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TEST REPORT

Application No.:	KSCR2210001885AT
FCC ID:	2ATCK-TMSS5B5
IC:	25126-TMSS5B5
Applicant:	Baolong Huf Shanghai Electronics Co., Ltd.
Address of Applicant:	1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai
Manufacturer:	Baolong Huf Shanghai Electronics Co., Ltd.
Address of Manufacturer:	1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai
Factory:	Baolong Huf Shanghai Electronics Co., Ltd.
Address of Factory:	1st Floor, Building 5, 5500 Shenzhuan Rd, Songjiang, Shanghai
Equipment Under Test (EUT):
EUT Name:	TPMS SENSOR
Model No.:	TMSS5B5
Trade Mark:	BH SENS
Standard(s) :	47 CFR Part 15, Subpart C 15.247
	RSS-247 Issue 2, February 2017
	RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt:	2022-10-10
Date of Test:	2022-10-15 to 2022-10-25
Date of Issue:	2022-10-29
Test Result:	Pass*

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

Enin fri

Eric Lin Laboratory Manager



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Revision Record					
Version	Remark				
00	Original	2022-10-29	/		

Authorized for issue by:			
	Paun. Lin	e.	
	Pawn.Liu/Project Engineer		
	Enie fri		
	Eric Lin /Reviewer		



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2 Test Summary

Radio Spectrum Technical Requirement						
Item	FCC Requirement	IC Requirement	Method	Result		
Antenna Requirement	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	RSS-Gen Clause 6.8	N/A	Customer Declaration		
N/A: Not applicable						
Radio Spectrum Matt	er Part					
Item	FCC Requirement	IC Requirement	Method	Result		
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247(b)(3)	RSS-247 Section 5.4(d)	ANSI C63.10 (2013) Section 11.9.1	Pass		
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247(a)(2)	RSS-247 Section 5.2(a)	ANSI C63.10 (2013) Section 11.8.1	Pass		
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247(e)	RSS-247 Section 5.2(b)	ANSI C63.10 (2013) Section 11.10.2	Pass		
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247(d)	RSS-247 Section 5.5	ANSI C63.10 (2013) Section 11.13.3.2	Pass		
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247(d)	RSS-247 Section 5.5	ANSI C63.10 (2013) Section 11.11	Pass		
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.205 & 15.209(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.10.5	Pass		
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.205 & 15.209(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4,6.5,6.6	Pass		
99% Bandwidth	-	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	Pass		



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3V by Battery
	Battery model:CR2032HT
	Output:3V
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.2 LE
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Plug-in Antenna
Antenna Gain:	0.44dBi(Provided by the manufacturer)
Data rate:	1Mbps,2Mbps,125Kbps,500Kbps
Firmware version:	V01
Serial Number:	6CB2FDAA5454
Test Voltage:	DC 3V

4.2 Power level setting using in test:

Francisco	BLE	BLE
Frequency	1M	2M
2402	5	5
2440	5	5
2480	5	5

4.3 Environment Parameter

Environment Parameter		Selected Values During Tests		sts
Relative Humidity		Ambient		
Value		Temperature(°C) Voltage(V)		Voltage(V)
NTNV		25		DC 3
Note:				
NV:Normal Voltage	LV:Low Extreme Test Vo	ltage	HV:High Extren	ne Test Voltage
NT:Normal Temperature	LT:Low Extreme Test Te	mperature	HT:High Extren	ne Test Temperature

4.4 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	LENOVO	K27	EB24537645
Serial port adapter plate	/	Test Plate 3	/



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Item	Measurement Uncertainty
Radio Frequency	8.4 x 10 ⁻⁸
Timeout	2s
Duty Cycle	0.37%
Occupied Bandwidth	3%
RF Conducted Power	0.6dB
RF Power Density	2.9dB
Conducted Spurious Emissions	0.75dB
PE Padiated Dower	5.2dB (Below 1GHz)
RF Radiated Fower	5.9dB (Above 1GHz)
	4.2dB (Below 30MHz)
Redicted Sourious Emission Test	4.5dB (30MHz-1GHz)
Radiated Spurious Emission Test	5.1dB (1GHz-18GHz)
	5.4dB (Above 18GHz)
Temperature Test	1°C
Humidity Test	3%
Supply Voltages	1.5%
Time	3%
	Radio Frequency Timeout Duty Cycle Occupied Bandwidth RF Conducted Power RF Power Density Conducted Spurious Emissions RF Radiated Power RF Radiated Power Temperature Test Humidity Test Supply Voltages

4.5 Measurement Uncertainty

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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4.6 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China. Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

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

2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).

4.7 Test Facility

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

• A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4.8 Deviation from Standards

None

4.9 Abnormalities from Standard Conditions

None



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5 Equipment List

ltem	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date		
RF Co	RF Conducted Test							
1	Spectrum Analyzer	Keysight	N9020A	KUS1911E004-2	08/22/2022	08/21/2023		
2	Spectrum Analyzer	Keysight	N9020A	KUS2001M001-2	08/22/2022	08/21/2023		
3	Spectrum Analyzer	Keysight	N9030B	KSEM021-1	01/22/2022	01/21/2023		
4	Signal Generator	R&S	SMW200A	KSEM020-1	08/22/2022	08/21/2023		
5	Signal Generator	Agilent	N5182A	KUS2001M001-1	08/22/2022	08/21/2023		
6	Radio Communication Test Station	Anritsu	MT8000A	KSEM001-1	08/22/2022	08/21/2023		
7	Radio Communication Analyzer	Anritsu	MT8821C	KSEM002-1	04/01/2022	03/31/2023		
8	Universal Radio Communication Tester	R&S	CMW500	KUS1911E004-1	08/22/2022	08/21/2023		
9	Switcher	CCSRF	FY562	KUS2001M001-3	08/22/2022	08/21/2023		
10	AC Power Source	EXTECH	6605	KS301178	N.C.R	N.C.R		
11	DC Power Supply	Aglient	E3632A	KS301180	N.C.R	N.C.R		
12	Conducted Test Cable	Thermax	RF01-RF04	CZ301111- CZ301120	01/16/2022	01/15/2023		
13	Temp. / Humidity Chamber	TERCHY	MHK-120AK	KS301190	04/01/2021	03/31/2023		
14	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-5	04/14/2022	04/13/2023		
15	Software	BST	TST-PASS	/	N/A	N/A		
RF Ra	diated Test							
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	08/22/2022	08/21/2023		
2	Universal Radio Communication Tester	R&S	CMW500	KSEM009-1	04/01/2022	03/31/2023		
3	Signal Generator	Agilent	E8257C	KS301066	08/22/2022	08/21/2023		
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	04/13/2021	04/12/2023		
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2021	06/28/2023		
6	Bilog Antenna	SCHWARZBECK	VULB9160	CZ301016	04/13/2021	04/12/2024		
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	KS301079	04/02/2022	04/01/2024		
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	KS301186	02/22/2021	02/21/2023		
9	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	03/17/2022	03/16/2023		
10	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/22/2022	01/21/2023		
11	Amplifier(18~40GHz)	COM-POWER	PAM-840A	KUS1710E001	01/22/2022	01/21/2023		
12	RE Test Cable	REBES MICROWAVE	/	CZ301097	11/14/2021	11/13/2022		
13	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	01/04/2022	31/03/2023		
14	Software	Faratronic	EZ_EMC-v 3A1	/	N/A	N/A		



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

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

15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is Plug-in Antenna and no consideration of replacement. The best case gain of the antenna is 0.33dBi.

Antenna location: Refer to internal photo.



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7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement	47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method:	ANSI C63.10 (2013) Section 11.9.1

Limit:

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

7.1.1 E.U.T. Operation

Operating Enviro	nment:				
Temperature:	25.0 °C	Humidity:	31.7 % RH	Atmospheric Pressure: 1010 r	mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.



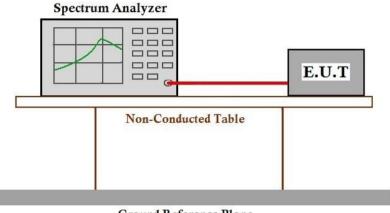
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7.1.3 Test Setup Diagram



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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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

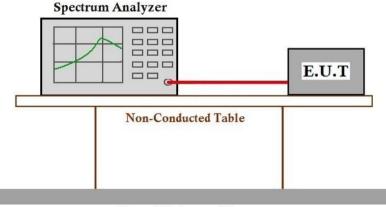
Operating Environment:

Temperature:	25.0 °C	Humidity:	31.7 % RH	Atmospheric Pressure:	1010	mbar
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7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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 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

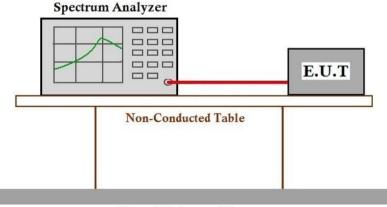
7.3.1 E.U.T. Operation

Operating Environment: Temperature: 25.0 °C Humidity: 31.7 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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 Conducted Band Edges Measurement

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

Limit:

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

7.4.1 E.U.T. Operation

Operating Environment: Temperature: 25.0 °C

Humidity: 31.7 % RH

Atmospheric Pressure: 1010 mbar

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.2 Test Mode Description



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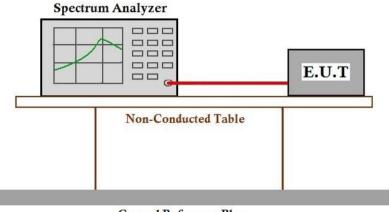
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7.4.3 Test Setup Diagram



Ground Reference Plane

7.4.4 Measurement Procedure and Data

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7.5 Conducted Spurious Emissions

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

Limit:

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

7.5.1 E.U.T. Operation

Operating Environment: Temperature: 25.0 °C

Humidity: 31.7 % RH

Atmospheric Pressure: 1010 mbar

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.2 Test Mode Description



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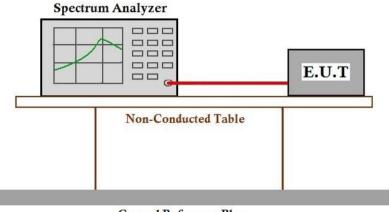
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7.5.3 Test Setup Diagram



Ground Reference Plane

7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.6 Radiated Emissions which fall in the restricted bands

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

Limit:

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

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

7.6.1 E.U.T. Operation

Operating Enviro	nment:					
Temperature:	23.5 °C	Humidity:	58.5 % RH	Atmospheric Pressure:	1010	mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.



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7.6.3 Test Setup Diagram

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3m or 10m antenna Tower internia antenna Tower internia internia Test Receiver internia internia Ground Reference Plane internia internia 30MHz-1GHz Above 1GHz



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7.6.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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

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

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

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

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



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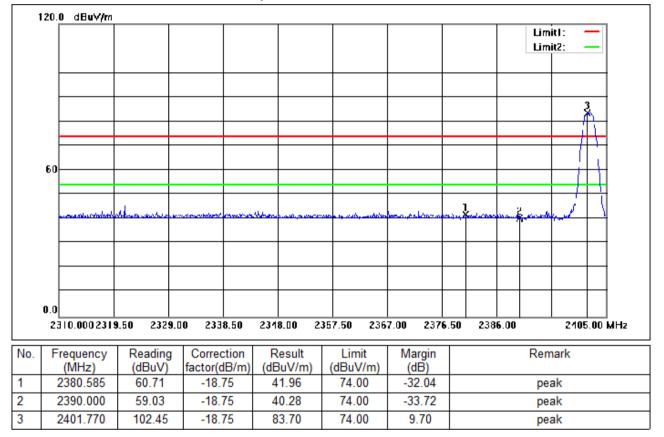
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Report No.: KSCR221000188501 Page: 23 of 78



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



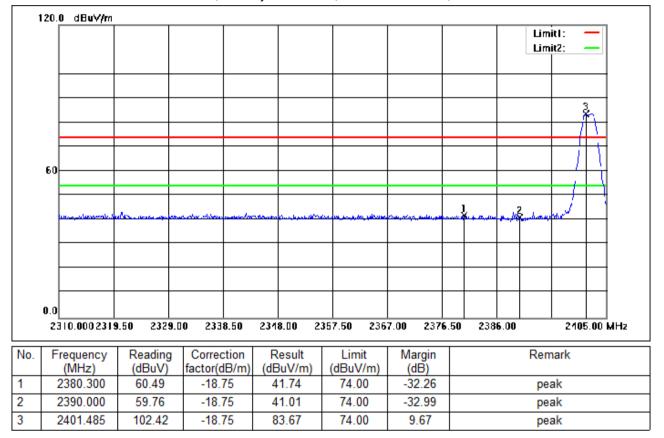
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



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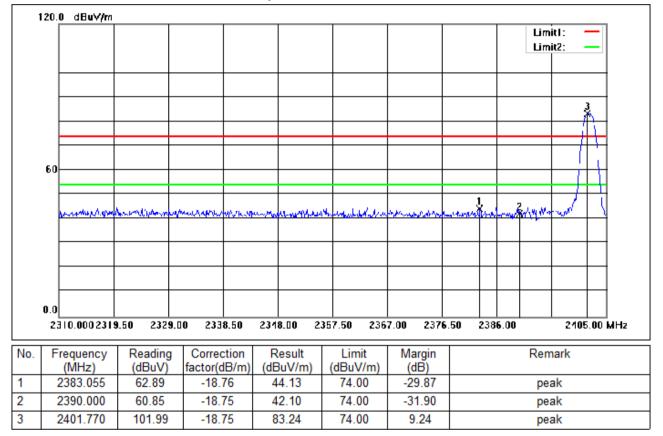
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



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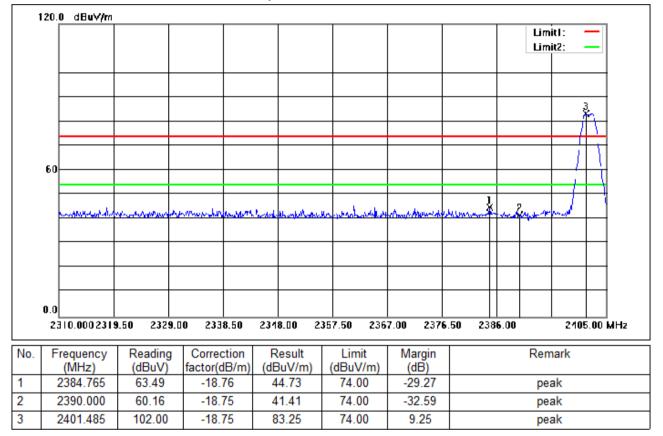
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



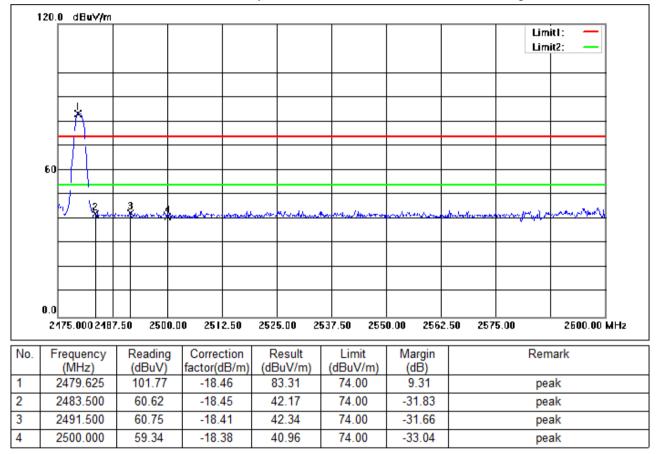
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Test Report Form Version: Rev01



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

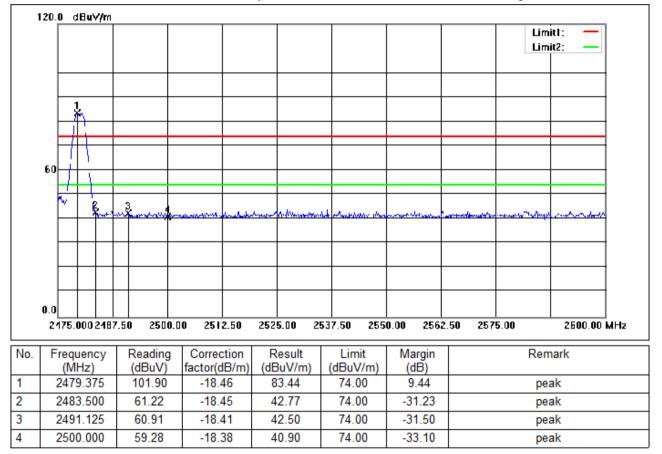


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High

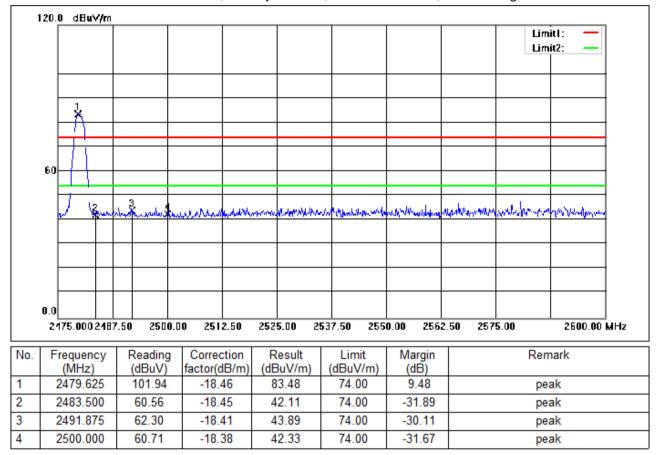


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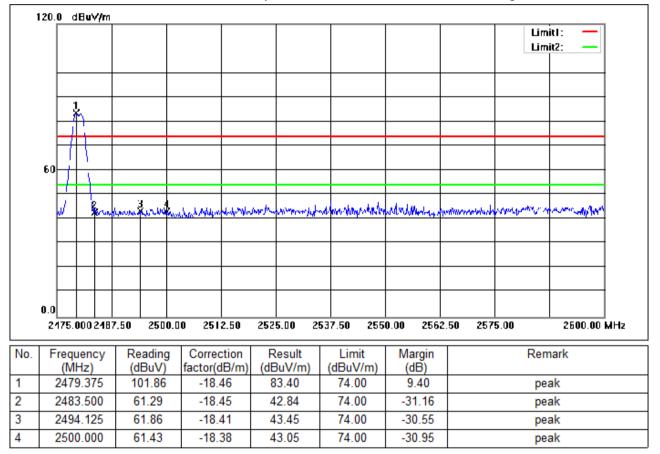


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7.7 Radiated Spurious Emissions Below 1GHz

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

Limit:

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

7.7.1 E.U.T. Operation

Operating Environment: Temperature: 23.5 °C

Humidity: 58.5 % RH

Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description				
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.				
Pre-scan	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.				



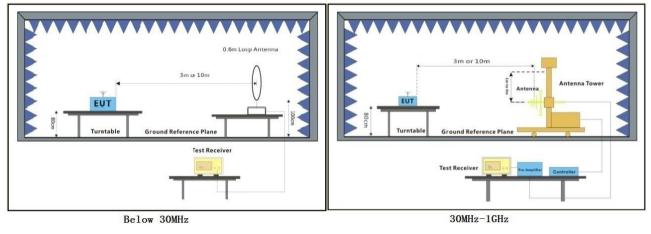
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7.7.3 Test Setup Diagram





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7.7.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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

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

Remark:

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

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

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



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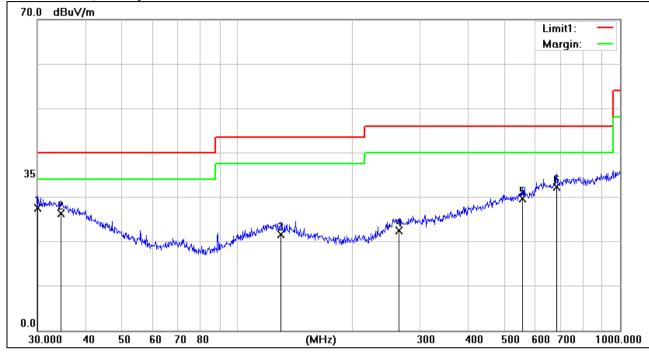
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Test Mode	00; Polarity:	Horizontal
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No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	30.1054	2.32	25.23	27.55	40.00	-12.45	201	260	QP
2	34.5173	1.60	24.77	26.37	40.00	-13.63	157	360	QP
3	129.9226	2.30	19.38	21.68	43.50	-21.82	201	338	QP
4	264.7457	1.59	20.98	22.57	46.00	-23.43	201	184	QP
5	554.8254	2.41	27.23	29.64	46.00	-16.36	100	234	QP
6	682.3485	4.73	27.48	32.21	46.00	-13.79	100	36	QP



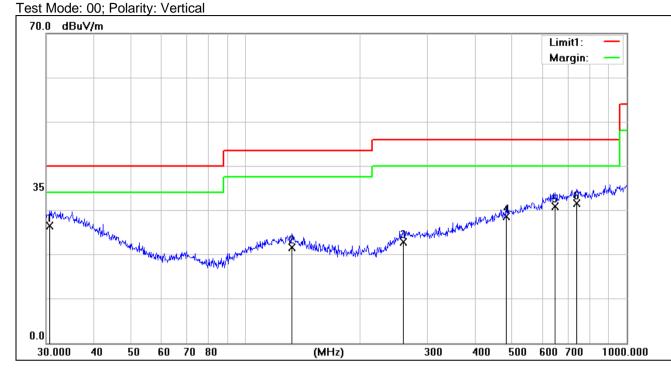
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No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	30.6379	1.40	25.16	26.56	40.00	-13.44	100	0	QP
2	132.2206	2.35	19.29	21.64	43.50	-21.86	106	360	QP
3	259.2338	2.02	20.81	22.83	46.00	-23.17	201	360	QP
4	482.2156	3.37	25.24	28.61	46.00	-17.39	100	317	QP
5	647.3856	3.11	27.77	30.88	46.00	-15.12	100	197	QP
6	739.6605	3.58	28.06	31.64	46.00	-14.36	201	360	QP



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7.8 Radiated Spurious Emissions Above 1GHz

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

Limit:

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

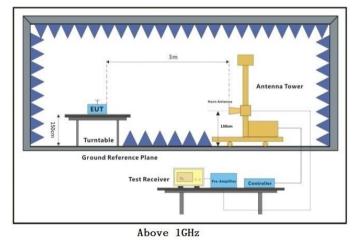
7.8.1 E.U.T. Operation

Operating Enviro	nment:			
Temperature:	23.5 °C	Humidity:	58.5 % RH	Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram





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7.8.4 Measurement Procedure and Data

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

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

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

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

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

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

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

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

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

Remark:

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

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

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

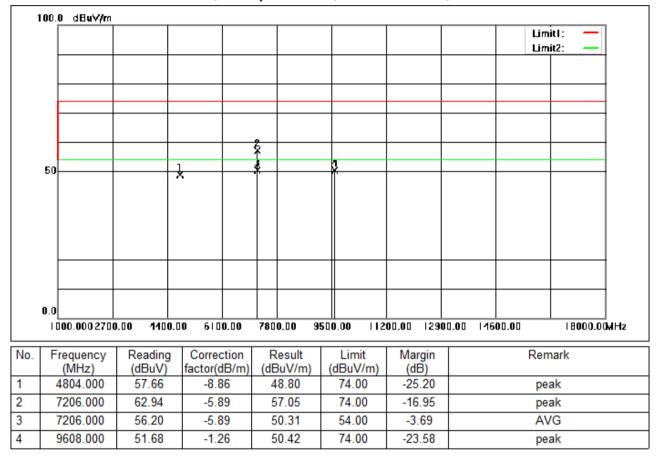


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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



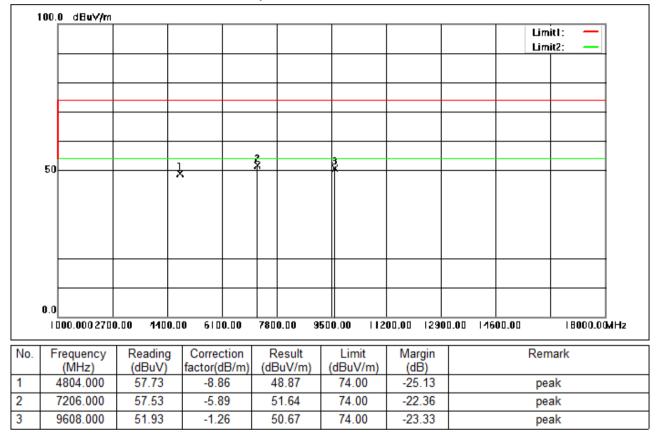
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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



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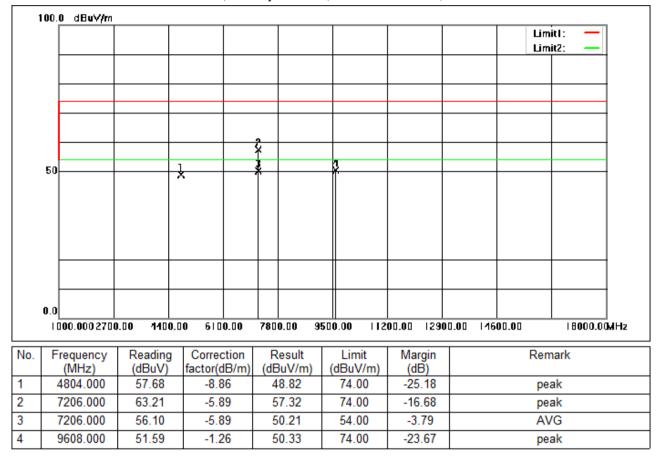
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



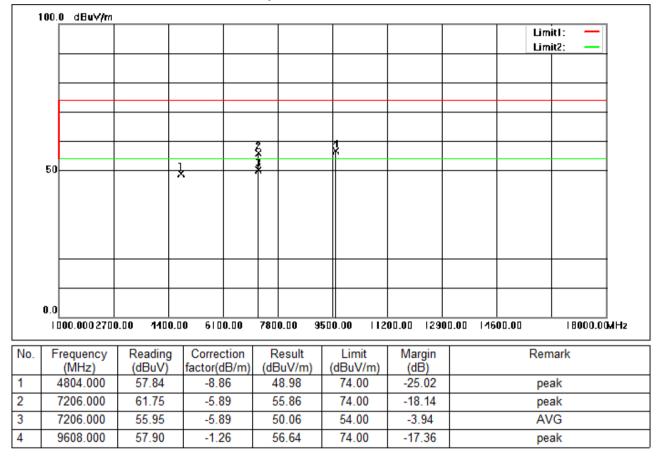
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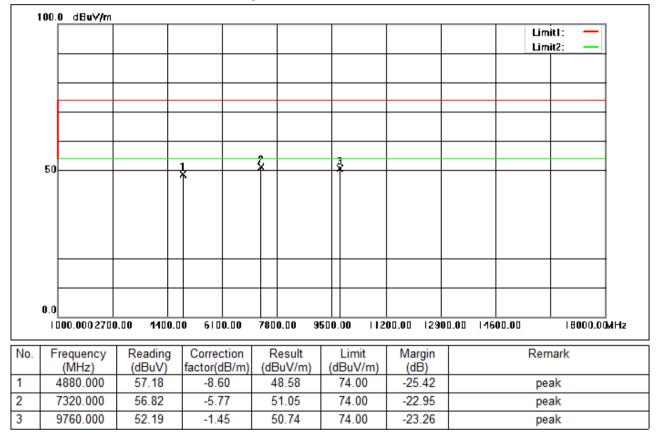
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:middle



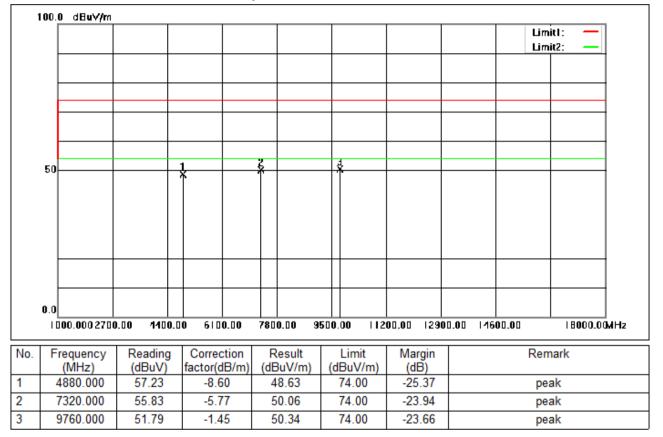
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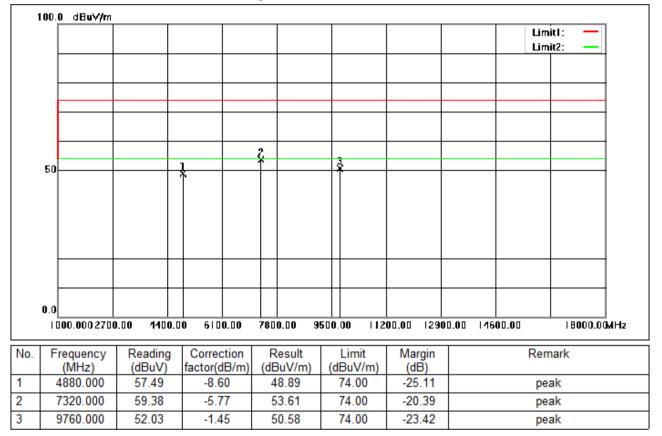
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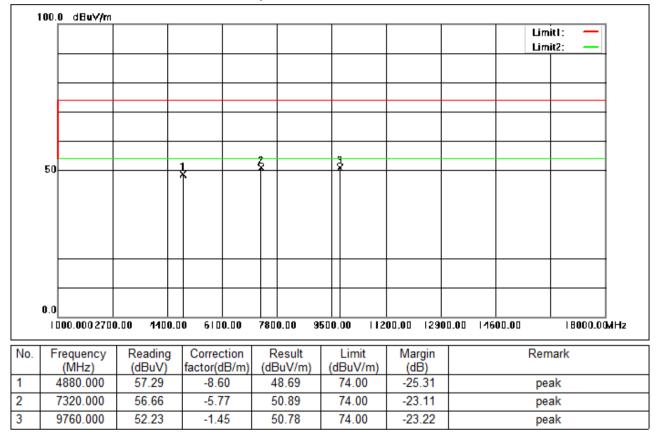
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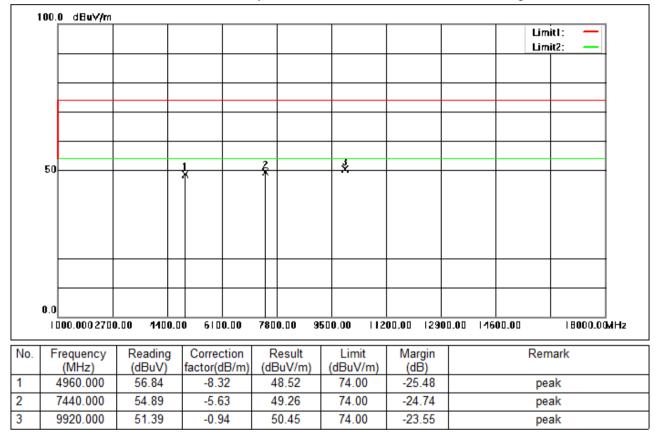
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



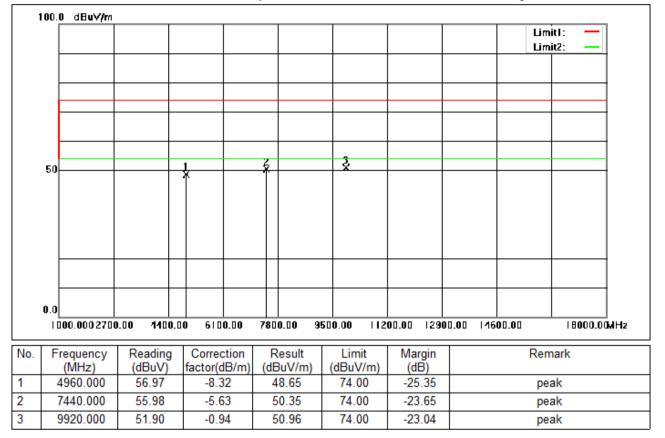
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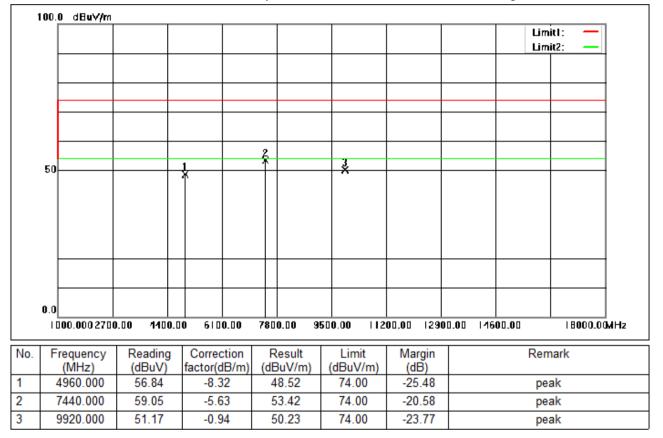
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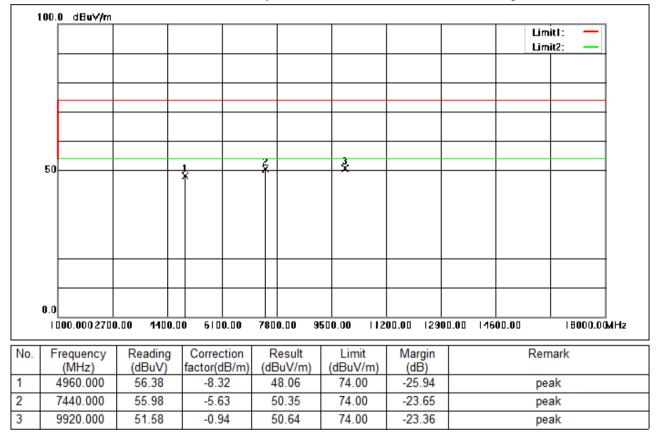
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7.9 99% Bandwidth

Test Requirement	RSS-Gen Section 6.7
Test Method:	ANSI C63.10 Section 6.9.3

7.9.1 E.U.T. Operation

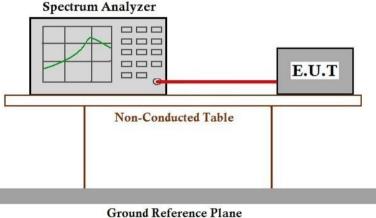
Operating Environment:

Temperature: 23.5 °C Humidity: 58.5 % RH Atmospheric Pressure: 1010 mba	Temperature:	23.5 °C	Humidity:	58.5 % RH	Atmospheric Pressure:	1010	mbar
-------------------------------------------------------------------------	--------------	---------	-----------	-----------	-----------------------	------	------

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1M)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2M)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.9.3 Test Setup Diagram



Ground Reference Plan

7.9.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2210001885AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2210001885AT



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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 (%)		
		2402	100.000	100.000	100.00	0.00	0.00		
1M	SISO	2440	100.000	100.000	100.00	0.00	0.00		
		2480	100.000	100.000	100.00	0.00	0.00		
		2402	100.000	100.000	100.00	0.00	0.00		
2M	SISO	2440	100.000	100.000	100.00	0.00	0.00		
		2480	100.000	100.000	100.00	0.00	0.00		



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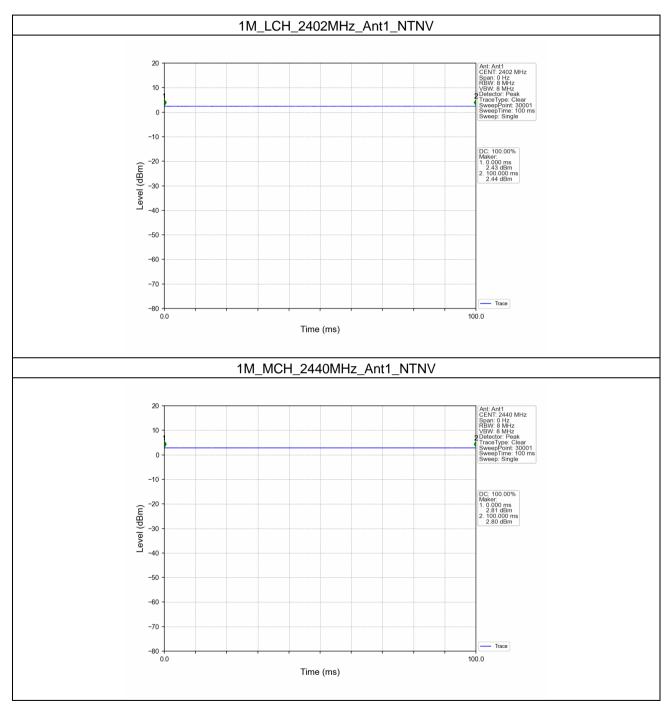
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1.1.2 Test Graph





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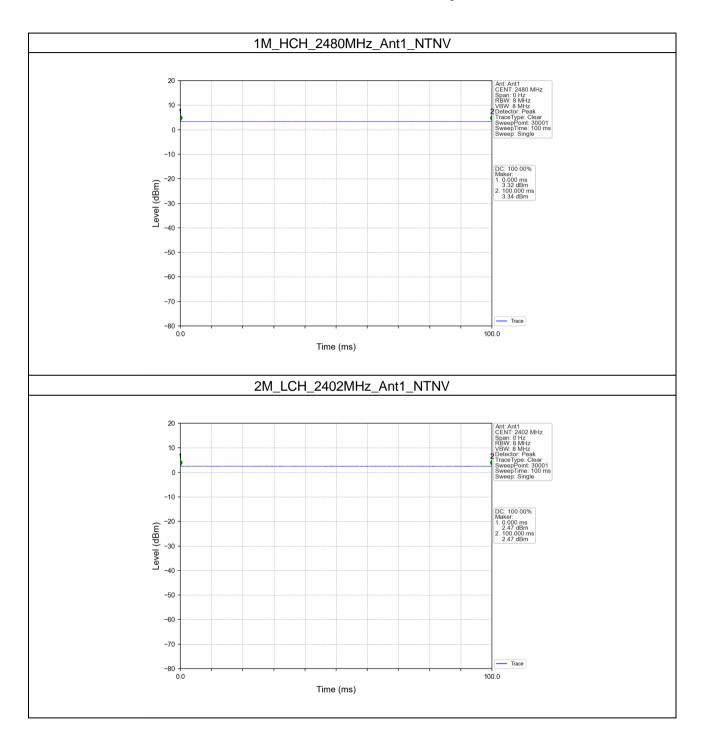
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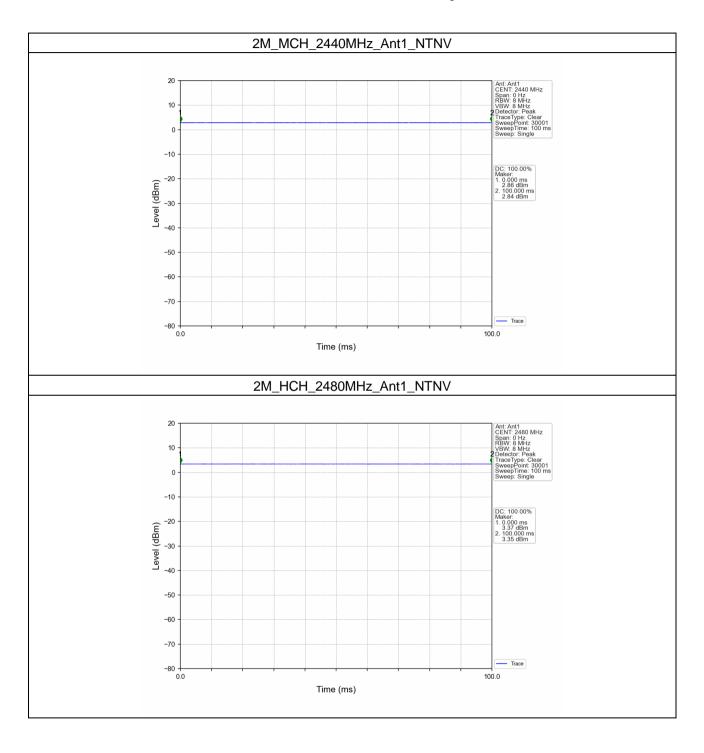
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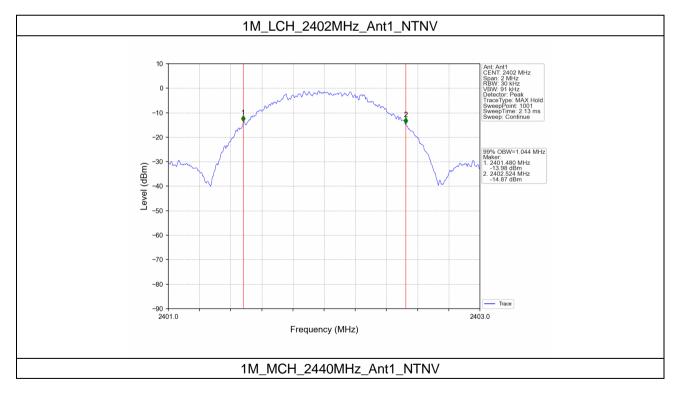
2. Bandwidth

2.1 OBW

2.1.1 Test Result

Mode	ТΧ			99% Occupied Bandwidth (MHz)	Verdict
wode	Mode Type (MHz) ANT		Result	verdict	
		2402	1	1.044	Pass
1M	SISO	2440	1	1.062	Pass
		2480	1	1.053	Pass
		2402	1	2.075	Pass
2M	SISO 244	2440	1	2.074	Pass
		2480	1	2.074	Pass

2.1.2 Test Graph





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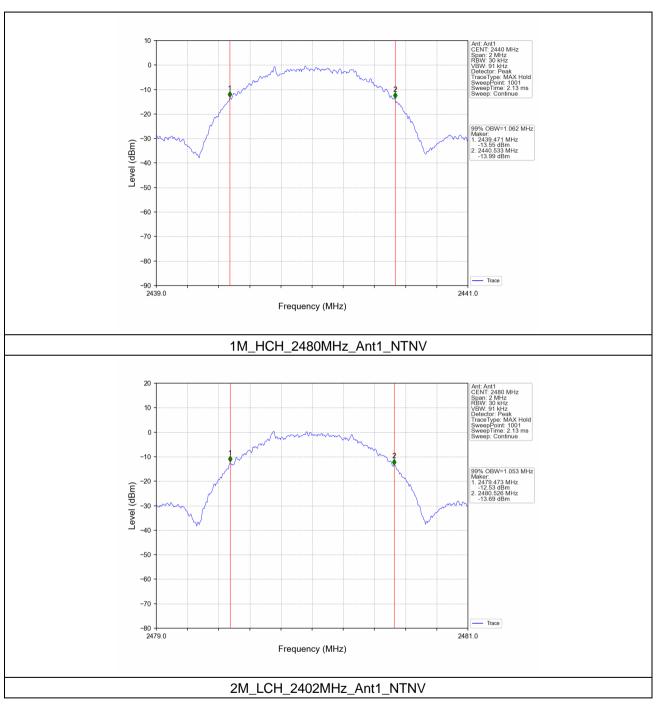
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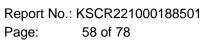
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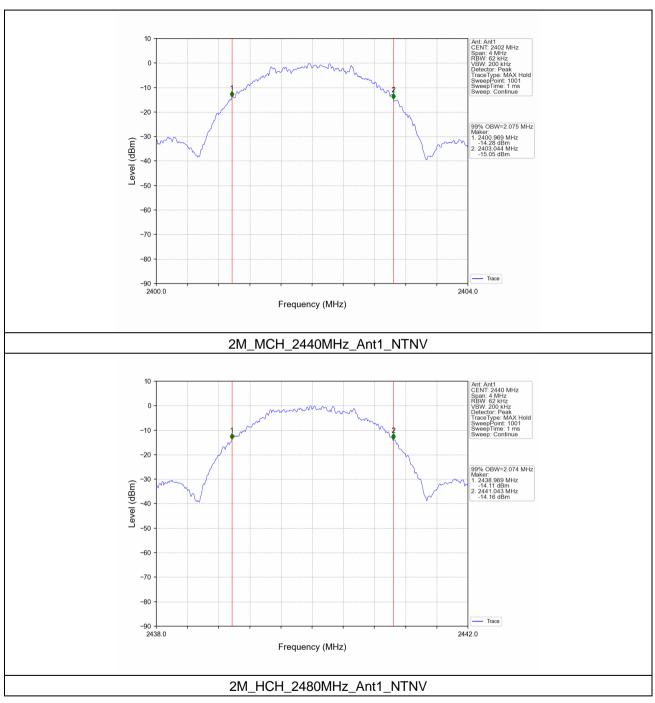




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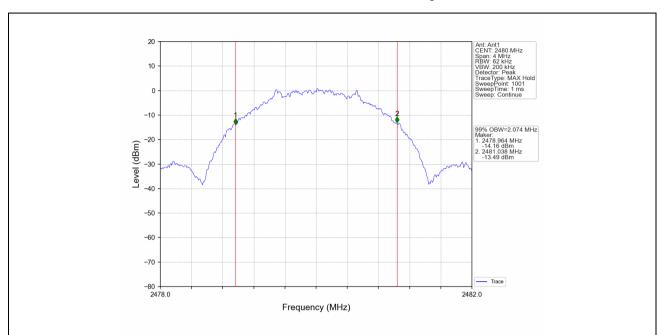
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2.2 6dB BW

2.2.1 Test Result

Mode	ТΧ	Frequency	ΔΝΙΤ	6dB Bandv	vidth (MHz)	Verdict
Mode	Туре	(MHz)	ANT	Result	Limit	verdict
1M SISO	2402	1	0.691	>=0.5	Pass	
	SISO	2440	1	0.731	>=0.5	Pass
		2480	1	0.718	>=0.5	Pass
		2402	1	1.436	>=0.5	Pass
2M	SISO	2440	1	1.431	>=0.5	Pass
		2480	1	1.435	>=0.5	Pass



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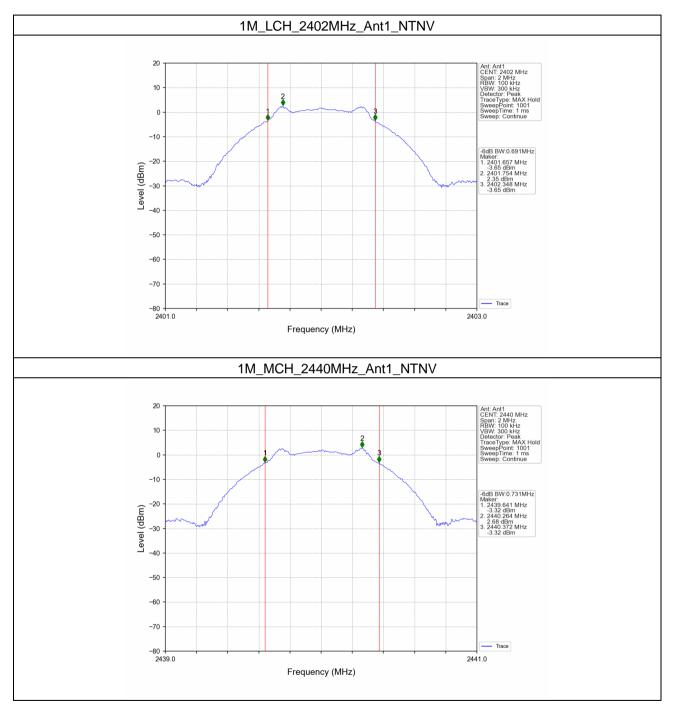
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2.2.2 Test Graph





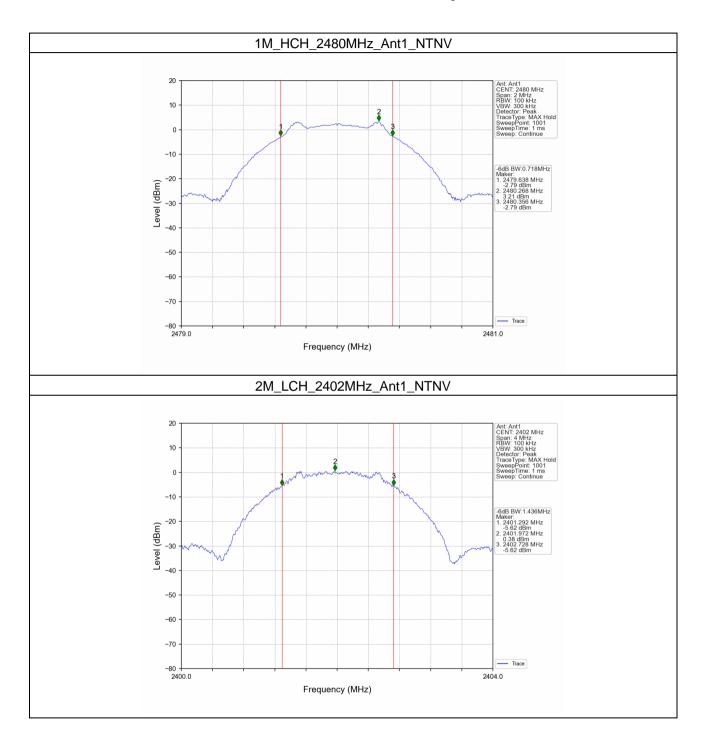
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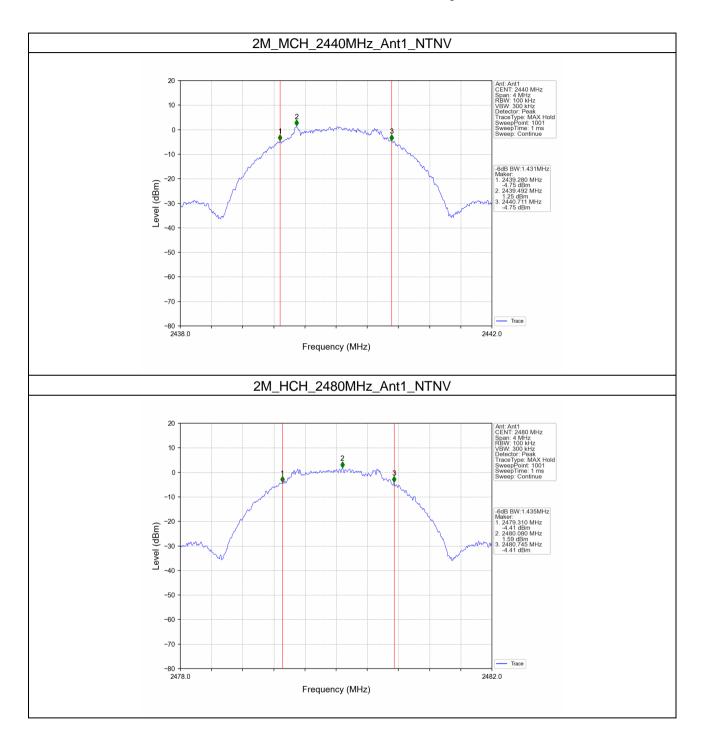
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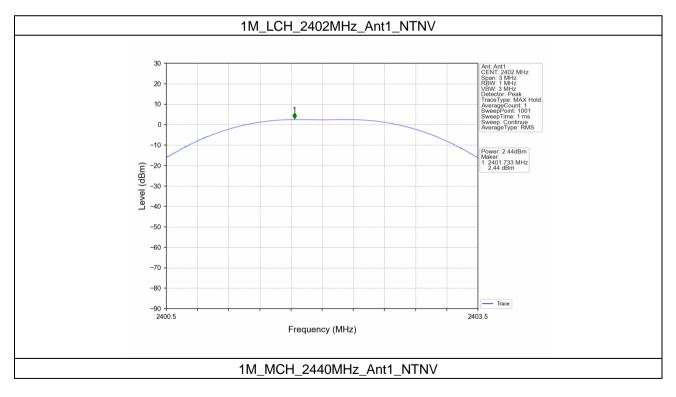
3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	ТХ	Frequency	Maximum Peak Conduct	Verdict						
Mode Type		(MHz)	ANT1	Limit	verdict					
		2402	2.44	<=30	Pass					
1M	SISO	2440	2.82	<=30	Pass					
		2480	3.33	<=30	Pass					
		2402	2.44	<=30	Pass					
2M	SISO	2440	2.82	<=30	Pass					
		2480	3.36	<=30	Pass					
Note1: Ant	enna Gain: /	Note1: Antenna Gain: Ant1: 0.44dBi;								

3.1.2 Test Graph





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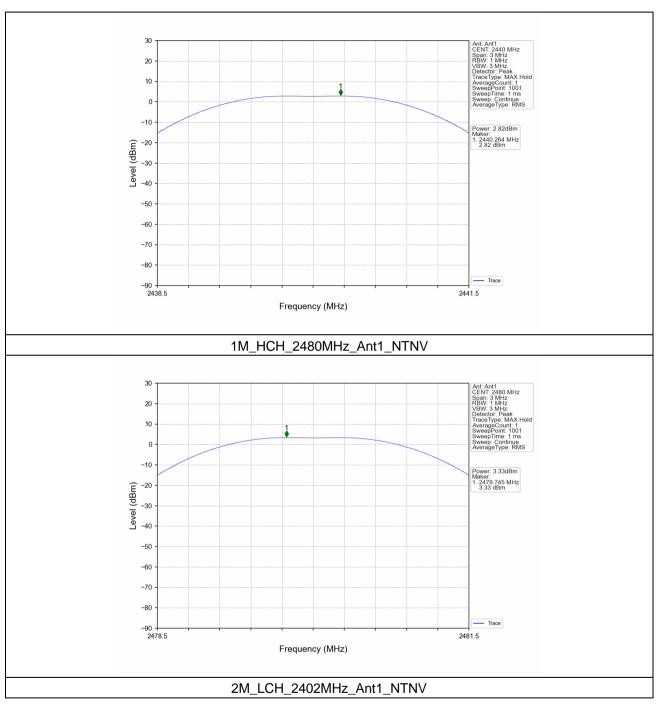
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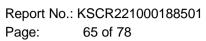


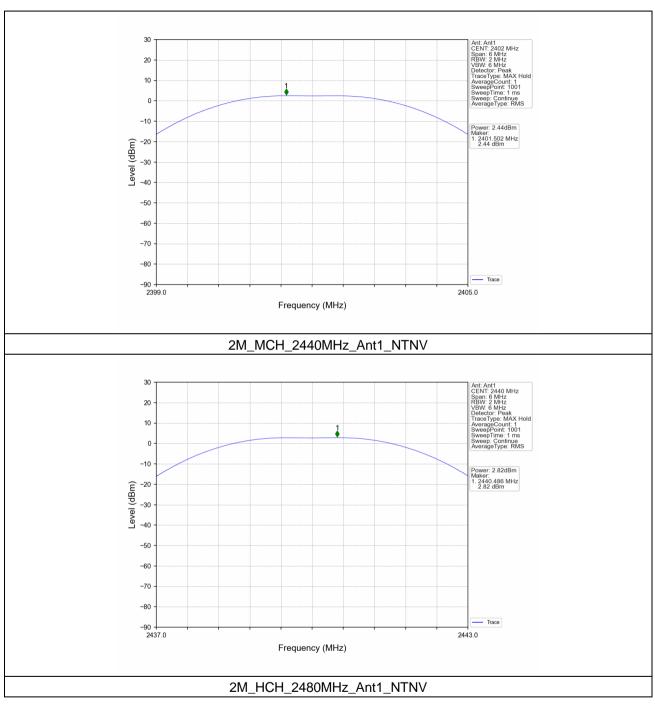
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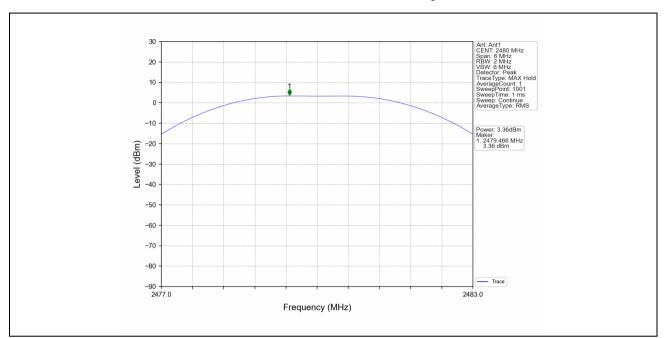








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4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

Mada	ТХ	Frequency	Maximum PS	aximum PSD (dBm/3kHz)				
Mode Type	Туре	(MHz)	ANT1	Limit	Verdict			
		2402	-8.46	<=8	Pass			
1M	1M SISO	2440	-10.50	<=8	Pass			
		2480	-9.44	<=8	Pass			
	2402	-13.13	<=8	Pass				
2M	SISO	2440	-12.53	<=8	Pass			
		2480	-12.02	<=8	Pass			
Note1: Antenr	Note1: Antenna Gain: Ant1: 0.44dBi;							



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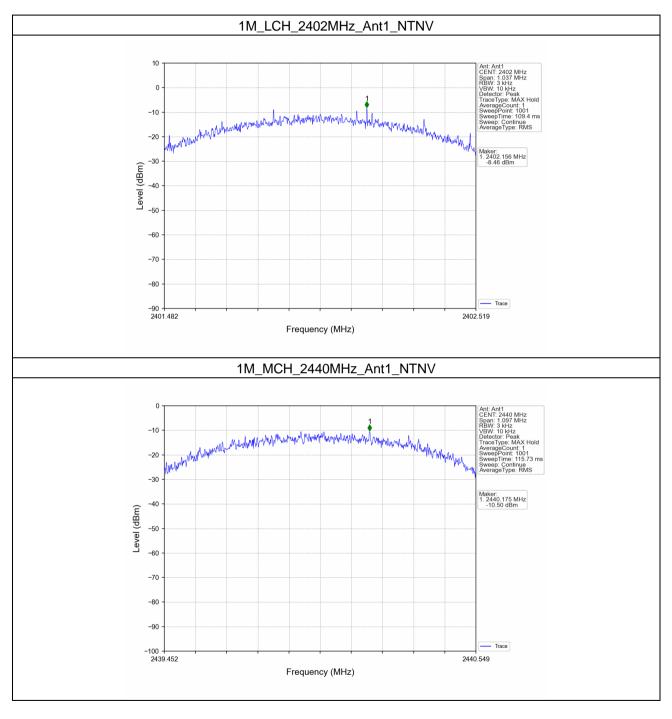
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4.1.2 Test Graph





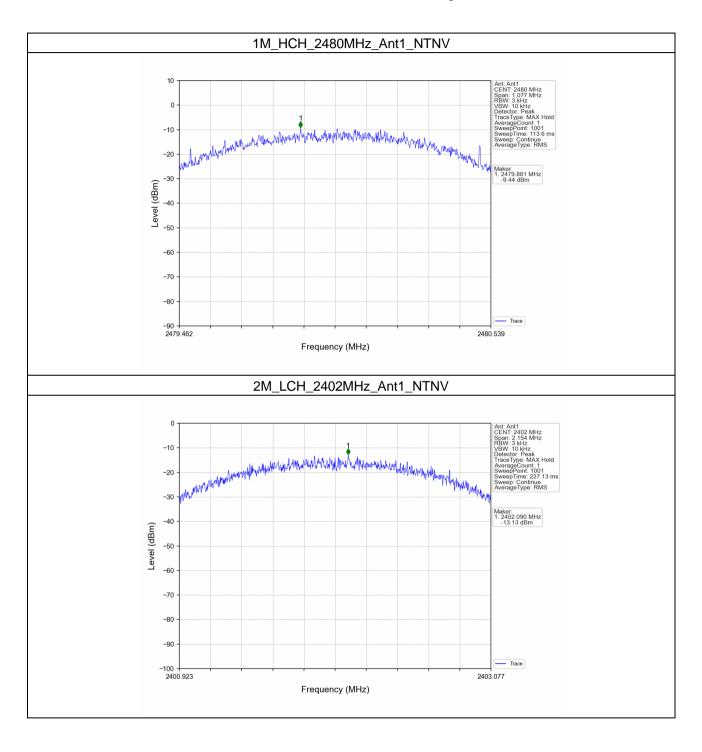
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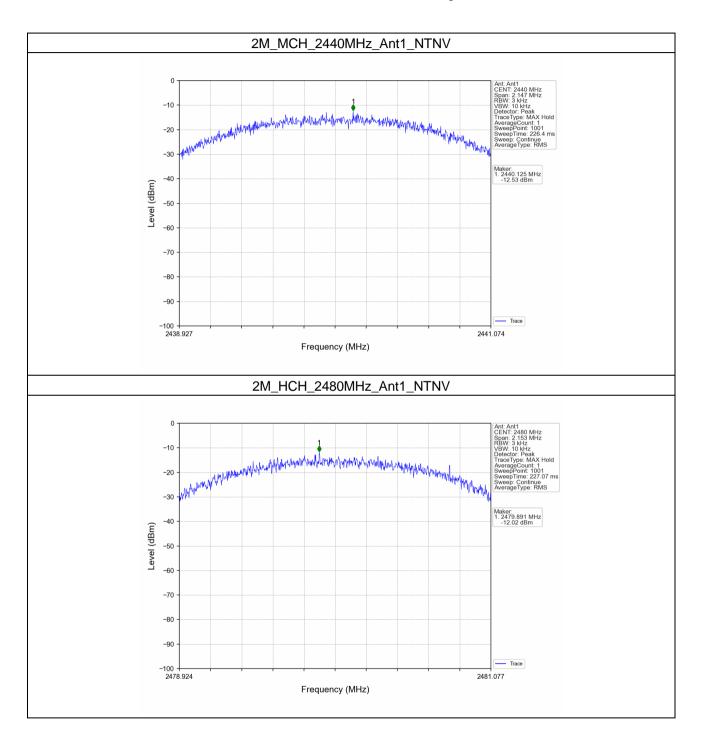
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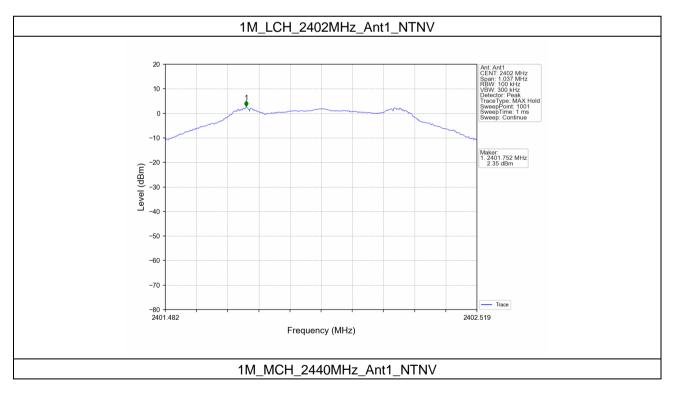
- 5. Unwanted Emissions InStandard Non-restricted Frequency Bands
- 5.1 Ref

5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)				
		2402	1	2.35				
1M	SISO	2440	1	2.58				
		2480	1	3.25				
		2402	1	1.01				
2M	SISO	2440	1	1.28				
		2480	1	1.60				
Note1: Refer to F	Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level							

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maxim was used to establish the reference level.

5.1.2 Test Graph

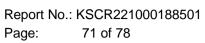


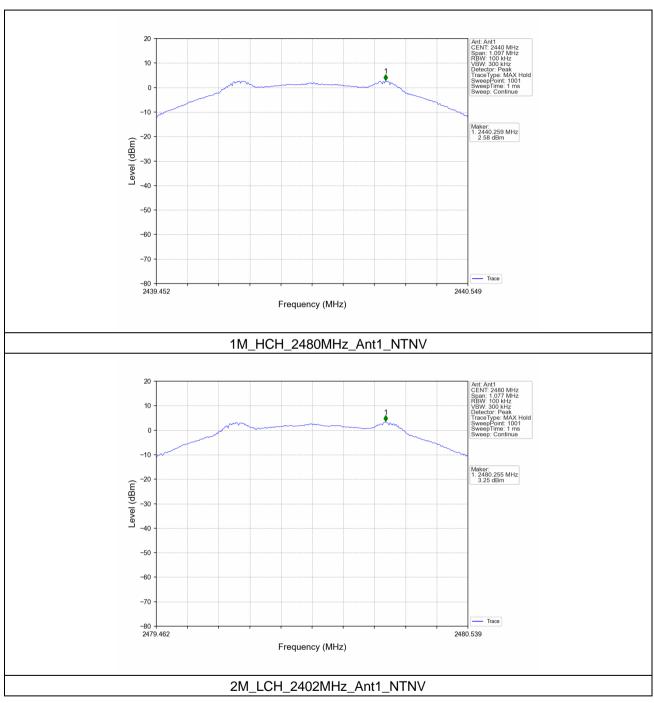


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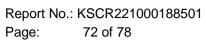


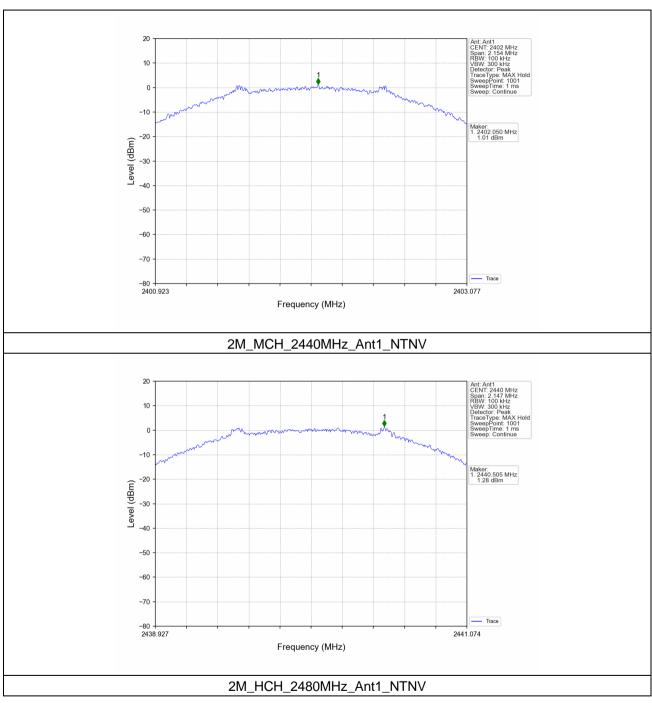




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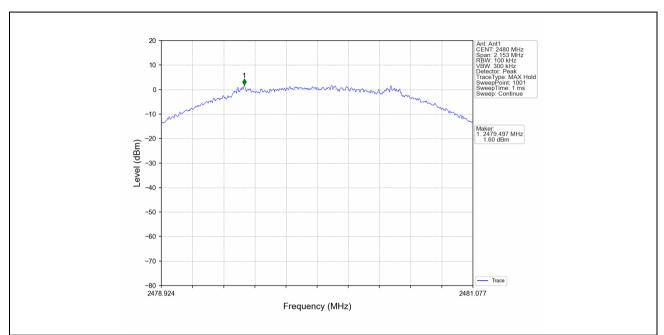




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5.2 CSE

5.2.1 Test Result

Mode	ТХ Туре	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict	
		2402	1	3.25	-16.75	Pass	
1M	SISO	2440	1	3.25	-16.75	Pass	
		2480	1	3.25	-16.75	Pass	
		2402	1	1.60	-18.40	Pass	
2M	SISO	2440	1	1.60	-18.40	Pass	
		2480	1	1.60	-18.40	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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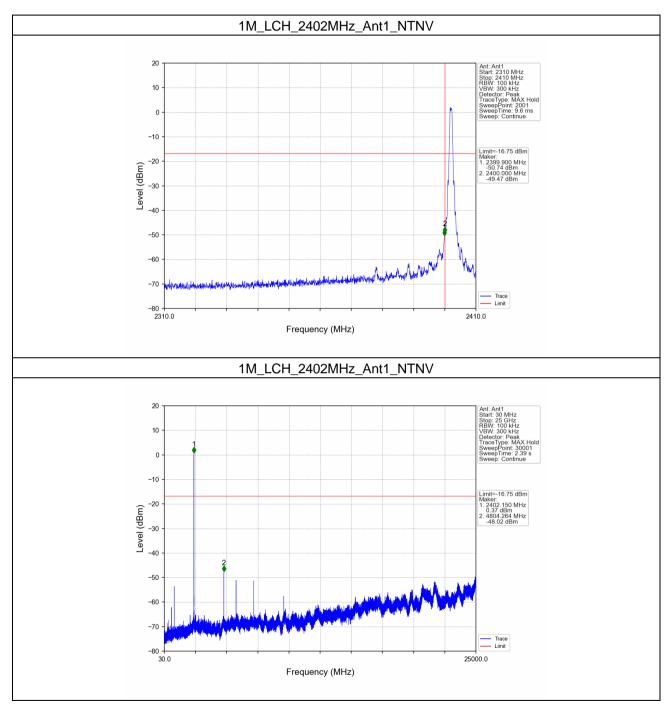
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5.2.2 Test Graph





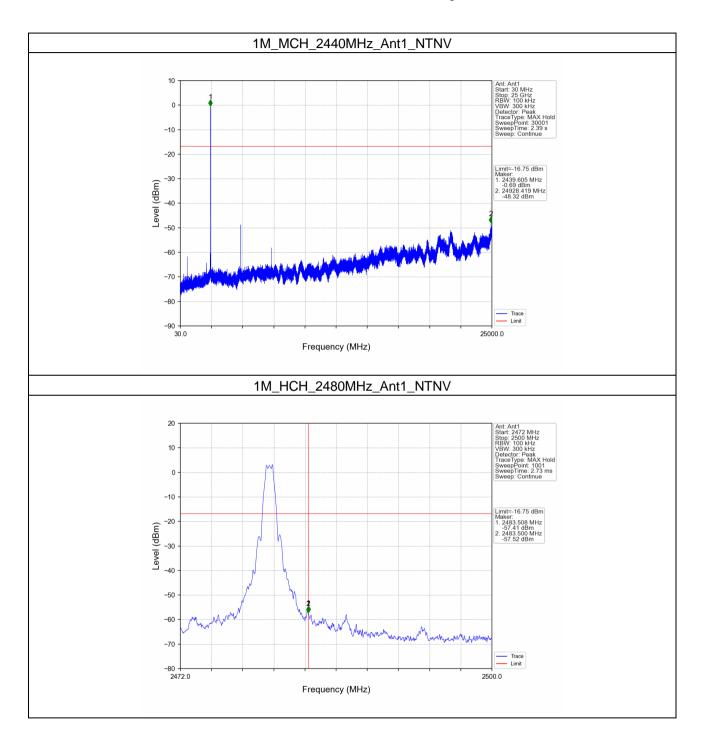
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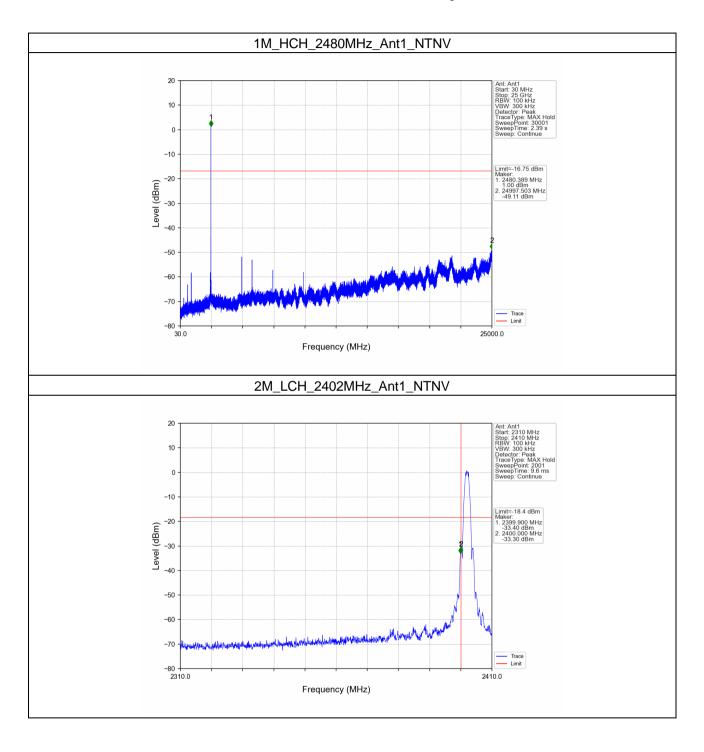
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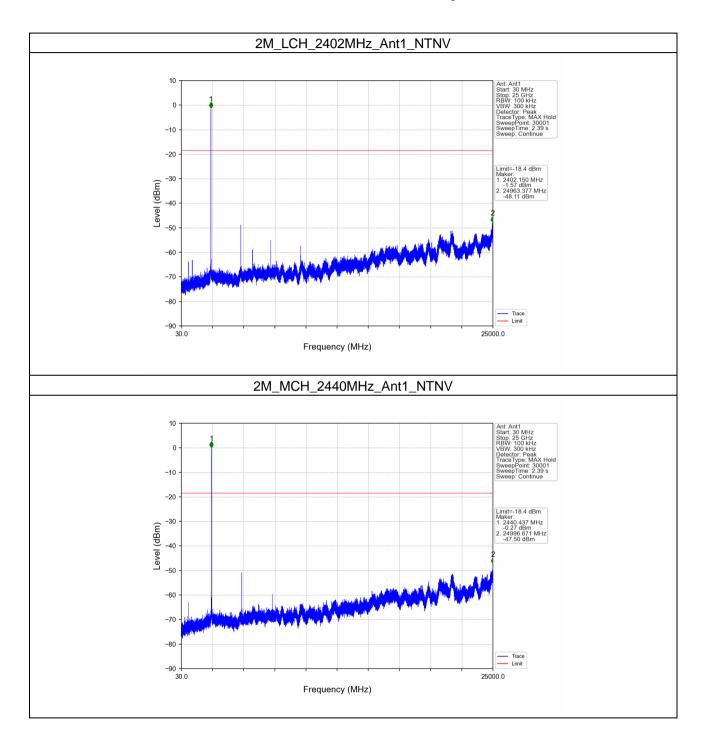
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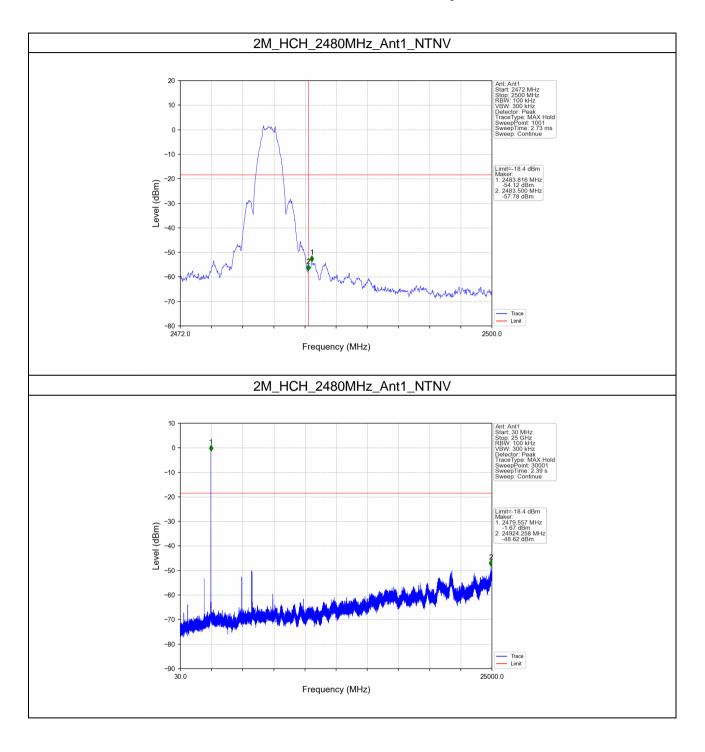
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