

EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 1 of 93 FCC ID: 2BBDS-TAD

# **TEST REPORT**

Application No.:	GZCR2303000318AT		
Applicant:	Vision IOT Inc		
Address of Applicant:	22994 LAVENDER VALLEY CT, ASHBURN, VA 20148		
Manufacturer:	Vision IOT Inc		
Address of Manufacturer:	22994 LAVENDER VALLEY CT, ASHBURN, VA 20148		
Factory:	SHI JIAZHUANG OURPCB Tech. Ltd		
Address of Factory:	3RD FLOOR NANHAI PLAZA, NO.505 XINHUA ROAD, XINHUA DISTRICT, SHIJIAZHUANG, HEBEI, CHINA		
Equipment Under Test (EUT	):		
EUT Name:	Smart Tag AON		
Model No.:	STONET2A433D, STONET2B433D 🔹		
*	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.		
Trade Mark:	Vision IoT		
Standard(s) :	47 CFR Part 15, Subpart C 15.247		
Date of Receipt:	2023-03-27		
Date of Test:	2023-04-13 to 2023-04-24		
Date of Issue:	2023-05-09		
Test Result:	Pass*		

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

Ridey Lin

Ricky Liu Manager



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 2 of 93

	Revision Record				
Version Report No. Date Remark					
01	GZCR230300031802	2023-05-09	Original		

Authorized for issue by		
	CJ Vu	
	Curry Wu/Project Engineer	_
	vivo cui	
	Vico Cui/Reviewer	_



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 3 of 93

## 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	Method Requirement			
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.2	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass		
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass		
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass		
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass		
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass		
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 11.12	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		

#### Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

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

Model No.: STONET2A433D, STONET2B433D

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on the sensor type:

Model	Sensor
STONET2A433D	On board
STONET2B433D	External wired door sensor

Therefore, only one model STONET2A433D was tested in this report.



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 4 of 93

## 3 Contents

		Pa	age
1	Cove	er Page	1
•	-		
2	Test	Summary	3
3	Cont	tents	4
	•		•
4		eral Information	
	4.1	Details of E.U.T.	
	4.2 4.3	Description of Support Units	
	4.3 4.4	Measurement Uncertainty Test Location	
	4.4 4.5	Test Facility	
	4.6	Deviation from Standards	
	4.7	Abnormalities from Standard Conditions	
_			
5	Equi	pment List	8
6	Radi	o Spectrum Technical Requirement	11
Ŭ			
	6.1	Antenna Requirement	
	6.1.1 6.1.2		
	-		
7	Radi	io Spectrum Matter Test Results	12
	7.1	Conducted Peak Output Power	
	7.1.1		
	7.1.2		
	7.1.3		
	7.1.4		
	7.2	Minimum 6dB Bandwidth	
	7.2.1 7.2.2		
	7.2.2	•	
	7.2.3		
	7.3	Power Spectrum Density	
	7.3.1		
	7.3.2		
	7.3.3		
	7.3.4		
	7.4	Conducted Band Edges Measurement	
	7.4.1		
	7.4.2		
	7.4.3	1 5	
	7.4.4		
	7.5	Conducted Spurious Emissions	
	7.5.1 7.5.2		
	7.5.2 7.5.3		
	7.5.5	rest Setup Diagram	19



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EMC-TRF-01	Rev 1.1	Report No.: GZCR230300031802		
		Page:	5 of 93	
7.5.4	Measurement Procedure and Data			19
7.6 F	Radiated Emissions which fall in the restricted bands			20
7.6.1	E.U.T. Operation			20
7.6.2	Test Mode Description			20
7.6.3	Test Setup Diagram			
7.6.4	Measurement Procedure and Data			
7.7 F	Radiated Spurious Emissions Below 1GHz			
7.7.1	E.U.T. Operation			
7.7.2	Test Mode Description			34
7.7.3	Test Setup Diagram			
7.7.4	Measurement Procedure and Data			
7.8 F	Radiated Spurious Emissions Above 1GHz			
7.8.1	E.U.T. Operation			
7.8.2	Test Mode Description			
7.8.3	Test Setup Diagram			
7.8.4	Measurement Procedure and Data			39
8 Test S	Setup Photo			58
9 EUT C	Constructional Details (EUT Photos)			59
10 Apper	ndix			60
in Abbei	IMIA	••••••		



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 6 of 93

#### **General Information** 4

## 4.1 Details of E.U.T.

Power supply:	DC 7.2V =Size 'A' battery x2
Test Voltage:	DC 7.2V
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11
Channel Spacing:	5MHz
Antenna Type:	Chip Antenna
Antenna Gain:	4.25 dBi
Power setting	default

### 4.2 Description of Support Units

The EUT has been tested as an independent unit.

### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 3%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Emissions which fall in the restricted bands	±5.00dB (30MHz-1GHz; 3m);±4.38dB (30MHz-1GHz; 10m);± 5.12dB (1GHz- 6GHz); ±5.38dB (6GHz-18GHz); ±5.61dB(18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±5.00dB (3m); ±4.38dB (10m)
Radiated Spurious Emissions Above 1GHz	±5.12dB (1GHz-6GHz); ±5.38dB (6GHz- 18GHz); ±5.61dB(18GHz-40GHz)

### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 7 of 93 Page:

### 4.5 Test Facility

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

#### ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

#### • SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

#### • FCC Recognized Accredited Test Firm(Registration No.: 486818)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

#### ISED (Registration No.: 4620B, CAB identifier: CN0052)

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

#### VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

#### CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

#### 4.6 Deviation from Standards

None

### 4.7 Abnormalities from Standard Conditions

None



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 8 of 93

#### 5 **Equipment List**

Conducted Peak Output Power							
Equipment Manufacturer Model No. Inventory No. Cal Date Cal Due Date							
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-02	2023-11-01		
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2022-06-21	2023-06-20		
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2022-09-08	2023-09-07		
Test Software	TST	V2.0	GZE100-82	N/A	N/A		

Minimum 6dB Bandwidth						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-02	2023-11-01	
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2022-06-21	2023-06-20	
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2022-09-08	2023-09-07	
Test Software	TST	V2.0	GZE100-82	N/A	N/A	

Power Spectrum Density					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-02	2023-11-01
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2022-06-21	2023-06-20
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2022-09-08	2023-09-07
Test Software	TST	V2.0	GZE100-82	N/A	N/A

Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-02	2023-11-01
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2022-06-21	2023-06-20
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2022-09-08	2023-09-07
Test Software	TST	V2.0	GZE100-82	N/A	N/A

Conducted Spurious Emissions					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-02	2023-11-01
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2022-06-21	2023-06-20
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2022-09-08	2023-09-07
Test Software	TST	V2.0	GZE100-82	N/A	N/A



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 9 of 93

Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Radiated Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2022-06-21	2023-06-20
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05
EMI Test Receiver (1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2022-05-20	2023-05-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 10 of 93

Radiated Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2022-12-16	2023-12-15
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2022-08-24	2023-08-23
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

General used equipmen	t				
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2022-06-24	2023-06-23



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Rev 1.1 EMC-TRF-01

Report No.: GZCR230300031802 Page: 11 of 93

#### **Radio Spectrum Technical Requirement** 6

#### Antenna Requirement 6.1

#### 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 Chip antenna and integrated on the main PCB and no consideration of replacement. The Maximum gain of the antenna is 4.25dBi.

Antenna location: Refer to internal photo.



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 12 of 93

#### **Radio Spectrum Matter Test Results** 7

#### 7.1 **Conducted Peak Output Power**

47 CFR Part 15, Subpart C 15.247(b)(3) Test Requirement ANSI C63.10 (2013) Section 11.9.2 Test Method:

I imit<sup>.</sup>

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

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

**Operating Environment:** 

Temperature: 23.1 °C Humidity: 57.7 % RH Atmospheric Pressure: 1008 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



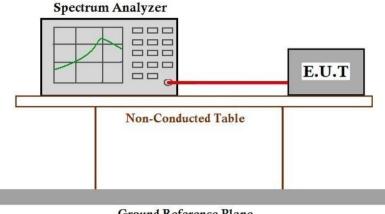
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 13 of 93

#### 7.1.3 Test Setup Diagram



Ground Reference Plane

#### 7.1.4 Measurement Procedure and Data

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

Please Refer to Appendix for Details



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Report No.: GZCR230300031802 14 of 93 Page:

### 7.2 Minimum 6dB Bandwidth

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

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

**Operating Environment:** Temperature: 23.1 °C

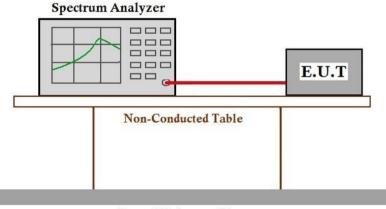
Humidity: 57.7 % RH

Atmospheric Pressure: 1008 mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

#### 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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EMC-TRF-01 Re	ev 1.1
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Report No.: GZCR230300031802 Page: 15 of 93

### 7.3 Power Spectrum Density

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

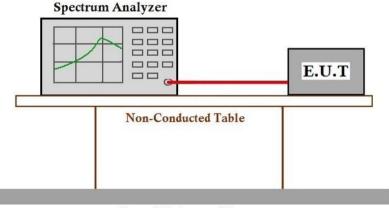
#### 7.3.1 E.U.T. Operation

Operating Environment: Temperature: 23.1 °C Humidity: 57.7 % RH Atmospheric Pressure: 1008 mbar

#### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. 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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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 16 of 93

### 7.4 Conducted Band Edges Measurement

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

Limit:

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

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

Operating Enviro	onment:					
Temperature:	23.1 °C	Humidity:	57.7 % RH	Atmospheric Pressure: 1	8001	mbar

#### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



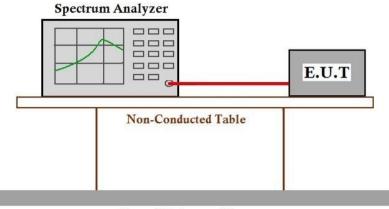
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 17 of 93

#### 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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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 18 of 93

### 7.5 Conducted Spurious Emissions

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

Limit:

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

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

Operating Enviro	onment:					
Temperature:	23.1 °C	Humidity:	57.7 % RH	Atmospheric Pressure:	1008	mbar

#### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



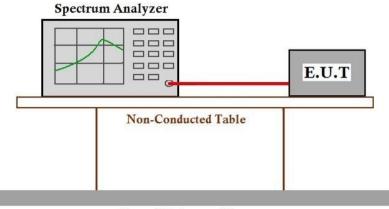
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 19 of 93

#### 7.5.3 Test Setup Diagram



Ground Reference Plane

#### 7.5.4 Measurement Procedure and Data

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EMC-TRF-01 Rev 2	1.1
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Report No.: GZCR230300031802 Page: 20 of 93

### 7.6 Radiated Emissions which fall in the restricted bands

3 m

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 11.12
Limit:	

Test Distance:

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

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

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

Operating Environment:									
Temperature:	24.5 °C	Humidity:	61.7 % RH		Atmospheric Pressure:	1008	mbar		

#### 7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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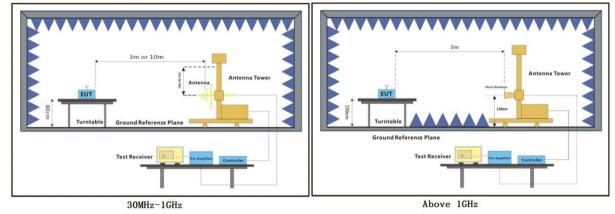
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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 21 of 93

#### 7.6.3 Test Setup Diagram



#### 7.6.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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



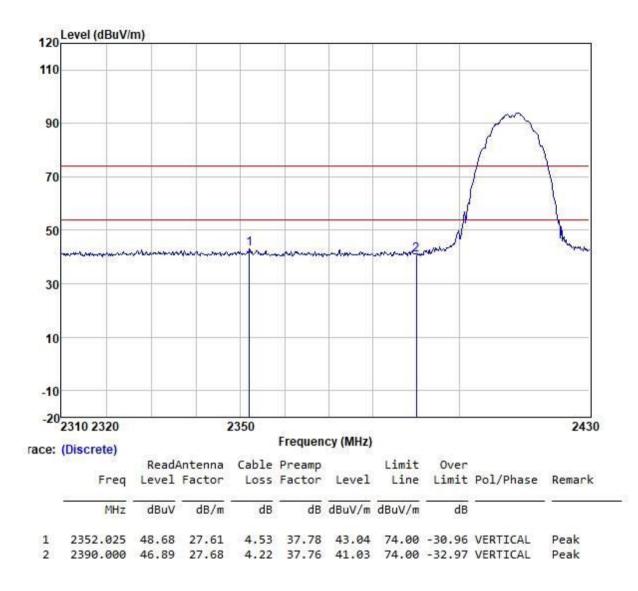
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 22 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



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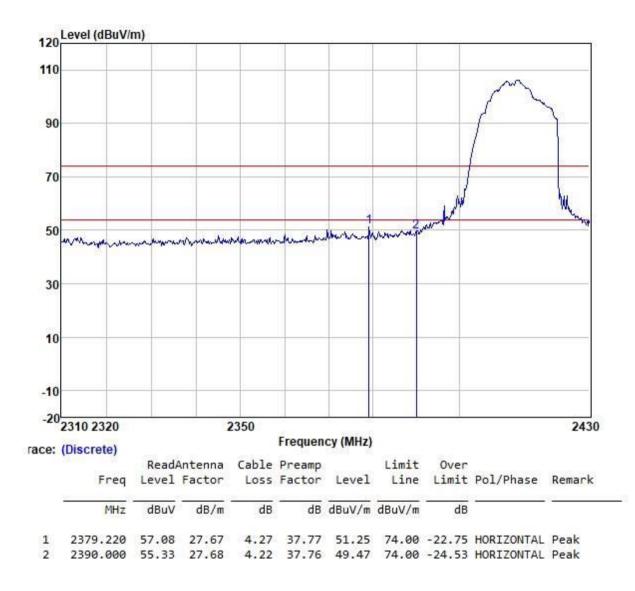


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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 23 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low





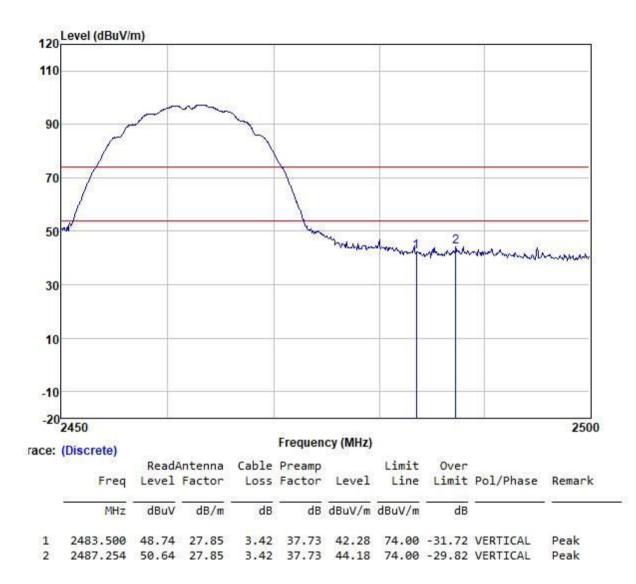
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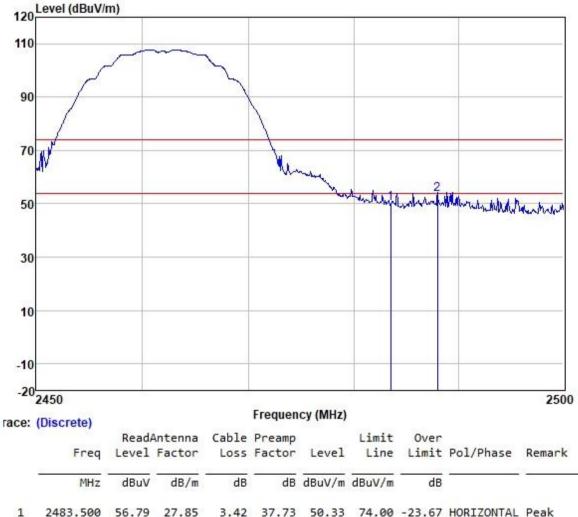
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 25 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High



2487.958 59.93 27.85 3.42 37.73 53.47 74.00 -20.53 HORIZONTAL Peak 2



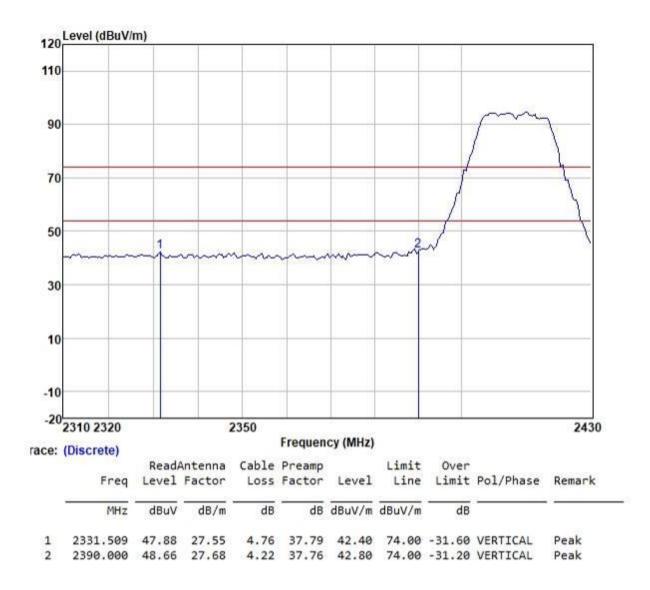
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Test Mode: 02; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:Low





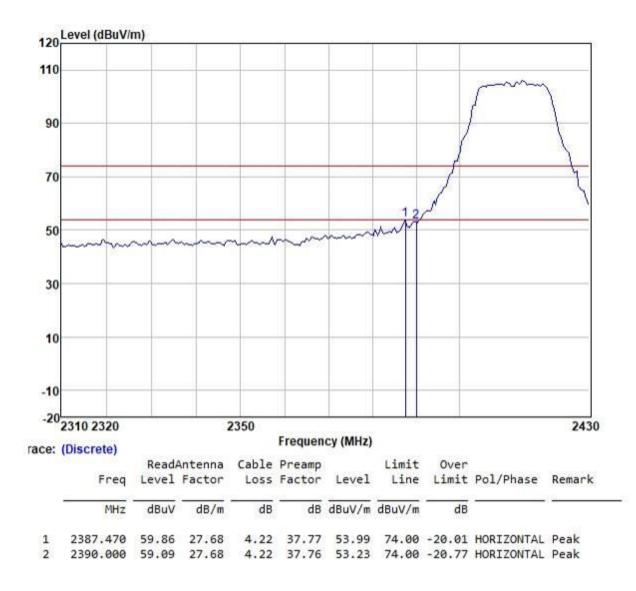
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 27 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:Low





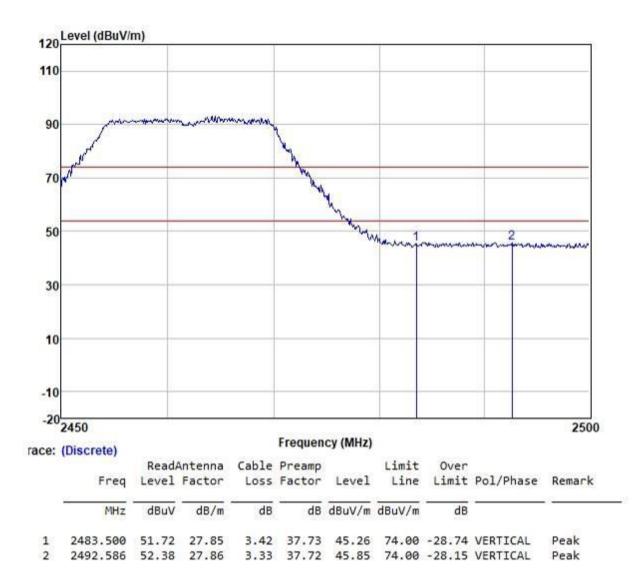
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 28 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:High





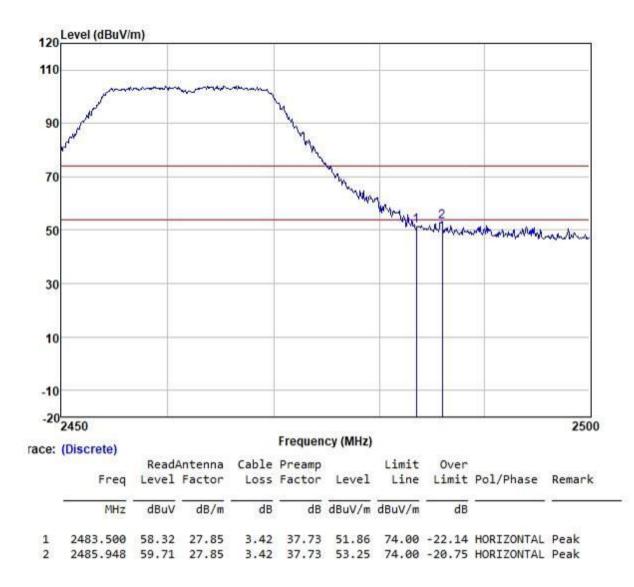
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 29 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:High





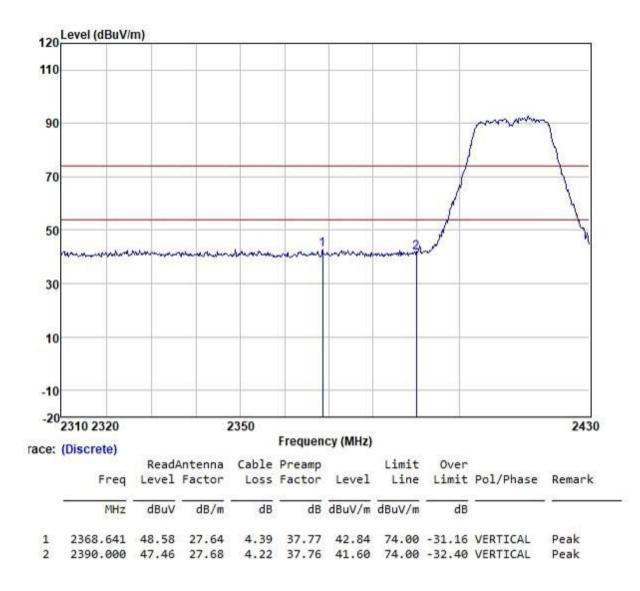
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 30 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low





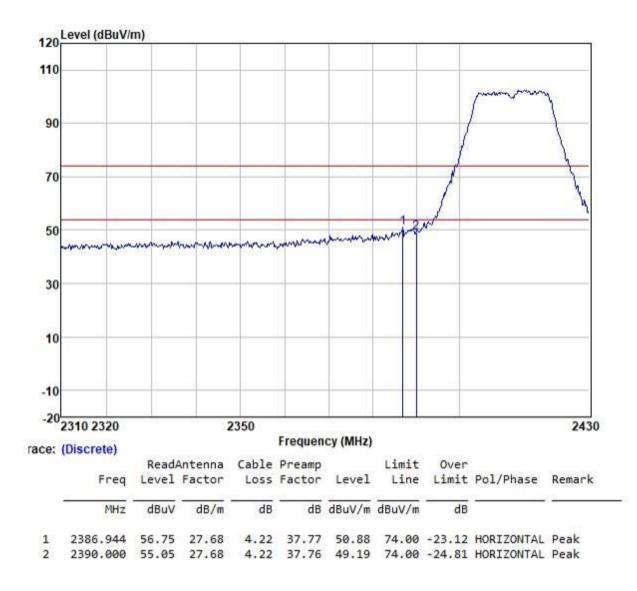
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Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low





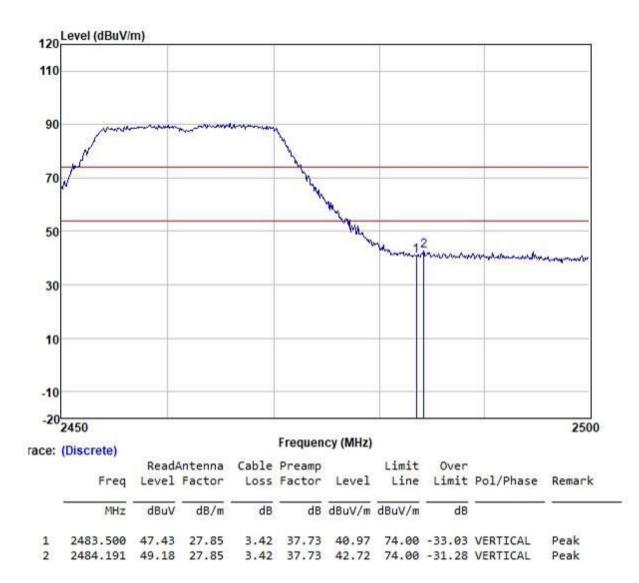
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 32 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High





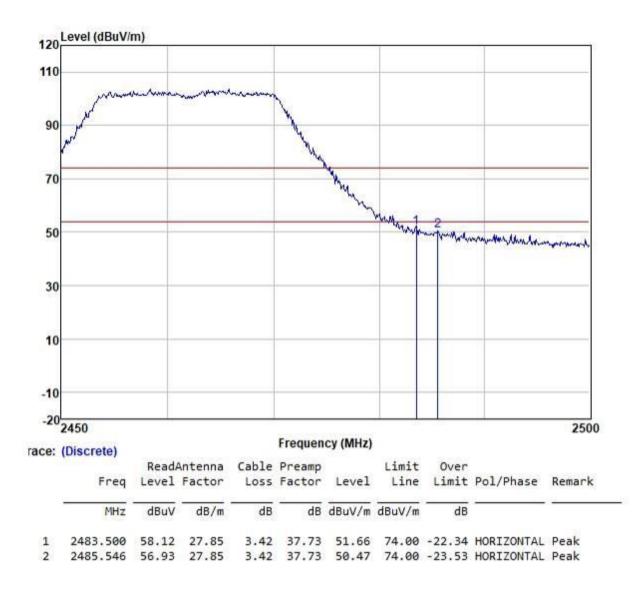
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 33 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High





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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 34 of 93 Page:

### 7.7 Radiated Spurious Emissions Below 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5
1 time to	

Limit:

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

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

**Operating Environment:** 

Temperature:	23.6 °C	Humidity:	56.3 % RH	
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Atmospheric Pressure: 1008 mbar

#### 7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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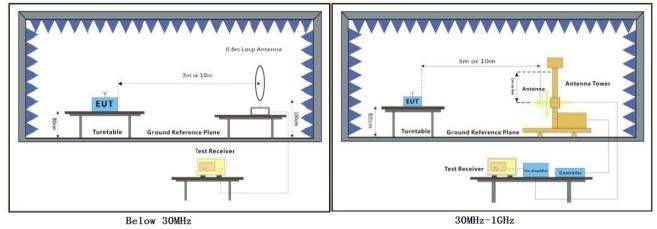
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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 35 of 93

#### 7.7.3 Test Setup Diagram



#### 7.7.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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

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

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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

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



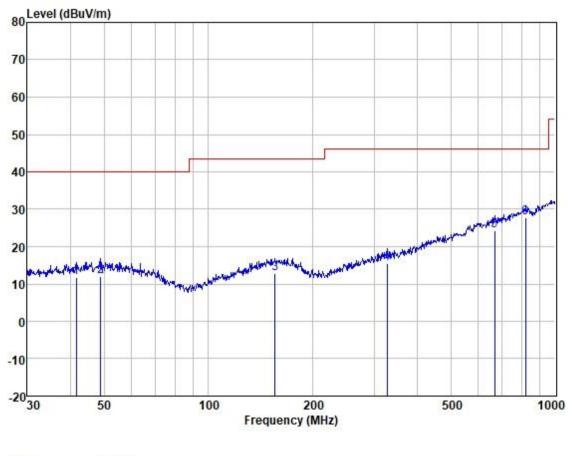
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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 36 of 93





Site	:	SGS
Job	:	
Model	:	
Power	:	
Test Mode	:	

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	Freq					Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	41.567	24.64	13.66	1.10	27.61	11.79	40.00	-28.21	HORIZONTAL	QP
2	48.843	24.41	13.97	1.13	27.60	11.91	40.00	-28.09	HORIZONTAL	QP
3	155.364	24.37	13.59	2.28	27.37	12.87	43.50	-30.63	HORIZONTAL	QP
4	327.887	25.22	14.21	3.41	27.37	15.47	46.00	-30.53	HORIZONTAL	QP
5	668.142	26.97	20.69	5.36	28.72	24.30	46.00	-21.70	HORIZONTAL	QP
6	821.710	26.70	23.38	6.11	28.53	27.66	46.00	-18.34	HORIZONTAL	QP



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 37 of 93

500

1000

Test Mode: 02; Polarity: Vertical

Site	:	SGS
Job	:	
Model	:	
Power	:	
Test Mode	:	

50

0

-10

-20<sup>L</sup>30

	Freq					Measured Level				Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	46.666	26.14	13.93	1.12	27.60	13.59	40.00	-26.41	VERTICAL	QP
2	53.505	25.35	13.90	1.17	27.60	12.82	40.00	-27.18	VERTICAL	QP
3	150.538	24.09	13.58	2.23	27.39	12.51	43.50	-30.99	VERTICAL	QP
4	340.782	24.63	14.33	3.51	27.51	14.96	46.00	-31.04	VERTICAL	QP
5	661.151	26.69	20.55	5.32	28.73	23.83	46.00	-22.17	VERTICAL	QP
6	948.761	26.61	24.19	6.70	28.09	29.41	46.00	-16.59	VERTICAL	QP

200

Frequency (MHz)



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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 38 of 93

## 7.8 Radiated Spurious Emissions Above 1GHz

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

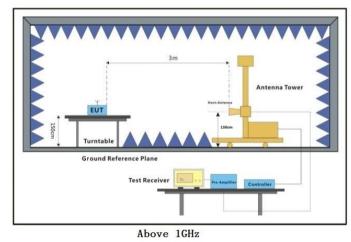
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance(meters)	
Above 1000	500	3	

### 7.8.1 E.U.T. Operation

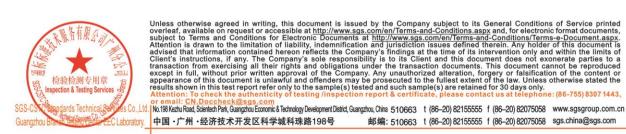
Operating Environment:							
Temperature:	24.5 °C	Humidity:	61.7 % RH	Atmospheric Pressure:	1008	mbar	

### 7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



#### 7.8.3 Test Setup Diagram



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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 39 of 93

#### 7.8.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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

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

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

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



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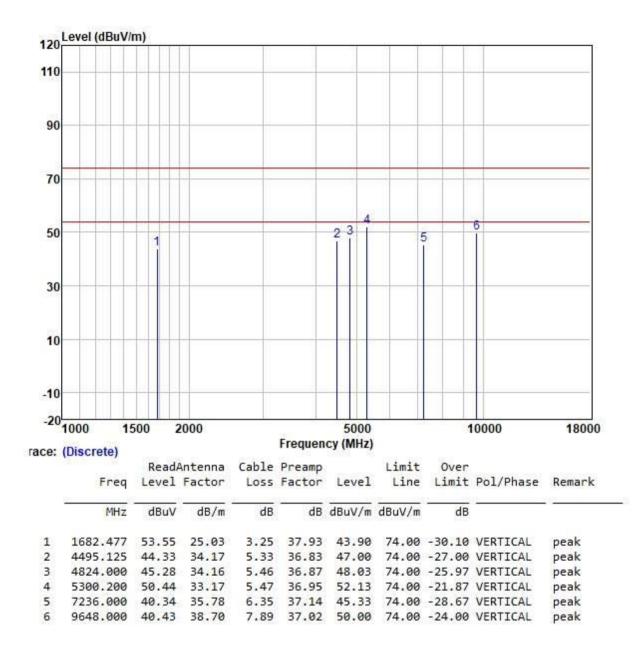
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 40 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low





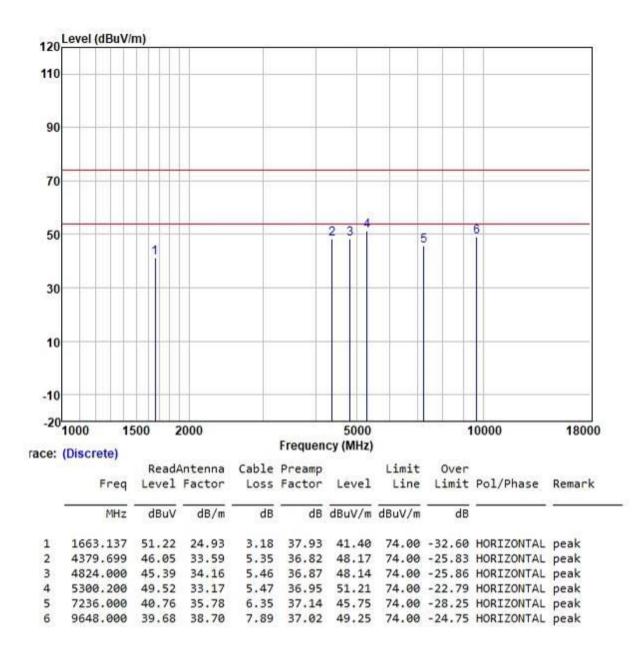
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 41 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low





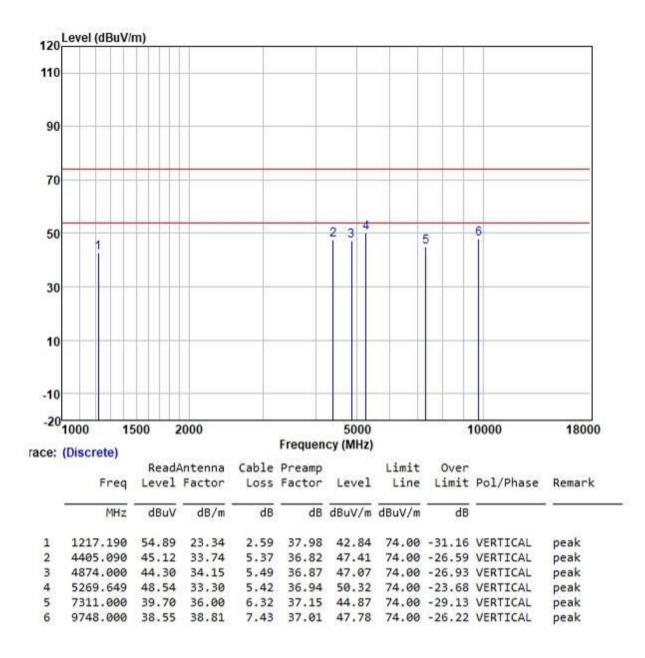
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 42 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:middle





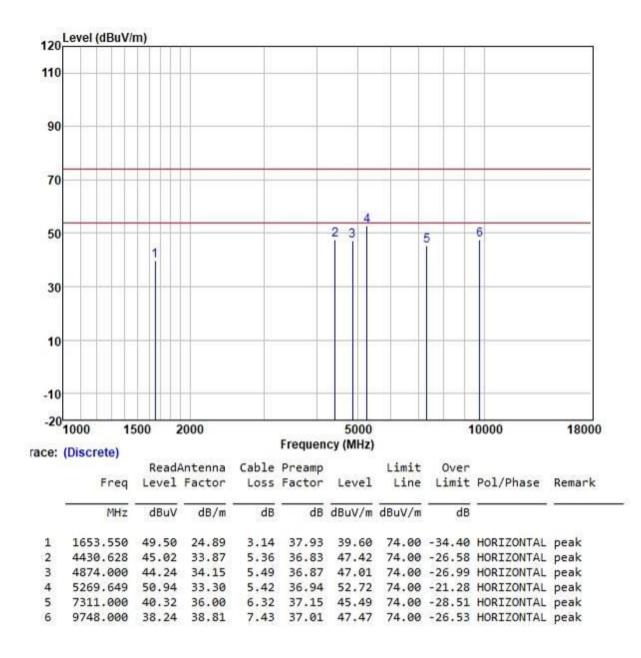
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 43 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:middle





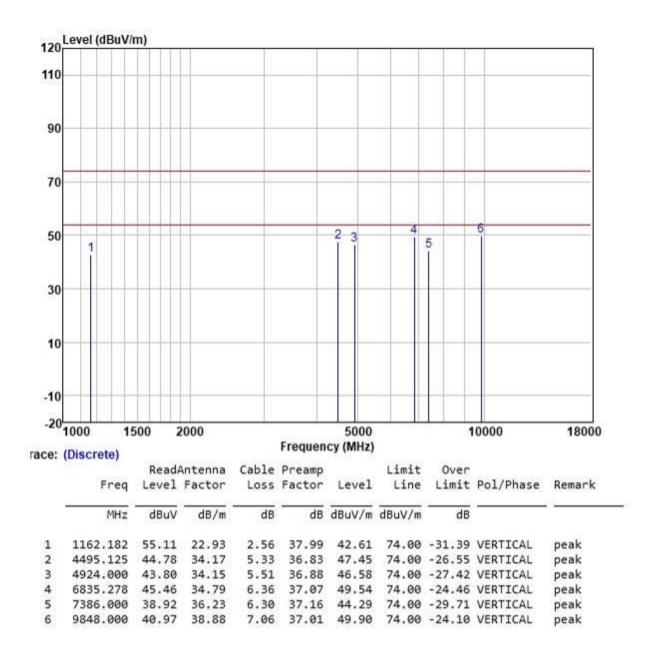
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 44 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:High





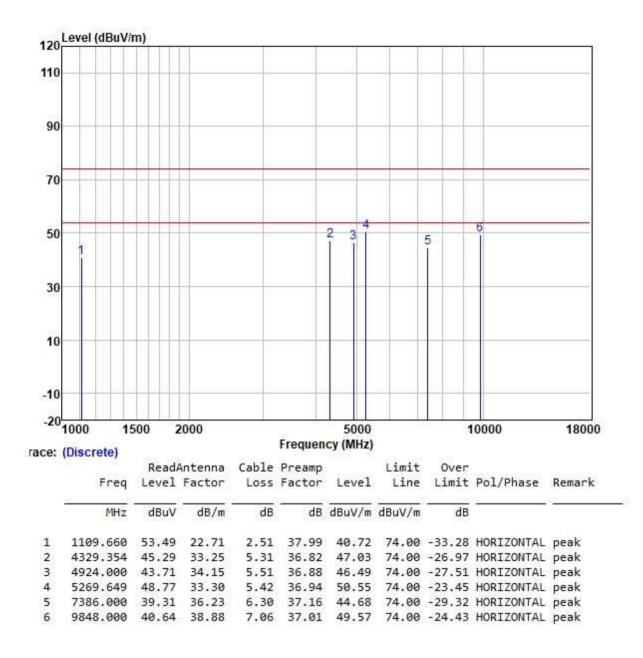
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 45 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High





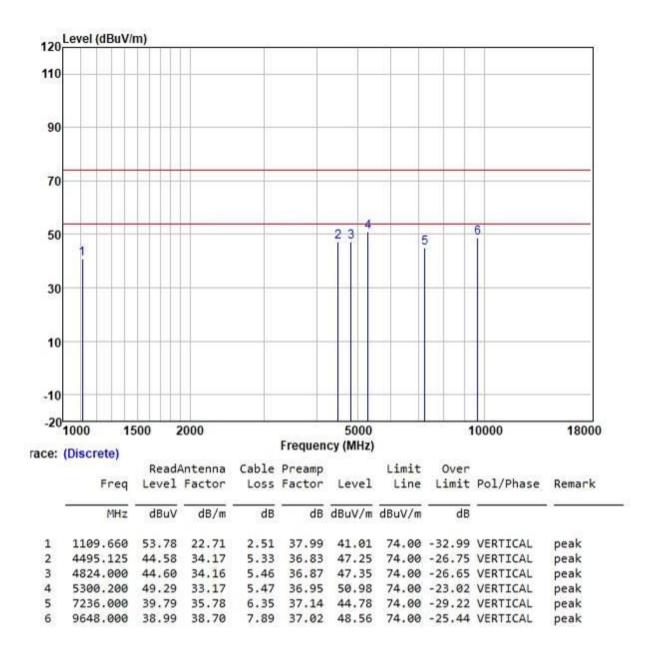
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 46 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:Low





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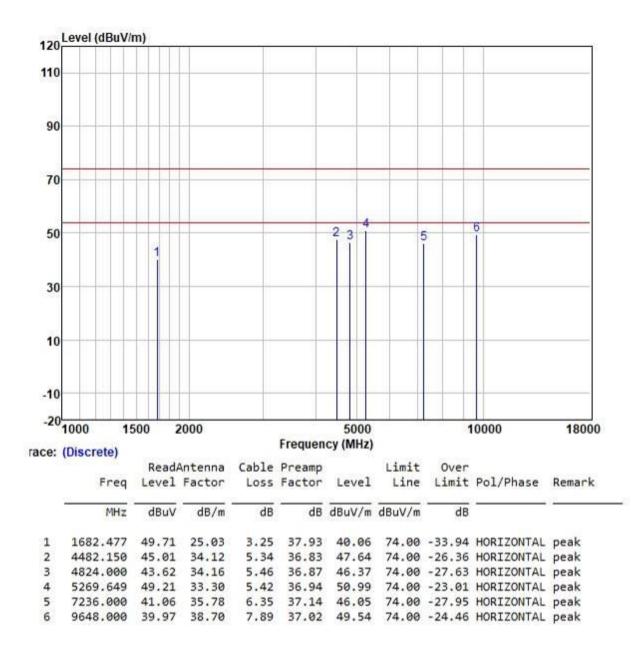
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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 47 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:Low





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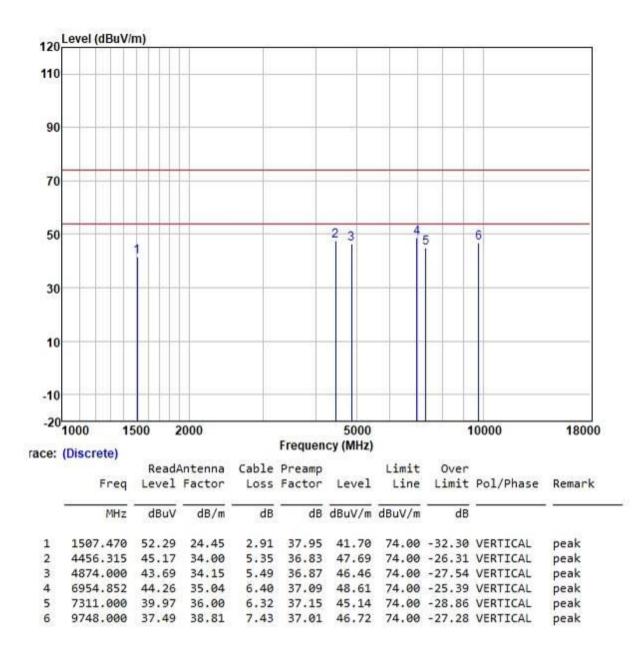
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 48 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:middle





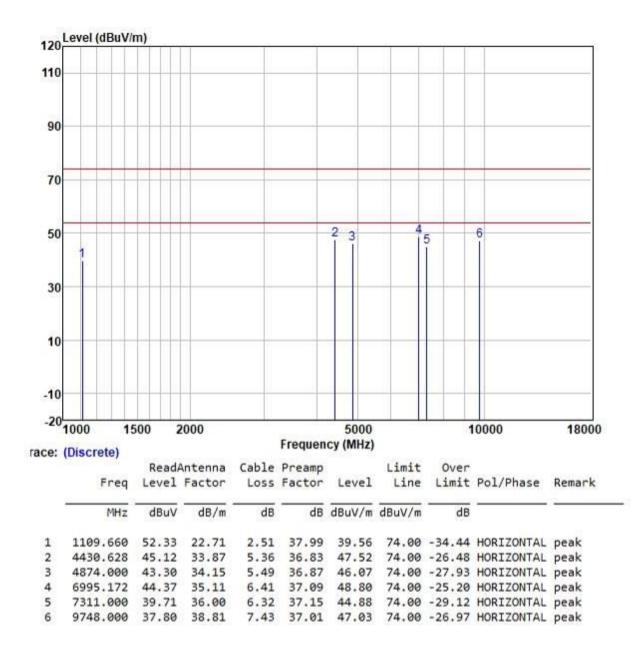
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 49 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:middle





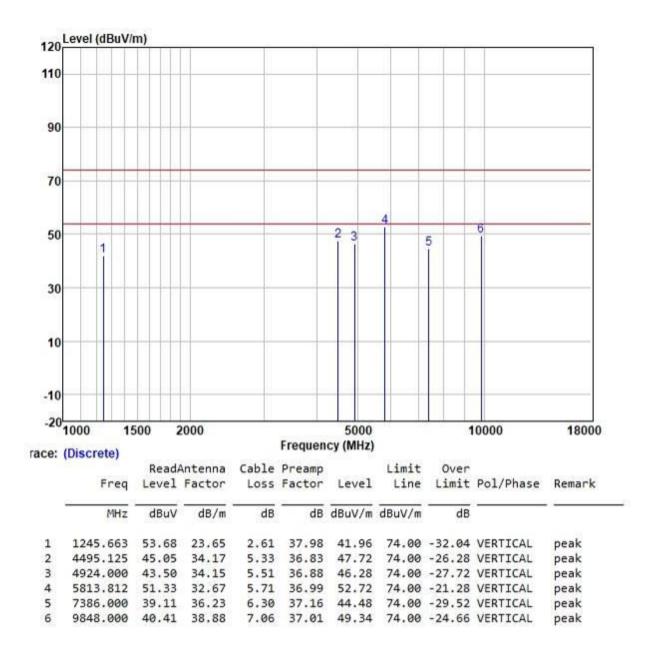
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 50 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:High





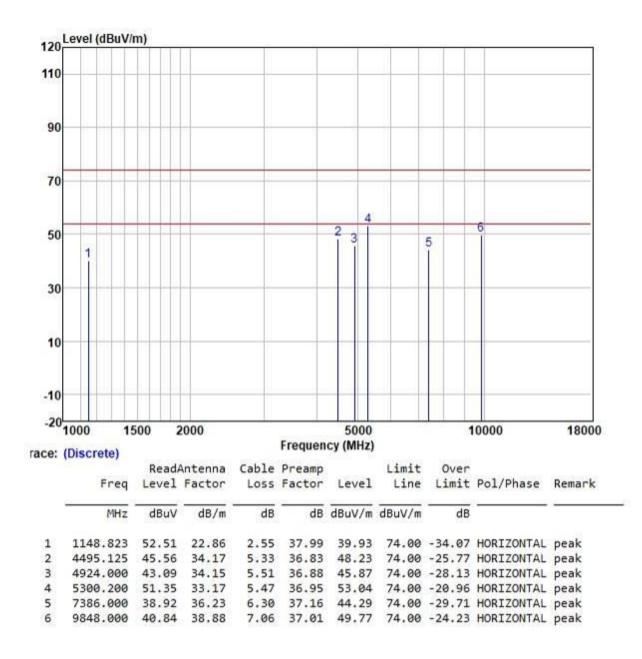
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 51 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:High



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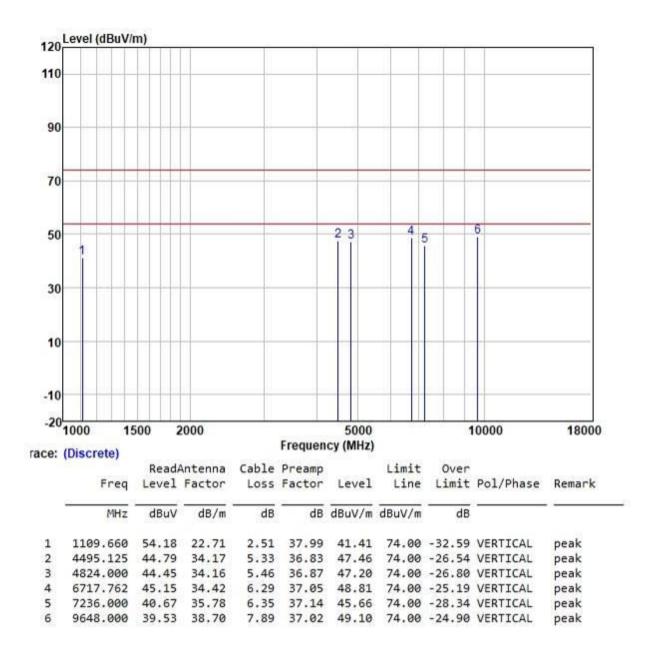
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 52 of 93

Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low





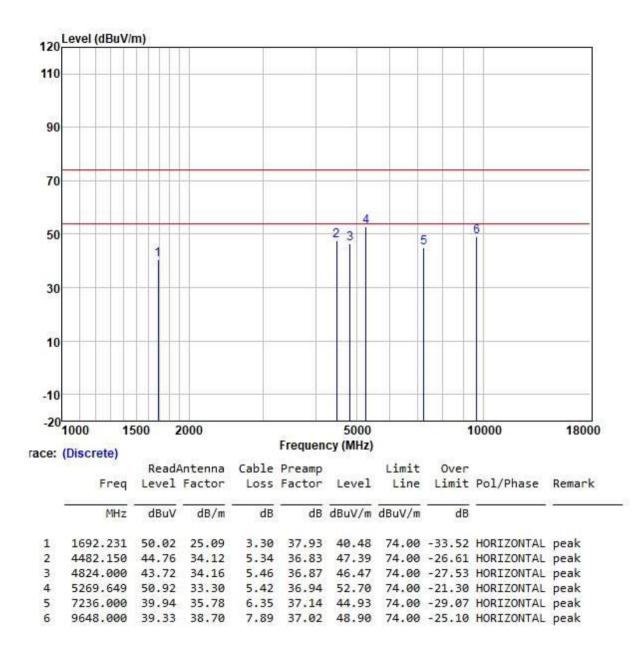
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EMC-TRF-01 Rev 1.1 Report No.: GZCR230300031802 Page: 53 of 93

Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low





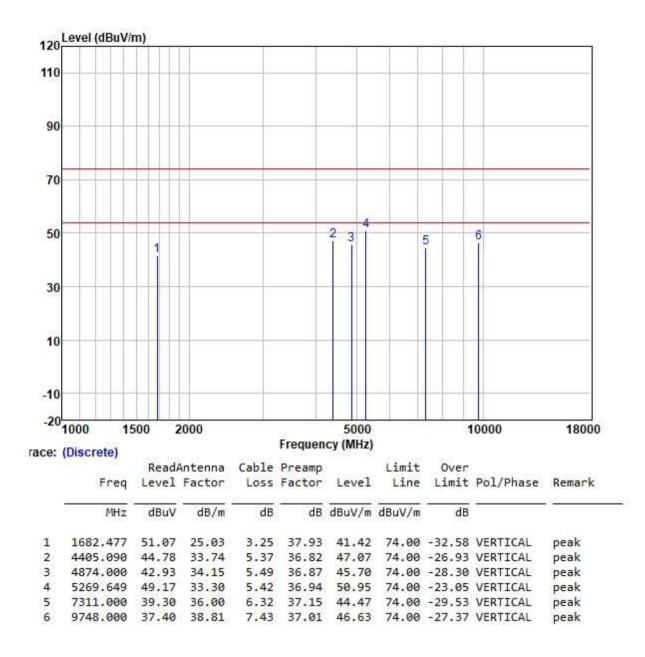
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Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:middle





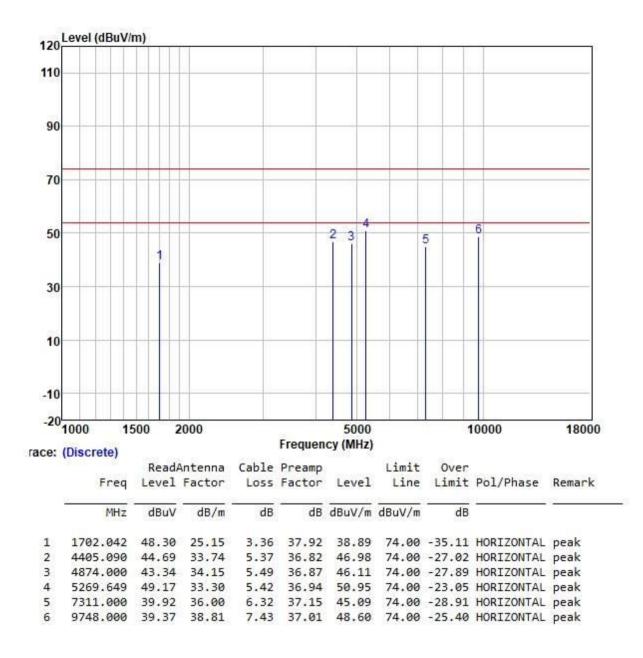
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Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



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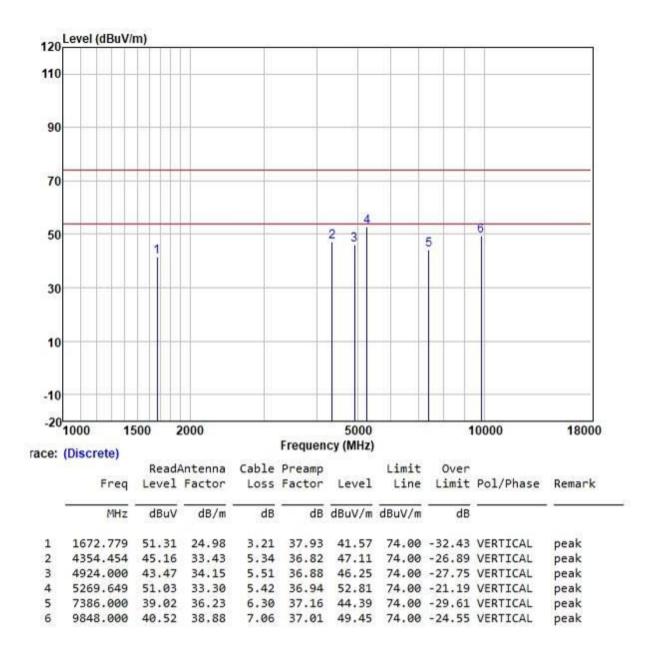
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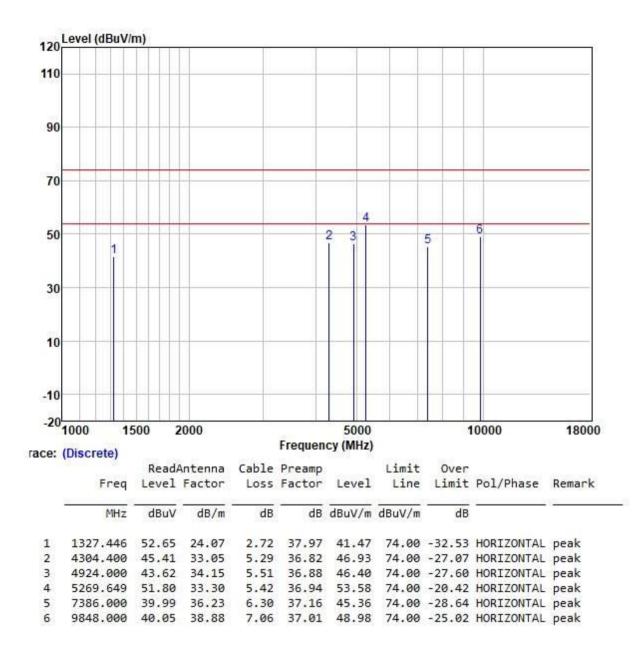
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Report No.: GZCR230300031802 Page: 58 of 93

#### **Test Setup Photo** 8

Refer to Setup Photos for GZCR230300031802



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Report No.: GZCR230300031802 Page: 59 of 93

#### **EUT Constructional Details (EUT Photos)** 9

Refer to External and Internal Photos for GZCR2303000318AT



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Report No.: GZCR230300031802 Page: 60 of 93

# **10** Appendix

# 1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

	Ant1								
Mode	ТХ Туре	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)		
		2412	12.417	12.547	98.96	0.05	0.03		
802.11b	SISO	2437	12.417	12.547	98.96	0.05	0.03		
		2462	12.417	12.547	98.96	0.05	0.03		
802.11g SISO		2412	2.065	2.195	94.08	0.27	0.04		
	2437	2.065	2.194	94.12	0.26	0.03			
	2462	2.065	2.194	94.12	0.26	0.03			
		2412	1.920	2.050	93.66	0.28	0.04		
802.11n (HT20)	SISO	2437	1.921	2.050	93.71	0.28	0.00		
(20)		2462	1.921	2.050	93.71	0.28	0.00		



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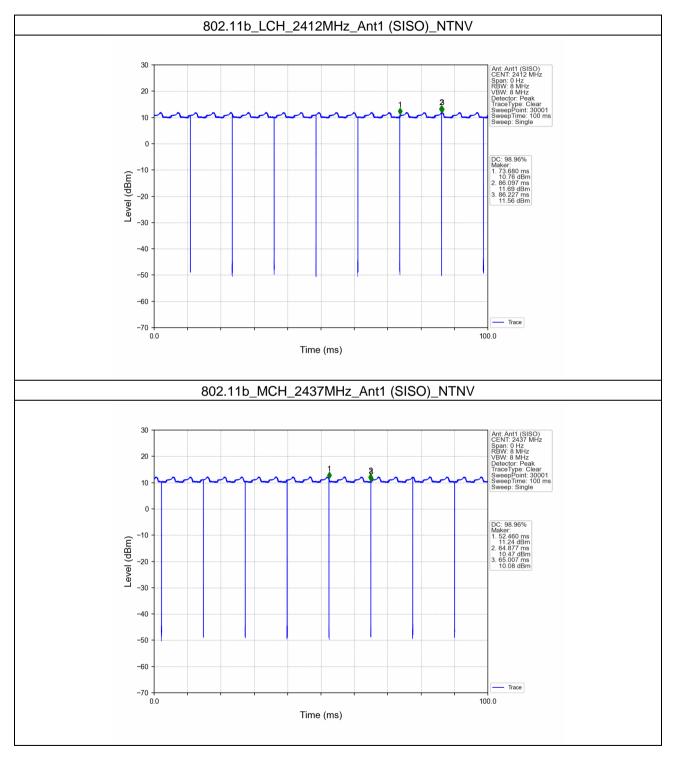
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## 1.1.2 Test Graph

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Laboratory.

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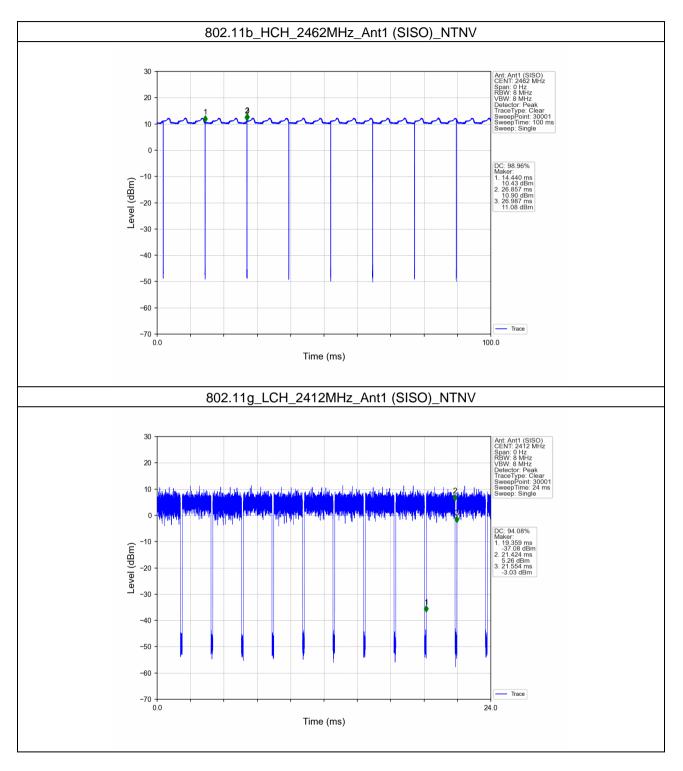
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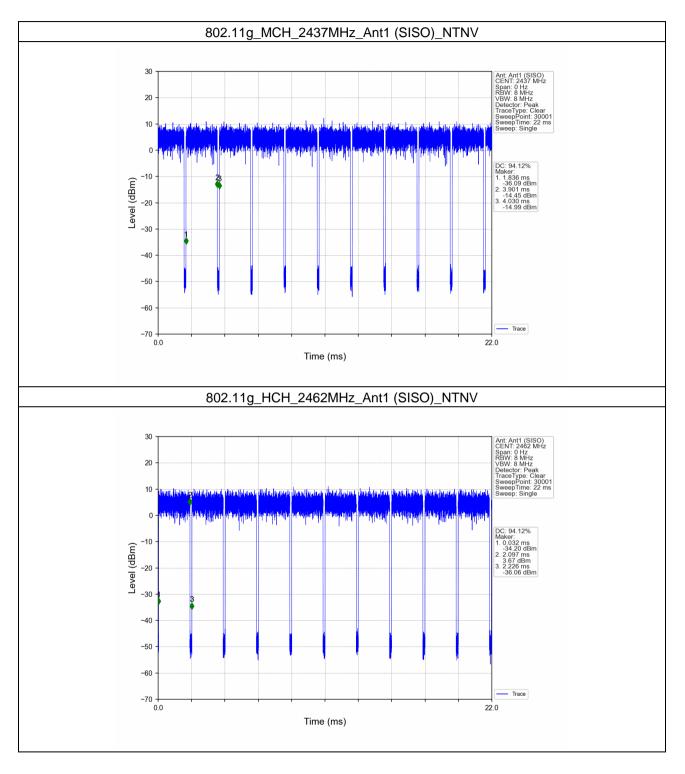
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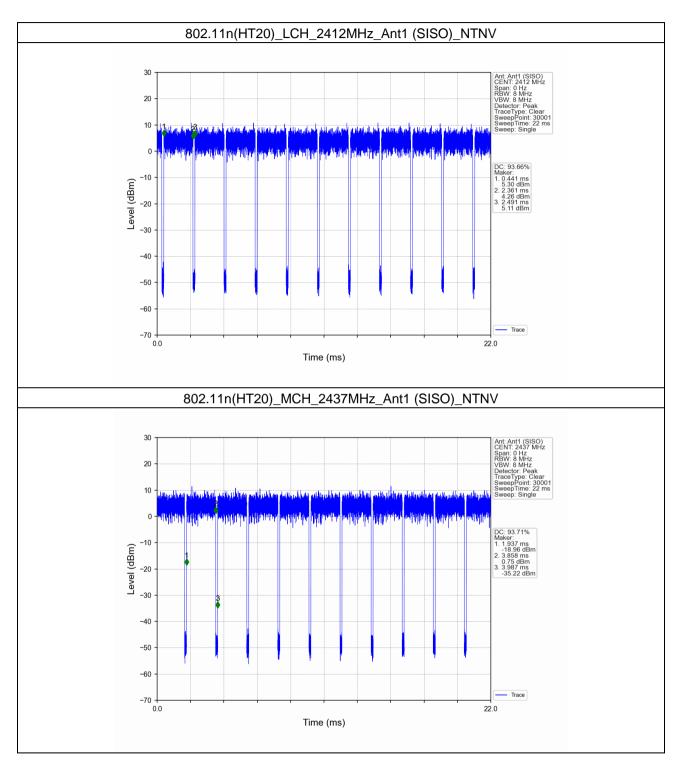
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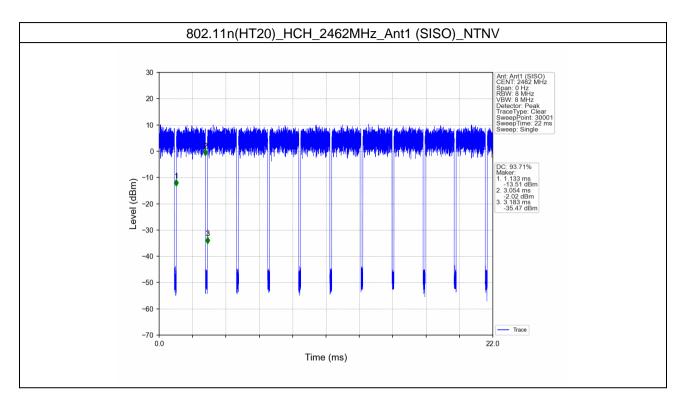
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Report No.: GZCR230300031802 65 of 93 Page:





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Report No.: GZCR230300031802 Page: 66 of 93

# 2. Bandwidth

## 2.2 6dB BW

## 2.1.1 Test Result

Mode	ТΧ	Frequency	Frequency (MHz) ANT -		vidth (MHz)	Verdict
Iviode	Туре	(MHz)			Limit	verdict
		2412	1	9.097	>=0.5	Pass
802.11b	SISO	2437	1	9.105	>=0.5	Pass
		2462	1	9.105	>=0.5	Pass
		2412	1	16.360	>=0.5	Pass
802.11g	802.11g SISO	2437	1	16.350	>=0.5	Pass
	2462	1	16.354	>=0.5	Pass	
		2412	1	17.595	>=0.5	Pass
802.11n (HT20)	SISO	2437	1	17.588	>=0.5	Pass
		2462	1	17.579	>=0.5	Pass



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Report No.: GZCR230300031802 Page: 67 of 93

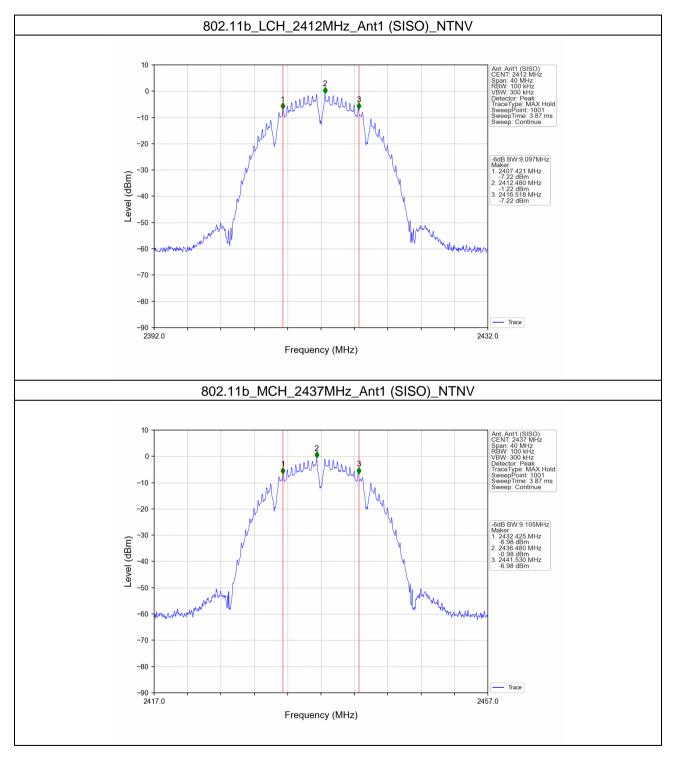
## 2.1.2 Test Graph

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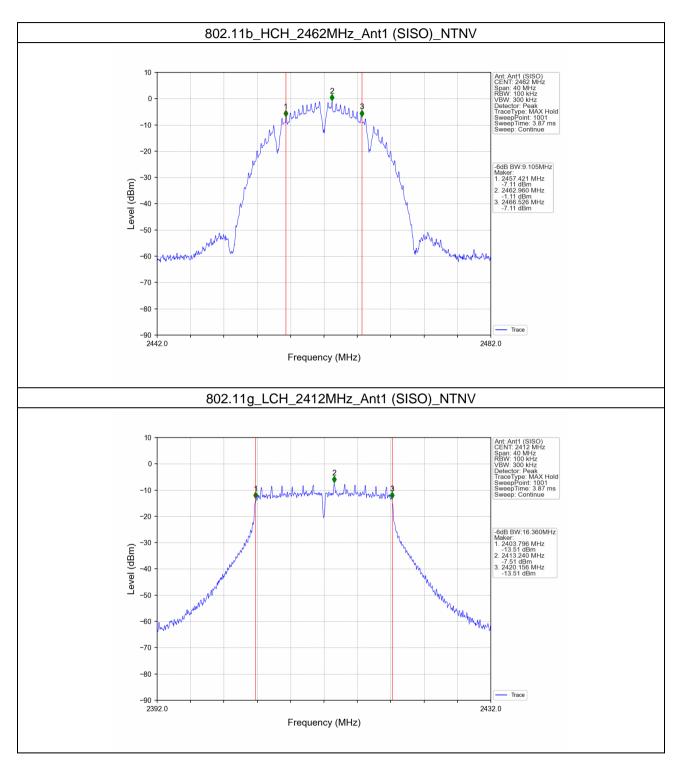
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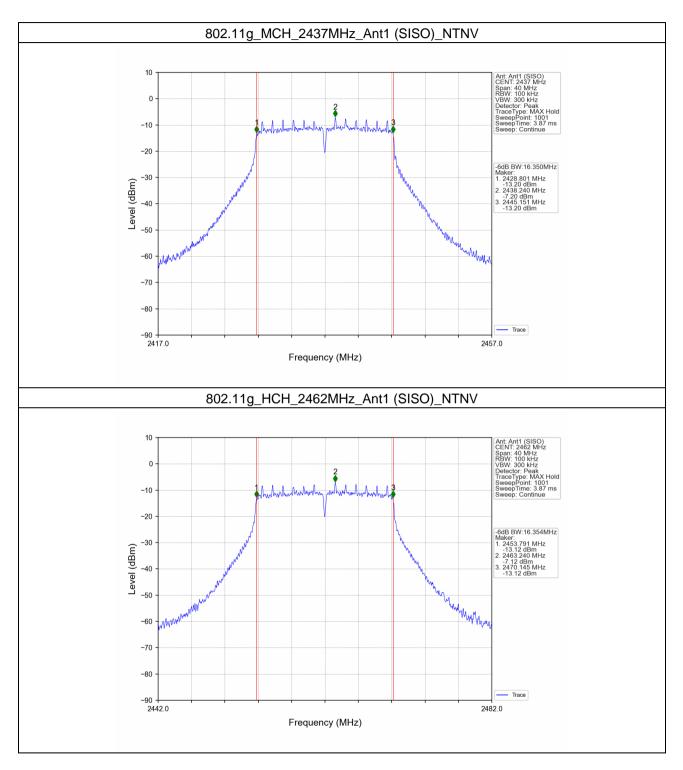
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Report No.: GZCR230300031802 Page: 69 of 93





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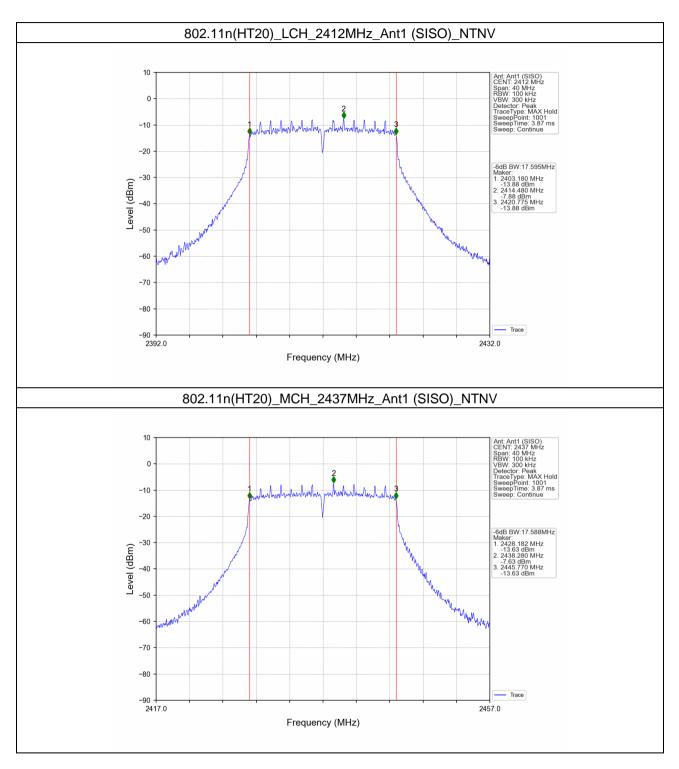
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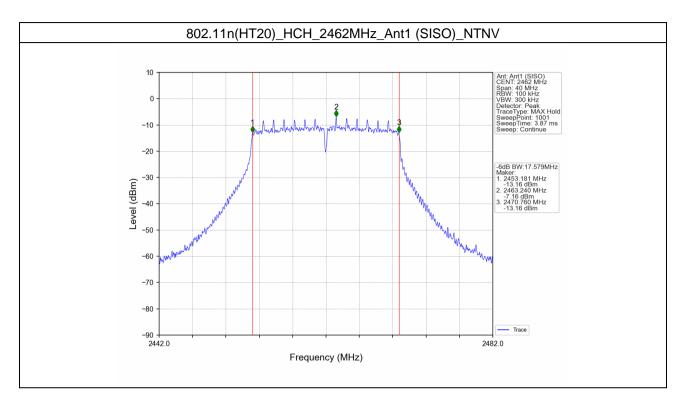
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Report No.: GZCR230300031802 Page: 72 of 93

# 3. Maximum Conducted Output Power

## 3.1 Power

## 3.1.1 Test Result

Mada TX		Frequency	Maximum Peak Conduct	Vardiat	
Mode	Mode Type		ANT1	Limit	Verdict
		2412	9.63	<=30	Pass
802.11b	SISO	2437	9.91	<=30	Pass
		2462	9.97	<=30	Pass
802.11g SISO		2412	11.17	<=30	Pass
	SISO	2437	11.36	<=30	Pass
	2462	11.39	<=30	Pass	
		2412	11.17	<=30	Pass
802.11n (HT20)	SISO	2437	11.28	<=30	Pass
(1120)		2462	11.40	<=30	Pass
Note1: Antenna Gain: Ant1: 4.25dBi;					



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Report No.: GZCR230300031802 Page: 73 of 93

- 4. Maximum Power Spectral Density
- 4.1 PSD
- 4.1.1 Test Result

Mode	ТХ Туре	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Vordiat
			ANT1	Limit	Verdict
802.11b	SISO	2412	-16.09	<=8	Pass
		2437	-16.35	<=8	Pass
		2462	-15.96	<=8	Pass
802.11g	SISO	2412	-21.84	<=8	Pass
		2437	-22.30	<=8	Pass
		2462	-22.51	<=8	Pass
802.11n (HT20)	SISO	2412	-20.43	<=8	Pass
		2437	-22.15	<=8	Pass
		2462	-22.23	<=8	Pass

Note1: Antenna Gain: Ant1: 4.25dBi;



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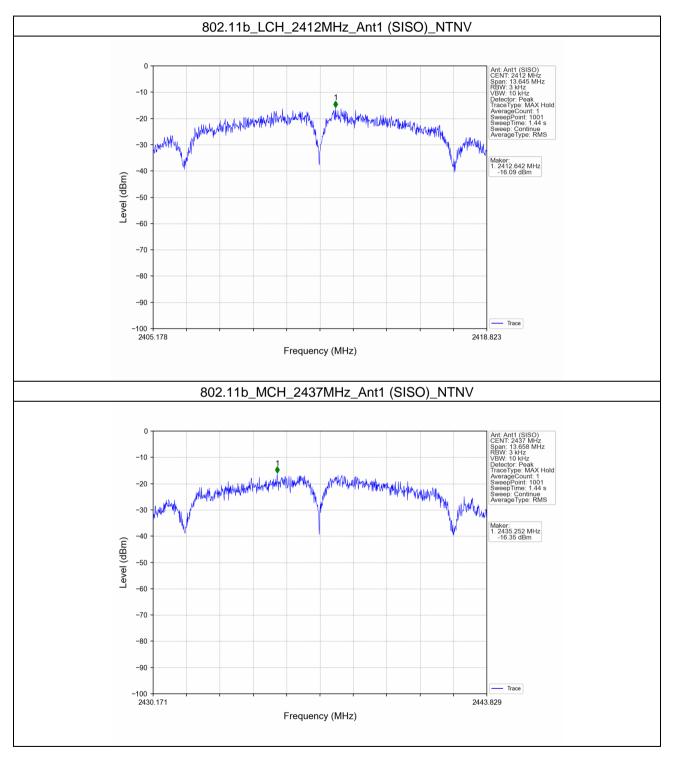
### 4.1.2 Test Graph

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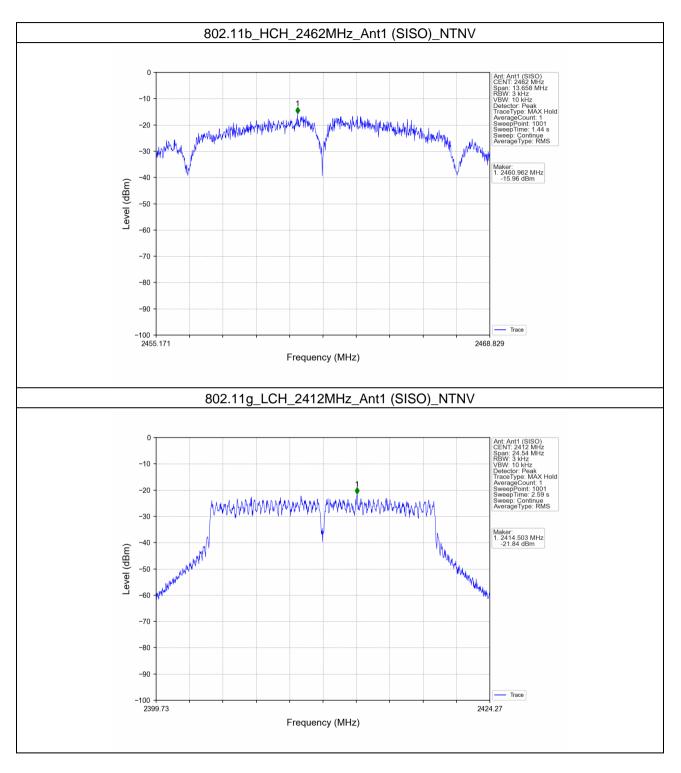
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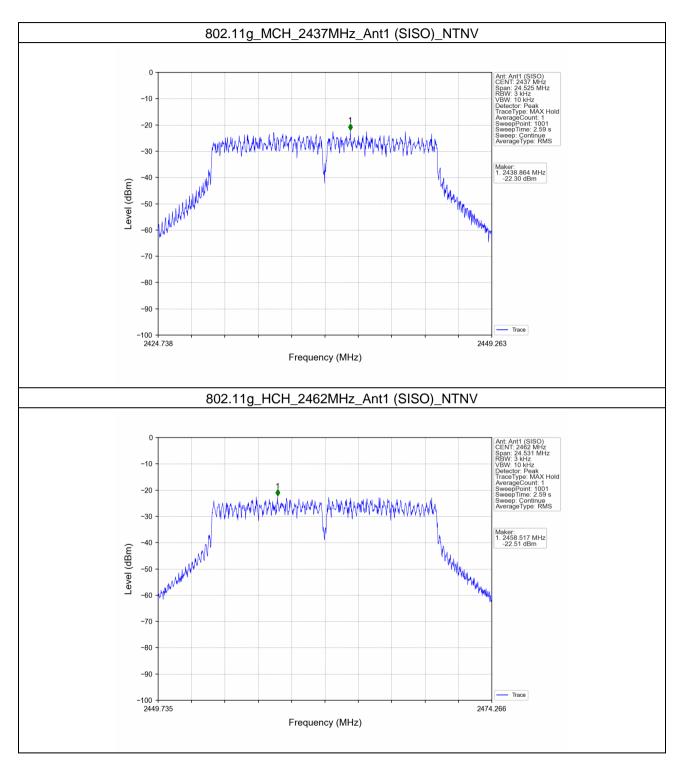
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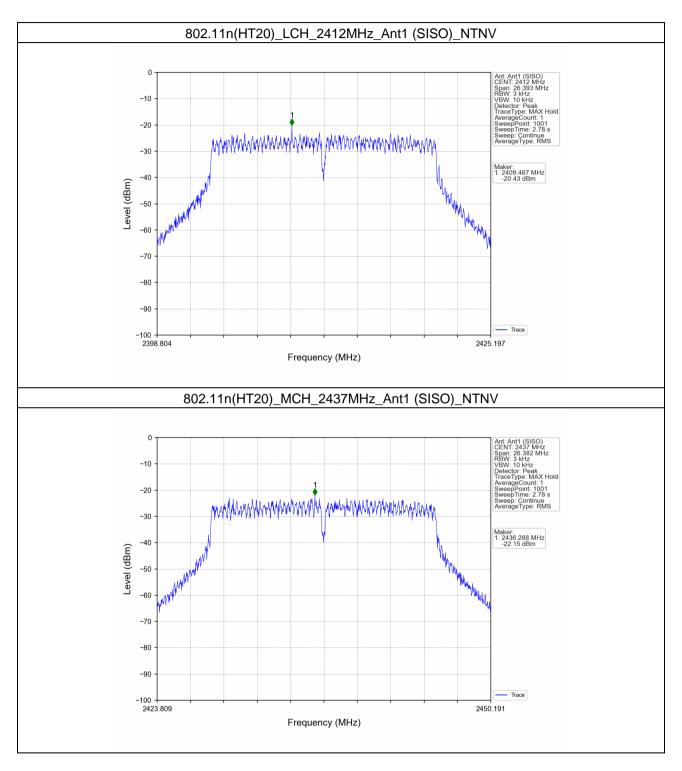
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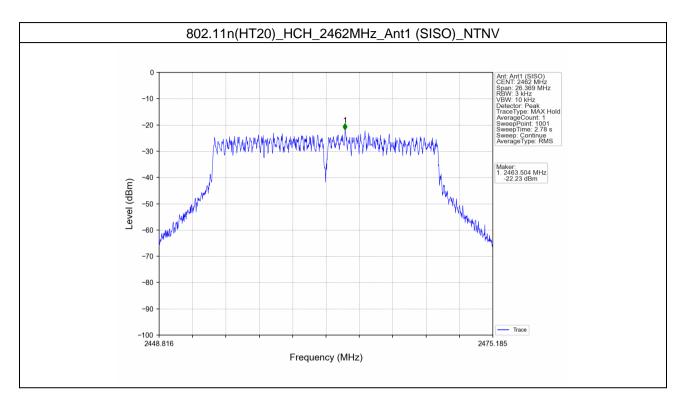
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Report No.: GZCR230300031802 Page: 79 of 93

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

### 5.1 Ref

#### 5.1.1 Test Result

Mode	ТХ Туре	Frequency (MHz)	ANT	Level of Reference (dBm)	
802.11b		2412	1	-1.45	
	SISO	2437	1	-1.00	
		2462	1	-1.00	
802.11g	SISO	2412	1	-7.48	
		2437	1	-7.96	
		2462	1	-7.09	
802.11n (HT20)	SISO	2412	1	-7.28	
		2437	1	-7.15	
		2462	1	-7.15	

was used to establish the reference level.



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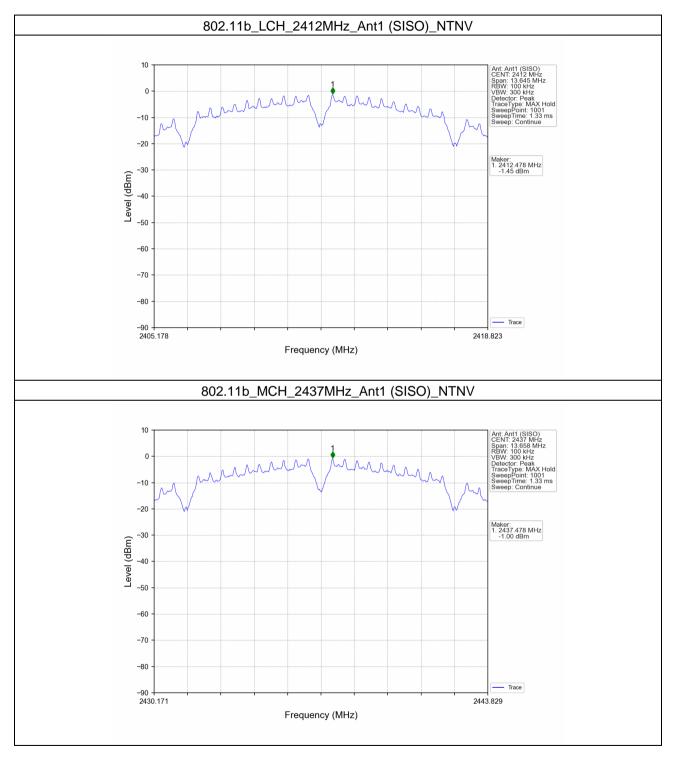
### 5.1.2 Test Graph

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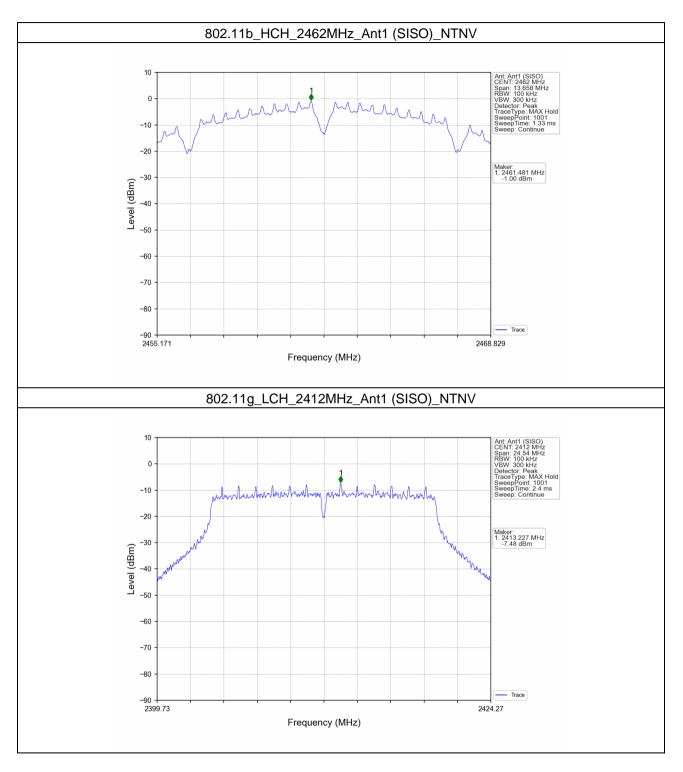
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Report No.: GZCR230300031802 Page: 81 of 93



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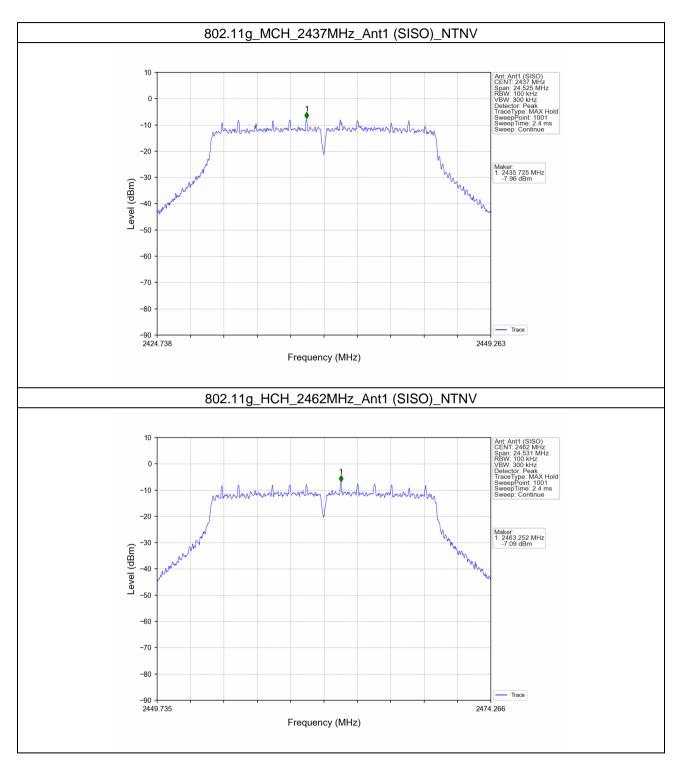
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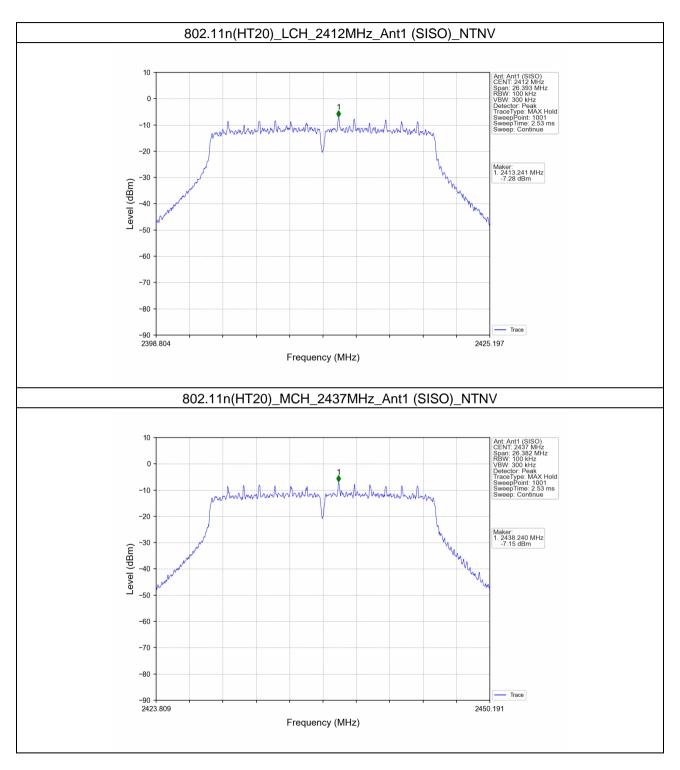
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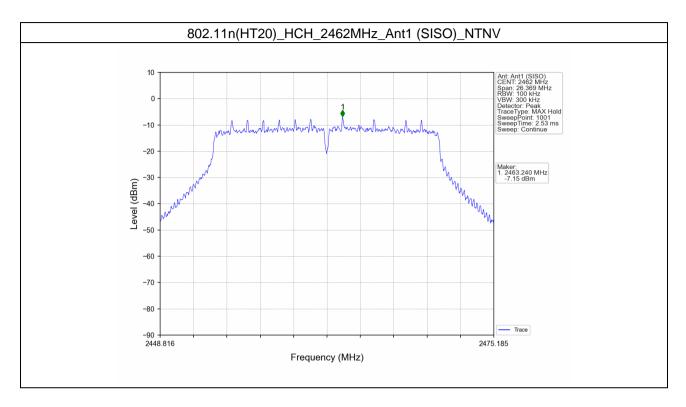
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Report No.: GZCR230300031802 Page: 84 of 93





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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 85 of 93

#### 5.2 CSE and Band Edges

#### 5.2.1 Test Result

Mode	ТХ Туре	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict	
802.11b	SISO	2412	1	-1.00	-21.00	Pass	
		2437	1	-1.00	-21.00	Pass	
		2462	1	-1.00	-21.00	Pass	
802.11g	SISO	2412	1	-7.09	-27.09	Pass	
		2437	1	-7.09	-27.09	Pass	
		2462	1	-7.09	-27.09	Pass	
802.11n (HT20)	SISO	2412	1	-7.15	-27.15	Pass	
		2437	1	-7.15	-27.15	Pass	
		2462	1	-7.15	-27.15	Pass	
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level							

was used to establish the reference level.



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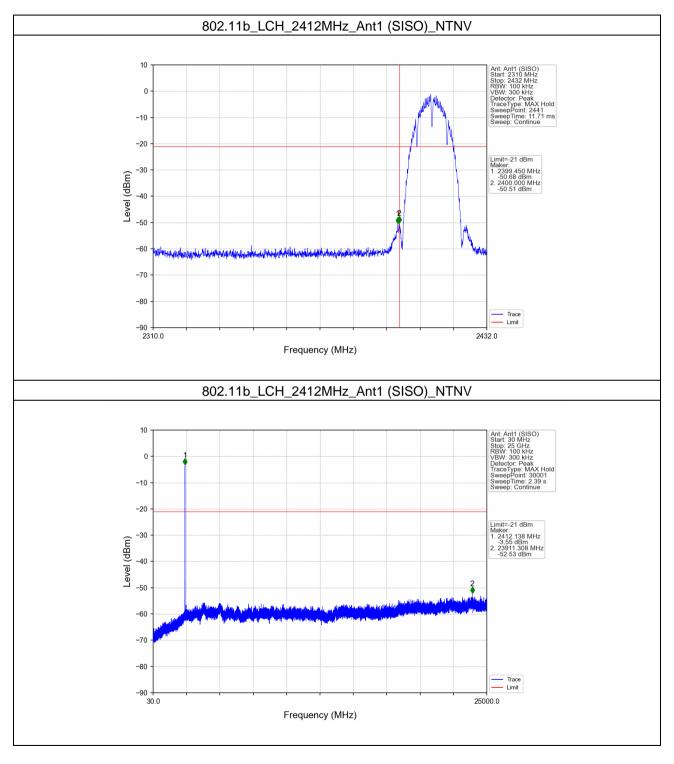
Report No.: GZCR230300031802 Page: 86 of 93

### 5.2.2 Test Graph

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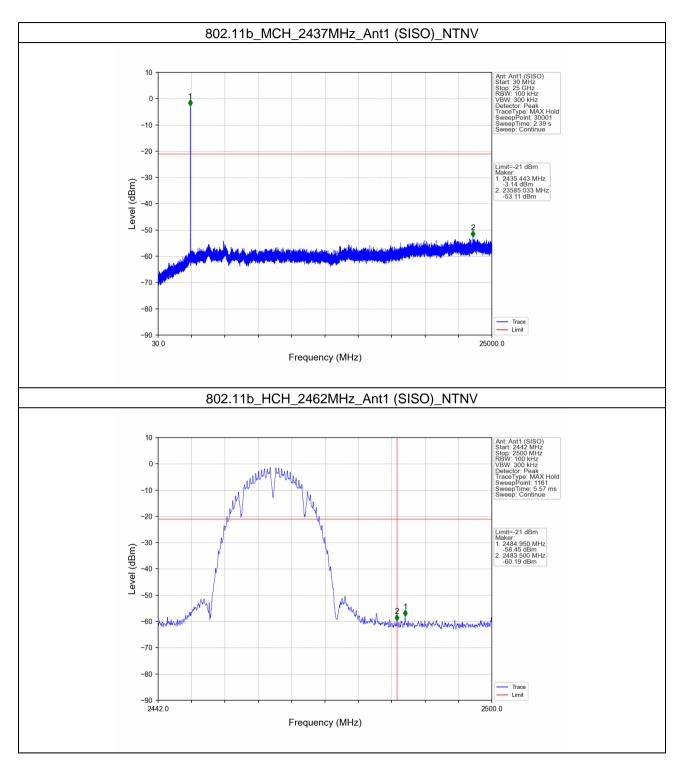
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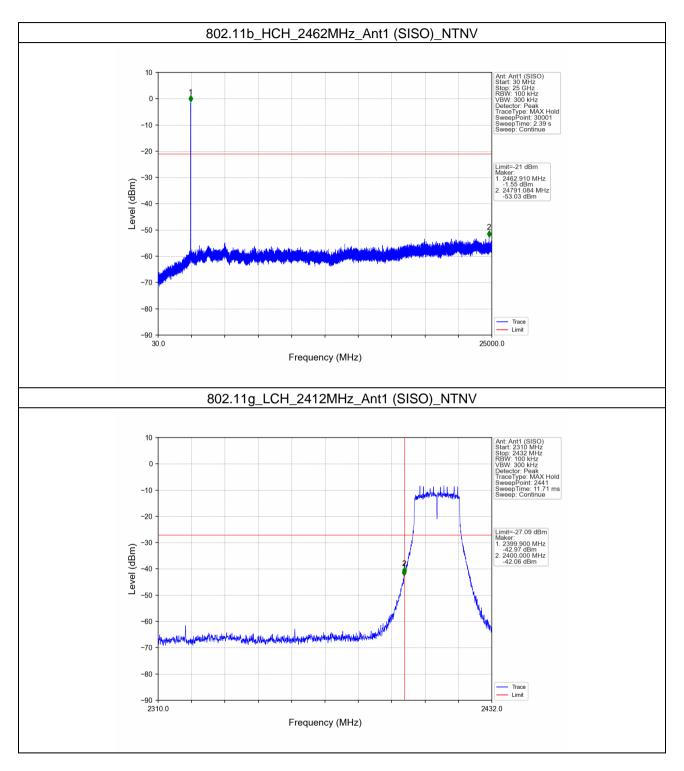
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Report No.: GZCR230300031802 Page: 88 of 93





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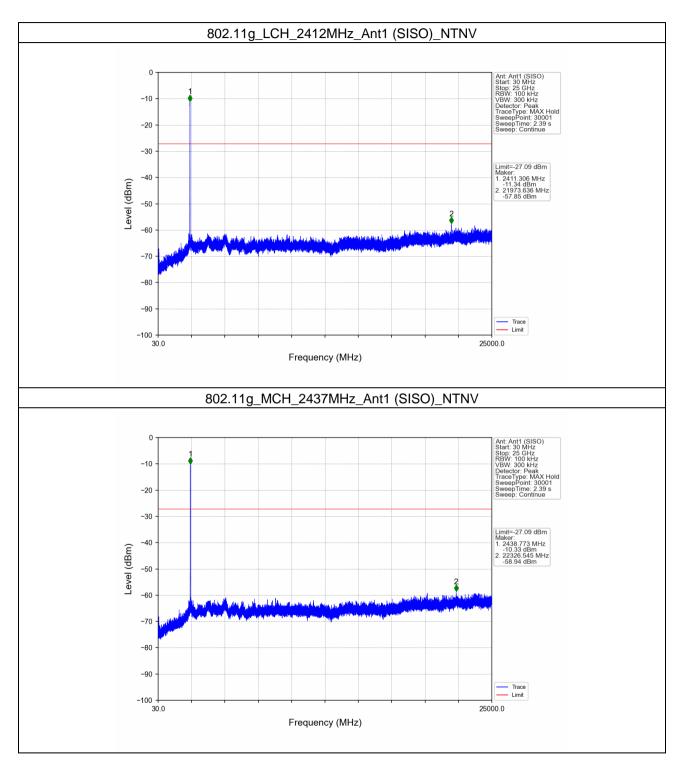
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EMC-TRF-01 Rev 1.1

Report No.: GZCR230300031802 Page: 89 of 93





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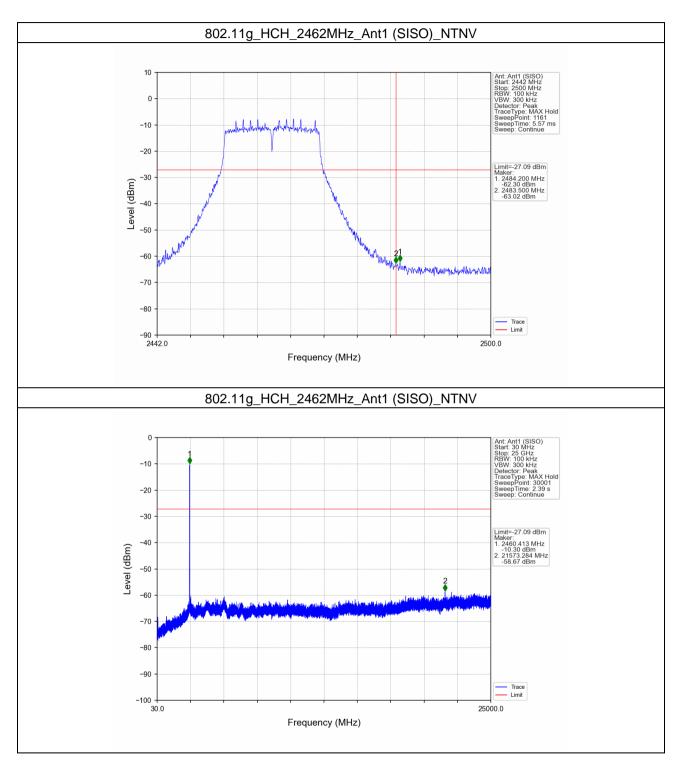
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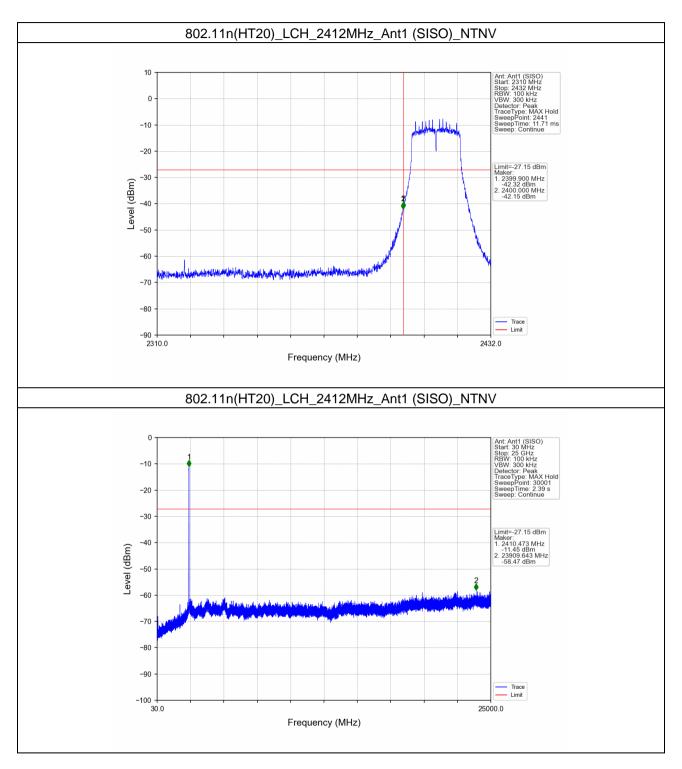
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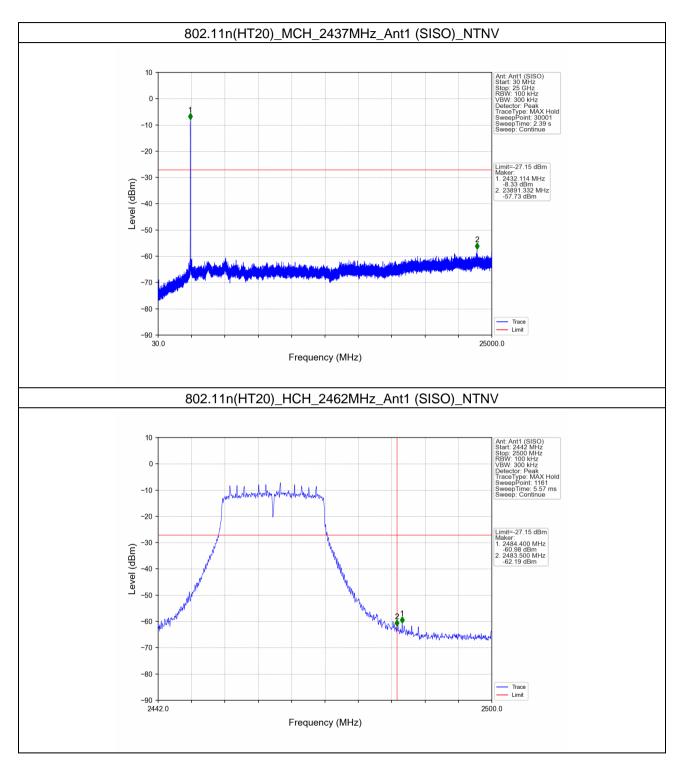
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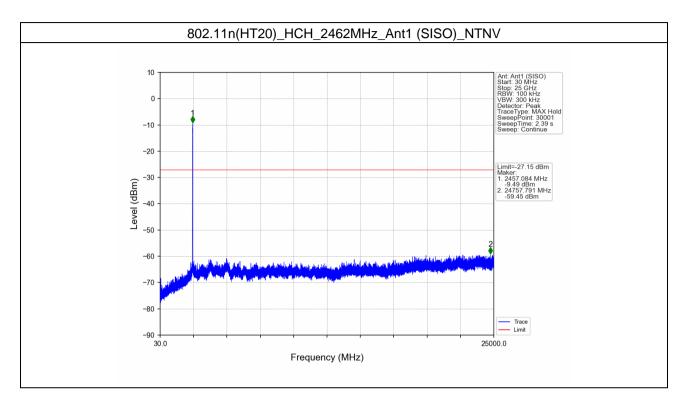
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Report No.: GZCR230300031802 Page: 93 of 93



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