TEST REPORT

Applicant:	Queclink Wireless Solutions Co., Ltd.
Address:	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China
Equipment Type:	RFID Reader
Model Name:	GPScanID 150
Brand Name:	QUECLINK
FCC ID:	YQD-GPSCANID150
Test Standard:	47 CFR Part 15 Subpart C ANSI C63.10-2013
Sample Arrival Date:	Sep. 05, 2022
Test Date:	Dec. 20, 2022
Date of Issue:	May 19, 2023

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Chong **Checked by:** Xia Long **Approved by:** Liao Jianming

(Technical Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	May 04, 2023	Initial Issue
Rev. 02	May 15, 2023	Added the Antenna Requirement in section 3.2
Rev. 03	May 19, 2023	Updated the Radiated Emission(9k-30M) test

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☑ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Queclink Wireless Solutions Co., Ltd.
Address	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China

2.2 Manufacturer Information

Manufacturer	Queclink Wireless Solutions Co., Ltd.
Address	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	RFID Reader
Model Name Under Test	GPScanID 150
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	18650 2S1P 2900mAh
	Serial No.	N/A
	Capacity	2900mAh
	Rated Voltage	7.4V
	Manufacturer	Jiangxi BetterPower New Energy Limited Liability Company
Ancillary Equipment 2	Adapter	
	Brand Name	N/A
	Model No.	RCL-X120400Z
	Serial No.	N/A
	Rated Input	240V~, 1000mA
	Rated Output	12VDC, 4000mA
	Manufacturer	ShenZhen RICHLY Technology Co., Ltd.
Ancillary Equipment 3	DATA/Charging Cable	
	Model No.	N/A
	Length (Approx.)	1 m
Ancillary Equipment 4	Ear Tag	
	Model No.	N/A
	Length (Approx.)	N/A

2.6 Technical Information

Network and Wireless connectivity	Bluetooth, WiFi, RFID, GPS, GLONASS

The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	ASK
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Frequency Range	134.2 kHz
Receiver Categorization	3
Number of channel	1
Tested Channel	1
Antenna Type	Coil Antenna

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Antenna Requirement	15.203	Pass Note	--
2	Radiated Emission	15.209,15.215(b)	Pass	Annex A.1
3	Conducted Emission, AC Ports	15.207	Pass	Annex A.2
4	20 dB Bandwidth	15.215(c)	Pass	Annex A.3
Note: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.				

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)	4.28 dB
Radiated emissions (9 kHz-30 MHz)	3.22 dB
Radiated emissions (30 MHz-1 GHz)-3m	4.76 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

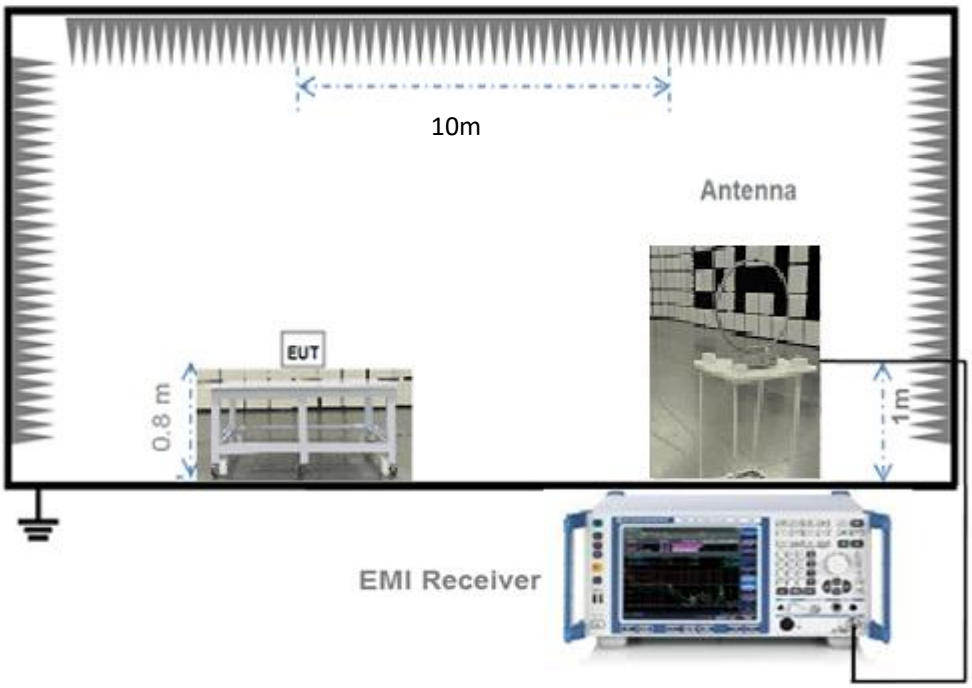
Relative Humidity	30% to 60%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	7.4 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2022.09.09	2023.09.08
Test Antenna-Loop	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	130	2022.02.19	2024.08.14
EMI Receiver	Keysight	N9038A	MY553301 20	2022.09.09	2023.09.08
Amplifier (30-1GHz)	COM-MV	ZT30-1000M	B201711908 1	2022.09.09	2023.09.08
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-00867	2022.04.12	2025.04.11
Anechoic Chamber	YiHeng	9m*6m*6m	142	2022.02.19	2024.08.18
EMI Receiver	KEYSIGHT	N9010B	MY571103 09	2022.09.09	2023.09.08
LISN	SCHWARZBECK	NSLK 8127	8127-687	2022.06.01	2023.05.31
Shielded Room	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2022.02.19	2025.02.18
Test Software	BALUN	BL410-E	V22.930	--	--

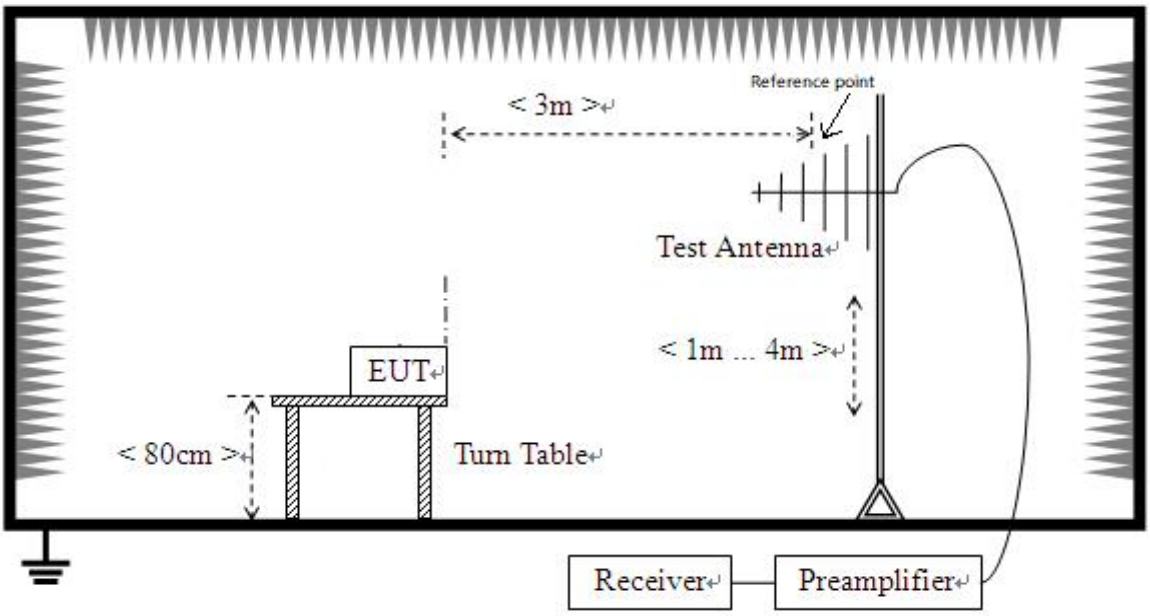
4.3 Test Setups

Test Setup 1



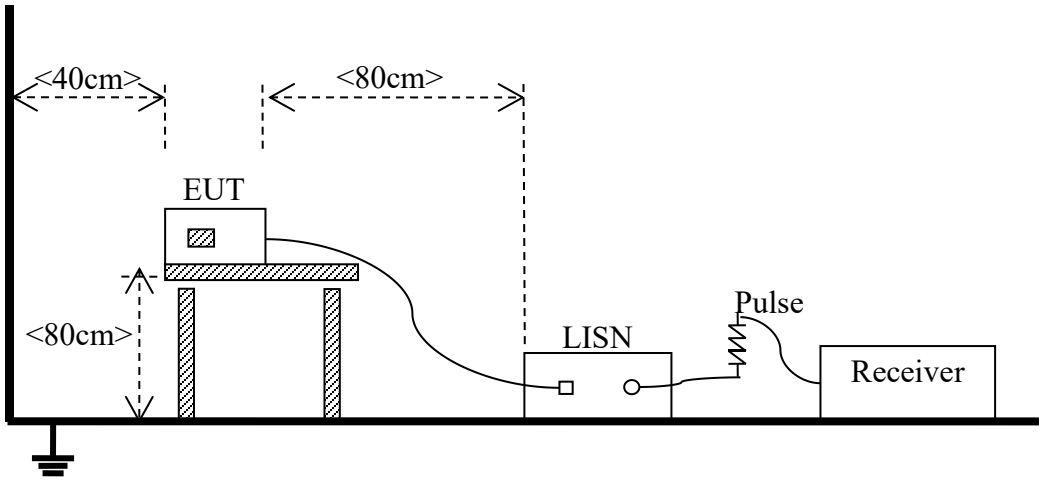
For Radiated Emission Test (Below 30 MHz)

Test Setup 2



(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 3



(For Conducted Emission, AC Ports Test)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §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. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device’s antenna shall be stated, based on a measurement or on data from the antenna’s manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device’s ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer EUT internal photos.

5.2 Emission Tests

5.2.1 Radiated Emission

5.2.1.1 Limit

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

NOTE:

1) Field Strength (dBμV/m) = 20*log [Field Strength (μV/m)].

2) In the emission tables above, the tighter limit applies at the band edges.

3) For above 1000 MHz, limit field strength of harmonics: 54 dBμV/m@3 m (AV) and 74 dBμV/m@3 m (PK)

4) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). For example, at the frequency 9 kHz, limit @10m = 20*log (2400/f) + 40log (dlimit/dmeasure) where limit = 300m, dmeasure=10m. limit @10m = 20*log (2400/9) + 40log (300/10) = 107.5 (dBμV/m).

5) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided, When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements). For example, at the frequency 30 MHz, limit @10m = 20*log (100) + 20log (dlimit/dmeasure) where limit = 3m, dmeasure=10m. limit @10m = 20*log (100) + 20log (3/10) = 29.5 (dBμV/m).

5.2.1.2 Test Setup

Refer to 4.3 section (test setup 1 to test setup 2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.2.1.3 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.2.1.4 Test Result

Please refer to ANNEX A.1.

NOTE:

1. Results (dBμV/m) = Reading (dBμV/m) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Over limit = Results – Limit.

5.2.2 Conducted Emission

5.2.2.1 Test Limit

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

1) The limit is applicable to Class B ITE.
2) The lower limit shall apply at the band edges.
3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.2.2.2 Test Setup

Refer to 4.3 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.2.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.2.2.4 Test Result

Please refer to ANNEX A.2.

NOTE**:**

1. Results (dBμV) = Reading (dBμV) + Factor (dB)

The reading level is calculated by software which is not shown in the sheet

2. Factor = Insertion loss + Cable loss

3. Over limit = Results – Limit.

5.2.3 20 dB bandwidth

5.2.3.1 Limit

FCC §15.215(c)

The 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth (10*log1%=20 dB) taking the total RF output power.

5.2.3.2 Test Setup

Refer to 4.3 section test (test setup 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = between 2 to 5 times the OBW

RBW = 1% to 5% the OBW

VBW ≥ 3RBW

Sweep = auto

Detector function = peak

Trace = max hold

The 99% emission bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while the EUT is operating in transmission mode.

Use the following spectrum analyzer settings:

Span = between 1.5 to 5 times the OBW

RBW = 1% to 5% OBW

VBW ≥ 3RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

5.2.3.4 Test Result

Please refer to ANNEX A.3.

ANNEX A TEST RESULTS

A.1 Radiated Emission

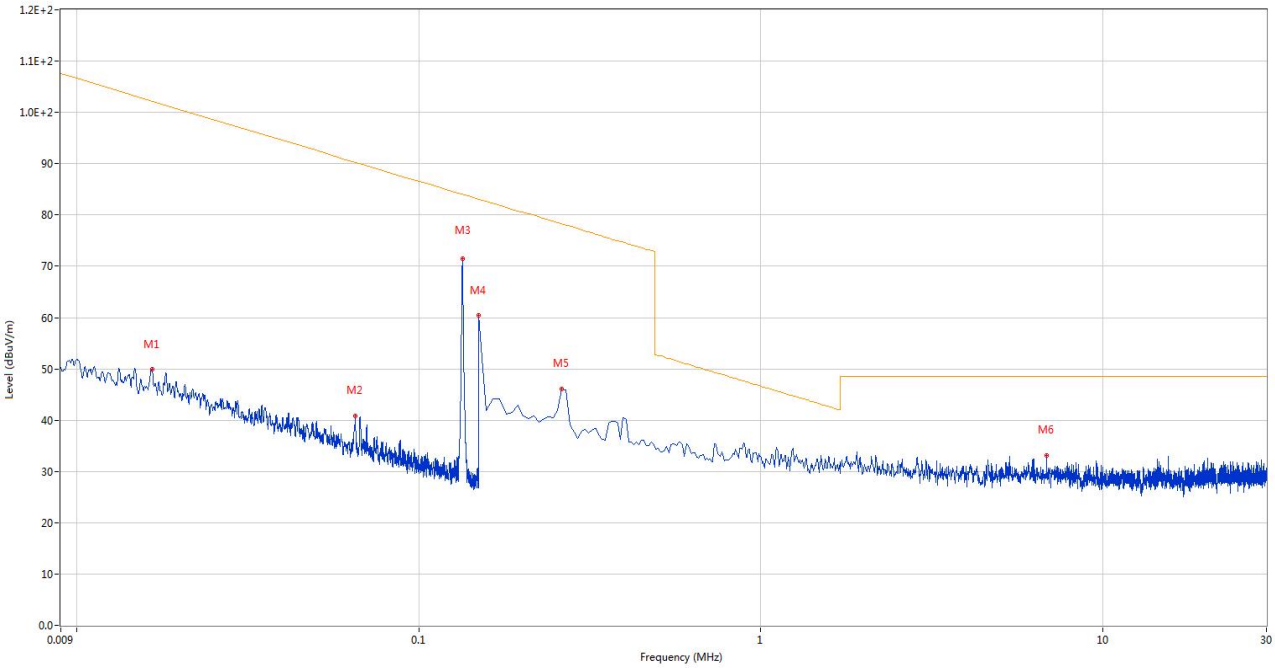
Note 1: The symbol of "--" in the table which means not application.

Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: According to the description of § 15.209 (d), the emission limits shown in the below table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. So the sweep detector for mark 0.134 MHz is average.

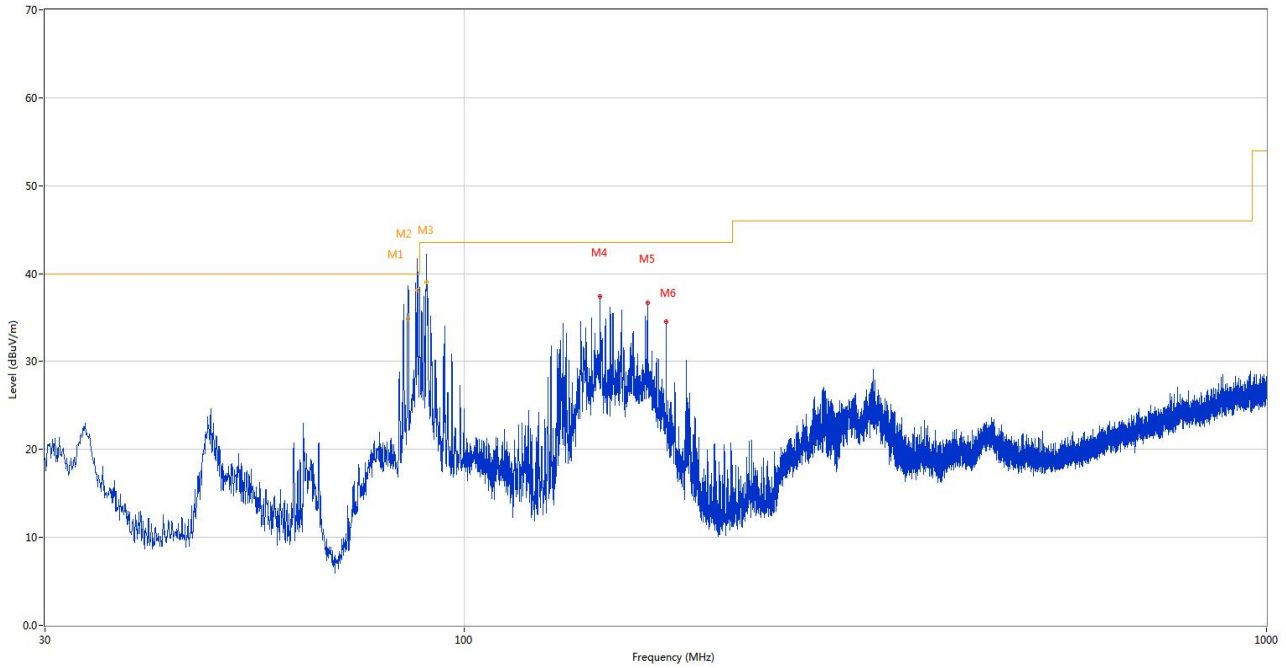
Test Data and Plots

A.1.1 Test Antenna Vertical, EUT X axis, 9 kHz –30 MHz, at 10m chamber,Test Distance=10m



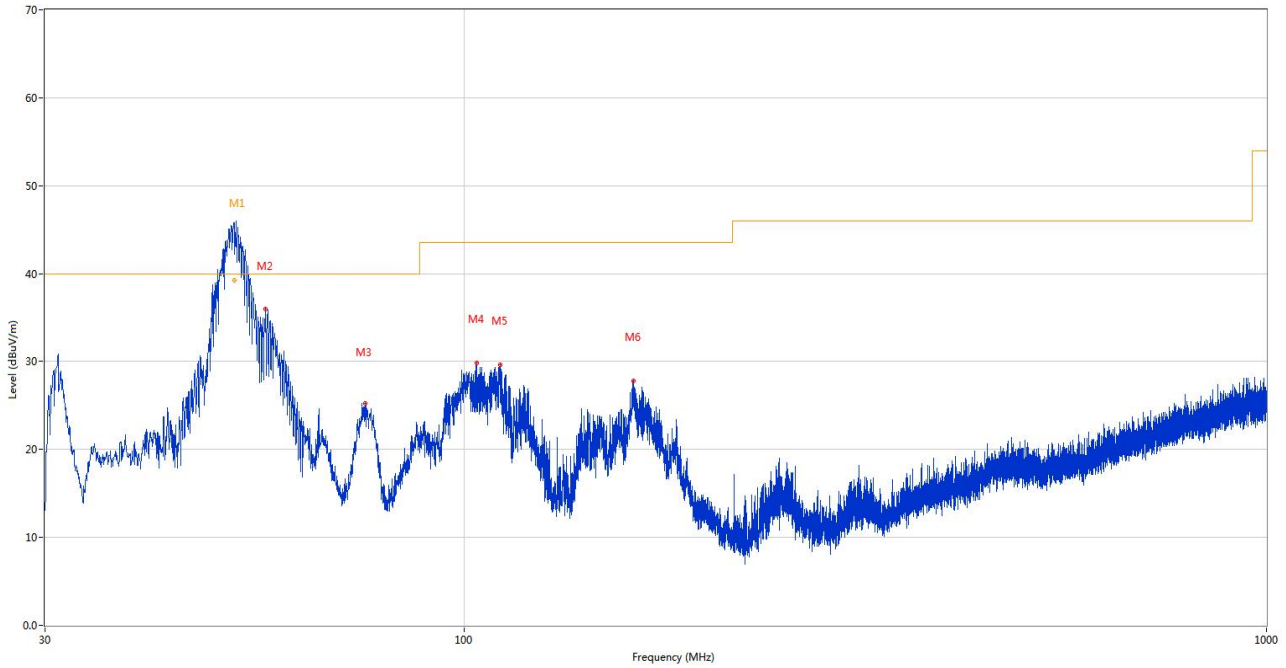
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.017	49.85	20.09	102.2	52.35	Peak	280.00	100	Vertical	Pass
2	0.065	40.85	20.18	90.3	49.45	Peak	269.00	100	Vertical	Pass
3	0.134	71.05	20.15	84.0	12.95	AV	359.00	100	Vertical	Pass
4	0.150	28.60	20.15	83.1	54.50	Peak	360.00	100	Vertical	Pass
5	0.262	46.04	20.13	78.2	32.16	Peak	174.00	100	Vertical	Pass
6	6.829	33.11	20.81	48.5	15.39	Peak	263.00	100	Vertical	Pass

A.1.2 Test Antenna Horizontal, EUT X axis, 30 MHz – 1 GHz, at 3m chamber



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	85.131	36.89	-30.32	40.0	3.11	Peak	329.00	113	Horizontal	N/A
1*	85.131	34.84	-30.32	40.0	5.16	QP	329.00	113	Horizontal	Pass
2	87.410	32.06	-30.29	40.0	7.94	Peak	360.00	193	Horizontal	N/A
2*	87.410	38.15	-30.29	40.0	1.85	QP	360.00	193	Horizontal	Pass
3	89.675	42.92	-30.36	43.5	0.58	Peak	360.00	134	Horizontal	N/A
3*	89.675	39.02	-30.36	43.5	4.48	QP	360.00	134	Horizontal	Pass
4	147.612	37.41	-24.94	43.5	6.09	Peak	329.00	200	Horizontal	Pass
5	169.146	36.68	-25.33	43.5	6.82	Peak	329.00	200	Horizontal	Pass
6	178.458	34.49	-26.91	43.5	9.01	Peak	360.00	200	Horizontal	Pass

A.1.3 Test Antenna Vertical, EUT X axis, 30 MHz – 1 GHz, at 3m chamber



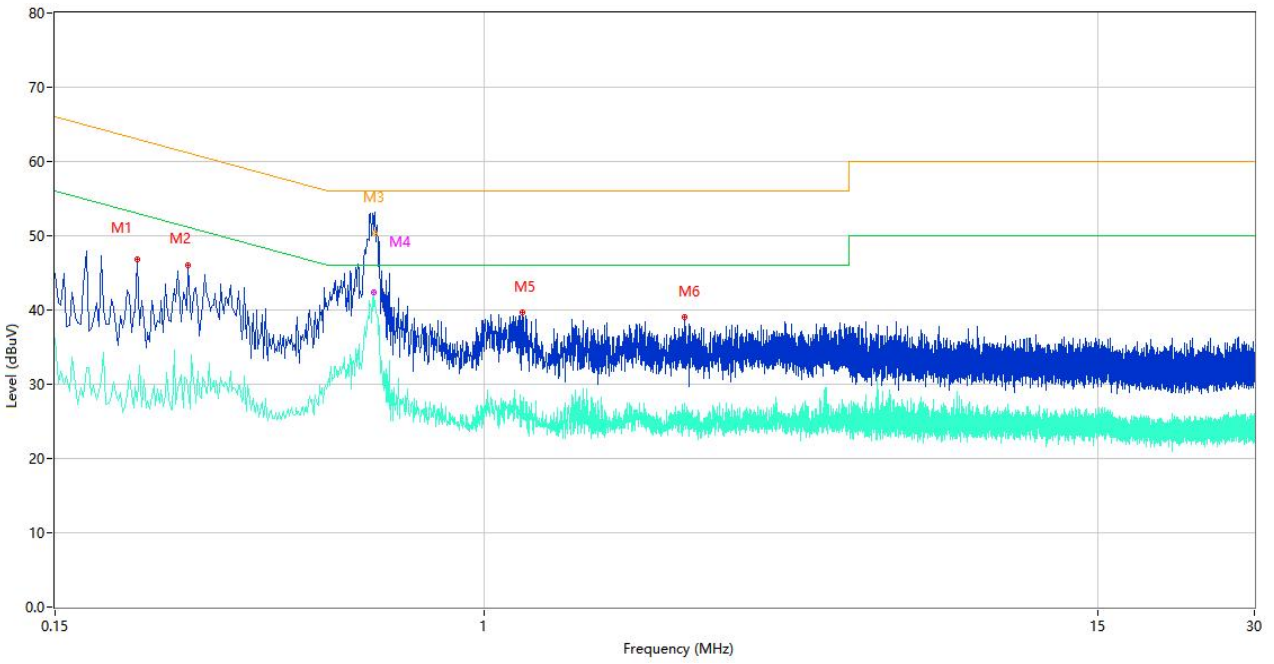
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	51.738	43.78	-26.82	40.0	-3.78	Peak	86.00	142	Vertical	N/A
1*	51.738	39.25	-26.82	40.0	0.75	QP	86.00	142	Vertical	Pass
2	56.481	35.92	-27.07	40.0	4.08	Peak	74.00	100	Vertical	Pass
3	75.202	25.29	-29.76	40.0	14.71	Peak	79.00	100	Vertical	Pass
4	103.672	29.87	-28.83	43.5	13.63	Peak	62.00	100	Vertical	Pass
5	110.753	29.60	-28.24	43.5	13.90	Peak	99.00	100	Vertical	Pass
6	162.405	27.75	-24.86	43.5	15.75	Peak	101.00	100	Vertical	Pass

A.2 Conducted Emission

Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

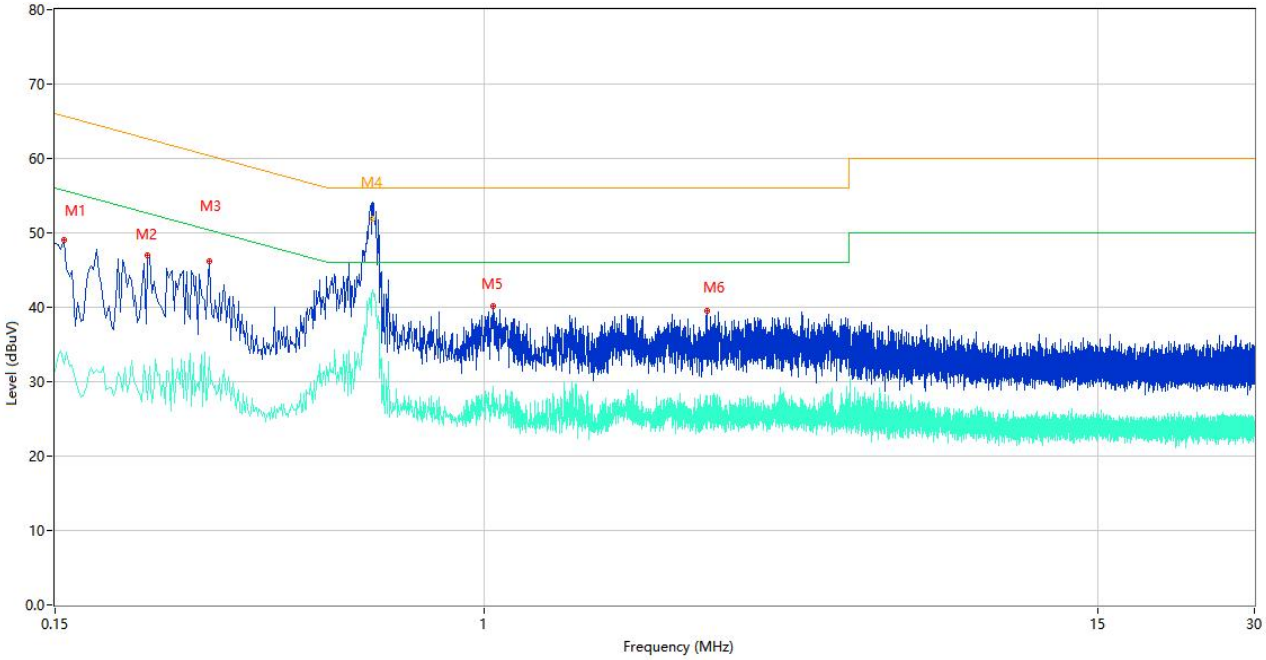
Test Data and Plots

A.2.1 L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.216	46.77	10.04	62.97	16.20	Peak	L	Pass
1**	0.216	27.73	10.04	52.97	25.24	AV	L	Pass
2	0.270	45.98	10.00	61.12	15.14	Peak	L	Pass
2**	0.270	29.42	10.00	51.12	21.70	AV	L	Pass
3	0.616	53.46	10.35	56.00	2.54	Peak	L	N/A
3*	0.616	50.33	10.35	56.00	5.67	QP	L	Pass
3**	0.616	41.28	10.35	46.00	4.72	AV	L	Pass
4	0.612	52.66	10.35	56.00	3.34	Peak	L	Pass
4**	0.612	42.44	10.35	46.00	3.56	AV	L	Pass
5	1.180	39.65	10.19	56.00	16.35	Peak	L	Pass
5**	1.180	27.66	10.19	46.00	18.34	AV	L	Pass
6	2.426	39.02	10.32	56.00	16.98	Peak	L	Pass
6**	2.426	27.29	10.32	46.00	18.71	AV	L	Pass

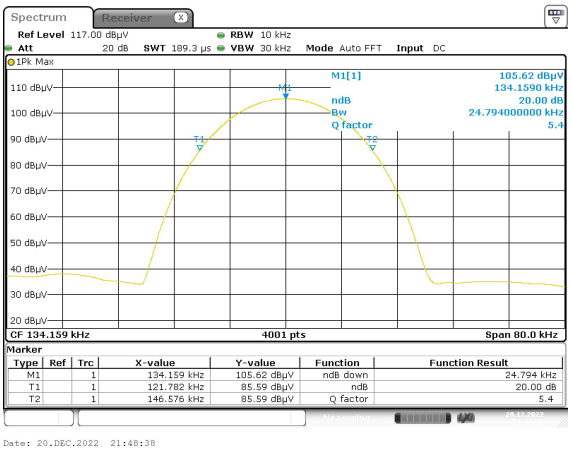
A.2.2 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.156	49.10	10.09	65.67	16.57	Peak	N	Pass
1**	0.156	32.45	10.09	55.67	23.22	AV	N	Pass
2	0.226	47.03	10.03	62.60	15.57	Peak	N	Pass
2**	0.226	27.64	10.03	52.60	24.96	AV	N	Pass
3	0.296	46.22	9.98	60.35	14.13	Peak	N	Pass
3**	0.296	33.32	9.98	50.35	17.03	AV	N	Pass
4	0.610	54.66	10.35	56.00	1.34	Peak	N	N/A
4*	0.610	51.83	10.35	56.00	4.17	QP	N	Pass
4**	0.610	42.32	10.35	46.00	3.68	AV	N	Pass
5	1.040	40.24	10.25	56.00	15.76	Peak	N	Pass
5**	1.040	29.40	10.25	46.00	16.60	AV	N	Pass
6	2.676	39.53	10.19	56.00	16.47	Peak	N	Pass
6**	2.676	28.05	10.19	46.00	17.95	AV	N	Pass

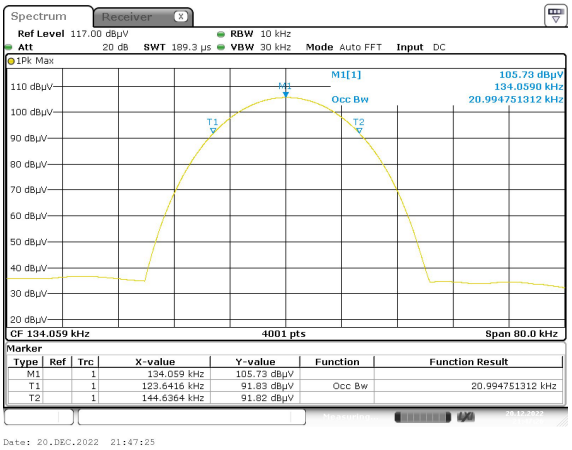
A.3 20 dB Bandwidth

Test Data and Plots



99% Occupied Bandwidth

Test Data and Plots



Note: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-EC2290276-AE-2.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-EC2290276-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-EC2290276-AI.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the “inspection and testing dedicated stamp” or test report stamp.
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--END OF REPORT--