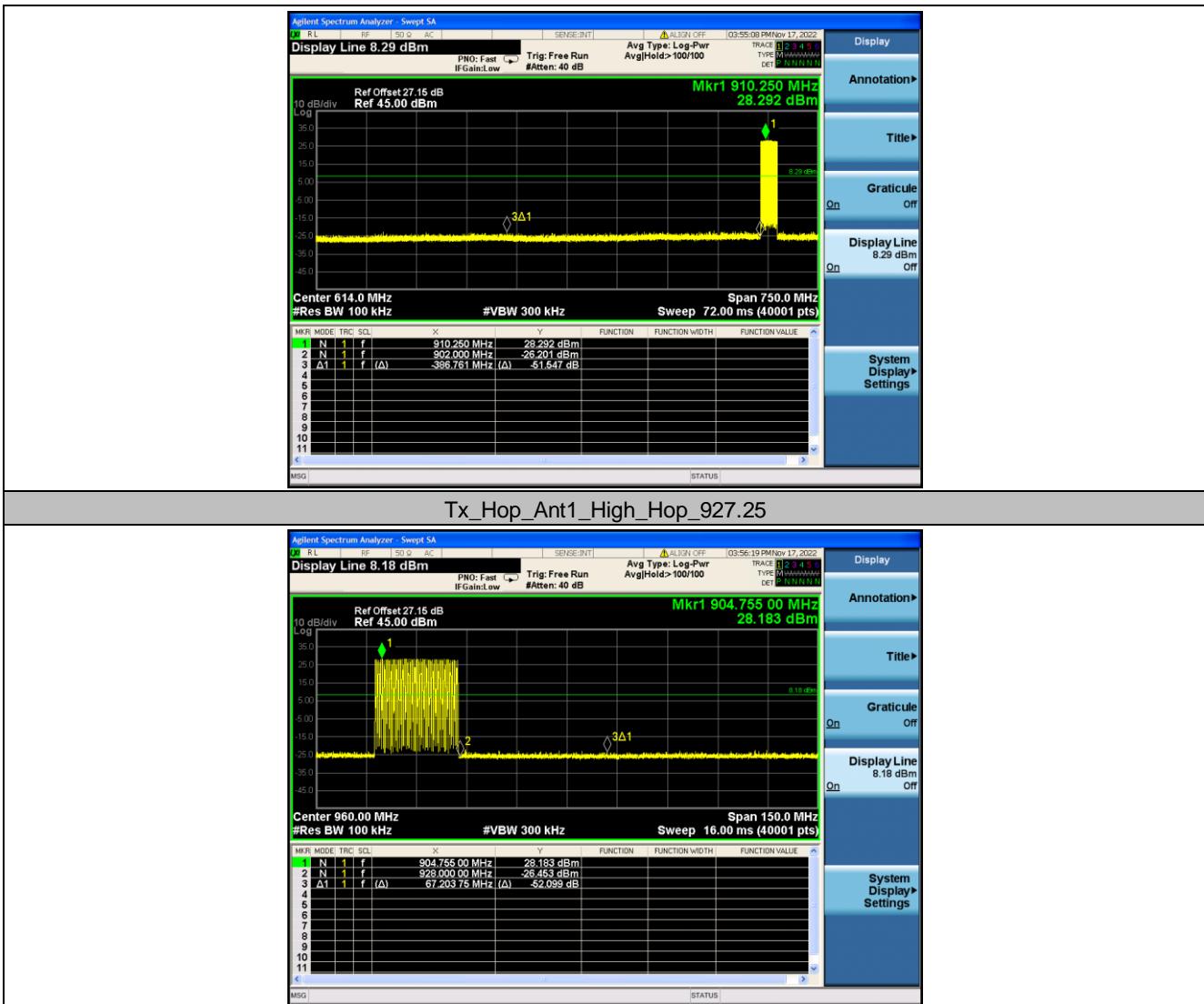
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## 10.8 Appendix H: Conducted Spurious Emission

### 10.8.1 Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
Tx_Non Hop	Ant1	902.75	Reference	27.178	27.178	---	PASS
			30~1000	27.178	-22.720	≤7.178	PASS
			1000~26500	27.178	-15.716	≤7.178	PASS
		915.25	Reference	27.235	27.235	---	PASS
			30~1000	27.235	-21.980	≤7.235	PASS
			1000~26500	27.235	-15.373	≤7.235	PASS
		927.25	Reference	26.775	26.775	---	PASS
			30~1000	26.775	-23.045	≤6.775	PASS
			1000~26500	26.775	-15.240	≤6.775	PASS

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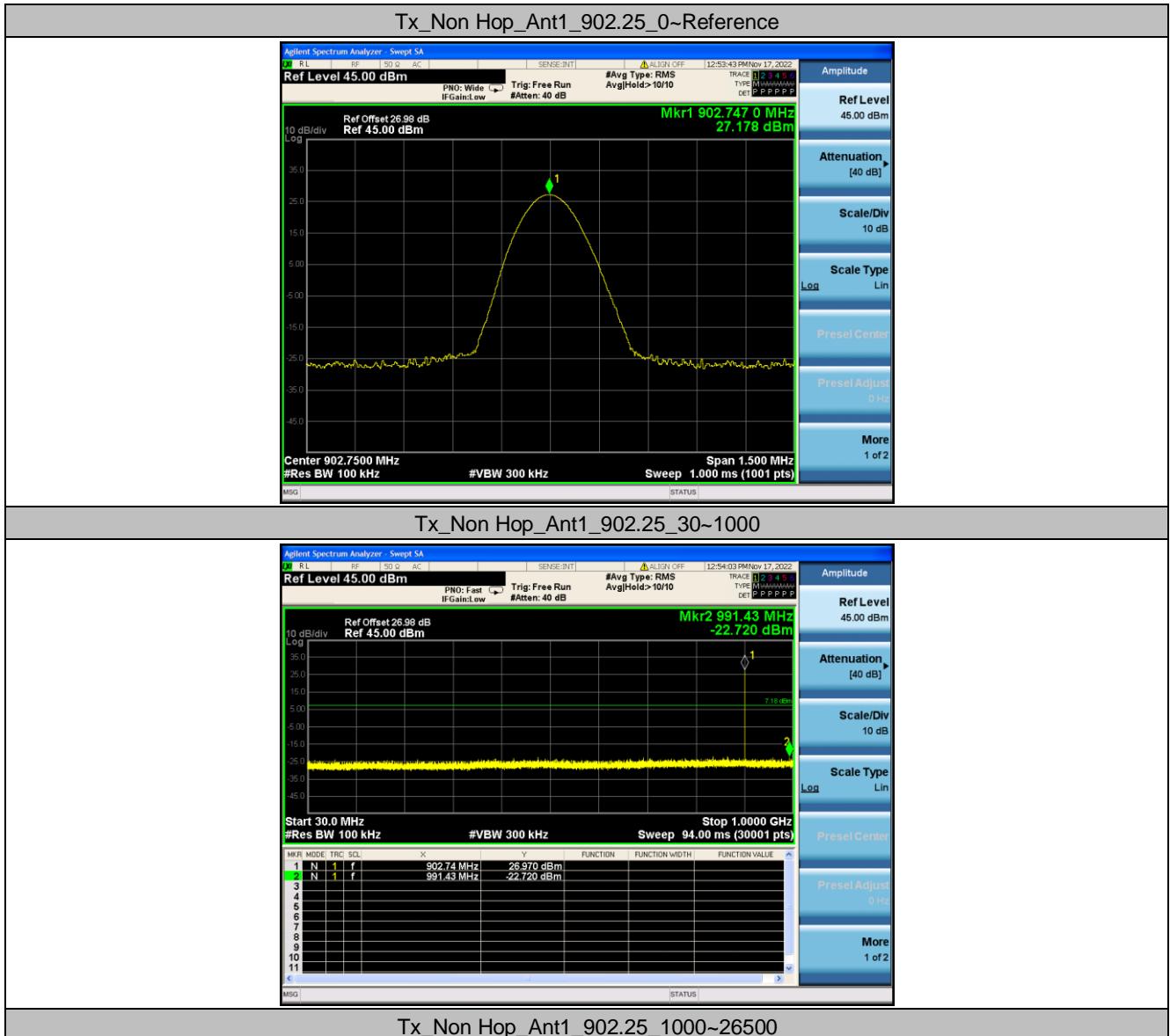
Sample(s) are retained for 50 days only.  
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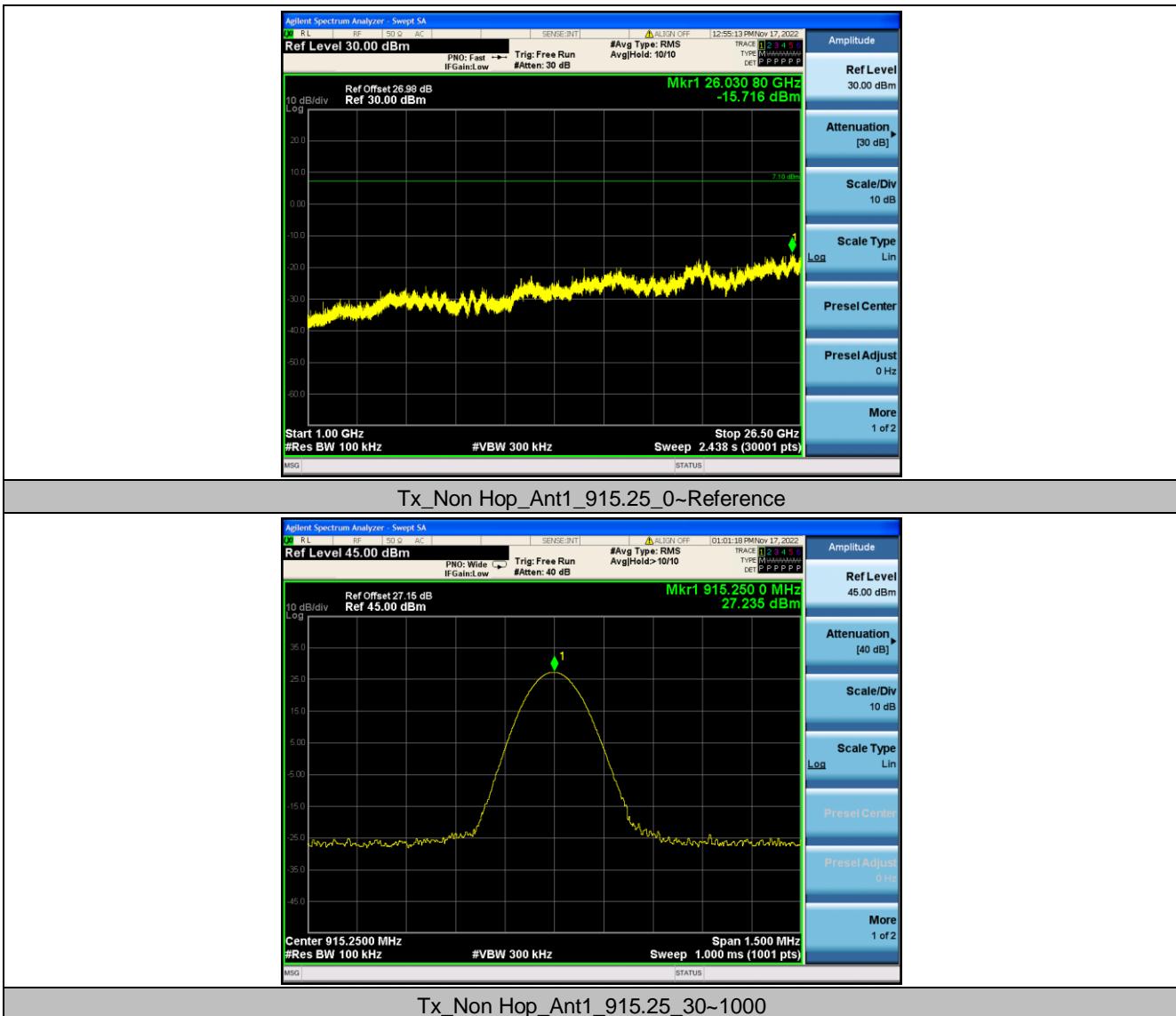
## 10.8.2 Test Graphs



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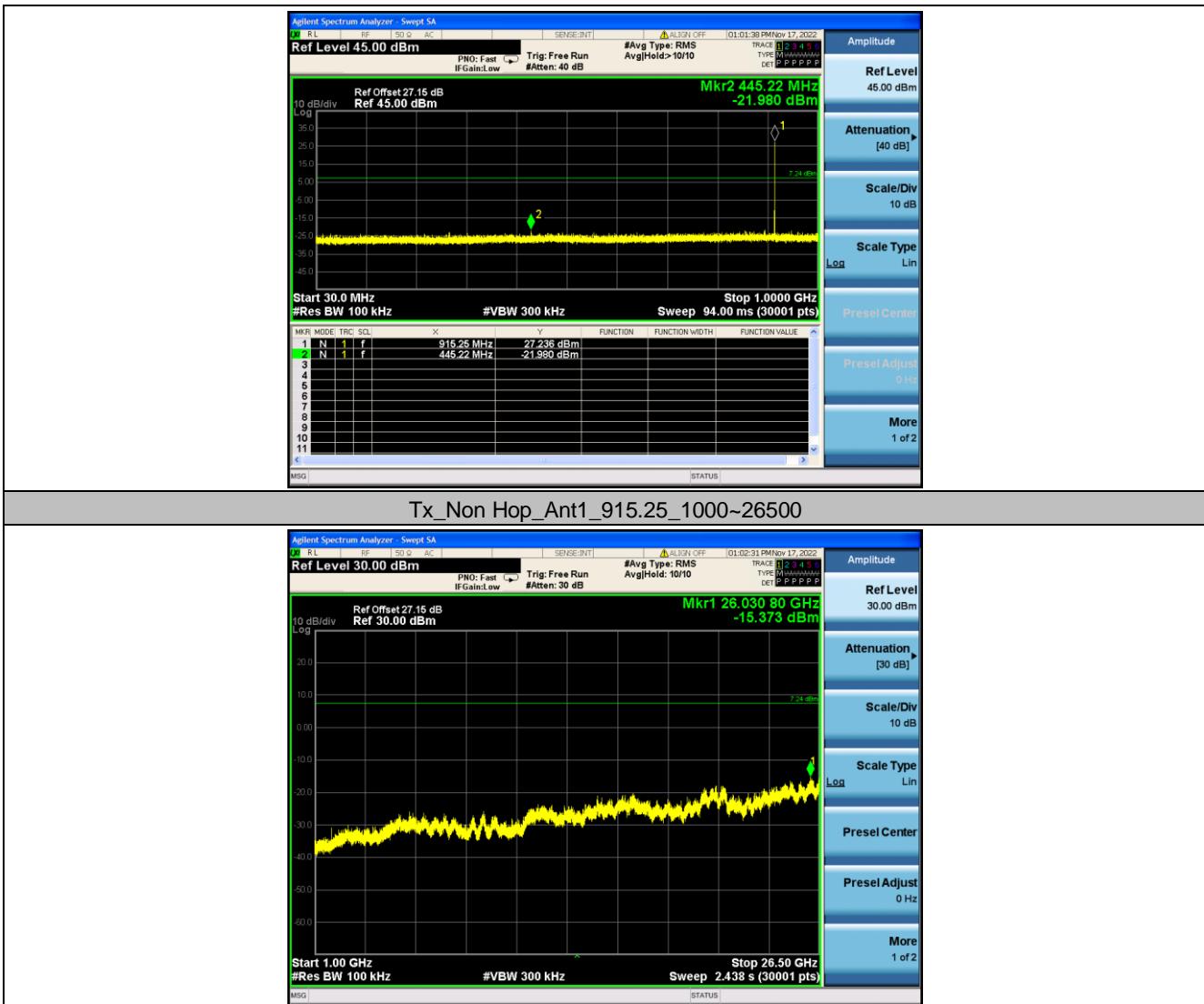
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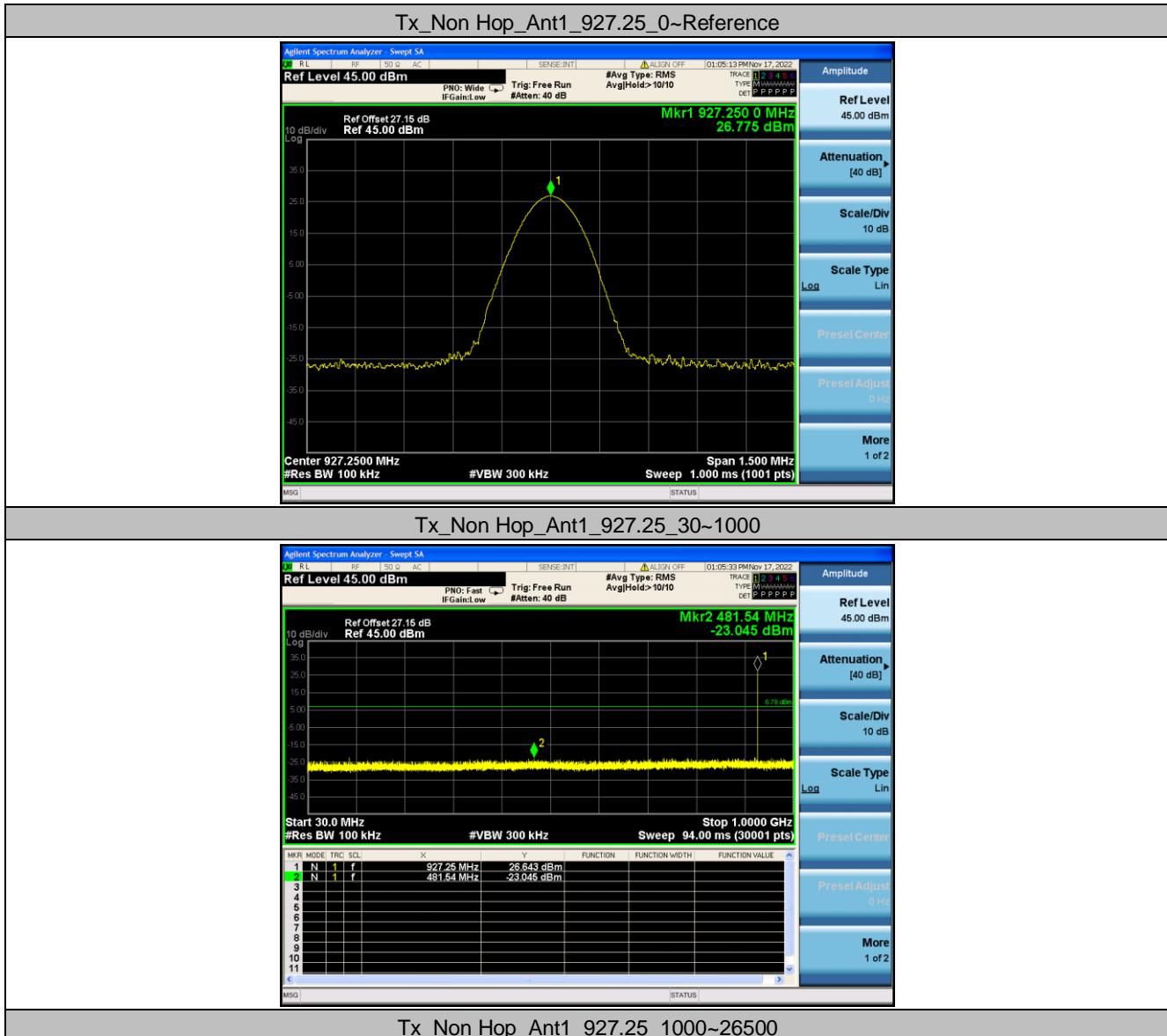
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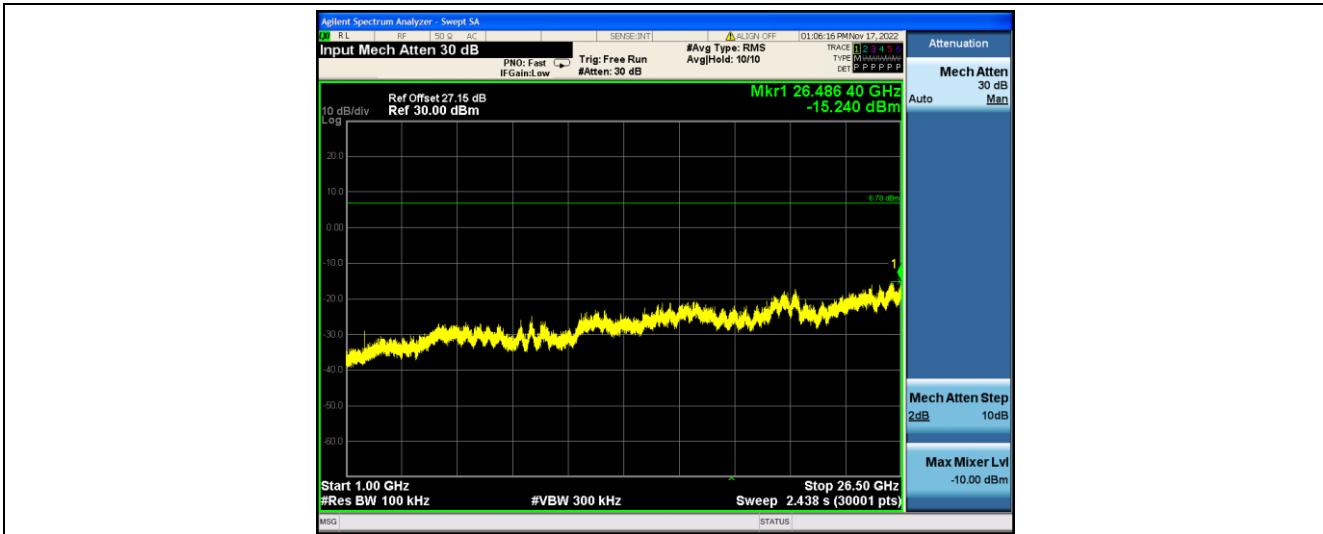


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-- End of the Report --

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