FCC TEST REPORT
FCC ID:2BNFE-R-20

For

Receiver

Model: R-20, R-10

Prepared for: KPNP CO., LTD.
#1805, 19,Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea

Prepared by: Shenzhen NCT Testing Technology Co., Ltd.
B2A101, B2A201, B2A202, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, China

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Report Number：NCT25014135E1-1
Date of Test：Dec. 24, 2024 - Jan. 05, 2025
Date of Issue：Jan. 05, 2025

Tested By:	Reported By:	Reviewed By:
Shine Wu	Keven Wu	Henry Wang

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from NCT Testing Technology

Table of contents

1.0 General Information

1.1 Client Information

Application:	KPNP CO., LTD.
Address of Application:	#1805, 19,Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea
Manufacturer:	KPNP CO., LTD.
Address of Manufacturer:	#1805, 19,Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea

1.2 General Description of E.U.T.

Product Name:	Receiver
Model:	R-20
Additional Model:	R-10
Trade Mark:	N/A
Power Supply:	Input: 5 V⎓0.5 A
Memo:	According client required
Model Difference:	R-20 is tested model, other models are derivative models . The models are identical in circuit, only different on the model names. So the test data of R-20 can represent the remaining models.
Remark:	N/A

1.3 Test Facility:

Site Description:	
EMC Lab.:	Accredited by CNAS, 2022-09-27 The certificate is valid until 2028.01.07 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017) The Certificate Registration Number is L8251 Designation Number: CN1347 Test Firm Registration Number: 894804 Accredited by A2LA, June 14, 2023 The Certificate Registration Number is 6837.01 Accredited by Industry Canada, November 09, 2018 The Conformity Assessment Body Identifier is CN0150 Company Number: 30806
Name of Test Lab:	Shenzhen NCT Testing Technology Co., Ltd.
Address of Test Lab:	B2A101, B2A201, B2A202, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, China.
Telephone:	+86-400-8868-419

1.4 Version:

Report No.	Version	Description	Approved
NCT25014135E1-1	Rev.01	Initial issue of report	Jan.10,2025

2.0 List of Measurement Equipment					
Conducted emission					
Name	**Model No.**	**Serial No.**	**Manufacturer**	**Date of Cal.**	**Due Date**
EMI Test Receiver	ESPI	101604	RS	2024/6/17	2025/6/16
LISN	ENV 216	102796	RS	2024/6/17	2025/6/16
LISN	VN1-13S	004023	CRANAGE	2024/6/17	2025/6/16

Radiated emission					
Name	**Model No.**	**Serial No.**	**Manufacturer**	**Date of Cal.**	**Due Date**
EMI Test Receiver	ESCI	101178	RS	2024/6/17	2025/6/16
Spectrum Analyzer	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
Amplifi（30MHz-1GHz）	BBV 9743 B	00374	SCHNWARZBECK	2024/6/17	2025/6/16
Bilog Antenna（30MHz-1GHz）	VULB9162	00473	SCHNWARZBECK	2023/3/19	2025/3/18
Horn antenna（1GHz-18GHz）	BBHA 9120 D	02622	SCHNWARZBECK	2023/3/19	2025/3/18
Pream plifier（1GHz-18GHz）	BBV 9718D	0024	SCHNWARZBECK	2024/6/17	2025/6/16
Spectrum Analyze（10Hz-40GHz）	FSV 40	100952	Rohde & Schwarz	2024/6/17	2025/6/16
Pream plifier（18GHz-40GHz）	BBV 9721	0056	SCHNWARZBECK	2024/6/17	2025/6/16
Double Ridge Guide Horn Antenna（18GHz-40GHz）	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Cable	DA800-4000MM	NA	DA	2024/6/17	2025/6/16
Cable	DA800-11000MM	NA	DA	2024/6/17	2025/6/16
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNWARZBECK	2024/6/17	2025/6/16
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	CHNWARZBECK	2024/6/17	2025/6/16

3.0 Technical Details

3.1 Investigations Requested

Perform Electromagnetic Interference [EMI] tests for FCC Requirement.

3.2 Test Standards

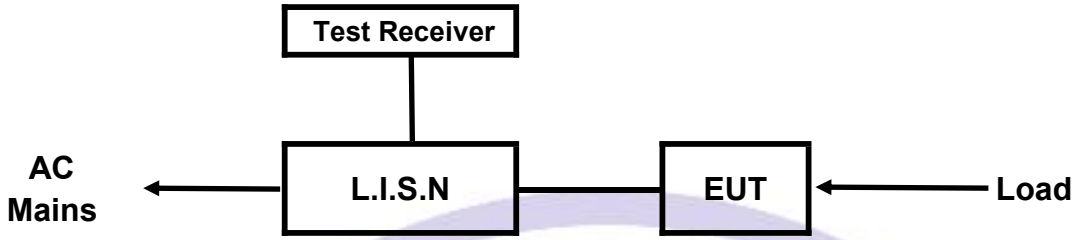
FCC Part 15 Subpart B

3.3 Measurement Uncertainty（95% confidence levels, k=2)

No.	Item	MU
1.	Temperature	±0.1℃
2.	Humidity	±1.0%
3.	Spurious emissions, conducted	±3.24dB
4.	All emissions, radiated	±5.03dB

4.0 Power Line Conducted Emission Test

4.1 Schematics of the test



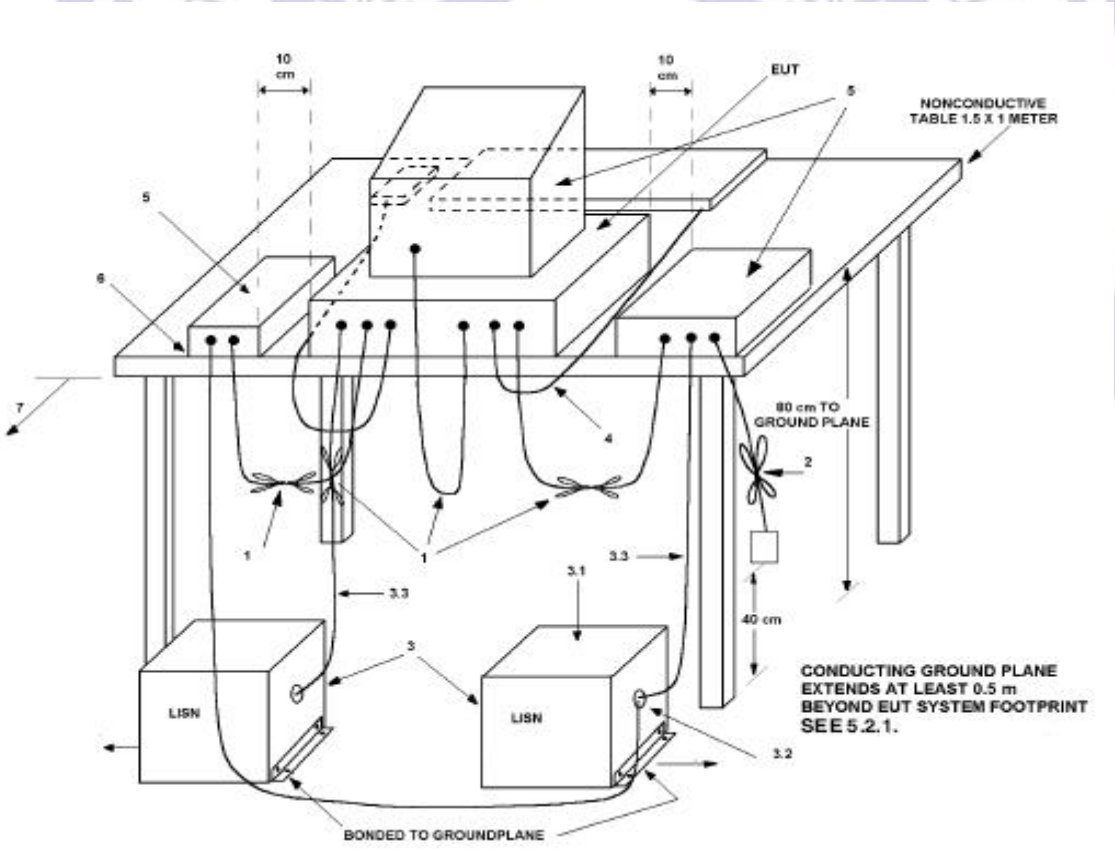
EUT: Equipment Under Test

4.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014.The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2014.

Test Voltage: 120V~, 60HZ

Block diagram of Test setup



4.3 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

1) Setup the EUT and simulators as shown on the following

2) Enable AF signal and confirm EUT active to normal condition

4.4 Test Equipment

Please refer to the Section 2

4.5 Power line conducted Emission Limit

Frequency(MHz)	Class A Limits (dBμV)		Class B Limits (dBμV)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

4.6 Photo documentation of the test set-up

Please refer to the Section 7

4.7 Test specification:

Environmental conditions:

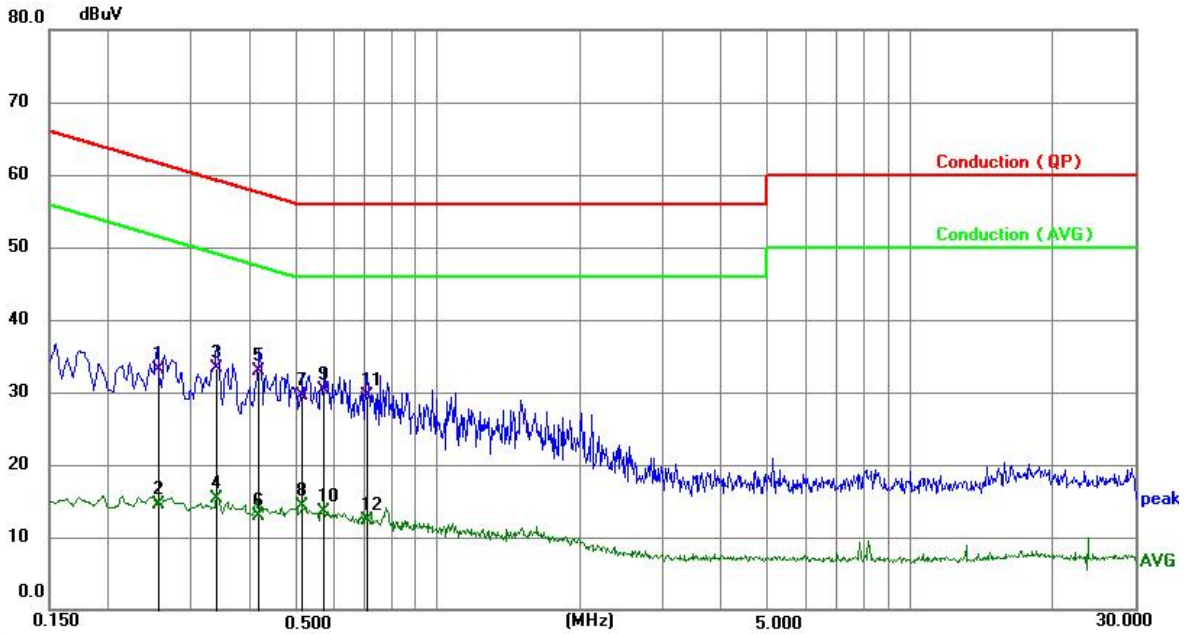
Temperature:26° C Humidity: 56% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

4.8 Test result Pass

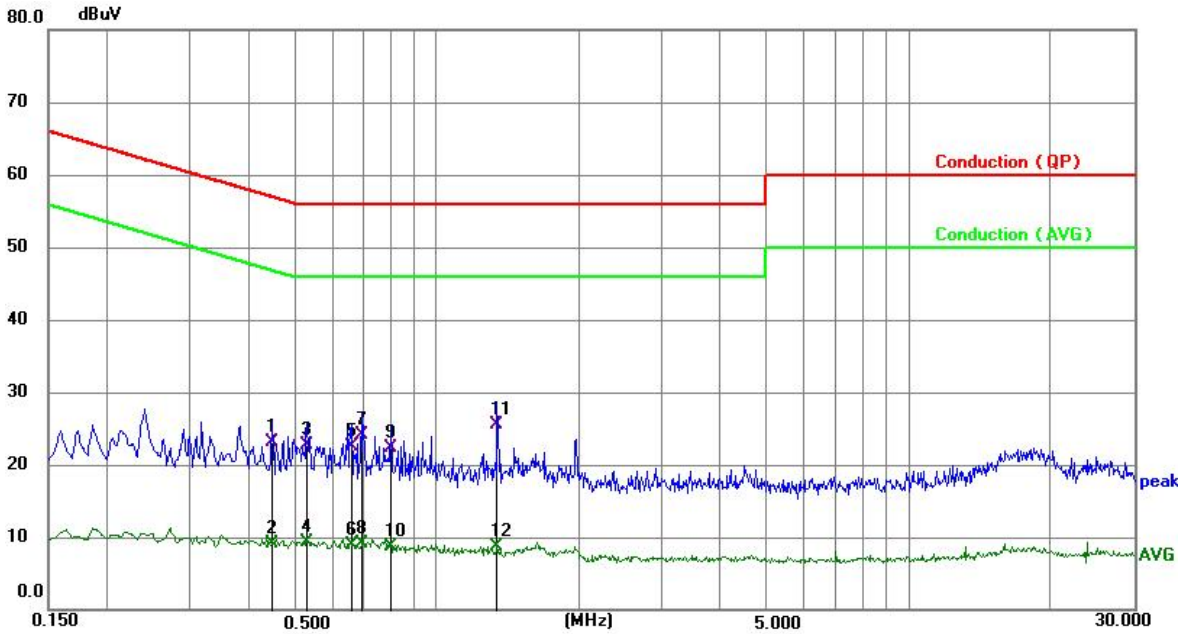
Remarks: According to the FCC Part 15 Subpart B

A Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2535	23.21	9.93	33.14	61.64	-28.50	QP
2	0.2535	4.62	9.93	14.55	51.64	-37.09	AVG
3	0.3390	23.32	9.96	33.28	59.23	-25.95	QP
4	0.3390	5.35	9.96	15.31	49.23	-33.92	AVG
5 *	0.4155	22.89	9.99	32.88	57.54	-24.66	QP
6	0.4155	2.83	9.99	12.82	47.54	-34.72	AVG
7	0.5144	19.55	10.02	29.57	56.00	-26.43	QP
8	0.5144	4.36	10.02	14.38	46.00	-31.62	AVG
9	0.5730	20.28	10.03	30.31	56.00	-25.69	QP
10	0.5730	3.38	10.03	13.41	46.00	-32.59	AVG
11	0.7080	19.37	10.04	29.41	56.00	-26.59	QP
12	0.7080	2.31	10.04	12.35	46.00	-33.65	AVG

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.4470	13.13	10.00	23.13	56.93	-33.80	QP
2	0.4470	-0.86	10.00	9.14	46.93	-37.79	AVG
3	0.5280	12.72	10.02	22.74	56.00	-33.26	QP
4	0.5280	-0.70	10.02	9.32	46.00	-36.68	AVG
5	0.6584	12.39	10.03	22.42	56.00	-33.58	QP
6	0.6584	-1.07	10.03	8.96	46.00	-37.04	AVG
7	0.6900	14.09	10.04	24.13	56.00	-31.87	QP
8	0.6900	-0.86	10.04	9.18	46.00	-36.82	AVG
9	0.7980	12.30	10.04	22.34	56.00	-33.66	QP
10	0.7980	-1.24	10.04	8.80	46.00	-37.20	AVG
11 *	1.3425	15.37	10.07	25.44	56.00	-30.56	QP
12	1.3425	-1.31	10.07	8.76	46.00	-37.24	AVG

5.0 Radiated Emission Test

5.1 Test Method and test Procedure:

1) The EUT was tested according to ANSI C63.4 –2014.

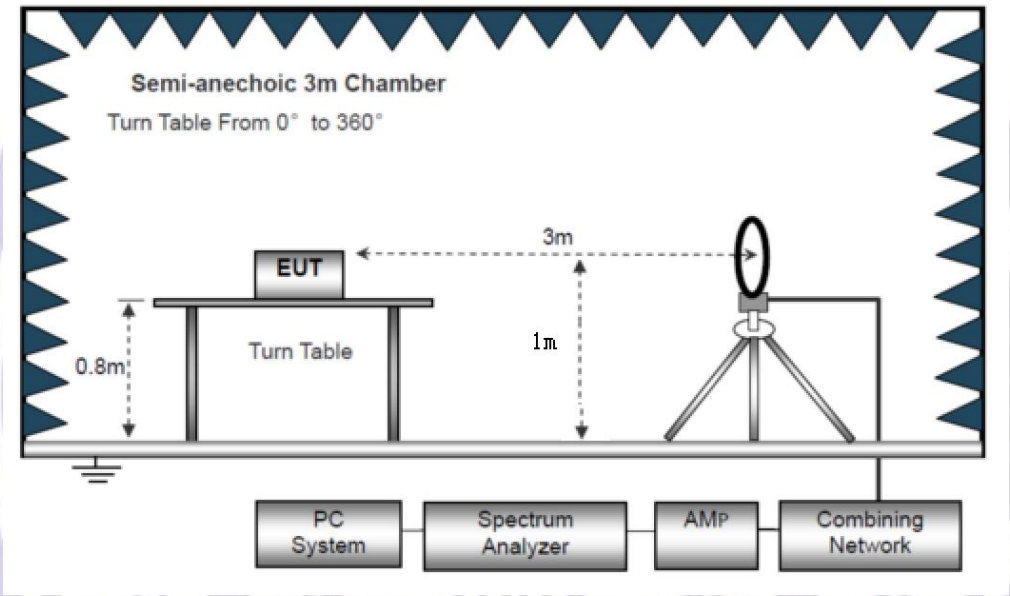
2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2014.

3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.

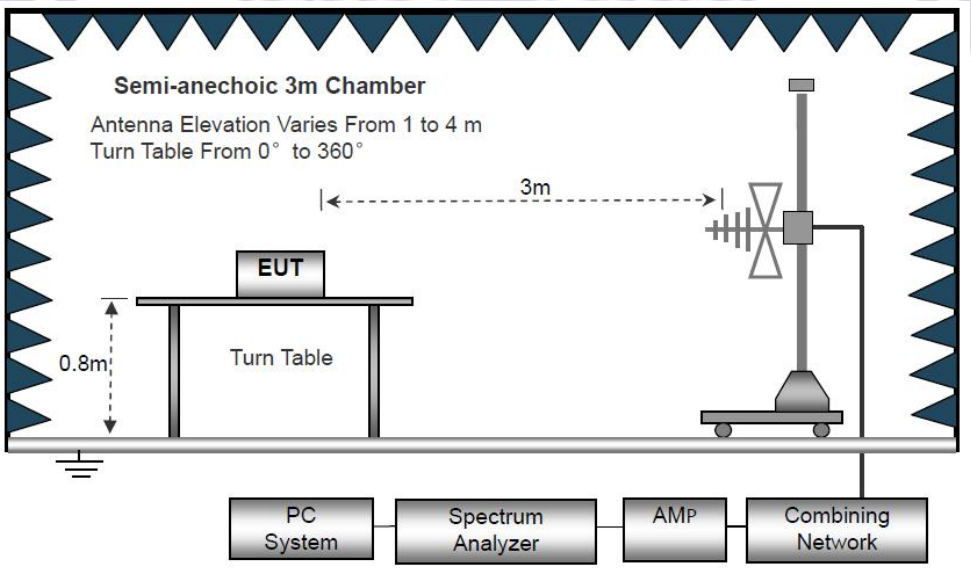
4) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup

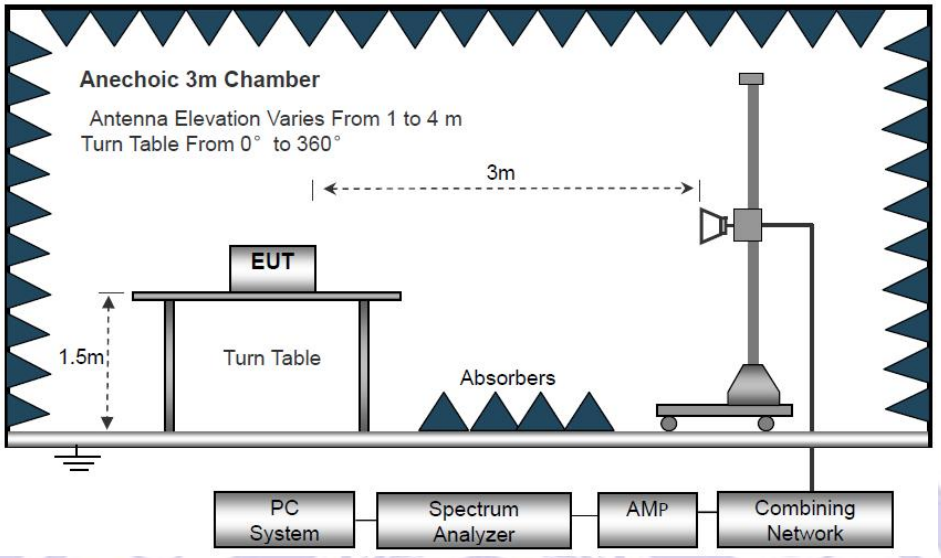
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



5.2 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

5.3 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequency Range (MHz)	Distance (m)	Field strength (dBμV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1) The frequency spectrum from 30MHz to 6GHz was investigated. All reading from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120KHz.
For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector.
AV value with RBW=1MHz, VBW=10Hz and PK.

2) Measurements were made at 3 meters.

3) If measurement is not made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

5.4 Photo documentation of the test set-up

Please refer to the Section 7

5.5 Test Equipment:

Please refer to the Section 2

5.6 Test specification:

Environmental conditions:

Temperature: 26° C Humidity: 56% Atmospheric pressure: 103kPa

5.7 Test result Pass

Remarks: According to the FCC Part 15 Subpart B

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
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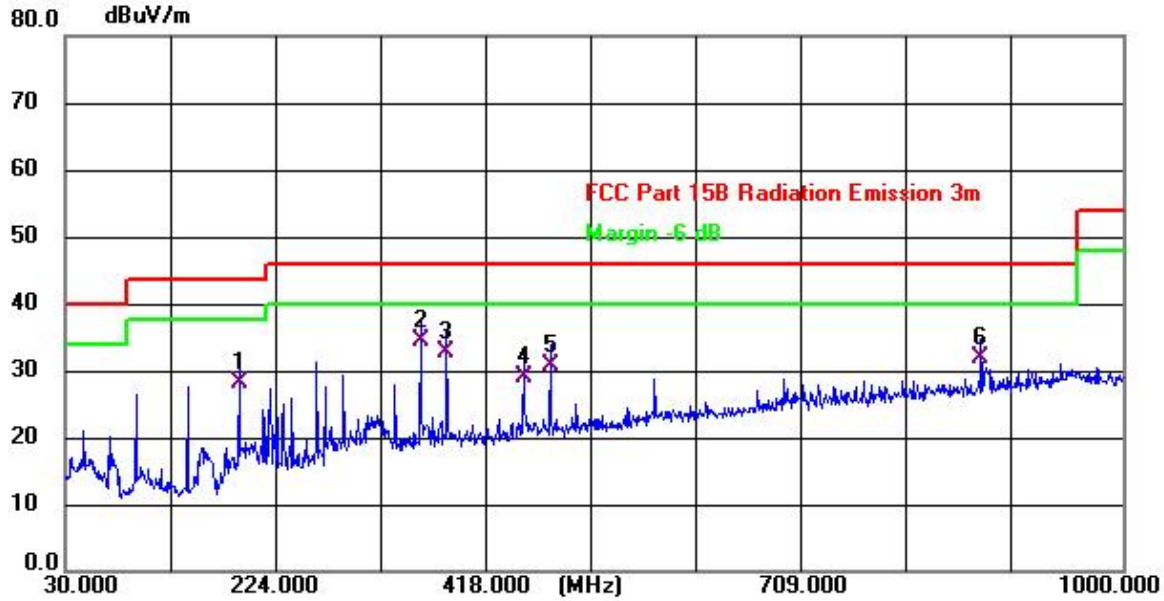
Note:

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 =40log(Specific distance/ test distance)(dB);

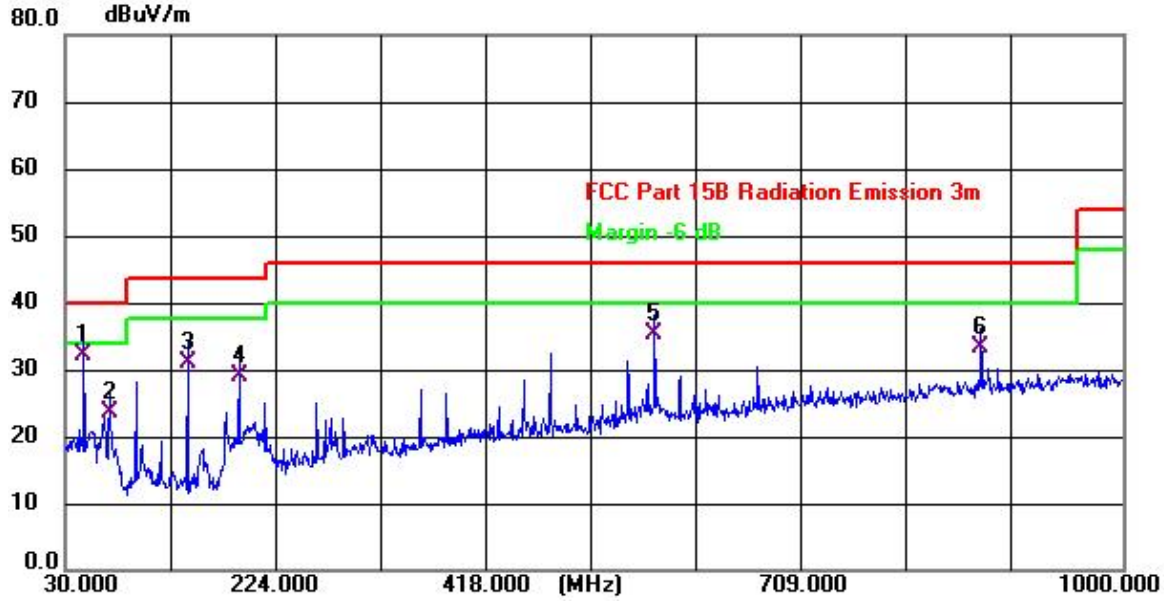
Limit line=Specific limits(dBuV) + distance extrapolation factor.

A. Radiated Emission In Horizontal (30MHz----1000MHz)



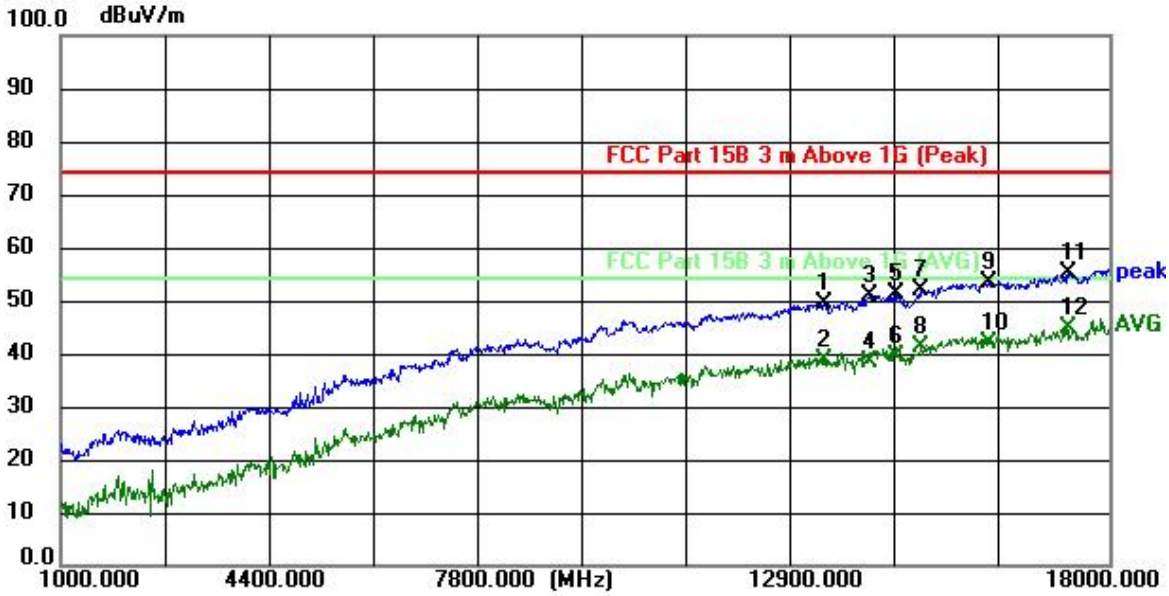
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	190.050	39.86	-11.72	28.14	43.50	-15.36	QP
2 *	355.920	41.21	-6.87	34.34	46.00	-11.66	QP
3	380.170	39.16	-6.31	32.85	46.00	-13.15	QP
4	450.980	33.79	-4.93	28.86	46.00	-17.14	QP
5	475.230	35.34	-4.50	30.84	46.00	-15.16	QP
6	870.020	29.71	2.08	31.79	46.00	-14.21	QP

B. Radiated Emission In Vertical (30MHz----1000MHz)



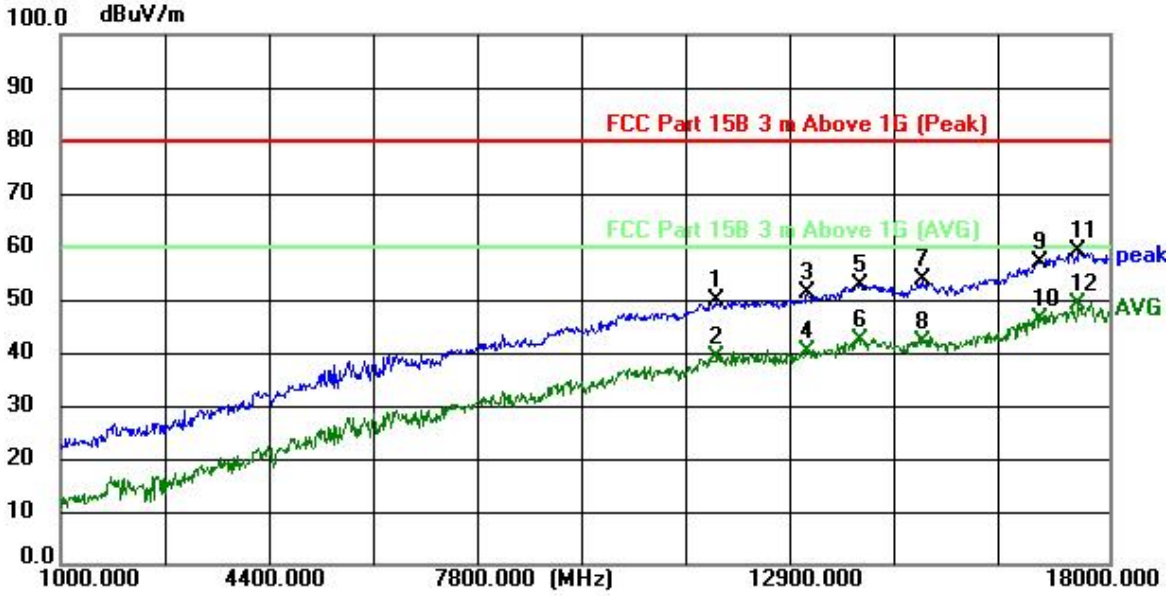
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	47.460	41.61	-9.45	32.16	40.00	-7.84	QP
2	70.740	36.89	-13.31	23.58	40.00	-16.42	QP
3	142.520	44.77	-13.74	31.03	43.50	-12.47	QP
4	190.050	40.77	-11.72	29.05	43.50	-14.45	QP
5	570.290	37.93	-2.72	35.21	46.00	-10.79	QP
6	870.020	31.16	2.08	33.24	46.00	-12.76	QP

A. Radiated Emission In Horizontal (1000MHz----18000MHz)



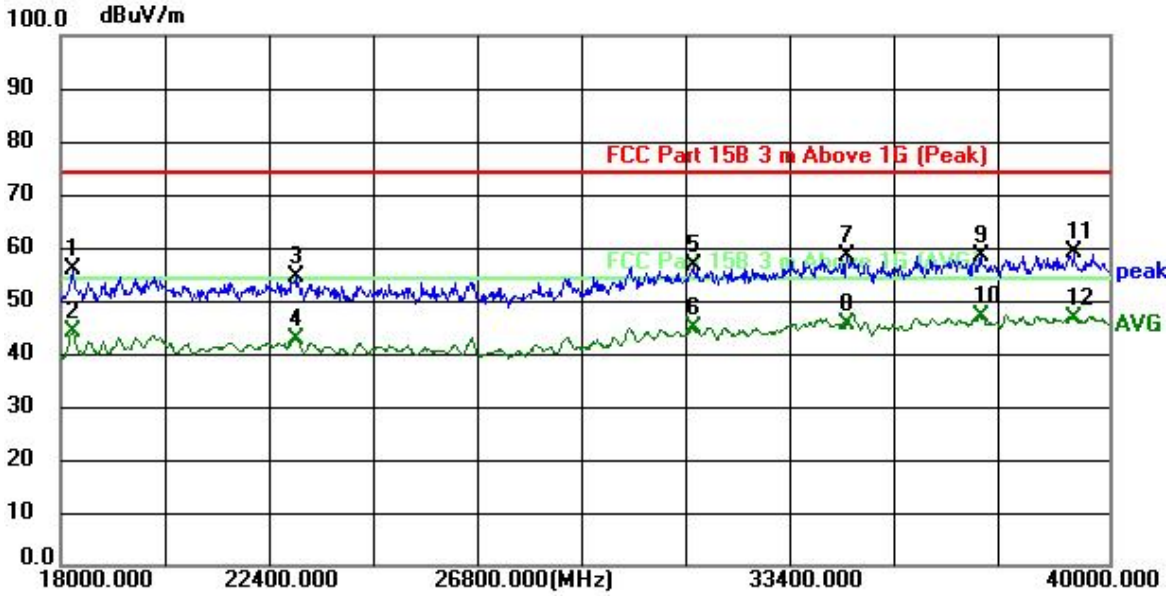
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13388.388	32.91	16.55	49.46	74.00	-24.54	peak
2	13388.388	22.30	16.55	38.85	54.00	-15.15	AVG
3	14103.103	34.93	15.98	50.91	74.00	-23.09	peak
4	14103.103	22.53	15.98	38.51	54.00	-15.49	AVG
5	14562.563	35.57	15.60	51.17	74.00	-22.83	peak
6	14562.563	23.75	15.60	39.35	54.00	-14.65	AVG
7	14953.954	36.68	15.29	51.97	74.00	-22.03	peak
8	14953.954	25.97	15.29	41.26	54.00	-12.74	AVG
9	16060.060	34.93	18.43	53.36	74.00	-20.64	peak
10	16060.060	23.62	18.43	42.05	54.00	-11.95	AVG
11	17336.336	32.77	22.27	55.04	74.00	-18.96	peak
12 *	17336.336	22.38	22.27	44.65	54.00	-9.35	AVG

B. Radiated Emission In Vertical (1000MHz----18000MHz)



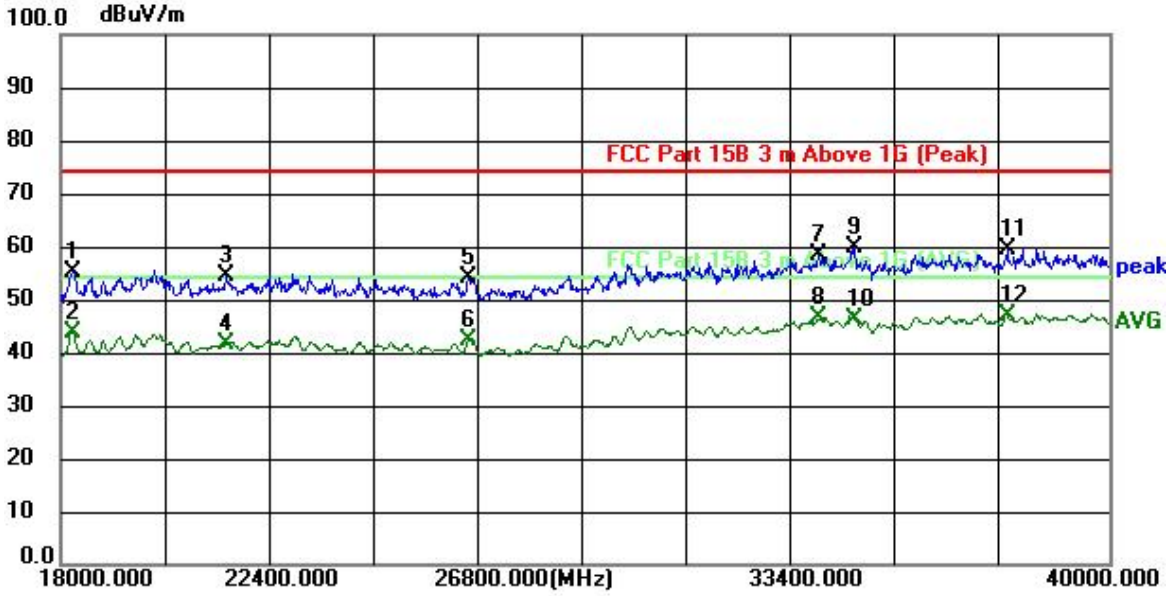
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	11642.000	34.02	15.67	49.69	80.00	-30.31	peak
2	11642.000	23.53	15.67	39.20	60.00	-20.80	AVG
3	13104.000	34.29	16.79	51.08	80.00	-28.92	peak
4	13104.000	23.48	16.79	40.27	60.00	-19.73	AVG
5	13954.000	36.68	16.10	52.78	80.00	-27.22	peak
6	13954.000	26.35	16.10	42.45	60.00	-17.55	AVG
7	14974.000	38.36	15.27	53.63	80.00	-26.37	peak
8	14974.000	26.72	15.27	41.99	60.00	-18.01	AVG
9	16878.000	36.19	20.88	57.07	80.00	-22.93	peak
10	16878.000	25.39	20.88	46.27	60.00	-13.73	AVG
11	17507.000	36.48	22.78	59.26	80.00	-20.74	peak
12 *	17507.000	26.29	22.78	49.07	60.00	-10.93	AVG

B. Radiated Emission In Horizontal (18000MHz----40000MHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	18242.000	54.89	0.90	55.79	74.00	-18.21	peak
2	18242.000	43.27	0.90	44.17	54.00	-9.83	AVG
3	22928.000	52.92	1.68	54.60	74.00	-19.40	peak
4	22928.000	41.10	1.68	42.78	54.00	-11.22	AVG
5	31266.000	52.97	3.60	56.57	74.00	-17.43	peak
6	31266.000	41.21	3.60	44.81	54.00	-9.19	AVG
7	34500.000	53.62	4.70	58.32	74.00	-15.68	peak
8	34500.000	40.95	4.70	45.65	54.00	-8.35	AVG
9	37316.000	54.37	4.11	58.48	74.00	-15.52	peak
10 *	37316.000	43.00	4.11	47.11	54.00	-6.89	AVG
11	39252.000	56.46	2.62	59.08	74.00	-14.92	peak
12	39252.000	44.06	2.62	46.68	54.00	-7.32	AVG

B. Radiated Emission In Vertical (18000MHz----40000MHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	18264.000	54.28	0.90	55.18	74.00	-18.82	peak
2	18264.000	42.93	0.90	43.83	54.00	-10.17	AVG
3	21476.000	52.90	1.44	54.34	74.00	-19.66	peak
4	21476.000	40.34	1.44	41.78	54.00	-12.22	AVG
5	26558.000	52.31	1.82	54.13	74.00	-19.87	peak
6	26558.000	40.41	1.82	42.23	54.00	-11.77	AVG
7	33906.000	53.73	4.53	58.26	74.00	-15.74	peak
8	33906.000	41.90	4.53	46.43	54.00	-7.57	AVG
9	34676.000	55.04	4.75	59.79	74.00	-14.21	peak
10	34676.000	41.62	4.75	46.37	54.00	-7.63	AVG
11	37866.000	55.67	3.69	59.36	74.00	-14.64	peak
12 *	37866.000	43.18	3.69	46.87	54.00	-7.13	AVG

6.0 FCC Label

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location: On the product body

7.0 Photos of testing

Please see the attachment for details.

8.0 Photos of the EUT

Please see the attachment for details.

--End of the report--