Positec Technology (China)Co., Ltd

RF TEST REPORT

Report Type:
FCC Part 15.247&RSS-247 RF report

Model:
3571, 35711, 35719, NR001L, NR001L.*
(*=0-20, A-Z, * denote different accessories)

REPORT NUMBER:
220602429SHA-001

ISSUE DATE:
August 23, 2022

DOCUMENT CONTROL NUMBER:
TTRF15.247-03_V1 © 2018 Intertek

Intertek Testing Services Shanghai
Building No.86, 1198 Qinzhou Road (North)
Caohejing Development Zone
Shanghai 200233, China

Telephone: 86 21 6127 8200
www.intertek.com

Total Quality. Assured.

TEST REPORT

Report no.: 220602429SHA-001

Applicant:	Positec Technology (China) Co., Ltd 18, Dongwang Road, Suzhou Industrial park, Jiangsu 215123, P.R. China
Manufacturer:	Positec Technology (China) Co., Ltd 18, Dongwang Road, Suzhou Industrial park, Jiangsu 215123, P.R. China
Factory:	Guangdong Joy Intelligent Technology Co., Ltd No.58,second street, Mawu new village, Changping Town, Dongguan City, Guangdong Province, P.R.China
FCC ID:	2ASC3NR001L

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2020): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:	**REVIEWED BY:**
Project Engineer Erick Liu	Reviewer Wakeyou Wang

Total Quality. Assured.

TEST REPORT

Content

TEST REPORT

Revision History

Report No.	Version	Description	Issued Date
220602429SHA-001	Rev. 01	Initial issue of report	August 23, 2022

Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	Pass
Power line conducted emission	15.207(a)	Pass

Notes: 1: NA =Not Applicable

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Robotic mopping cleaner
Type/Model:	3571, 35711, 35719, NR001L, NR001L.* (*=0-20, A-Z, * denote different accessories)
Description of EUT:	EUT is Robotic mopping cleaner with WIFI function. This report is a C2PC report which based on 211203032SHA-001, just changed the gyroscope and lidar, after evaluation, we performed Power line conducted emission & Radiated Emissions tests and list worst case in the report.
Rating:	Adapter: Input: 100-240V~ 50-60Hz 0.5A Output: 19Vd.c. 0.6A 11.4W Working: 14.4V d.c.
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	July 12, 2022
Date of test:	July 13, 2022 ~ August 5, 2022

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20), IEEE 802.11n(HT40)
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT20): OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT40): OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Operating Frequency:	2412MHz to 2462MHz for IEEE 802.11b/g/n(HT20) 2422MHz to 2452MHz for IEEE 802.11n(HT40)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20) 7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna:	PCB Antenna, gain is 4.0dBi

1.3 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2020)
ANSI C63.10 (2013)
KDB 558074 (v05r02)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Software name	Manufacturer	Version	Supplied by
Wifi Tool	-	-	Client

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	802.11b	2412	2437	2462
	802.11g	2412	2437	2462
	802.11n(HT20)	2412	2437	2462
	802.11n(HT40)	2422	2437	2452

Data rate and Power setting:
The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rata as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate	Power Setting
2400-2483.5	802.11b	1Mbps	13C
	802.11g	6Mbps	13C
	802.11n(HT20)	MCS0	13C
	802.11n(HT40)	MCS0	13C

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	Mouse	Dell	-

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	21°C	52% RH
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Occupied bandwidth		
Radiated Emissions in restricted frequency bands	22°C	53% RH
Power line conducted emission	21°C	53% RH

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2023-07-08
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2022-11-09
☒	Shielded room	Zhongyu	-	EC 2838	2023-01-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2022-10-19
☒	Bilog Antenna	TESEQ	CBL 6112B	EC 6411	2023-08-05
☒	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2023-06-09
☒	Horn antenna	R&S	HF 906	EC 3049	2023-05-21
☒	Semi-anechoic chamber	Albatross	-	EC 3048	2023-08-21
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2023-03-24
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3442	2023-01-04

2.7 Measurement uncertainty

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

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

3 Radiated Emissions in restricted frequency bands

Test result: **Pass**

3.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

3.2 Measurement Procedure

The EUT was tested according to Subclause 11.12 of ANSI C63.10.

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

TEST REPORT

For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

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

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

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

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

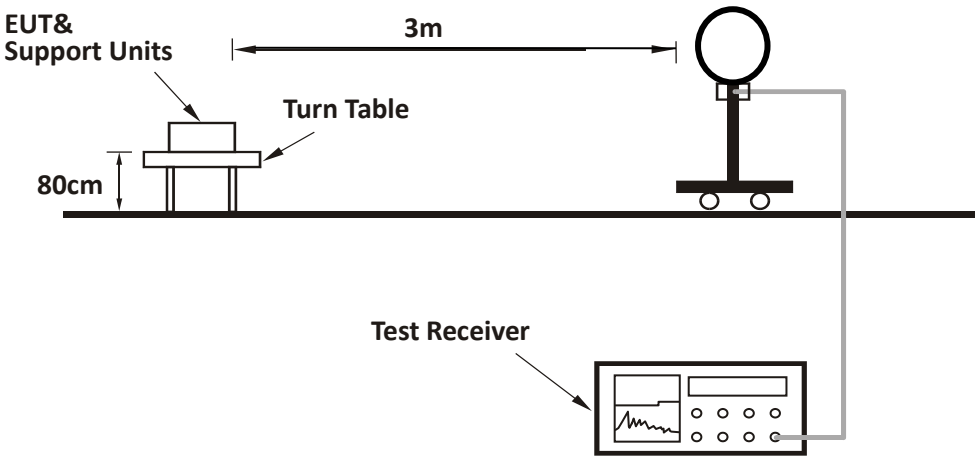
f) The test-receiver system was set to peak and average detector function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

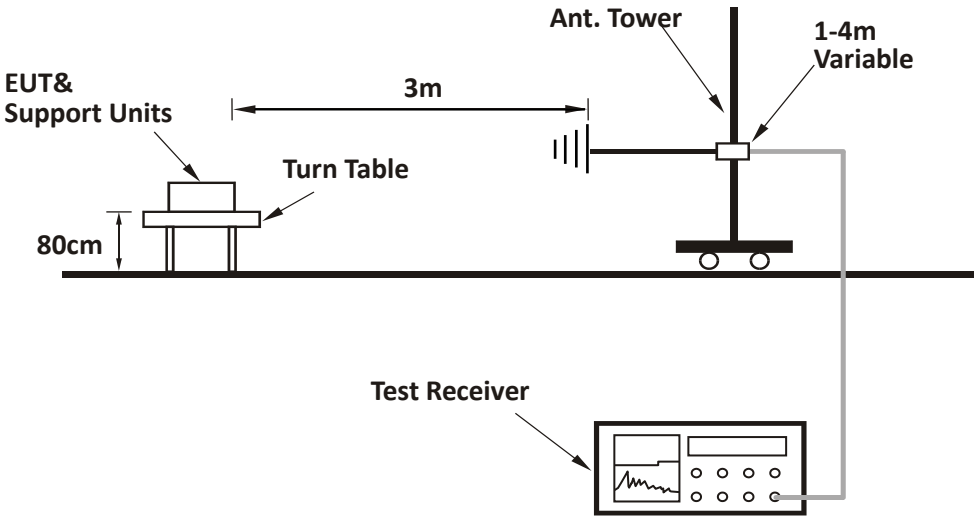
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions were reported.

3.3 Test Configuration

For Radiated emission below 30MHz:

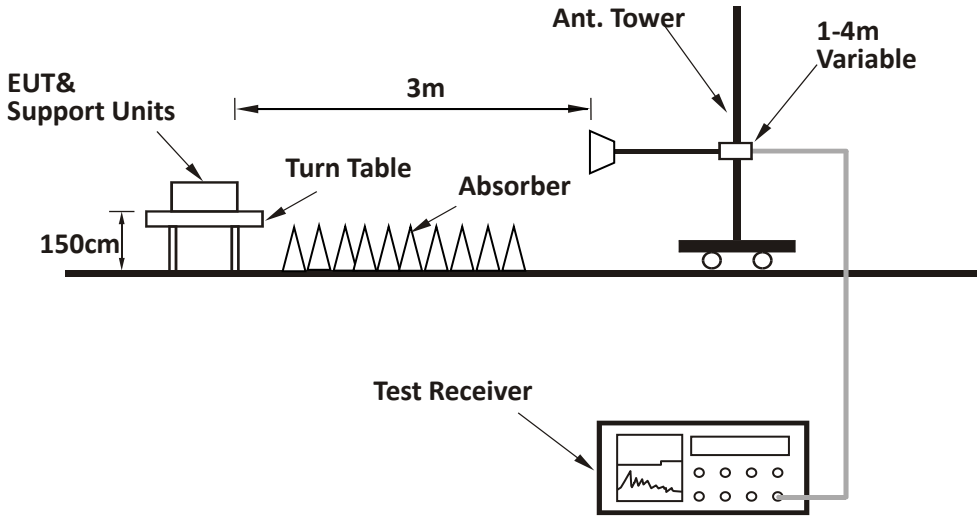


For Radiated emission 30MHz to 1GHz:



TEST REPORT

For Radiated emission above 1GHz:



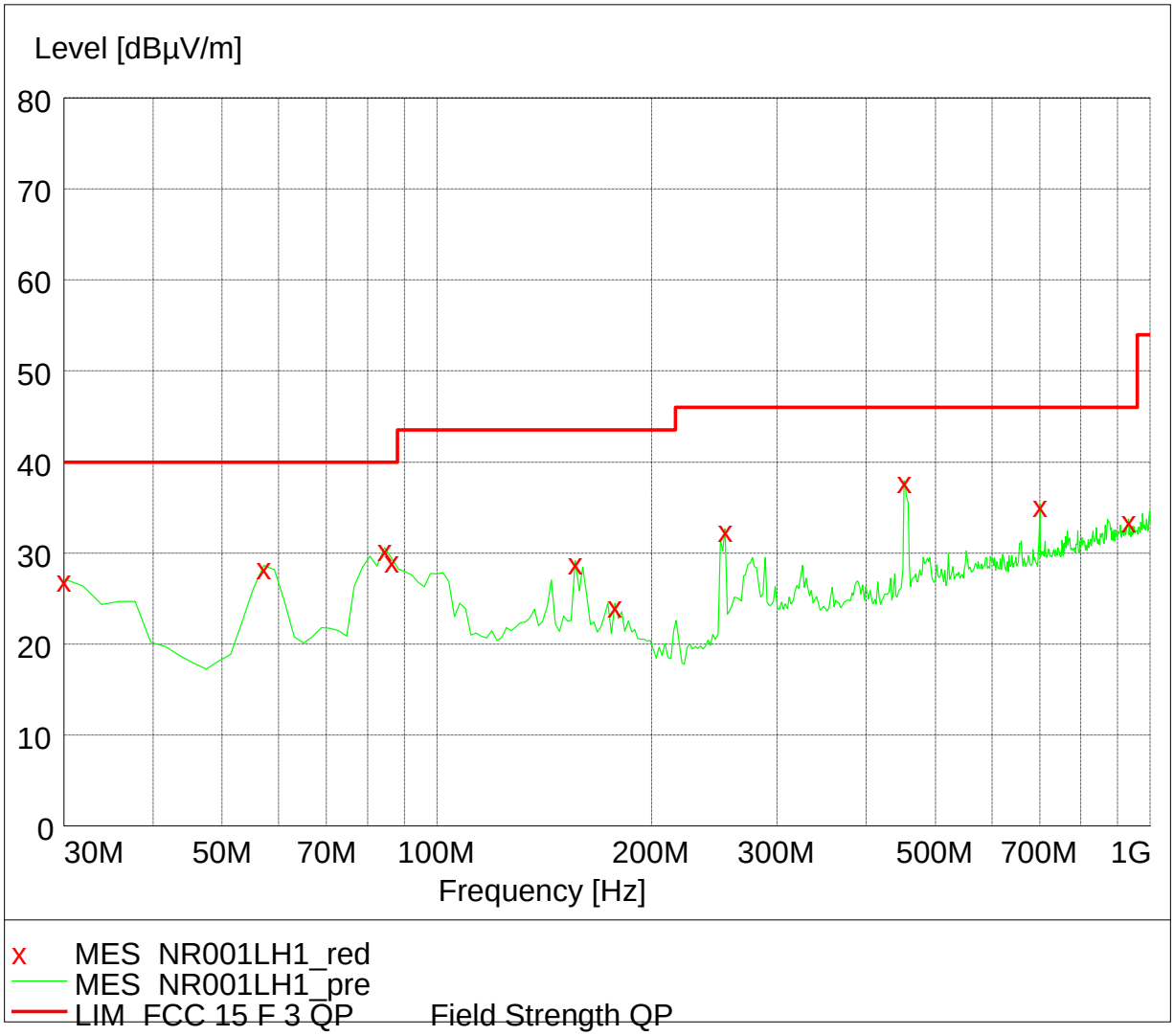
TEST REPORT

3.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

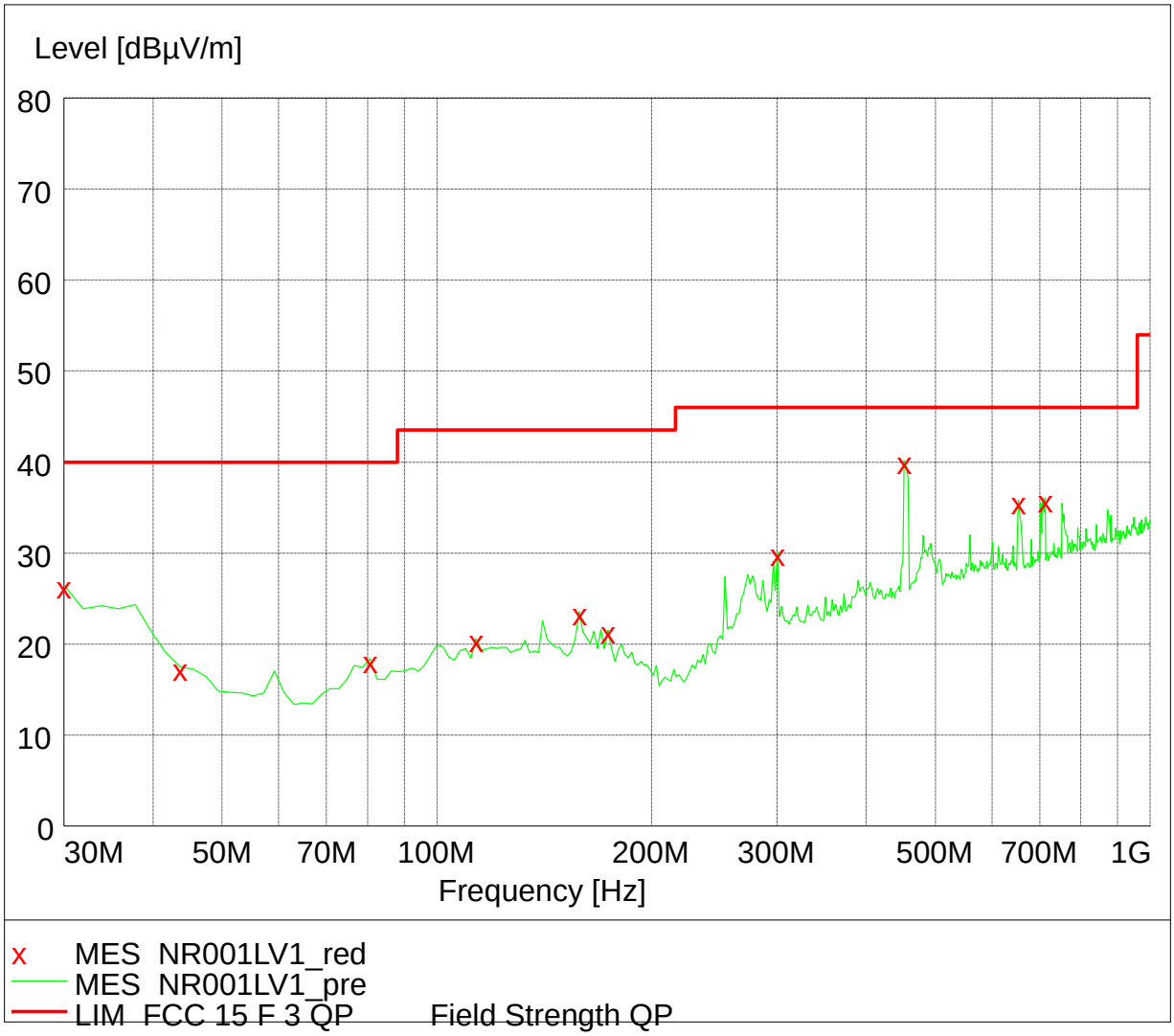
Test data below 1GHz
Charging mode:

H



TEST REPORT

V



TEST REPORT

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	57.21	28.60	40.00	11.40	PK
H	84.43	30.60	40.00	9.40	PK
H	86.37	29.40	40.00	10.60	PK
H	451.82	38.00	46.00	8.00	PK
H	700.64	35.40	46.00	10.60	PK
H	931.96	33.70	46.00	12.30	PK
V	30.00	26.50	40.00	13.50	PK
V	158.30	23.60	43.50	19.90	PK
V	300.20	30.10	46.00	15.90	PK
V	451.82	40.20	46.00	5.80	PK
V	653.99	35.80	46.00	10.20	PK
V	712.30	36.00	46.00	10.00	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

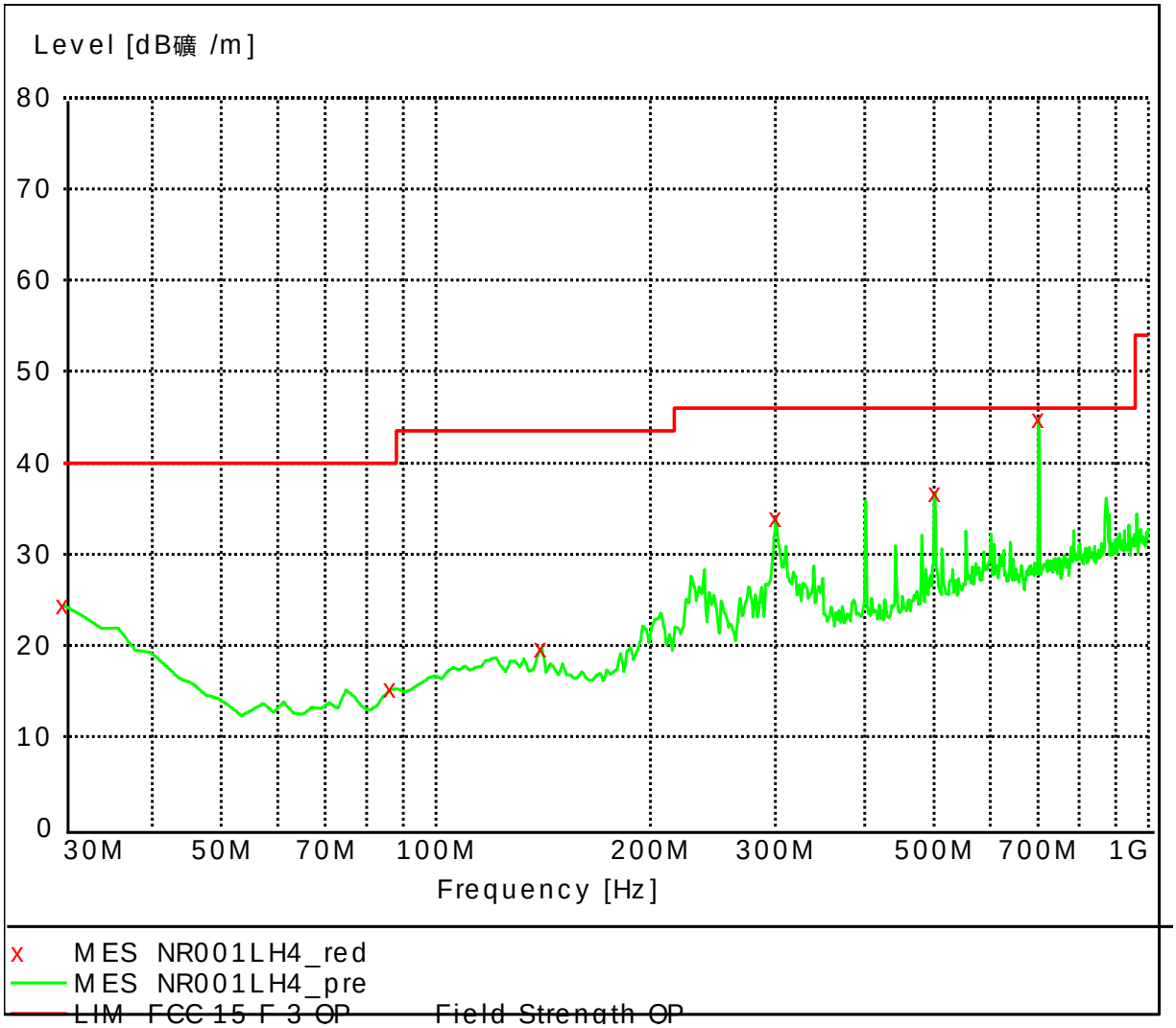
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

TEST REPORT

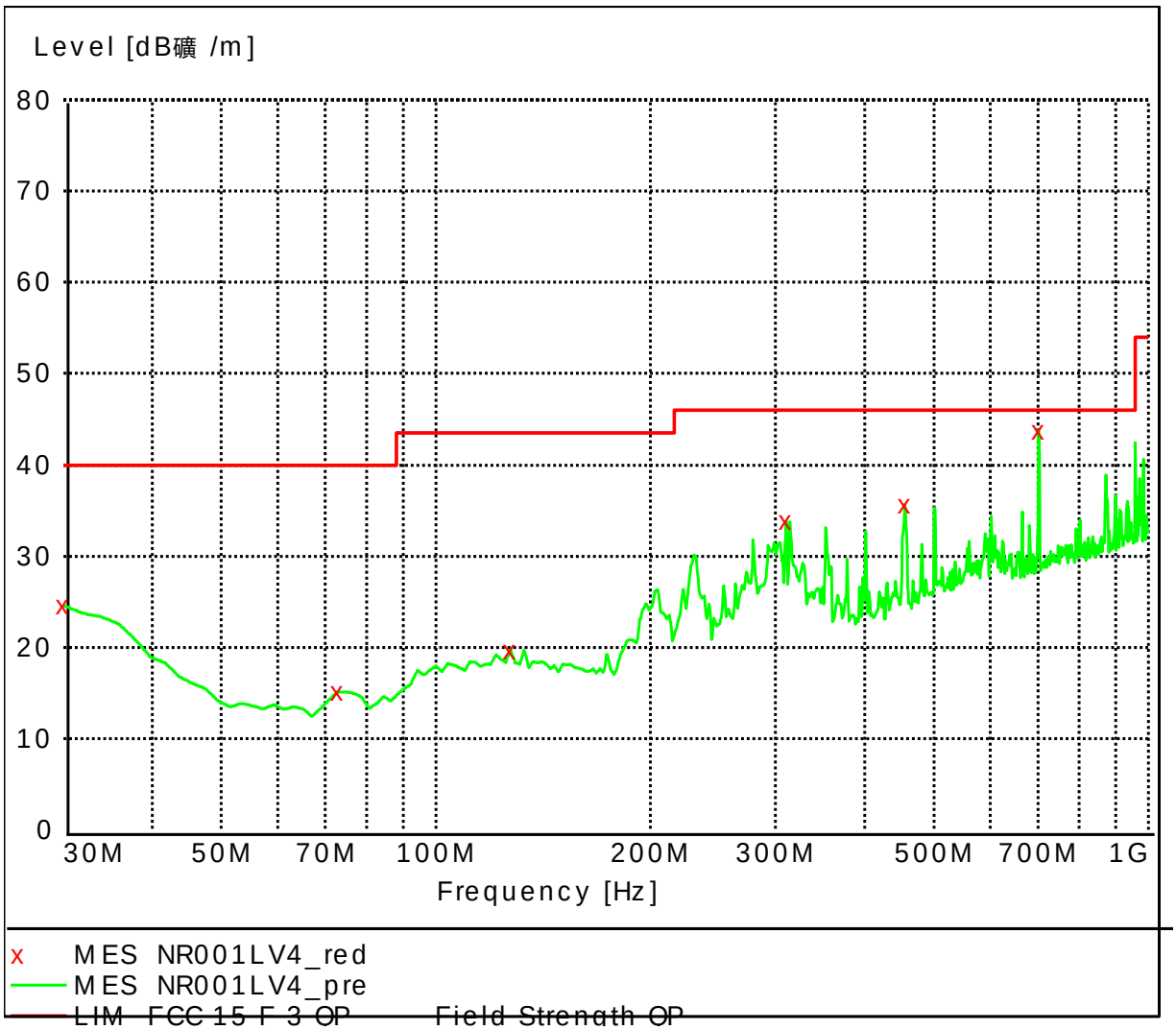
Working mode:

H



TEST REPORT

V



TEST REPORT

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	24.40	21.40	40.00	PK
H	86.37	15.20	10.20	40.00	PK
H	140.80	19.70	12.90	43.50	PK
H	300.20	34.00	15.70	46.00	PK
H	502.36	36.70	20.40	46.00	PK
H	702.59	44.80	22.60	46.00	PK
V	30.00	24.60	21.40	40.00	PK
V	72.77	15.10	8.30	40.00	PK
V	127.19	19.70	13.70	43.50	PK
V	309.92	33.90	16.00	46.00	PK
V	455.71	35.70	19.50	46.00	PK
V	702.59	43.80	22.60	46.00	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

TEST REPORT

Test result above 1GHz:
The emission was conducted from 1GHz to 25GHz

We test all modes and list the worst case data(B mode) below:

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2412	98.90	Fundamental	/	PK
	H	2390	51.10	74.00	22.90	PK
	H	4824	52.40	74.00	21.60	PK
M	H	2437	99.00	Fundamental	/	PK
	H	4874	40.30	74.00	33.70	PK
H	H	2462	98.40	Fundamental	/	PK
	H	2483.5	52.40	74.00	21.60	PK
	H	4924	52.80	74.00	21.20	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

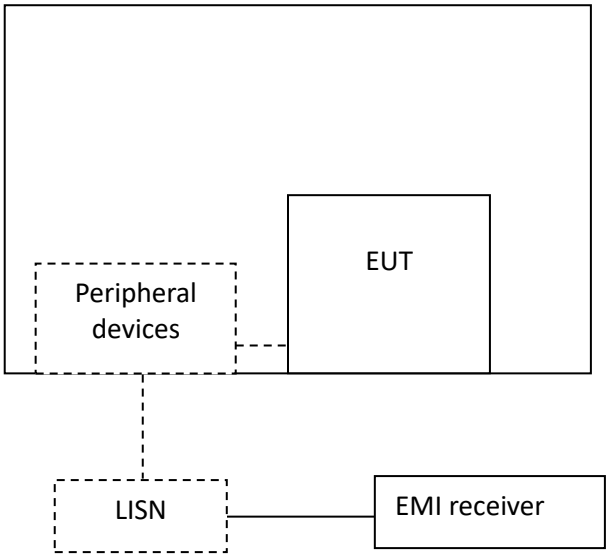
4 Power line conducted emission

Test result: **Pass**

4.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

4.2 Test Configuration



4.3 Measurement Procedure

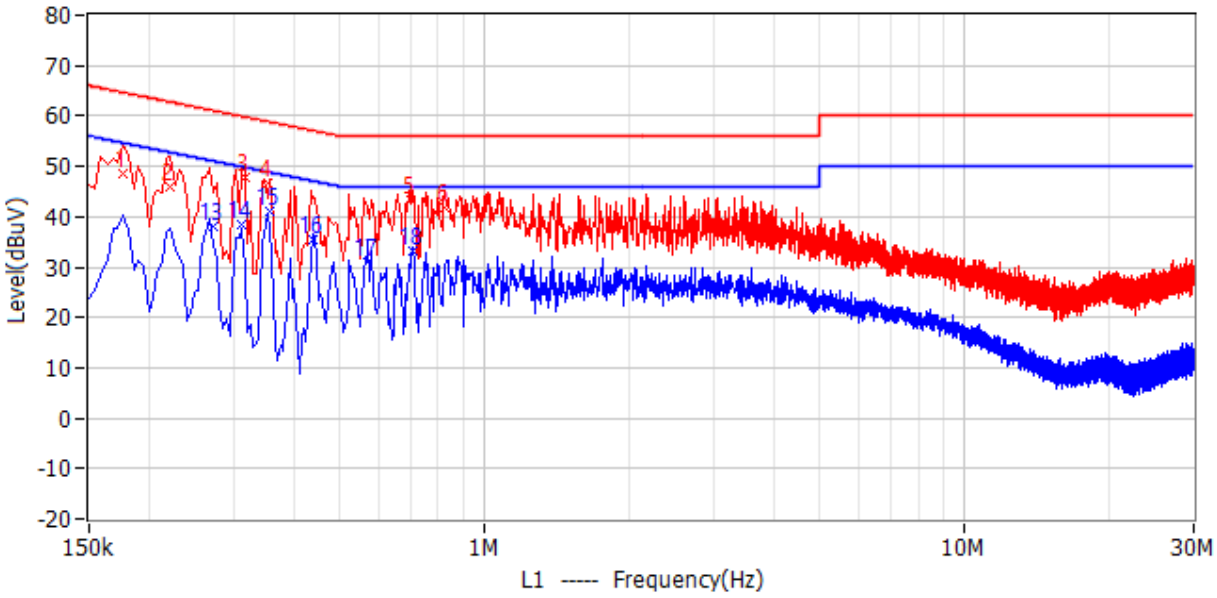
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

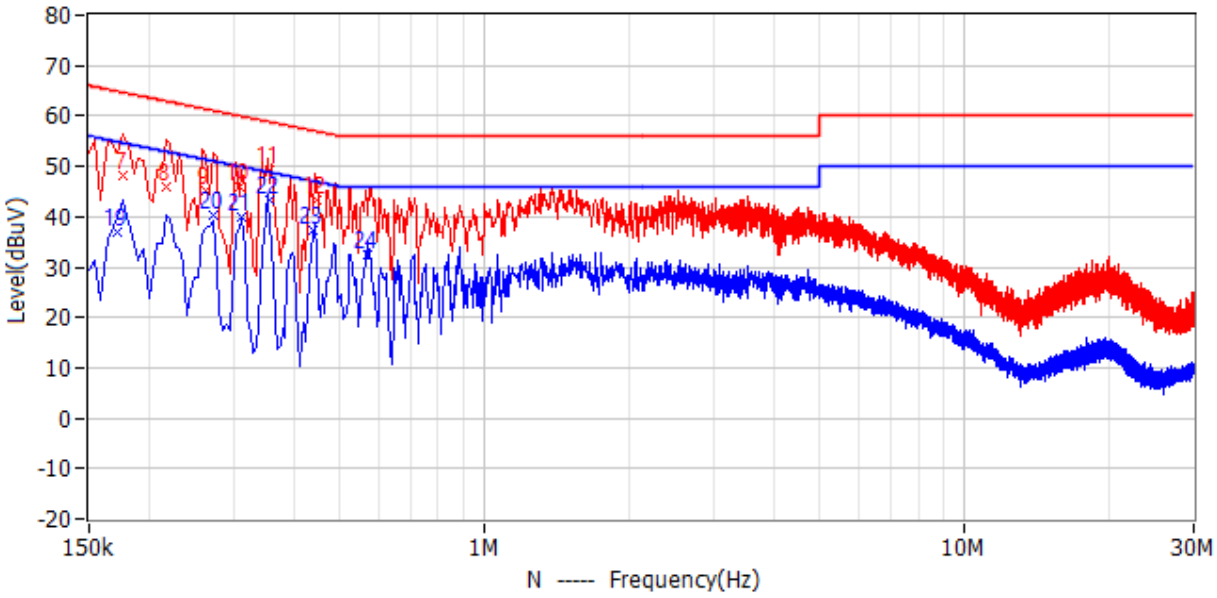
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

4.4 Test Results of Power line conducted emission

L Line





TEST REPORT

No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	177.000kHz	64.6	48.4	-16.2	42.3	6.1	QP	L1
2	222.000kHz	62.7	45.9	-16.9	39.7	6.2	QP	L1
3	316.500kHz	59.8	47.8	-12.0	41.6	6.2	QP	L1
4	352.500kHz	58.9	46.7	-12.2	40.5	6.2	QP	L1
5	703.500kHz	56.0	43.3	-12.7	37.1	6.2	QP	L1
6	829.500kHz	56.0	41.8	-14.2	35.6	6.2	QP	L1
7	177.000kHz	64.6	48.1	-16.5	41.9	6.2	QP	N
8	217.500kHz	62.9	45.9	-17.0	39.6	6.3	QP	N
9	262.500kHz	61.4	45.1	-16.2	38.9	6.2	QP	N
10	307.500kHz	60.0	45.8	-14.2	39.6	6.2	QP	N
11	357.000kHz	58.8	49.2	-9.6	43.0	6.2	QP	N
12	447.000kHz	56.9	43.2	-13.8	36.9	6.3	QP	N
13	271.500kHz	51.1	38.2	-12.9	32.0	6.2	CAV	L1
14	312.000kHz	49.9	38.5	-11.4	32.3	6.2	CAV	L1
15	357.000kHz	48.8	41.2	-7.6	35.0	6.2	CAV	L1
16	438.000kHz	47.1	35.6	-11.5	29.4	6.2	CAV	L1
17	568.500kHz	46.0	30.8	-15.2	24.6	6.2	CAV	L1
18	708.000kHz	46.0	33.3	-12.7	27.1	6.2	CAV	L1
19	172.500kHz	54.8	37.1	-17.7	30.9	6.2	CAV	N
20	271.500kHz	51.1	40.3	-10.8	34.1	6.2	CAV	N
21	312.000kHz	49.9	40.0	-10.0	33.8	6.2	CAV	N
22	357.000kHz	48.8	43.3	-5.5	37.1	6.2	CAV	N
23	438.000kHz	47.1	37.4	-9.7	31.1	6.3	CAV	N
24	573.000kHz	46.0	32.4	-13.6	26.1	6.3	CAV	N

Remark: 1. Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Level = Original Receiver Reading + Factor
3. Delta= Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Factor = 10.00 + 2.00 = 12.00dB;
Level = 10dBuV + 12.00dB = 22.00dBuV;
Delta = 22.00dBuV - 66.00dBuV = –44.00dB.

********** END **********