*Audix Technology Corp.*
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*New Taipei City244,Taiwan*
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# FCC 15.225 & RSS-210
# 13.56MHz Test Report

# for

# LG Electronics Inc.

# 222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do, 451-713, Korea

| | | |
|---|---|---|
| **Product Name** | **:** | **LG Cloud Device All-in-One Thin Client** |
| **Model Name** | **:** | **(1)24CN670N (2)24CN670W (3)24CN670NK (4)24CN670WK** |
| **Brand** | **:** | **LG** |
| **FCC ID** | **:** | **BEJNT-24CN670** |
| **IC** | **:** | **2703H-24CN670** |
| **Prepared by:** | **:** | **AUDIX Technology Corporation, EMC Department** |

Testing Laboratory
1724

The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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# TEST REPORT

| | | |
|---|---|---|
| Applicant | : | LG Electronics Inc. |
| Manufacturer | : | LG Electronics Inc. |
| Factory | : | LG Electronics Nanjing New Technology Co., Ltd. |
| EUT Description | | |
| (1) Product | : | LG Cloud Device All-in-One Thin Client |
| (2) Model | : | (1)24CN670N (2)24CN670W (3)24CN670NK (4)24CN670WK |
| (3) Brand | : | LG |
| (4) Power Supply | : | DC 19V, 6.32A |

Applicable Standards:

47CFRFCC Part 15 Subpart C
ANSI C63.10:2013
RSS-Gen (Issue 5), March 2019
RSS-210 (Issue 10), December 2019

***Audix Technology Corp.*** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
***Audix Technology Corp.*** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2020. 07. 27

Reviewed by: Annie Yu (Annie Yu/Administrator)

Approved by: Johnny Hsueh (Johnny Hsueh/Section Manager)

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# 1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Data | Revision Summary | Report Number |
|---|---|---|---|
| 0 | 2020. 07. 27 | Original Report | EM-F200323 |

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# 2. SUMMARY OF TEST RESULTS

| Rule | | Description | Results |
|---|---|---|---|
| FCC | IC | | |
| 15.207 | RSS-Gen §8.8 | Conducted Emission | **PASS** |
| 15.225(a)(b)(c) | RSS-210 §B.6 (a) | Radiation Emission (In-Band) | **PASS** |
| 15.225(d)/15.209 | RSS-Gen §8.9<br>RSS-210 §B.6 (a) | Radiation Emission (Out-Band) | **PASS** |
| 15.215 (c) | N/A | 20dB Bandwidth | **PASS** |
| 15.225(e) | RSS-210 §B.6 (b) | Frequency Stability Tolerance | **PASS** |
| Note: The uncertainties value is not used in determining the result. | | | |

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# 3. GENERAL INFORMATION

## 3.1. Description of Application

<table>
<tr><td>Applicant</td><td>LG Electronics Inc.<br>222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea.</td></tr>
<tr><td>Manufacturer</td><td>LG Electronics Inc.<br>222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea.</td></tr>
<tr><td>Factory</td><td>LG Electronics Nanjing New Technology Co., Ltd.<br>346, Yaoxin Road Economic & Technical Development Zone 210038 Nanjing PEOPLE'S REPUBLIC OF CHINA</td></tr>
<tr><td>Product</td><td>LG Cloud Device All-in-One Thin Client</td></tr>
<tr><td>Model</td><td>(1)24CN670N (2)24CN670W (3)24CN670NK (4)24CN670WK<br>The difference between models is as following, and the difference has no influence on RF function. The model 24CN670N was tested in this report.
<table>
<tr><td>Model / Difference</td><td>24CN670N</td><td>24CN670W</td><td>24CN670NK</td><td>24CN670WK</td></tr>
<tr><td>Windows OS</td><td>No</td><td>Yes</td><td>No</td><td>No</td></tr>
<tr><td>Packing Keyboard/Mouse</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td></tr>
<tr><td colspan="5">Note: The 4 models (24CN670N, 24CN670W, 24CN670NK, 24CN670WK) are for FCC ID application, and only 1 model (24CN670N) is for ISED application.</td></tr>
</table></td></tr>
<tr><td>Brand</td><td>LG</td></tr>
</table>

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## 3.2. Description of EUT

<table>
<tr><td>Test Model</td><td>24CN670N</td></tr>
<tr><td>Test Sample</td><td>
<table>
<tr><th>Sample No.</th><th>Test Item</th><th>Firmware</th></tr>
<tr><td>#1</td><td>AC Conduction</td><td>N/A</td></tr>
<tr><td>#1</td><td>RSE</td><td>N/A</td></tr>
<tr><td>#1</td><td>Conducted</td><td>N/A</td></tr>
</table>
</td></tr>
<tr><td>Serial Number</td><td>N/A</td></tr>
<tr><td>Power Rating</td><td>DC 19V, 6.32A</td></tr>
<tr><td>RF Features</td><td>RFID</td></tr>
<tr><td>Transmit Type</td><td>1T1R</td></tr>
<tr><td>Sample Status</td><td>Production</td></tr>
<tr><td>Date of Receipt</td><td>2020. 07. 09</td></tr>
<tr><td>Date of Test</td><td>2020. 07. 22 ~ 23</td></tr>
<tr><td>Interface Ports of EUT</td><td>Back View<br>• DP Out Port x1<br>• USB (Type C) Port x1<br>• USB 3.0 Port (DC 5V/0.9A) x4<br>• LAN Port x1<br>• SFP Port x1<br>• DC In Port x1<br>• HDMI In Port x1<br>• Audio In Port x1<br>Side View<br>• USB In 1 (DC 5V/0.5A) Port x1<br>• USB In 2 (DC 5V/0.5A) Port x1</td></tr>
<tr><td>Accessories Supplied</td><td>• AC Adapter<br>• USB Keyboard (Option)<br>• USB Mouse (Option)</td></tr>
</table>

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## 3.3. Antenna Information

| No. | Antenna Part Number | Manufacture | Antenna Type | Frequency (MHz) | Max Gain(dBi) |
|---|---|---|---|---|---|
| 1 | N/A | N/A | Loop | N/A | N/A |
| 2 | N/A | N/A | Loop | N/A | N/A |

## 3.4. EUT Specifications Assessed in Current Report

| Mode | Fundamental Range (MHz) | Channel Number | Modulation |
|---|---|---|---|
| RFID | 13.56 | 1 | ASK, FSK, PSK |
| | 0.125 | 1 | ASK, FSK, PSK |

## 3.5. Description of Key Components

| Item | Supplier | Model / Type | Character |
|---|---|---|---|
| System | Microsoft | Non OS | 27CN670W/ 27CN670WK<br>: Windows 10IoT LTSB |
| Main Board | LG | CL66 MB | --- |
| Control Board | LG | LM21F | --- |
| USB Board | PEGARTRON | USB CL66 | --- |
| CPU<br>(Socket: BGA1090) | Intel | J4105 | 1.50GHz |
| LCD Panel | LG Display | LM238WF1-SJM1 | 1920*1080 |
| Memory (RAM) | SAMSUNG | M471A5244CB0-CTD | 4GB DDR4 2666MHz |
| Integrated RFID Reader | RF IDeas | OEM-805N23KU | 125kHz<br>13.56MHz |
| RFID Antenna | RF IDeas | PCB-1101-03 | --- |
| WLAN Combo Card | Intel | 9560NGW | WLAN and BT, 2x2 PCIe M.2 2230 adapter card<br>FCC ID: PD99560NG<br>IC: 1000M-9560NG |
| WLAN Combo Antenna | LG | 27/34CL650 MAIN V2 | Manufacturer:<br>INPAQ TECHNOLOGY CO., LTD.<br>Main: Black, PIFA Type |
| | LG | 27/34CL650 AUX V2 | Manufacturer:<br>INPAQ TECHNOLOGY CO., LTD.<br>Aux: Gray, PIFA Type |
| USB Mouse | LG | SM-9023 | --- |
| USB Keyboard | LG | KB25C | --- |
| AC Adapter | LG | DA-120D19 | Manufacturer:<br>Asian Power Devices Inc.<br>I/P: AC 100-240V, 50-60Hz, 1.8-0.7A,<br>O/P: DC 19V, 6.32A |
| | AC Power Cord: Non-Shielded, Detached, 1.5m (3C) | | |

Remark: For more detailed features description, please refer to the manufacturer's specifications or the user manual.

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## 3.6. Test Configuration

| Item | | Test Frequency (MHz) |
|---|---|---|
| Radiated Test Case | Radiated Spurious Emission (In-Band) | 13.56 |
| | Radiated Spurious Emission (Out-Band) Note1 | 13.56 |
| Conducted Test Case | 20dB Bandwidth | 13.56 |
| | Frequency Stability | 13.56 |

Note 1:
■Mobile Device
□Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: □Lie □Side □Stand

## 3.7. Tested Supporting System List

### 3.7.1. Support Peripheral Unit

| No. | Product | Brand | Model No. | Serial No. | Approval |
|---|---|---|---|---|---|
| 1. | Notebook Computer | ASUS | E403SA | N/A | N/A |
| 2. | LCD Monitor | DELL | MS116C | CN-049PRO-CH40 0-8BM-06YI-A00 | FCC By DoC |
| 3. | Mobile Phone | ASUS | ZE620KL | N/A | N/A |
| 4. | USB Keyboard | LG | KB25C | N/A | FCC By DoC |
| 5. | USB Mouse | LG | SM-9023 | 68600009 | FCC By DoC |
| 6. | Earphone | LGITON | FS-99 | N/A | N/A |

### 3.7.2. Cable Lists

| No. | Cable Description Of The Above Support Units |
|---|---|
| 1. | HDMI Cable: Shielded, Detachable, 1.5m<br>Adapter: ASUS, M/N AD890526<br>DC Power Cord：Unshielded, Detachable, 2.0m |
| 2. | DP Cable: Shielded, Detachable, 1.5m<br>DC Power Cable: Unshielded, Detachable, 1.5 m<br>AC Power Cord: Unshielded, Detachable, 1.8m |
| 4. | USB Cable: Unshielded, Detachable, 3.0m+1.8m |
| 5. | USB Cable: Unshielded, Detachable, 1.5m |
| 6. | USB Cable: Unshielded, Detachable, 1.8m |
| 7. | Earphone Cable: Unshielded, Detachable, 1.2m |

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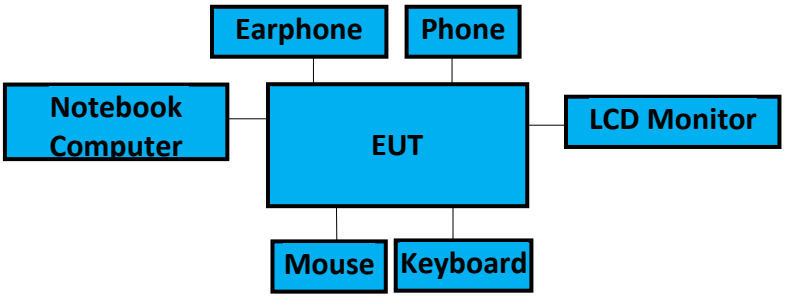
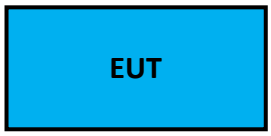
## 3.8. Setup Configuration

### 3.8.1. EUT Configuration for AC Conduction and Radiated Emission




### 3.8.2. EUT Configuration for RF Conducted Test Items




## 3.9. Operating Condition of EUT

To Set EUT RF function on continues transmitting.

## 3.10.Description of Test Facility

| | |
|---|---|
| Name of Test Firm | Audix Technology Corporation / EMC Department<br>No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan<br>Tel: +886-2-26092133<br>Fax: +886-2-26099303<br>Website : www.audixtech.com<br>Contact e-mail: attemc_report@audixtech.com |
| Accreditations | The laboratory is accredited by following organizations under ISO/IEC 17025:2017<br>(1) NVLAP(USA)<br>NVLAP Lab Code 200077-0<br>(2) TAF(Taiwan)<br>No. 1724 |
| Test Facilities | FCC OET Designation Number under APEC MRA by NCC is : TW1724<br>ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724<br>(1) No. 8 Shielding Room<br>(2) No.1 3m Semi Anechoic Chamber<br>(3) RF Test Room |

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## 3.11.Measurement Uncertainty

| Test Items/Facilities | | Frequency Range | Uncertainty |
|---|---|---|---|
| Conduction Test | | 9kHz-150kHz | ±3.7dB |
| | | 150kHz-30MHz | ±3.5dB |
| Radiation Test | No.1 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.1dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±3.9dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.2dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.1dB |
| | | 1GHz-6GHz, 3m | ±4.2dB |
| | | 6GHz-18GHz, 3m | ±4.6dB |
| | No.3 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±3.9dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±3.9dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.4dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.1dB |
| | No.4 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.3dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±4.0dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.3dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.4dB |
| | | 1GHz-6GHz, 3m | ±4.5dB |
| | | 6GHz-18GHz, 3m | ±4.6dB |
| | No.5 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.0dB |
| | | 200MHz-1000MHz, 3m, Horizontal | ±3.9dB |
| | | 30MHz-200MHz, 3m, Vertical | ±4.2dB |
| | | 200MHz-1000MHz, 3m, Vertical | ±4.3dB |
| | | 1GHz-6GHz, 3m | ±4.3dB |
| | | 6GHz-18GHz, 3m | ±4.7dB |
| | Fully Anechoic Chamber | 30MHz~1000MHz | ±4.7dB |
| | | 1GHz~18GHz | ±5.3dB |

Remark：Uncertainty = $ku_c(y)$

| Test Item | Uncertainty |
|---|---|
| 20dB Bandwidth | ± 0.2kHz |
| 99% Bandwidth | ± 0.38% |
| Frequency Stability | ±0.78ppm |

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# 4. MEASUREMENT EQUIPMENTLIST

## 4.1. Conducted Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|---|---|
| 1. | Test Receiver | R&S | ESR3 | 101774 | 2020.02.04 | 1 Year |
| 2. | A.M.N. | R&S | ENV432 | 101567 | 2020.04.20 | 1 Year |
| 3. | L.I.S.N. | Kyoritsu | KNW-407 | 8-855-9 | 2019.12.10 | 1 Year |
| 4. | Pulse Limiter | R&S | ESH3-Z2 | 100354 | 2020.01.05 | 1 Year |
| 5. | Cable | Yeida | RG/58AU | CE-08 | 2019.09.20 | 1 Year |
| 6. | Digital Thermo-Hygro Meter | iMax | HTC-1 | No.8 S/R | 2019.09.20 | N.C.R. |
| 7 | Test Software | Audix | e3 | V6.120619c | N.C.R. | N.C.R. |

## 4.2. Radiated Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | Agilent | N9010A-526 | MY53400071 | 2019. 09. 11 | 1 Year |
| 2. | Spectrum Analyzer | Agilent | N9030A-526 | MY53310269 | 2020. 01. 16 | 1 Year |
| 3. | Test Receiver | R & S | ESCS30 | 100338 | 2020. 06. 10 | 1 Year |
| 4. | Amplifier | HP | 8447D | 2944A06305 | 2020. 01. 16 | 1 Year |
| 5. | Bilog Antenna | TESEQ | CBL6112D | 33821 | 2020. 01. 17 | 1 Year |
| 6. | Loop Antenna | R&S | HFH2-Z2 | 891847/27 | 2019.12. 26 | 2 Years |
| 7. | Coaxial Cable | MIYAZAKI | 5D2W | RE-11 | 2020. 01. 31 | 1 Year |
| 8. | Coaxial Cable | MIYAZAKI | 5D2W | CLAMP-01 | 2020. 01. 31 | 1 Year |
| 9. | Digital Thermo-Hygro Meter | iMax | HTC-1 | No.1 3m A/C | 2020. 04. 17 | 1 Year |
| 10. | Test Software | Audix | e3 | V6.120619c | N.C.R. | N.C.R. |

## 4.3. RF Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | Keysight | N9020B-544 | MY57120357 | 2020. 01. 10 | 1 Year |
| 2. | Probe Antenna | EMCO | 7405 | 9011-1836 | N.C.R. | N.C.R. |
| 3. | Transformer | TAILI | TL-220 | N/A | N.C.R. | N.C.R. |
| 4. | Programmable Temperature & Humidity Chamber | GIANT | GTH-150-40-CP-AR | MAA1505-008 | 2020. 05. 19 | 1 Year |
| 5. | Digital Thermo-Hygro Meter | Shenzhen Datronn Electronics | KT-905 | RF | 2020. 04. 17 | 1 Year |

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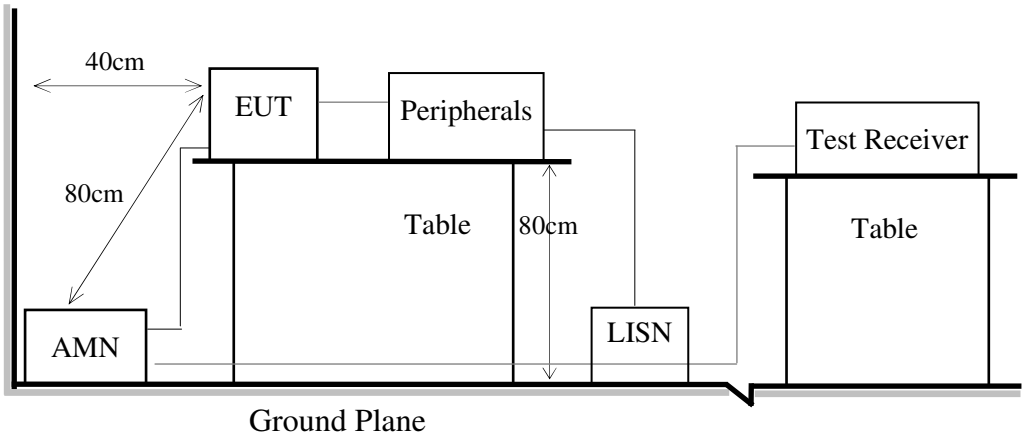
# 5. CONDUCTED EMISSION

## 5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.8.1

5.1.2. Shielded Room Setup Diagram




## 5.2. Conducted Emission Limit

| Frequency | Conducted Limit | |
|---|---|---|
| | Quasi-Peak Level | Average Level |
| 150kHz ~ 500kHz | 66 ~ 56 dBμV | 56 ~ 46 dBμV |
| 500kHz ~ 5MHz | 56 dBμV | 46 dBμV |
| 5MHz ~ 30MHz | 60 dBμV | 50 dBμV |

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

## 5.3. Test Procedure

5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.

5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).

5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)

5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

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## 5.4. Test Results

Please refer to Appendix A.

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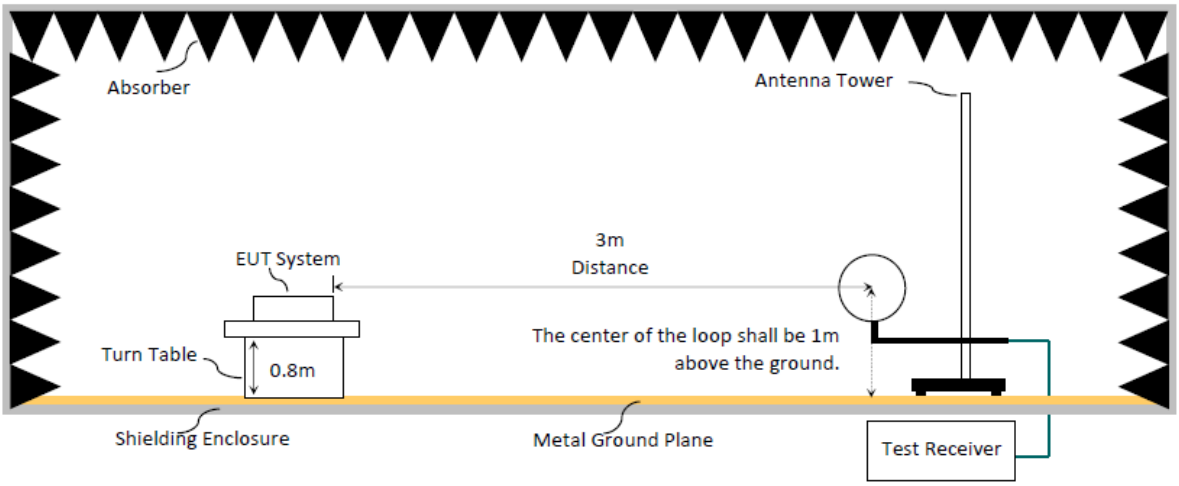
# 6. RADIATED EMISSION (IN-BAND)

## 6.1. Block Diagram of Test Setup

### 6.1.1. Block Diagram of EUT

Indicated as section 3.8.1

### 6.1.2. Setup Diagram for 9kHz-30MHz



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## 6.2. Radiated Emission Limits

| Frequency (MHz) | Distance(m) | Limits | |
|---|---|---|---|
| | | μV/m | dBμV/m |
| 13.553-13.567 | 30 | 15848 | 84 |
| | 3 | 1584893 | 124 |
| 13.410 -13.553 and 13.567-13.710 | 30 | 334 | 50.50 |
| | 3 | 33381 | 90.50 |
| 13.110 -13.410 and 13.710-14.010 | 30 | 106 | 40.5 |
| | 3 | 10592 | 80.50 |

Remark：(1) dBμV/m = 20 log (μV/m)

(2) 15848uV/m= 84dBuV/m=84+40log(30m/3m)=124dBuV/m
334uV/m= 50.5dBuV/m=50.5+40log(30m/3m)=90.5dBuV/m
106uV/m= 40.5dBuV/m=40.5+40log(30m/3m)=80.5dBuV/m

## 6.3. Test Procedure

**Frequency Range 9kHz~30MHz:**

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 and RSS-210 regulation.

(1) RBW = 9kHz with peak and average detector.

(2) Detector: average and peak (10kHz-490kHz)
Q.P. (490kHz-30MHz)

## 6.4. Test Results

Please refer to Appendix A.

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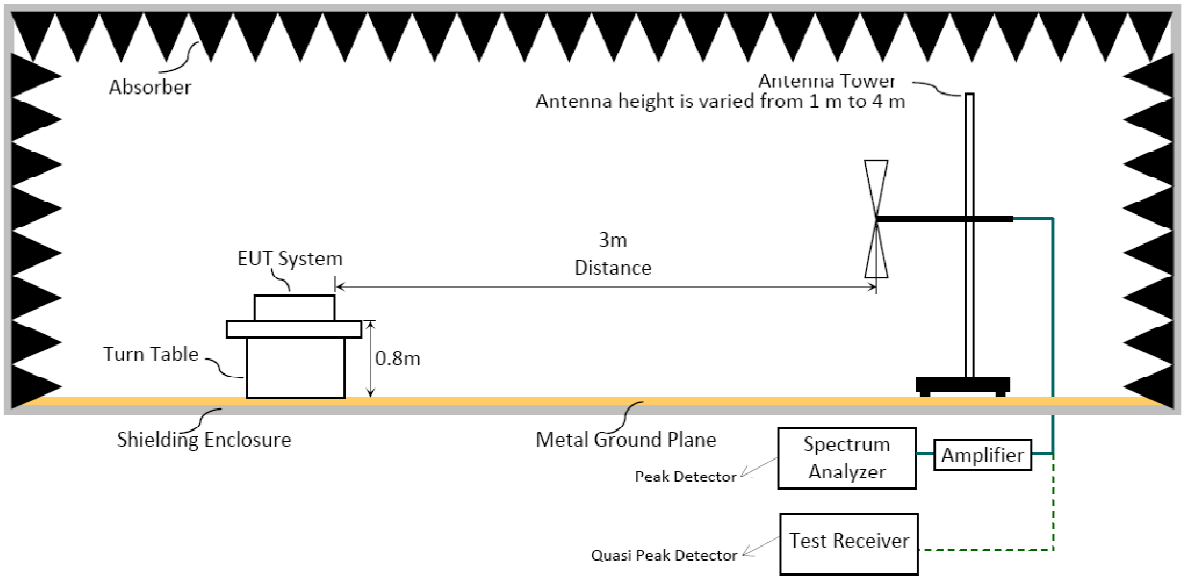
# 7. RADIATED EMISSION (OUT-BAND)

## 7.1. Block Diagram of Test Setup

### 7.1.1. Block Diagram of EUT

Indicated as section 3.8

### 7.1.2. Setup Diagram for 30-1000MHz



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## 7.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6 must also comply with the radiated emission limits specified as below.

| Frequency (MHz) | Distance(m) | Limits | |
|---|---|---|---|
| | | dBμV/m | μV/m |
| 0.009 - 0.490 | 300 | 67.6-20 log f(kHz) | 2400/f kHz |
| 0.490 - 1.705 | 30 | 87.6-20 log f(kHz) | 24000/f kHz |
| 1.705 - 30 | 30 | 29.5 | 30 |
| 30 - 88 | 3 | 40.0 | 100 |
| 88- 216 | 3 | 43.5 | 150 |
| 216- 960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |
| Above 1000 | 3 | 74.0 dBμV/m (Peak)<br>54.0 dBμV/m (Average) | |

Remark：(1) dBμV/m = 20 log (μV/m)
(2) The tighter limit applies to the edge between two frequency bands.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(4) Fundamental and emission fall within operation band are exempted from this section.
(5) Pursuant to ANSI C63.10: 6.6.4.3,if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

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## 7.4. Test Procedure

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 regulation.

**Frequency Range 30MHz~1GHz:**

Spectrum Analyzer is used for pre-testing with following setting:

(1)RBW = 120KHz

(2)VBW ≥ 3 x RBW.

(3)Detector = Peak.

(4)Sweep time = auto.

(5)Trace mode = max hold.

(6)Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using theQ.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: 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.

## 7.5. Measurement Result Explanation

Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading

## 7.6. Test Results

Please refer to Appendix A.

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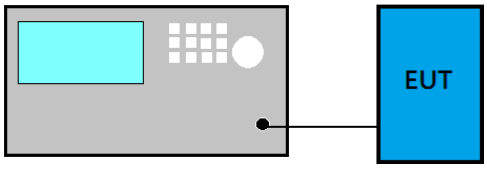
# 8. 20dB/99% BANDWIDTH

## 8.1. Block Diagram of Test Setup




## 8.2. Specification Limits

The bandwidth shall be specified in operating frequency band.

## 8.3. Test Procedure

**20dB**

Following measurement procedure is reference to ANSI C63.10:2013:
(1) Set Span range 2~5 times the OBW
(2) Set VBW≥3xRBW.
(3) Detector = Peak.
(4) Trace mode = Max hold.
(5) Sweep = Auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

**99%**

Following measurement procedure is reference to ANSI C63.10:2013:
(1) Set Span range 1.5~5 times the OBW
(2) Set RBW close to1% to 5% of OBW.
(3) Set VBW≥3xRBW.
(4) Detector = Peak.
(5) Trace mode = Max hold.
(6) Sweep = Auto couple.
(7) Allow the trace to stabilize.

## 8.4. Test Results

Please refer to Appendix A

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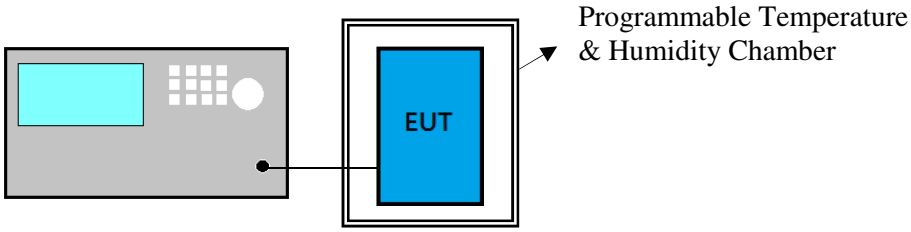
# 9. FREQUENCY STABILITY

## 9.1. Block Diagram of Test Setup




## 9.2. Specification Limits

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of -20degrees 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 degree C.

## 9.3. Test Procedure

The device operating in the 13.553-13.567MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20 degrees to +50 degree C at normal supply voltage.

## 9.4. Test Results

Please refer to Appendix A

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# 10. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: (1)24CN670N (2)24CN670W (3)24CN670NK (4)24CN670WK)

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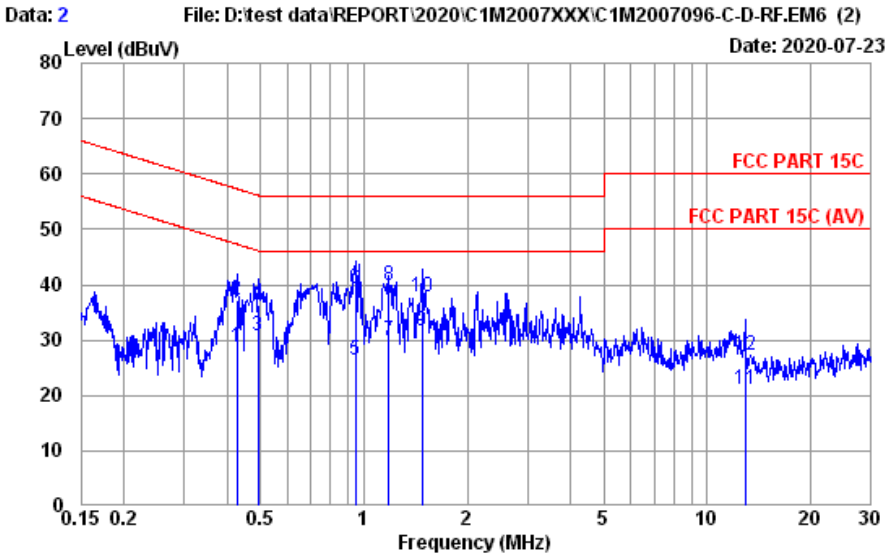
# A.1 CONDUCTED EMISSION

| Test Date | 2020/07/23 | Temp./Hum. | 27℃/51% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz | | |




Site No. : No.8 Shielded Room Data No. : 2
Instrument 1 : Receiver ESR(774)
Instrument 2 : EMV432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C Phase : NEUTRAL
Environment : 27°C / 51% Engineer : Roy Hung
EUT Model : 24CN670N Test Rating : 120Vac/60Hz
Test Mode : Operating

| | Freq. (MHz) | AMN Factor (dB) | Cable Loss (dB) | Pulse Att. (dB) | Reading (dBμV) | Emission Level (dBμV) | Limits (dBμV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.426 | 10.20 | 0.04 | 9.85 | 8.62 | 28.71 | 47.33 | 18.62 | Average |
| 2 | 0.426 | 10.20 | 0.04 | 9.85 | 17.03 | 37.12 | 57.33 | 20.21 | QP |
| 3 | 0.491 | 10.20 | 0.04 | 9.86 | 10.77 | 30.87 | 46.14 | 15.27 | Average |
| 4 | 0.491 | 10.20 | 0.04 | 9.86 | 16.32 | 36.42 | 56.14 | 19.72 | QP |
| 5 | 0.943 | 10.20 | 0.05 | 9.86 | 6.37 | 26.48 | 46.00 | 19.52 | Average |
| 6 | 0.943 | 10.20 | 0.05 | 9.86 | 19.17 | 39.28 | 56.00 | 16.72 | QP |
| 7 | 1.184 | 10.20 | 0.05 | 9.86 | 9.83 | 29.94 | 46.00 | 16.06 | Average |
| 8 | 1.184 | 10.20 | 0.05 | 9.86 | 19.66 | 39.77 | 56.00 | 16.23 | QP |
| 9 | 1.479 | 10.29 | 0.06 | 9.86 | 11.34 | 31.55 | 46.00 | 14.45 | Average |
| 10 | 1.479 | 10.29 | 0.06 | 9.86 | 17.62 | 37.83 | 56.00 | 18.17 | QP |
| 11 | 12.920 | 10.62 | 0.15 | 9.93 | 0.26 | 20.96 | 50.00 | 29.04 | Average |
| 12 | 12.920 | 10.62 | 0.15 | 9.93 | 6.43 | 27.13 | 60.00 | 32.87 | QP |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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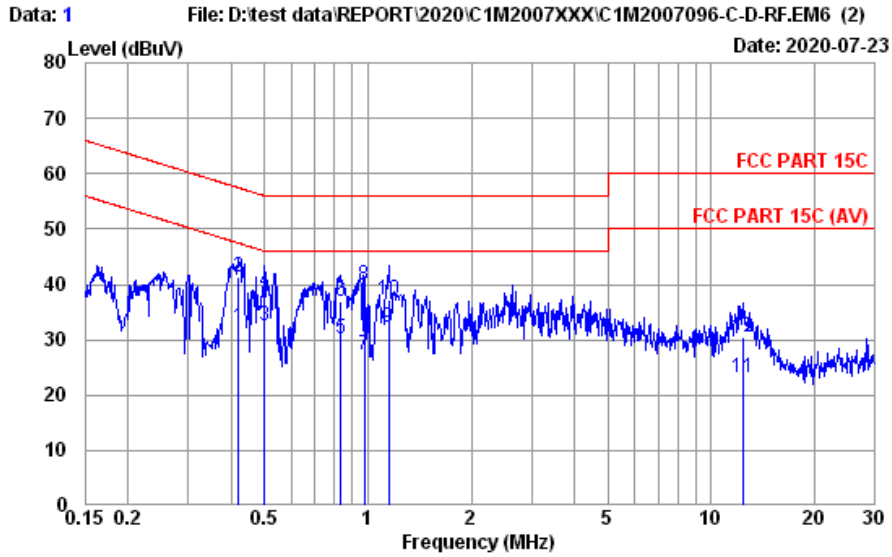
| Test Date | 2020/07/23 | Temp./Hum. | 27℃/51% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz | | |




Site No. : No.8 Shielded Room
Instrument 1 : Receiver ESR(774)
Instrument 2 : ENV432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C
Environment : 27°C / 51%
EUT Model : 24CN670N
Test Mode : Operating

Data No. : 1
Phase : LINE
Engineer : Roy Hung
Test Rating : 120Vac/60Hz

| | Freq. (MHz) | AMN Factor (dB) | Cable Loss (dB) | Pulse Att. (dB) | Reading (dBμV) | Emission Level (dBμV) | Limits (dBμV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.420 | 10.20 | 0.04 | 9.85 | 12.00 | 32.09 | 47.44 | 15.35 | Average |
| 2 | 0.420 | 10.20 | 0.04 | 9.85 | 21.37 | 41.46 | 57.44 | 15.98 | QP |
| 3 | 0.500 | 10.20 | 0.04 | 9.86 | 12.56 | 32.66 | 46.01 | 13.35 | Average |
| 4 | 0.500 | 10.20 | 0.04 | 9.86 | 18.57 | 38.67 | 56.01 | 17.34 | QP |
| 5 | 0.835 | 10.20 | 0.05 | 9.86 | 9.98 | 30.09 | 46.00 | 15.91 | Average |
| 6 | 0.835 | 10.20 | 0.05 | 9.86 | 16.76 | 36.87 | 56.00 | 19.13 | QP |
| 7 | 0.975 | 10.20 | 0.05 | 9.86 | 7.01 | 27.12 | 46.00 | 18.88 | Average |
| 8 | 0.975 | 10.20 | 0.05 | 9.86 | 19.76 | 39.87 | 56.00 | 16.13 | QP |
| 9 | 1.147 | 10.28 | 0.05 | 9.86 | 11.94 | 32.13 | 46.00 | 13.87 | Average |
| 10 | 1.147 | 10.28 | 0.05 | 9.86 | 16.89 | 37.08 | 56.00 | 18.92 | QP |
| 11 | 12.384 | 10.45 | 0.15 | 9.93 | 2.76 | 23.29 | 50.00 | 26.71 | Average |
| 12 | 12.384 | 10.45 | 0.15 | 9.93 | 9.87 | 30.40 | 60.00 | 29.60 | QP |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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# A.2 RADIATED EMISSION (IN-BAND)

| Test Date | 2020/07/22 | Temp./Hum. | 23℃/56% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz | Tested by | Sean Wang |

Antenna at 0 Degree

| Test Frequency (MHz) | Test Result (dBμV/m at 3m) | Limits (dBμV/m at 3m) | Margin (dB) | Detector |
|---|---|---|---|---|
| 13.560 | 67.60 | 124.00 | 56.40 | QP |

Antenna at 90 Degree

| Test Frequency (MHz) | Test Result (dBμV/m at 3m) | Limits (dBμV/m at 3m) | Margin (dB) | Detector |
|---|---|---|---|---|
| 13.560 | 72.60 | 124.00 | 51.40 | QP |

Note: All emissions are lower than the ambient level cannot be measured.

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# A.3 RADIATED EMISSION (OUT-BAND)

| Test Date | 2020/07/22 | Temp./Hum. | 23℃/56% |
|---|---|---|---|
| Test Voltage | AC 120V, 60Hz | Tested by | Sean Wang |

A.3.1 Emissions within Restricted Frequency Bands

A.3.1.1 Frequency 9kHz~30MHz

Antenna at 0 Degree

| Test Frequency (MHz) | Test Result (dBμV/m at 3m) | Limits (dBμV/m at 3m) | Margin (dB) | Detector |
|---|---|---|---|---|
| 27.120 | ---Note | 69.54 | --- | QP |

Antenna at 90 Degree

| Test Frequency (MHz) | Test Result (dBμV/m at 3m) | Limits (dBμV/m at 3m) | Margin (dB) | Detector |
|---|---|---|---|---|
| 27.120 | ---Note | 69.54 | --- | QP |

Note: All emissions are lower than the ambient level cannot be measured.

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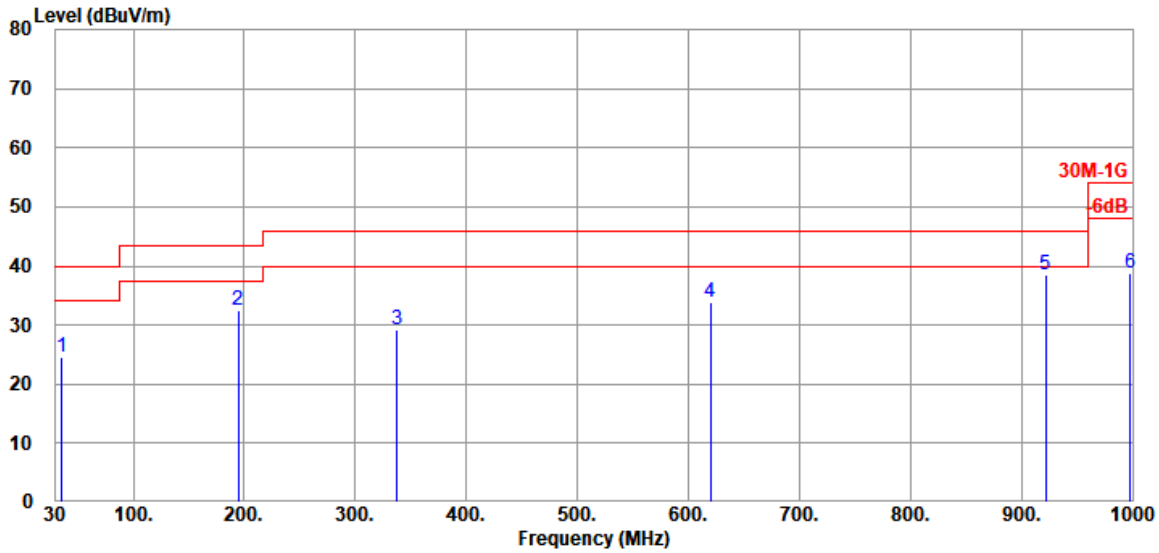
A.3.1.2 Frequency 30MHz ~ 1000MHz




Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|---|
| 35.820 | 21.56 | 1.38 | 26.52 | 28.21 | 24.63 | 40.00 | 15.37 | Peak |
| 194.900 | 15.23 | 3.50 | 25.88 | 39.68 | 32.53 | 43.50 | 10.97 | Peak |
| 337.490 | 20.31 | 5.11 | 26.06 | 29.90 | 29.26 | 46.00 | 16.74 | Peak |
| 619.760 | 24.84 | 7.14 | 27.48 | 29.47 | 33.97 | 46.00 | 12.03 | Peak |
| 921.430 | 26.96 | 8.81 | 27.07 | 29.81 | 38.51 | 46.00 | 7.49 | Peak |
| 998.060 | 27.38 | 9.15 | 26.84 | 29.07 | 38.76 | 54.00 | 15.24 | Peak |

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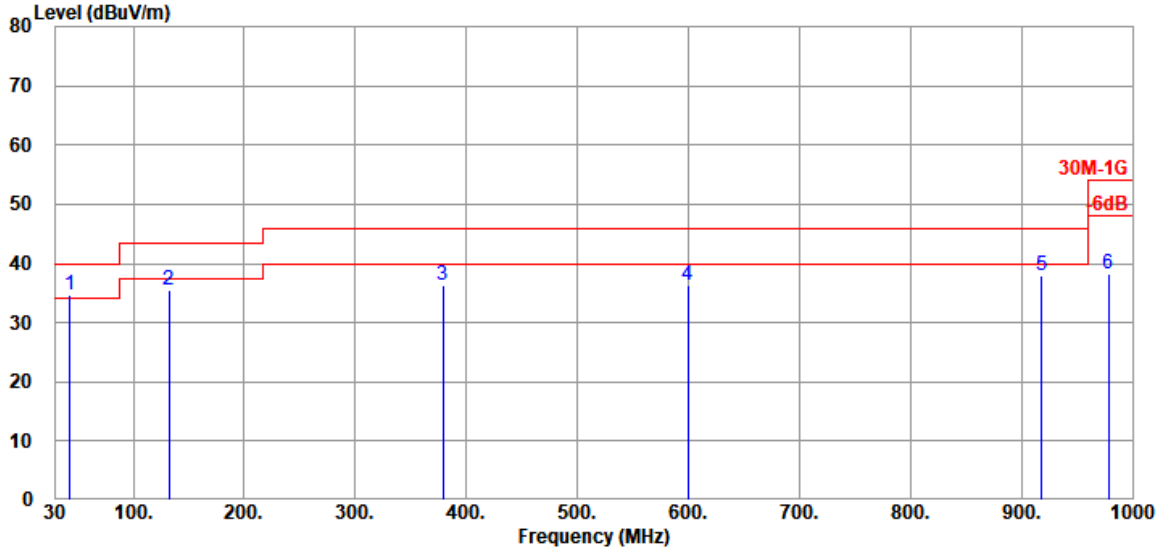


Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|---|
| 42.610 | 17.56 | 1.54 | 26.51 | 42.09 | 34.68 | 40.00 | 5.32 | Peak |
| 131.850 | 18.33 | 2.84 | 26.14 | 40.53 | 35.56 | 43.50 | 7.94 | Peak |
| 379.200 | 21.35 | 5.72 | 26.39 | 35.75 | 36.43 | 46.00 | 9.57 | Peak |
| 599.390 | 24.80 | 7.03 | 27.48 | 31.96 | 36.31 | 46.00 | 9.69 | Peak |
| 918.520 | 26.94 | 8.80 | 27.09 | 29.21 | 37.86 | 46.00 | 8.14 | Peak |
| 978.660 | 27.28 | 9.07 | 26.90 | 28.86 | 38.31 | 54.00 | 15.69 | Peak |

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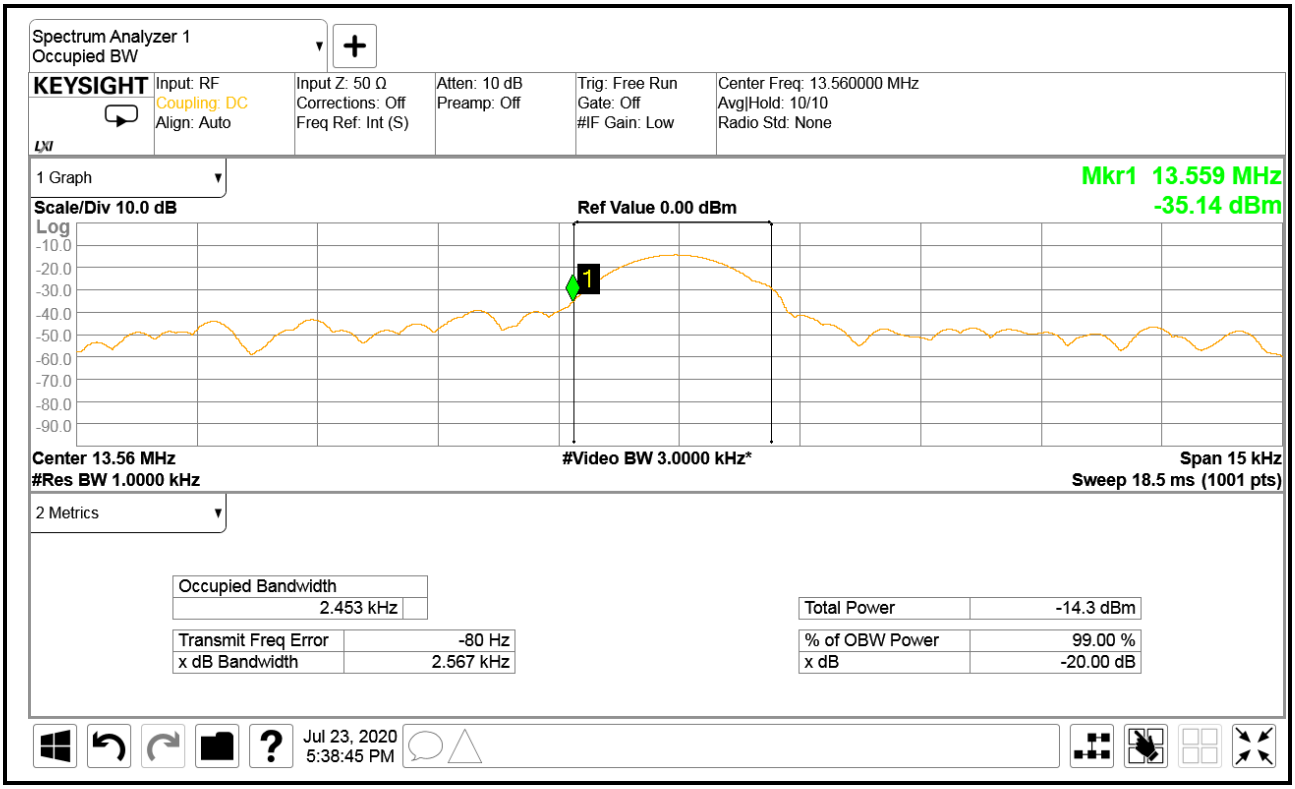
# A.4 20dB/99% BANDWIDTH

| | | | |
|---|---|---|---|
| Test Date | 2020/07/23 | Temp./Hum. | 27℃/54% |
| Cable Loss | N/A | Tested by | Sean Wang |
| Test Voltage | AC 120V, 60Hz | | |

### A.4.1.1 20dB/99% Bandwidth Result

| Centre Frequency (MHz) | 20 dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|
| 13.56 | 2.567kHz | 2.453 |

### A.4.1.2 Measurement Plots



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# A.5 FREQUENCY STABILITY

| Test Date | 2020/07/23 | Temp./Hum. | 27℃/54% |
|---|---|---|---|
| Test Normal Voltage | AC 120V, 60Hz | Tested by | Sean Wang |

| Mode: 0 Minute | | | | | |
|---|---|---|---|---|---|
| Temperature(℃) | -20 | -10 | 0 | 10 | 20 |
| Voltage | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 138V/60Hz |
| Frequency(MHz) | 13.55988 | 13.55923 | 13.55944 | 13.55953 | 13.55982 |
| Error (%) | -0.00088 | 0.00568 | -0.00413 | -0.00347 | -0.00133 |
| Temperature(℃) | 20 | 30 | 40 | 50 | 20 |
| Voltage | DC 102V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz |
| Frequency(MHz) | 13.56001 | 13.55999 | 13.55963 | 13.55995 | 13.56000 |
| Error (%) | 0.00007 | 0.00011 | -0.00273 | -0.00037 | 0.00000 |

| Mode: 2 Minute | | | | | |
|---|---|---|---|---|---|
| Temperature(°C) | -20 | -10 | 0 | 10 | 20 |
| Voltage | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 138V/60Hz |
| Frequency(MHz) | 13.55981 | 13.55977 | 13.55952 | 13.55947 | 13.55917 |
| Error (%) | -0.00140 | 0.00170 | -0.00354 | -0.00391 | -0.00612 |
| Temperature(°C) | 20 | 30 | 40 | 50 | 20 |
| Voltage | DC 102V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz |
| Frequency(MHz) | 13.56042 | 13.55982 | 13.55995 | 13.55993 | 13.56002 |
| Error (%) | 0.00310 | -0.00133 | -0.00034 | -0.00049 | 0.00013 |

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| Mode: 5 Minute | | | | | |
|---|---|---|---|---|---|
| Temperature(℃) | -20 | -10 | 0 | 10 | 20 |
| Voltage | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 138V/60Hz |
| Frequency(MHz) | 13.55977 | 13.55942 | 13.55960 | 13.55917 | 13.55903 |
| Error (%) | -0.00170 | -0.00428 | -0.00295 | -0.00612 | -0.00715 |
| Temperature(℃) | 20 | 30 | 40 | 50 | 20 |
| Voltage | DC 102V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz |
| Frequency(MHz) | 13.56010 | 13.55942 | 13.55973 | 13.55996 | 13.56023 |
| Error (%) | 0.00074 | -0.00428 | -0.00199 | -0.00029 | 0.00170 |

| Mode: 10 Minute | | | | | |
|---|---|---|---|---|---|
| Temperature(℃) | -20 | -10 | 0 | 10 | 20 |
| Voltage | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 138V/60Hz |
| Frequency(MHz) | 13.55982 | 13.55958 | 13.56034 | 13.56042 | 13.56055 |
| Error (%) | -0.00133 | -0.00310 | 0.00251 | 0.00310 | 0.00406 |
| Temperature(℃) | 20 | 30 | 40 | 50 | 20 |
| Voltage | DC 102V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz | AC 120V/60Hz |
| Frequency(MHz) | 13.56003 | 13.55994 | 13.55969 | 13.55983 | 13.56004 |
| Error (%) | 0.00022 | -0.00044 | -0.00229 | -0.00125 | 0.00029 |

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# APPDNDIX B

## TEST PHOTOGRAPHS

(Model: (1)24CN670N (2)24CN670W (3)24CN670NK (4)24CN670WK)