

Report No.: SZCR210402082002 Page: 1 of 50

## TEST REPORT

Application No.:	SZCR2104020820AT			
Applicant:	American Exchange Time LLC			
Address of Applicant:	No.1441 Broadway 27th Floor, New York, NY 10018, New York,United States			
Manufacturer:	American Exchange Time LLC			
Address of Manufacturer:	No.1441 Broadway 27th Floor, New York, NY 10018, New York,United States			
Factory:	American Exchange Time LLC			
Address of Factory:	No.1441 Broadway 27th Floor, New York, NY 10018, New York,United States			
Equipment Under Test (EUT	):			
EUT Name:	Smart Watch			
Model No.:	500114, 500185 🌲			
÷.	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.			
Trade Mark:	iTech Gladiator 2			
FCC ID:	2AS3PITEG21			
Standard(s) :	47 CFR Part 15, Subpart C 15.247			
Date of Receipt:	2021-04-29			
Date of Test:	2021-04-30 to 2021-05-07			
Date of Issue:	2021-05-10			
Test Result:	Pass*			

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

Keny. Ku

Keny Xu EMC Laboratory Manager



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Revision Record							
Version	Version Chapter Date Modifier Remark						
01		2021-05-10		Original			

Authorized for issue by:		
	1-farry Ulu	
	Harry Wu/Project Engineer	
	Eric Fu	
	Eric Fu/Reviewer	



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## 2 Test Summary

Radio Spectrum Technical Requirement					
Item Standard Method Requirement Re					
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 Peak Output Power		ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass		
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass		
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass		
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass		
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	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		

## **Declaration of EUT Family Grouping:**

Model No.: 500114, 500185

Only the model 500114 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on model name and appearance.



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## 4 General Information

## 4.1 Details of E.U.T.

Power supply:	DC 3.7V Rechargeable Battery
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Integral Antenna
Antenna Gain:	0dBi

## 4.2 Description of Support Units

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

## 4.3 Measurement Uncertainty

Measurement Uncertainty
± 0.75dB
± 3%
± 2.84dB
± 0.75dB
± 0.75dB
± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)
± 4.5dB
± 4.8dB
-

Remark:

The  $U_{\text{lab}}$  (lab Uncertainty) is less than  $U_{\text{cispr}}$  (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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## 4.4 Test Location

All tests were performed at: SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China, 518057. Fax: +86 755 2671 0594 Tel: +86 755 2601 2053 No tests were sub-contracted.

## 4.5 Test Facility

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

## A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

### VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

### FCC –Designation Number: CN1178

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

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

### Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

## 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None



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#### **Equipment List** 5

Conducted Peak Output Power						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12	
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2021-04-08	2022-04-07	
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-01	2020-07-10	2021-07-09	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2021-04-08	2022-04-07	

Minimum 6dB Bandwidth						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12	
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2021-04-08	2022-04-07	
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-01	2020-07-10	2021-07-09	
Attenuator	Attenuator Huber+Suhner		SEM021-09	2021-04-08	2022-04-07	

Power Spectrum Density						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12	
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2021-04-08	2022-04-07	
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A	
Coaxial Cable	Coaxial Cable SGS		SEM031-01	2020-07-10	2021-07-09	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2021-04-08	2022-04-07	

Conducted Band Edges Measurement						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12	
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2021-04-08	2022-04-07	
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A	



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Coaxial Cable	SGS	N/A	SEM031-01	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2021-04-08	2022-04-07

Conducted Spurious Emissions						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12	
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2021-04-08	2022-04-07	
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A	
Coaxial Cable	axial Cable SGS		SEM031-01	2020-07-10	2021-07-09	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2021-04-08	2022-04-07	

Radiated Emissions which fall in the restricted bands						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25	
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31	
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09	
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2020-11-14	2023-11-13	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2021-03-24	2022-03-23	

Radiated Spurious Emissions Below 1GHz						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18	
MXE EMI Receiver	EMI Receiver Agilent Technologies		SEM004-15	2020-11-02	2021-11-01	
BiConiLog Antenna	og Antenna ETS-LINDGREN		SEM003-02	2019-05-24	2022-05-23	
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2021-03-24	2022-03-23	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	Coaxial Cable SGS		SEM025-01	2020-07-10	2021-07-09	



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Radiated Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Manufacturer Model No Inventory N		Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Signal Analyzer Agilent Technologie		N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	Coaxial Cable SGS		SEM026-01	2020-07-10	2021-07-09

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



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## 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 integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.

Antenna location: Refer to internal photo.



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## 7 Radio Spectrum Matter Test Results

## 7.1 Conducted Peak Output Power

Test Requirement47 CFR Part 15, Subpart C 15.247(b)(3)Test Method:ANSI C63.10 (2013) Section 11.9.1

Limit:	
Frequency range(MHz)	Output power of the intentional radiator(watt)
	1 for ≥50 hopping channels
902-928	0.25 for 25≤ hopping channels <50
	1 for digital modulation
	1 for ≥75 non-overlapping hopping channels
2400-2483.5	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

## 7.1.1 E.U.T. Operation

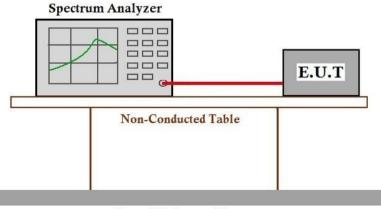
Operating Environment:

Temperature:	25.9 °C	Lumidity	35.8 % RH	Atmospheric Pressure:	1010	mhor
remperature.	23.3 C	riumuny.	55.0 /0 KH	Autospheric i lessure.	1010	mbai

## 7.1.2 Test Mode Description

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

### 7.1.3 Test Setup Diagram



#### **Ground Reference Plane**

## 7.1.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.2 Minimum 6dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.247a(2)
Test Method:	ANSI C63.10 (2013) Section 11.8.1

Limit:

≥500 kHz

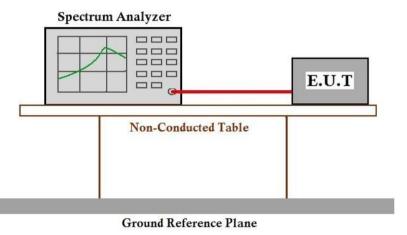
## 7.2.1 E.U.T. Operation

Operating Enviror						
Temperature:	25.9 °C	Humidity:	35.8 % RH	Atmospheric Pressure:	1010	mbar

## 7.2.2 Test Mode Description

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

## 7.2.3 Test Setup Diagram



## 7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.3 Power Spectrum Density

Test Requirement	47 CFR Part 15, Subpart C 15.247(e)
Test Method:	ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

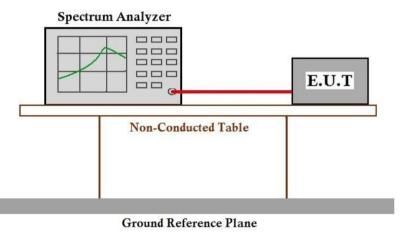
### 7.3.1 E.U.T. Operation

Operating Enviror	nment:					
Temperature:	25.9 °C	Humidity:	35.8 % RH	Atmospheric Pressure:	1010	mbar

### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX 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 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2

Limit:

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

### 7.4.1 E.U.T. Operation

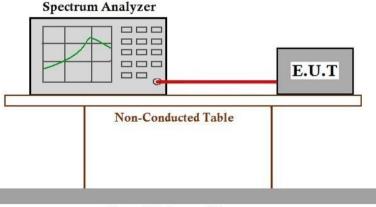
**Operating Environment:** 

Temperature:	25.9 °C	Humidity:	35.8 % RH	Atmospheric Pressure: 10	010 mbar

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

## 7 4 2 Test Mede Deserintian

### 7.4.3 Test Setup Diagram



Ground Reference Plane

## 7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details





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## 7.5 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11

Limit:

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

### 7.5.1 E.U.T. Operation

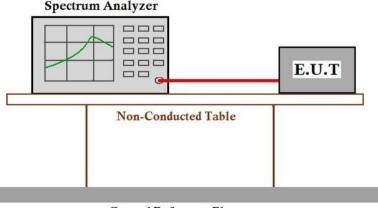
**Operating Environment:** 

Temperature:	25.9 °C	Humidity:	35.8 % RH	Atmospheric Pressure:	1010	mbar

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

## 7.5.2 Test Mode Description

### 7.5.3 Test Setup Diagram



**Ground Reference Plane** 

## 7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details





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## 7.6 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.

## 7.6.1 E.U.T. Operation

Operating Environment: Temperature: 21.2 °C

Humidity: 54.8 % RH

Atmospheric Pressure: 1010 mbar

### 7.6.2 Test Mode Description

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



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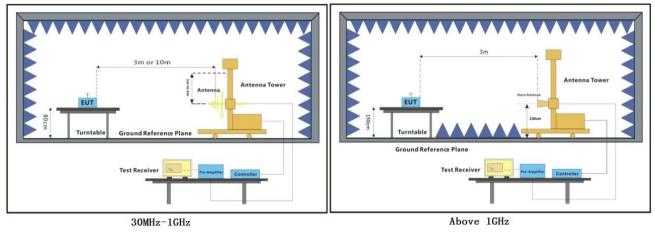
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## 7.6.3 Test Setup Diagram



### 7.6.4 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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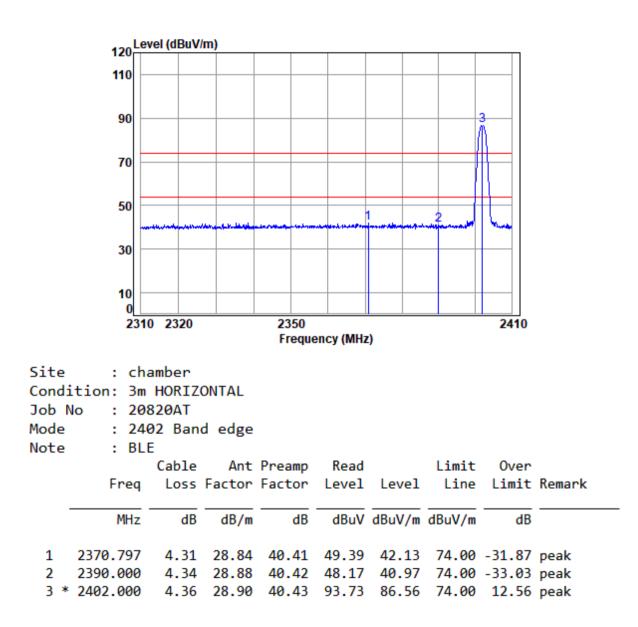
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low





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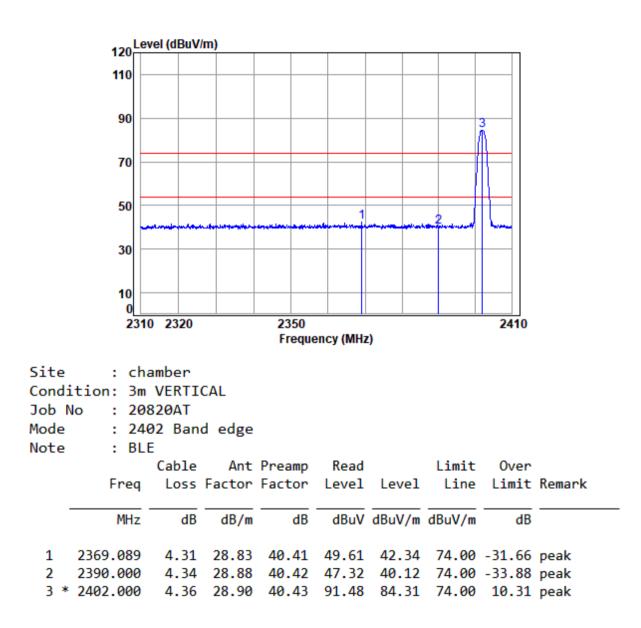
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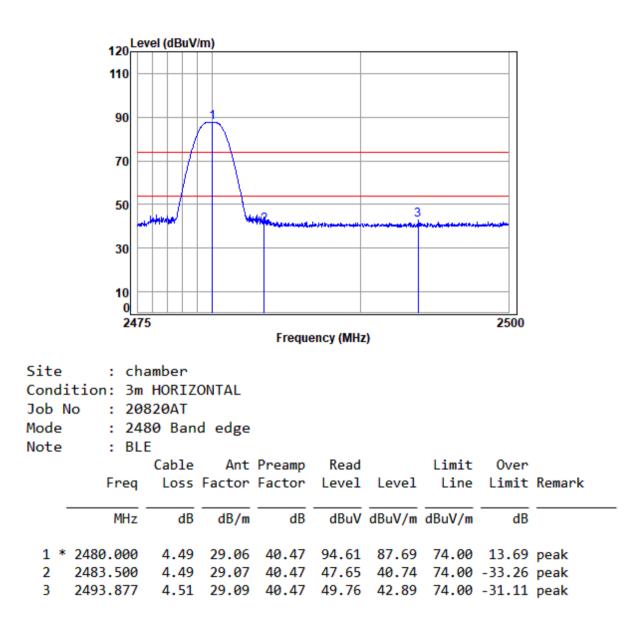
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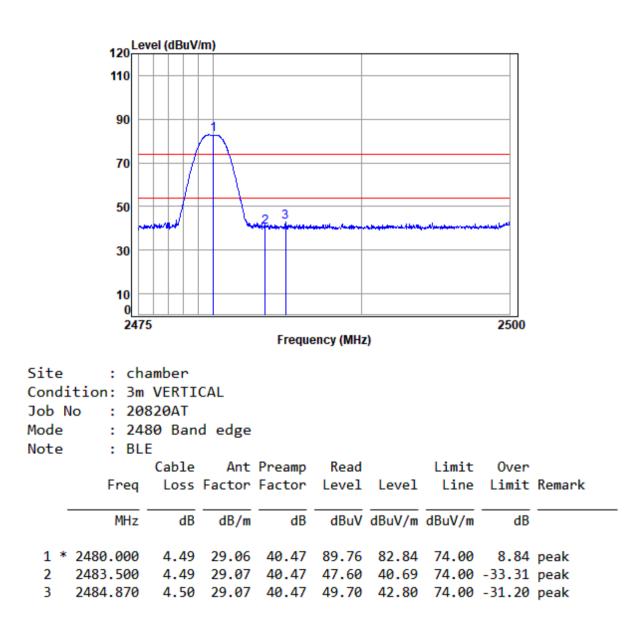
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High





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## 7.7 Radiated Spurious Emissions Below 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5
Measurement Distance:	3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

### 7.7.1 E.U.T. Operation

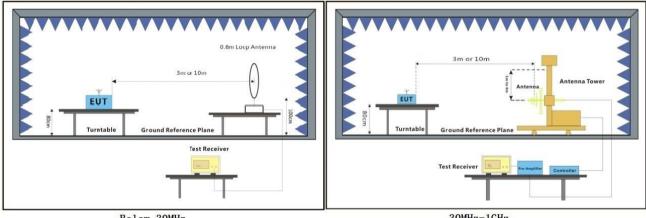
Operating Environ	iment:			
Temperature:	24.6 °C	Humidity:	63.0 % RH	Atmospheric Pre

ressure: 1010 mbar

## 7.7.2 Test Mode Description

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

## 7.7.3 Test Setup Diagram



Below 30MHz

30MHz-1GHz



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### 7.7.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 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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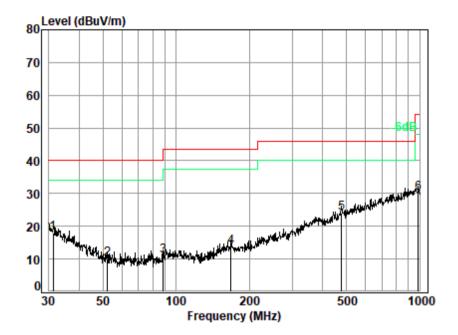
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site :	chamber
Condition:	3m HORIZONTAL
Job No. :	20820AT
Test Mode:	01

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	31.29	0.61	22.02	27.73	23.05	17.95	40.00	-22.05	QP
2	52.21	0.72	13.50	27.68	23.64	10.18	40.00	-29.82	QP
3	88.65	1.29	12.97	27.62	24.28	10.92	43.50	-32.58	QP
4	167.82	1.17	15.56	27.26	24.25	13.72	43.50	-29.78	QP
5	478.85	2.46	24.22	27.72	25.07	24.03	46.00	-21.97	QP
6	986.07	3.59	29.59	26.73	23.73	30.18	54.00	-23.82	QP
									-



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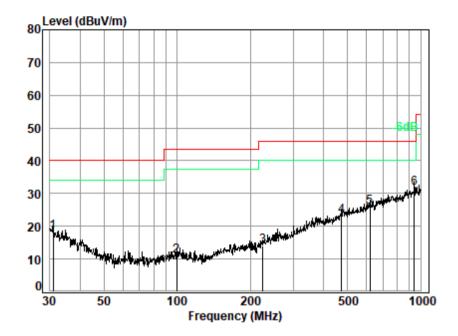
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site :	chamber
Condition:	3m VERTICAL
Job No. :	20820AT
Test Mode:	01

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.96	0.61	22.27	27.73	23.05	18.20	40.00	-21.80	QP
2	99.53	1.11	13.95	27.61	23.64	11.09	43.50	-32.41	QP
3	225.31	1.44	17.07	27.06	22.47	13.92	46.00	-32.08	QP
4	473.83	2.45	23.87	27.70	24.59	23.21	46.00	-22.79	QP
5	618.54								
6	942.13								-
									-



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## 7.8 Radiated Spurious Emissions Above 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.6
Measurement Distance:	3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)	
Above 1000	500	3	

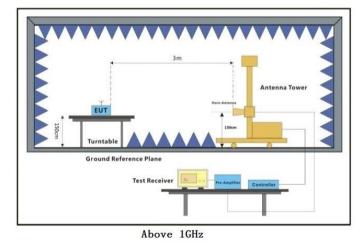
## 7.8.1 E.U.T. Operation

Operating Enviro	nment:					
Temperature:	21.2 °C	Humidity:	54.7 % RH	Atmospheric Pressure:	1010	mbar

### 7.8.2 Test Mode Description

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

## 7.8.3 Test Setup Diagram







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#### 7.8.4 Measurement Procedure and Data

a. For 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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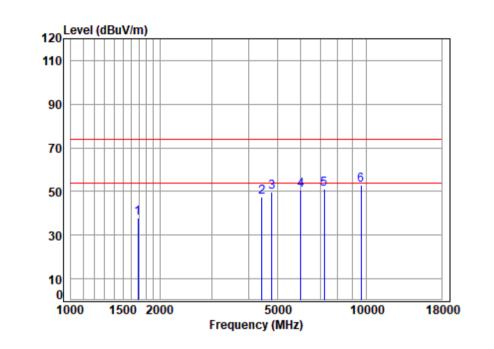
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site :	cha	amber
Condition:	Зm	HORIZONTAL
Job No :	208	320AT
Mode :	246	02 TX SE
Note :	BLE	E
		Cable Ant Preamp
F	roa	Loss Factor Factor

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1687.347	3.42	26.64	40.05	47.90	37.91	74.00	-36.09	peak
2	4430.628	6.70	32.95	41.81	49.55	47.39	74.00	-26.61	peak
3	4804.000	7.10	33.62	42.14	51.11	49.69	74.00	-24.31	peak
4	6001.626	8.26	34.60	42.40	50.21	50.67	74.00	-23.33	peak
5	7206.000	8.74	35.67	41.50	48.15	51.06	74.00	-22.94	peak
6	9608.000	10.81	37.34	37.76	42.36	52.75	74.00	-21.25	peak
									-



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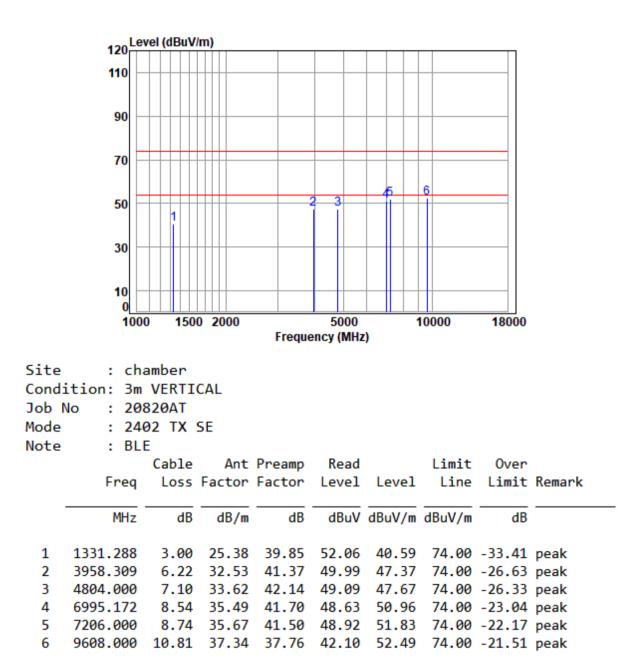
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low





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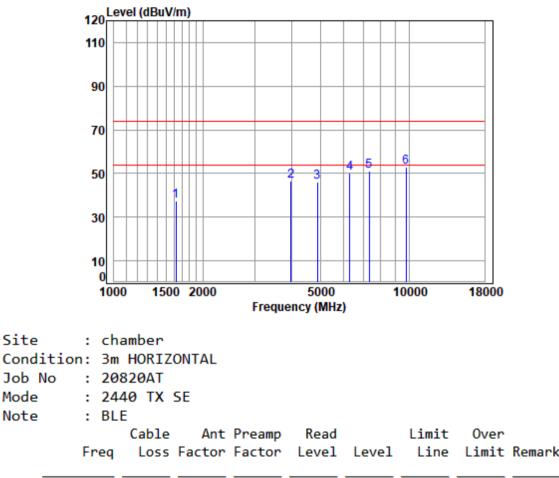
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle



	Freq	LOSS	Factor	Factor	rever	Level	Line	LIMIC	кетагк
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1620.431	3.36	26.32	40.02	47.70	37.36	74.00	-36.64	peak
2	3981.257	6.25	32.57	41.39	49.01	46.44	74.00	-27.56	peak
3	4880.000	7.18	33.77	42.20	47.44	46.19	74.00	-27.81	peak
4	6303.890	8.27	34.60	42.18	49.56	50.25	74.00	-23.75	peak
5	7320.000	8.84	35.76	41.40	47.77	50.97	74.00	-23.03	peak
6	9760.000	10.76	37.41	37.50	42.25	52.92	74.00	-21.08	peak



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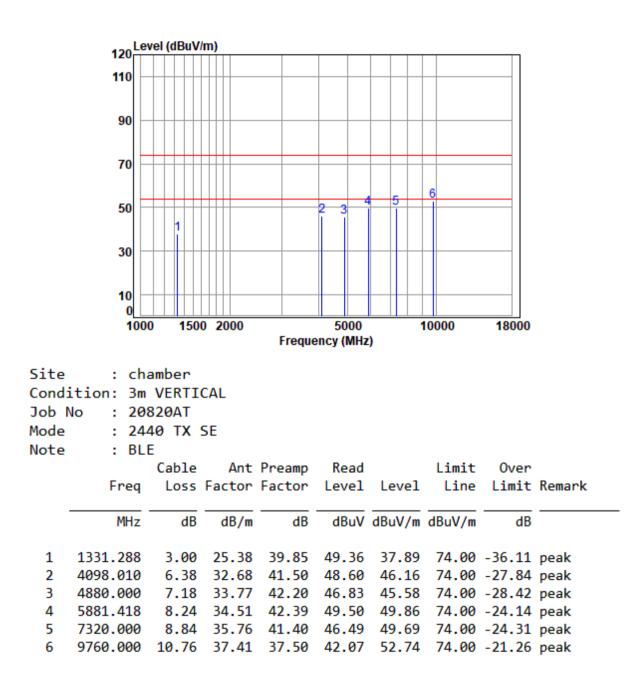
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle





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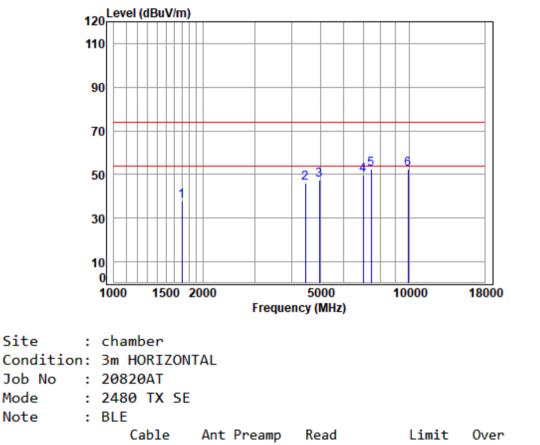
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



				i i comp	11000			0.00	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1697.129	3.43	26.69	40.06	47.94	38.00	74.00	-36.00	peak
2	4456.315	6.72	32.97	41.84	48.22	46.07	74.00	-27.93	peak
3	4960.000	7.26	33.92	42.27	48.42	47.33	74.00	-26.67	peak
4	6974.982	8.53	35.46	41.72	47.41	49.68	74.00	-24.32	peak
5	7440.000	8.96	35.85	41.29	49.05	52.57	74.00	-21.43	peak
6	9920.000	10.71	37.47	37.23	41.63	52.58	74.00	-21.42	peak



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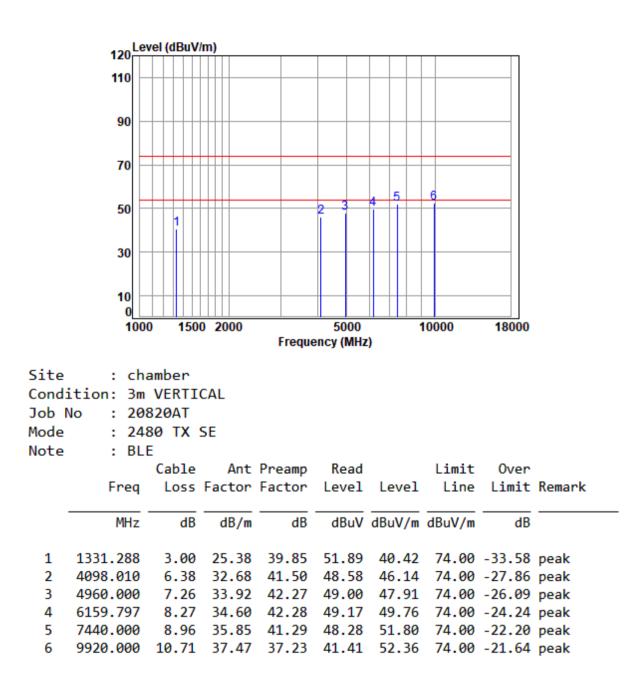
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High





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## 8 Test Setup Photo

Refer to test setup Photos for SZCR2104020820AT

## 9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2104020820AT



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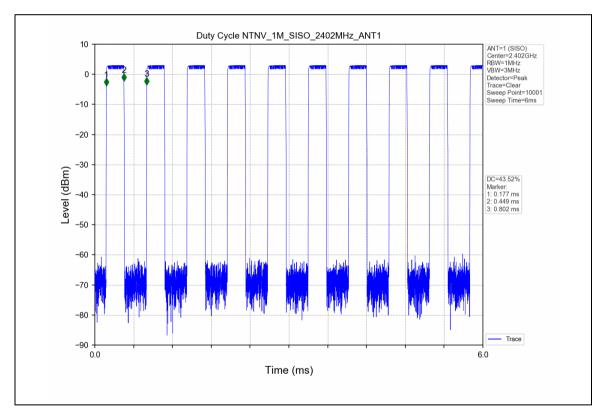
## 10 Appendix

## 1. Duty Cycle

## 1.1 Test Result

Test Mode	Channel Frequency( MHz)	ТХ Туре	ANT No.	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
	2402	SISO	1	0.272	0.625	43.52	3.61
1M	2440	SISO	1	0.273	0.625	43.68	3.60
	2480	SISO	1	0.273	0.625	43.68	3.60

## 1.2 Test Graph

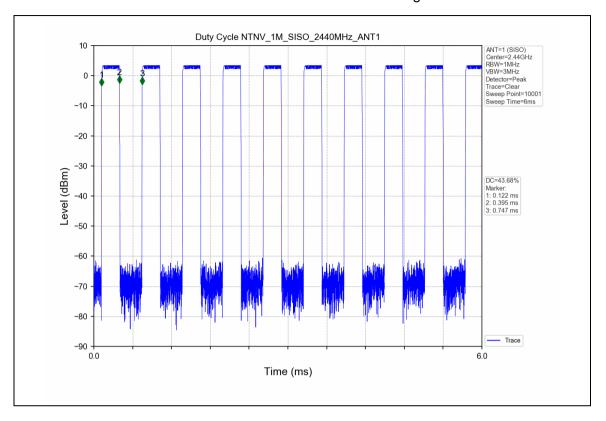


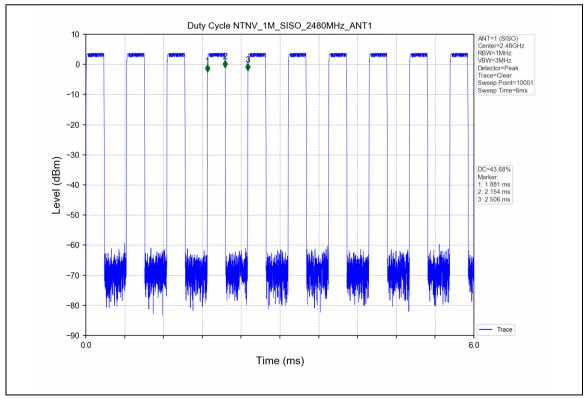




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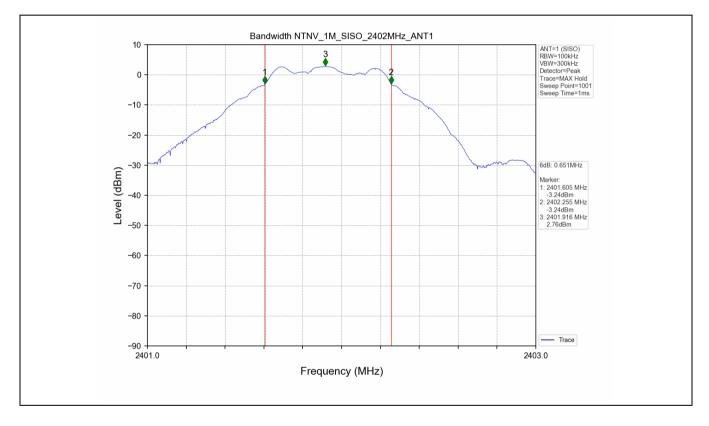
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#### 2. Bandwidth

#### 2.1 Test Result

Test Mode	Frequency (MHz)	ТХ Туре	ANT No.	6dB Bai	Verdict	
				Test Result (MHz)	Limits (MHz)	verdict
1M	2402	SISO	1	0.651	≥0.5	PASS
	2440	SISO	1	0.639	≥0.5	PASS
	2480	SISO	1	0.650	≥0.5	PASS

#### 2.2 Test Graph - 6dB Bandwidth



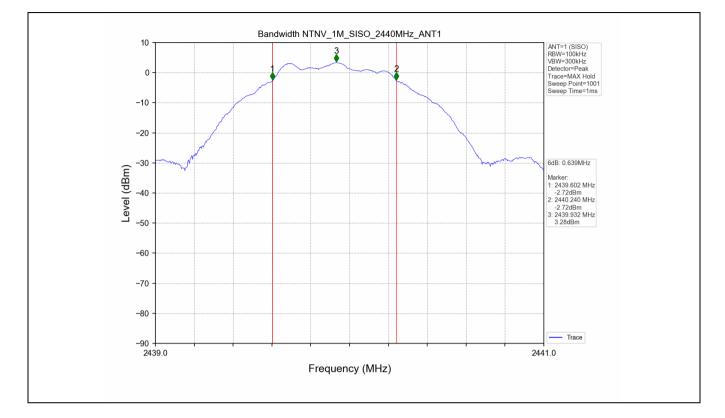


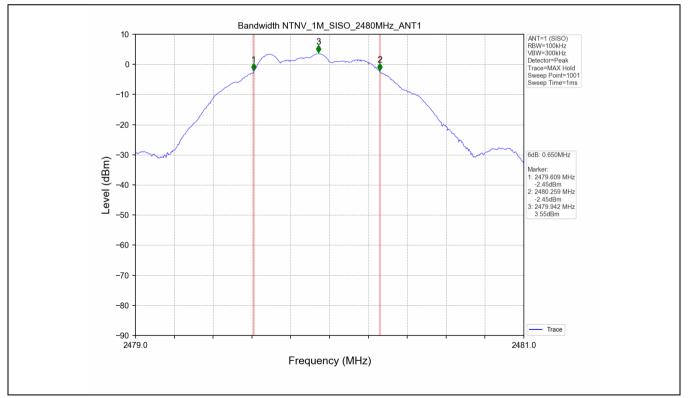


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#### 3. Maximum Conducted Output Power

#### 3.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Measured Peak Output Power (dBm)	Limits (dBm)	Verdict	
	(1112)		Ant 1			
1M	2402	SISO	3.03	30	PASS	
	2440	SISO	3.50	30	PASS	
	2480	SISO	3.77	30	PASS	



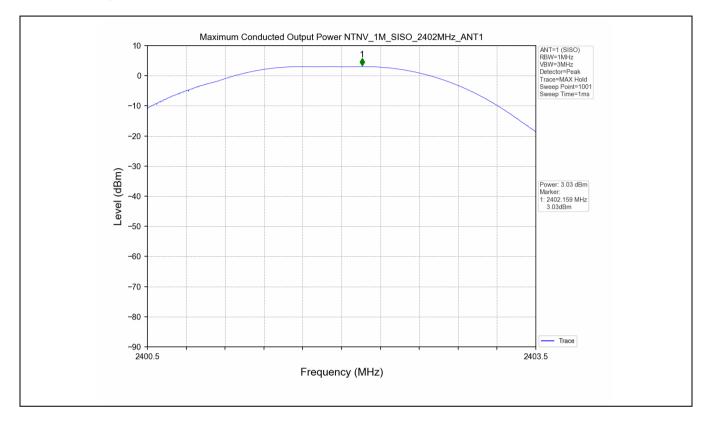
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#### 3.2 Test Graph



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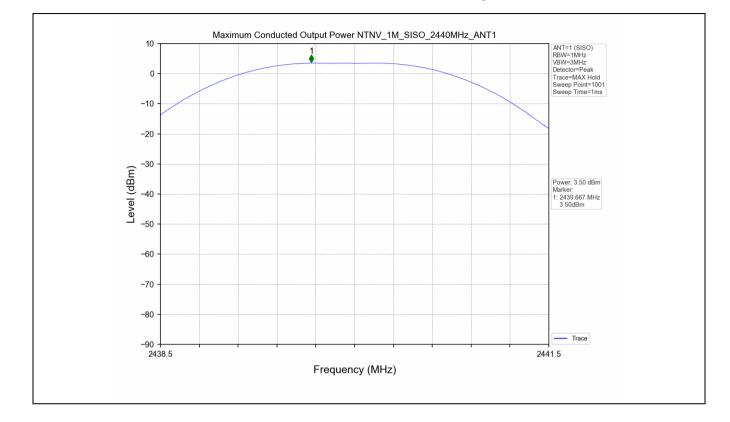
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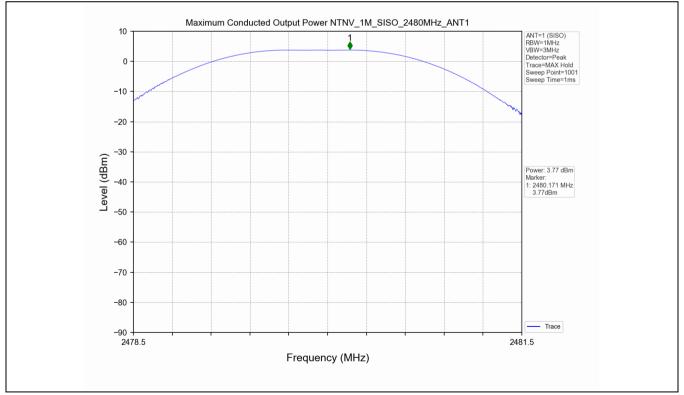


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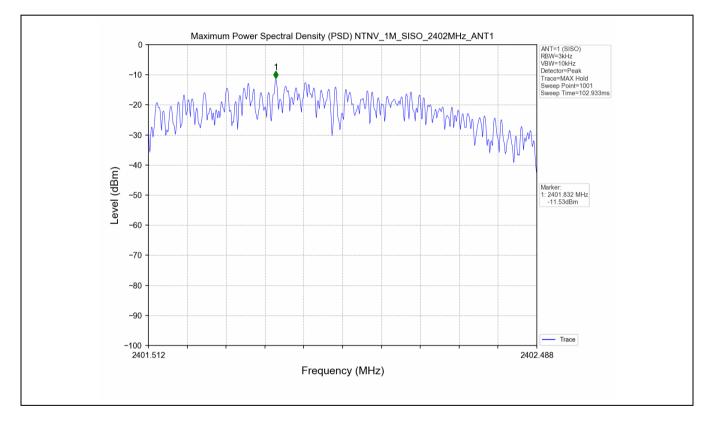
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#### 4. Maximum Power Spectral Density (PSD)

#### 4.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Maximum Power Spectral Density (dBm/3KHz) Ant 1	Limits (dBm/3kHz)	Verdict
	2402	SISO	-11.53	≤8	PASS
1M	2440	SISO	-11.14	≤8	PASS
	2480	SISO	-9.95	≤8	PASS

#### 4.2 Test Graph



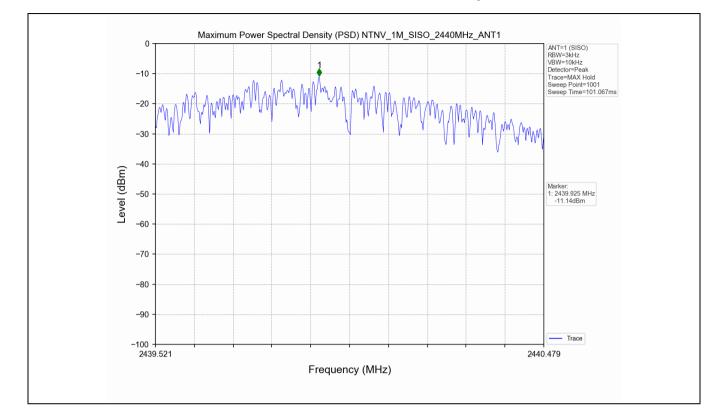


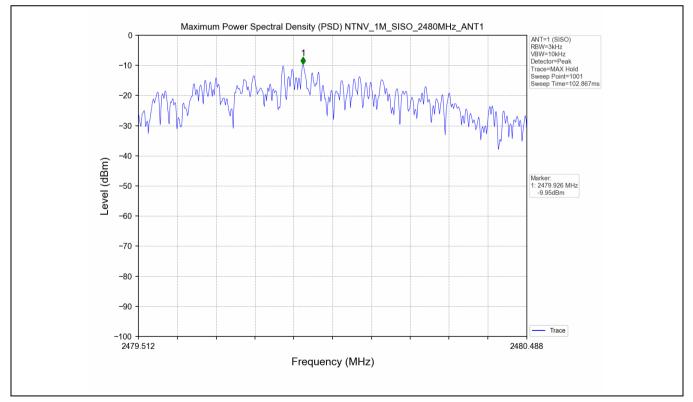


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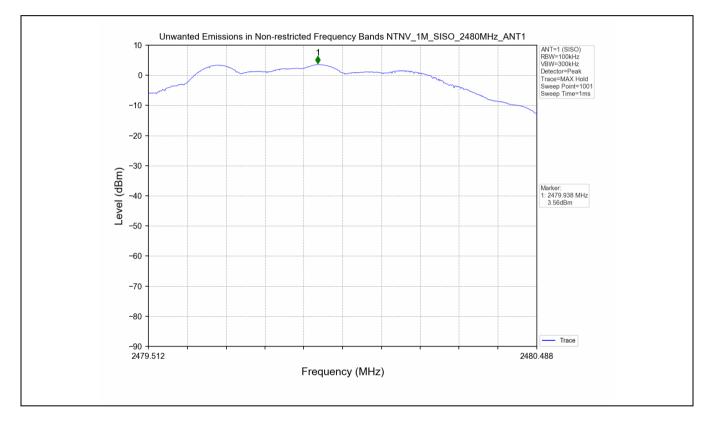
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#### 5. Unwanted Emissions in Non-restricted Frequency Bands

#### 5.1 Test Result

Test Mode	Frequency (MHz)	ТХ Туре	ANT No.	Spurious Conducted Emission (dBm)	Limits (dBm)	Verdict
	2402	SISO	1	Refer to test graph	-16.43	PASS
1M	2440	SISO	1	Refer to test graph	-16.43	PASS
	2480	SISO	1	Refer to test graph	-16.43	PASS

#### 5.2 Test Graph



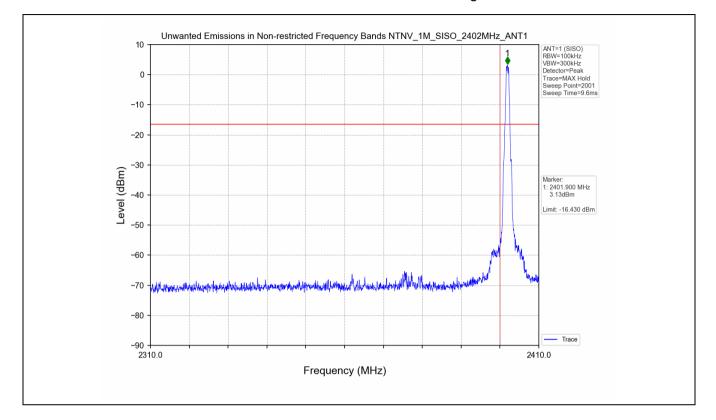


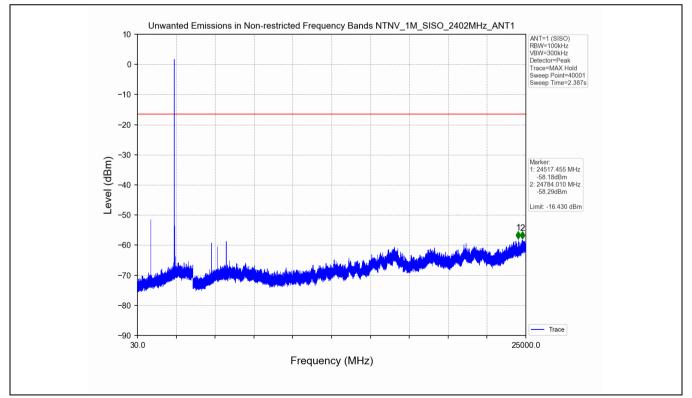


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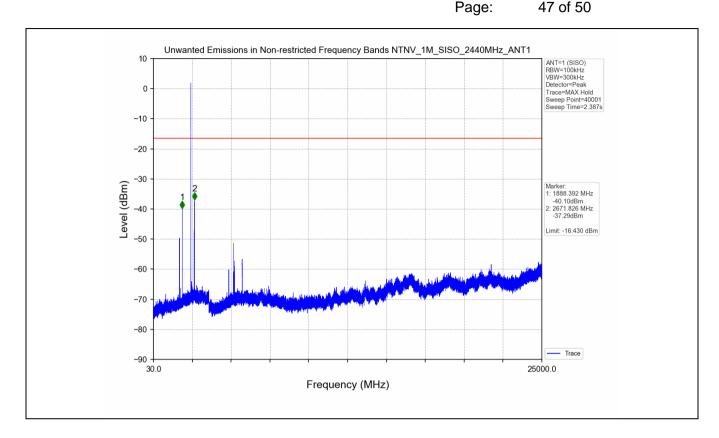
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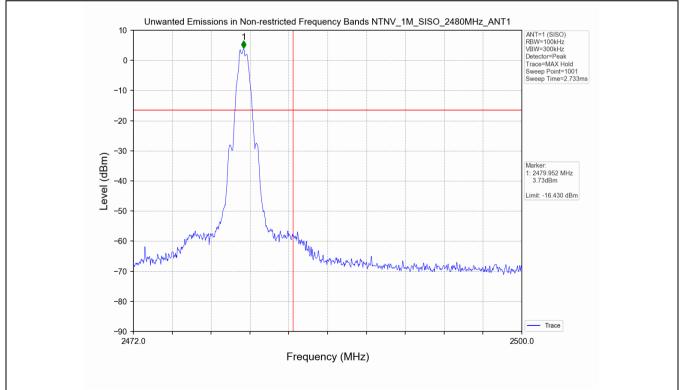
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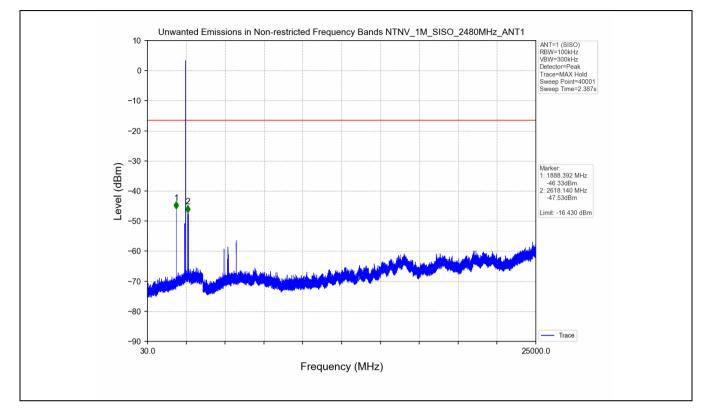
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#### 6. Frequency Error

#### 6.1 Test Result

Test Mode	Frequency (MHz)	ТХ Туре	ANT	Measured Fre	Vordiet	
				Test Result	Limit	Verdict
	2402	SISO	1	2401.93	2400-2483.5	PASS
1M	2440	SISO	1	2439.93	2400-2483.5	PASS
	2480	SISO	1	2479.92	2400-2483.5	PASS



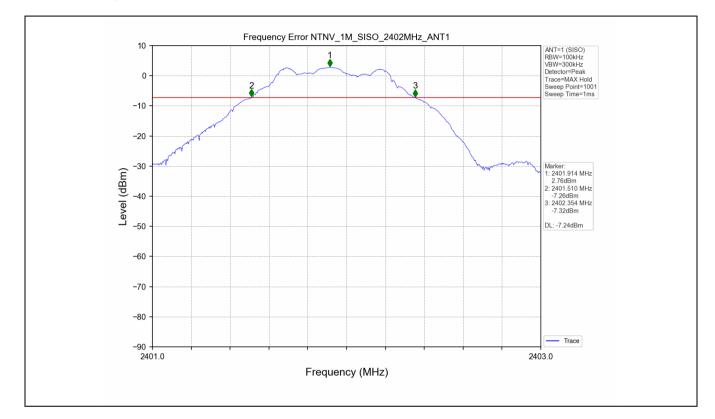
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#### 6.2 Test Graph



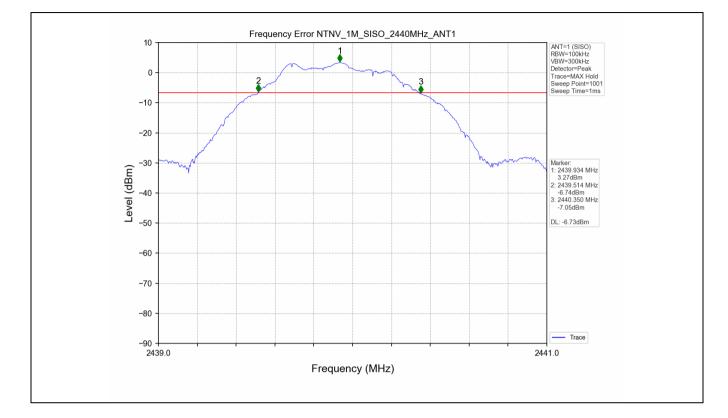
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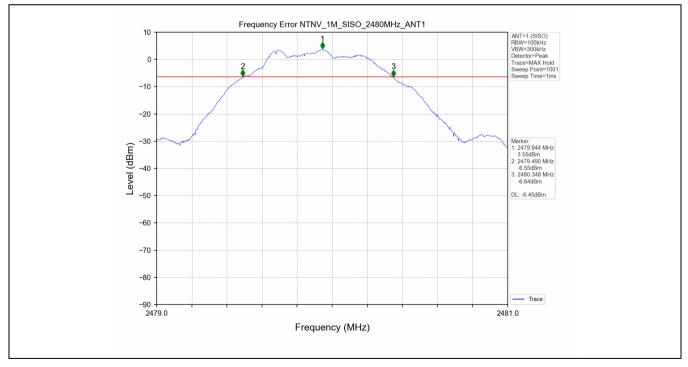
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