

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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# TEST REPORT

Application No.:	SZEM2004003281CR			
Applicant:	Harman International Industries, Inc.			
Address of Applicant:	8500 Balboa Boulevard, Northridge, California, 91329, United States			
Manufacturer:	Harman International Industries, Inc.			
Address of Manufacturer:	8500 Balboa Boulevard, Northridge, California, 91329, United States			
Factory:	Kingstate Electronics(Dongguan)Co., Ltd			
Address of Factory:	Shi Chong Industrial Park, Shi Chong Avenue, Xiang Xi Village, Shi Pai Town, Dong Guan City, Guang Dong Province, China.			
Equipment Under Test (EUT	):			
EUT Name:	BLUETOOTH HEADSET			
Model No.:	UA STREAK			
FCC ID:	APIJBLUASTREAK			
Trade Mark:	JBL			
Standard(s) :	47 CFR Part 15, Subpart C 15.247			
Date of Receipt:	2020-04-30			
Date of Test:	2020-05-07 to 2020-07-04			
Date of Issue:	2020-07-14			
Test Result:	Pass*			

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

Keny. XN

Keny Xu EMC Laboratory Manager



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	Revision Record						
Version Chapter Date Modifier Rem							
01		2020-07-14		Original			

Authorized for issue by:		
	Bonson Wong	
	Benson Wang /Project Engineer	
	EvicFu	
	Eric Fu /Reviewer	



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# 2 Test Summary

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

Radio Spectrum Matter Part						
Item	Standard	Method	Requirement	Result		
Minimum 6dB	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass		
Bandwidth	Subpart C 15.247	Section 11.8.1	C 15.247a(2)			
Conducted Peak	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass		
Output Power	Subpart C 15.247	Section 11.9.1	C 15.247(b)(3)			
Power Spectrum	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass		
Density	Subpart C 15.247	Section 11.10.2	C 15.247(e)			
Conducted Band	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass		
Edges Measurement	Subpart C 15.247	Section 11.13.3.2	C 15.247(d)			
Conducted Spurious	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass		
Emissions	Subpart C 15.247	Section 11.11	C 15.247(d)			
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious	47 CFR Part 15,	ANSI C63.10 (2013)	47 CFR Part 15, Subpart	Pass		
Emissions	Subpart C 15.247	Section 6.4,6.5,6.6	C 15.205 & 15.209			



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# 4 General Information

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

Power Supply:	Left earbuds: Li-Ion Polymer Battery 3.7V 55mAh (Charge by travel case) Right earbuds: Li-Ion Polymer Battery 3.7V 55mAh (Charge by travel case) travel case with backup battery: Li-Ion Polymer Battery 3.85V 410mAh (Charged by type-C port)
Cable:	Type-c cable: 27cm unshielded
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Data Rate:	Support 1M/bit
Channel Spacing:	2MHz
Modulation Type:	GFSK
Number of Channels:	40
Antenna Type:	Integral Antenna
Antenna Gain:	Left earbuds: -3.03dBi; Right earbuds: -3.93dBi

# 4.2 Description of Support Units

The EUT has been tested as an independent unit.

## 4.3 Measurement Uncertainty

Item	Measurement Uncertainty		
Radio Frequency	± 7.25 x 10 <sup>-8</sup>		
Duty cycle	± 0.37%		
Occupied Bandwidth	± 3%		
RF conducted power	± 0.75dB		
RF power density	± 2.84dB		
Conducted Spurious emissions	± 0.75dB		
DE Dedicted power	± 4.5dB (Below 1GHz)		
RF Radiated power	± 4.8dB (Above 1GHz)		
Dedicted Spurious emission test	± 4.5dB (Below 1GHz)		
Radiated Spurious emission test	± 4.8dB (Above 1GHz)		
Temperature test	± 1°C		
Humidity test	± 3%		
Supply voltages	± 1%		
Time	± 3%		



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#### 4.4 Test Location

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

No tests were sub-contracted.

#### 4.5 Test Facility

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

#### • A2LA (Certificate No. 3816.01)

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

#### • VCCI

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

#### • FCC – Designation Number: CN1178

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

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

#### • Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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#### **Equipment List** 5

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	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Cooviel Coble	SGS	N/A	CEM024 02	2019-07-11	2020-07-10
Coaxial Cable	565	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27

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	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	363	IN/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27



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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	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Cooviel Coble	\$ <u></u>	N/A	SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	SGS	IN/A		2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27

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	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
COaxial Cable	363	IN/A	SEI0031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27



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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	2020-03-24	2021-03-23	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23	
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A	
Cooviel Coble		N/A	SEM031-02	2019-07-11	2020-07-10	
Coaxial Cable	SGS	IN/A	SEIVIU31-02	2020-07-10	2021-07-09	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	N/A	N/A	
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23	
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27	

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	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
Coaxial Cable	363	IN/A	SEIM026-01	2020-07-10	2021-07-09
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2020-04-01	2021-03-31
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21



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Radiated Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
Coaxial Cable	363	N/A	SEI020-01	2020-07-10	2021-07-09
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2020-04-01	2021-03-31
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019-07-11	2020-07-10
Coaxial Cable	363	IN/A	SEM029-01	2020-07-10	2021-07-09
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2019-12-16	2020-12-15
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2020-04-09	2021-04-08



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General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06



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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 as below: Left earbuds: -3.03dBi; Right earbuds: -3.93dBi.

Antenna location: Refer to internal photo.



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# 7 Radio Spectrum Matter Test Results

### 7.1 Minimum 6dB Bandwidth

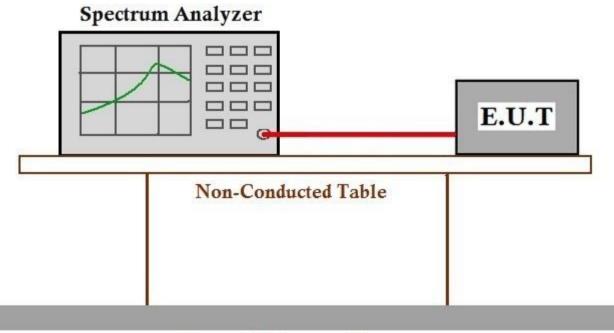
Test Requirement	47 CFR Part 15, Subpart C 15.247a(2)
Test Method:	ANSI C63.10 (2013) Section 11.8.1
Limit:	≥500 kHz

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

Operating Environment:

1 0						
Temperature:	28.8 °C	Humidity:	38	% RH	Atmospheric Pressure: 1005 mb	ar
Pretest these modes to find	d:TX mode(Lef transmitting mo			/—	eep the EUT in continuously	
the worst case:	i:TX mode(Rig transmitting mo			/_	eep the EUT in continuously	
The worst case for final test:	d:TX mode(Let transmitting mo				eep the EUT in continuously	
	i:TX mode(Rig transmitting mo			/—	eep the EUT in continuously	

#### 7.1.2 Test Setup Diagram



# **Ground Reference Plane**

#### 7.1.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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### 7.2 Conducted Peak Output Power

Test Requirement	47 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



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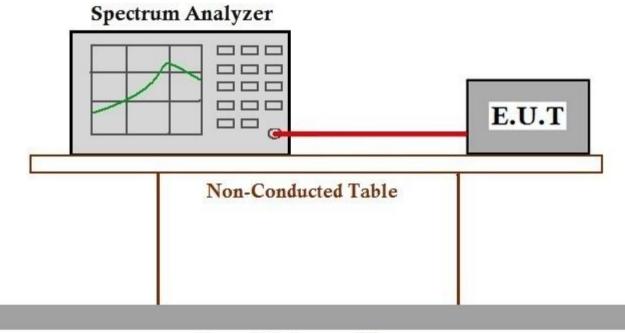


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#### 7.2.1 E.U.T. Operation

Operating Enviro	nment:					
Temperature:	28.8 °C	Humidity:	38	% RH	Atmospheric Pressure: 1005	mbar
Pretest these modes to find the worst case:	transmitting m	node with GFS ght earbuds 1	SK me M/bit	odulation. of BLE)_k	eep the EUT in continuously Keep the EUT in continuously	
The worst case for final test:	d:TX mode(Le transmitting m			/—	eep the EUT in continuously	
	i:TX mode(Rig transmitting m	•		/_	Keep the EUT in continuously	

#### 7.2.2 Test Setup Diagram



# Ground Reference Plane

#### 7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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### 7.3 Power Spectrum Density

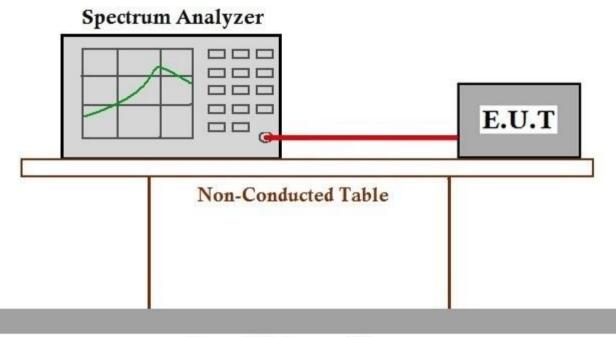
Test Requirement	47 CFR Part 15, Subpart C 15.247(e)
Test Method:	ANSI C63.10 (2013) Section 11.10.2
Limit:	${\leq}8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission

#### 7.3.1 E.U.T. Operation

**Operating Environment:** 

Temperature:	28.8 °C	Humidity:	38	% RH	Atmospheric Pressure: 1005	mbar				
Pretest these modes to find	d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									
the worst case:	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									
The worst case d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously for final test: transmitting mode with GFSK modulation.										
	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									

#### 7.3.2 Test Setup Diagram



# Ground Reference Plane

#### 7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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## 7.4 Conducted Band Edges Measurement

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

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)



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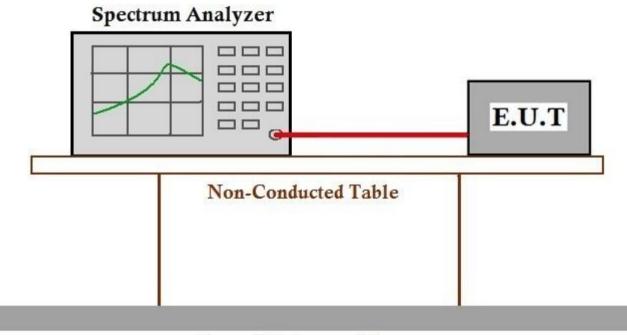


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#### 7.4.1 E.U.T. Operation

Operating Environment:											
Temperature:	28.8 °C	Humidity:	38	% RH	Atmospheric Pressure: 1005	mbar					
Pretest these modes to find the worst case:	transmitting m i:TX mode(Rig	d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation. i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									
The worst case for final test:											
	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.										

#### 7.4.2 Test Setup Diagram



# Ground Reference Plane

#### 7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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# 7.5 Conducted Spurious Emissions

Test Requirement
Test Method:
Limit:

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

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)



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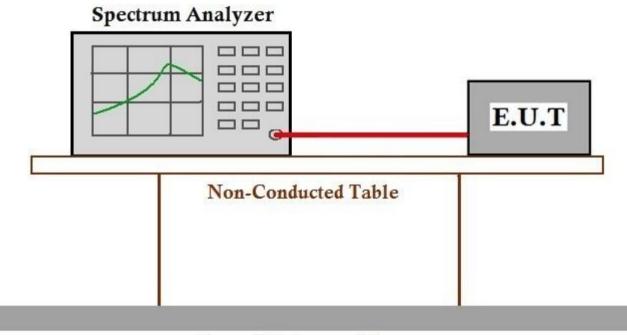


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#### 7.5.1 E.U.T. Operation

Operating Environment:											
Temperature:	28.8 °C	Humidity:	38	% RH	Atmospheric Pressure: 1005	mbar					
Pretest these modes to find the worst case:	transmitting m i:TX mode(Rig	d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation. i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									
The worst case for final test:	······································										
	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.										

#### 7.5.2 Test Setup Diagram



# Ground Reference Plane

#### 7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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# 7.6 Radiated Emissions which fall in the restricted bands

47 CFR Part 15, Subpart C 15.205 & 15.209
ANSI C63.10 (2013) Section 6.10.5
3m

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.



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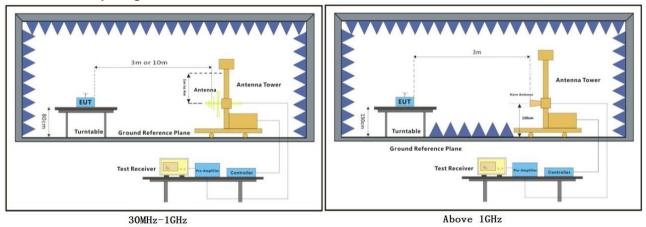
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#### 7.6.1 E.U.T. Operation

**Operating Environment:** 

	ment.											
Temperature:	23 °C	Humidity:	54	% RH	Atmospheric Pressure: 1005	mbar						
Pretest these modes to find		d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.										
the worst case:	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.											
The worst case d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.												
	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.											

#### 7.6.2 Test Setup Diagram





Shenzhen P

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#### 7.6.3 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.



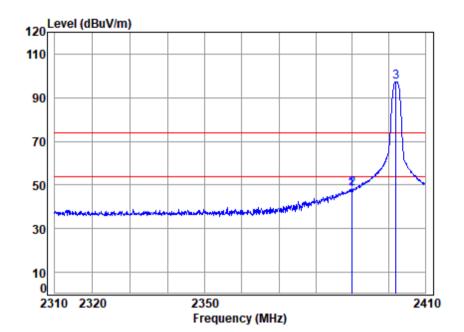
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Mode:d; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Site	: cha	amber							
Condition: 3m HORIZONTAL									
Job No : 03278CR/03281CR									
Mode : 2402 Band edge									
Note	: BLE	ΕL							
		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	
	200 764	2 60		40.07	FC 66	47.00	74.00	06.40	
1 2	389.761	3.69	28.52	40.97	56.66	47.90	74.00	-26.10	peak
2 2	390.000	3.69	28.52	40.97	56.94	48.18	74.00	-25.82	peak
3 * 2	402.000	3.63	28.54	40.98	105.98	97.17	74.00	23.17	peak



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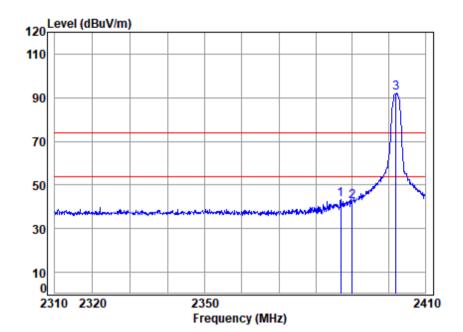
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Mode:d; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site	: cha	amber							
Condition: 3m VERTICAL									
Job No : 03278CR/03281CR									
Mode : 2402 Band edge									
Note	: BLE	EL							
		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 23					51.97				•
2 23	90.000	3.69	28.52	40.97	51.11	42.35	74.00	-31.65	peak
3 * 24	02.000	3.63	28.54	40.98	100.76	91.95	74.00	17.95	peak



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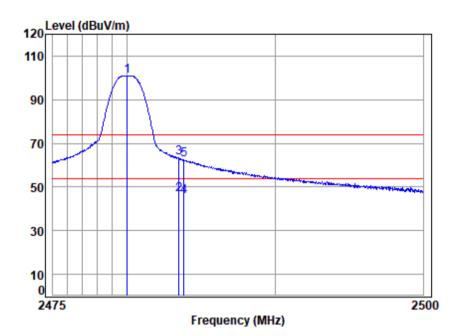
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Mode:d; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m HORIZONTAL Job No : 03278CR/03281CR Mode : 2480 Band edge Note : BLE L									
		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 *	2480.000	3.99	28.67	41.01	109.34	100.99	74.00	26.99	peak
2	2483.500	4.01	28.67	41.01	54.94	46.61	54.00	-7.39	Average
3	2483.500	4.01	28.67	41.01	71.64	63.31	74.00	-10.69	peak
4	2483.821	4.01	28.67	41.01	54.01	45.68	54.00	-8.32	Average
5	2483.821	4.01	28.67	41.01	70.75	62.42	74.00	-11.58	peak



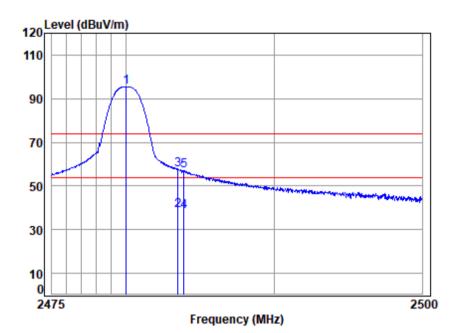
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Mode:d; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 03278CR/03281CR Mode : 2480 Band edge Note : BLE L									
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss			Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 *	2480.000	3.99	28.67	41.01	103.61	95.26	74.00	21.26	peak
2	2483.500	4.01	28.67	41.01	47.29	38.96	54.00	-15.04	Average
3	2483.500	4.01	28.67	41.01	65.59	57.26	74.00	-16.74	peak
4	2483.896	4.01	28.67	41.01	46.69	38.36	54.00	-15.64	Average
5	2483.896	4.01	28.67	41.01	65.39	57.06	74.00	-16.94	peak



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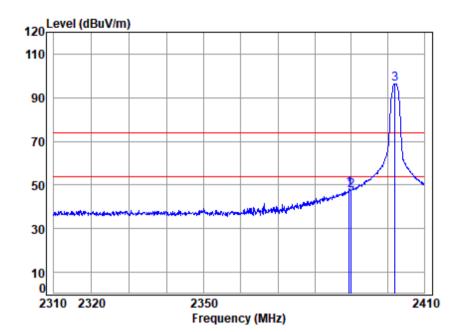
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Mode:i; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Site	: cha	amber							
Condition: 3m HORIZONTAL									
Job No : 03278CR/03281CR									
Mode : 2402 Band edge									
Note	: BLE	ER							
		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	
							74.00		
1 23	89.356	3.69	28.52	40.97	56.98	48.22	/4.00	-25./8	peak
2 23	90.000	3.69	28.52	40.97	56.20	47.44	74.00	-26.56	peak
3 * 24	02.000	3.63	28.54	40.98	104.94	96.13	74.00	22.13	peak



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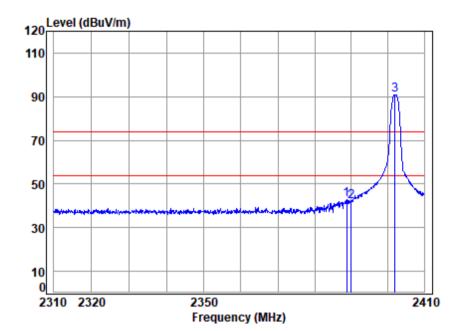
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Mode:i; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site : chamber										
Condition: 3m VERTICAL										
Job No : 03278CR/03281CR										
Mode	Mode : 2402 Band edge									
Note	: BLE	ER								
		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	2388.748	3.69	28 23	40.07	51 62	12 86	74 00	21 14	nook	
-				40.97					•	
2				40.97					•	
3 *	2402.000	3.63	28.54	40.98	99.60	90.79	74.00	16.79	peak	



Shenzhen

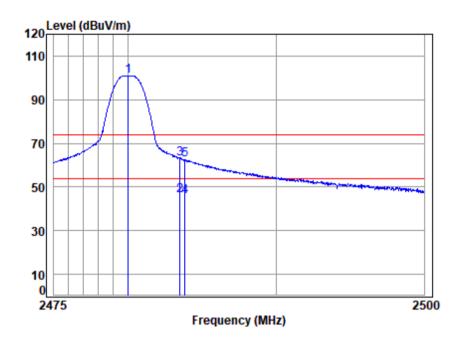
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Mode:i; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



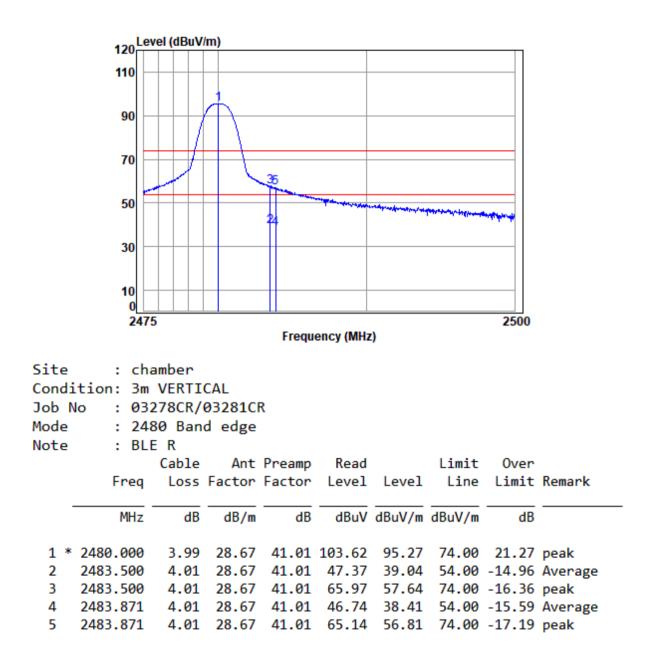
Site : chamber										
Condition: 3m HORIZONTAL										
Job No : 03278CR/03281CR										
Mode : 2480 Band edge										
Note	: BL	ER								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 *	2480.000	3.99	28.67	41.01	109.38	101.03	74.00	27.03	peak	
2	2483.500	4.01	28.67	41.01	54.24	45.91	54.00	-8.09	Average	
3	2483.500	4.01	28.67	41.01	71.25	62.92	74.00	-11.08	peak	
4	2483.821	4.01	28.67	41.01	53.84	45.51	54.00	-8.49	Average	
5	2483.821	4.01	00 67	44 04	70 74	CO 44	74 00	-11.59		





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Mode:i; Polarization:Vertical; Modulation:GFSK; ; Channel:High





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## 7.7 Radiated Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance:	10m (Below 1GHz) and 3m (Above 1GHz)
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.



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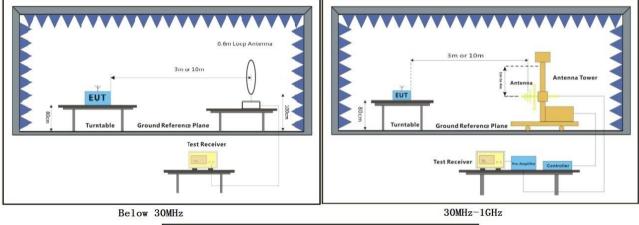
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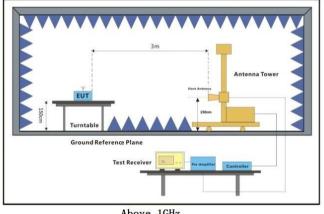
#### 7.7.1 E.U.T. Operation

Operating Environment:

Temperature:	25 °C	Humidity: 45	% RH	Atmospheric Pressure:	1005	mbar				
Pretest these modes to find	transmitting mod	d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.								
the worst case:	i:TX mode(Right earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									
The worst case for final test:	d:TX mode(Left earbuds 1M/bit of BLE)_Keep the EUT in continuously transmitting mode with GFSK modulation.									
	i:TX mode(Right transmitting mod		/_	ep the EUT in continuous	ly					

#### 7.7.2 Test Setup Diagram





Above 1GHz





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#### 7.7.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

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

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

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

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

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

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



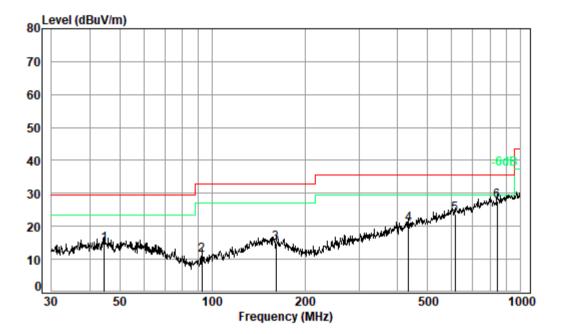
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30MHz~1GHz QP value: Mode: d Polarization: Horizontal;



Condition: 10m HORIZONTAL Job No. : 03281CR Test Mode: d

	Freq		Preamp Factor						Remark
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	44.587	20.36	32.44	0.95	25.74	14.61	29.50	-14.89	QP
2	92.462	14.42	32.33	1.22	27.83	11.14	33.00	-21.86	QP
3	160.909	19.75	32.30	1.50	25.97	14.92	33.00	-18.08	QP
4	434.065	22.82	32.23	2.66	27.33	20.58	35.60	-15.02	QP
5	614.214	26.42	32.06	3.17	26.06	23.59	35.60	-12.01	QP
6 pp	842.130	28.62	31.75	3.38	27.49	27.74	35.60	-7.86	QP



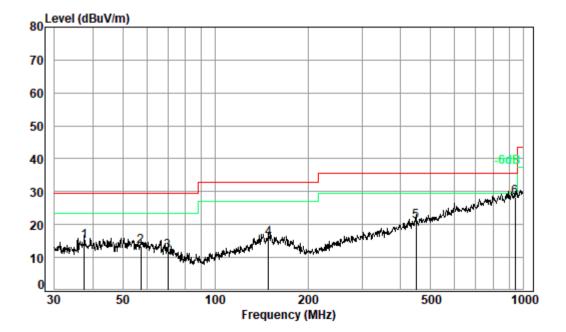
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Mode :d; Polarization: Vertical



## Condition: 10m VERTICAL Job No. : 03281CR Test Mode: d

	Freq		Preamp Factor						Remark
		, ac coi	, accor	2000			22112		includer in
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.548	19.89	32.42	0.90	26.47	14.84	29.50	-14.66	QP
2	57.191	19.62	32.43	1.03	25.08	13.30	29.50	-16.20	QP
3	70.090	17.57	32.39	1.08	25.63	11.89	29.50	-17.61	QP
4	148.963	20.15	32.30	1.47	26.39	15.71	33.00	-17.29	QP
5	449.556	23.48	32.29	2.70	27.09	20.98	35.60	-14.62	QP
6 pp	942.131	29.81	31.29	3.48	26.16	28.16	35.60	-7.44	QP



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The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

 $L_3 / L_{10} = D_{10} / D_3$ 

Note:

L<sub>3</sub>: Level @ 3m distance. Unit: uV/m;

L<sub>10</sub>: Level @ 10m distance. Unit: uV/m;

D<sub>3</sub>: 3m distance. Unit: m

D<sub>10</sub>: 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
37.55	14.84	5.52	18.40	25.30	40.00	-14.70	V
57.19	13.30	4.62	15.41	23.76	40.00	-16.24	V
70.09	11.89	3.93	13.10	22.35	40.00	-17.65	V
148.96	15.71	6.10	20.34	26.17	43.50	-17.33	V
449.56	20.98	11.19	37.31	31.44	46.00	-14.56	V
942.13	28.16	25.59	85.29	38.62	46.00	-7.38	V
44.59	14.61	5.38	17.92	25.07	40.00	-14.93	Н
92.46	11.14	3.61	12.02	21.60	43.50	-21.90	Н
160.91	14.92	5.57	18.57	25.38	43.50	-18.12	Н
434.07	20.58	10.69	35.64	31.04	46.00	-14.96	Н
614.21	23.59	15.12	50.39	34.05	46.00	-11.95	Н
842.13	27.74	24.38	81.26	38.20	46.00	-7.80	Н



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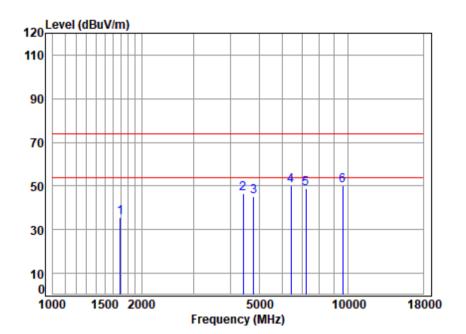
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Above 1GHz

Mode:d; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



	Condition: 3m HORIZONTAL Job No : 03278CR/03281CR Mode : 2402 TX SE Note : BLE L													
		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	1692.231	3.28	26.64	40.63	46.52	35.81	74.00	-38.19	peak					
2	4417.841	6.63	33.46	42.49	48.73	46.33	74.00	-27.67	peak					
3	4804.000	6.80	33.97	42.77	47.27	45.27	74.00	-28.73	peak					
4	6414.167	7.63	35.52	42.00	49.08	50.23	74.00	-23.77	peak					
5	7206.000	8.44	36.07	41.58	46.04	48.97	74.00	-25.03	peak					
6	9608.000	9.17	37.67	38.57	42.14	50.41	74.00	-23.59	peak					



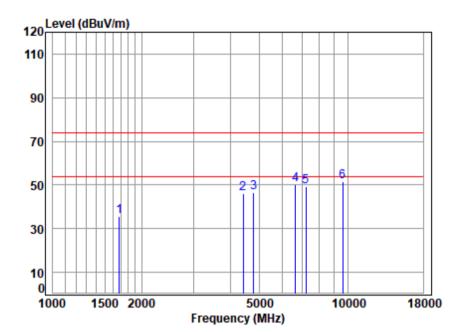
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Mode:d; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site	: cha	amber												
Condition: 3m VERTICAL														
Job I	Job No : 03278CR/03281CR													
Mode : 2402 TX SE														
Note : BLE L														
		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	1682.477	3.25	26.60	40.62	46.27	35.50	74.00	-38.50	peak					
2	4417.841	6.63	33.46	42.49	48.40	46.00	74.00	-28.00	peak					
3	4804.000	6.80	33.97	42.77	48.50	46.50	74.00	-27.50	peak					
4	6640.542	8.14	35.69	41.87	48.03	49.99	74.00	-24.01	peak					
5	7206.000	8.44	36.07	41.58	46.42	49.35	74.00	-24.65	peak					
6		9.17	37.67	38.57	43.44		74 00	-22.29						



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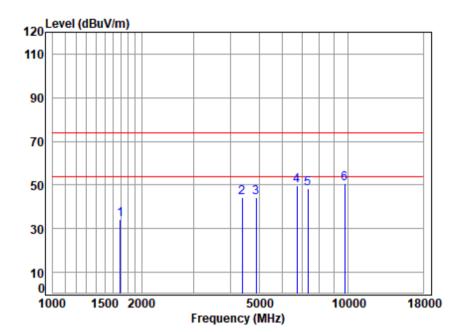
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Mode:d; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



	Condition: 3m HORIZONTAL Job No : 03278CR/03281CR Mode : 2440 TX SE Note : BLE L													
		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	1692.231	3.28	26.64	40.63	45.00	34.29	74.00	-39.71	peak					
2	4392.376	6.66	33.42	42.47	46.87	44.48	74.00	-29.52	peak					
3	4880.000	7.02	34.06	42.82	45.91	44.17	74.00	-29.83	peak					
4	6717.762	8.28	35.73	41.83	47.63	49.81	74.00	-24.19	peak					
5	7323.000	8.36	36.16	41.52	45.16	48.16	74.00	-25.84	peak					
6	9764.000	9.30	37.76	38.34	41.94	50.66	74.00	-23.34	peak					

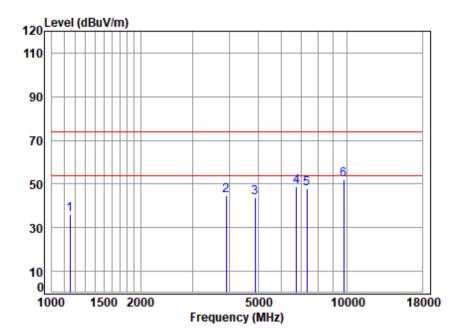


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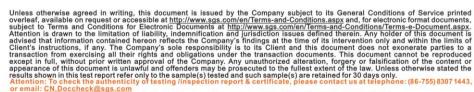


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Mode:d; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Site	Site : chamber													
Cond:	Condition: 3m VERTICAL													
Job I	Job No : 03278CR/03281CR													
Mode	Mode : 2440 TX SE													
Note	Note : BLE L													
		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	1152.148	2.42	24.37	40.24	49.61	36.16	74.00	-37.84	peak					
2	3901.516	6.01	32.51	42.07	48.28	44.73	74.00	-29.27	peak					
3	4880.000	7.02	34.06	42.82	45.50	43.76	74.00	-30.24	peak					
4	6756.708	8.14	35.76	41.81	46.94	49.03	74.00	-24.97	peak					
5	7323.000	8.36	36.16	41.52	44.70	47.70	74.00	-26.30	peak					
6	9764,000	9.30	37.76	38,34	43.44	52,16	74.00	-21.84	peak					



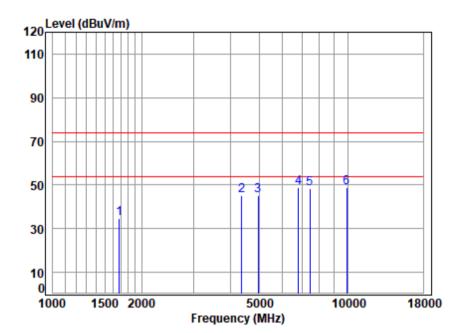
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Report No.: SZEM200400328103 Page: 43 of 80

Mode:d; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



	Condition: 3m HORIZONTAL Job No : 03278CR/03281CR Mode : 2480 TX SE Note : BLE L													
		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	1682.477	3.25	26.60	40.62	45.42	34.65	74.00	-39.35	peak					
2	4367.058	6.56	33.37	42.45	47.72	45.20	74.00	-28.80	peak					
3	4960.000	7.02	34.15	42.87	47.03	45.33	74.00	-28.67	peak					
4	6795.879	8.00	35.78	41.79	46.82	48.81	74.00	-25.19	peak					
5	7440.000	8.10	36.25	41.46	45.49	48.38	74.00	-25.62	peak					
6	9920.000	8.96	37.85	38.12	40.29	48.98	74.00	-25.02	peak					



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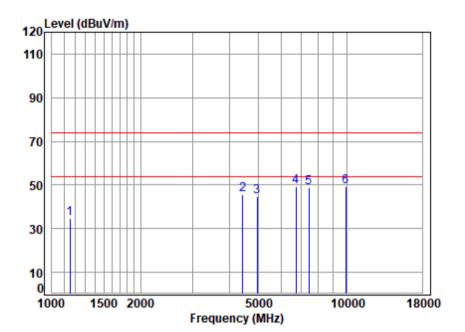
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Mode:d; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Job No Mode	Condition: 3m VERTICAL Job No : 03278CR/03281CR Mode : 2480 TX SE Note : BLE L													
		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 11	152.148	2.42	24.37	40.24	48.30	34.85	74.00	-39.15	peak					
2 44	443.453	6.55	33.50	42.51	48.13	45.67	74.00	-28.33	peak					
3 49	960.000	7.02	34.15	42.87	46.51	44.81	74.00	-29.19	peak					
4 67	717.762	8.28	35.73	41.83	46.93	49.11	74.00	-24.89	peak					
5 74	440.000	8.10	36.25	41.46	45.75	48.64	74.00	-25.36	peak					
6 99	920.000	8.96	37.85	38.12	40.51	49.20	74.00	-24.80	peak					



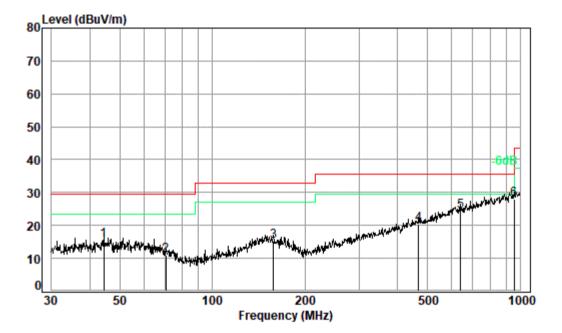
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30MHz~1GHz QP value: Mode: i; Polarization: Horizontal;



Condition: 10m HORIZONTAL Job No. : 03281CR Test Mode: i

	Freq		Preamp Factor						Remark
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	44.431	20.34	32.44	0.95	26.64	15.49	29.50	-14.01	QP
2	70.584	17.39	32.39	1.08	24.78	10.86	29.50	-18.64	QP
3	158.112	19.87	32.30	1.49	26.10	15.16	33.00	-17.84	QP
4	468.876	23.69	32.36	2.79	26.29	20.41	35.60	-15.19	QP
5	640.611	26.31	32.12	3.19	26.94	24.32	35.60	-11.28	QP
6 pp	955.438	29.88	31.22	3.51	25.86	28.03	35.60	-7.57	QP



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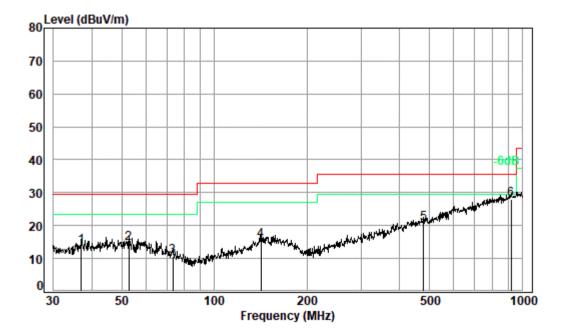
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Mode :i; Polarization: Vertical



Condition: 10m VERTICAL Job No. : 03281CR Test Mode: i

		Ant	Preamp	Cable	Read		Limit	0ver	
	Freq	Factor	Factor	Loss	Level	Level	Line	Limit	Remark
_									
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.025	19.76	32.41	0.90	25.52	13.77	29.50	-15.73	QP
2	52.760	19.98	32.45	1.00	26.08	14.61	29.50	-14.89	QP
3	73.359	16.56	32.38	1.11	25.39	10.68	29.50	-18.82	QP
4	141.826	19.79	32.30	1.45	26.44	15.38	33.00	-17.62	QP
5	478.846	23.70	32.40	2.84	26.42	20.56	35.60	-15.04	QP
6 pp	922.516	29.80	31.40	3.45	26.07	27.92	35.60	-7.68	QP



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The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

 $L_3 / L_{10} = D_{10} / D_3$ 

Note:

L<sub>3</sub>: Level @ 3m distance. Unit: uV/m;

L<sub>10</sub>: Level @ 10m distance. Unit: uV/m;

D<sub>3</sub>: 3m distance. Unit: m

D<sub>10</sub>: 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)		Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
37.025	13.77	4.88	16.27	24.23	40.00	-15.77	V
52.760	14.61	5.38	17.92	25.07	40.00	-14.93	V
73.359	10.68	3.42	11.40	21.14	40.00	-18.86	V
141.826	15.38	5.87	19.58	25.84	43.50	-17.66	V
478.846	20.56	10.67	35.55	31.02	46.00	-14.98	V
922.516	17.92	7.87	26.23	28.38	46.00	-17.62	V
44.431	15.49	5.95	19.83	25.95	40.00	-14.05	Н
70.584	10.86	3.49	11.64	21.32	40.00	-18.68	Н
158.112	15.16	5.73	19.09	25.62	43.50	-17.88	Н
468.876	20.41	10.48	34.94	30.87	46.00	-15.13	Н
640.611	24.32	16.44	54.81	34.78	46.00	-11.22	Н
955.438	28.03	25.21	84.02	38.49	46.00	-7.51	Н



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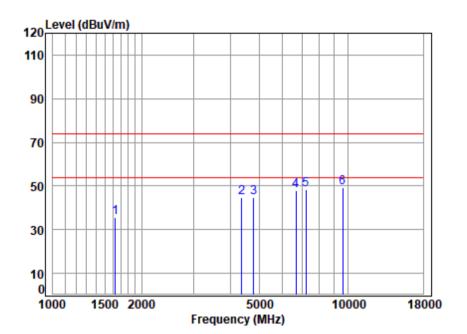
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Above 1GHz

Mode:i; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



	Condition: 3m HORIZONTAL Job No : 03278CR/03281CR Mode : 2402 TX SE Note : BLE R													
		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	1629.825	3.06	26.38	40.59	46.63	35.48	74.00	-38.52	peak					
2	4367.058	6.56	33.37	42.45	47.13	44.61	74.00	-29.39	peak					
3	4804.000	6.80	33.97	42.77	46.56	44.56	74.00	-29.44	peak					
4	6679.040	8.27	35.71	41.85	46.00	48.13	74.00	-25.87	peak					
5	7206.000	8.44	36.07	41.58	45.30	48.23	74.00	-25.77	peak					
6	9608.000	9.17	37.67	38.57	40.82	49.09	74.00	-24.91	peak					



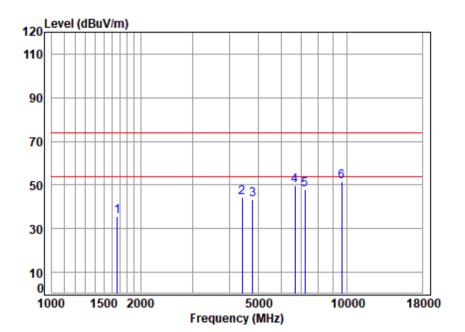
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Mode:i; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Job I Mode	Site : chamber Condition: 3m VERTICAL Job No : 03278CR/03281CR Mode : 2402 TX SE Note : BLE R											
Note	: 511	Cable	Ant	Preamp	Read		Limit	0ver				
	Freq			Factor		Level		Limit	Remark			
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB				
1	1667.951	3.20	26.54	40.61	46.33	35.46	74.00	-38.54	peak			
2	4417.841	6.63	33.46	42.49	46.43	44.03	74.00	-29.97	peak			
3	4804.000	6.80	33.97	42.77	45.41	43.41	74.00	-30.59	peak			
4	6679.040	8.27	35.71	41.85	47.48	49.61	74.00	-24.39	peak			
5	7206.000	8.44	36.07	41.58	45.13	48.06	74.00	-25.94	peak			
6	9608.000	9.17	37.67	38.57	43.35	51.62	74.00	-22.38	peak			



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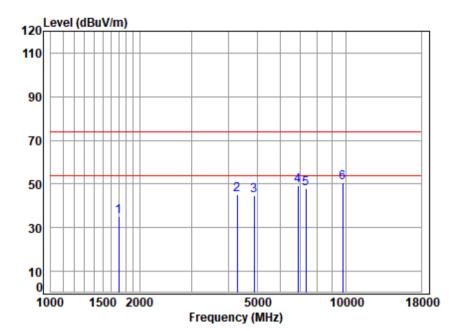
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Mode:i; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Site Cond Job Mode Note	ition: 3m No : 032 : 244	278CR/ 40 TX E R Cable	03281CI SE Ant	R Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1702.042	3.30	26.68	40.63	45.60	34.95	74.00	-39.05	peak
2	4291.977	6.29	33.24	42.39	48.00	45.14	74.00	-28.86	peak
3	4880.000	7.02	34.06	42.82	46.56	44.82	74.00	-29.18	peak
4	6874.906	7.87	35.83	41.75	47.13	49.08	74.00	-24.92	peak
5	7323.000	8.36	36.16	41.52	44.97	47.97	74.00	-26.03	peak
6	9764.000	9.30	37.76	38.34	42.05	50.77	74.00	-23.23	peak



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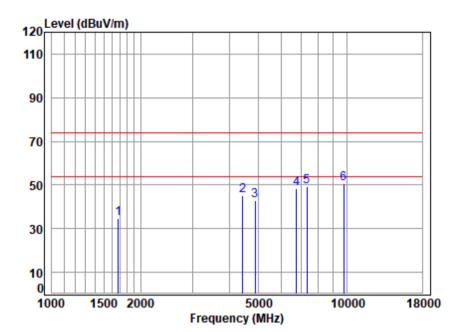
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Mode:i; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Site Cond: Job I Mode Note	ition: 3m No : 03 : 24	278CR/ 40 TX	03281C	र					
		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	1682.477	3 25	26.60	40.62	45.30		74 00	20 47	maale
			20.00	40.02	45.50	54.55	74.00	-39.47	реак
2	4443.453	6.55	33.50	40.02	47.58		74.00		
2 3	4443.453 4880.000		33.50		47.58	45.12		-28.88	peak
		6.55 7.02	33.50	42.51	47.58 44.78	45.12 43.04	74.00	-28.88 -30.96	peak peak
3	4880.000	6.55 7.02	33.50 34.06 35.75	42.51 42.82	47.58 44.78 46.29	45.12 43.04 48.43	74.00 74.00	-28.88 -30.96 -25.57	peak peak peak



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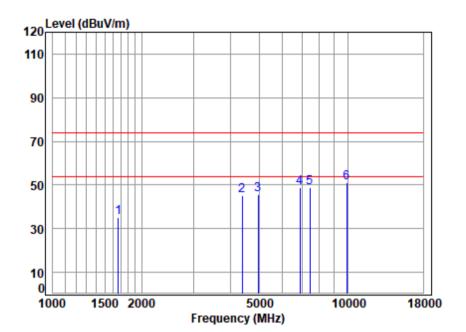
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Mode:i; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m HORIZONTAL Job No : 03278CR/03281CR Mode : 2480 TX SE Note : BLE R											
		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	1667.951	3.20	26.54	40.61	45.87	35.00	74.00	-39.00	peak		
2	4379.699	6.61	33.39	42.46	47.75	45.29	74.00	-28.71	peak		
3	4960.000	7.02	34.15	42.87	47.17	45.47	74.00	-28.53	peak		
4	6874.906	7.87	35.83	41.75	46.81	48.76	74.00	-25.24	peak		
5	7440.000	8.10	36.25	41.46	45.94	48.83	74.00	-25.17	peak		
6	9920.000	8.96	37.85	38.12	42.30	50.99	74.00	-23.01	peak		



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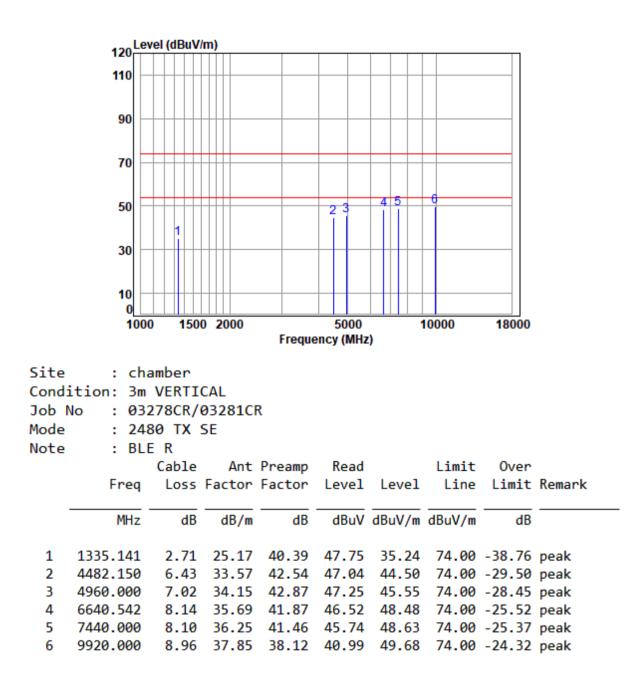
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Mode:i; Polarization:Vertical; Modulation:GFSK; ; Channel:High





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#### **Photographs** 8

#### 8.1 **Test Setup**

Please refer to setup photos.

## 8.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.



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## 9 Appendix

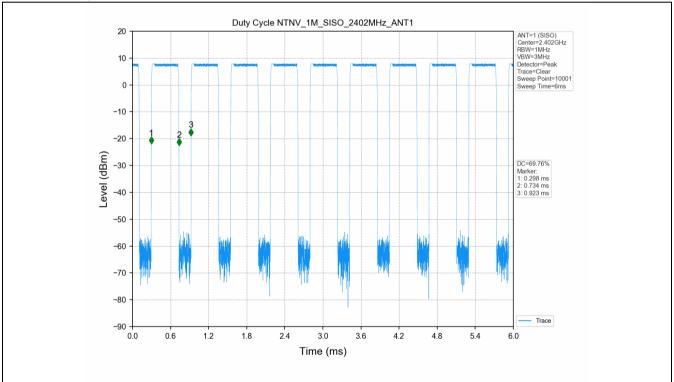
## 9.1 Appendix 15.247 – Left earbuds

1.	Dutv	Cycle
	Duty	Oyolo

## 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	0.436	0.625	69.76	1.56				
1M	2440	SISO	1	0.436	0.625	69.76	1.56				
	2480	SISO	1	0.437	0.626	69.81	1.56				

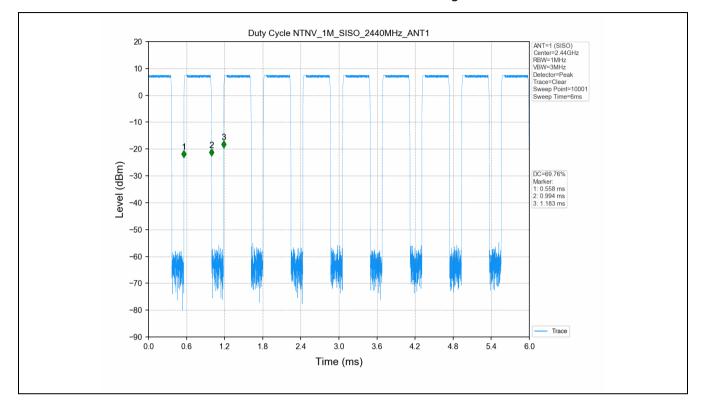
## 1.2 Test Graph

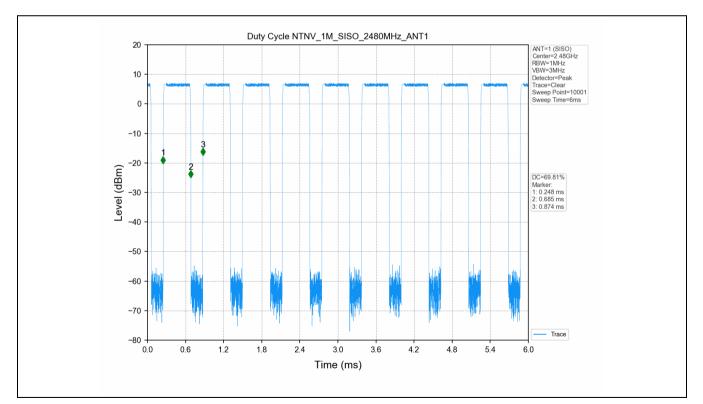






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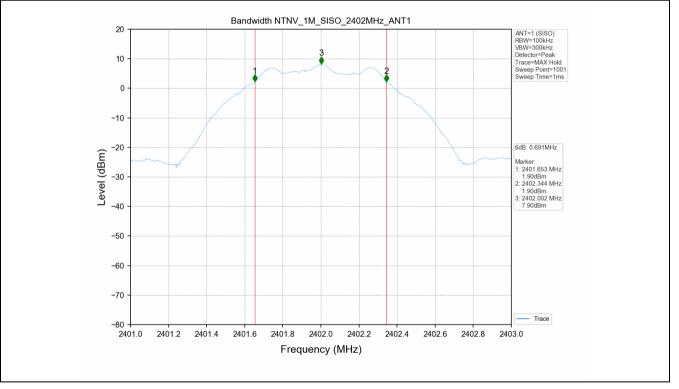
## 2. Bandwidth

## 2.1 Test Result

Test Mode	Frequency			6dB Bai	Verdict		
Test Mode	(MHz)	ТХ Туре	ANT No.	Test Result (MHz)	Limits (MHz)	verdict	
	2402	SISO	1	0.691	≥0.5	PASS	
1M	2440	SISO	1	0.698	≥0.5	PASS	
	2480	SISO	1	0.715	≥0.5	PASS	

Tost Modo	Frequency			99% Occupied Bandwidth				
Test Mode	(MHz)	ТХ Туре	ANT No.	Test Result (MHz)				
	2402	SISO	1	1.018	Only for Report Use			
1M	2440 SISO		1	1.019	Only for Report Use			
	2480	SISO	1	1.019	Only for Report Use			

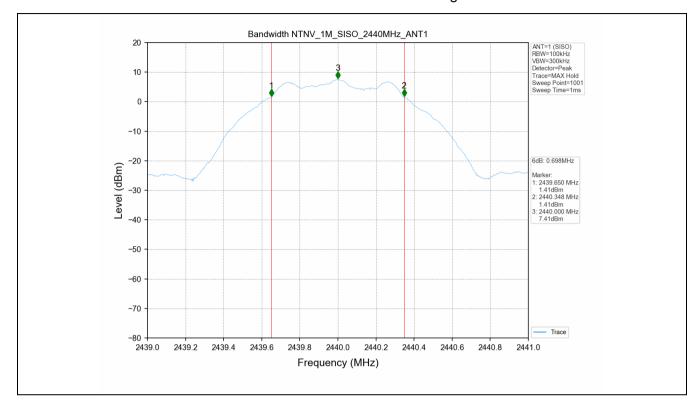
## 2.2 Test Graph - 6dB Bandwidth

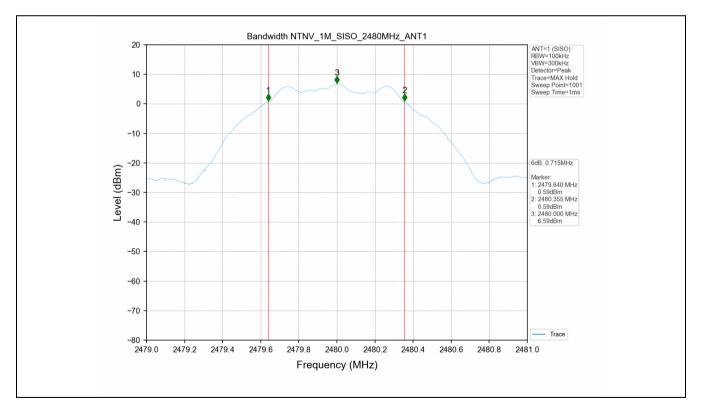






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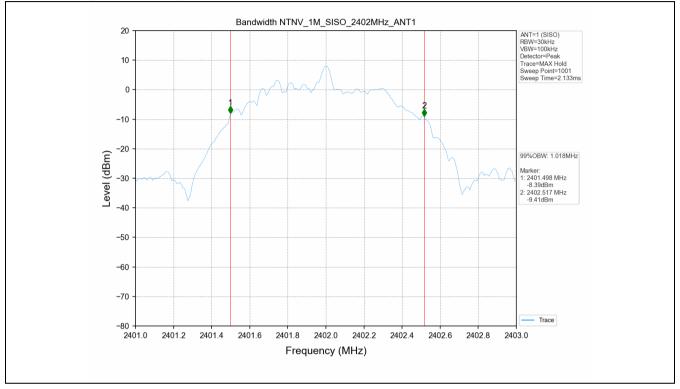
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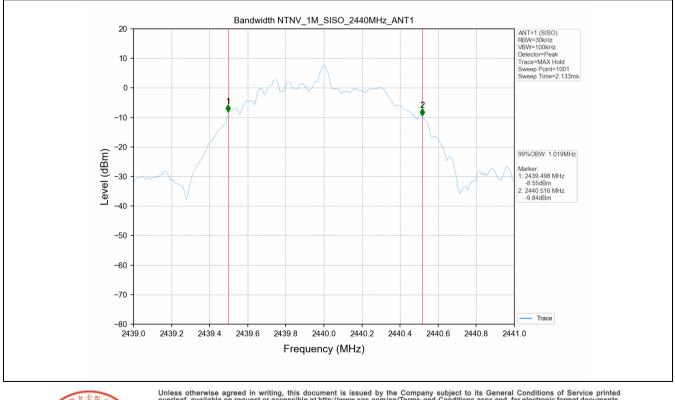
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### 2.3 Test Graph - 99% Occupied Bandwidth



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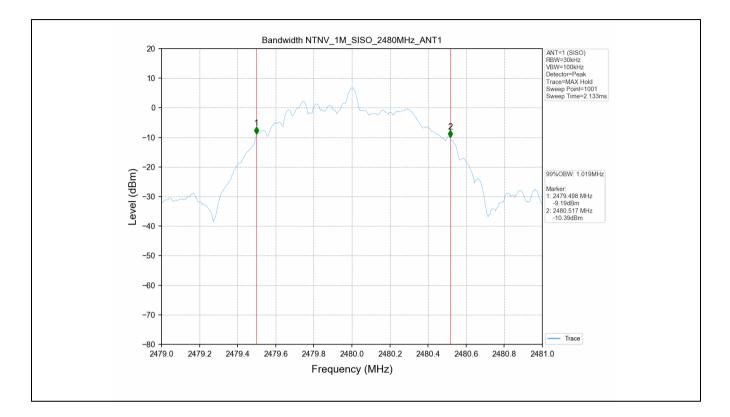
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- 3. Maximum Conducted Output Power
- 3.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Measured Peak Output Power (dBm) Ant 1	Limits (dBm)	Verdict	
	2402	SISO	7.94	30	PASS	
1M	2440	SISO	7.63	30	PASS	
	2480	SISO	7.05	30	PASS	

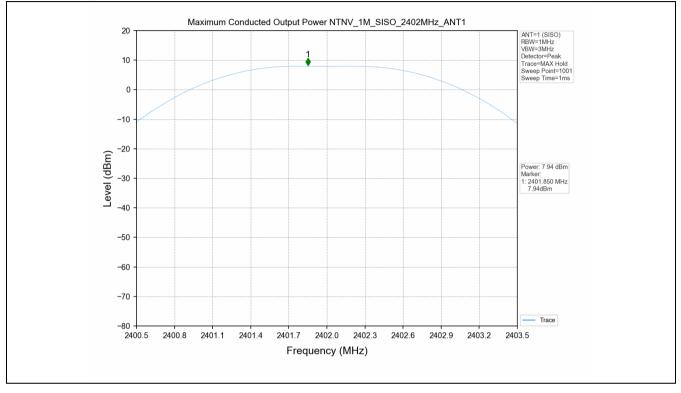


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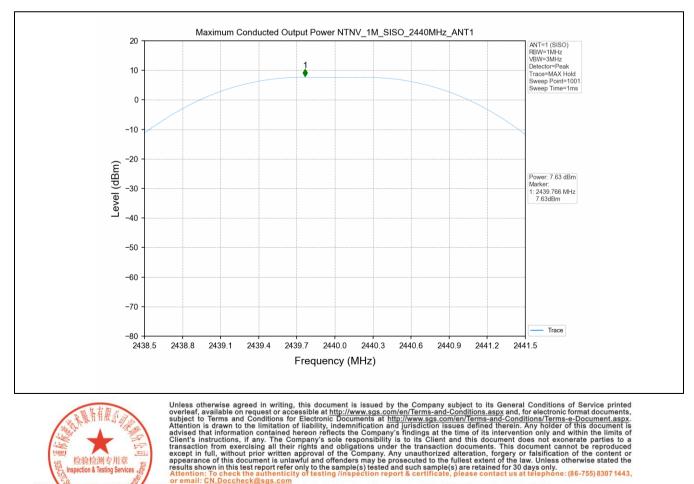
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### 3.2 Test Graph



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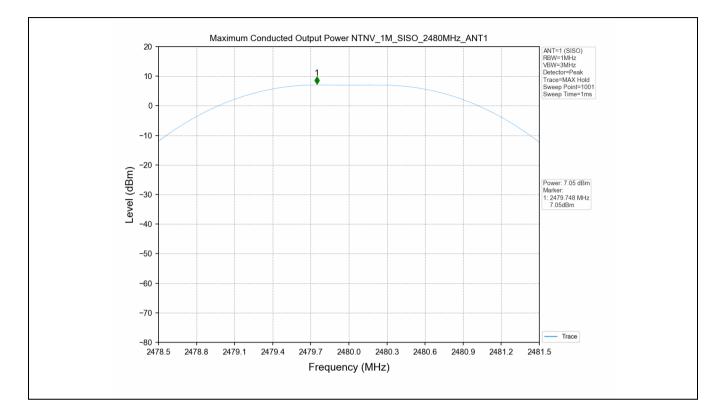
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- 4. Maximum Power Spectral Density (PSD)
- 4.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Maximum Power Spectral Density (dBm/3KHz) Ant 1	Limits (dBm/3kHz)	Verdict
	2402	SISO	-6.42	≤8	PASS
1M	2440	SISO	-6.66	≤8	PASS
	2480	SISO	-7.28	≤8	PASS

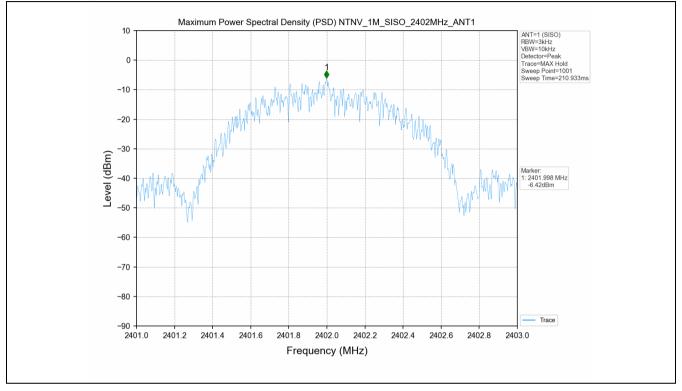


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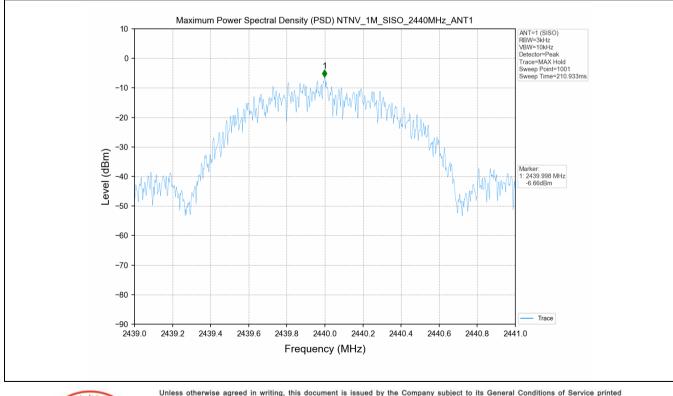
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### 4.2 Test Graph



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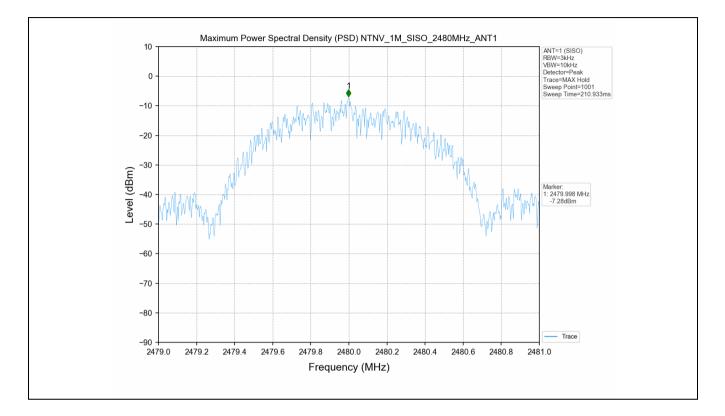
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5. Unwanted Emissions in Non-restricted Frequency Bands

### 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	-12.10	PASS
1M	2440	SISO	1	Refer to test graph	-12.10	PASS
	2480	SISO	1	Refer to test graph	-12.10	PASS

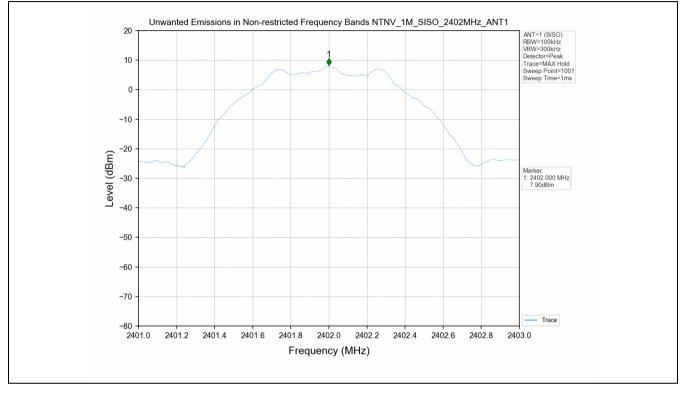


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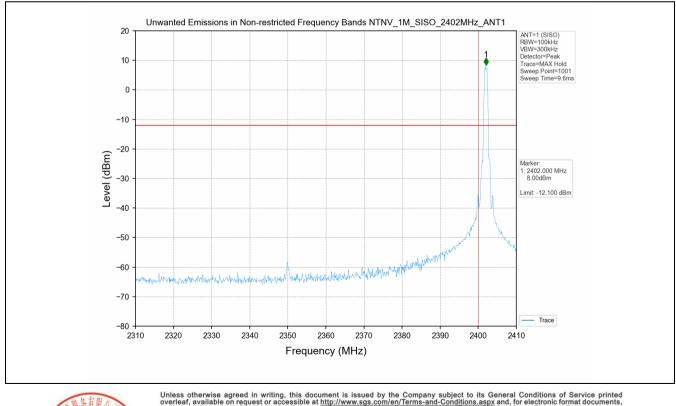
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#### 5.2 Test Graph

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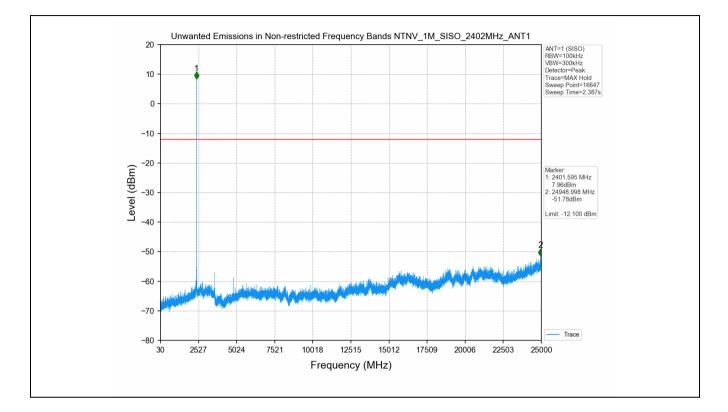
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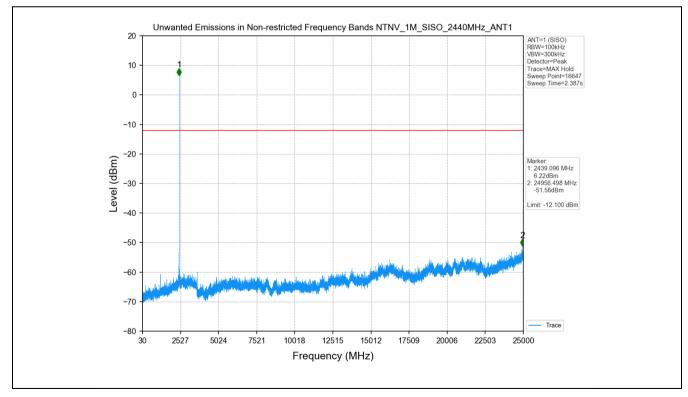


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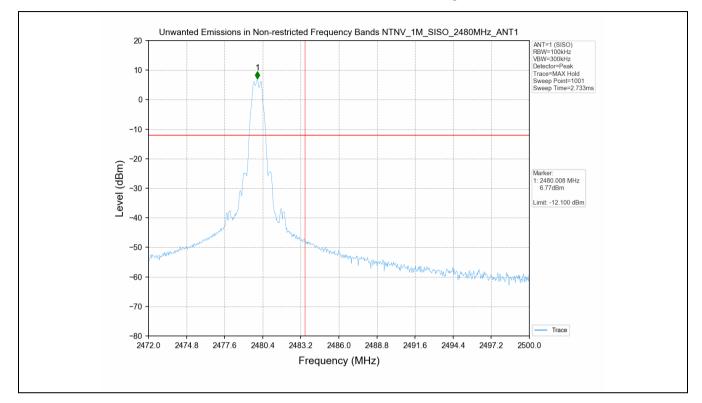


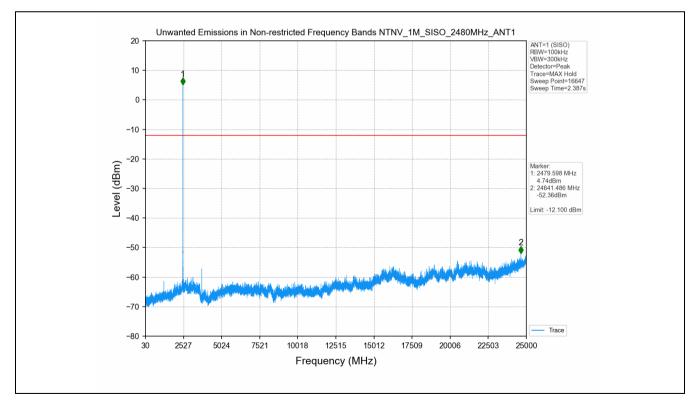






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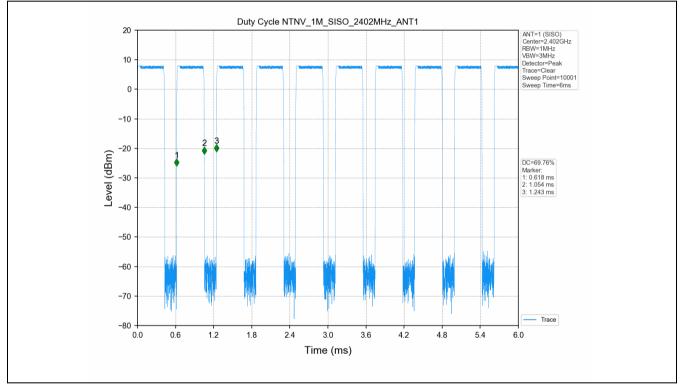
## 9.2 Appendix 15.247 - Right earbuds

## 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	0.436	0.625	69.76	1.56
1M	2440	SISO	1	0.436	0.625	69.76	1.56
	2480	SISO	1	0.436	0.625	69.76	1.56

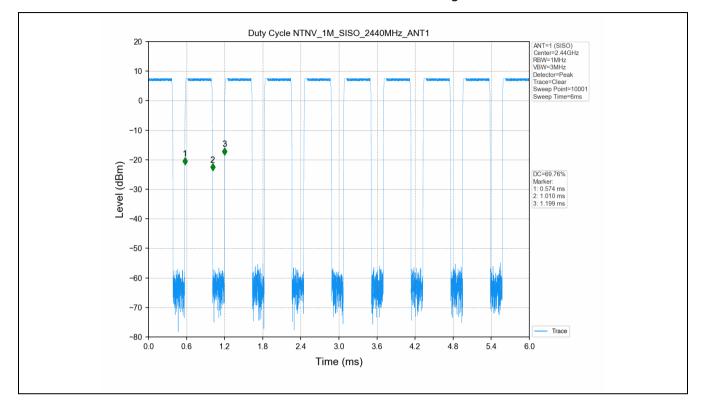
## 1.2 Test Graph

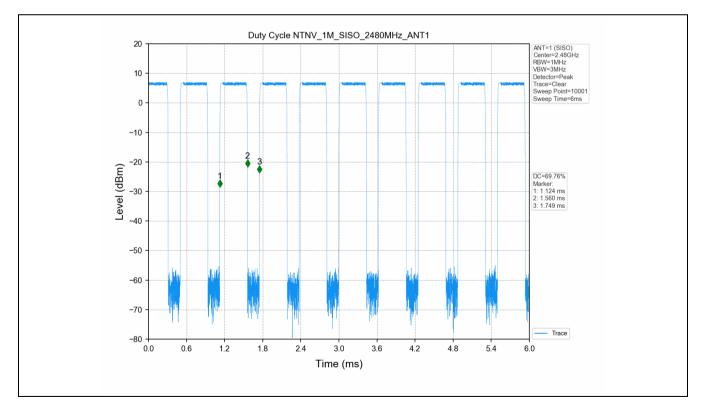






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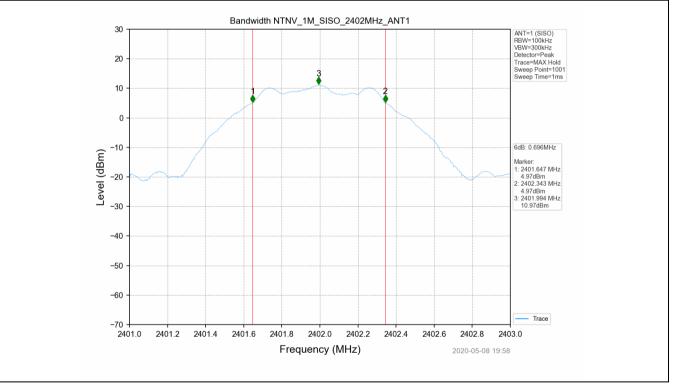
## 2. Bandwidth

## 2.1 Test Result

Test Mode	Frequency (MHz)	ТХ Туре	ANT No.	6dB Bai	Vardiat	
				Test Result (MHz)	Limits (MHz)	Verdict
1M	2402	SISO	1	0.696	≥0.5	PASS
	2440	SISO	1	0.706	≥0.5	PASS
	2480	SISO	1	0.717	≥0.5	PASS

Test Mede	Frequency (MHz)	ТХ Туре	ANT No.	99% Occupied Bandwidth		
Test Mode				Test Result (MHz)		
1M	2402	SISO	1	1.027	Only for Report Use	
	2440	SISO	1	1.027	Only for Report Use	
	2480	SISO	1	1.027	Only for Report Use	

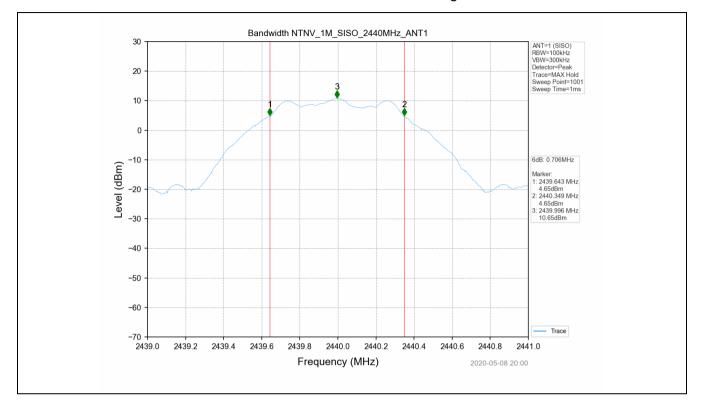
## 2.2 Test Graph - 6dB Bandwidth

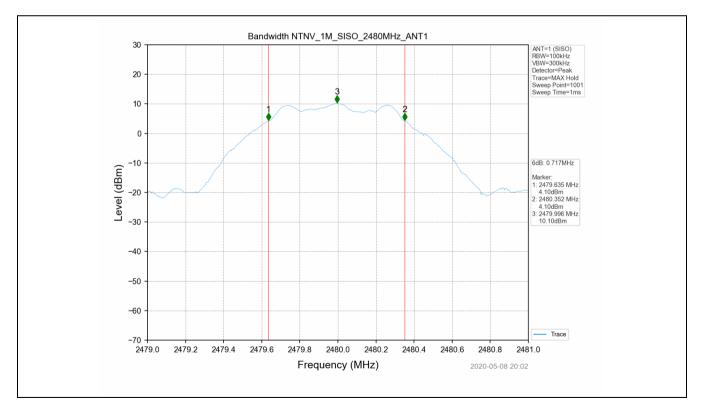






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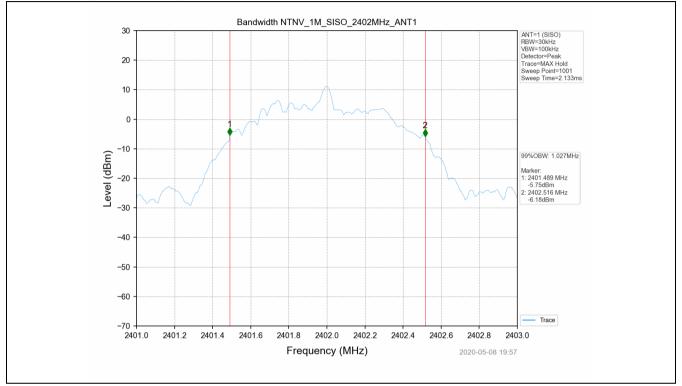
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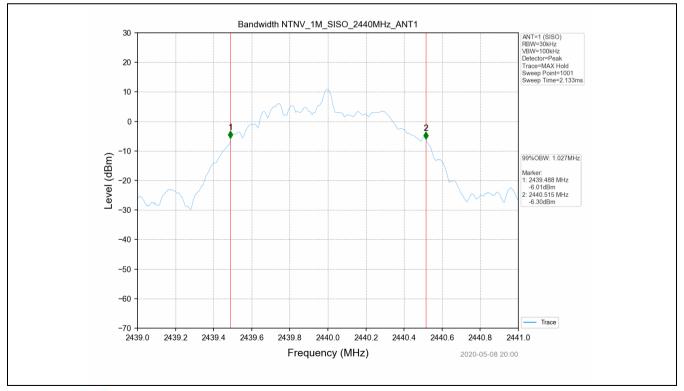
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### 2.3 Test Graph - 99% Occupied Bandwidth



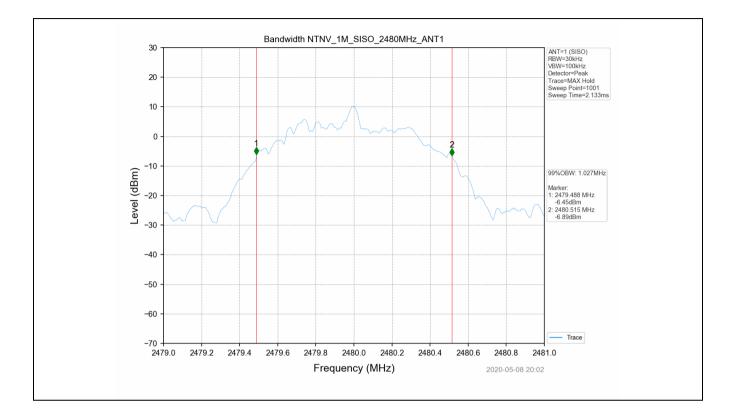
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- 3. Maximum Conducted Output Power
- 3.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Measured Peak Output Power (dBm) Ant 1	Limits (dBm)	Verdict
1M	2402	SISO	7.96	30	PASS
	2440	SISO	7.62	30	PASS
	2480	SISO	7.05	30	PASS

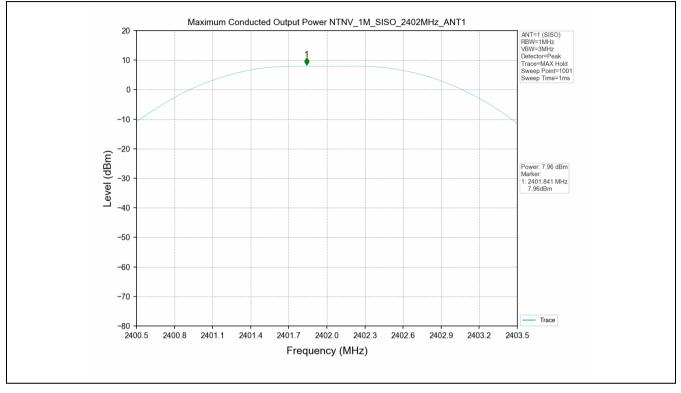


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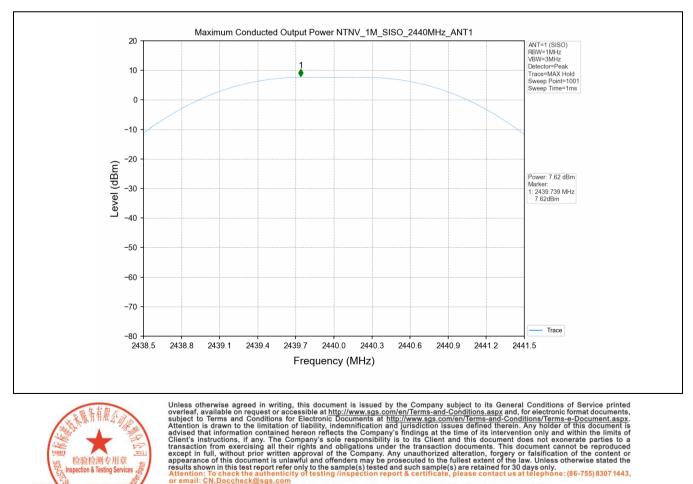
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### 3.2 Test Graph



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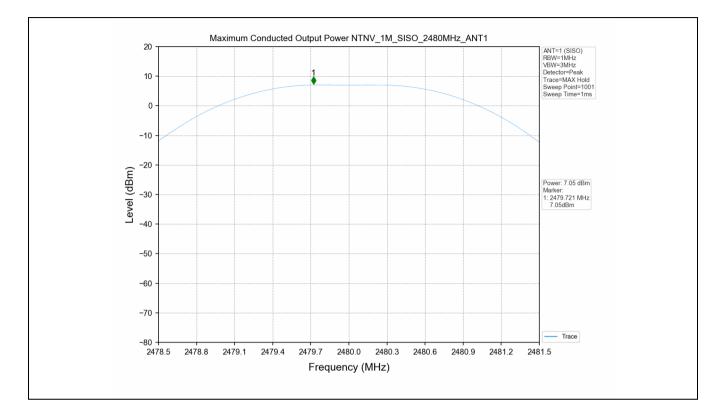
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- 4. Maximum Power Spectral Density (PSD)
- 4.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Maximum Power Spectral Density (dBm/3KHz) Ant 1	Limits (dBm/3kHz)	Verdict
	2402	SISO	-6.37	≤8	PASS
1M	2440	SISO	-6.57	≤8	PASS
	2480	SISO	-7.27	≤8	PASS

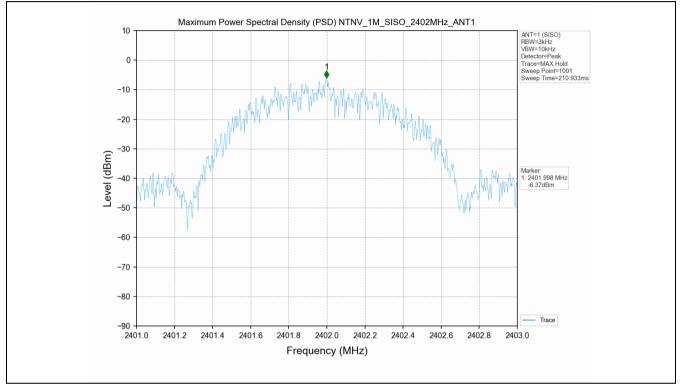


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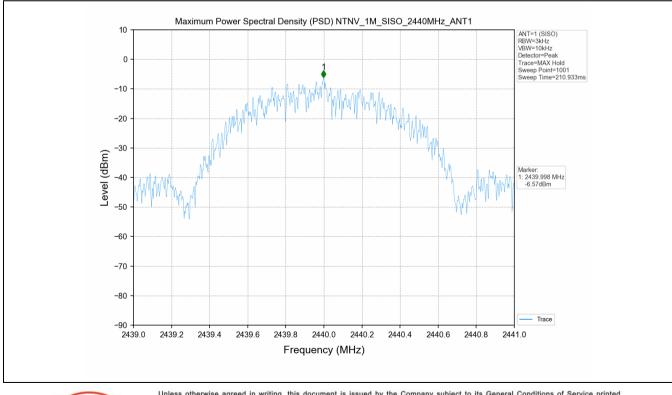
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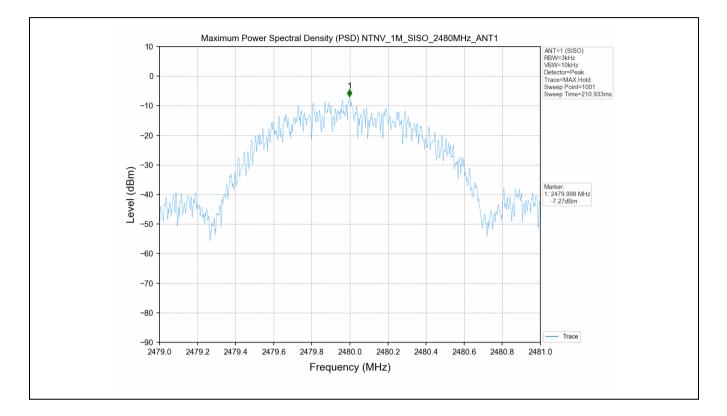
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### 5. Unwanted Emissions in Non-restricted Frequency Bands

### 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	-12.08	PASS
1M	2440	SISO	1	Refer to test graph	-12.08	PASS
	2480	SISO	1	Refer to test graph	-12.08	PASS

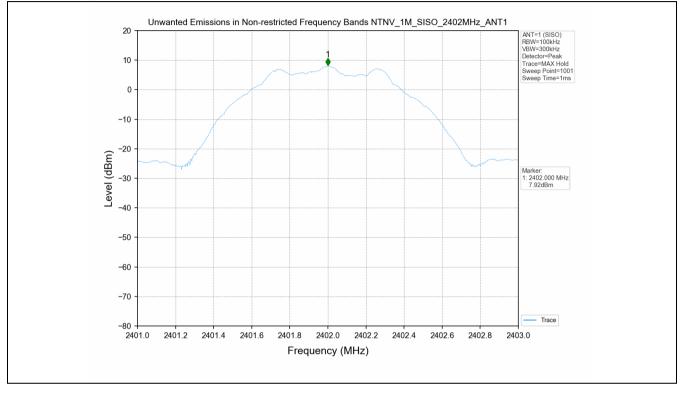


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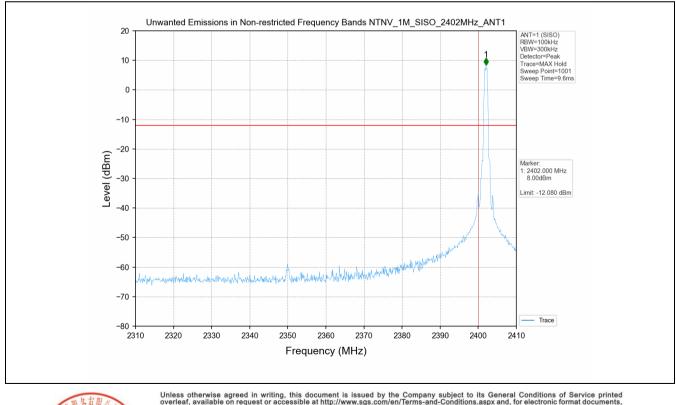
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#### 5.2 Test Graph



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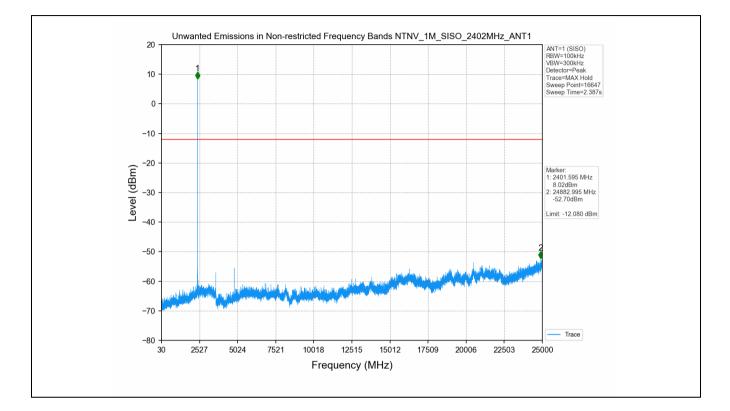
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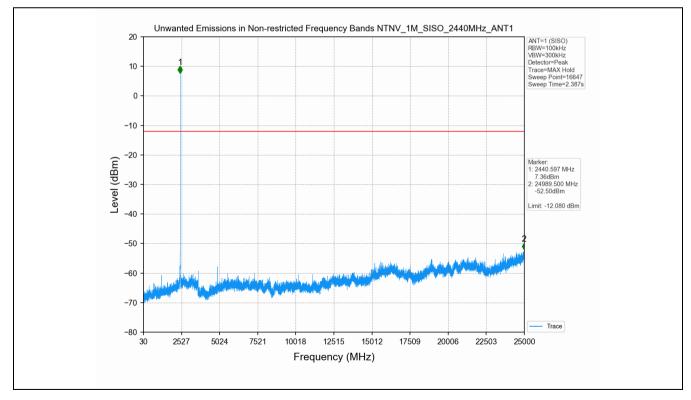


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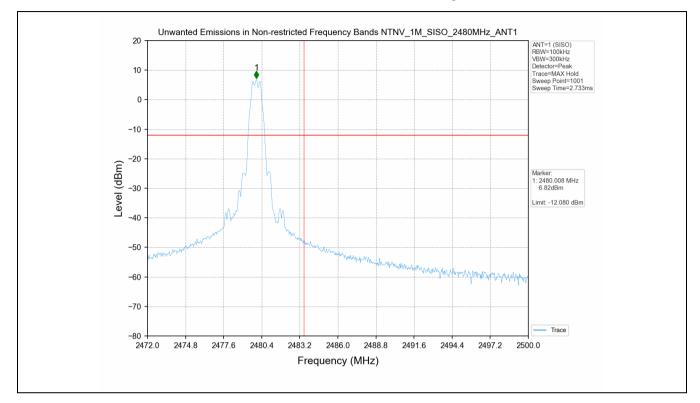


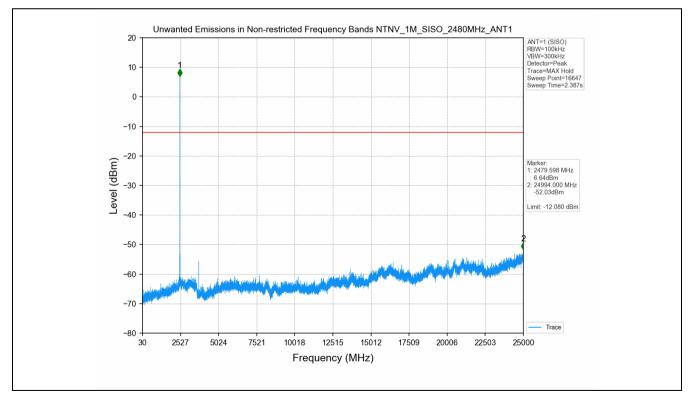






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