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TEST REPORT

Application No.:	SZEM2007006655CR		
Applicant:	Creative Labs Pte. Ltd.		
Address of Applicant:	31 International Business Park, #03-01, Singapore 609921		
Manufacturer:	Creative Labs Pte. Ltd.		
Address of Manufacturer:	31 International Business Park, #03-01, Singapore 609921		
Equipment Under Test (EUT)):		
EUT Name:	Creative SBS E2900		
Model No.:	MF0490		
Trade mark:	Creative		
FCC ID:	2AJIV-MF0490		
Standard(s) :	47 CFR Part 15, Subpart C 15.247		
Date of Receipt:	2020-08-21		
Date of Test:	2020-08-25 to 2020-09-11		
Date of Issue:	2020-09-15		
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						
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01		2020-09-15		Original		

Authorized for issue by:		
	Vincent Chen	
	Vincent Chen/Project Engineer	
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	Eric Fu/Reviewer	



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Test Summary 2

Radio Spectrum Technical Requirement					
ltem	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	
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass	

Radio Spectrum Matter Part					
Item	Standard	Method	Requirement	Result	
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass	
Conducted Peak Output Power			Pass		
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass	
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass	
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass	
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass	
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass	
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass	
Radiated Emissions which fall in the restricted bands	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 Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass	



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4 General Information

4.1 Details of E.U.T.

Power Supply:	AC 110V-230V, 50/60Hz, 700mA DC 3.0V (2*1.5V "AAA" Size Batteries) for remote controller	
Operation Frequency:	2402MHz to 2480MHz	
Bluetooth Version:	V5.0 Classic	
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)	
Modulation Type:	GFSK, π/4DQPSK	
Number of Channels:	79	
Channel Spacing:	1MHz	
Antenna Type:	PCB Antenna	
Antenna Gain:	-0.76dBi	

4.2 Cable

Cable	Length	Shielding	Core
AUX In	165	Unshielded	Non-Core
AC line	190	Unshielded	Non-Core
FM Antenna	149	Unshielded	Non-Core

4.3 Description of Support Units

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



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4.4 Measurement Uncertainty			
Test Item	Measurement Uncertainty		
Conducted Emissions at AC Power Line (150kHz-30MHz)	\pm 3.0dB (150kHz to 30MHz)		
Conducted Peak Output Power	± 0.75dB		
20dB Bandwidth	± 3%		
Carrier Frequencies Separation	± 7.25 x 10-8		
Hopping Channel Number	± 7.25 x 10-8		
Dwell Time	± 0.37%		
Conducted Band Edges Measurement	± 0.75dB		
Conducted Spurious Emissions	± 0.75dB		
Radiated Emissions which fall in the restricted bands	± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)		
Radiated Spurious Emissions	± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)		

Remark:

The Ulab (lab Uncertainty) is less than Ucispr (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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4.5 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.

4.6 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.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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Equipment List 5

Conducted Emissions at AC Power Line (150kHz-30MHz)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2019-06-13	2022-06-12	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
On avrial Only In	SGS	N/A	SEM024-01	2019-07-11	2020-07-10	
Coaxial Cable	363	N/A	SEIM024-01	2020-07-10	2021-07-09	
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019-09-24	2020-09-23	
LISN	ETS-LINDGREN	3816/2	SEM007-02	2020-04-01	2021-03-31	
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2020-03-24	2021-03-23	

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
Cooviel Cable		N1/A	CEM024 02	2019-07-11	2020-07-10
Coaxial Cable	SGS	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



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20dB 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
Coaxial Cable	000	N1/A	SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	SGS	N/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

Carrier Frequencies Sep	paration				
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			0EM034 00	2019-07-11	2020-07-10
Coaxial Cable	SGS	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



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Hopping Channel Numb	er				
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 Cable	SGS	N1/A	N/A SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	363	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

Dwell Time					
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 Cable	202	N1/A	SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	SGS	N/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



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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	000	N/A	SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	SGS			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 Spurious En	nissions				
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 Cable		N1/A	N/A SEM031-02	2019-07-11	2020-07-10
Coaxial Cable	SGS	N/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

Radiated 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	Agilent Technologies	N9038A	SEM004-15	2019-12-16	2020-12-15
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-02	2019-05-24	2022-05-23
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2020-04-01	2021-03-31
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09



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Radiated 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
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
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	2017-10-17	2020-10-16
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31

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
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
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	2017-10-17	2020-10-16
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31



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General used equipmen	t				
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)

Limit:

Standard Requirement:

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

15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.76dBi.

Antenna location: Refer to Internal photos.



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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247

Limit:

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- > Number of shift register stages: 9
- > Length of pseudo-random sequence: 29 -1 = 511 bits
- > Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



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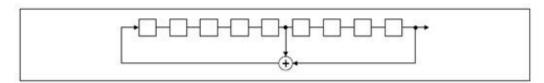
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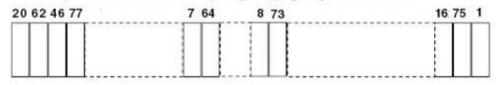
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Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement:	47 CFR Part 15, Subpart C 15.207
Test Method:	ANSI C63.10 (2013) Section 6.2

Limit:

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

7.1.1 E.U.T. Operation

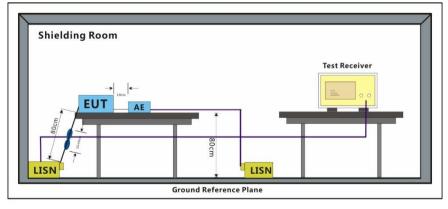
Operating Environment:

Temperature:	23 °	C Humidit	y: 56	% RH	Atmospheric Pressure:	1000	mbar
•			,		•		

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.1.3 Test Setup Diagram





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7.1.4 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50µH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

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



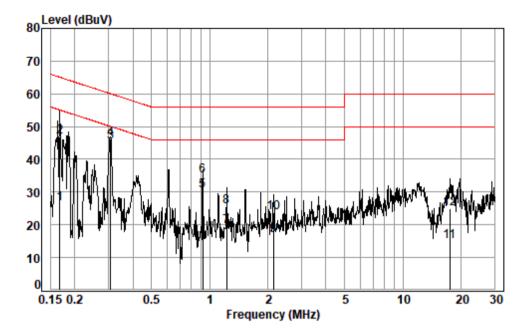
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Test Mode: 00: Line: Live line



Site : Shielding Room Condition: Line Job No. : 06655CR Test mode: 00

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1677	0.01	9.68	16.89	26.58	55.08	-28.50	Average
2	0.1677	0.01	9.68	37.11	46.80	65.08	-18.28	QP
3	0.3067	0.04	9.68	35.70	45.42	50.06	-4.64	Average
4	0.3067	0.04	9.68	36.60	46.32	60.06	-13.74	QP
5	0.9184	0.09	9.70	20.67	30.46	46.00	-15.54	Average
6	0.9184	0.09	9.70	25.21	35.00	56.00	-21.00	QP
7	1.2226	0.11	9.71	9.65	19.47	46.00	-26.53	Average
8	1.2226	0.11	9.71	15.65	25.47	56.00	-30.53	QP
9	2.1439	0.16	9.76	6.87	16.79	46.00	-29.21	Average
10	2.1439	0.16	9.76	13.89	23.81	56.00	-32.19	QP
11	17.4750	0.23	10.76	3.85	14.84	50.00	-35.16	Average
12	17.4750	0.23	10.76	13.89	24.88	60.00	-35.12	QP



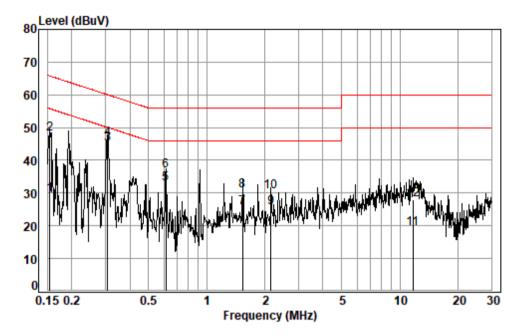
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Test Mode: 00: Line: Neutral Line

Site :	Shielding	Room
Condition:	Neutral	
Job No. :	06655CR	
Test mode:	00	

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1540	0.01	9.67	19.89	29.57	55.78	-26.21	Average
2	0.1540	0.01	9.67	38.50	48.18	65.78	-17.60	QP
3	0.3067	0.04	9.67	35.38	45.09	50.06	-4.97	Average
4	0.3067	0.04	9.67	36.81	46.52	60.06	-13.54	QP
5	0.6140	0.07	9.68	23.00	32.75	46.00	-13.25	Average
6	0.6140	0.07	9.68	26.92	36.67	56.00	-19.33	QP
7	1.5355	0.13	9.71	15.64	25.48	46.00	-20.52	Average
8	1.5355	0.13	9.71	20.73	30.57	56.00	-25.43	QP
9	2.1553	0.16	9.74	15.63	25.53	46.00	-20.47	Average
10	2.1553	0.16	9.74	20.46	30.36	56.00	-25.64	QP
11	11.6826	0.19	10.36	8.73	19.28	50.00	-30.72	Average
12	11.6826	0.19	10.36	17.44	27.99	60.00	-32.01	QP



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7.2 Conducted Peak Output Power

Test Requirement	47 CFR Part 15, Subpart C 15.247
Test Method:	ANSI C63.10 (2013) Section 7.8.5

Limit:

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

7.2.1 E.U.T. Operation

Operating Environment: Temperature: 23.3 °C

Humidity: 52.6 % RH

Atmospheric Pressure: 1000 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



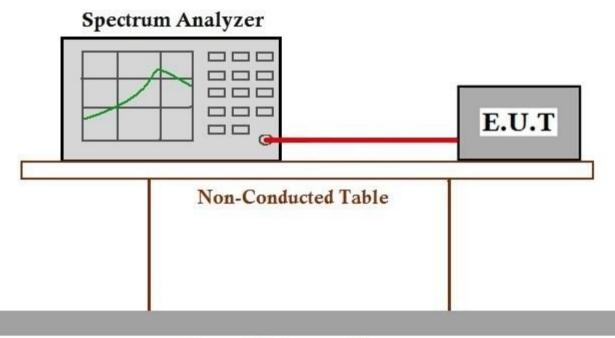
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7.2.3 Test Setup Diagram



Ground Reference Plane

7.2.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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7.3 20dB Bandwidth

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

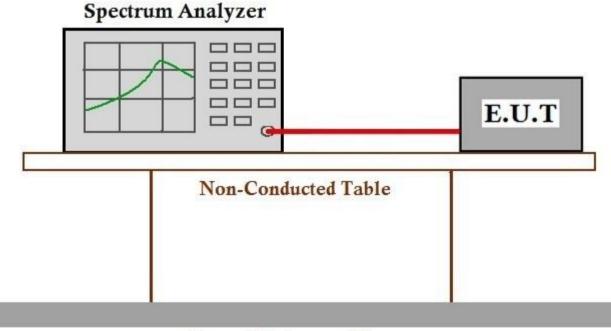
7.3.1 E.U.T. Operation

Operating Enviror	nment:				
Temperature:	23.3 °C	Humidity:	52.6 % RH	Atmospheric Pressure: 1000 mb	bar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



Ground Reference Plane

7.3.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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7.4 Carrier Frequencies Separation

Test Requirement47 CFR Part 15, Subpart C 15.247Test Method:ANSI C63.10 (2013) Section 7.8.2

Limit:

2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W.

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C

Humidity: 52.6 % RH

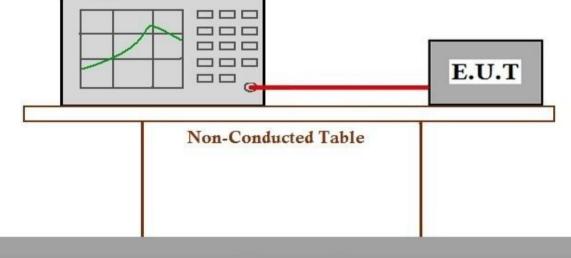
Atmospheric Pressure: 1000 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.4.3 Test Setup Diagram





Ground Reference Plane

7.4.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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7.5 Hopping Channel Number

Test Requirement	47 CFR Part 15, Subpart C 15.247
Test Method:	ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
000.000	50 for 20dB bandwidth <250kHz
902-928	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.5.1 E.U.T. Operation

Operating Environment:						
Temperature:	23.3 °C	Humidity:	52.6 % RH	Atmospheric Pressure:	1000	mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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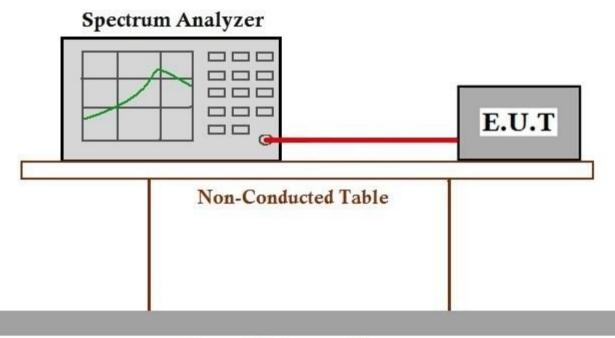
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7.5.3 Test Setup Diagram



Ground Reference Plane

7.5.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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7.6 Dwell Time

Test Requirement	47 CFR Part 15, Subpart C 15.247
Test Method:	ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
002.029	0.4S within a 20S period(20dB bandwidth<250kHz)
902-928	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400 2402 5	0.4S within a period of 0.4S multiplied by the number
2400-2483.5	of hopping channels
5725-5850	0.4S within a 30S period

7.6.1 E.U.T. Operation

Operating Environment:						
Temperature:	23.3 °C	Humidity:	52.6 % RH	Atmospheric Pressure:	1000	mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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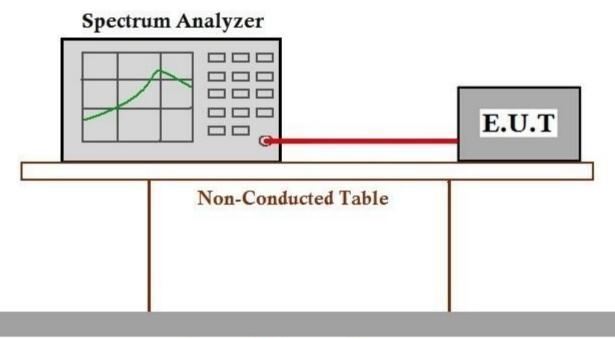
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7.6.3 Test Setup Diagram



Ground Reference Plane

7.6.4 Measurement Procedure and Data

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7.7 Conducted Band Edges Measurement

Test Requirement Test Method: 47 CFR Part 15, Subpart C 15.247 ANSI C63.10 (2013) Section 7.8.6

Limit:

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

7.7.1 E.U.T. Operation

Operating Environment:						
Temperature:	23.3 °C	Humidity:	52.6 % RH	Atmospheric Pres	sure: 1000	mbar

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.7.2 Test Mode Description



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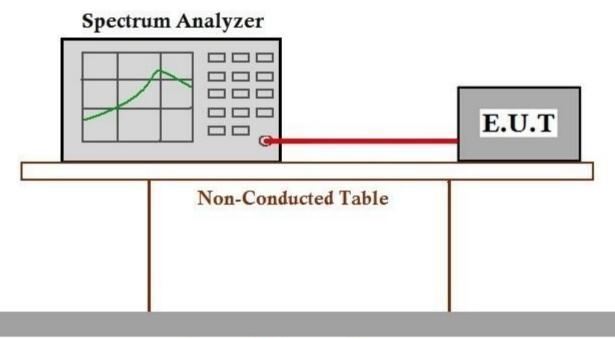
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7.7.3 Test Setup Diagram



Ground Reference Plane

7.7.4 Measurement Procedure and Data

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7.8 Conducted Spurious Emissions

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

Limit:

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

7.8.1 E.U.T. Operation

Operating Environment:						
Temperature:	23.3 °C	Humidity:	52.6 % RH	Atmospheric Pressure:	1000	mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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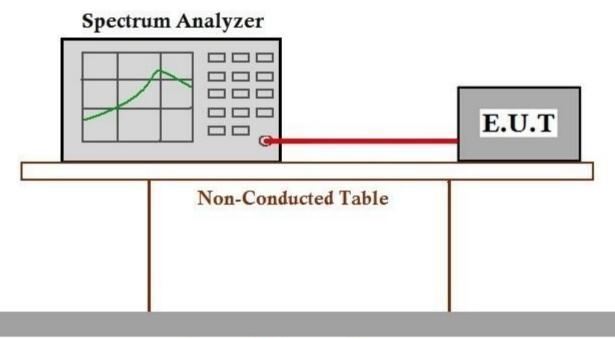
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7.8.3 Test Setup Diagram



Ground Reference Plane

7.8.4 Measurement Procedure and Data

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7.9 Radiated Emissions which fall in the restricted bands

47 CFR Part 15, Subpart C 15.205 & 15.209 Test Requirement Test Method: ANSI C63.10 (2013) Section 6.10.5

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.

Average value:

	Average value=Peak value + PDCF					
Calculate Formula:	PDCF=20 log(Duty cycle)					
	Duty cycle= T on time / T period					
	Ton time =2.904ms					
Test data:	T period =100ms					
	PCDF value= -30.74dB					



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7.9.1 E.U.T. Operation

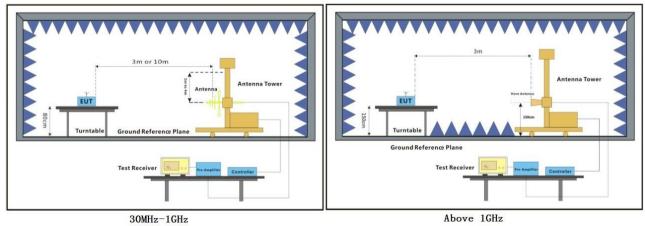
Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1000 mba	Temperature:	25	°C	Humidity:	55	% RH	Atmospheric Pressure:	1000	mbar
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7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.9.3 Test Setup Diagram





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7.9.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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

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

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

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



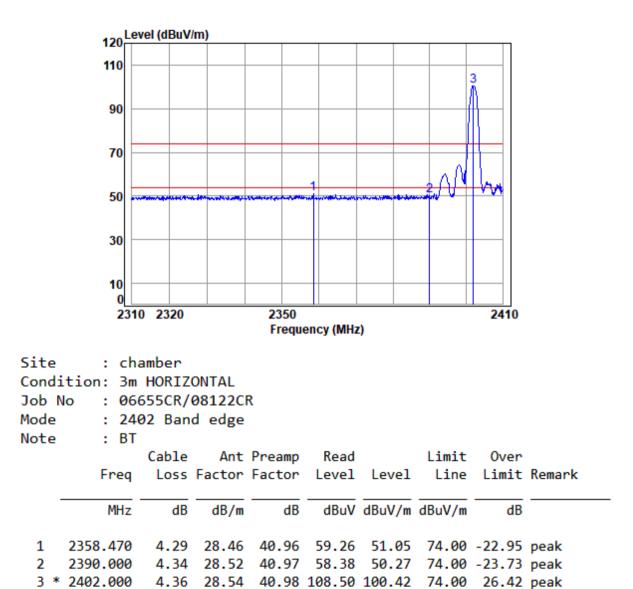
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low





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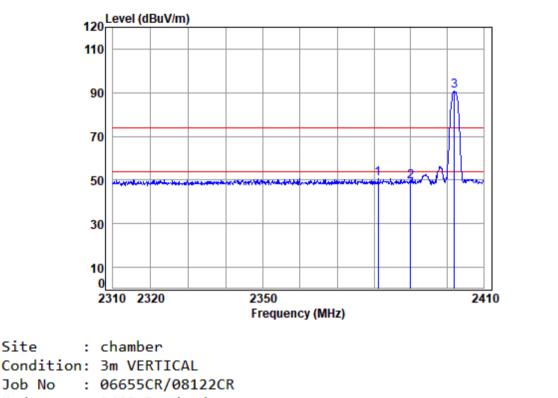
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Mode	5								
Note	: BT	Cable	Δnt	Preamp	Read		limit	0ver	
	Frea			Factor					Romank
	i i eq	2033	1 ac coi	1 ac coi	Lever	Level	LTHE	LIMIC	Nellion K
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2381.168	4.33	28.50	40.97	58.84	50.70	74.00	-23.30	peak
2	2390.000	4.34	28.52	40.97	57.40	49.29	74.00	-24.71	peak
3 *	2402.000	4.36	28.54	40.98	98.69	90.61	74.00	16.61	peak



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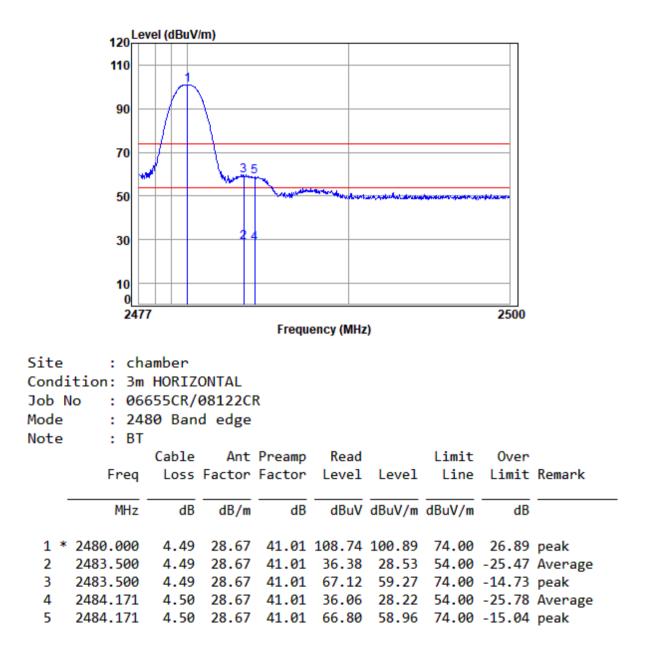
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High





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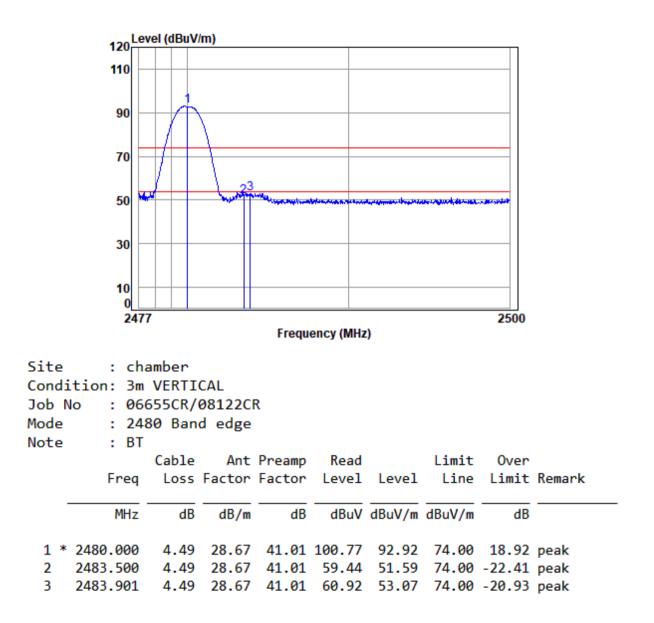
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High





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7.10 Radiated Spurious Emissions

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

Limit:

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.10.1 E.U.T. Operation

Operating Enviror	nment	t:						
Temperature:	25	°C	Humidity:	51	% RH	Atmospheric Pressure:	1000	mbar

7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



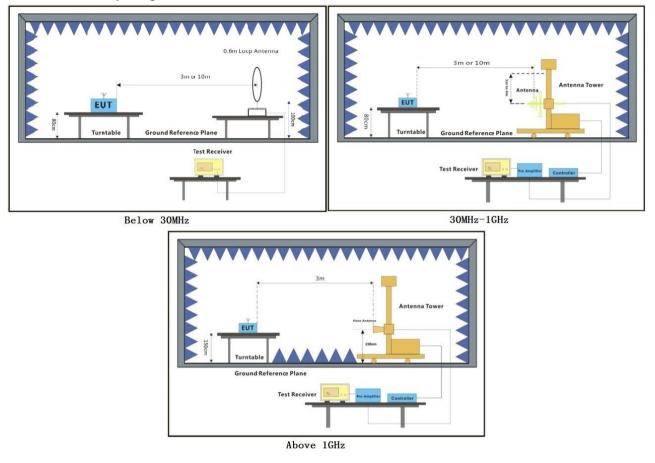
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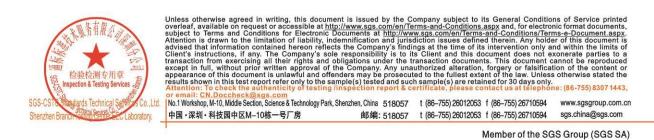
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7.10.3 Test Setup Diagram







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7.10.4 Measurement Procedure and Data

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

b. 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.



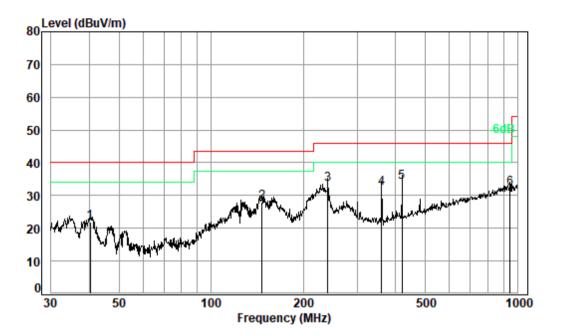
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Radiated Emission below 1GHz 30MHz~1GHz (QP) Test Mode: 00; Polarity: Horizontal



Condition: 3m HORIZONTAL Job No. : 06655CR Test mode: 00

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	40.28	0.70	17.40	27.70	31.41	21.81	40.00	-18.19	QP
2	146.89	1.16	14.35	27.35	39.86	28.02	43.50	-15.48	QP
3	239.99	1.56	18.80	27.02	40.01	33.35	46.00	-12.65	QP
4	360.45	2.19	21.39	27.20	35.92	32.30	46.00	-13.70	QP
5 p	p 420.58	2.34	22.89	27.48	36.33	34.08	46.00	-11.92	QP
6	945.44	3.55	30.03	26.93	25.49	32.14	46.00	-13.86	QP



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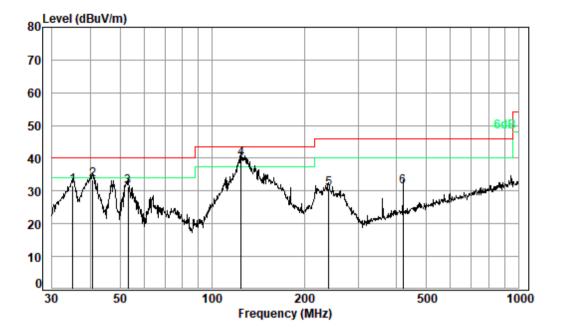
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Test Mode: 00; Polarity: Vertical



Condition: 3m VERTICAL Job No. : 06655CR Test mode: 00

	Freq			Preamp Factor					Remark
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	35.13	0.65	19.76	27.72	39.01	31.70	40.00	-8.30	QP
2	40.70	0.70	17.24	27.70	43.30	33.54	40.00	-6.46	QP
3	53.13	0.73	13.87	27.68	44.39	31.31	40.00	-8.69	QP
4 pp	124.13	1.13	13.23	27.46	52.98	39.88	43.50	-3.62	QP
5	239.99	1.56	18.80	27.02	37.26	30.60	46.00	-15.40	QP
6	420.58	2.34	22.89	27.48	33.72	31.47	46.00	-14.53	QP



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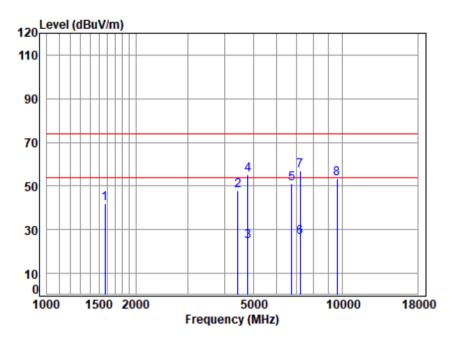
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Transmitter emission above 1GHz

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



Site :	chamber
Condition:	3m HORIZONTAL
Job No :	06655CR/08122CR
Mode :	2402 TX SE

Note

ote	: BT								
		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	
4	4574 265		26.44	40.55	F2 22	40.45	74.00	24.05	
1	1574.265	3.33	26.14	40.55	53.23	42.15	74.00	-31.85	реак
2	4430.628	6.70	33.48	42.50	50.11	47.79	74.00	-26.21	peak
3	4804.000	7.10	33.97	42.77	26.21	24.51	54.00	-29.49	Average
4	4804.000	7.10	33.97	42.77	56.95	55.25	74.00	-18.75	peak
5	6756.708	8.42	35.76	41.81	48.91	51.28	74.00	-22.72	peak
6	7206.000	8.74	36.07	41.58	23.28	26.51	54.00	-27.49	Average
7	7206.000	8.74	36.07	41.58	54.02	57.25	74.00	-16.75	peak
8	9608.000	10.81	37.67	38.57	43.48	53.39	74.00	-20.61	peak



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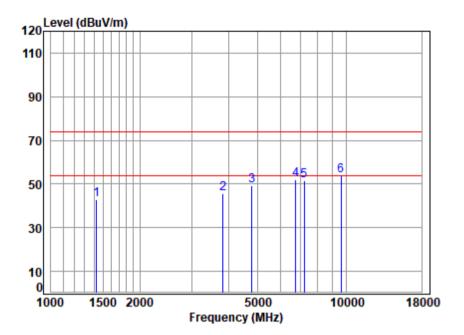
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site :	chamber
Condition:	3m VERTICAL
Job No :	06655CR/08122CR
Mode :	2402 TX SE

Note

ote	: BT								
		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	1426.916	3.15	25.53	40.46	54.64	42.86	74.00	-31.14	peak
2	3834.438	6.04	32.38	42.02	49.40	45.80	74.00	-28.20	peak
3	4804.000	7.10	33.97	42.77	51.11	49.41	74.00	-24.59	peak
4	6756.708	8.42	35.76	41.81	49.53	51.90	74.00	-22.10	peak
5	7206.000	8.74	36.07	41.58	48.19	51.42	74.00	-22.58	peak
6	9608.000	10.81	37.67	38.57	43.78	53.69	74.00	-20.31	peak



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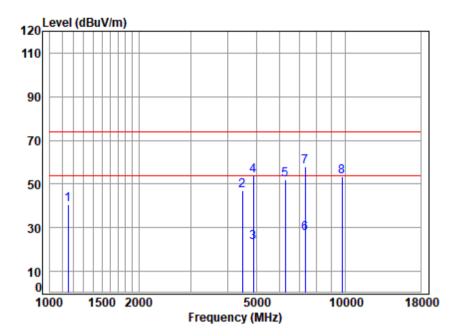
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site :	chamber
Condition:	3m HORIZONTAL
Job No :	06655CR/08122CR
Mode :	2441 TX SE

Note

ote	: BT								
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
-									
	MHz	dB	dB/m	dB	aBuv	dBuV/m	dBuV/m	dB	
1	1152.148	2.67	24.37	40.24	53.83	40.63	74.00	-33.37	peak
2	4482.150	6.74	33.57	42.54	49.12	46.89	74.00	-27.11	peak
3	4882.000	7.18	34.06	42.82	24.85	23.27	54.00	-30.73	Average
4	4882.000	7.18	34.06	42.82	55.59	54.01	74.00	-19.99	peak
5	6267.553	8.27	35.37	42.08	50.24	51.80	74.00	-22.20	peak
6	7323.000	8.85	36.16	41.52	23.75	27.24	54.00	-26.76	Average
7	7323.000	8.85	36.16	41.52	54.49	57.98	74.00	-16.02	peak
8	9764.000	10.76	37.76	38.34	43.37	53.55	74.00	-20.45	peak



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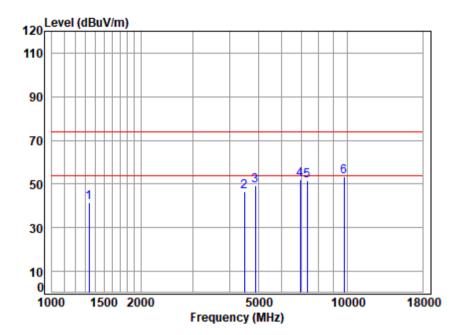
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site :	chamber
Condition:	3m VERTICAL
Job No :	06655CR/08122CR
Mode :	2441 TX SE

Mode	
Note	

ote	: BT								
		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	1335.141	3.00	25.17	40.39	53.52	41.30	74.00	-32.70	peak
2	4482.150	6.74	33.57	42.54	48.55	46.32	74.00	-27.68	peak
3	4882.000	7.18	34.06	42.82	51.03	49.45	74.00	-24.55	peak
4	6934.778	8.51	35.86	41.72	49.31	51.96	74.00	-22.04	peak
5	7323.000	8.85	36.16	41.52	48.02	51.51	74.00	-22.49	peak
6	9764.000	10.76	37.76	38.34	43.43	53.61	74.00	-20.39	peak



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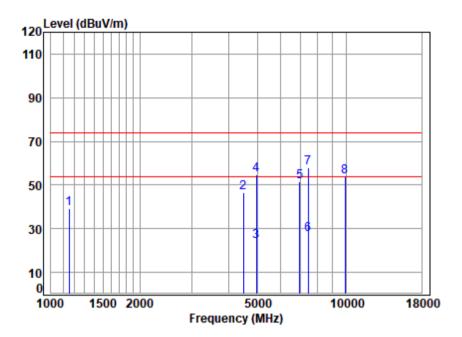
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site :	chamber
Condition:	3m HORIZONTAL
Job No :	06655CR/08122CR
Mode :	2480 TX SE

Note

ote	: BT								
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
-	MHz	dB	dB/m	dB		dBuV/m		dB	
	PILIZ	ub	ub/iii	ub	ubuv	ubuv/iii	ubuv/iii	ub	
1	1152.148	2.67	24.37	40.24	52.61	39.41	74.00	-34.59	peak
2	4482.150	6.74	33.57	42.54	48.70	46.47	74.00	-27.53	peak
3	4960.000	7.26	34.15	42.87	25.48	24.02	54.00	-29.98	Average
4	4960.000	7.26	34.15	42.87	56.22	54.76	74.00	-19.24	peak
5	6954.852	8.52	35.87	41.71	48.82	51.50	74.00	-22.50	peak
6	7440.000	8.96	36.25	41.46	23.68	27.43	54.00	-26.57	Average
7	7440.000	8.96	36.25	41.46	54.42	58.17	74.00	-15.83	peak
8	9920.000	10.71	37.85	38.12	43.26	53.70	74.00	-20.30	peak



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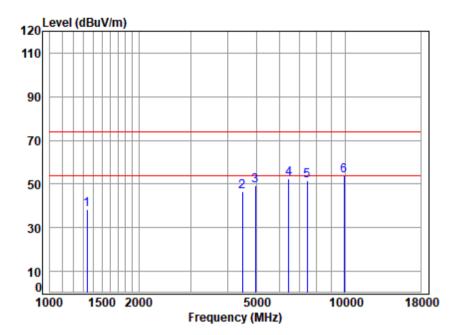
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Site :	chamber
Condition:	3m VERTICAL
Job No :	06655CR/08122CR
Mode :	2480 TX SE

Mode	
Note	

ote	: BT								
		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	1335.141	3.00	25.17	40.39	50.52	38.30	74.00	-35.70	peak
2	4482.150	6.74	33.57	42.54	48.96	46.73	74.00	-27.27	peak
3	4960.000	7.26	34.15	42.87	50.76	49.30	74.00	-24.70	peak
4	6432.732	8.28	35.54	41.99	50.53	52.36	74.00	-21.64	peak
5	7440.000	8.96	36.25	41.46	47.67	51.42	74.00	-22.58	peak
6	9920.000	10.71	37.85	38.12	43.19	53.63	74.00	-20.37	peak



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Test Setup Photo 8

Refer to test setup photos.

EUT Constructional Details (EUT Photos) 9

Refer to external and internal photos.



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10 Appendix

Appendix for 15.247

1. Bandwidth

1.1 Test Result

Test Made	Frequency			20dB Bandwidth	Vardiat
Test Mode	(MHz)	ТХ Туре	ANT No.	Test Result (MHz)	Verdict
	2402	SISO	1	0.947	PASS
GFSK	2441	SISO	1	0.949	PASS
	2480	SISO	1	0.949	PASS
	2402	SISO	1	1.314	PASS
Pi/4DQPSK	2441	SISO	1	1.307	PASS
	2480	SISO	1	1.310	PASS



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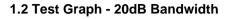
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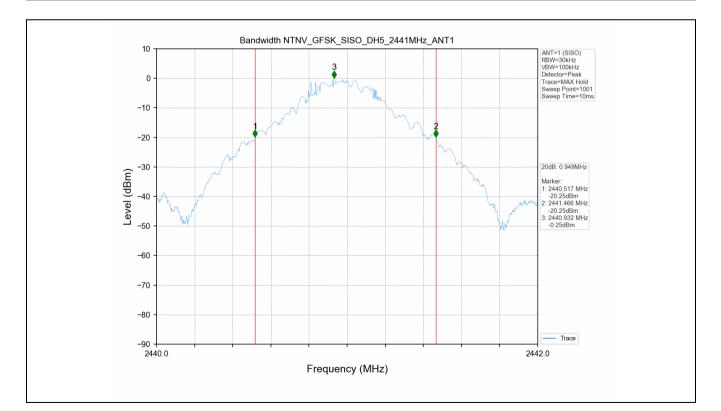
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Bandwidth NTNV_GFSK_SISO_DH5_2402MHz_ANT1 10 ANT=1 (SISO) ANI=1 (SISO) RBW=30kHz VBW=100kHz Detector=Peak Trace=MAX Hold Sweep Point=1001 Sweep Time=10ms 0 my -10 -20 -30 20dB: 0.947MHz Level (dBm) Marke Marker: 1: 2401.519 MHz -20.55dBm 2: 2402.466 MHz -20.55dBm 3: 2401.820 MHz -0.55dBm -40 -50 -60 -70 -80 Trace -90 2401.0 2403.0 Frequency (MHz)







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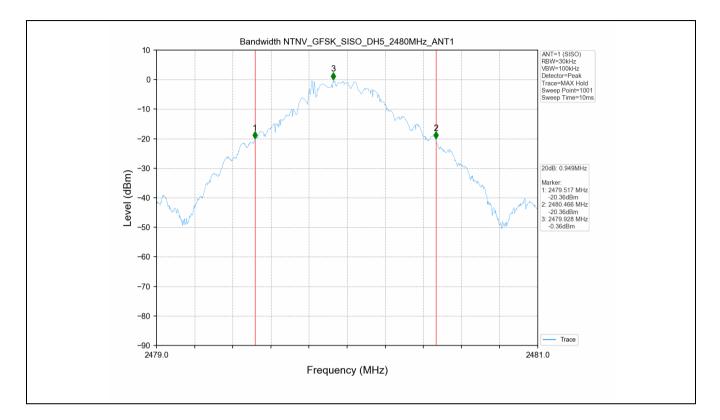
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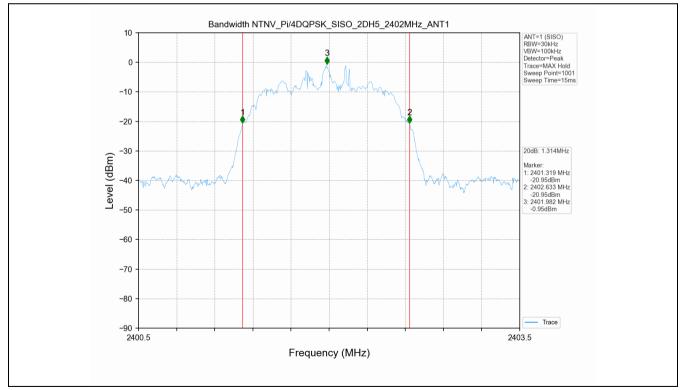
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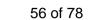


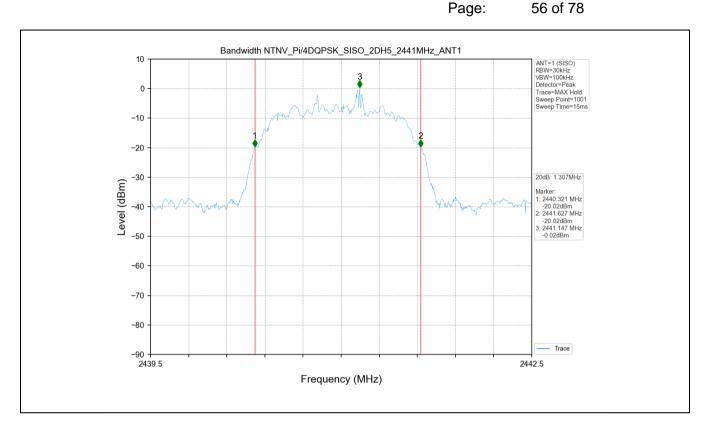


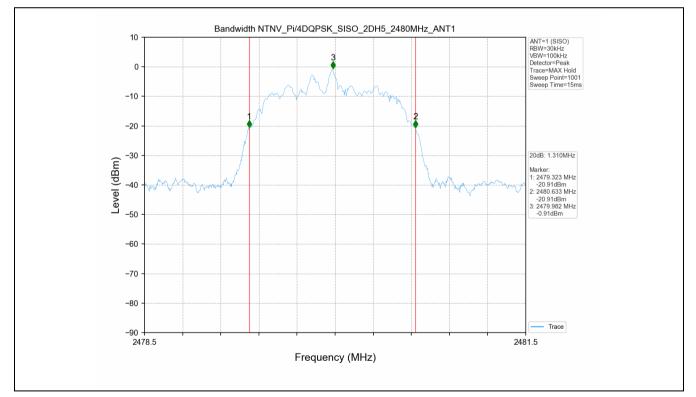
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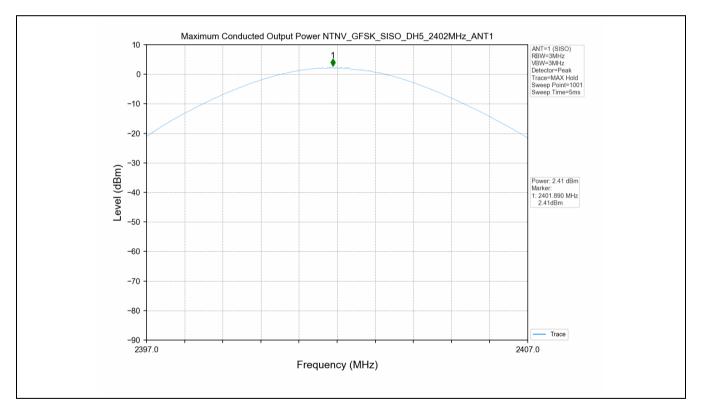
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2. Maximum Conducted Output Power

2.1 Test Result

Test Mode	Frequency (MHz)	Тх Туре	Measured Peak Output Power (dBm) Ant 1	Limits (dBm)	Verdict
	2402	SISO	2.41	30	PASS
GFSK	2441	SISO	3.01	30	PASS
	2480	SISO	2.26	30	PASS
	2402	SISO	2.31	20.97	PASS
Pi/4DQPSK	2441	SISO	3.30	20.97	PASS
	2480	SISO	3.06	20.97	PASS

2.2 Test Graph



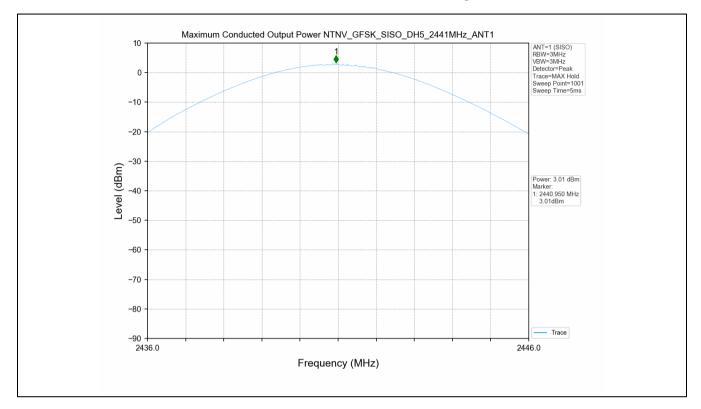


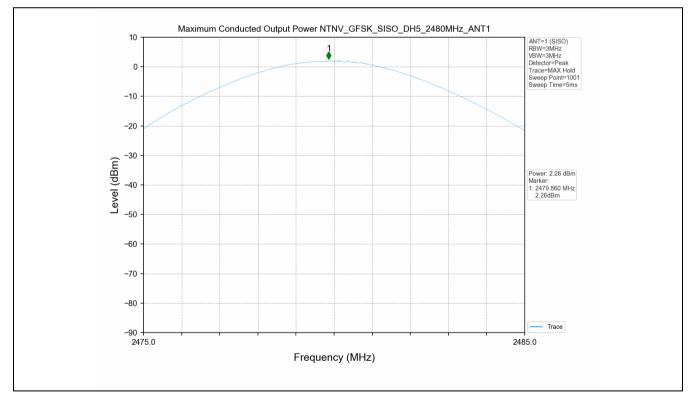


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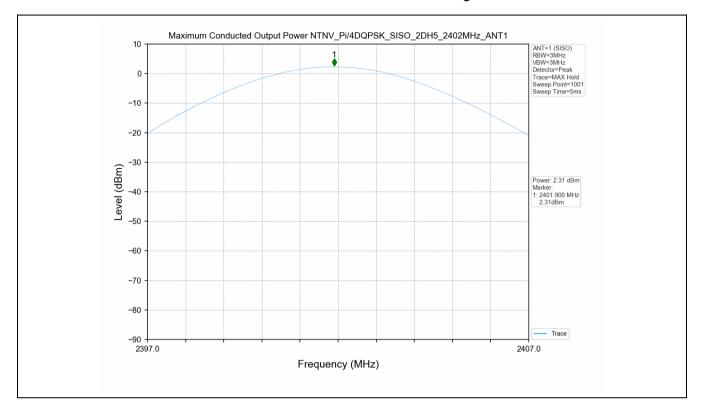
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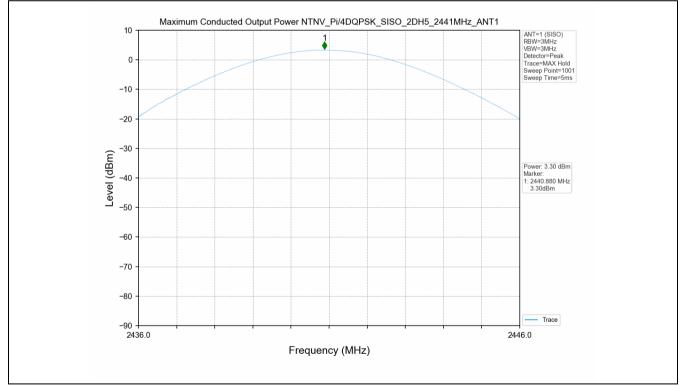


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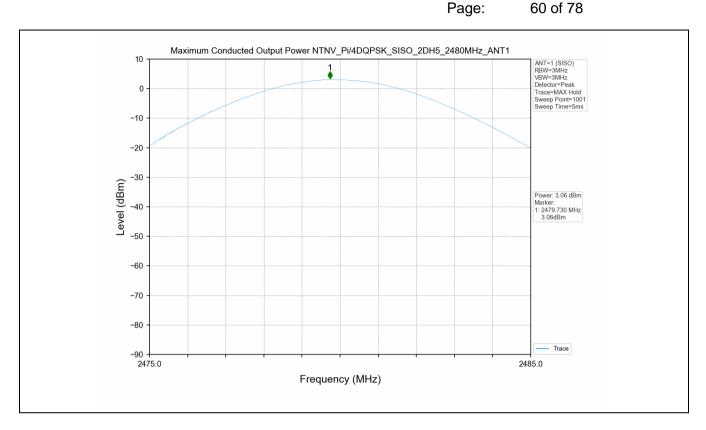
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3. Carrier frequency separation

3.1 Test Result

Test Mode	ТХ Туре	ANT No.	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limits (MHz)	Verdict
GFSK	SISO	1	1.000	0.949	≥0.949	PASS
Pi/4DQPSK	SISO	1	0.984	1.314	≥0.876	PASS



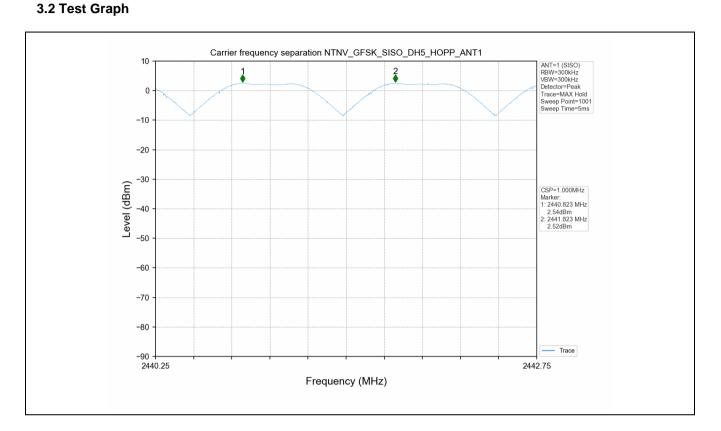
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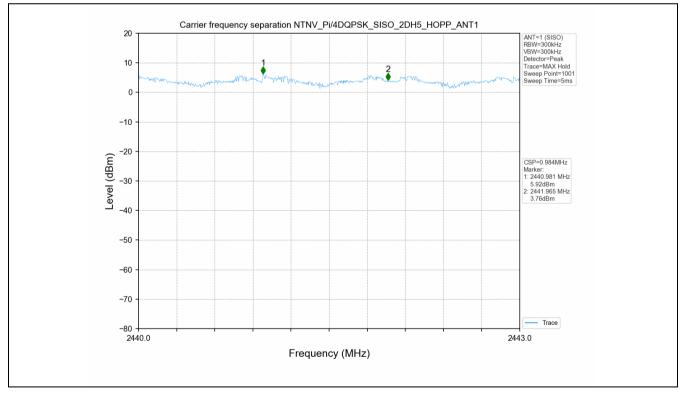
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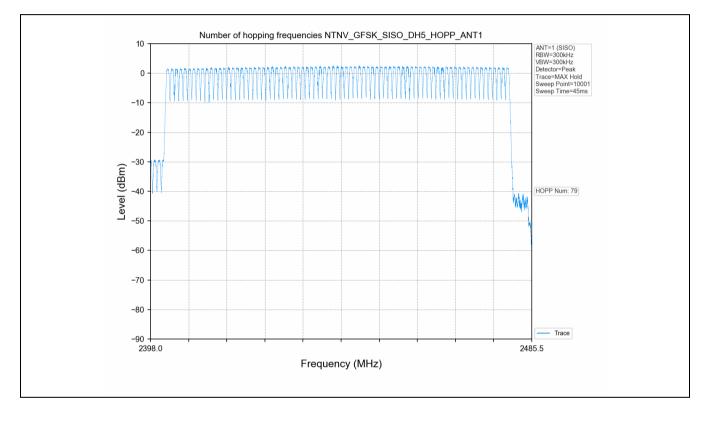
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4. Number of hopping frequencies

4.1 Test Result

Test Mode	ТХ Туре	ANT No.	Num of Hopping Frequencies	Limits	Verdict
GFSK	SISO	1	79	≥15	PASS
Pi/4DQPSK	SISO	1	79	≥15	PASS

4.2 Test Graph



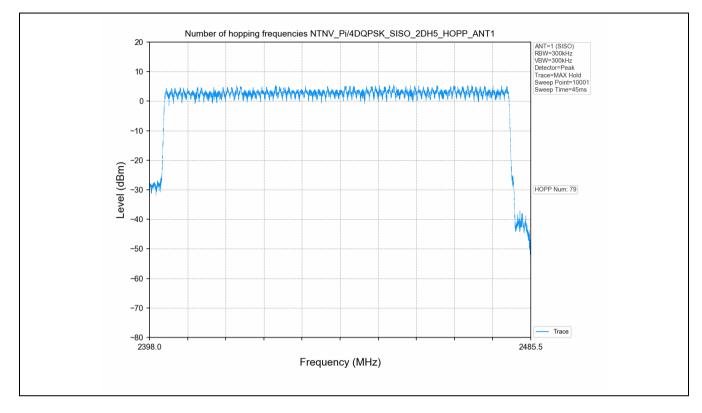




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5. Time of Occupancy (Dwell Time)

5.1 Test Result

Test Mode	Packet Type	ТХ Туре	ANT	Duration of Single Pulse (ms)	ation Pariod	Num of Pulse in Observation Period	Dwell Time (ms)	Limits (ms)	Verdict
	DH1	SISO	1	0.378	31.6	320	120.960	≤400	PASS
GFSK	DH3	SISO	1	1.634	31.6	97	158.498	≤400	PASS
	DH5	SISO	1	2.881	31.6	59	169.979	≤400	PASS
	2DH1	SISO	1	0.389	31.6	320	124.480	≤400	PASS
Pi/4DQ PSK	2DH3	SISO	1	1.640	31.6	111	182.040	≤400	PASS
1 SIX	2DH5	SISO	1	2.887	31.6	63	181.881	≤400	PASS



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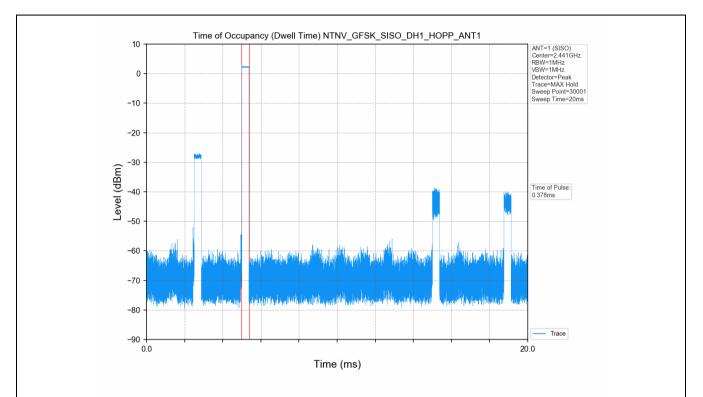
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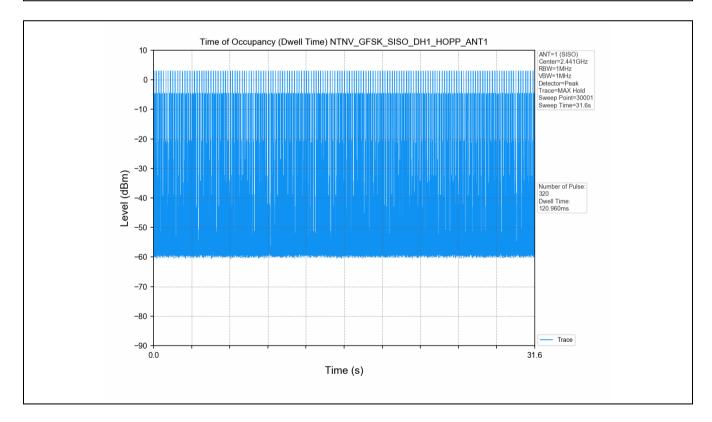
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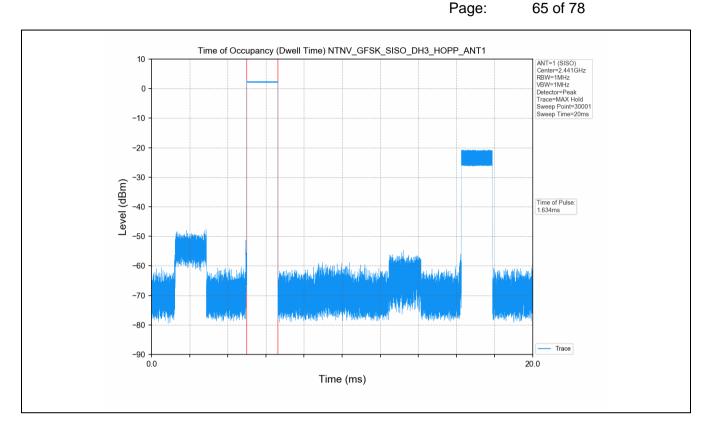
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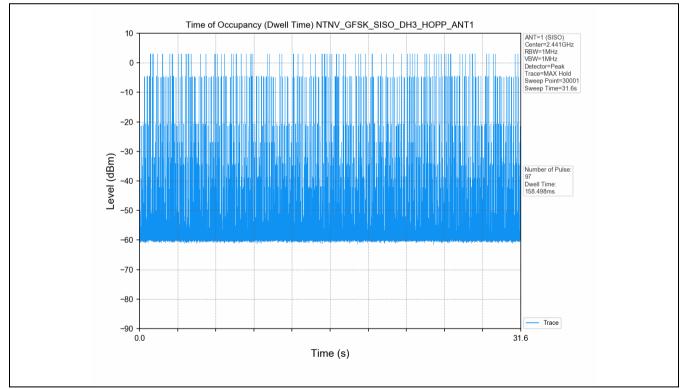
5.2 Test Graph



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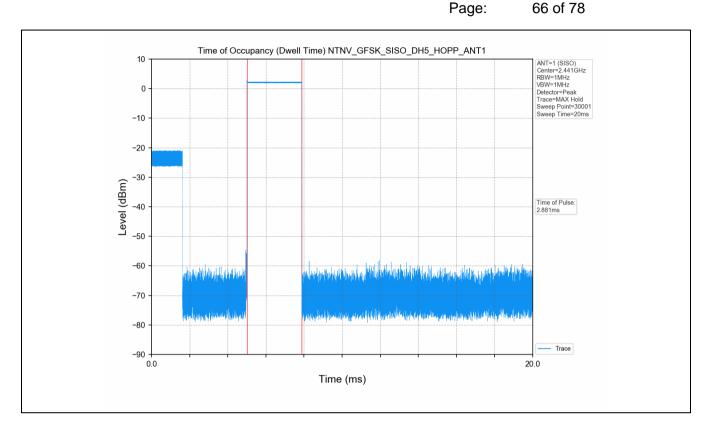
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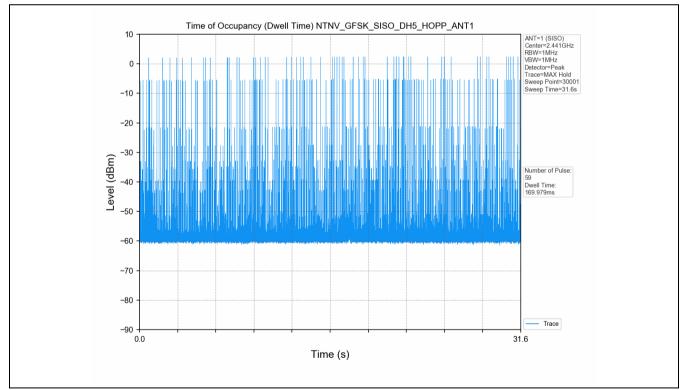
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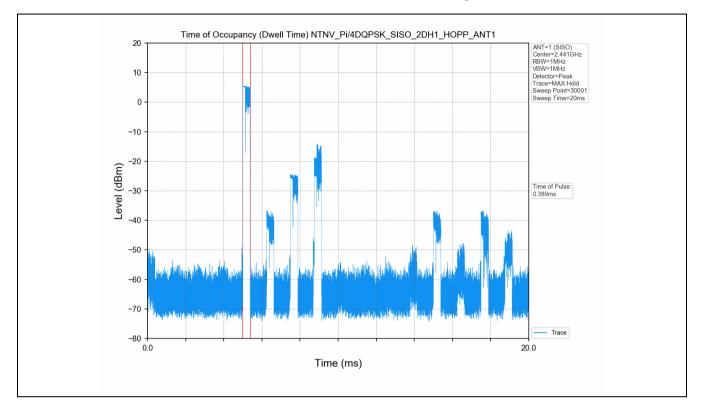
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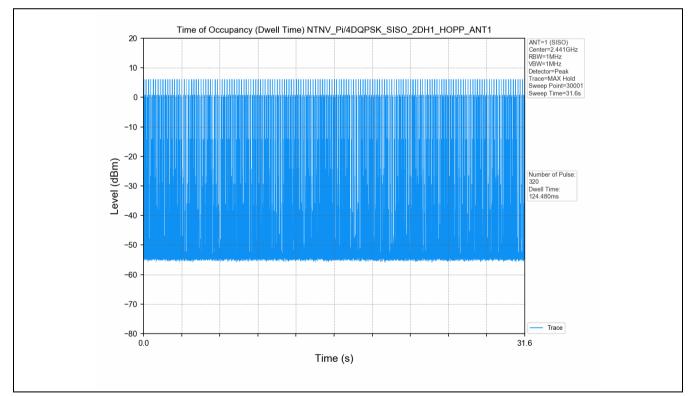


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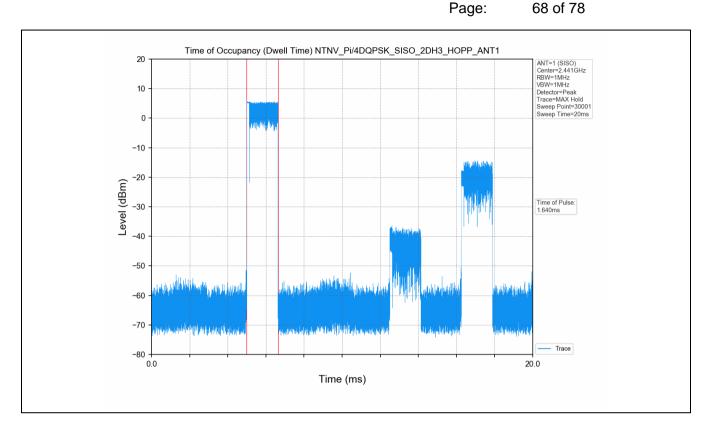
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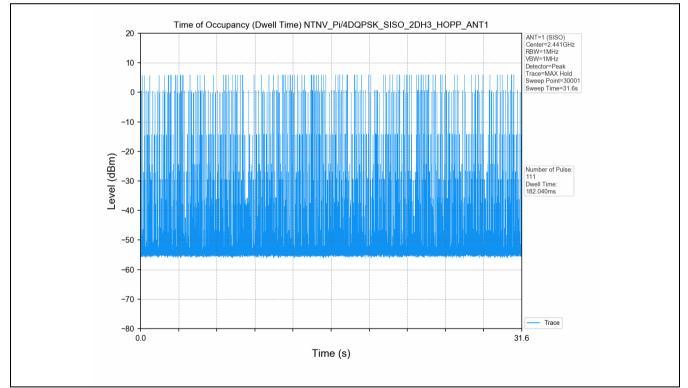
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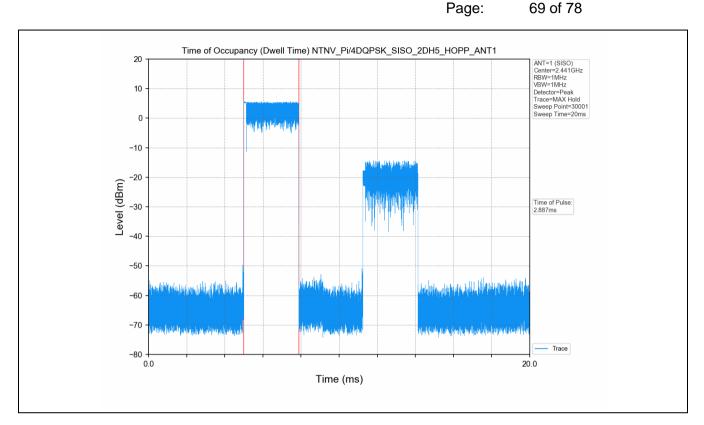
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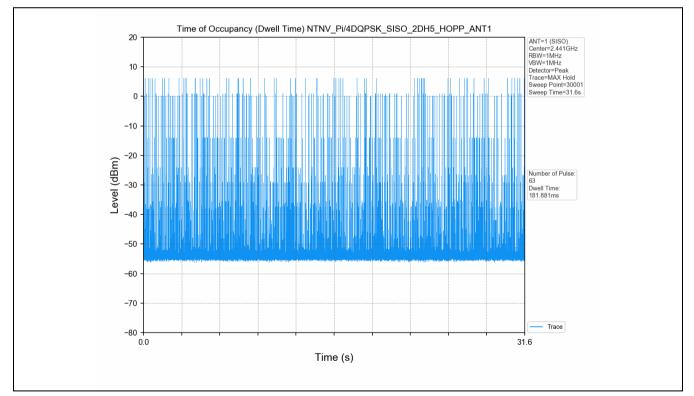
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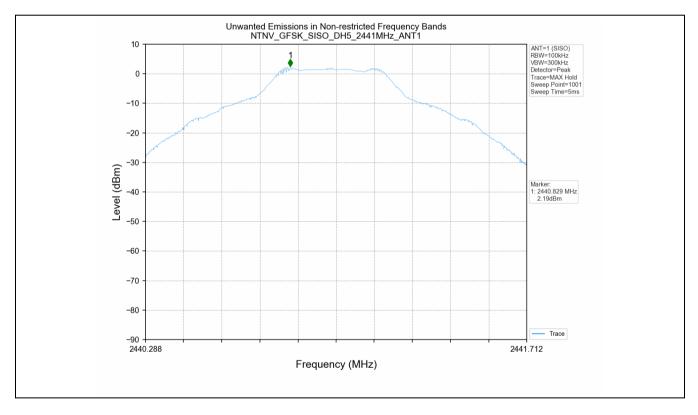
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6. Unwanted Emissions in Non-restricted Frequency Bands

6.1 Test Result

Test Mode	Frequency (MHz)	ТХ Туре	ANT No.	Spurious Conducted Emission (dBm)	Limits (dBm)	Verdict
	2402	SISO	1	Refer to test graph	-17.80	PASS
OFOK	2441	SISO	1	Refer to test graph	-17.80	PASS
GFSK	2480	SISO	1	Refer to test graph	-17.80	PASS
	Hopping	SISO	1	Refer to test graph	-17.80	PASS
	2402	SISO	1	Refer to test graph	-17.72	PASS
	2441	SISO	1	Refer to test graph	-17.72	PASS
Pi/4DQPSK	2480	SISO	1	Refer to test graph	-17.72	PASS
	Hopping	SISO	1	Refer to test graph	-17.72	PASS

6.2 Test Graph

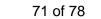


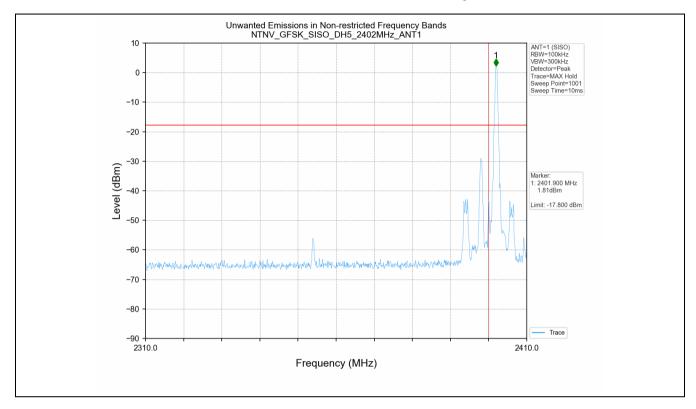


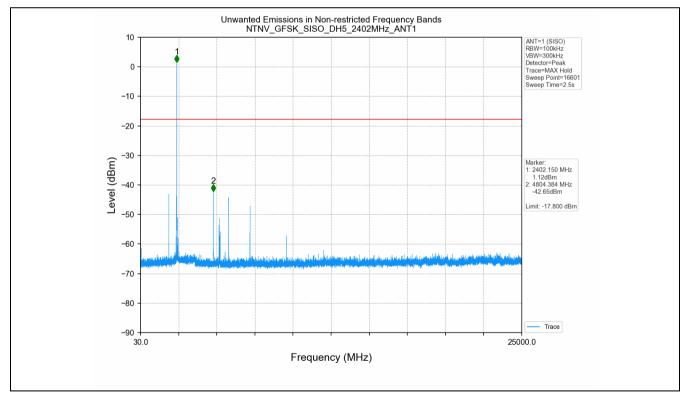


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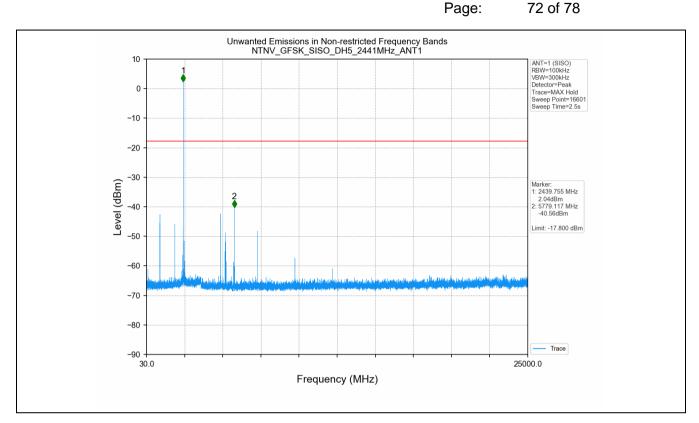
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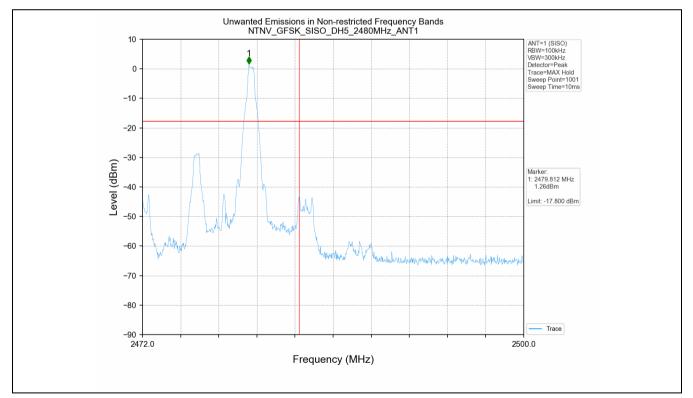
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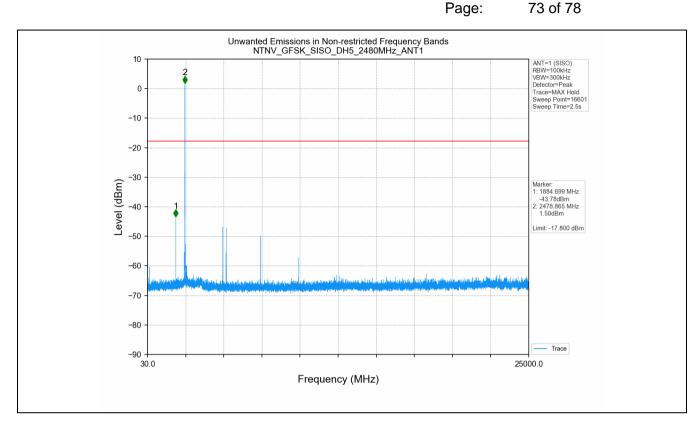
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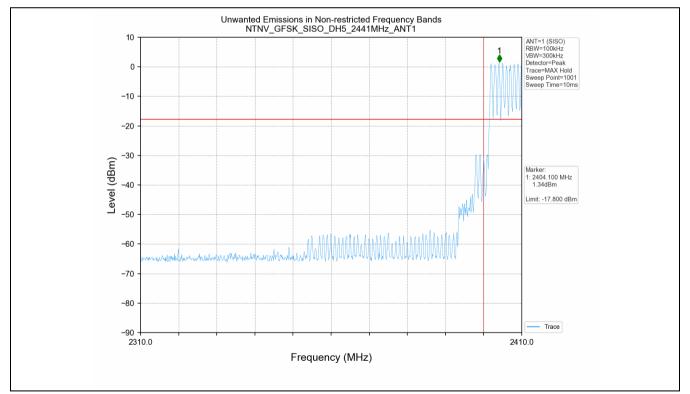
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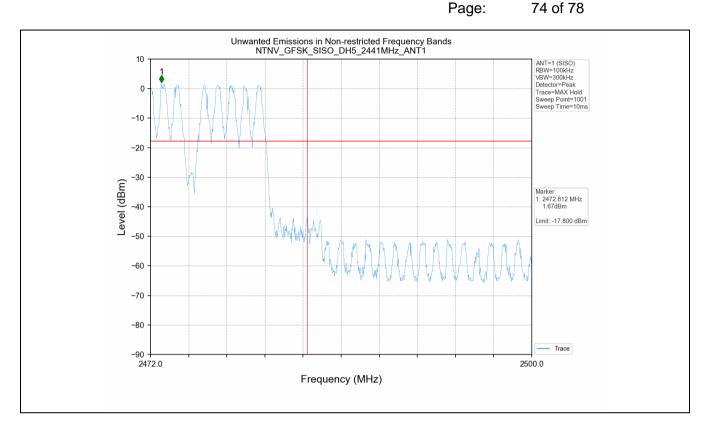
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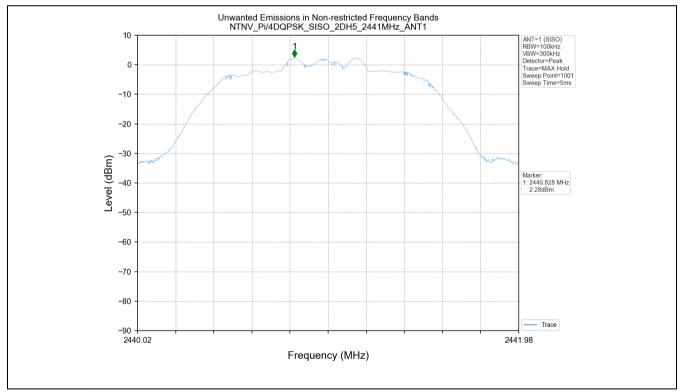
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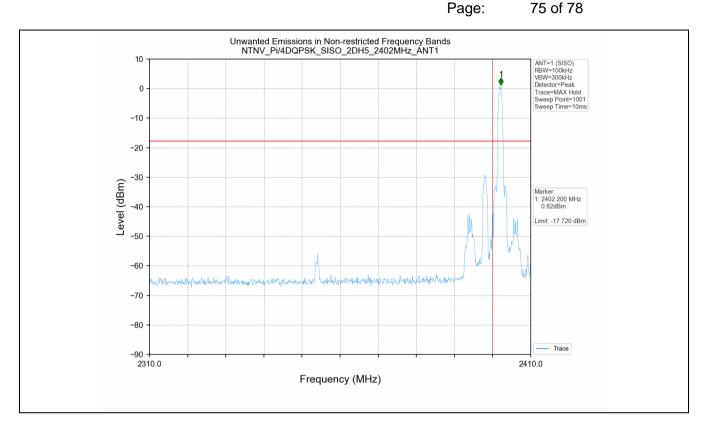
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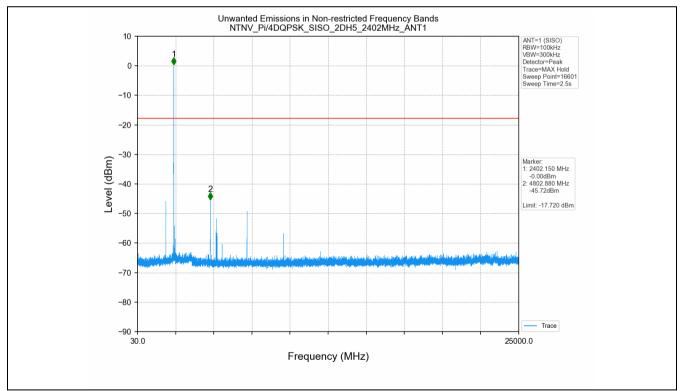
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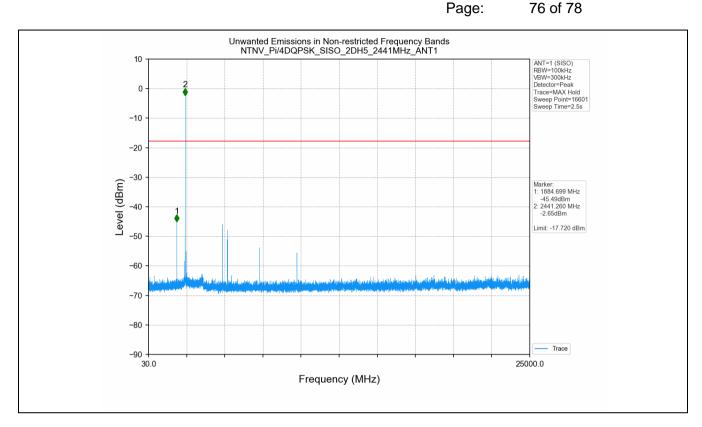
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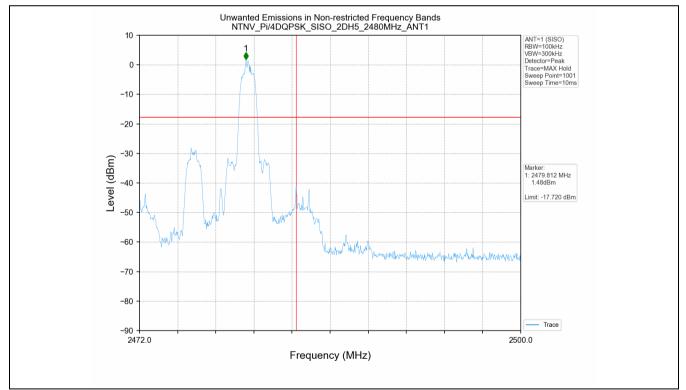
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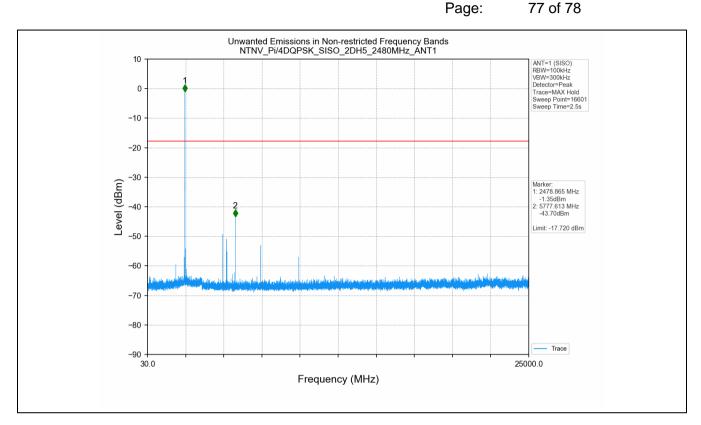
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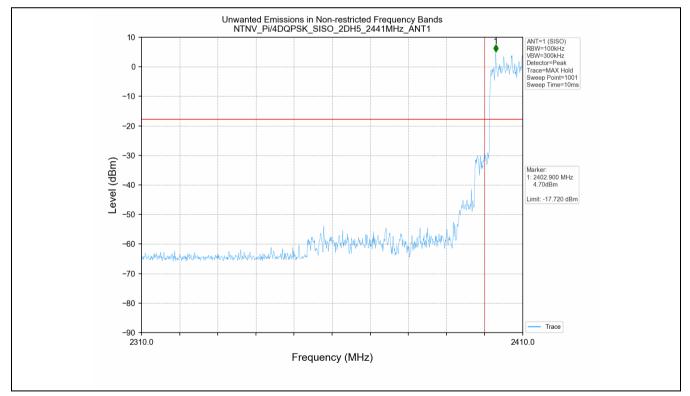
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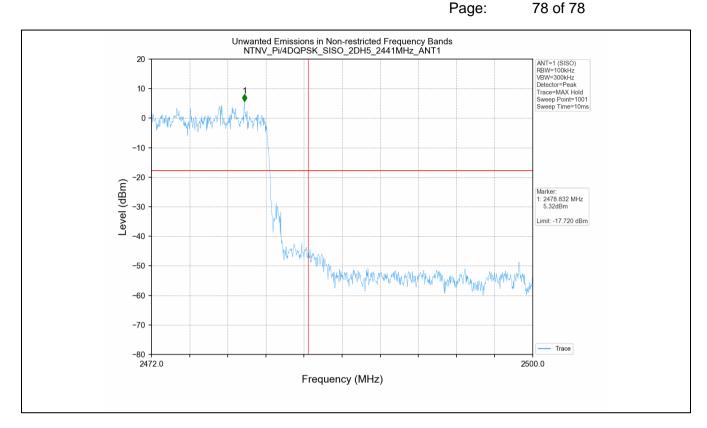
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