

TEST REPORT

Product Name : AddCon+
Model Number : SVP-ADCN1BR
FCC ID : 2A4GC-SVPADCN1R

Prepared for : Shiftall Inc.
Address : 4F TokyoDaiwa Bldg., 2-6-10 Nihonbashibakurocho,
Chuo, Tokyo, Japan

Prepared by : EMTEK (DONGGUAN) CO., LTD.
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Date of sample receipt : Mar 06, 2026
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Date of issue : Mar 25, 2026

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1 TEST RESULT CERTIFICATION

Applicant : Shiftall Inc.
Address : 4F TokyoDaiwa Bldg., 2-6-10 Nihonbashibakurocho, Chuo, Tokyo, Japan
Manufacturer : Shiftall Inc.
Address : 4F TokyoDaiwa Bldg., 2-6-10 Nihonbashibakurocho, Chuo, Tokyo, Japan
Factory : Crane-elec. Co.,LTD
Address : Tamagushi Asahi Bldg. 1F, 3-3-97 Tamagushicho-higashi, Higashiosaka, Osaka, Japan
EUT : AddCon+
Model Name : SVP-ADCN1BR
Trademark : N/A

Measurement Procedure Used:

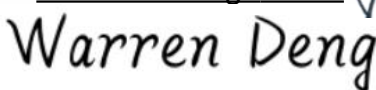
APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	PASS
IC RSS-GEN, Issue 5, February 2021 IC RSS-210, Issue 11, Jun 2024	PASS

The above equipment was tested by EMTEK (DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2020) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2, Part 15.249, IC RSS-210 Issue 11 and IC RSS-GEN, Issue 5.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : Mar 06, 2026 to Mar 24 2026

Prepared by : 
Jessica Zhang /Editor

Reviewer : 
Warren Deng /Supervisor

Approve & Authorized Signer : 
Sam Lv / Manager

Modified History

Version	Report No.	Revision Date	Summary
	EDG2601300397E00601R	/	Original Report



2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product Name	AddCon+
Model number	SVP-ADCN1BR
Device Type	2.4G SRD
Power Supply	DC 5V from USB DC 3.7V built-in battery
Modulation:	GFSK(1Mbps,2Mbps)
Operating Frequency Range	2402MHz-2480MHz
Number of Channels	40 Channels
Max Field Strength	94.98 dBuV@3m
Antenna Type	Chip Antenna
Antenna gain	2.5 dBi
Product SW/HW version:	HW:1.0 SW:N/A
Radio SW/HW version:	HW:1.0 SW:N/A
Temperature Range:	10°C ~ +30°C

Note: for more details, please refer to the User's manual of the EUT.

3 SUMMARY OF TEST RESULT

FCC Part Clause	IC Part Clause	Test Parameter	Verdict	Remark
15.207	RSS-GEN Clause 8.8	Conducted Emission	PASS	
15.209	RSS-Gen.8.9 RSS-210 Annex B.10(a)	Radiated Emission	PASS	
15.249	RSS-210 Annex B.10(a)	Radiated Spurious Emission	PASS	
15.249	RSS-210 Annex B.10(a)	Band edge test	PASS	
15.249	RSS-GEN Clause 6.7 RSS-210 Annex B.10 (b)	Emission Bandwidth	PASS	
15.203	RSS-GEN Clause 6.8	Antenna Requirement	PASS	
NOTE1: N/A (Not Applicable)				
NOTE2: The report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.				

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for **FCC ID: 2A4GC-SVPADCN1R** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

IC RSS-GEN, Issue 5(04-2018)+A1(03-2019)+A2(02-2021)

IC RSS-210, Issue 11, Jun 2024

4.2 MEASUREMENT EQUIPMENT USED

Conducted Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	100137	2025/4/28	1Year
AMN	Rohde&Schwarz	ENV216	101209	2025/4/28	1Year
AMN	Rohde&Schwarz	ENV216	100017	2025/4/28	1Year
RF Switching Unit	CDS	RSU-M2	38401	2025/4/28	1Year
AMN	Schwarzbeck	NNLK8121	8121-641	2025/4/29	1Year
AMN	Rohde&Schwarz	ESH3-Z6	101101	2025/4/28	1Year
AMN	Rohde&Schwarz	ESH3-Z6	101102	2025/4/28	1Year
Power Splitters & Dividers	Weinschel Associates	WA1506A	A1066	2025/4/28	1Year
Current Probe	FCC	F-52	8377	2025/4/29	1Year
Passive voltage probe	Rohde&Schwarz	ESH2-Z3	100122	2025/4/28	1Year
Cable	Rosenberger	RG 223/U	525178	2025/4/28	2Year
Cable	Rosenberger	RG223/U	525179	2025/4/28	2Year
Test Software	Farad	Ver.CON-03A1	--	N/A	N/A

For Spurious Emissions Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	101415	2025/4/29	1Year
Bi-log Hybrid Antenna	Schwarzbeck	VULB9163	141	2025/5/1	1Year
Pre-Amplifier	HP	8447F	OPH64	2025/4/29	1 Year
Signal Analyzer	R&S	FSV30	103039	2025/4/29	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	1272	2025/5/1	1Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-567	2025/5/1	1Year
Pre-Amplifier	LUNAR EM	PM1-18-40	J10100000081	2025/4/29	1Year
Loop antenna	Schwarzbeck	FMZB1519	1519-012	2025/5/1	1Year
Cable	Rosenberger	CIL02	A0783566	2025/4/28	2Year
Cable	HTS	CBL-26	D1245	2025/4/28	2Year
Cable	HTS	CBL-26	D8503	2025/4/28	2Year
Cable	HTS	CBL-26	/	2025/4/28	2Year
6 db attenuator	AR-WORLWDWID E	6dB/50FH-006-100	324011	2025/4/28	1Year
Test Software	Farad	Ver.RA-03A1	--	N/A	N/A

For other test items:

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Wireless Connectivity Tester	R&S	CMW270	102543	2025/4/28	1Year
Automatic Control Unit	Tonscend	JS0806-2	2118060480	2025/4/28	1Year
Signal Analyzer	KEYSIGHT	N9010B	MY60242456	2025/4/28	1Year
Analog Signal Generator	KEYSIGHT	N5173B	MY61252625	2025/4/28	1Year
UP/DOWN-Converter	R&S	CMW-Z800A	100274	2025/4/28	1Year
Vector Signal Generator	KEYSIGHT	N5182B	MY61252674	2025/4/28	1Year
Frequency Extender	KEYSIGHT	N5182BX07	MY59362541	2025/4/28	1Year
Temperature&Humidity test chamber	ESPEC	EL-02KA	12107166	2025/4/28	1 Year
Radio frequency test system	Tonscend	JS1120-3	--	N/A	N/A

For measurement cables(It is from the antenna end of EUTto the test port of test equipment.)

Equipment	Manufacturer	cable loss	Application frequency band	Measurement data of line loss comes from	Last Cal.	Cal. Interval
Measurement cable	Provided by the applicant	0.5 dBm	2402-2480MHz	Manufacturers claim themselves.	N/A	N/A

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

The EUT has been tested under its typical operating condition so those modulation and channel were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

The product is specially treated and the rating is used in the form of a channel collection. Samples of fixed frequency and rate are provided by the applicant for testing

Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	14	2428	...	...
2	2404	15	2430	38	2476
3	2406	16	2432	39	2478
...	...	...	...	40	2480

Note: $f_c = 2400\text{MHz} + k \times 2\text{MHz}$ $k=1$ to 40

Test Frequency and Channel list:

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	20	2440	40	2480

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at:

EMTEK (DONGGUAN) CO., LTD.

1&2/F., Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.	: Accredited by CNAS, 2024.07.06 The certificate is valid until 2030.07.05 The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2018 The Certificate Registration Number is L3150 Accredited by FCC Designation Number: CN1451 Test Firm Registration Number: 846861 Accredited by A2LA The Certificate Registration Number is 4321.02 Accredited by Industry Canada The Certificate Registration Number is CN0113
Name of Firm	: EMTEK (DONGGUAN) CO., LTD.
Site Location	: 1&2/F., Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Table 1

Test Parameter	Measurement Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	See below
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	See below
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^\circ\text{C}$
Humidity	$\pm 3\%$

Table 2

Test Item

Conducted Emission Uncertainty

Uncertainty

: 2.08dB(9K-150KHz)
2.42dB(150K-30MHz)

Radiated Emission Uncertainty
(3m Chamber)

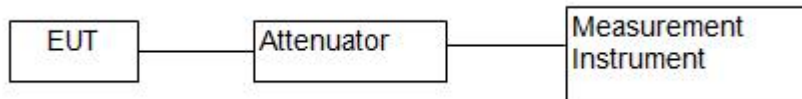
: 3.32dB (30M~1GHz Polarize: H)
3.34dB (30M~1GHz Polarize: V)
4.98dB (1~6GHz)
5.20dB (6~18GHz)

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The 2.4G SRD component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in ANSI C63.10-2020 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Measurements shall be taken, using the following steps, at a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment (see RSS-Gen for applicable versions of ANSI and CISPR standards).

(1) Line the ground plane with absorbers between the transmitter and the receive antenna to minimize reflections. The absorbers used should have a minimum-rated attenuation of 20 dB through the measurement frequency range of interest. The absorbers shall be positioned to replicate the layout used when compliance with the applicable acceptability criterion was achieved, as set forth in the aforementioned standards on site validation.

(2) Set the height of the receive antenna to 1.5 m. The receive antenna must be one that was designed and fabricated to operate over the entire frequency range of interest, for example, an appropriate standard gain horn.

(3) The distance between the receive antenna and the radiating source shall be sufficient in order to ensure far-field conditions.

(4) Mount the transmitter at a height of 1.5 m.

(5) Configure the device under test (DUT) to produce the maximum power spectral density as measured while assessing compliance with Section 6.2.2 (i.e. channel frequency, modulation type and data rate). If the DUT is equipped with a detachable antenna and the antenna is intended for remote installation (i.e.

tower-mounted), the DUT may be substituted with a suitable signal generator. The level and frequency settings on the generator shall be set so as to reproduce the maximum power spectral density, measured within a 1 MHz bandwidth, obtained while assessing compliance to Section 6.2.2.

(6) Position the transmitter or the radiating antenna so that elevation pattern measurements can be taken.

(7) Find the 0° reference point in the horizontal plane.

(8) Care should be taken when positioning the receive antenna to avoid cross-polarization. Antennas of known mounting polarization should be assessed with the receive antenna oriented in the same polarity. If the polarization of the transmit antenna is unknown or the transmit antenna can be mounted in either polarization, e.i.r.p. measurements should be performed to find which mounting polarity provides the highest e.i.r.p. value. Testing shall be carried out with the receive antenna and the DUT mounted in each polarity.

(9) The emission shall be centred on the display of the spectrum analyzer with the following settings:

i. If the power spectral density of the DUT was assessed with a peak detector and the antenna cannot be detached from the DUT, the spectrum analyzer shall be set to a peak detector with a resolution bandwidth and video bandwidth of 1 MHz.

ii. If the power spectral density of the DUT was assessed using a sample detector with power averaging and the antenna cannot be detached from the DUT, the spectrum analyzer shall be set to a sample detector, configured to produce 100 power averages and set with a resolution bandwidth, as well as a video bandwidth of 1 MHz.

iii. If the antenna can be detached from the DUT, a continuous wave (CW) signal equal to that of the power spectral density measurement may be used, the spectrum analyzer shall be set to peak detector with a resolution bandwidth and video bandwidth of 1 MHz.

(10) Rotate the turntable 360° recording the field strength at each step. Throughout the main beam of the antenna, the step size shall be kept to a maximum of 1°.

Once outside the main beam of the antenna, the maximum step size shall be as follows, when compared to the requirements of Section 6.2.2:

i. Between 0° and 8°, maximum step size of 2°;

ii. Between 8° and 40°, maximum step size of 4°;

iii. Between 40° and 45°, maximum step size of 1°;

iv. Between 45° and 90°, maximum step size of 5°.

Once the mask reaches 90°, the mask will be inverted and the step size will follow in the same manner as above.

For the purpose of this procedure, the main beam of the antenna is defined as the 3 dB beamwidth.

(11) Convert the measured field strength values in terms of e.i.r.p. density (dBW/1 MHz) using the following equation:

$$\text{e.i.r.p. density (dBW/MHz)} = 10 \log((E \cdot r)^2 / 30)$$

E = field strength in V/m

r = measurement distance in metres

(12) Plot the results against the emission mask with reference to the horizontal plane.

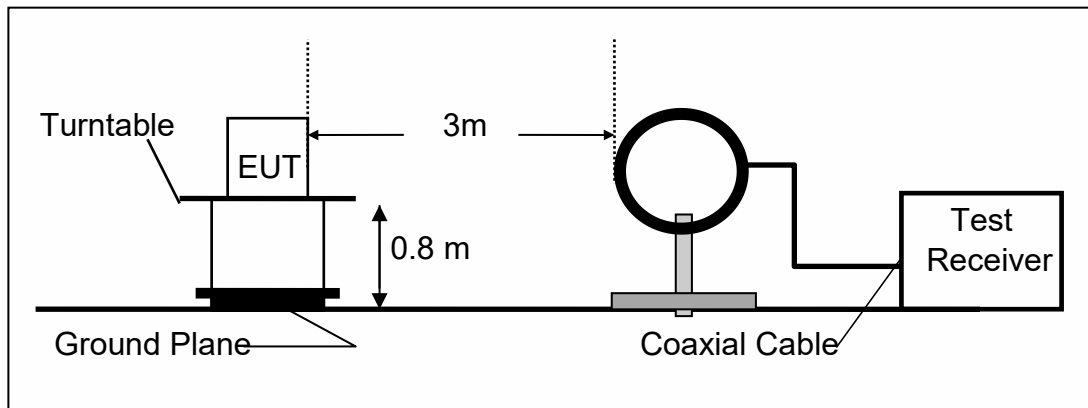
(13) Using the plot, the 0° can be rotated to determine the worst-case installation tilt angle.

(14) Testing shall be performed using the highest gain antenna for every antenna type, if applicable.

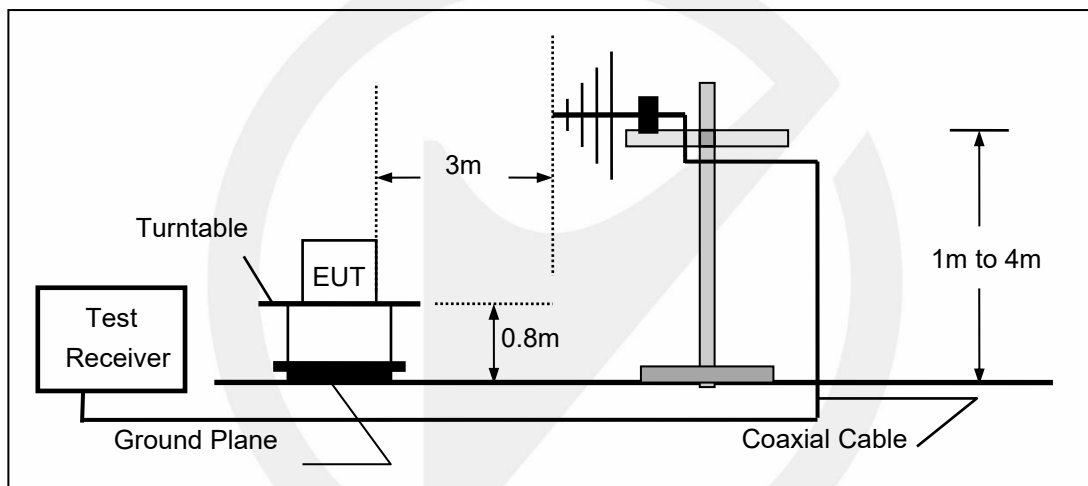
(15) Antenna type(s), antenna model number(s), and worst-case tilt angle(s) necessary to remain compliant with the elevation mask requirement set forth in Section 6.2.2(3) of RSS-247 shall be clearly indicated in the user manual.

The following figure is an example of a polar elevation mask measured using the Method 1 reference to dBμV/m at 3 m.

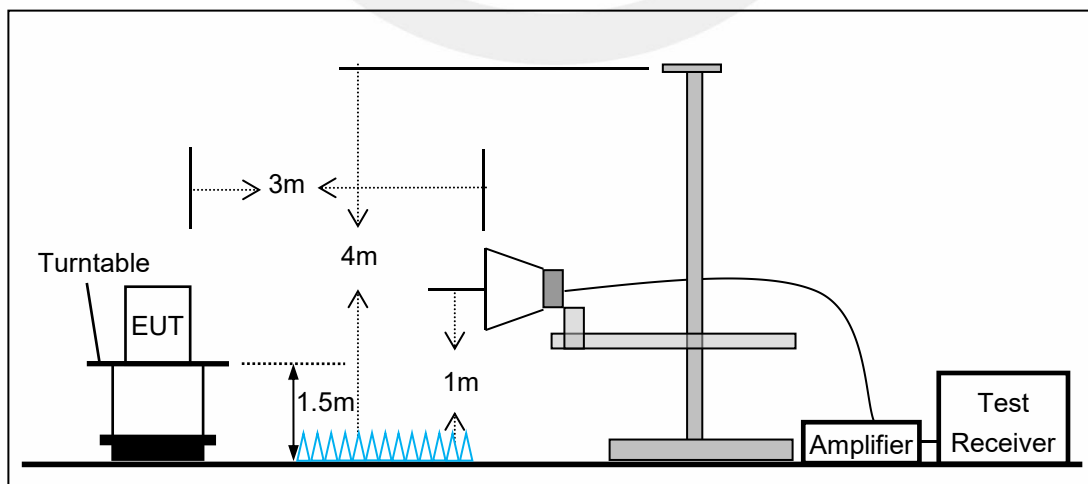
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

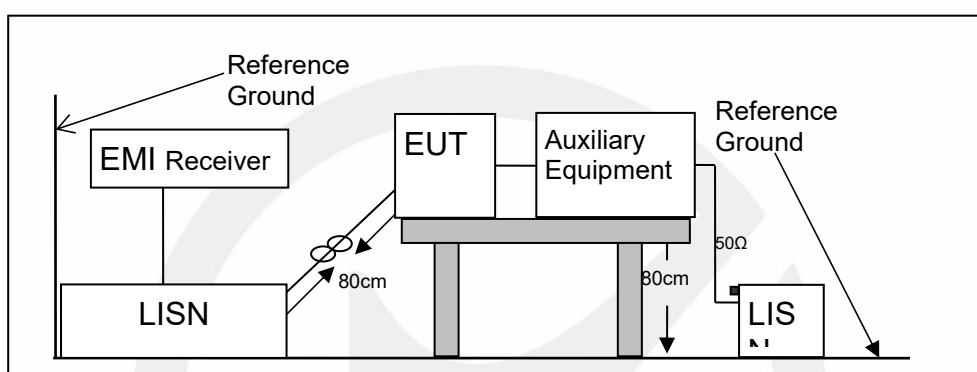


7.3 CONDUCTED EMISSION TEST SETUP

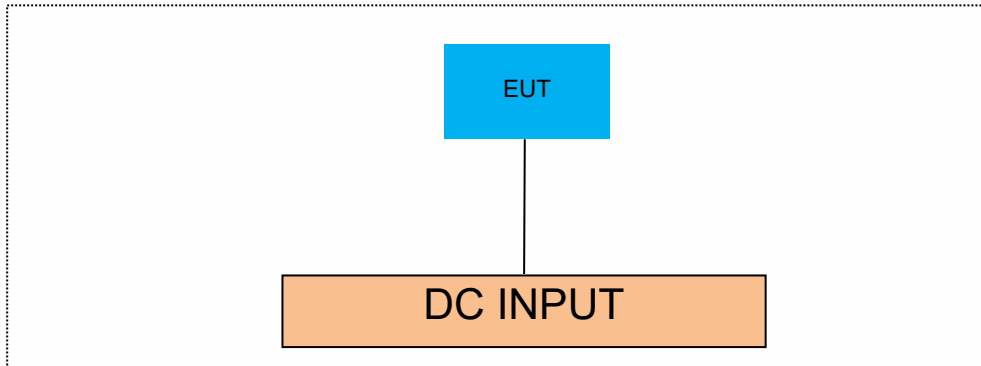
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8 m.

According to the requirements in ANSI C63.10-2020 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E46L	11S168003748Z0LR06E0HG
Adapter	APPLE	/	/
/	/	/	/

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8 TEST REQUIREMENTS

8.1 BANDWIDTH TEST

8.1.1 Applicable Standard

According to FCC Part 15.249
According to RSS-GEN Clause 6.7

8.1.2 Conformance Limit

N/A

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.1.4 Test Procedure

The EUT was operating in controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW $\geq 1\%$ of the 20 dB bandwidth(100KHz)

Set the video bandwidth (VBW) $\geq$ RBW(300KHz).

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

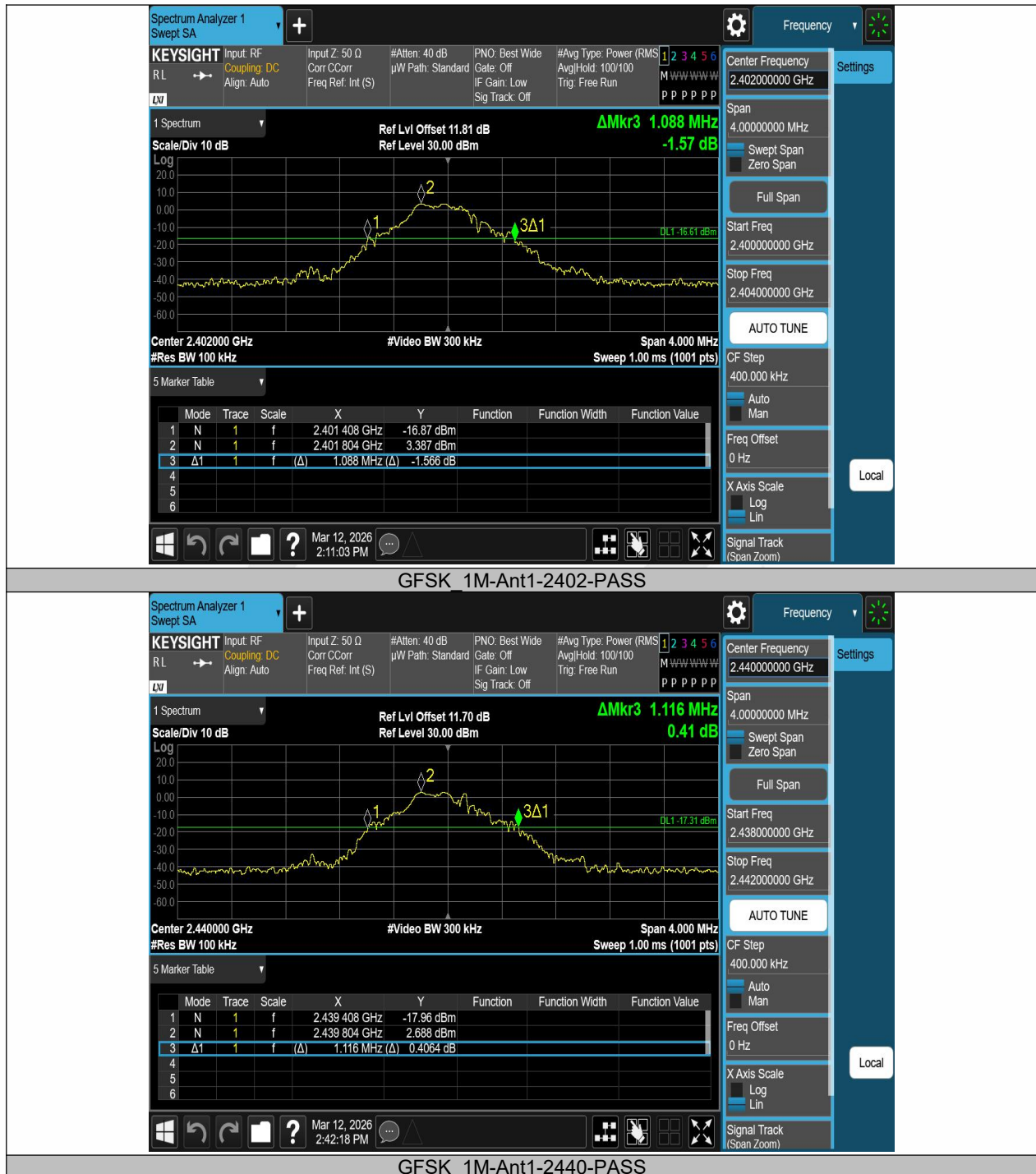
Measure and record the results in the test report.

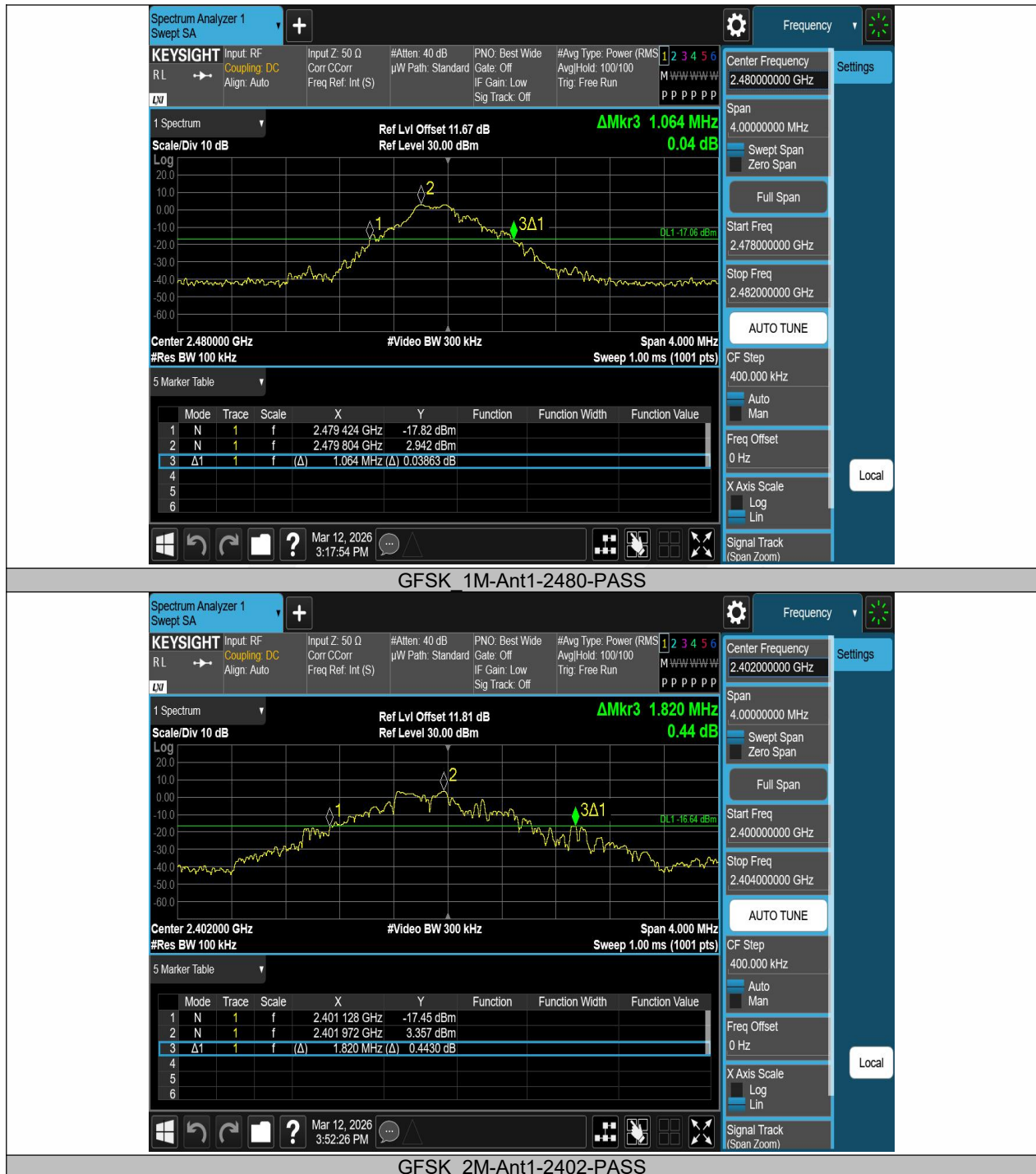
Test Results

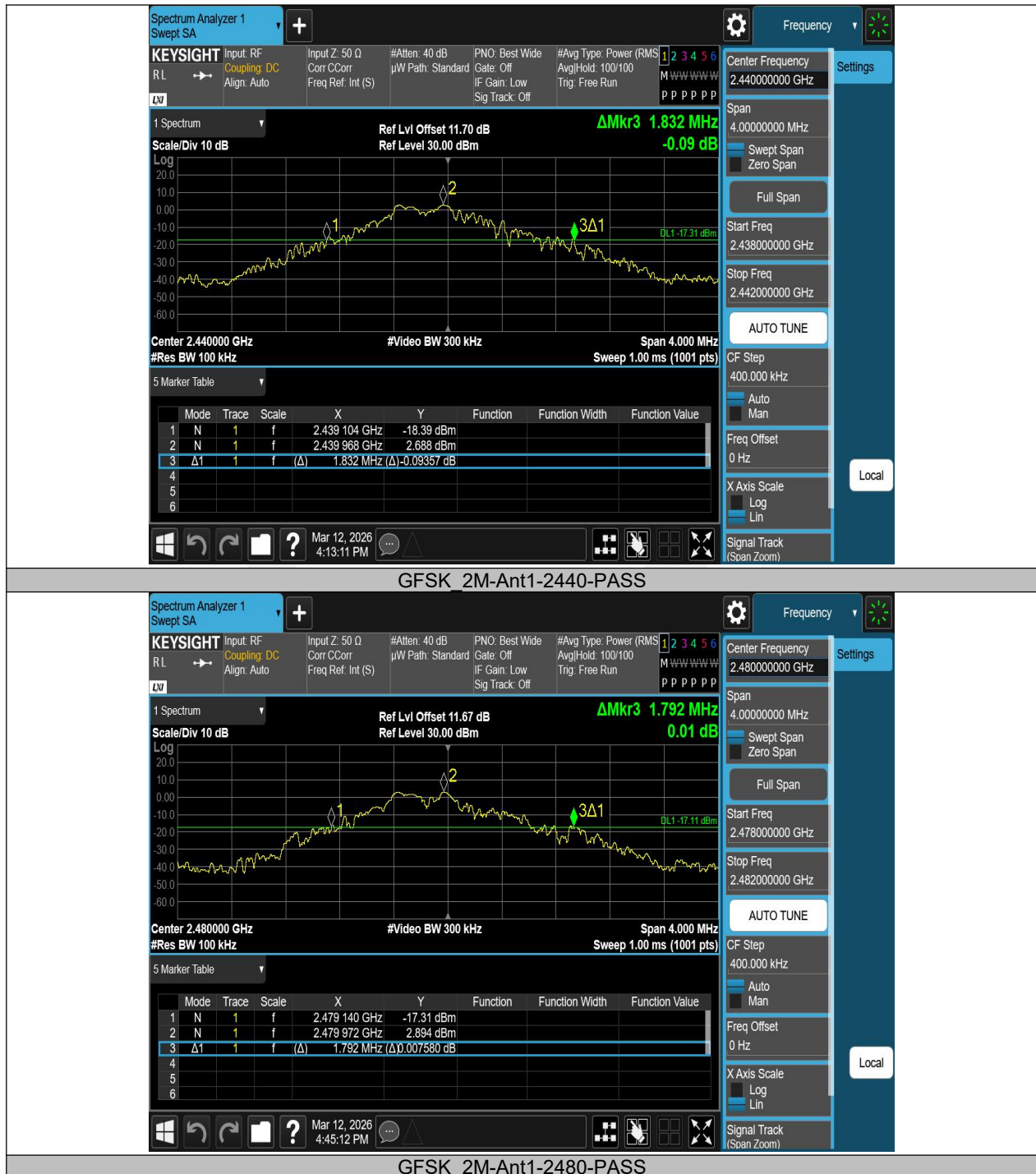
Temperature:	25°C
Relative Humidity:	45%
ATM Pressure:	1011 mbar

Note: N/A

TestMode	Antenna	Frequency[MHz]	20DB BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
GFSK_1M	Ant1	2402	1.088	2401.408	2402.496	----	----
GFSK_1M	Ant1	2440	1.116	2439.408	2440.524	----	----
GFSK_1M	Ant1	2480	1.064	2479.424	2480.488	----	----
GFSK_2M	Ant1	2402	1.820	2401.128	2402.948	----	----
GFSK_2M	Ant1	2440	1.832	2439.104	2440.936	----	----
GFSK_2M	Ant1	2480	1.792	2479.140	2480.932	----	----







8.2 99% BANDWIDTH

8.2.1 Applicable Standard

According to RSS-GEN Clause 6.7

8.2.2 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.2.3 Test Procedure

The EUT was operating in 2.4G SRD mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1%-5% OBW(30 KHz).

Set the video bandwidth (VBW) =100 kHz.

Set Span=3 MHz

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Use the 99 % power bandwidth function of the instrument

Measure the maximum width of the emission.

Measure and record the results in the test report.

8.2.4 Test Results

Temperature:	25°C
Relative Humidity:	45%
ATM Pressure:	1011 mbar

Note: N/A

Not Applicable

8.3 RADIATED SPURIOUS EMISSION

8.3.1 Applicable Standard

According to FCC Part 15.249 and 15.209

According to RSS-Gen.8.9, RSS-Gen 8.10 and RSS-210 Annex B.10

8.3.2 Conformance Limit

According to FCC Part 15.249 and RSS-210 Annex B.10(a): 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)).

According to FCC Part 15.205 and RSS-Gen.8.10, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part 15.205 and RSS-Gen.8.9, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	24000/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Remark :1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

Field strength of fundamental and Field strength of harmonics Limit:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50(94 dBV/m)	500(54 dBV/m)
2400-2483.5 MHz	50(94 dBV/m)	500(54 dBV/m)
5725-5875 MHz	50(94 dBV/m)	500(54 dBV/m)
24.0-24.25 GHz	250(108 dBV/m)	2500(68 dBV/m)

As shown in §15.35(b) and RSS-210 Annex B.10, for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section 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 this report

Fundamental Frequency	Field Strength Of Fundamental	Field Strength of Spurious Emissions
2400-2483.5 MHz	AV:94 dBuV/m at 3m distance	AV:54 dBuV/m at 3m distance
	PK:114 dBuV/m at 3m distance	PK:74 dBuV/m at 3m distance

8.3.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

8.3.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz(1GHz to 25GHz), 100 kHz for $f < 1$ GHz(30MHz to 1GHz)

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2020 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

8.3.5 Test Results

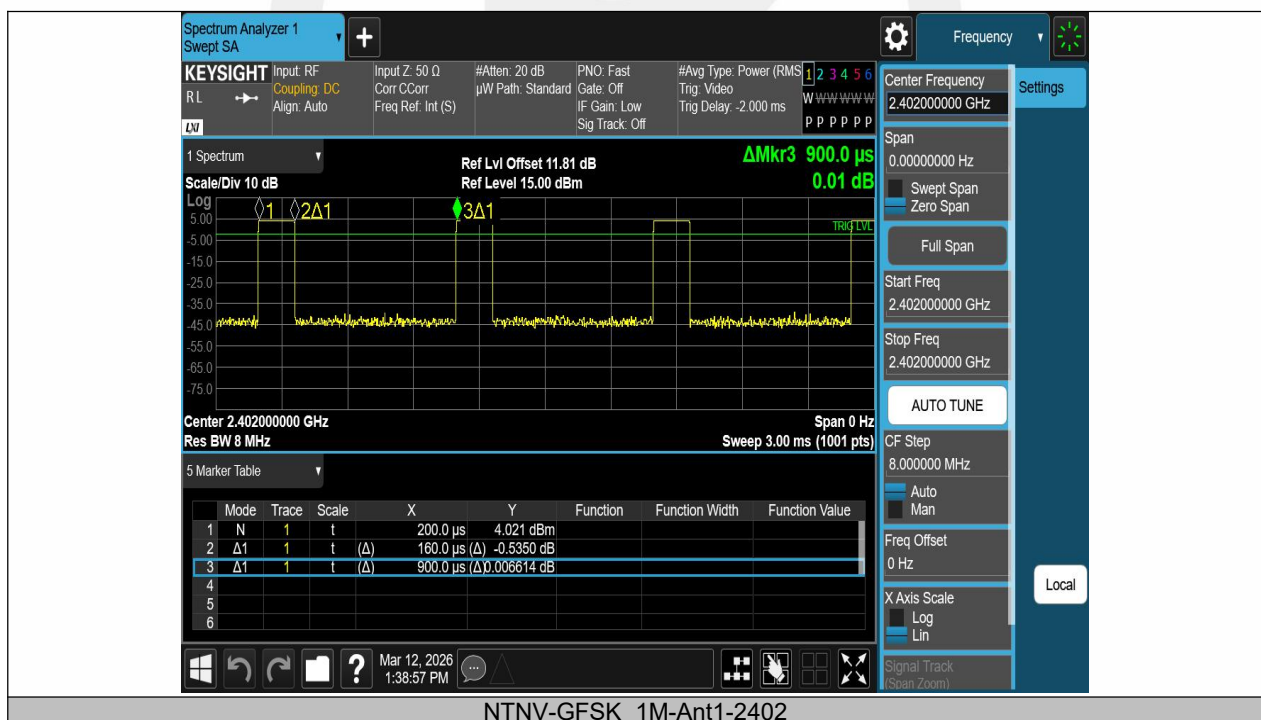
Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

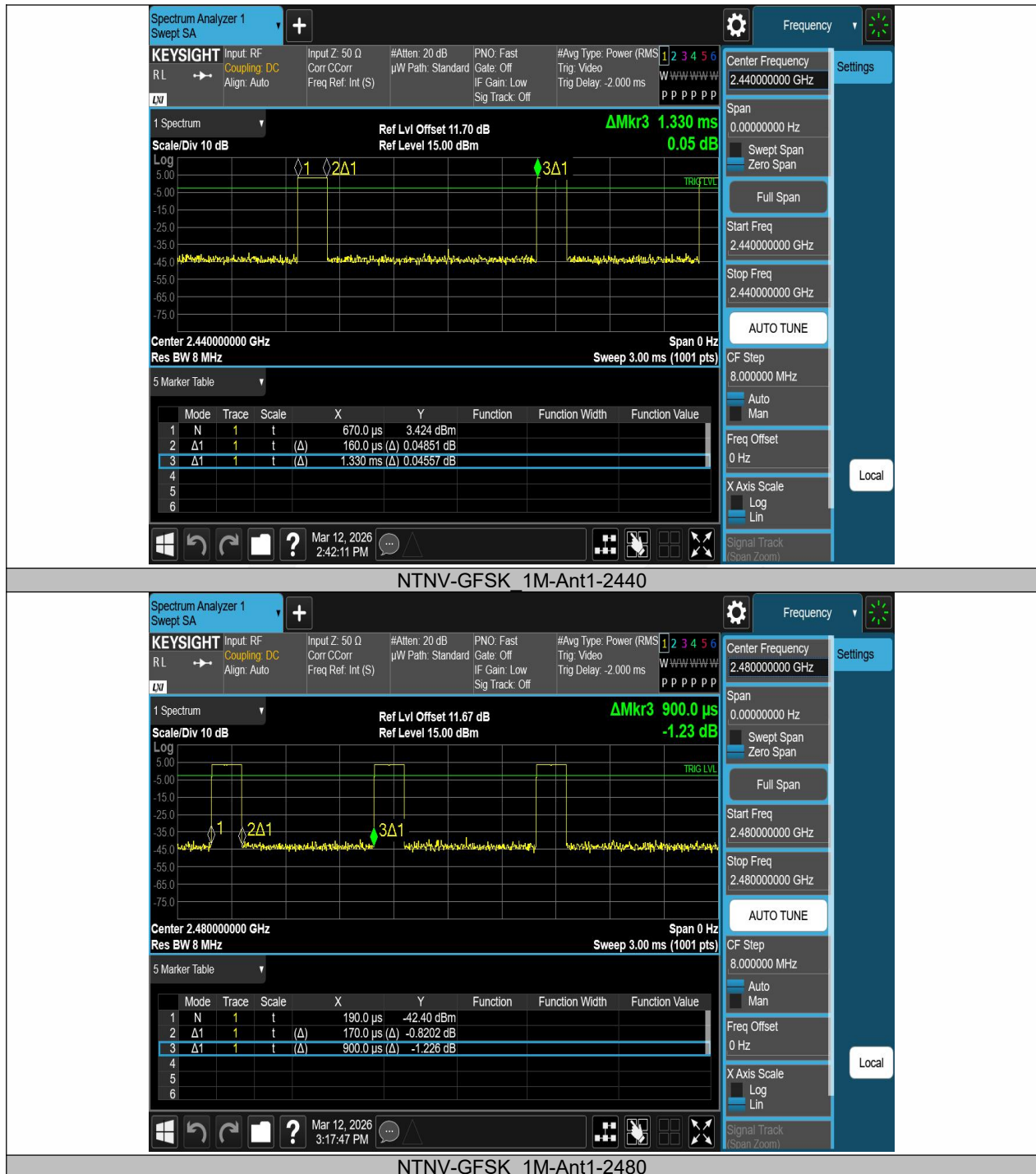
The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average= Peak Value+20log(Duty Cycle), where the duty factor is calculated from following formula:

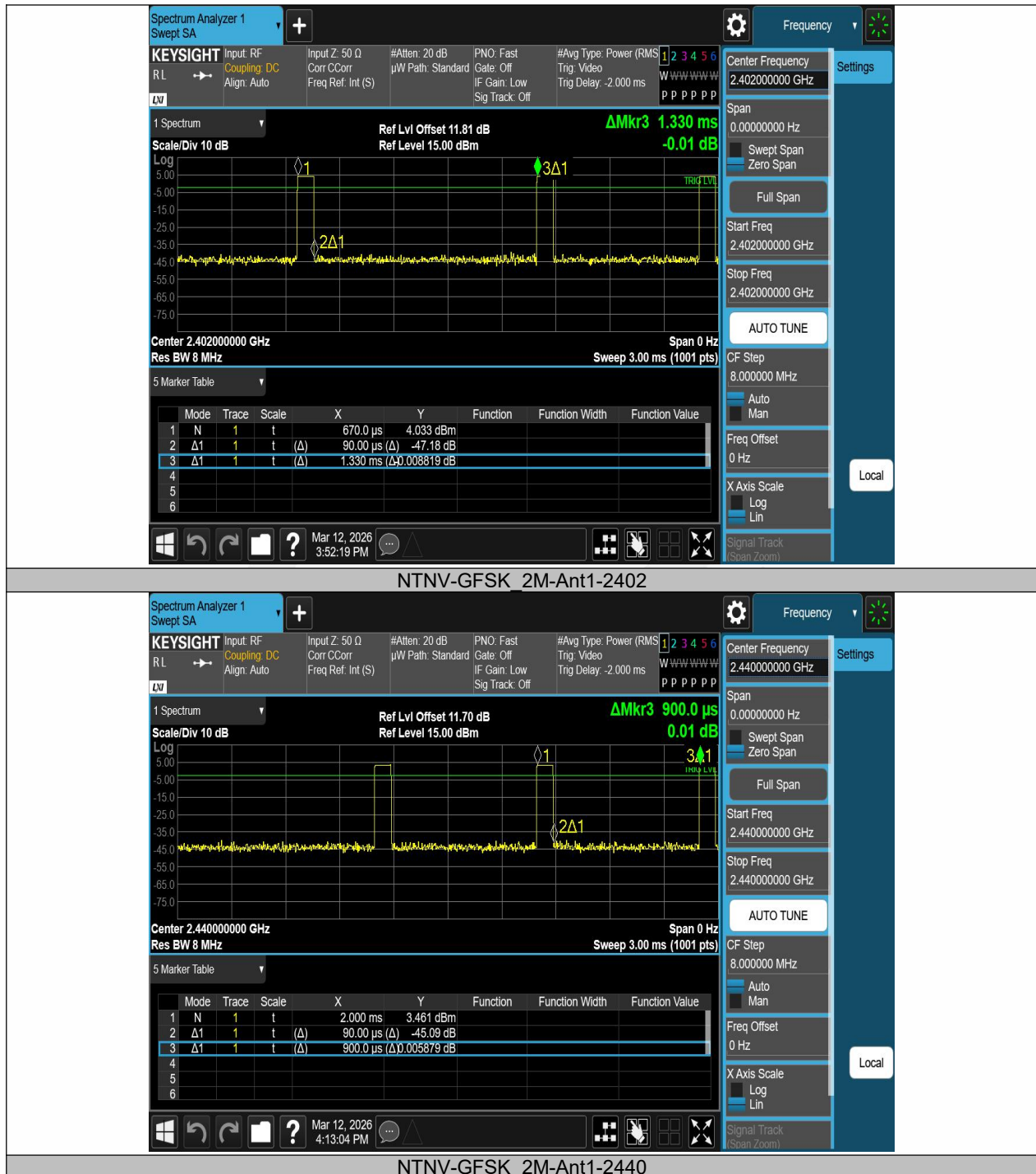
The duty cycle is simply the on-time divided by the period:

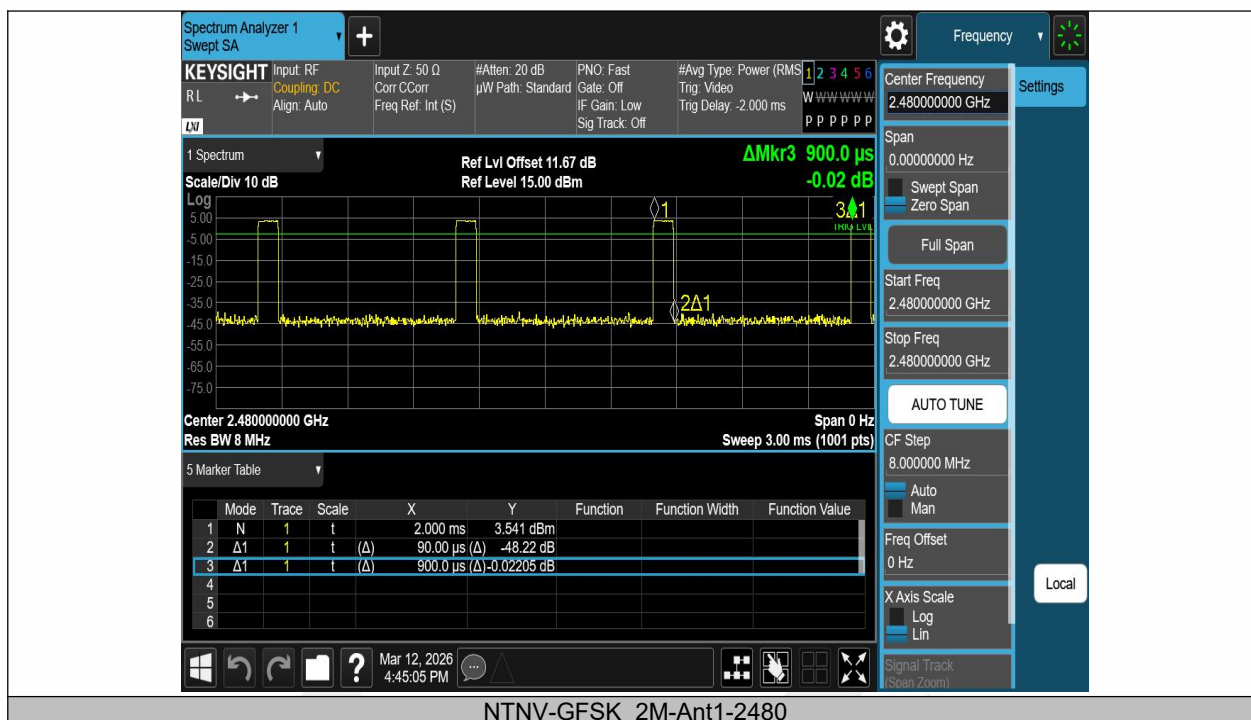
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
GFSK_1M	Ant1	2402	0.16	0.90	17.78	-15.00
GFSK_1M	Ant1	2440	0.16	1.33	12.03	-18.39
GFSK_1M	Ant1	2480	0.17	0.90	18.89	-14.48
GFSK_2M	Ant1	2402	0.09	1.33	6.77	-23.39
GFSK_2M	Ant1	2440	0.09	0.90	10.00	-20.00
GFSK_2M	Ant1	2480	0.09	0.90	10.00	-20.00

Please see the test plot below:









■ Spurious Emission below 30MHz (9KHz to 30MHz)

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance} / \text{test distance})(\text{dB})$;

Limit line = Specific limits(dBuV) + distance extrapolation factor

■ Field Strength of the fundamental signal

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
2402(1M)	V	88.26	73.26	114	94	-25.74	-20.74
2402(1M)	H	94.36	79.36	114	94	-19.64	-14.64
2440(1M)	V	89.2	70.81	114	94	-24.8	-23.19
2440(1M)	H	94.58	76.19	114	94	-19.42	-17.81
2480(1M)	V	86.24	71.76	114	94	-27.76	-22.24
2480(1M)	H	91.46	76.98	114	94	-22.54	-17.02
2402(2M)	V	88.62	65.23	114	94	-25.38	-28.77
2402(2M)	H	94.98	71.59	114	94	-19.02	-22.41
2440(2M)	V	87.95	67.95	114	94	-26.05	-26.05
2440(2M)	H	93.98	73.98	114	94	-20.02	-20.02
2480(2M)	V	84.36	64.36	114	94	-29.64	-29.64
2480(2M)	H	91.86	71.86	114	94	-22.14	-22.14

Note: (1) Correct Factor= Antenna Factor +Cable Loss- Amplifier Gain
(2) Emission Level= Reading Level+Probe Factor +Cable Loss

■ Out of Band Emissions

All the antenna(Antenna 1) and modes(GFSK-1M;GFSK-2M) mode have been tested, and the worst(Antenna 1, GFSK-2M) result recorded was report as below:

Test mode: GFSK-2M Frequency: Channel 1: 2402MHz

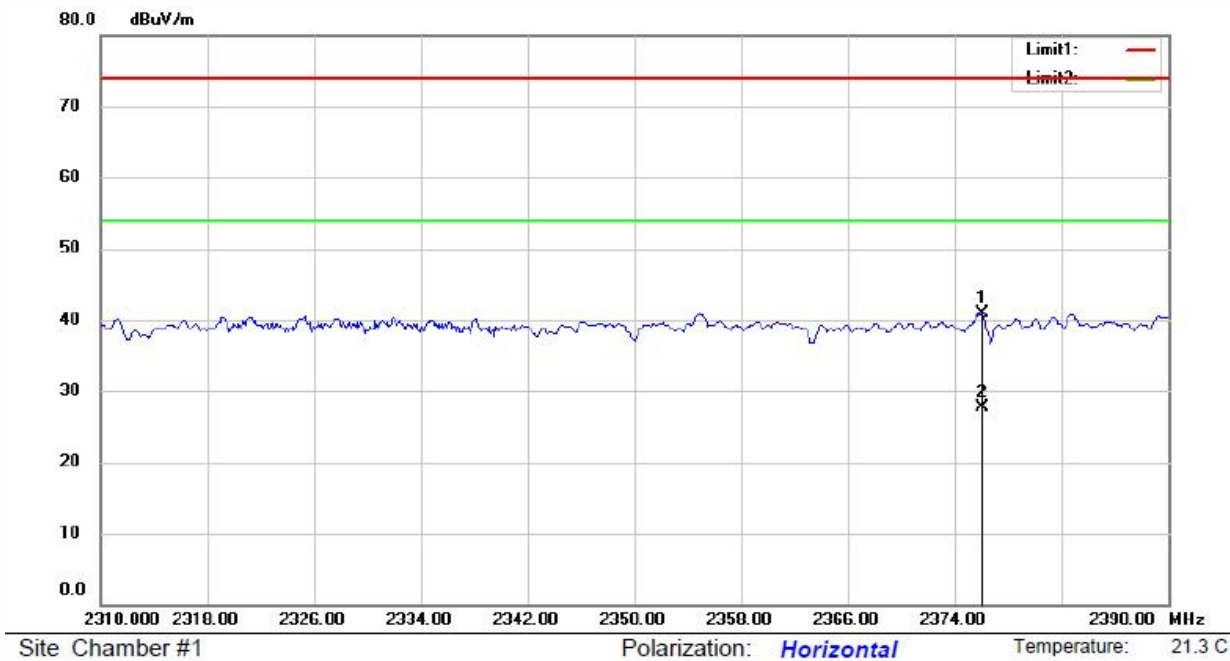
Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)
2376.080	H	40.88	74.00	27.63	54.00
2385.208	V	40.98	74.00	27.57	54.00

Test mode: GFSK-2M Frequency: Channel 40: 2480MHz

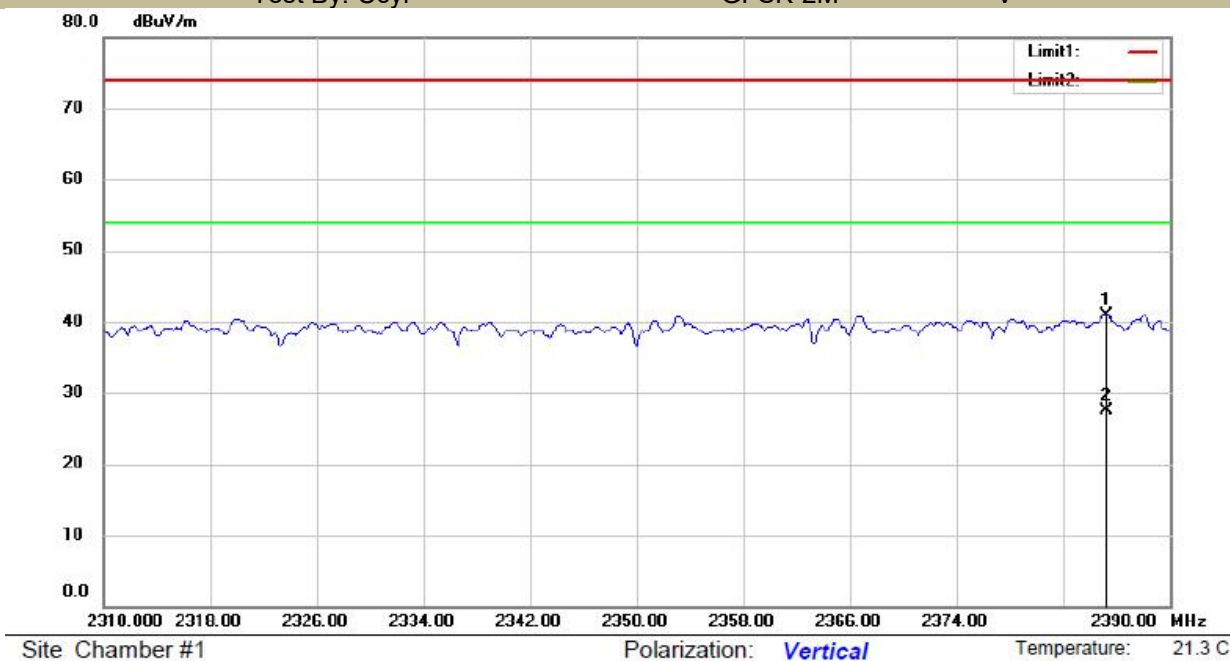
Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)
2483.500	H	53.08	74.00	39.47	54.00
2483.500	V	46.16	74.00	32.05	54.00

- Note:**
- (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
 - (2) Emission Level= Reading Level+Correct Factor +Cable Loss.
 - (3) Correct Factor= Ant_F + Cab_L - Preamp
 - (4)Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

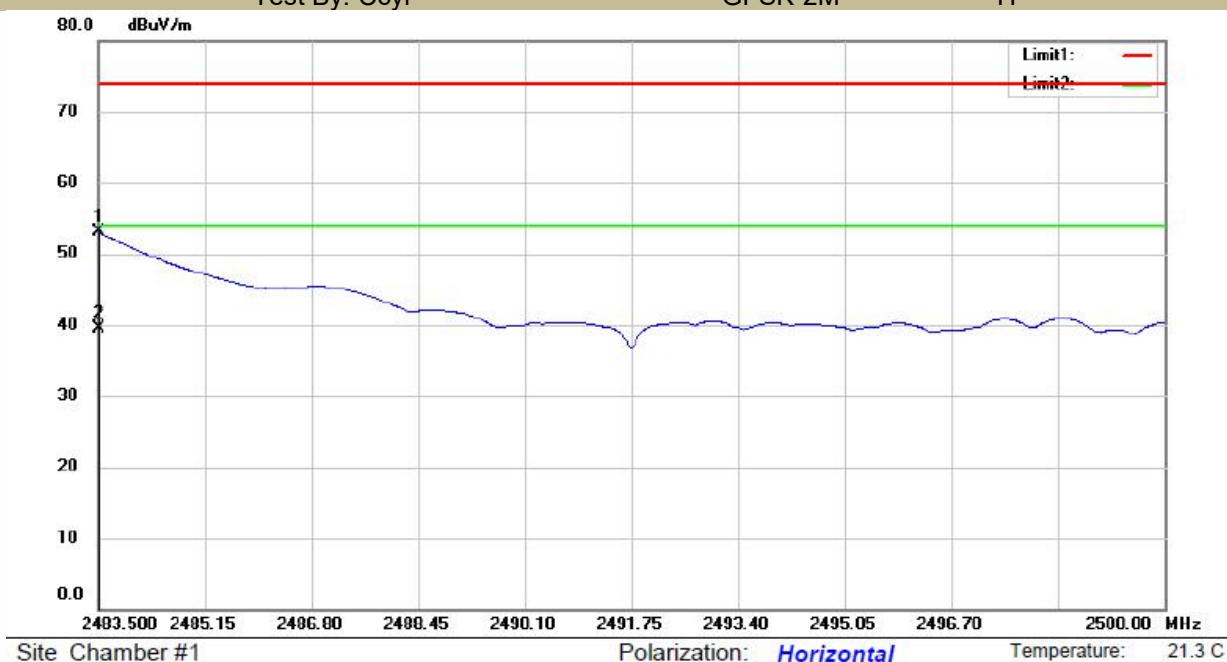
Test Model	Band Emissions
	Low
	Test By: Ccyf
	GFSK-2M
	H



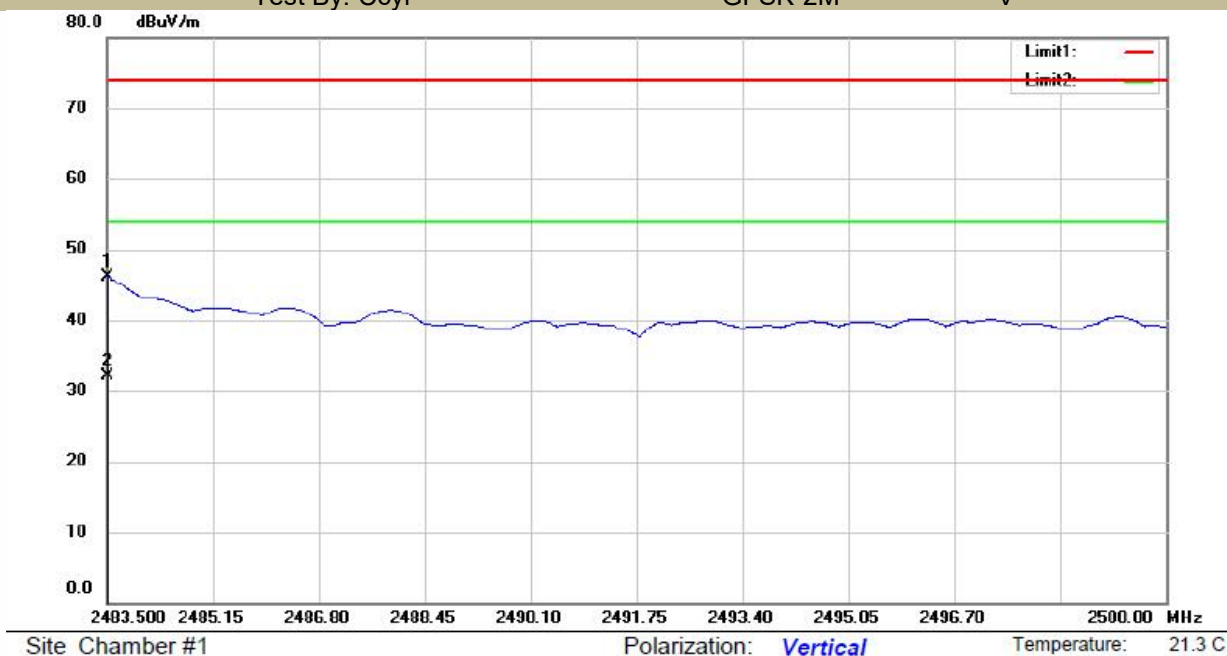
Test Model	Band Emissions
	Low
	Test By: Ccyf
	GFSK-2M
	V



Test Model	Band Emissions High Test By: Ccyf	GFSK-2M	H
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Test Model	Band Emissions High Test By: Ccyf	GFSK-2M	V
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■ Spurious Emission Above 1GHz (1GHz to 25GHz)

All the antenna(Antenna 1) and modes(GFSK-1M;GFSK-2M) mode have been tested, and the worst(Antenna 1, GFSK-2M) result recorded was report as below:

Test mode: GFSK-2M Frequency: Channel 1: 2402MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
6870.93	V	53.66	40.19	74.00	54.00	-20.34	-13.81
8047.84	V	53.35	39.93	74.00	54.00	-20.65	-14.07
11137.09	V	53.27	39.78	74.00	54.00	-20.73	-14.22
6611.81	H	52.74	39.38	74.00	54.00	-21.26	-14.62
7838.92	H	53.62	40.21	74.00	54.00	-20.38	-13.79
11230.83	H	53.53	40.19	74.00	54.00	-20.47	-13.81

Test mode: GFSK-2M Frequency: Channel 20: 2440MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
5433.60	V	52.33	38.97	74.00	54.00	-21.67	-15.03
7364.48	V	53.89	40.35	74.00	54.00	-20.11	-13.65
10958.27	V	53.92	40.44	74.00	54.00	-20.08	-13.56
5643.28	H	52.68	39.23	74.00	54.00	-21.32	-14.77
7622.19	H	53.43	39.92	74.00	54.00	-20.57	-14.08
10983.64	H	54.33	40.87	74.00	54.00	-19.67	-13.13

Test mode: GFSK-2M Frequency: Channel 40: 2480MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
7021.51	V	53.25	39.64	74.00	54.00	-20.75	-14.36
8310.22	V	53.88	40.33	74.00	54.00	-20.12	-13.67
10744.99	V	53.79	40.28	74.00	54.00	-20.21	-13.72
6562.31	H	53.60	40.22	74.00	54.00	-20.40	-13.78
8106.20	H	54.16	40.73	74.00	54.00	-19.84	-13.27
10810.41	H	53.99	40.57	74.00	54.00	-20.01	-13.43

Note: (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).

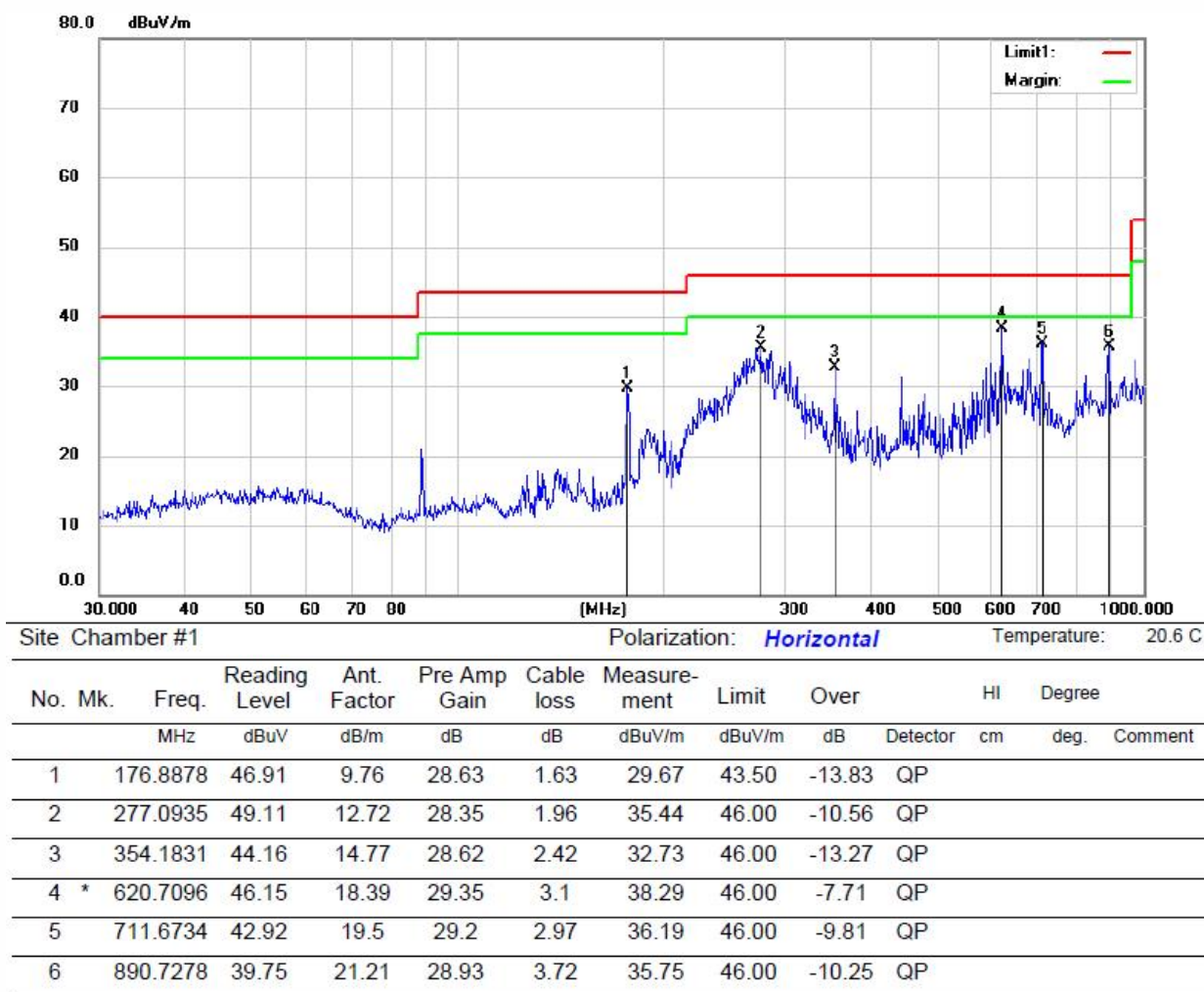
(2) Emission Level= Reading Level+Correct Factor +Cable Loss.

(3) Correct Factor= Ant_F + Cab_L - Preamp

(4)Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission below 1GHz (30MHz to 1GHz)

All the antenna(Antenna 1) and modes(GFSK-1M;GFSK-2M) mode have been tested, and the worst(Antenna 1, GFSK-2M) result recorded was report as below:

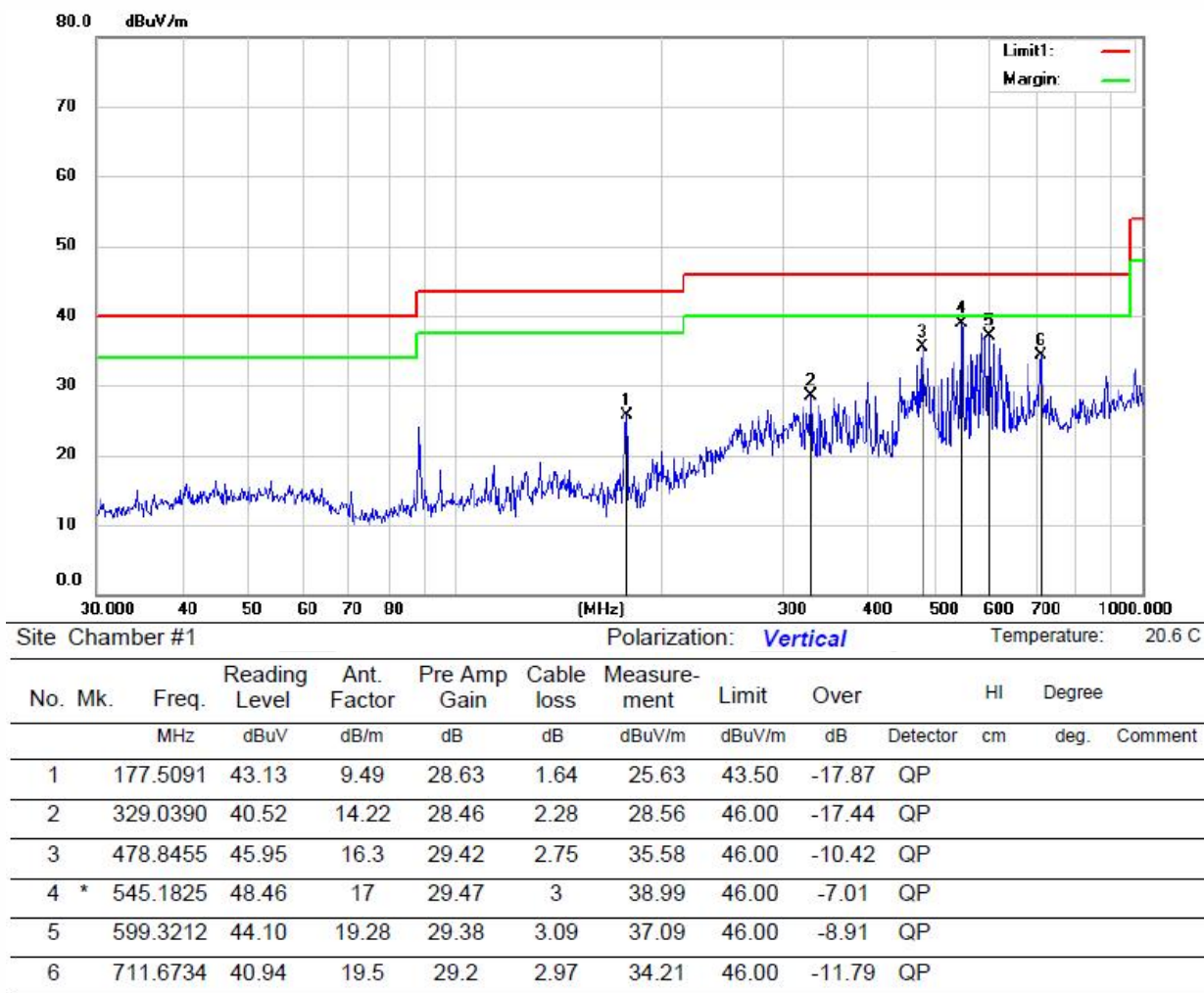


*:Maximum data x:Over limit !:over margin

Operator: Ccyf

Remark:

1. Measurement (dBuV/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dBμV/m)
2. Over (dB) = Measurement (dBuV/m) - Limit (dBuV/m)



*:Maximum data x:Over limit !:over margin

Operator: Ccyf

Remark:

1. Measurement (dBuV/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dBuV/m)
2. Over (dB) = Measurement (dBuV/m) - Limit (dBuV/m)

8.4 CONDUCTED EMISSIONS TEST

8.4.1 Applicable Standard

According to FCC Part 15.207(a)
According to IC RSS-Gen 8.8

8.4.2 Conformance Limit

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

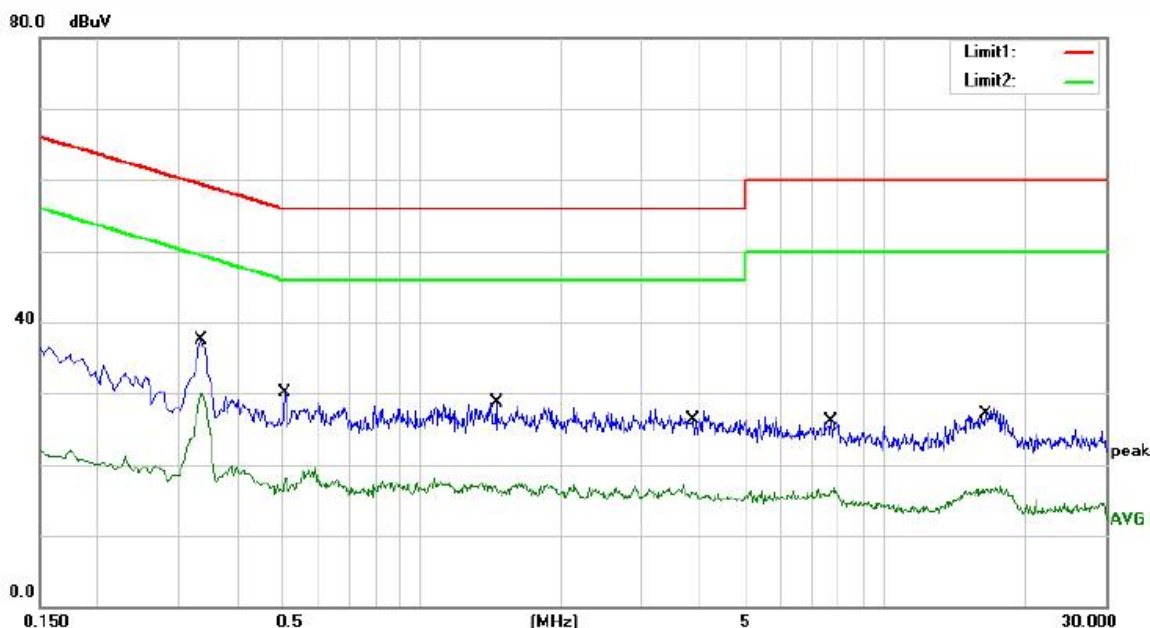
8.4.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

8.4.5 Test Results

Pass

The AC120V &240V voltage have been tested, and the worst result recorded was report as below:

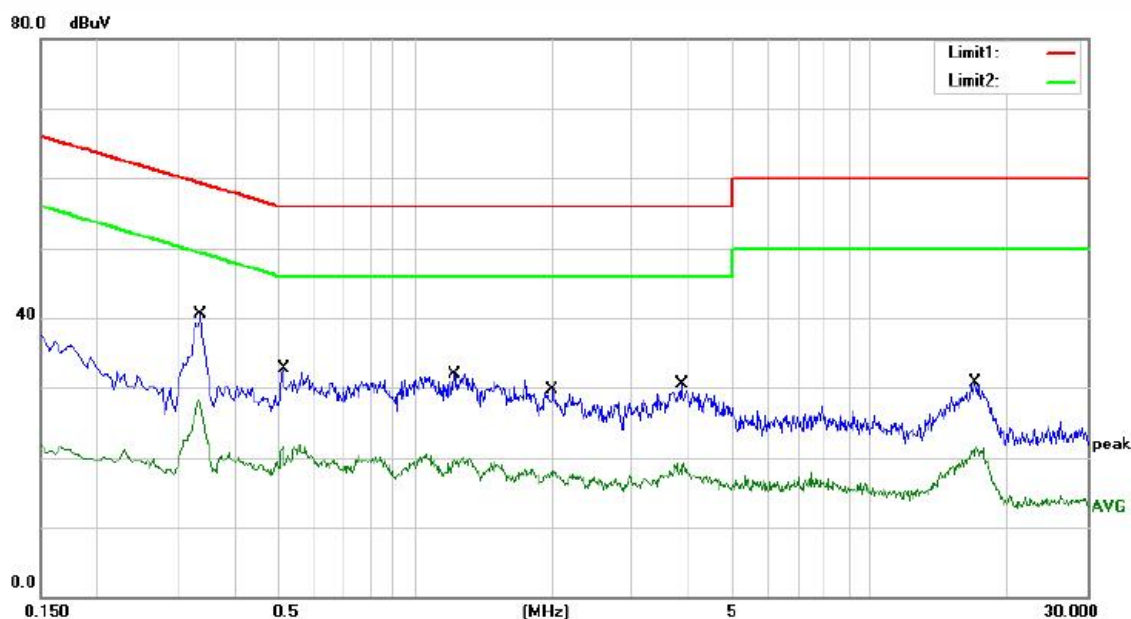


Site site #1		Phase: L1						Temperature: 20.2	
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3340	19.55	17.96	37.51	59.35	-21.84	QP	
2	*	0.3340	11.87	17.96	29.83	49.35	-19.52	AVG	
3		0.5100	12.60	17.55	30.15	56.00	-25.85	QP	
4		0.5100	0.64	17.55	18.19	46.00	-27.81	AVG	
5		1.4420	11.16	17.59	28.75	56.00	-27.25	QP	
6		1.4420	-0.67	17.59	16.92	46.00	-29.08	AVG	
7		3.9180	9.72	17.70	27.42	56.00	-28.58	QP	
8		3.9180	-1.50	17.70	16.20	46.00	-29.80	AVG	
9		7.6540	8.28	17.76	26.04	60.00	-33.96	QP	
10		7.6540	-1.14	17.76	16.62	50.00	-33.38	AVG	
11		16.5700	9.36	17.80	27.16	60.00	-32.84	QP	
12		16.5700	-1.23	17.80	16.57	50.00	-33.43	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Lusi

Remark:

1. Measurement (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
2. Over (dB) = Measurement (dBμV) - Limit (dBμV)



Site site #1 Phase: N Temperature: 20.2

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.3340	22.50	17.96	40.46	59.35	-18.89	QP	
2		0.3340	10.31	17.96	28.27	49.35	-21.08	AVG	
3		0.5140	15.19	17.55	32.74	56.00	-23.26	QP	
4		0.5140	4.08	17.55	21.63	46.00	-24.37	AVG	
5		1.2140	14.36	17.58	31.94	56.00	-24.06	QP	
6		1.2140	1.29	17.58	18.87	46.00	-27.13	AVG	
7		2.0100	11.99	17.62	29.61	56.00	-26.39	QP	
8		2.0100	0.54	17.62	18.16	46.00	-27.84	AVG	
9		3.8500	12.72	17.70	30.42	56.00	-25.58	QP	
10		3.8500	1.39	17.70	19.09	46.00	-26.91	AVG	
11		17.0860	12.93	17.80	30.73	60.00	-29.27	QP	
12		17.0860	3.62	17.80	21.42	50.00	-28.58	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Lusi

Remark:

1. Measurement (dBuV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBuV)

2. Over (dB) = Measurement (dBuV) - Limit (dBuV)

8.5 ANTENNA APPLICATION

8.5.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	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 shall be considered sufficient to comply with the provisions of this section. 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.
FCC 47 CFR Part 15.249 (b)	If transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
RSS-Gen Section 6.8	The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

8.5.2 Result

PASS.

- Note:
- ☒ Antenna use a permanently attached antenna which is not replaceable.
 - ☐ Not using a standard antenna jack or electrical connector for antenna replacement
 - ☐ The antenna has to be professionally installed (please provide method of installation)

Please refer to the attached document Internal Photos to show the antenna connector.

----- END OF REPORT -----