| | | | | |
|---|---|---|---|---|
| **Prüfbericht-Nr.:** *Test report no.:* | CN23UGU9 (FCC-Colocated) 001 | **Auftrags-Nr.:** *Order no.:* | 48215914 |  |
| **Kunden-Referenz-Nr.:** *Client reference no.:* | N/A | **Auftragsdatum:** *Order date:* | 2023-02-17 | |
| **Auftraggeber:** *Client:* | Dot Origin Ltd<br>Unit 7 Coopers Place, Combe Lane, Wormley, Godalming, GU8 5SZ, UK | | | |
| **Prüfgegenstand:** *Test item:* | VTAP200ESS | | | |
| **Bezeichnung / Typ-Nr.:** *Identification / Type no.:* | VTAP200ESS | | | |
| **Auftrags-Inhalt:** *Order content*: | Spot Checking Emissions (FCC) | | | |
| **Prüfgrundlage:** *Test specification:* | FCC 47CFR Part 15: Subpart C Section 15.247 | | | |
| **Wareneingangsdatum:** *Date of sample receipt:* | 2023-03-30 | | | |
| **Prüfmuster-Nr.:** *Test sample no:* | A003445985-001 | | | |
| **Prüfzeitraum:** *Testing period:* | 2023-04-09 - 2023-04-12 | | | |
| **Ort der Prüfung:** *Place of testing:* | EMC/RF Taipei Testing Site | | | |
| **Prüflaboratorium:** *Testing laboratory:* | Taipei Testing Laboratories | | | |
| **Prüfergebnis*:** *Test result*:* | Pass | | | |

| | | | |
|---|---|---|---|
| **zusammengestellt von:** *compiled by:* | | **genehmigt von:** authorized by: | |
| **Datum:** *Date:* 2023-04-27 | Ethan Shao | **Ausstellungsdatum:** *Issue date:* 2023-04-27 | Brenda Chen |
| **Stellung** / *Position:* | Assistant Project Engineer | **Stellung** / *Position:* | Senior Project Manager |

**Sonstiges** / *Other:*

**Zustand des Prüfgegenstandes bei Anlieferung:** Prüfmuster vollständig und unbeschädigt
*Condition of the test item at delivery:* *Test item complete and undamaged*

| | | | | | |
|---|---|---|---|---|---|
| * Legende: | 1 = sehr gut | 2 = gut | 3 = befriedigend | 4 = ausreichend | 5 = mangelhaft |
| | P(ass) = entspricht o.g. Prüfgrundlage(n) | | F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | N/A = nicht anwendbar | N/T = nicht getestet |
| ** Legend:* | *1 = very good* | *2 = good* | *3 = satisfactory* | *4 = sufficient* | *5 = poor* |
| | *P(ass) = passed a.m. test specification(s)* | | *F(ail) = failed a.m. test specification(s)* | *N/A = not applicable* | *N/T = not tested* |

**Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.**
*This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.*
V05

# TEST SUMMARY

| Report Section | FCC Clause | Test Item | Result |
|---|---|---|---|
| 5.1.1 | 15.247(d) | Radiated Spurious Emissions and Band Edges | Pass |
| 5.2.1 | 15.207 | Mains Conducted Emission | Pass |

**Note:** Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

# Contents

**HISTORY OF THIS TEST REPORT** ..... 4

**1. GENERAL REMARKS** ..... 5
**1.1 COMPLEMENTARY MATERIALS** ..... 5
**1.2 DECISION RULE OF CONFORMITY** ..... 5

**2. TEST SITES** ..... 6
**2.1 TEST LABORATORY** ..... 6
**2.2 TEST FACILITY** ..... 6
**2.3 TRACEABILITY** ..... 7
**2.4 CALIBRATION** ..... 7
**2.5 MEASUREMENT UNCERTAINTY** ..... 7

**3. GENERAL PRODUCT INFORMATION** ..... 8
**3.1 PRODUCT FUNCTION AND INTENDED USE** ..... 8
**3.2 SYSTEM DETAILS AND RATINGS** ..... 8
**3.3 NOISE GENERATING AND NOISE SUPPRESSING PARTS** ..... 8
**3.4 SUBMITTED DOCUMENTS** ..... 9

**4. TEST SET-UP AND OPERATON MODES** ..... 10
**4.1 PRINCIPLE OF CONFIGURATION SELECTION** ..... 10
**4.2 TEST OPERATION AND TEST SOFTWARE** ..... 10
**4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT** ..... 11
**4.4 TEST SETUP DIAGRAM** ..... 12

**5. TEST RESULTS** ..... 13
**5.1 TRANSMITTER REQUIREMENT & TEST SUITES** ..... 13
*5.1.1 Radiated Spurious Emissions* ..... 13
**5.2 MAINS EMISSION** ..... 16
*5.2.1 Mains Conducted Emission* ..... 16

**APPENDIX A - TEST RESULT OF RADIATED EMISSIONS AND Mains Conducted Emissions**
**APPENDIX SP - PHOTOGRAPHS OF TEST SETUP**
**APPENDIX EP - PHOTOGRAPHS OF EUT**

# HISTORY OF THIS TEST REPORT

| Report No. | Description | Date Issued |
|---|---|---|
| CN23UGU9 (FCC-Colocated) 001 | Original Release | 2023-04-27 |

# 1. General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
**Appendix A - Test Result of Radiated Emissions and Mains Conducted Emissions**
**Appendix SP - Photographs of Test Setup**
**Appendix EP - Photographs of EUT**

### Applied Standard and Test Levels

| Radio |
|---|
| FCC CFR47 Part 15: Subpart C Section 15.247 |
| FCC CFR47 Part 2: Subpart J Section 2.1091 |
| FCC 47 CFR Part 90 |
| ANSI C63.10:2013 |
| KDB 558074 D01 15.247 Meas Guidance v05r02 |
| KDB 996369 D04 Module Integration Guide v01 |

## 1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

# 2. Test Sites

## 2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

## 2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 180491
ISED Registration No.: 25563

## 2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

## 2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of k=2 to indicate a 95% level of confidence.

### Emission Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| Radiated Emission (9 kHz ~ 30 MHz) | ± 1.15 dB |
| Radiated Emission (30 MHz ~ 200 MHz) | ± 1.30 dB |
| Radiated Emission (200 MHz ~ 1 GHz) | ± 1.30 dB |
| Radiated Emission (1 GHz ~ 18 GHz) | ± 1.54 dB |
| Radiated Emission (18 GHz ~ 40 GHz) | ± 2.52 dB |
| Mains Conducted Emission | ± 1.65 dB |

# 3. General Product Information

## 3.1 Product Function and Intended Use

The EUT is a ready-to-use 13.56 MHz NFC reader that is designed for use in many application and especially those where reading virtual card, tickets and passed from mobile phone wallet apps via NFC is a requirement.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

## 3.2 System Details and Ratings

### Basic Information of EUT

| Item | EUT information |
|---|---|
| Kind of Equipment/Test Item | VTAP200ESS |
| Type Identification | VTAP200ESS |
| FCC ID | 2A282-VTAP200ESS |

### Technical Specification of EUT

| Item | EUT information |
|---|---|
| Operating Frequency | WiFi: 2412 ~ 2472 MHz / 2422 ~2462MHz<br>Bluetooth: 2402 ~ 2480 MHz<br>NFC: 13.56 MHz |
| Operation Voltage | 12 Vdc |

| Item | EUT information |
|---|---|
| Modulation | WiFi:<br>DSSS (DBPSK, DQPSK, CCK)<br>OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)<br>Bluetooth: GFSK, π/4-DQPSK, 8DPSK<br>NFC: ASK |
| Antenna Information | Refer to note as below |

Note:
1. The antenna list is as below.

| Type | Gain (dBi) | | |
|---|---|---|---|
| | NFC | BT | WiFi 2.4GHz |
| PCB Antenna | - | 3.4 | 3.4 |

## 3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

## 3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

# 4. Test Set-up and Operaton Modes

## 4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.
During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output expected by the customer and is going to be fixed on the firmware of the final end product.

## 4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with RF cable which makes it possible to control them through a base station simulator.

The samples were used as follows:
A003445985-001
Full test was applied on all test modes, but only worst case was shown.

| EUT Configure Mode | Applicable To | Description |
|---|---|---|
| | Radiated Spurious Emissions | |
| - | √ | - |

Note:
1. "-" means no effect.

**Radiated Spurious Emissions**

☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Description |
|---|---|
| - | NFC+Bluetooth |
| - | NFC+WiFi 2.4GHz |

**Test Condition**

| Test Item | Ambient Temperature | Relative Humidity | Tested by |
|---|---|---|---|
| Radiated Spurious Emissions | 23.4-24.9 °C | 61-63 % | Ray Huang |

## 4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

### Accessory of EUT

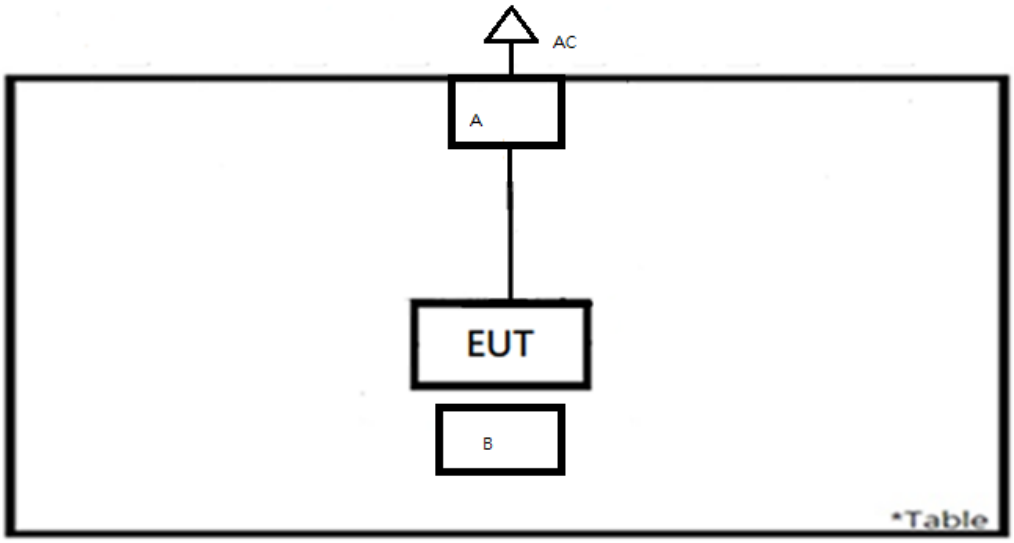
None.

### Support Unit

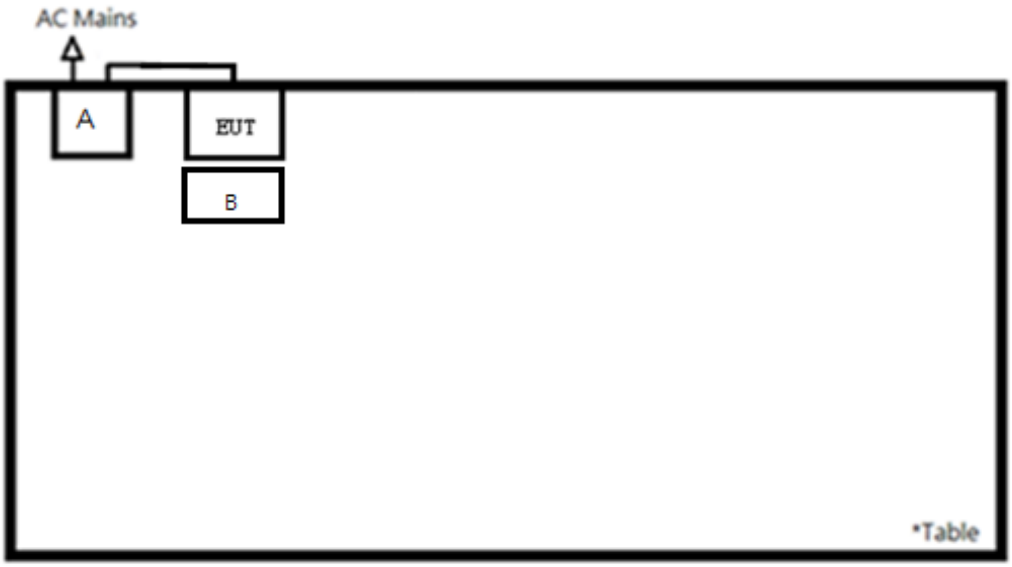
| Radiated and Mains Conducted Tests | | | | |
|---|---|---|---|---|
| No. | Description | Brand | Model | Remark |
| A | Switching Adapter | multicomp pro | DSA-12PFU-12 | I/P: 100-240 Vac, 50/60 Hz, 0.5 A<br>O/P: 12 Vdc, 1.0 A<br>150 cm non-shielded cable with core |
| | | | | A003424337-008 |
| B | NFC Card | Generic | Dot Origin-01 | A003424337-003 |

## 4.4 Test Setup Diagram

**<Radiated Spurious Emissions Mode>**




**<Mains Conducted Emission Mode>**



# 5. Test Results

## 5.1 Transmitter Requirement & Test Suites

### 5.1.1 Radiated Spurious Emissions

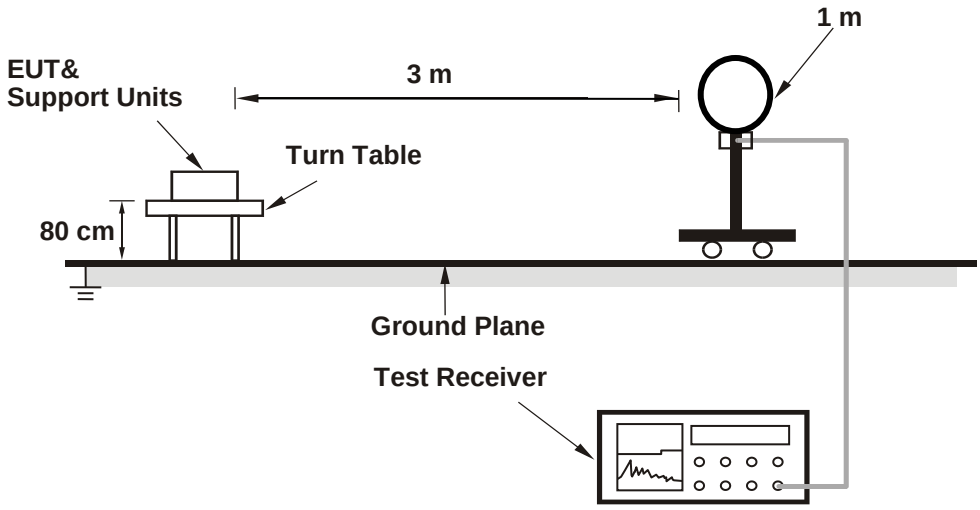
**Limit**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

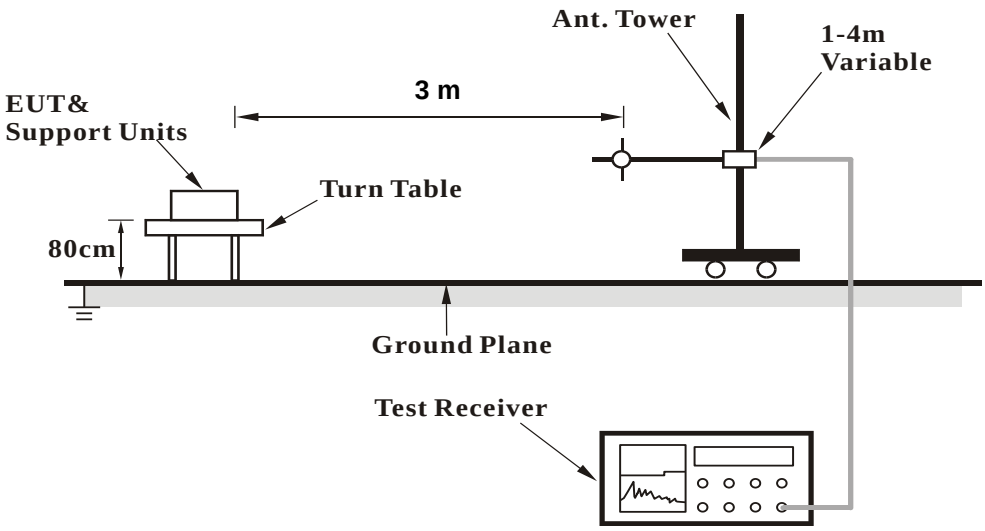
**Kind of Test Site** 3m Semi-Anechoic Chamber

**Test Setup**

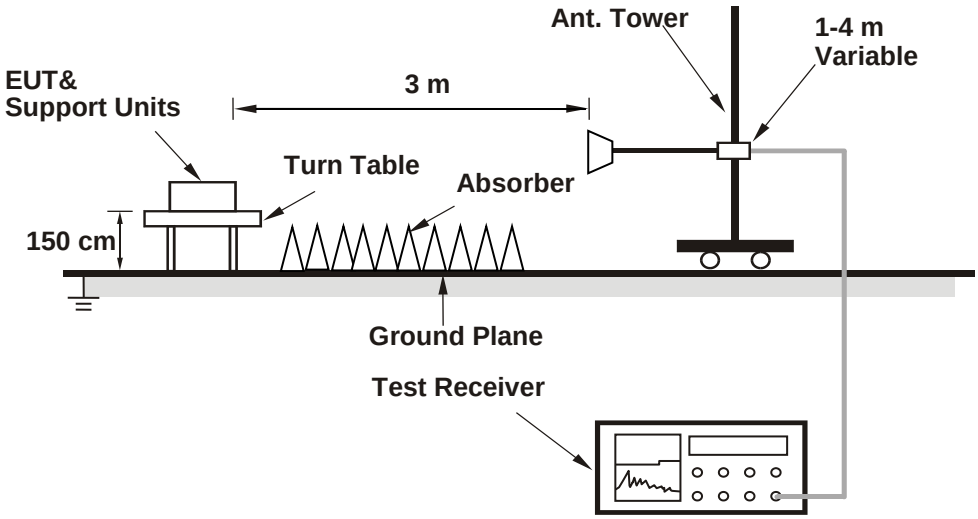
**<Radiated Emissions below 30 MHz>**



**<Radiated Emissions 30 MHz to 1 GHz>**




**<Radiated Emissions above 1 GHz>**




For the actual test configuration, please refer to the attached file (Test Setup Photo).

**Test Instruments**

Test Date: 2023/4/9

| Kind of Equipment | Manufacturer | Type | S/N | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Above 1GHz | | | | | |
| Signal Analyzer | R&S | FSV40 | 101509 | 2022/4/22 | 2023/4/21 |
| Horn Antenna | ETS-Lindgren | 3117 | 00218929 | 2022/12/8 | 2023/12/7 |
| HF-AMP + AC source | EMCI | EMC051845SE | 980633 | 2023/2/22 | 2024/2/21 |
| HF-AMP + AC source | EMCI | EMC184045SE | 980657 | 2023/2/16 | 2024/2/15 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | 00890 | 2022/5/6 | 2023/5/5 |
| 30MHz-1GHz | | | | | |
| Receiver | R&S | ESR7 | 102109 | 2023/2/24 | 2024/2/23 |
| Bilog Antenna | SCHWARZBECK | VULB-9168 | 00949 | 2022/5/29 | 2023/5/28 |
| LF-AMP | Agilent | 8447D | 2944A107722 | 2023/3/22 | 2024/3/20 |
| Below 1GHz | | | | | |
| Receiver | R&S | ESR7 | 102109 | 2023/2/24 | 2024/2/23 |
| Loop Antenna | SCHWARZBECK | FMZB 1519B | 00215 | 2023/1/4 | 2024/1/3 |

**Test Procedures**

a. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
b. 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.
c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
d. Following C63.26 section 5.5 and 5.2.7
EIRP (dBm) = E (dB$\mu$V/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
ERP (dBm) = E (dB$\mu$V/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. Testing was carried out within frequency range 30 MHz to the tenth harmonic.
3. All modes of operation were investigated and the worst-case emissions are reported.
4. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

**Test Results**

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix A.

# 5.2 Mains Emission

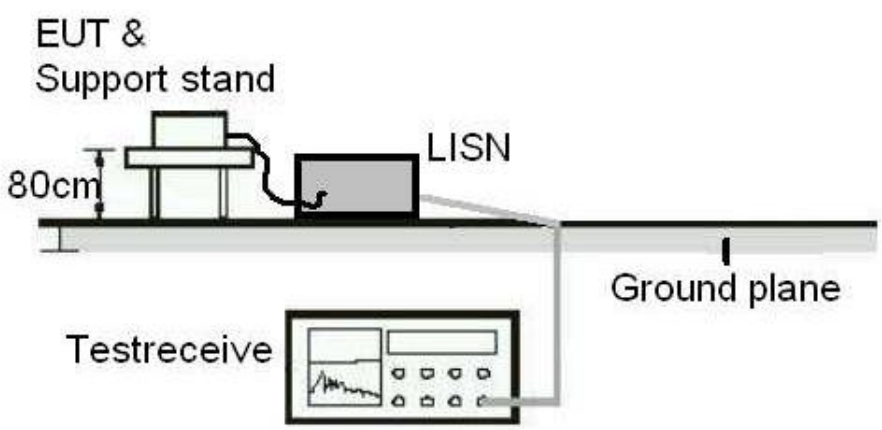
## 5.2.1 Mains Conducted Emission

**Limit**

Mains Conducted emissions as defined in §15.207 must comply with the mains conducted emission limits.

**Kind of Test Site** Shielded room

**Test Setup**




**Test Instruments**

Test Date: 2023/4/12

| Kind of Equipment | Manufacturer | Type | S/N | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Two-Line V-Network | Rohde & Schwarz | ENV216 | 101938 | 2022/9/22 | 2023/9/21 |
| EMI Test Receiver | R&S | ESCI | 100797 | 2022/6/19 | 2023/6/18 |

**Test Procedures**

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

**Test Results**

Please refer to Appendix A.

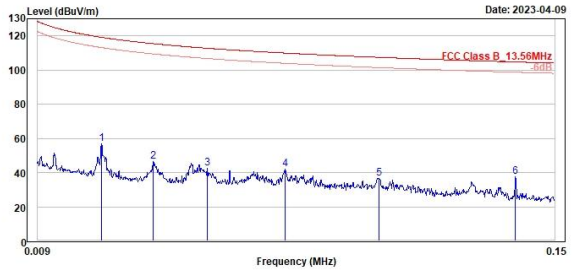
# Appendix A: Test Results of Radiated Spurious Emissions

## Spurious Emissions, Tx Mode, 9kHz ~ 30MHz

### NFC+8DPSK

#### 9kHz~150kHz(Open)

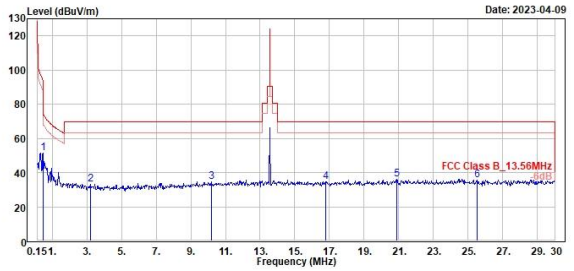
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 0.026 | 56.88 | 37.93 | 18.95 | 119.13 | -62.25 | 100 | 220 | Peak | Open | |
| 2 | 0.040 | 46.41 | 27.25 | 19.16 | 115.46 | -69.05 | 100 | 43 | Peak | Open | |
| 3 | 0.055 | 42.71 | 23.73 | 18.98 | 112.75 | -70.04 | 100 | 73 | Peak | Open | |
| 4 | 0.076 | 41.98 | 23.50 | 18.48 | 109.93 | -67.95 | 100 | 191 | Peak | Open | |
| 5 | 0.102 | 36.79 | 18.86 | 17.93 | 107.41 | -70.62 | 100 | 160 | Peak | Open | |
| 6 | 0.139 | 37.38 | 19.30 | 18.08 | 104.72 | -67.34 | 100 | 133 | Peak | Open | |

#### 150kHz~30MHz(Open)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



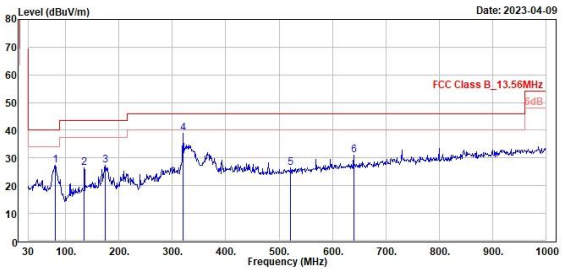

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 0.478 | 51.52 | 32.68 | 18.84 | 94.01 | -42.49 | 100 | 43 | Peak | Open | |
| 2 | 3.195 | 33.32 | 13.71 | 19.61 | 69.50 | -36.18 | 100 | 26 | Peak | Open | |
| 3 | 10.180 | 34.56 | 12.95 | 21.61 | 69.50 | -34.94 | 100 | 206 | Peak | Open | |
| 4 | 16.776 | 34.60 | 12.52 | 22.08 | 69.50 | -34.90 | 100 | 269 | Peak | Open | |
| 5 | 20.896 | 35.88 | 13.57 | 22.31 | 69.50 | -33.62 | 100 | 250 | Peak | Open | |
| 6 | 25.523 | 35.83 | 13.45 | 22.38 | 69.50 | -33.67 | 100 | 360 | Peak | Open | |

## Spurious Emissions, Tx Mode, 30MHz ~ 1GHz

### NFC+8DPSK

#### Horizontal

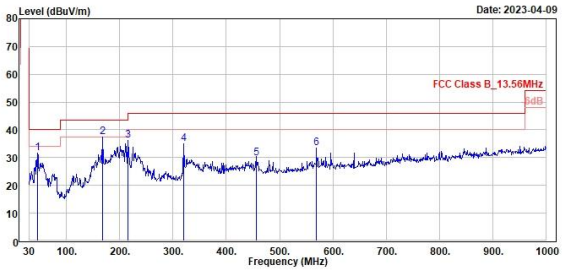
TUV Rheinland Taiwan Ltd.
No. 458-18,Sec 2,Fenliao.,Linkou Dist.,New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 80.440 | 27.24 | 39.07 | -11.83 | 40.00 | -12.76 | 200 | 138 | Peak | Horizontal | |
| 2 | 134.760 | 26.41 | 34.50 | -8.09 | 43.50 | -17.09 | 200 | 193 | Peak | Horizontal | |
| 3 | 173.560 | 27.23 | 35.16 | -7.93 | 43.50 | -16.27 | 100 | 121 | Peak | Horizontal | |
| 4 | 320.030 | 38.87 | 44.74 | -5.87 | 46.00 | -7.13 | 100 | 16 | Peak | Horizontal | |
| 5 | 521.790 | 26.55 | 29.00 | -2.45 | 46.00 | -19.45 | 100 | 20 | Peak | Horizontal | |
| 6 | 640.130 | 31.18 | 31.91 | -0.73 | 46.00 | -14.82 | 100 | 111 | Peak | Horizontal | |

#### Vertical

TUV Rheinland Taiwan Ltd.
No. 458-18,Sec 2,Fenliao.,Linkou Dist.,New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



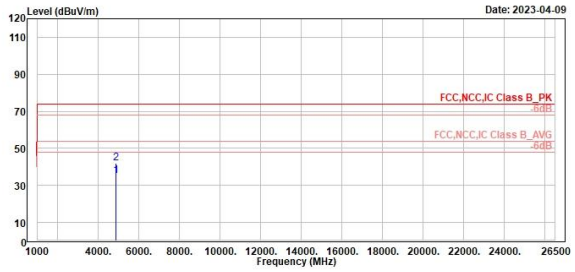

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 45.520 | 31.54 | 38.88 | -7.34 | 40.00 | -8.46 | 100 | 148 | Peak | Vertical | |
| 2 | 167.740 | 37.43 | 44.80 | -7.37 | 43.50 | -6.07 | 100 | 152 | Peak | Vertical | |
| 3 | 215.270 | 36.24 | 45.78 | -9.54 | 43.50 | -7.26 | 100 | 73 | Peak | Vertical | |
| 4 | 320.030 | 34.99 | 40.86 | -5.87 | 46.00 | -11.01 | 200 | 173 | Peak | Vertical | |
| 5 | 456.800 | 29.95 | 33.34 | -3.39 | 46.00 | -16.05 | 100 | 305 | Peak | Vertical | |
| 6 | 569.320 | 33.39 | 35.05 | -1.66 | 46.00 | -12.61 | 100 | 173 | Peak | Vertical | |

## Spurious Emissions, Tx Mode, 1GHz ~ 26.5GHz

### NFC+8DPSK

#### Horizontal

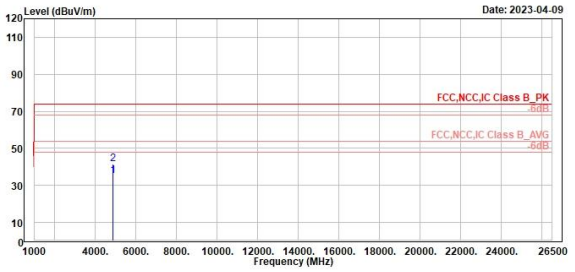
TUV Rheinland Taiwan Ltd.
No. 458-18,Sec 2,Fenliao.,Linkou Dist.,New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 4882.000 | 35.06 | 45.40 | -10.34 | 54.00 | -18.94 | 200 | 70 | Average | Horizontal | |
| 2 | 4882.000 | 41.98 | 52.32 | -10.34 | 74.00 | -32.02 | 200 | 70 | Peak | Horizontal | |

#### Vertical

TUV Rheinland Taiwan Ltd.
No. 458-18,Sec 2,Fenliao.,Linkou Dist.,New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



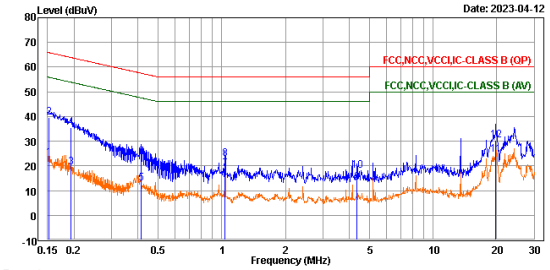

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 4882.000 | 35.02 | 45.36 | -10.34 | 54.00 | -18.98 | 100 | 43 | Average | Vertical | |
| 2 | 4882.000 | 41.75 | 52.09 | -10.34 | 74.00 | -32.25 | 100 | 43 | Peak | Vertical | |

## Mains Conducted Emission, Tx Mode, 150kHz ~ 30MHz

### Worst Band for NFC+8DPSK

### (Line)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322

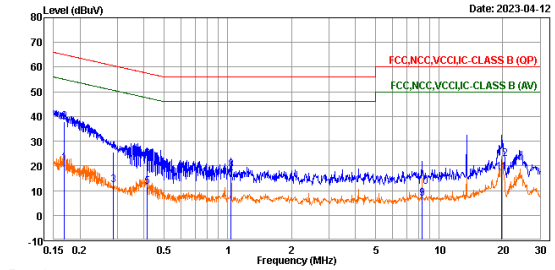



Trace: 1

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dBuV | dB | dBuV | dB | | | |
| 1 | 0.15 | 23.33 | 13.64 | 9.69 | 55.88 | -32.55 | Average | line1 | |
| 2 | 0.15 | 39.56 | 29.87 | 9.69 | 65.88 | -26.32 | QP | line1 | |
| 3 | 0.19 | 19.27 | 9.59 | 9.68 | 53.89 | -34.62 | Average | line1 | |
| 4 | 0.19 | 35.49 | 25.81 | 9.68 | 63.89 | -28.40 | QP | line1 | |
| 5 | 0.42 | 12.86 | 3.18 | 9.68 | 47.51 | -34.65 | Average | line1 | |
| 6 | 0.42 | 23.45 | 13.77 | 9.68 | 57.51 | -34.06 | QP | line1 | |
| 7 | 1.04 | 18.87 | 9.18 | 9.69 | 46.00 | -27.13 | Average | line1 | |
| 8 | 1.04 | 22.93 | 13.24 | 9.69 | 56.00 | -33.07 | QP | line1 | |
| 9 | 4.36 | 13.24 | 3.49 | 9.75 | 46.00 | -32.76 | Average | line1 | |
| 10 | 4.36 | 18.01 | 8.26 | 9.75 | 56.00 | -37.99 | QP | line1 | |
| 11 | 19.74 | 24.64 | 14.83 | 9.81 | 50.00 | -25.36 | Average | line1 | |
| 12 | 19.74 | 30.45 | 20.64 | 9.81 | 60.00 | -29.55 | QP | line1 | |

### (Neutral)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




Trace: 1

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dBuV | dB | dBuV | dB | | | |
| 1 | 0.17 | 21.04 | 11.37 | 9.67 | 55.05 | -34.01 | Average | neutral | |
| 2 | 0.17 | 37.88 | 28.21 | 9.67 | 65.05 | -27.17 | QP | neutral | |
| 3 | 0.29 | 12.08 | 2.43 | 9.65 | 50.62 | -38.54 | Average | neutral | |
| 4 | 0.29 | 25.71 | 16.06 | 9.65 | 60.62 | -34.91 | QP | neutral | |
| 5 | 0.42 | 11.63 | 1.97 | 9.66 | 47.51 | -35.88 | Average | neutral | |
| 6 | 0.42 | 22.96 | 13.30 | 9.66 | 57.51 | -34.55 | QP | neutral | |
| 7 | 1.04 | 14.34 | 4.68 | 9.66 | 46.00 | -31.66 | Average | neutral | |
| 8 | 1.04 | 18.32 | 8.66 | 9.66 | 56.00 | -37.68 | QP | neutral | |
| 9 | 8.29 | 6.88 | -2.89 | 9.77 | 50.00 | -43.12 | Average | neutral | |
| 10 | 8.29 | 11.68 | 1.91 | 9.77 | 60.00 | -48.32 | QP | neutral | |
| 11 | 19.74 | 17.26 | 7.39 | 9.87 | 50.00 | -32.74 | Average | neutral | |
| 12 | 19.74 | 22.86 | 12.99 | 9.87 | 60.00 | -37.14 | QP | neutral | |

## Spurious Emissions, Tx Mode, 9kHz ~ 30MHz

### NFC+802.11b_2412MHz

#### 9kHz~150kHz(Open)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
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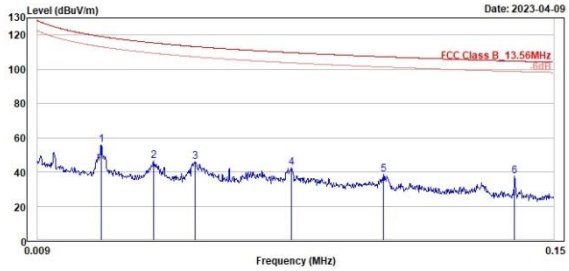
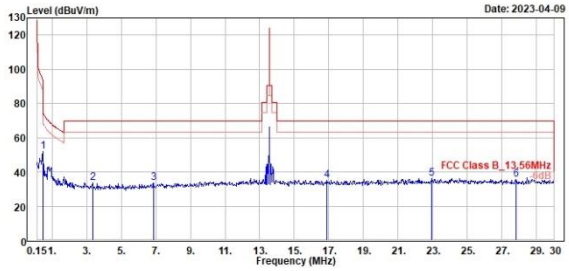



| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 0.026 | 56.07 | 37.12 | 18.95 | 119.13 | -63.06 | 100 | 42 | Peak | Open | |
| 2 | 0.041 | 46.38 | 27.22 | 19.16 | 115.39 | -69.01 | 100 | 233 | Peak | Open | |
| 3 | 0.052 | 45.78 | 26.72 | 19.06 | 113.25 | -67.47 | 100 | 188 | Peak | Open | |
| 4 | 0.078 | 42.37 | 23.94 | 18.43 | 109.71 | -67.34 | 100 | 211 | Peak | Open | |
| 5 | 0.103 | 38.53 | 20.60 | 17.93 | 107.30 | -68.77 | 100 | 147 | Peak | Open | |
| 6 | 0.139 | 37.50 | 19.42 | 18.08 | 104.72 | -67.22 | 100 | 146 | Peak | Open | |

#### 150kHz~30MHz(Open)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



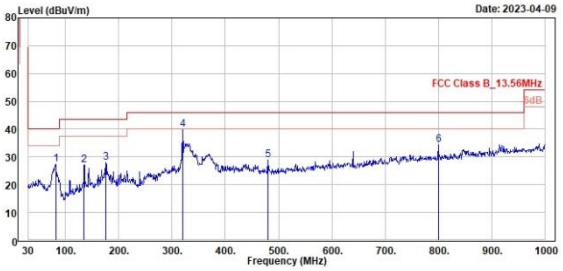

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 0.478 | 51.84 | 33.00 | 18.84 | 94.01 | -42.17 | 100 | 201 | Peak | Open | |
| 2 | 3.344 | 33.58 | 13.98 | 19.60 | 69.50 | -35.92 | 100 | 224 | Peak | Open | |
| 3 | 6.866 | 33.39 | 13.15 | 20.24 | 69.50 | -36.11 | 100 | 199 | Peak | Open | |
| 4 | 16.866 | 34.88 | 12.80 | 22.08 | 69.50 | -34.62 | 100 | 249 | Peak | Open | |
| 5 | 22.955 | 36.02 | 13.68 | 22.34 | 69.50 | -33.48 | 100 | 335 | Peak | Open | |
| 6 | 27.821 | 35.34 | 12.92 | 22.42 | 69.50 | -34.16 | 100 | 118 | Peak | Open | |

## Spurious Emissions, Tx Mode, 30MHz ~ 1GHz

### NFC+802.11b_2412MHz

#### Horizontal

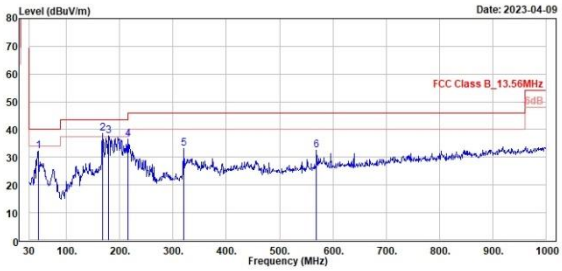
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 81.410 | 27.31 | 39.41 | -12.10 | 40.00 | -12.69 | 200 | 141 | Peak | Horizontal | |
| 2 | 134.760 | 27.19 | 35.28 | -8.09 | 43.50 | -16.31 | 200 | 211 | Peak | Horizontal | |
| 3 | 175.500 | 28.09 | 36.25 | -8.16 | 43.50 | -15.41 | 200 | 277 | Peak | Horizontal | |
| 4 | 320.030 | 39.73 | 45.60 | -5.87 | 46.00 | -6.27 | 100 | 66 | Peak | Horizontal | |
| 5 | 480.080 | 28.82 | 32.17 | -3.35 | 46.00 | -17.18 | 200 | 62 | Peak | Horizontal | |
| 6 | 800.180 | 34.36 | 32.18 | 2.18 | 46.00 | -11.64 | 100 | 296 | Peak | Horizontal | |

#### Vertical

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



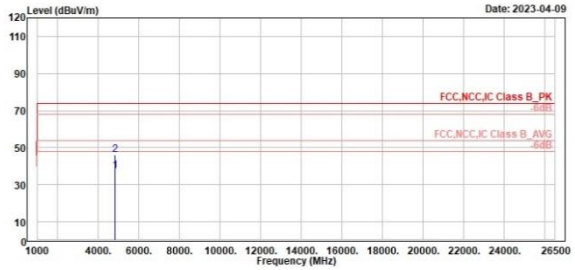

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 46.490 | 32.09 | 39.31 | -7.22 | 40.00 | -7.91 | 100 | 139 | Peak | Vertical | |
| 2 ! | 167.740 | 38.55 | 45.92 | -7.37 | 43.50 | -4.95 | 100 | 220 | Peak | Vertical | |
| 3 ! | 179.380 | 37.72 | 46.38 | -8.66 | 43.50 | -5.78 | 100 | 220 | Peak | Vertical | |
| 4 | 215.270 | 36.60 | 46.14 | -9.54 | 43.50 | -6.90 | 100 | 147 | Peak | Vertical | |
| 5 | 320.030 | 33.05 | 38.92 | -5.87 | 46.00 | -12.95 | 200 | 148 | Peak | Vertical | |
| 6 | 569.320 | 32.61 | 34.27 | -1.66 | 46.00 | -13.39 | 100 | 292 | Peak | Vertical | |

## Spurious Emissions, Tx Mode, 1GHz ~ 26.5GHz

### NFC+802.11b_2412MHz

#### Horizontal

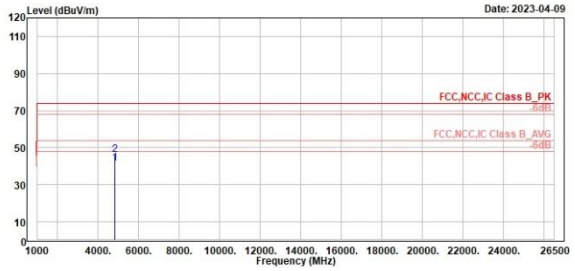
TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 4824.000 | 37.29 | 47.63 | -10.34 | 54.00 | -16.71 | 200 | 74 | Average | Horizontal | |
| 2 | 4824.000 | 45.96 | 56.30 | -10.34 | 74.00 | -28.04 | 200 | 74 | Peak | Horizontal | |

#### Vertical

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322



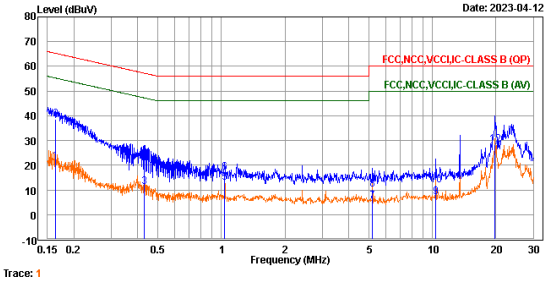

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | APos | TPos | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | | |
| 1 | 4824.000 | 41.44 | 51.78 | -10.34 | 54.00 | -12.56 | 200 | 241 | Average | Vertical | |
| 2 | 4824.000 | 46.23 | 56.57 | -10.34 | 74.00 | -27.77 | 200 | 241 | Peak | Vertical | |

## Mains Conducted Emission, Tx Mode, 150kHz ~ 30MHz

### Worst Band for NFC+802.11b_2412MHz

### (Line)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322

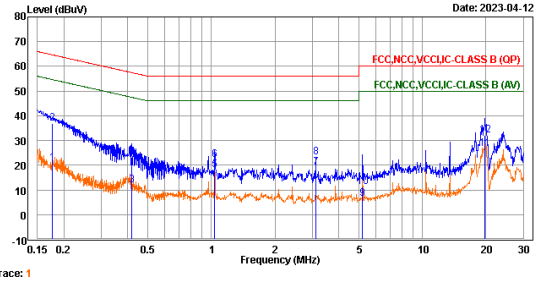



Trace: 1

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dBuV | dB | dBuV | dB | | | |
| 1 | 0.16 | 21.57 | 11.88 | 9.69 | 55.25 | -33.68 | Average | line1 | |
| 2 | 0.16 | 38.67 | 28.98 | 9.69 | 65.25 | -26.58 | QP | line1 | |
| 3 | 0.43 | 11.05 | 1.37 | 9.68 | 47.26 | -36.21 | Average | line1 | |
| 4 | 0.43 | 23.76 | 14.08 | 9.68 | 57.26 | -33.50 | QP | line1 | |
| 5 | 1.04 | 13.01 | 3.32 | 9.69 | 46.00 | -32.99 | Average | line1 | |
| 6 | 1.04 | 16.99 | 7.30 | 9.69 | 56.00 | -39.01 | QP | line1 | |
| 7 | 5.19 | 5.50 | -4.26 | 9.76 | 50.00 | -44.50 | Average | line1 | |
| 8 | 5.19 | 10.34 | 0.58 | 9.76 | 60.00 | -49.66 | QP | line1 | |
| 9 | 10.38 | 7.05 | -2.76 | 9.81 | 50.00 | -42.95 | Average | line1 | |
| 10 | 10.38 | 11.75 | 1.94 | 9.81 | 60.00 | -48.25 | QP | line1 | |
| 11 | 19.74 | 25.28 | 15.47 | 9.81 | 50.00 | -24.72 | Average | line1 | |
| 12 | 19.74 | 28.28 | 18.47 | 9.81 | 60.00 | -31.72 | QP | line1 | |

### (Neutral)

TÜV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao., Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel:+886-2172-1000 Fax:+886-2172-1322




Trace: 1

| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Remark | Pol/Phase | Note |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dBuV | dB | dBuV | dB | | | |
| 1 | 0.18 | 20.72 | 11.06 | 9.66 | 54.68 | -33.96 | Average | neutral | |
| 2 | 0.18 | 36.80 | 27.14 | 9.66 | 64.68 | -27.88 | QP | neutral | |
| 3 | 0.42 | 11.93 | 2.27 | 9.66 | 47.47 | -35.54 | Average | neutral | |
| 4 | 0.42 | 23.06 | 13.40 | 9.66 | 57.47 | -34.41 | QP | neutral | |
| 5 | 1.04 | 17.99 | 8.33 | 9.66 | 46.00 | -28.01 | Average | neutral | |
| 6 | 1.04 | 22.11 | 12.45 | 9.66 | 56.00 | -33.89 | QP | neutral | |
| 7 | 3.12 | 19.02 | 9.31 | 9.71 | 46.00 | -26.98 | Average | neutral | |
| 8 | 3.12 | 23.13 | 13.42 | 9.71 | 56.00 | -32.87 | QP | neutral | |
| 9 | 5.19 | 6.42 | -3.32 | 9.74 | 50.00 | -43.58 | Average | neutral | |
| 10 | 5.19 | 11.05 | 1.31 | 9.74 | 60.00 | -48.95 | QP | neutral | |
| 11 | 19.74 | 26.76 | 16.89 | 9.87 | 50.00 | -23.24 | Average | neutral | |
| 12 | 19.74 | 32.20 | 22.33 | 9.87 | 60.00 | -27.80 | QP | neutral | |