



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7) Date : Feb 13, 2020

Application No. : LY023332(2)

Applicant : CAPITAL PROSPECT LIMITED  
ROOM 1303, BLOCK B, VERISTRONG IND CENTRE  
34-36 AU PUI WAN STREET  
FOTAN, SHATIN, N.T. HONG KONG

Sample Description : One(1) item of submitted sample stated to be:

| Sample Description                   | Model No. |
|--------------------------------------|-----------|
| Garage Door Controller Mini Nova Hub | 2NV9      |

Radio Frequency : 910 – 918 MHz and 2412 – 2462MHz  
Rating : DC7.5V (EUT) and AC 100-240V (AC/DC Adapter)  
Sample registration No. : RY037224-003(0) and RY037224-005(1)  
PMN : 2NV9  
HVIN : 2NV9

Date Received : Oct 2, 2019.

Test Period : Oct 3, 2019 to Oct 30, 2019

Test Requested : FCC 47CFR Part 15 Certification  
ISED Certification for License-exempt Device

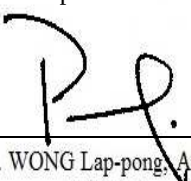
Test Method : 47 CFR Part 15 (10-1-18 Edition)  
ANSI C63.10 – 2013  
ANSI C63.4 – 2014  
RSS-210 Issue 9  
RSS-Gen Issue 5

Test Result : See attached sheet(s) from page 2 to 19.

Conclusion : The submitted sample was found to comply with requirement of FCC 47CFR Part 15  
Subpart C, section 15.249 and ISED Canada Radio Standard Specification RSS-210.

Remark : This report is only for the measurement of 900MHz transmitter. The authorization of the  
WiFi module has been certified by FCC and ISED and the 900MHz receiver is under  
another sDoC report.

For and on behalf of  
CMA Industrial Development Foundation Limited

Authorized Signature :  Page 1 of 19  
Mr. WONG Lap-pong, Andrew  
Manager

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### Table of Contents

|     |                                                                  |    |
|-----|------------------------------------------------------------------|----|
| 1   | General Information .....                                        | 3  |
| 1.1 | General Description .....                                        | 3  |
| 1.2 | Location of the test site .....                                  | 4  |
| 1.3 | List of measuring equipment.....                                 | 5  |
| 1.4 | Measurement Uncertainty.....                                     | 6  |
| 1.5 | Test Summary .....                                               | 6  |
| 1.6 | External Photo, Internal Photo and Test Configuration Photo..... | 6  |
| 2   | Description of the radiated emission test .....                  | 7  |
| 2.1 | Test Procedure .....                                             | 7  |
| 2.2 | Test Setup .....                                                 | 8  |
| 2.3 | Test Result .....                                                | 10 |
| 3   | Description of the Line-conducted Test.....                      | 13 |
| 3.1 | Test Procedure .....                                             | 13 |
| 3.2 | Test Result .....                                                | 13 |
| 3.3 | Test Setup .....                                                 | 13 |
| 3.4 | Graph and Table of Conducted Emission Measurement Data .....     | 14 |
| 4   | Bandwidth .....                                                  | 16 |
| 5   | Appendices.....                                                  | 17 |

Page 2 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 1 General Information

#### 1.1 General Description

The EUT is a Garage Door Controller Mini Nova Hub, model: 2NV9. It is used to control and monitor the garage door with smartphone and other security sensor. It is equipped with a 900MHz transceiver and WiFi transceiver to make the communication with the smartphone and the other security sensor. The WiFi function is mainly to connect with smartphone and local router for smartphone controlling the garage door with "Orbit Home" mobile App. The 900MHz transceiver is connected with other 900MHz security control and other 900MHz Siren for security purpose. The voltage input of the 2NV9 is DC 7.5V and supplied by an AC adapter with AC 100 – 240V input and DC 7.5V output.

The 900MHz transceiver is operating in frequency band from 910 – 918MHz and operated by the RF IC, CMT2380 with 26MHz oscillator. GFSK modulation is used. The RF signal is transmitted with a PCB antenna, 0.0dBi antenna gain.

The WiFi transceiver is operating with IEEE 802.11b/g/n(HT20) and in frequency band 2412 – 2462MHz. The WiFi transceiver is operated by WiFi Module, model: HM-WF8266A. The WiFi module has been certified by FCC and ISED under WiFi module with FCC ID: 2ASEO-HM-WF8266A and IC: 24999-WF8266A respectively.

Brief Circuit Description is listed below

|                        |                                        |
|------------------------|----------------------------------------|
| U1                     | : RF IC of 900MHz Transceiver, CMT2380 |
| Y1                     | : 26MHz clock for 900MHz RF IC         |
| U2                     | : RF amplifier                         |
| L1, L2, L3, C2, C3, C5 | : Matching circuit                     |
| U3                     | : WiFi Module, HM-WF8266A              |

Page 3 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 1.2 Location of the test site

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2014. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,  
9 – 13 Wong Chuk Yeung Street,  
Fo Tan, Shatin,  
New Territories,  
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2014. A shielded room is located at :

Ground Floor, Yan Hing Centre,  
9 – 13 Wong Chuk Yeung Street,  
Fo Tan, Shatin,  
New Territories,  
Hong Kong.

FCC Accredited Lab (Designation Number: HK0004)  
ISED Wireless Test Site (ISED Assigned Code: 4093A)

Page 4 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 1.3 List of measuring equipment

| Equipment               | Manufacturer     | Model No.    | Serial No.  | Calibration Due Date | Calibration Period |
|-------------------------|------------------|--------------|-------------|----------------------|--------------------|
| EMI Test Receiver       | Rohde & Schwarz  | ESCS30       | 100001      | 29 Mar 2020          | 1Year              |
| Spectrum Analyzer       | R&S              | FSV40        | 100964      | 07Feb 2020           | 1Year              |
| Spectrum Analyzer       | Rohde & Schwarz  | FSP30        | 100628      | 26 Mar 2020          | 1Year              |
| Broadband Antenna       | Schaffner        | CBL6112B     | 2692        | 27 Mar 2021          | 2Years             |
| Loop Antenna            | EMCO             | 6502         | 00056620    | 25 Jan 2020          | 2Years             |
| Horn Antenna            | Schwarzbeck      | BBHA 9120D   | 9120D-531   | 21 Dec 2020          | 2Years             |
| Broadband Pre-Amplifier | Schwarzbeck      | BBV 9718     | 9718-119    | 21 Dec 2020          | 2Years             |
| Horn Antenna            | Schwarzbeck      | BBHA 9170    | BBHA9170442 | 01 Aug 2020          | 2Years             |
| Broadband Pre-Amplifier | Schwarzbeck      | BBV 9719     | 9719-010    | 01 Aug 2020          | 2Years             |
| Coaxial Cable           | Schaffner        | RG 213/U     | N/A         | 16 May 2020          | 1Year              |
| Coaxial Cable           | Suhner           | RG 214/U     | N/A         | 16 May 2020          | 1Year              |
| Coaxial Cable           | Suhner           | Sucoflex_104 | N/A         | 21 Dec 2019          | 1Year              |
| LISN                    | Rohde & Schwarz  | ENV216       | 101323      | 22 Jan 2020          | 1Year              |
| Coaxial Cable           | Tyco Electronics | RG 58C/U     | N/A         | 23 Oct 2019          | 1Year              |

Page 5 of 19

FCC ID: KUT2NV9

IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%.

#### Radiated emissions

| Frequency                     | Uncertainty ( $U_{lab}$ ) |
|-------------------------------|---------------------------|
| 30MHz ~ 200MHz (Horizontal)   | 4.59dB                    |
| 30MHz ~ 200MHz (Vertical)     | 4.49dB                    |
| 200MHz ~ 1000MHz (Horizontal) | 4.94dB                    |
| 200MHz ~ 1000MHz (Vertical)   | 4.97dB                    |
| 1GHz ~ 6GHz                   | 4.52dB                    |
| 6GHz – 18GHz                  | 4.58dB                    |

### 1.5 Test Summary

| TEST ITEM                         | FCC REFERENCE  | RSS REFERENCE          | RESULT |
|-----------------------------------|----------------|------------------------|--------|
| Fundamental and harmonic emission | 15.249(a)      | RSS-210, Annex B.10(a) | Comply |
| Out-band emission                 | 15.249(d)      | RSS-210, Annex B.10(b) | Comply |
| Peak Limit                        | 15.249(e)      | RSS-Gen, 8.1           | Comply |
| Bandwidth                         | 15.215(c)      | RSS-Gen, 6.7           | Comply |
| Conducted Emission                | 15.207(a)      | RSS-Gen, 8.8           | Comply |
| Frequency Stability               | Not applicable | RSS-Gen, 8.11          | Comply |

### 1.6 External Photo, Internal Photo and Test Configuration Photo

The External Photo, Internal Photo and Test Configuration Photo associated with this report for the tested product are saved in separated pdf file listed in the following

| File content             | File name                               |
|--------------------------|-----------------------------------------|
| External Photo           | KUT2NV9_4454A-2NV9 External Photo.pdf   |
| Internal Photo           | KUT2NV9_4454A-2NV9 Internal Photo.pdf   |
| Test Configuration Photo | KUT2NV9_4454A-2NV9 Test Setup Photo.pdf |

Page 6 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

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# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 2 Description of the radiated emission test

#### 2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013.

A non-conductive turntable with dimensions of 1.5m x 0.4m x 0.8m (L x W x H) placed above the reference ground plane. The equipment under test (EUT) was placed at 0.8m height for below 1GHz measurement and 1.5m height for above 1GHz measurement. The test distance is 3m between EUT and receiving antenna. A broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated. Additional absorbing material will be placed between the EUT and receiving antenna for above 1GHz measurement.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement.

Page 7 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

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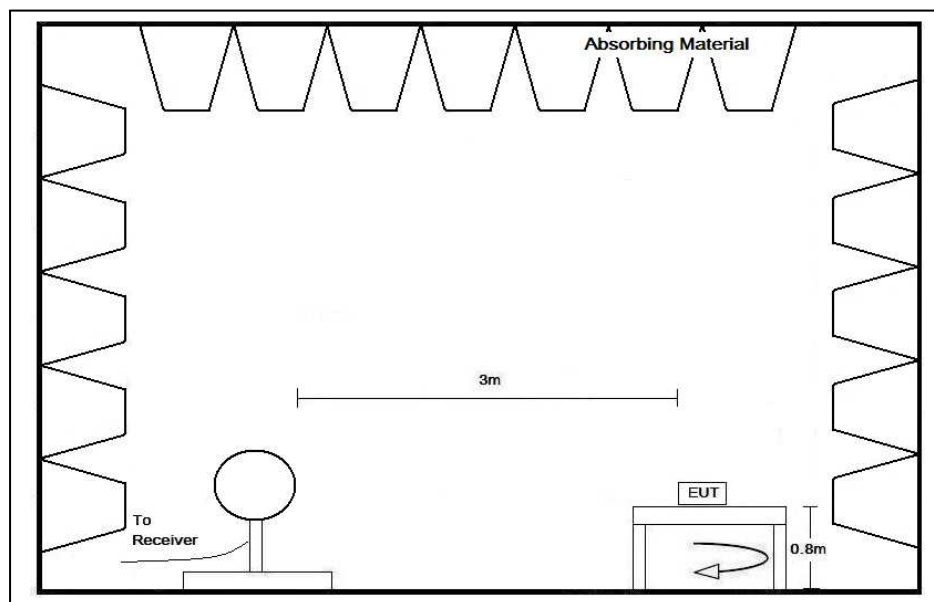
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## TEST REPORT

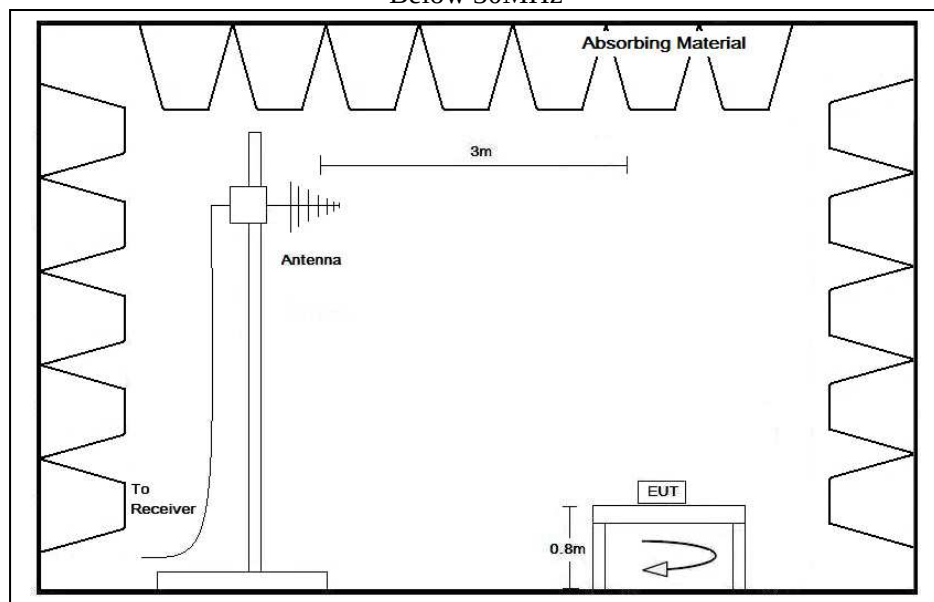
Report No. : AY0059771(7)

Date : Feb 13, 2020

### 2.2 Test Setup



Below 30MHz



30MHz – 1GHz

Page 8 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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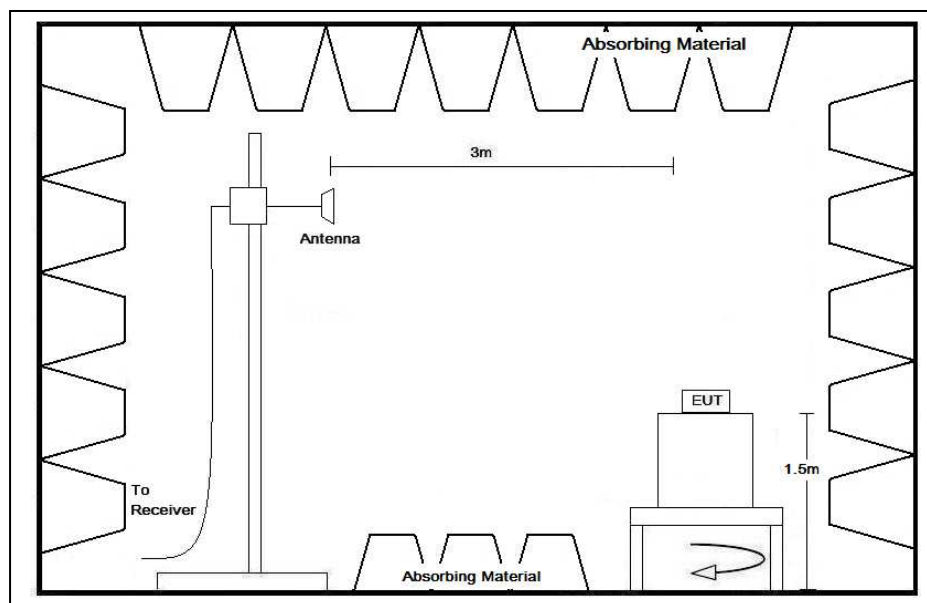
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## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 2.2 Test Setup



Above 1GHz



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## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 2.3 Test Result

Peak Detector data was measured unless otherwise stated.

The radiated emissions are measured from 9kHz to 10GHz (the tenth harmonics)

The worst case configuration is shown on the worst case configuration of test setup photo.

The frequencies from fundamental up to tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next pages.

The EUT has been tested in Transmission mode.

It was found that the EUT meet the FCC and RSS requirement.

Page 10 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 2.4 Radiated Emission Measurement Data

#### Radiated emission

##### Environmental conditions:

| Parameter            | Recorded value |     |
|----------------------|----------------|-----|
| Ambient temperature: | 28.2           | ° C |
| Relative humidity:   | 43.6           | %   |

Channel: 910MHz

| Polarization | Frequency(MHz) | Reading at 3m (dBμV) | Antenna Factor and Cable Loss (dB/m) | Field Strength at 3m (dBμV/m) | Limit at 3m (dBμV/m) | Margin (dB) | Detector Type |
|--------------|----------------|----------------------|--------------------------------------|-------------------------------|----------------------|-------------|---------------|
| H            | 909.984        | 62.5                 | 28.3                                 | 90.8                          | 94.0                 | -3.2        | QP            |
| V            | 909.932        | 53.9                 | 28.3                                 | 82.2                          | 94.0                 | -11.8       | QP            |
| V            | 902.000        | 12.9                 | 28.3                                 | 41.2                          | 46.0                 | -4.8        | PK            |
| H            | 1819.885       | 55.4                 | -7.6                                 | 47.8                          | 54.0                 | -6.2        | PK            |
| H            | 2729.845       | 44.4                 | -4.7                                 | 39.7                          | 54.0                 | -14.3       | PK            |
| V            | 3639.810       | 44.9                 | -2.3                                 | 42.6                          | 54.0                 | -11.4       | PK            |
| V            | 5460.030       | 41.3                 | 3.2                                  | 44.5                          | 54.0                 | -9.5        | PK            |

Remark: 1) All emission above 1GHz is measured with Peak detector and compared with the average limit, so no average measurement is performed.

Page 11 of 19

FCC ID: KUT2NV9

IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

Channel: 918MHz

| Polarization | Frequency (MHz) | Reading at 3m (dBμV) | Antenna Factor and Cable Loss (dB/m) | Field Strength at 3m (dBμV/m) | Limit at 3m (dBμV/m) | Margin (dB) | Detector Type |
|--------------|-----------------|----------------------|--------------------------------------|-------------------------------|----------------------|-------------|---------------|
| H            | 917.938         | 61.6                 | 28.3                                 | 89.9                          | 94.0                 | -4.1        | QP            |
| V            | 917.928         | 56.8                 | 28.3                                 | 85.1                          | 94.0                 | -8.9        | QP            |
| V            | 928.000         | 12.6                 | 28.3                                 | 40.9                          | 46.0                 | -5.1        | QP            |
| H            | 1835.855        | 55.1                 | -7.6                                 | 47.5                          | 54.0                 | -6.5        | PK            |
| H            | 2753.950        | 44.6                 | -4.7                                 | 39.9                          | 54.0                 | -14.1       | PK            |
| V            | 3671.770        | 47.4                 | -2.3                                 | 45.1                          | 54.0                 | -8.9        | PK            |
| V            | 5507.560        | 39.6                 | 4.1                                  | 43.7                          | 54.0                 | -10.3       | PK            |

Remark: 1) All emission above 1GHz is measured with Peak detector and compared with the average limit, so no average measurement is performed.

Page 12 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 3 Description of the Line-conducted Test

#### 3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

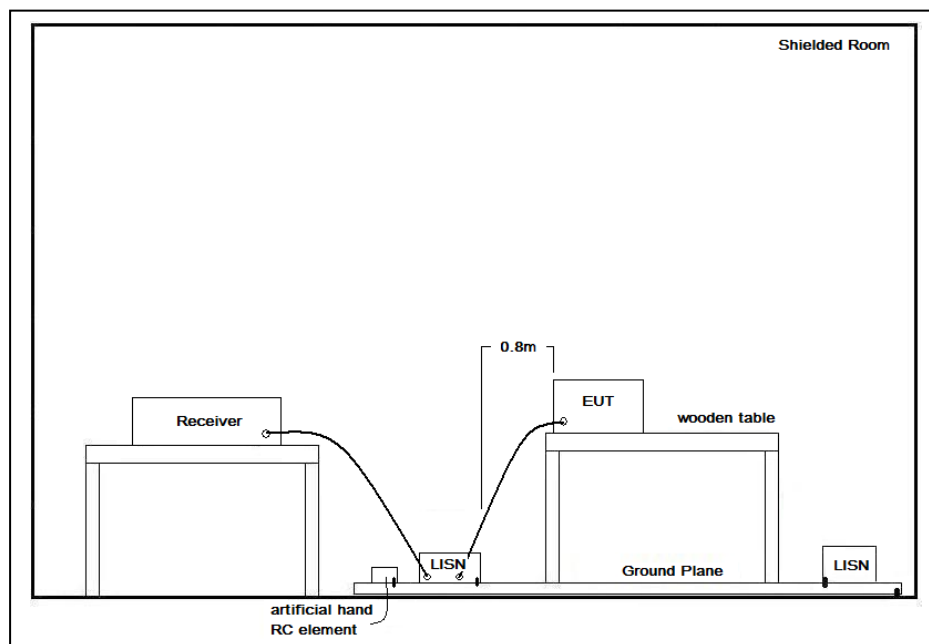
#### 3.2 Test Result

The worst case configuration is shown on the worst case configuration of test setup photo.

The EUT has been tested in Transmission mode of 910MHz and 918MHz and found the worst case on 910MHz transmission.

It was found that the EUT meet the FCC and RSS requirement.

#### 3.3 Test Setup



Page 13 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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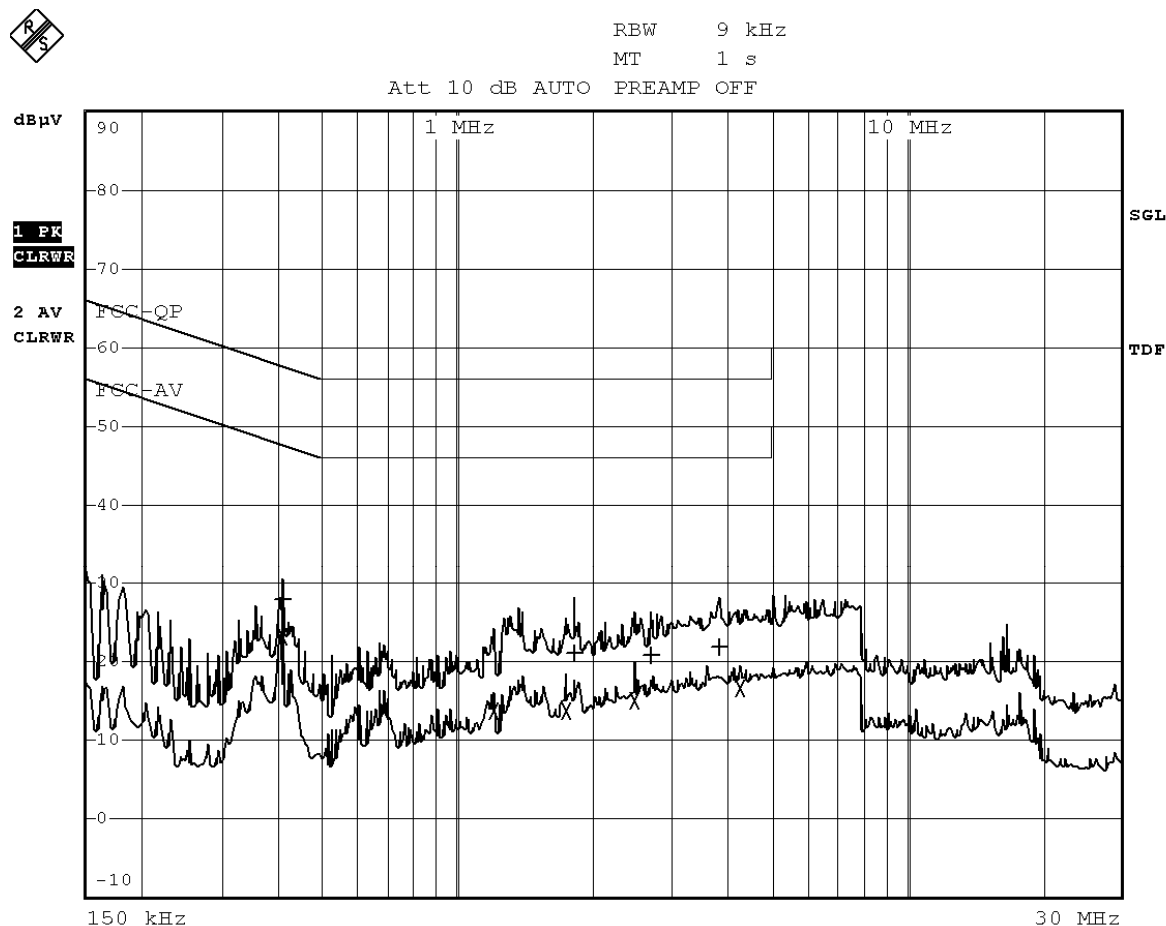
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## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

### 3.4 Graph and Table of Conducted Emission Measurement Data



Page 14 of 19

FCC ID: KUT2NV9

IC: 4454A-2NV9

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# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AY0059771(7)

Date : Feb 13, 2020

| EDIT PEAK LIST (Final Measurement Results) |            |            |        |                |
|--------------------------------------------|------------|------------|--------|----------------|
| Trace1:                                    | FCC-QP     |            |        |                |
| Trace2:                                    | FCC-AV     |            |        |                |
| Trace3:                                    | ---        |            |        |                |
| TRACE                                      | FREQUENCY  | LEVEL dBμV |        | DELTA LIMIT dB |
| 1 Quasi Peak                               | 411 kHz    | 27.80      | N gnd  | -29.82         |
| 2 Average                                  | 411 kHz    | 23.31      | L1 gnd | -24.31         |
| 2 Average                                  | 684.5 kHz  | 13.73      | N gnd  | -32.26         |
| 2 Average                                  | 1.211 MHz  | 13.81      | N gnd  | -32.18         |
| 2 Average                                  | 1.742 MHz  | 13.77      | N gnd  | -32.22         |
| 1 Quasi Peak                               | 1.8185 MHz | 20.99      | N gnd  | -35.00         |
| 2 Average                                  | 2.4755 MHz | 15.15      | N gnd  | -30.84         |
| 1 Quasi Peak                               | 2.714 MHz  | 20.94      | N gnd  | -35.05         |
| 1 Quasi Peak                               | 3.8345 MHz | 21.88      | N gnd  | -34.11         |
| 2 Average                                  | 4.28 MHz   | 16.72      | N gnd  | -29.27         |

Page 15 of 19

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### 4 Bandwidth

Appendices A1 and A2 show the fundamental emission is confined in the specified band. 20dB bandwidth is 208.7kHz and 99% bandwidth is 200.8kHz. Both bandwidths fall in the band of 902 – 928MHz. It also shows that the EUT met the bandwidth requirement of FCC Part 15.215(c) and bandwidth and frequency stability requirement of RSS-GEN.

Page 16 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

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## TEST REPORT

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### 5 Appendices

|     |                     |   |         |
|-----|---------------------|---|---------|
| A1. | 20dB Bandwidth Plot | 2 | page(s) |
| A2. | 99% Bandwidth Plot  | 2 | Page(s) |

Page 17 of 19

FCC ID: KUT2NV9  
IC: 4454A-2NV9

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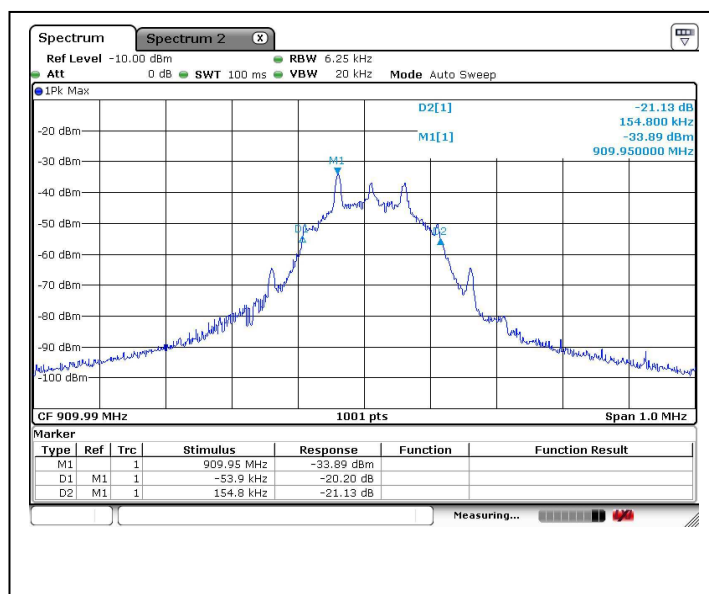
廠商會檢定中心

## TEST REPORT

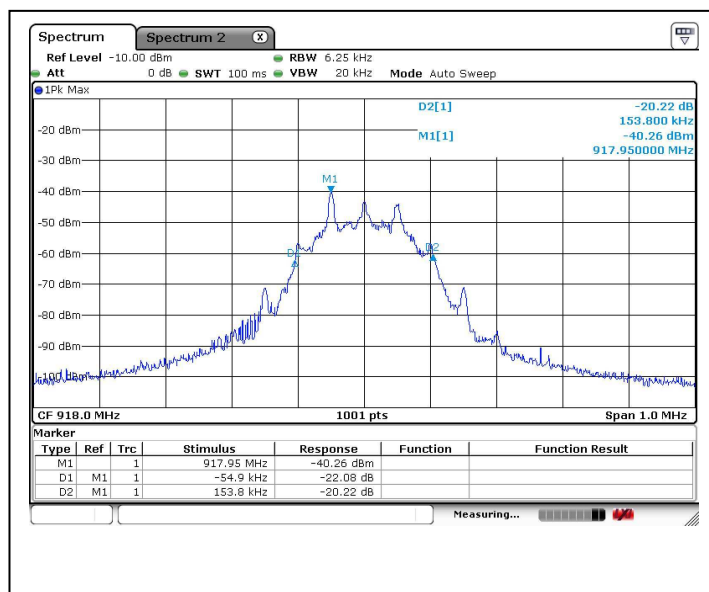
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Date : Feb 13, 2020

### A1. 20dB Bandwidth Plot



Channel: 910MHz



Channel: 918MHz

Page 18 of 19

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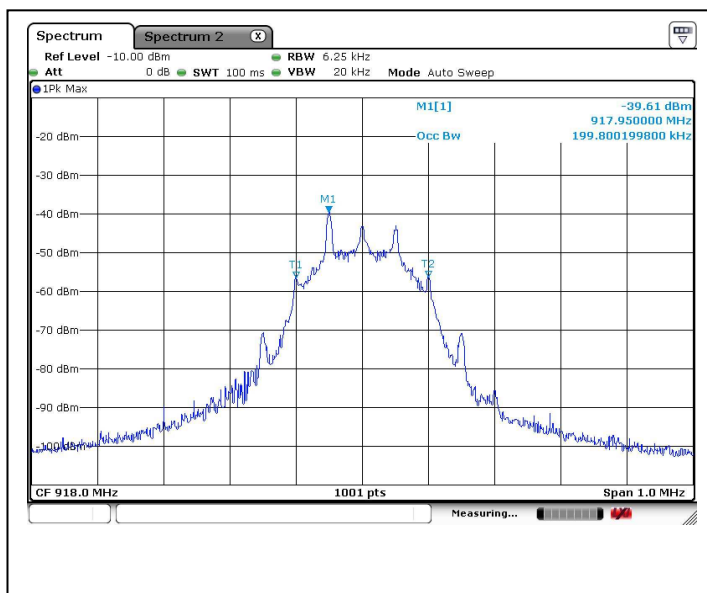
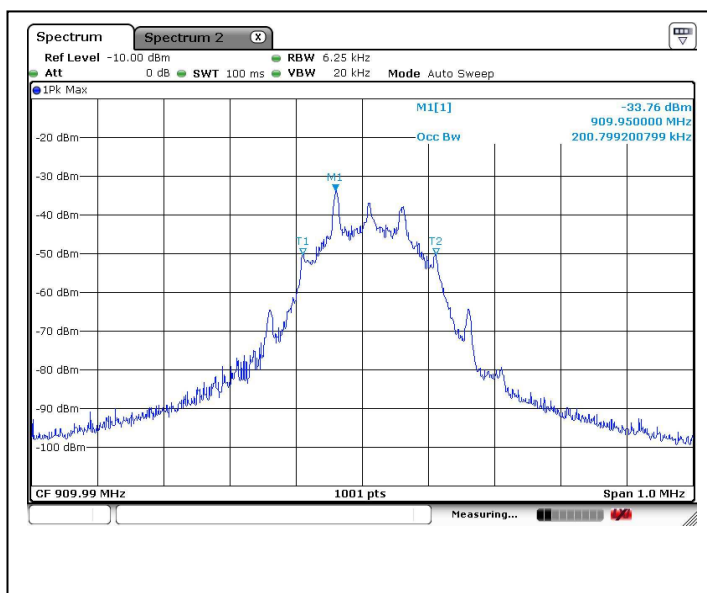
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### A2. 99% Bandwidth Plot



\*\*\*\*\* End of Report \*\*\*\*\*

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Page 19 of 19

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