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Report Template Version: V04
Report Template Revision Date: 2018-07-06

# **Test Report**

**Report No.:** CQASZ20240200265E-01

Applicant: TOPDON TECHNOLOGY Co., Ltd.

Address of Applicant: Unit 2005 20/F, Qianhai Shimao Tower, Qianhai Shenzhen-Hong kong Cooperation

Zone, Shenzhen, China, 518052

**Equipment Under Test (EUT):** 

Product: THINKTOOL PROS+, Smart Automotive Diagnostic System

Model No.: TKT04, Phoenix Plus, Phoenix Plus 2

Teat Model No.: TKT04

Brand Name: TOPDON

FCC ID: 2AVYW-PHPLUS

**Standards:** 47 CFR Part 15, Subpart C

**Date of Receipt:** 2024-02-01

**Date of Test:** 2024-02-01 to 2024-03-06

Date of Issue: 2024-03-06
Test Result: PASS\*

\*In the configuration tested, the EUT complied with the standards specified above

Tested By:

(Lewis Zhou)

Reviewed By:

(Timo Lei)

Approved By:

(Alex Wang)



The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.



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## 1 Version

## **Revision History Of Report**

| Report No.           | Version | Description    | Issue Date |
|----------------------|---------|----------------|------------|
| CQASZ20240200265E-01 | Rev.01  | Initial report | 2024-03-06 |

Note:

This test report (Ref. No.: CQASZ20240200265E-01)

All test data comes from source test reports (Ref. No.:CQASZ20210300306E-01).

Only on the basis of the original report Change Model No., ower supply panel, Applicant, Address of Applicant, Manufacturer, Address of Manufacturer, Brand Name, Photographs of EUT. These changes do not affect RF performance.



# 2 Test Summary

| Test Item   | Test Requirement                                    | Test method      | Result |
|---|---|------------------|--------|
| Antenna Requirement   | 47 CFR Part 15, Subpart C Section 15.203/15.247 (c) | ANSI C63.10 2013 | PASS   |
| AC Power Line<br>Conducted<br>Emission                            | 47 CFR Part 15, Subpart C Section<br>15.207         | ANSI C63.10 2013 | PASS   |
| Conducted Peak Output<br>Power                                    | 47 CFR Part 15, Subpart C Section<br>15.247 (b)(3)  | ANSI C63.10 2013 | N/A    |
| 6dB Occupied<br>Bandwidth   | 47 CFR Part 15, Subpart C Section<br>15.247 (a)(2)  | ANSI C63.10 2013 | N/A    |
| Power Spectral Density  | 47 CFR Part 15, Subpart C Section 15.247 (e)        | ANSI C63.10 2013 | N/A    |
| Band-edge for RF<br>Conducted Emissions                           | 47 CFR Part 15, Subpart C Section 15.247(d)         | ANSI C63.10 2013 | N/A    |
| RF Conducted Spurious<br>Emissions                                | 47 CFR Part 15, Subpart C Section 15.247(d)         | ANSI C63.10 2013 | N/A    |
| Radiated Spurious<br>Emissions                                    | 47 CFR Part 15, Subpart C Section<br>15.205/15.209  | ANSI C63.10 2013 | PASS   |
| Restricted bands around fundamental frequency (Radiated Emission) | 47 CFR Part 15, Subpart C Section<br>15.205/15.209  | ANSI C63.10 2013 | PASS   |



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# 4 General Information

## 4.1 Client Information

| Applicant:               | TOPDON TECHNOLOGY Co., Ltd.   |
|--------------------------|---|
| Address of Applicant:    | Unit 2005 20/F, Qianhai Shimao Tower, Qianhai Shenzhen-Hong kong<br>Cooperation Zone, Shenzhen, China, 518052 |
| Manufacturer:            | TOPDON TECHNOLOGY Co., Ltd.   |
| Address of Manufacturer: | Unit 2005 20/F, Qianhai Shimao Tower, Qianhai Shenzhen-Hong kong<br>Cooperation Zone, Shenzhen, China, 518052 |
| Factory:                 | THINKCAR TECH CO., LTD. BanTian Branch  |
| Address of Factory:      | 2606, building 4, phase II, TiananYungu, Gangtou community, Bantian,<br>Longgang District, Shenzhen           |

# 4.2 General Description of EUT

| Product Name:                    | THINKTOOL PROS+, Smart Automotive Diagnostic System  |
|----------------------------------|--|
| Model No.:                       | TKT04, Phoenix Plus, Phoenix Plus 2  |
| Test Model No.:                  | TKT04  |
| Trade Mark:                      | TOPDON   |
| Hardware Version:                | BSK-Y8-V3  |
| Software Version:                | Y8_tool_proplus_20201023_1413_V1.8   |
| Test sample SN:                  | 850022568053   |
| EUT Power Supply:                | lithium battery:DC7.6V, 6300mAh, Charge by DC5V<br>Adapter:<br>MODEL: PSYB0502500<br>INPUT: 100-240V~50/60Hz 0.6A Max<br>OUTPUT: 5V 2.5A, 12.5W  |
| EUT Supports Radios application: | Bluetooth Dual mode: 2402-2480MHz<br>2.4GHz: Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462MHz;<br>802.11n(HT40): 2422MHz~2452MHz<br>5GHz: Wi-Fi: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz |

# 4.3 Product Specification subjective to this standard

| Operation Frequency:  | 2402MHz~2480MHz                      |
|-----------------------|--------------------------------------|
| Bluetooth Version:    | V5.0                                 |
| Modulation Type:      | GFSK                                 |
| Transfer Rate:        | 1Mbps, 2Mbps                         |
| Number of Channel:    | 40                                   |
| Product Type:         | ☐ Mobile ☐ Portable ☐ Fix Location   |
| Test Software of EUT: | RF Test (manufacturer declare)       |
| Antenna Type:         | internal antenna with ipex connector |
| Antenna Gain:         | 1.61dBi                              |



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| Operation Frequency each of channel |           |         |           |         |           |         |           |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                             | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0                                   | 2402MHz   | 10      | 2422MHz   | 20      | 2442MHz   | 30      | 2462MHz   |
| 1                                   | 2404MHz   | 11      | 2424MHz   | 21      | 2444MHz   | 31      | 2464MHz   |
| 2                                   | 2406MHz   | 12      | 2426MHz   | 22      | 2446MHz   | 32      | 2466MHz   |
| 3                                   | 2408MHz   | 13      | 2428MHz   | 23      | 2448MHz   | 33      | 2468MHz   |
| 4                                   | 2410MHz   | 14      | 2430MHz   | 24      | 2450MHz   | 34      | 2470MHz   |
| 5                                   | 2412MHz   | 15      | 2432MHz   | 25      | 2452MHz   | 35      | 2472MHz   |
| 6                                   | 2414MHz   | 16      | 2434MHz   | 26      | 2454MHz   | 36      | 2474MHz   |
| 7                                   | 2416MHz   | 17      | 2436MHz   | 27      | 2456MHz   | 37      | 2476MHz   |
| 8                                   | 2418MHz   | 18      | 2438MHz   | 28      | 2458MHz   | 38      | 2478MHz   |
| 9                                   | 2420MHz   | 19      | 2440MHz   | 29      | 2460MHz   | 39      | 2480MHz   |

#### Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel                    | Frequency |
|----------------------------|-----------|
| The lowest channel (CH0)   | 2402MHz   |
| The middle channel (CH19)  | 2440MHz   |
| The highest channel (CH39) | 2480MHz   |

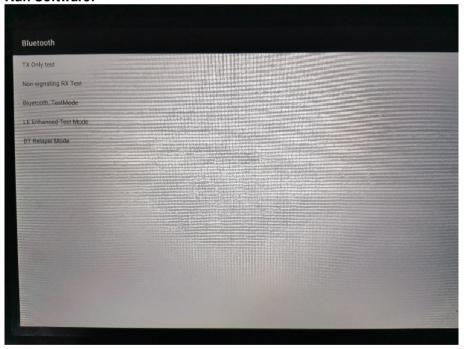


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# 4.4 Additional Instructions

| EUT Test Software Settings:  |   |      |  |  |  |
|--|---|------|--|--|--|
| Mode:  | ☐ Special software is used.   |      |  |  |  |
|  | ☑ Through engineering command into the engineering mode. engineering command: *#*#3646633#*#* |      |  |  |  |
| EUT Power level:   | Class2 (Power level is built-in set parameters and cannot be changed and selected)            |      |  |  |  |
| Use test software to set the lowest frequency, the middle frequency and the highest frequency keep |   |      |  |  |  |
| transmitting of the EUT.   |   |      |  |  |  |
| Mode   | Channel Frequency(MHz)  |      |  |  |  |
|  | CH0 2402  |      |  |  |  |
| GFSK   | CH19  | 2440 |  |  |  |
|  | CH39 2480   |      |  |  |  |

### Run Software:







## 4.5 Test Environment

| Operating Environment  | :   |
|------------------------|---|
| Radiated Emissions:    |   |
| Temperature:           | 25.3 °C   |
| Humidity:              | 55 % RH   |
| Atmospheric Pressure:  | 1009 mbar   |
| Conducted Emissions:   |   |
| Temperature:           | 25.6 °C   |
| Humidity:              | 60 % RH   |
| Atmospheric Pressure:  | 1009 mbar   |
| Radio conducted item t | est (RF Conducted test room):   |
| Temperature:           | 25.5 °C   |
| Humidity:              | 52 % RH   |
| Atmospheric Pressure:  | 1009 mbar   |
| Test mode:             |   |
| Test Mode:             | Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT. |
|                        | Note: In the process of transmitting of EUT, the duty cycle $>$ 98%.  |

# 4.6 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

| Description | Manufacturer | Model No.      | Certification     | Supplied by |
|-------------|--------------|----------------|-------------------|-------------|
| PC          | Lenovo       | ThinkPad E450c | FCC ID            | CQA         |
| 2) Cable    |              |                |                   |             |
| Cable No.   | Description  | Manufacturer   | Cable Type/Length | Supplied by |
|             |              |                | ,                 | ,           |





## 4.7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** guality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

| No. | Item                               | Uncertainty        | Notes |
|-----|------------------------------------|--------------------|-------|
| 1   | Radiated Emission (Below 1GHz)     | 5.12dB             | (1)   |
| 2   | Radiated Emission (Above 1GHz)     | 4.60dB             | (1)   |
| 3   | Conducted Disturbance (0.15~30MHz) | 3.34dB             | (1)   |
| 4   | Radio Frequency                    | 3×10 <sup>-8</sup> | (1)   |
| 5   | Duty cycle                         | 0.6 %.             | (1)   |
| 6   | Occupied Bandwidth                 | 1.1%               | (1)   |
| 7   | RF conducted power                 | 0.86dB             | (1)   |
| 8   | RF power density                   | 0.74               | (1)   |
| 9   | Conducted Spurious emissions       | 0.86dB             | (1)   |
| 10  | Temperature test                   | 0.8℃               | (1)   |
| 11  | Humidity test                      | 2.0%               | (1)   |
| 12  | Supply voltages                    | 0.5 %.             | (1)   |
| 13  | Frequency Error                    | 5.5 Hz             | (1)   |

<sup>(1)</sup>This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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### 4.8 Test Location

### Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

### 4.9 Test Facility

#### • A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

### • FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

### 4.10 Deviation from Standards

None.

## 4.11 Other Information Requested by the Customer

None.



# 4.12Equipment List

|                               |              |                            | Instrument | Calibration | 0-1:14:              |
|-------------------------------|--------------|----------------------------|------------|-------------|----------------------|
| Test Equipment                | Manufacturer | Model No.                  | No.        | Date        | Calibration Due Date |
| EMI Test Receiver             | R&S          | ESR7                       | CQA-005    | 2023/9/8    | 2024/9/7             |
| Spectrum analyzer             | R&S          | FSU26                      | CQA-038    | 2023/9/8    | 2024/9/7             |
| Spectrum analyzer             | R&S          | FSU40                      | CQA-075    | 2023/9/8    | 2024/9/7             |
| Preamplifier                  | MITEQ        | AFS4-00010300-18-<br>10P-4 | CQA-035    | 2023/9/8    | 2024/9/7             |
| Preamplifier                  | MITEQ        | AMF-6D-02001800-<br>29-20P | CQA-036    | 2023/9/8    | 2024/9/7             |
| Preamplifier                  | EMCI         | EMC184055SE                | CQA-089    | 2023/9/8    | 2024/9/7             |
| Loop antenna                  | Schwarzbeck  | FMZB1516                   | CQA-060    | 2021/9/16   | 2024/9/15            |
| Bilog Antenna                 | R&S          | HL562                      | CQA-011    | 2021/9/16   | 2024/9/15            |
| Horn Antenna                  | R&S          | HF906                      | CQA-012    | 2021/9/16   | 2024/9/15            |
| Horn Antenna                  | Schwarzbeck  | BBHA 9170                  | CQA-088    | 2021/9/16   | 2024/9/15            |
| Coaxial Cable<br>(Above 1GHz) | CQA          | N/A                        | C007       | 2023/9/8    | 2024/9/7             |
| Coaxial Cable<br>(Below 1GHz) | CQA          | N/A                        | C013       | 2023/9/8    | 2024/9/7             |
| Antenna Connector             | CQA          | RFC-01                     | CQA-080    | 2023/9/8    | 2024/9/7             |
| RF<br>cable(9KHz~40GHz)       | CQA          | RF-01                      | CQA-079    | 2023/9/8    | 2024/9/7             |
| Power meter                   | R&S          | NRVD                       | CQA-029    | 2023/9/8    | 2024/9/7             |
| Power divider                 | MIDWEST      | PWD-2533-02-SMA-<br>79     | CQA-067    | 2023/9/8    | 2024/9/7             |
| EMI Test Receiver             | R&S          | ESR7                       | CQA-005    | 2023/9/8    | 2024/9/7             |
| LISN                          | R&S          | ENV216                     | CQA-003    | 2023/9/8    | 2024/9/7             |
| Coaxial cable                 | CQA          | N/A                        | CQA-C009   | 2023/9/8    | 2024/9/7             |
| DC power                      | KEYSIGHT     | E3631A                     | CQA-028    | 2023/9/8    | 2024/9/7             |

#### Test software:

| Tool Contracto.                   |              |                |  |  |  |  |
|-----------------------------------|--------------|----------------|--|--|--|--|
|                                   | Manufacturer | Software brand |  |  |  |  |
| Radiated Emissions test software  | Tonscend     | JS1120-3       |  |  |  |  |
| Conducted Emissions test software | Audix        | e3             |  |  |  |  |
| RF Conducted test software        | Audix        | e3             |  |  |  |  |





### 5 Test results and Measurement Data

### 5.1 Antenna Requirement

**Standard requirement:** 47 CFR Part 15C Section 15.203 /247(c)

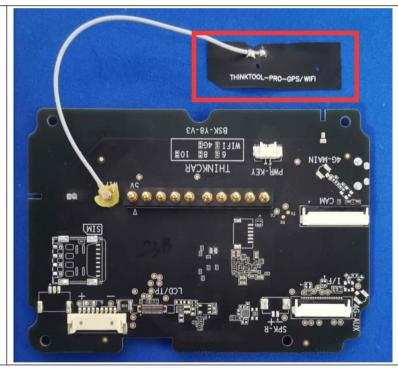
15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **EUT Antenna:**



The antenna is internal antenna with ipex connector. The best case gain of the antenna is 1.61dBi.





# 5.2 Conducted Emissions

| Test Requirement:      | 47 CFR Part 15C Section 15.207   |   |  |  |  |  |
|------------------------|--|---|--|--|--|--|
| Test Method:           | ANSI C63.10: 2013  |   |  |  |  |  |
| Test Frequency Range:  | 150kHz to 30MHz  |   |  |  |  |  |
| Limit:                 | [  | Limit (c                                    | Limit (dBuV)   |  |  |  |
|                        | Frequency range (MHz)  | Quasi-peak                                  | Average  |  |  |  |
|                        | 0.15-0.5   | 66 to 56*                                   | 56 to 46*  |  |  |  |
|                        | 0.5-5  | 56  | 46   |  |  |  |
|                        | 5-30   | 60  | 50   |  |  |  |
|                        | * Decreases with the logarithn   | n of the frequency.                         | <u> </u>   |  |  |  |
| Test Procedure:        | The mains terminal disturb<br>room.     The EUT was connected<br>Impedance Stabilization N   | to AC power source etwork) which provides   | through a LISN 1 (Line s a $50\Omega/50\mu H + 5\Omega$ linear |  |  |  |
|                        | impedance. The power connected to a second LIS   |   |  |  |  |  |
|                        | plane in the same way a<br>multiple socket outlet strip<br>single LISN provided the ra   | as the LISN 1 for the was used to connect r | unit being measured. A multiple power cables to a              |  |  |  |
|                        | 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.   |   |  |  |  |  |
|                        | <ul> <li>4) The test was performed with a vertical ground reference plane. The reference the EUT shall be 0.4 m from the vertical ground reference plane vertical ground reference plane was bonded to the horizontal greference plane. The LISN 1 was placed 0.8 m from the boundary unit under test and bonded to a ground reference plane for mounted on top of the ground reference plane. This distance was be the closest points of the LISN 1 and the EUT. All other units of the and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ul> |   |  |  |  |  |
|                        |  |   |  |  |  |  |
| Test Setup:            | Shielding Room  EUT  AC Mains  LISN1   | AE  LISN2 → AC Ma  Ground Reference Plane   | Test Receiver  |  |  |  |
| Exploratory Test Mode: | Transmitting with GFSK modu<br>Charge + Transmitting mode.   | ılation.                                    |  |  |  |  |

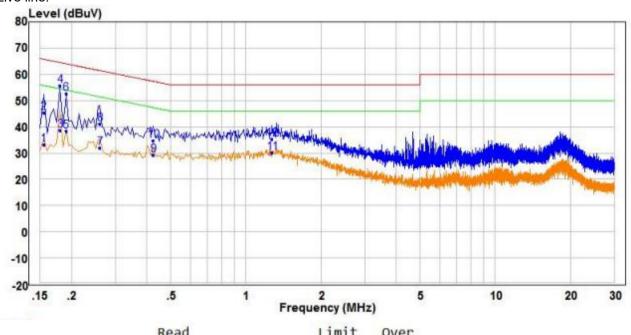


| Final Test Mode: | Through Pre-scan, find the 2Mbps of data type and GFSK modulation is the worst case. |
|------------------|--|
|                  | For below 1GHz part, through pre-scan, the worst case is the highest channel.        |
|                  | Only the worst case is recorded in the report.                                       |
| Test Results:    | Pass   |



### **Measurement Data**

#### Live line:



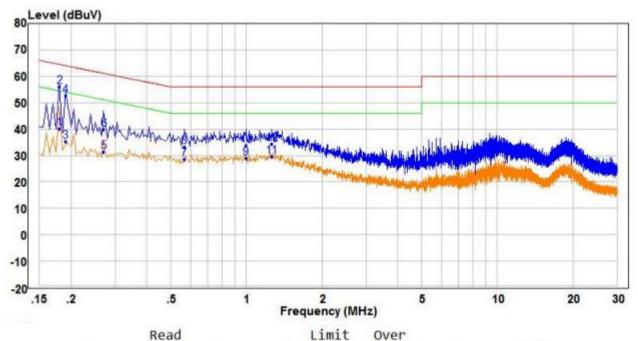
|     |   | Freq  | Level | Factor | Level | Limit | Limit  | Remark  | Pol/Phase |
|-----|---|-------|-------|--------|-------|-------|--------|---------|-----------|
|     | - | MHZ   | dBuV  | dB     | dBuV  | dBuV  | dB     |         |           |
| 1   |   | 0.155 | 23.50 | 9.69   | 33.19 | 55.73 | -22.54 | Average | Line      |
| 2   |   | 0.155 | 35.71 | 9.69   | 45.40 | 65.73 | -20.33 | QP      | Line      |
| 3   |   | 0.180 | 28.99 | 9.64   | 38.63 | 54.49 | -15.86 | Average | Line      |
| 4 P | P | 0.180 | 46.18 | 9.64   | 55.82 | 64.49 | -8.67  | QP      | Line      |
| 5 A | V | 0.190 | 28.74 | 9.63   | 38.37 | 54.04 | -15.67 | Average | Line      |
| 6   |   | 0.190 | 42.89 | 9.63   | 52.52 | 64.04 | -11.52 | QP      | Line      |
| 7   |   | 0.260 | 22.42 | 9.53   | 31.95 | 51.43 | -19.48 | Average | Line      |
| 8   |   | 0.260 | 31.69 | 9.53   | 41.22 | 61.43 | -20.21 | QP      | Line      |
| 9   |   | 0.425 | 19.69 | 9.63   | 29.32 | 47.35 | -18.03 | Average | Line      |
| 10  |   | 0.425 | 25.02 | 9.63   | 34.65 | 57.35 | -22.70 | QP      | Line      |
| 11  |   | 1.275 | 19.83 | 10.38  | 30.21 | 46.00 | -15.79 | Average | Line      |
| 12  |   | 1.275 | 24.89 | 10.38  | 35.27 | 56.00 | -20.73 | QP      | Line      |

#### Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.



### Neutral line:



|    |    | Freq  | Level | Factor | Level | Line  | Limit  | Remark  | Pol/Phase |
|----|----|-------|-------|--------|-------|-------|--------|---------|-----------|
|    |    | MHz   | dBuV  | dB     | dBuV  | dBuV  | dB     |         |           |
| 1  | AV | 0.180 | 30.63 | 9.64   | 40.27 | 54.49 | -14.22 | Average | Neutral   |
| 2  | PP | 0.180 | 46.34 | 9.64   | 55.98 | 64.49 | -8.51  | QP      | Neutral   |
| 3  |    | 0.190 | 25.76 | 9.62   | 35.38 | 54.04 | -18.66 | Average | Neutral   |
| 4  |    | 0.190 | 43.08 | 9.62   | 52.70 | 64.04 | -11.34 | QP      | Neutral   |
| 5  |    | 0.270 | 21.91 | 9.51   | 31.42 | 51.12 | -19.70 | Average | Neutral   |
| 6  |    | 0.270 | 30.49 | 9.51   | 40.00 | 61.12 | -21.12 | QP      | Neutral   |
| 7  |    | 0.565 | 18.92 | 9.77   | 28.69 | 46.00 | -17.31 | Average | Neutral   |
| 8  |    | 0.565 | 23.48 | 9.77   | 33.25 | 56.00 | -22.75 | QP      | Neutral   |
| 9  |    | 0.995 | 19.25 | 9.70   | 28.95 | 46.00 | -17.05 | Average | Neutral   |
| 10 |    | 0.995 | 24.07 | 9.70   | 33.77 | 56.00 | -22.23 | QP      | Neutral   |
| 11 |    | 1.260 | 19.80 | 9.71   | 29.51 | 46.00 | -16.49 | Average | Neutral   |
| 12 |    | 1.260 | 24.85 | 9.71   | 34.56 | 56.00 | -21.44 | QP      | Neutral   |

#### Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.



# 5.3 Radiated Spurious Emission & Restricted bands

| 5.3.1 Spurious Emissions |  |                       |                                |                   |            |                            |  |
|--------------------------|--|-----------------------|--------------------------------|-------------------|------------|----------------------------|--|
| Test Requirement:        | 47 CFR Part 15C Section 15.209 and 15.205  |                       |                                |                   |            |                            |  |
| Test Method:             | ANSI C63.10 2013   |                       |                                |                   |            |                            |  |
| Test Site:               | Measurement Distance   | : 3m                  | (Semi-Anech                    | noic Cham         | ber)       |                            |  |
| Receiver Setup:          | Frequency  |                       | Detector                       | RBW               | VBW        | Remark                     |  |
|                          | 0.009MHz-0.090MH   | z                     | Peak                           | 10kHz             | 30kHz      | Peak                       |  |
|                          | 0.009MHz-0.090MH   | z                     | Average                        | 10kHz             | 30kHz      | Average                    |  |
|                          | 0.090MHz-0.110MH   | z                     | Quasi-peak                     | 10kHz             | 30kHz      | Quasi-peak                 |  |
|                          | 0.110MHz-0.490MH   | Z                     | Peak                           | 10kHz             | 30kHz      | Peak                       |  |
|                          | 0.110MHz-0.490MH   | Z                     | Average                        | 10kHz             | 30kHz      | Average                    |  |
|                          | 0.490MHz -30MHz  |                       | Quasi-peak                     | 10kHz             | 30kHz      | Quasi-peak                 |  |
|                          | 30MHz-1GHz   | 30MHz-1GHz Quasi-peak |                                |                   | z 300kHz   | Quasi-peak                 |  |
|                          | Above 1GHz   |                       | Peak                           | 1MHz              | 3MHz       | Peak                       |  |
|                          |  |                       | Peak                           | 1MHz              | 10Hz       | Average                    |  |
| Limit:                   | Fraguency  |                       | eld strength<br>crovolt/meter) | Limit<br>(dBuV/m) | Remark     | Measuremen<br>distance (m) |  |
|                          | 0.009MHz-0.490MHz 2  |                       | 400/F(kHz)                     | -                 | -          | 300                        |  |
|                          | 0.490MHz-1.705MHz 24   |                       | 000/F(kHz)                     | -                 | -          | 30                         |  |
|                          | 1.705MHz-30MHz   |                       | 30                             | -                 | -          | 30                         |  |
|                          | 30MHz-88MHz  |                       | 100                            | 40.0 Quasi-peak   |            | 3                          |  |
|                          | 88MHz-216MHz   |                       | 150                            | 43.5              | Quasi-peak | . 3                        |  |
|                          | 216MHz-960MHz  |                       | 200                            | 46.0              | Quasi-peak | . 3                        |  |
|                          | 960MHz-1GHz  |                       | 500                            | 54.0              | Quasi-peak | . 3                        |  |
|                          | Above 1GHz   |                       | 500                            | 54.0              | Average    | 3                          |  |
|                          | Note: 15.35(b), Unless otherwise specified, the limit on peak rafrequency emissions is 20dB above the maximum permitted average emiss limit applicable to the equipment under test. This peak limit applies to the topeak emission level radiated by the device. |                       |                                |                   |            | erage emission             |  |



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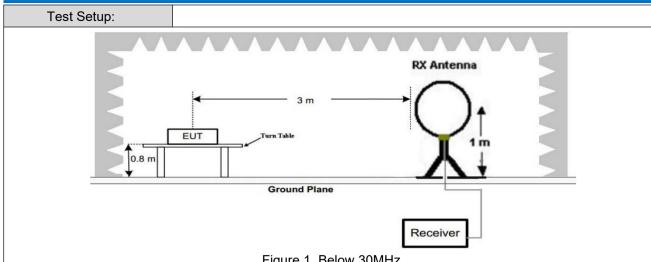
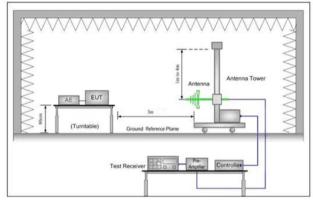


Figure 1. Below 30MHz



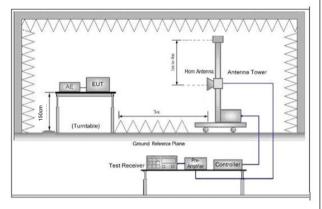


Figure 2. 30MHz to 1GHz

Figure 3. Above 1 GHz

#### Test Procedure:

- 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
  - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

Note: For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

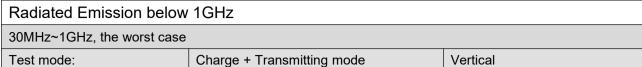
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the

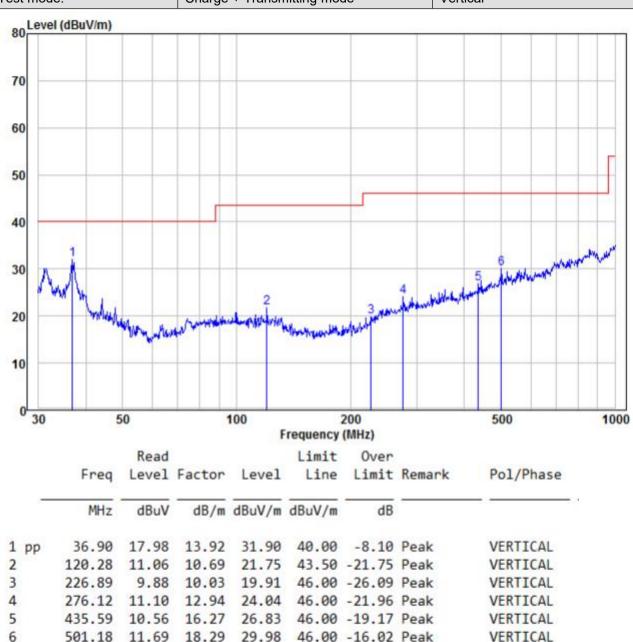


|                  | measurement.   |
|------------------|--|
|                  | d. For each suspected emission, the EUT was arranged to its worst case<br>and then the antenna was tuned to heights from 1 meter to 4 meters (for<br>the test frequency of below 30MHz, the antenna was tuned to heights 1<br>meter) and the rotatable table was turned from 0 degrees to 360<br>degrees to find the maximum reading.  |
|                  | e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.  |
|                  | <ul> <li>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>g. Test the EUT in the lowest channel (2402MHz),the middle channel (2440MHz),the Highest channel (2480MHz)</li> </ul> |
|                  | h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.  |
|                  | i. Repeat above procedures until all frequencies measured was complete.  |
| Exploratory Test | Transmitting with GFSK modulation.   |
| Mode:            | Transmitting mode, Charge + Transmitting mode.   |
| Final Test Mode: | Pretest the EUT at Transmitting mode and Charge + Transmitting mode, found the Charge + Transmitting mode which it is worse case.  Through Pre-scan, find the 2Mbps of data type and GFSK modulation is the  |
|                  | worst case.  |
|                  | For below 1GHz part, through pre-scan, the worst case is the highest channel.  |
|                  | Only the worst case is recorded in the report.   |
| Test Results:    | Pass   |



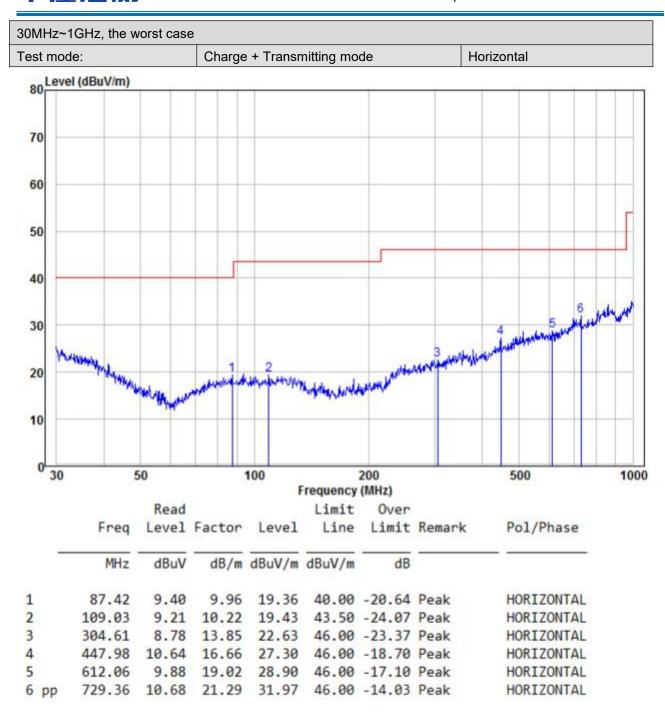






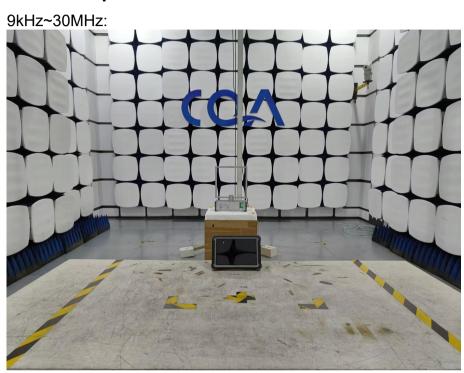


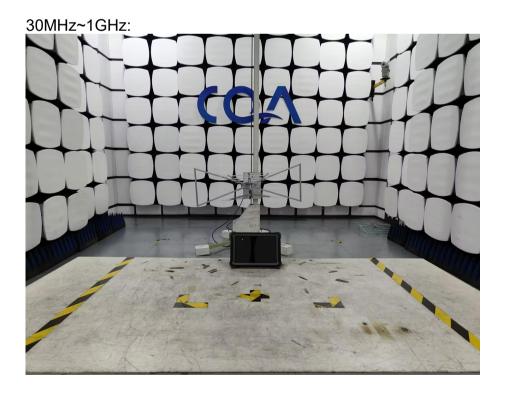




# 6 Photographs - EUT Test Setup

# 6.1 Radiated Spurious Emission









# **6.2** Conducted Emission



# 7 Photographs - EUT Constructional Details



