FCC Test Report

Report No.: AGC07434220822FE10

FCC ID	:	2ARXB-B21A
PRODUCT DESIGNATION	:	Label Printer
BRAND NAME	:	NIIMBOT
MODEL NAME	:	NIIMBOT B21
APPLICANT	:	Wuhan Jingchen Intelligent Identification Technology Co., Ltd.
DATE OF ISSUE	:	Sep. 16, 2022
STANDARD(S)	:	FCC Part 15 Subpart C §15.225
REPORT VERSION	:	V 1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 16, 2022	Valid	Initial Release

TABLE OF CONTENTS

1. GENERAL INFORMATION

Applicant	Wuhan Jingchen Intelligent Identification Technology Co., Ltd.
Address	Creative Workshop No. 5, Creative World, Yezhihu West Road, Hongshan District, Wuhan, China
Manufacturer	Wuhan Jingchen Intelligent Identification Technology Co., Ltd.
Address	Creative Workshop No. 5, Creative World, Yezhihu West Road, Hongshan District, Wuhan, China
Factory	Huangpi branch of Wuhan Jingchen Intelligent Identification Technology Co., Ltd.
Address	4th Floor, Block 6, Hui Qiang Technology Park, No. 1 Tianyang Road, Chuanlong Av, Hengdian street, Huangpi District, Wuhan, China
Product Designation	Label Printer
Brand Name	NIIMBOT
Test Model	NIIMBOT B21
Date of Test	Aug. 26, 2022 to Sep. 15, 2022
Deviation from Standard	No any deviation from the test method
Test Result	Pass
Test Report Form No	AGCTR-ER-FCC-NFCV1.0

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) 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 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Part 15.225.

Prepared By	Bibo Zhang (Project Engineer)	Sep. 16, 2022
Reviewed By	Calvin Liu (Reviewer)	Sep. 16, 2022
Approved By	Max Zhang (Authorized Officer)	Sep. 16, 2022

2. PRODUCT INFORMATION

2.1 PRODUCT TECHNICAL DESCRIPTION

Hardware Version	38.01
Software Version	38.05
Operation Frequency	13.56MHz
Modulation Type	ASK/FSK
Number of channels	1
Field Strength of Fundamental	79.49dBuV/m_(Max)
Antenna Designation_Main	Coil Antenna
Antenna Gain	0dBi
Antenna Designation_Auxiliary	Coil Antenna
Antenna Gain	0dBi
Power Supply	DC 7.4V by battery or DC 5V by adapter
Note: The device supports the main antenna and the auxiliary antenna for wireless work, and does not support simultaneous transmission	

2.2 TEST FREQUENCY LIST

Frequency Band	Channel Number	Frequency
13.110~14.010 MHz	01	13.56 MHz

2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ARXB-B21A** filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

2.4 TEST METHODOLOGY

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

2.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7 ANTENNA REQUIREMENT

Standard Requirement
15.203 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 antennathat uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a brokenantenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:
The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is 0dBi.

3. TEST ENVIRONMENT

3.1 ADDRESS OF THE TEST LABORATORY

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 TEST FACILITY

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

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 ENVIRONMENTAL CONDITIONS

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range (℃)	15 - 35	-20 - 50
Relative humidty range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Power supply	--	--
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

3.4 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±2.9 dB
Uncertainty of Radiated Emission below 150kHz	U_c = ±4.2 dB
Uncertainty of Radiated Emission below 30MHz	U_c = ±3.8 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±3.8 dB
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %

3.5 LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESPI	101206	Mar. 28, 2022	Mar. 27, 2023
Artificial power network	R&S	ESH2-Z5	100086	Jun. 08, 2022	Jun. 07, 2023
Test Software	FARA	EZ-EMC(Ver. AGC-CON03A1)	N/A	N/A	N/A
Test Receiver	R&S	ESCI	10096	Mar. 28, 2022	Mar. 27, 2023
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
2.4GHz Filter	EM Electronics	N/A	N/A	Mar. 18, 2022	Mar. 19, 2024
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn Antenna	SCHWARZBEC	BBHA9170	768	Oct. 31, 2021	Oct. 30, 2023
Active Loop Antenna (9K-30Mhz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS	3117	00034609	Apr. 23, 2021	Apr. 22, 2023
Preamplifier Assembly	ETS	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
Preamplifier Assembly	ETS	3117PA	00225134	Sep. 01, 2022	Sep. 02, 2024
Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 08, 2021	Jan. 07, 2023
Test Software	Tonscend	JS32-RE(Ver.2.5)	N/A	N/A	N/A

4.SYSTEM TEST CONFIGURATION

4.1 EUT CONFIGURATION

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

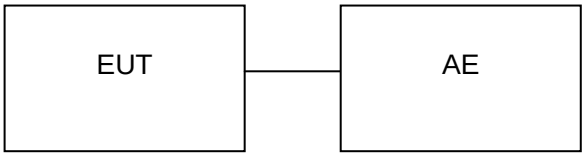
4.2 EUT EXERCISE

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

4.3 CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:

Conducted Emission Configure:



4.4 EQUIPMENT USED IN TESTED SYSTEM

The Following Peripheral Devices And Interface Cables Were Connected During The Measurement:

☒ Test Accessories Come From The Laboratory

Item	Equipment	Model No.	Identifier	Note
1	Adapter	HW-050200C01	DC 5V	AE

☒ Test Accessories Come From The Manufacturer

Item	Equipment	Model No.	Identifier	Note
1	Label Printer	NIIMBOT B21	2ARXB-B21A	EUT
2	Charger line	N/A	0.8m unshielded	Accessory

4.5 SUMMARY OF TEST RESULTS

Item	FCC Rules	Description Of Test	Result
1	§15.203	Antenna Equipment	Pass
2	15.225(a)(b)(c)	Field Strength of Fundamental	Pass
3	§15.209	Radiated Emission	Pass
4	§15.215(c)	20dB Bandwidth	Pass
5	§15.205(a)	Restricted Bands of Operation	Pass
6	§15.225(e)	Frequency Stability	Pass
7	§15.207	AC Power Line Conducted Emission	Pass

5. DESCRIPTION OF TEST MODES

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	NFC/ ASK/FSK
Radiated&Conducted Test Cases	Mode 1: Tx_13.56 MHz_ (Main Antenna Identification) Mode 2: Tx_13.56 MHz_ (Auxiliary Antenna Identification)
AC Conducted Emission	Mode 1: NFC Normal Operation + adapter power supply Tx _13.56 MHz_ (Main Antenna Identification) Mode 2: NFC Normal Operation + adapter power supply Tx _13.56 MHz_ (Auxiliary Antenna Identification)

Note:

1. Only the worst-case results of the main antenna are recorded in the report, only for radiated field strength, radiated disturbance, frequency stability and conducted disturbance.
2. The battery is full-charged during the test.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
4. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

6. FIELD STRENGTH OF FUNDAMENTAL

6.1 PROVISIONS APPLICABLE

Rules and specifications	FCC CFR 47 Part 15 section 15.225			
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.			
Freq. of Emission (MHz)	Field Strength (μV/m) at 30m	Field Strength (dBμV/m) at 30m	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
1.705~13.110	30	29.5	48.58	69.5
13.110~13.410	106	40.5	59.58	80.5
13.410~13.553	334	50.5	69.58	90.5
13.553~13.567	15848	84.0	103.08	124.0
13.567~13.710	334	50.5	69.58	90.5
13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5

6.2 MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the

pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

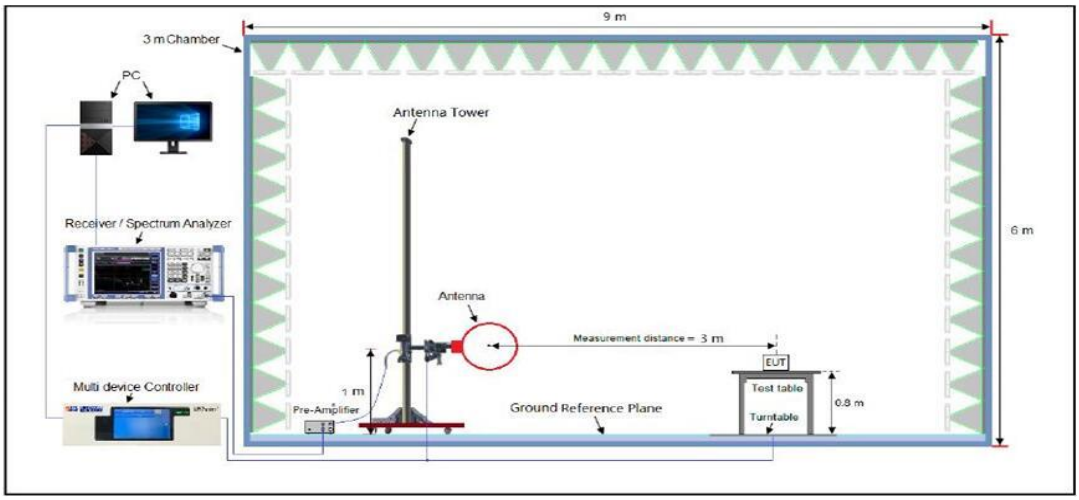
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

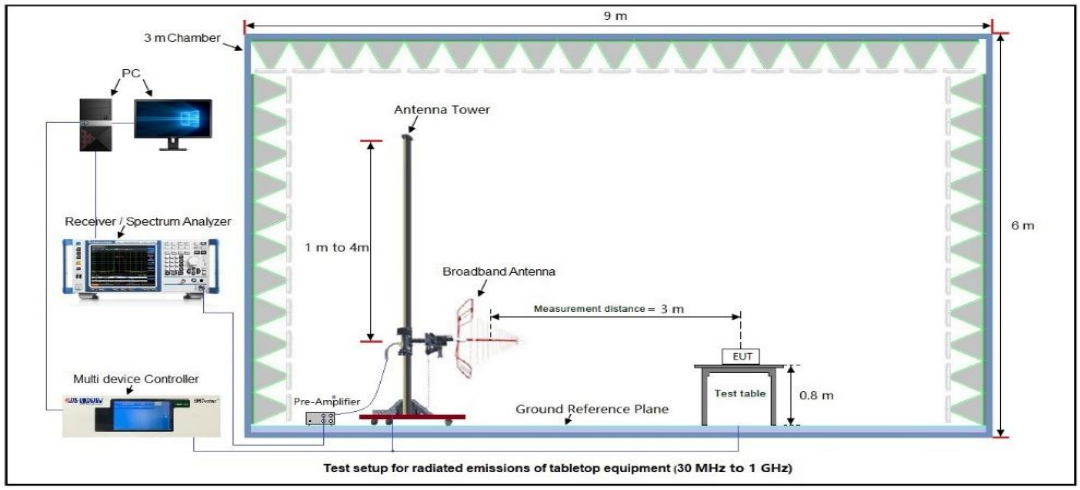
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

6.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)

RADIATED EMISSION TEST SETUP 9KHz-30MHz



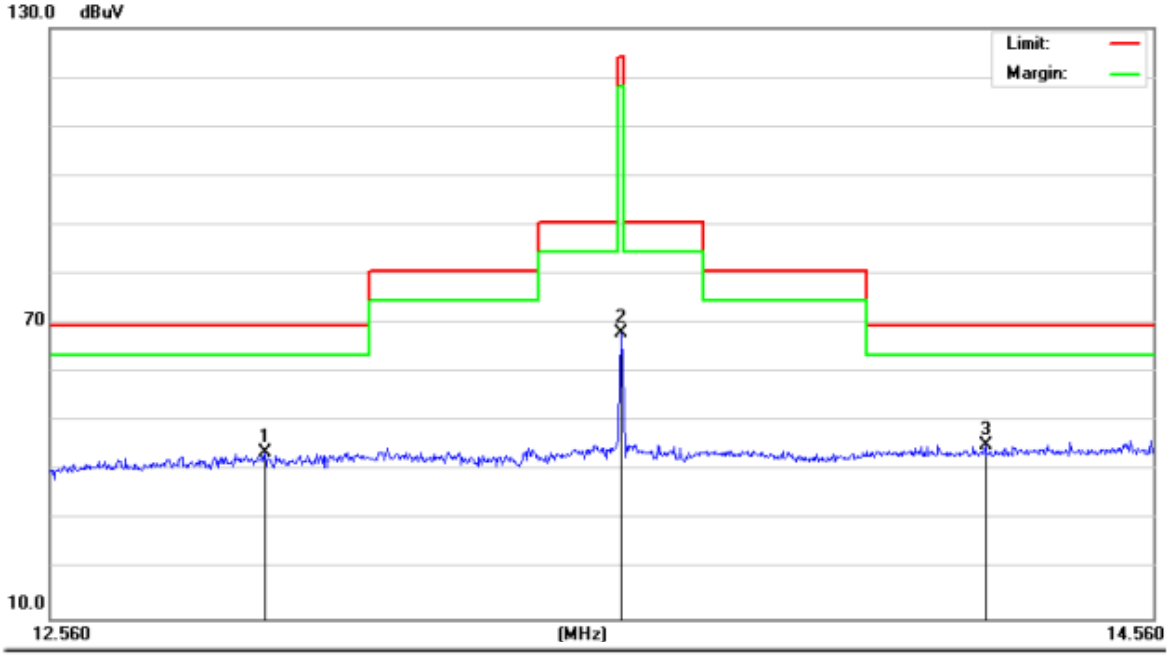
RADIATED EMISSION TEST SETUP 30MHz-1000MHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

6.4 MEASUREMENT RESULTS

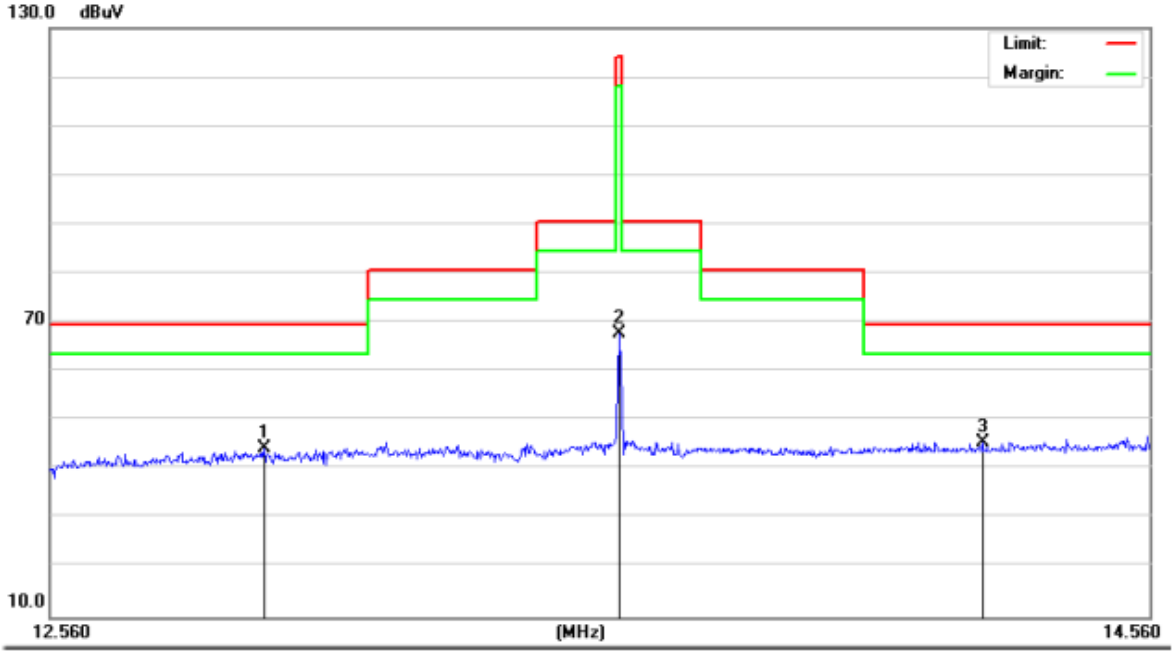
EUT	Label Printer	Model Name	NIIMBOT B21
Temperature	22°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Face



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dB	dB	Detector
1		12.9280	19.26	24.59	43.85	69.50	-25.65	peak
2		13.5600	43.49	24.64	68.13	124.0	-55.87	peak
3	*	14.2378	20.45	24.69	45.14	69.50	-24.36	peak

RESULT: PASS

EUT	Label Printer	Model Name	NIIMBOT B21
Temperature	22°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Side



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dB	dB	Detector
1		12.9280	19.76	24.59	44.35	69.50	-25.15	peak
2		13.5600	42.99	24.64	67.63	124.0	-56.37	peak
3	*	14.2378	20.95	24.69	45.64	69.50	-23.86	peak

RESULT: PASS

7. RADIATED EMISSION

7.1 LIMITS OF RADIATED EMISSION TEST

According to 15.35, on any frequency or frequencies below or equal to 1000 MHz, the limits Shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test.

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

15.209 Limit in the below table has to be followed:

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m.

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

7.2 MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.

5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

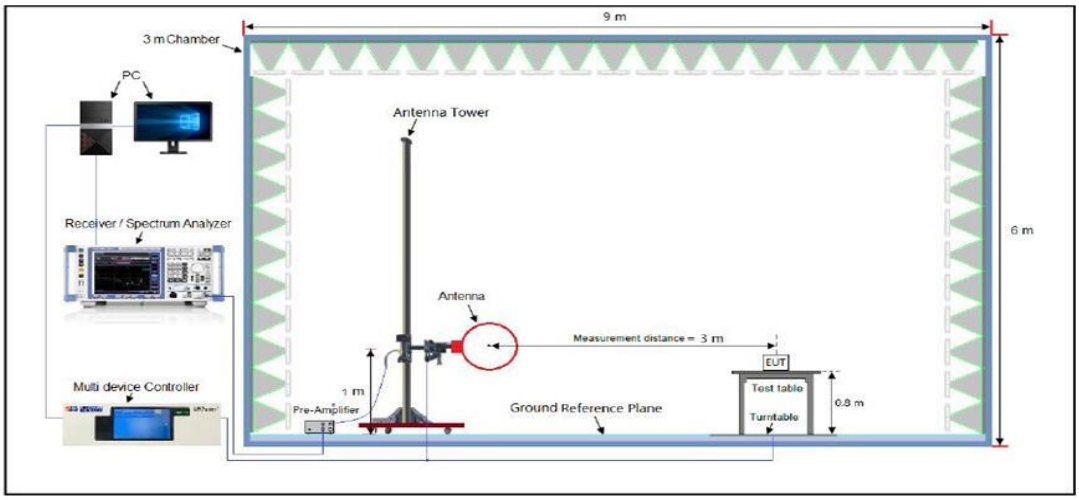
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

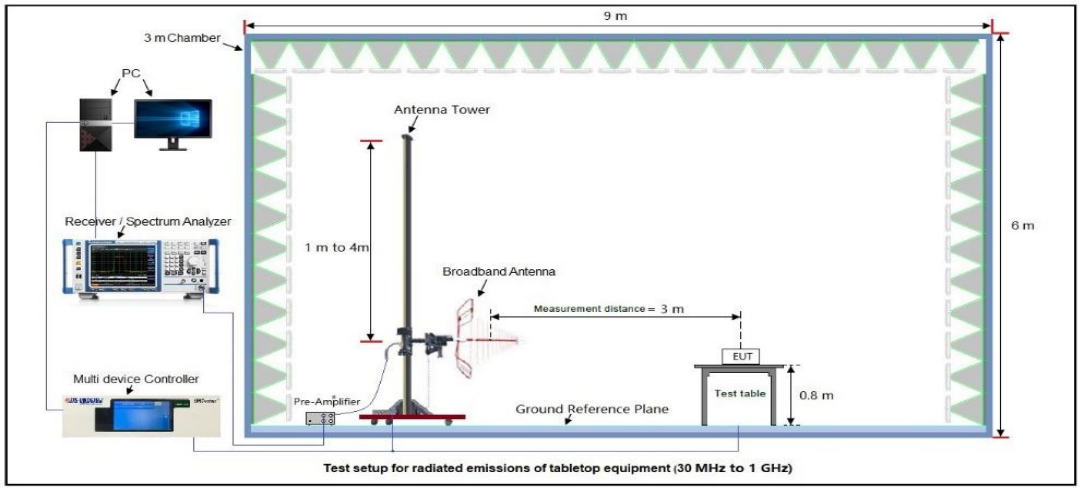
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

7.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)

RADIATED EMISSION TEST SETUP 9KHz-30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

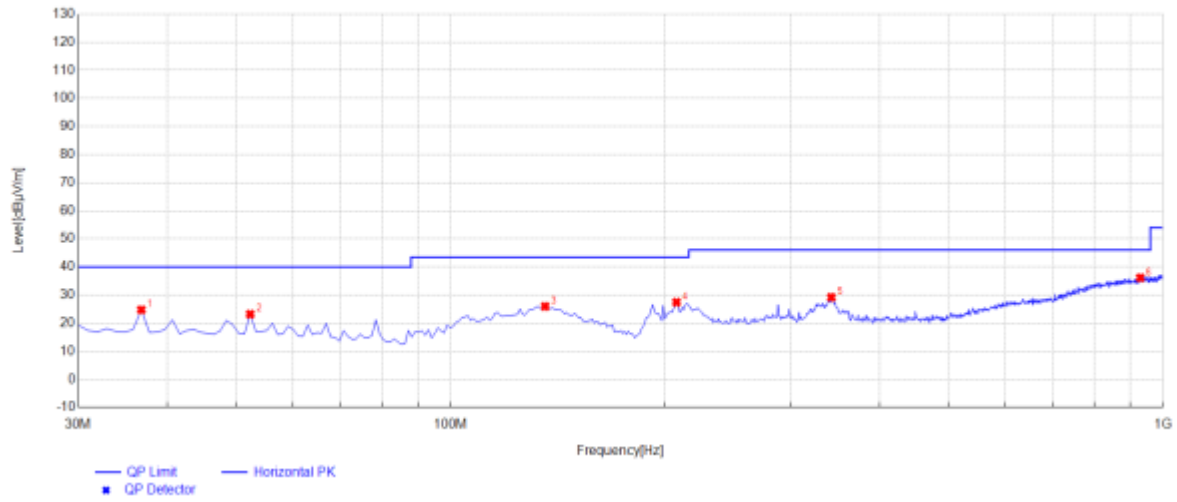
7.4 MEASUREMENT RESULT

RADIATED EMISSION BELOW 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

RADIATED EMISSION FROM 30MHz ~1000MHz

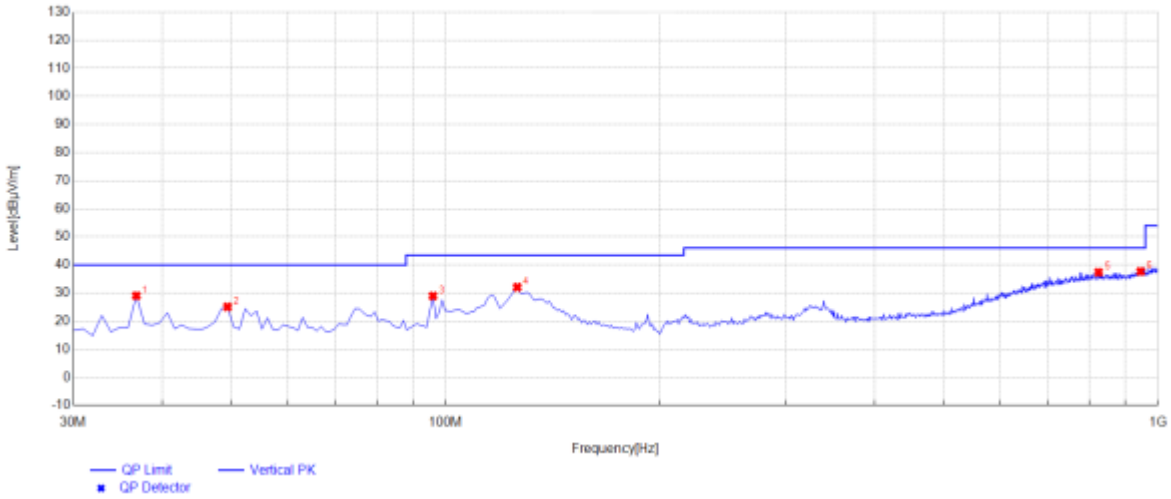
EUT	Label Printer	Model Name	NIIMBOT B21
Temperature	22°C	Relative Humidity	62%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.79	24.74	10.73	40.00	15.26	100	180	Horizontal
2	52.31	23.18	11.49	40.00	16.82	100	1	Horizontal
3	135.73	25.96	16.92	43.50	17.54	100	359	Horizontal
4	207.51	27.43	11.77	43.50	16.07	100	302	Horizontal
5	342.34	29.22	15.81	46.00	16.78	100	168	Horizontal
6	929.19	36.15	31.03	46.00	9.85	100	59	Horizontal

RESULT: PASS

EUT	Label Printer	Model Name	NIIMBOT B21
Temperature	22°C	Relative Humidity	62%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.79	29.03	10.73	40.00	10.97	100	129	Vertical
2	49.4	25.10	11.61	40.00	14.90	100	187	Vertical
3	95.96	28.95	9.71	43.50	14.55	100	183	Vertical
4	126.03	32.10	16.78	43.50	11.40	100	355	Vertical
5	825.4	37.38	31.51	46.00	8.62	100	34	Vertical
6	945.68	37.70	32.84	46.00	8.30	100	5	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Limit-Level.

2. All test modes had been pre-tested. The mode 1 is the worst case and recorded in the report.

8. 20 dB BANDWIDTH

8.1 PROVISIONS APPLICABLE

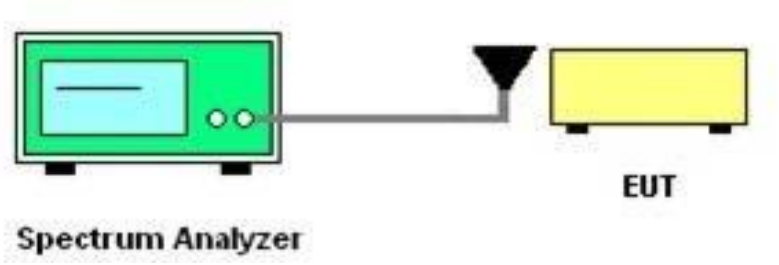
Intentional radiators must be designed to ensure that the 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

8.2 MEASUREMENT PROCEDURE

Set the parameters of SPA as below:

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. Centre frequency = Operation Frequency
3. The resolution bandwidth of 10 kHz and the video bandwidth of 30 kHz were used.
4. Span: 100kHz, Sweep time: Auto
5. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
6. Measured the spectrum width with power higher than 20dB below carrier.
7. Measured the 99% OBW.
8. Record the plots and Reported.

8.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)

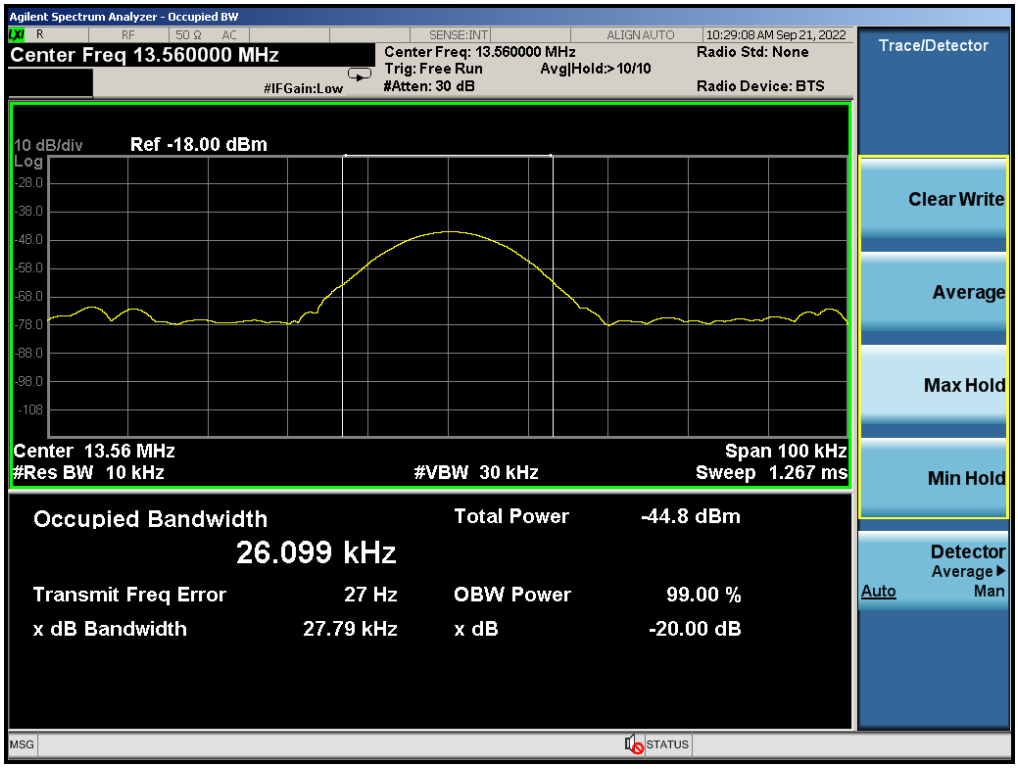


8.4 MEASUREMENT RESULTS

Main Antenna:

Test Data of Occupied Bandwidth and -20dB Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (kHz)	-20dB Bandwidth (kHz)	Limits (MHz)	Pass or Fail
ASK/FSK	13.56	26.099	27.79	N/A	Pass

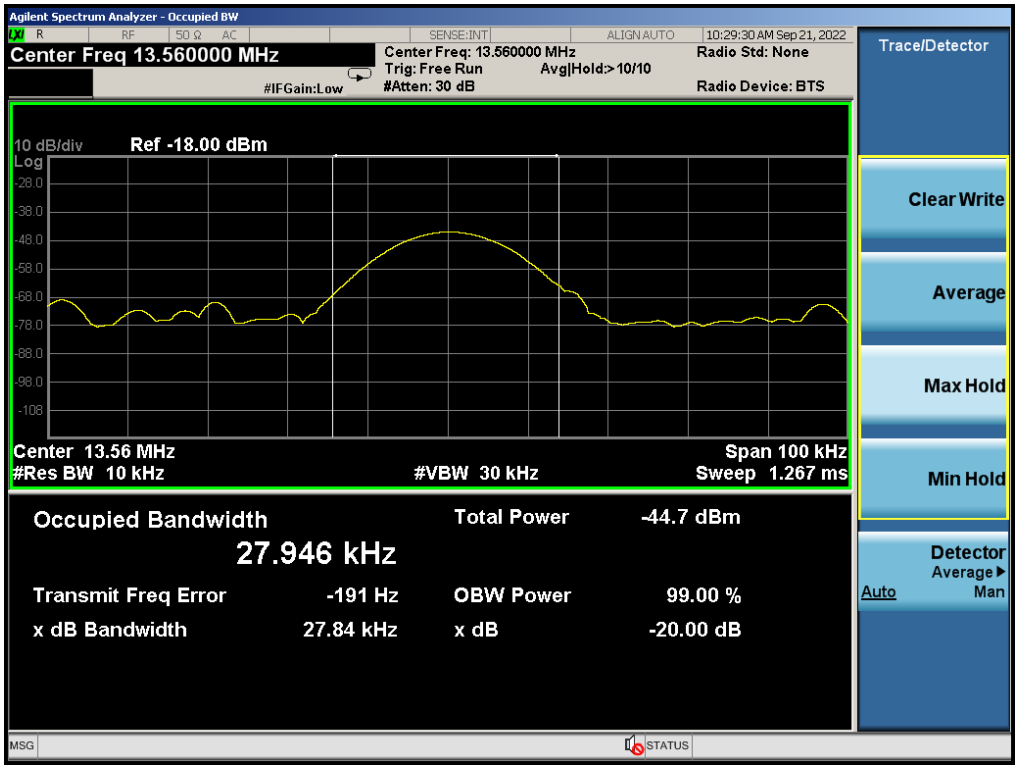
Test Graphs of Occupied Bandwidth&-20dB Bandwidth



Auxiliary Antenna:

Test Data of Occupied Bandwidth and -20dB Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (kHz)	-20dB Bandwidth (kHz)	Limits (MHz)	Pass or Fail
ASK/FSK	13.56	27.946	27.84	N/A	Pass

Test Graphs of Occupied Bandwidth&-20dB Bandwidth



9. FREQUENCY STABILITY

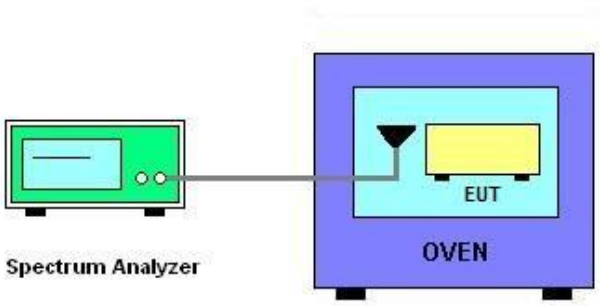
9.1 PROVISIONS APPLICABLE

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

9.2 MEASUREMENT PROCEDURE

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±100ppm.
6. Extreme temperature rule is -20°C~50°C.

9.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



9.4 MEASUREMENT RESULTS

Operating frequency: 13.56MHz

Voltage vs. Frequency Stability (Test Temperature: 20℃)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (ppm)	Limit(ppm)	Conclusion
7.4	13.56075	+68	±100	PASS
6.66	13.56058			
8.14	13.56092			

Temperature vs. Frequency Stability (Test Voltage: 7.4V)

Temperature	Measurement Frequency (MHz)	Max. Deviation (ppm)	Limit(ppm)	Conclusion
-20℃	13.56045	+65	±100	PASS
-10℃	13.56075			
0℃	13.56063			
10℃	13.56088			
20℃	13.56058			
30℃	13.56079			
40℃	13.56048			
50℃	13.56048			

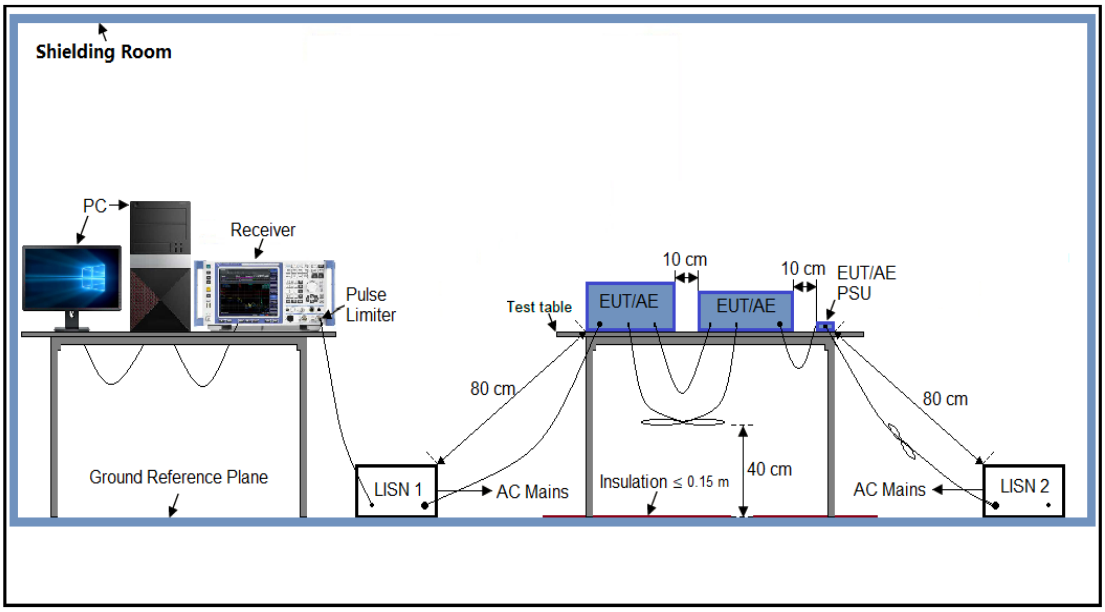
10. AC POWER LINE CONDUCTED EMISSION TEST

10.1 LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

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

10.2 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



10.3 PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

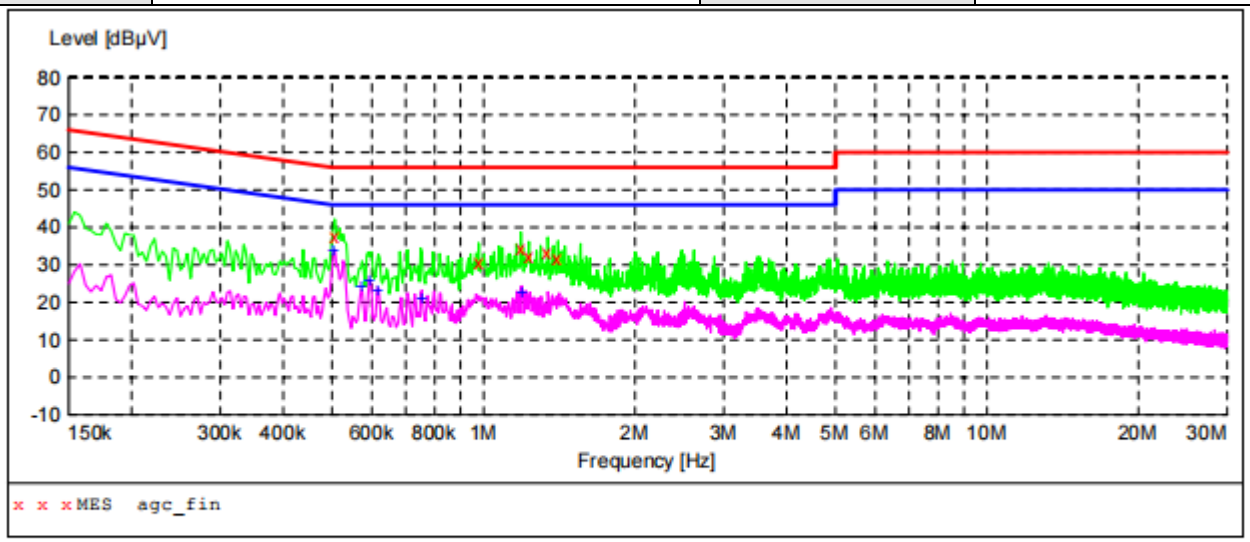
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4 FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

10.5 MEASUREMENT RESULTS

AC LINE CONDUCTED EMISSION TEST			
Test Mode	Mode 1	LISN line	Line of fire



MEASUREMENT RESULT: "agc_fin"

2022/8/31 15:50

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.506000	37.60	5.4	56	18.4	QP	L1	GND
0.978000	30.80	5.4	56	25.2	QP	L1	GND
1.186000	34.60	5.7	56	21.4	QP	L1	GND
1.230000	32.40	5.7	56	23.6	QP	L1	GND
1.342000	33.30	5.9	56	22.7	QP	L1	GND
1.406000	31.80	5.9	56	24.2	QP	L1	GND

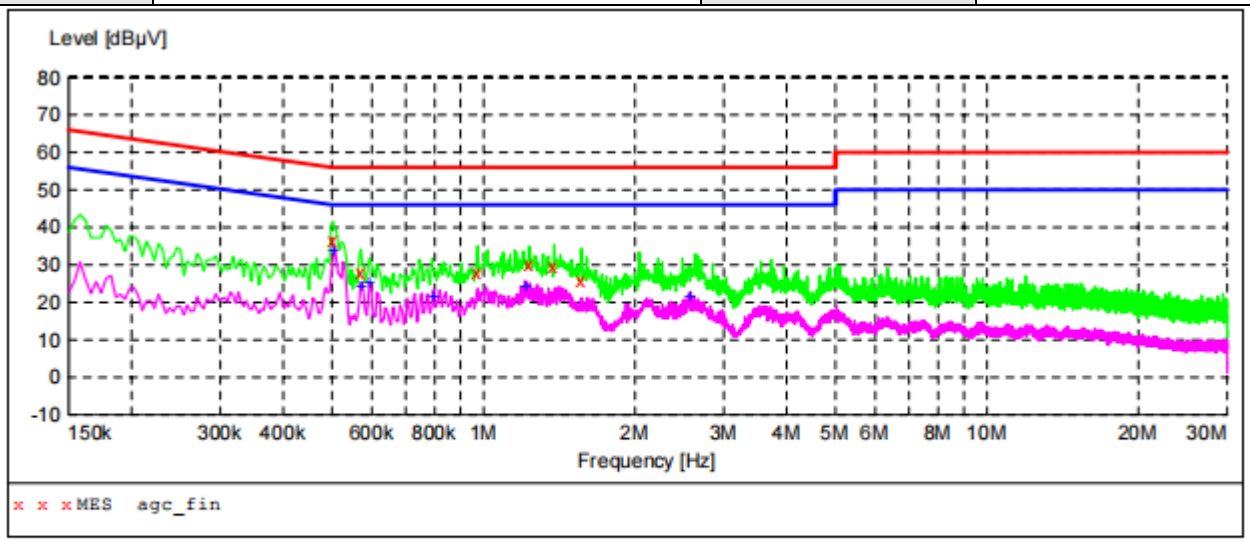
MEASUREMENT RESULT: "agc_fin2"

2022/8/31 15:50

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.506000	34.10	5.4	46	11.9	AV	L1	GND
0.574000	24.00	5.4	46	22.0	AV	L1	GND
0.594000	25.90	5.4	46	20.1	AV	L1	GND
0.618000	23.40	5.4	46	22.6	AV	L1	GND
0.754000	20.80	5.4	46	25.2	AV	L1	GND
1.190000	22.70	5.7	46	23.3	AV	L1	GND

RESULT: PASS

AC LINE CONDUCTED EMISSION TEST			
Test Mode	Mode 1	LISN line	Neutral



MEASUREMENT RESULT: "agc_fin"

2022/8/31 15:54

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.502000	36.30	5.4	56	19.7	QP	N	GND
0.570000	28.00	5.4	56	28.0	QP	N	GND
0.974000	27.70	5.4	56	28.3	QP	N	GND
1.234000	29.90	5.7	56	26.1	QP	N	GND
1.382000	29.50	5.9	56	26.5	QP	N	GND
1.566000	25.90	6.1	56	30.1	QP	N	GND

MEASUREMENT RESULT: "agc_fin2"

2022/8/31 15:54

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.506000	34.00	5.4	46	12.0	AV	N	GND
0.574000	24.40	5.4	46	21.6	AV	N	GND
0.594000	25.40	5.4	46	20.6	AV	N	GND
0.798000	21.70	5.4	46	24.3	AV	N	GND
1.210000	24.20	5.7	46	21.8	AV	N	GND
2.578000	21.40	6.5	46	24.6	AV	N	GND

RESULT: PASS

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC07434220822AP02

APPENDIX B: PHOTOGRAPHS OF TEST EUT

Refer to the Report No.: AGC07434220822AP03

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

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