

# FCC Test Report

|              |                      |
|--------------|----------------------|
| Product Name | Mobile Data Terminal |
| Model No.    | MT7030               |
| FCC ID       | 2ABTU-MT7030         |

|           |   |
|-----------|---|
| Applicant | RuggON Corporation  |
| Address   | 4F, No. 298, Yang Guang St., Neihu Dist., Taipei City, Taiwan |

|                 |                     |
|-----------------|---------------------|
| Date of Receipt | Mar. 31, 2020       |
| Issued Date     | Jul. 02, 2020       |
| Report No.      | 2030836R-RFUSP17V01 |
| Report Version  | V1.0                |



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

# Test Report

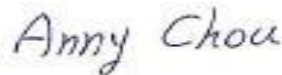
Issued Date: Jul. 02, 2020

Report No.: 2030836R-RFUSP17V01



|                     |   |
|---------------------|---|
| Product Name        | Mobile Data Terminal  |
| Applicant           | RuggON Corporation  |
| Address             | 4F, No. 298, Yang Guang St., Neihu Dist., Taipei City, Taiwan                   |
| Manufacturer        | RuggON Corporation  |
| Model No.           | MT7030  |
| FCC ID.             | 2ABTU-MT7030  |
| EUT Rated Voltage   | DC 9~36V  |
| EUT Test Voltage    | DC 24V  |
| Trade Name          | RuggON  |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2018<br>ANSI C63.4: 2014, ANSI C63.10: 2013 |
| Test Result         | Complied  |

Documented By :



( Senior Adm. Specialist / Anny Chou )

Tested By :



( Assistant Engineer / Trista Huang )

Approved By :



( Director / Vincent Lin )

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## **Revision History**

| <b>Report No.</b>   | <b>Version</b> | <b>Description</b>       | <b>Issued Date</b> |
|---------------------|----------------|--------------------------|--------------------|
| 2030836R-RFUSP17V01 | V1.0           | Initial issue of report. | 2020-07-02         |

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

|                 |                      |
|-----------------|----------------------|
| Product Name    | Mobile Data Terminal |
| Trade Name      | RuggON               |
| Model No.       | MT7030               |
| FCC ID          | 2ABTU-MT7030         |
| Contain FCC ID  | 2ABTU-MS01PRO        |
| Frequency Range | 13.56MHz             |
| Modulation      | ASK                  |
| USB Cable       | Shielded, 2m         |

Frequency of Each Channel:

| Channel    | Frequency |
|------------|-----------|
| Channel 1: | 13.56 MHz |

Note:

1. This device is an Mobile Data Terminal with a built-in 13.56MHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

|           |                  |
|-----------|------------------|
| Test Mode | Mode 1: Transmit |
|-----------|------------------|

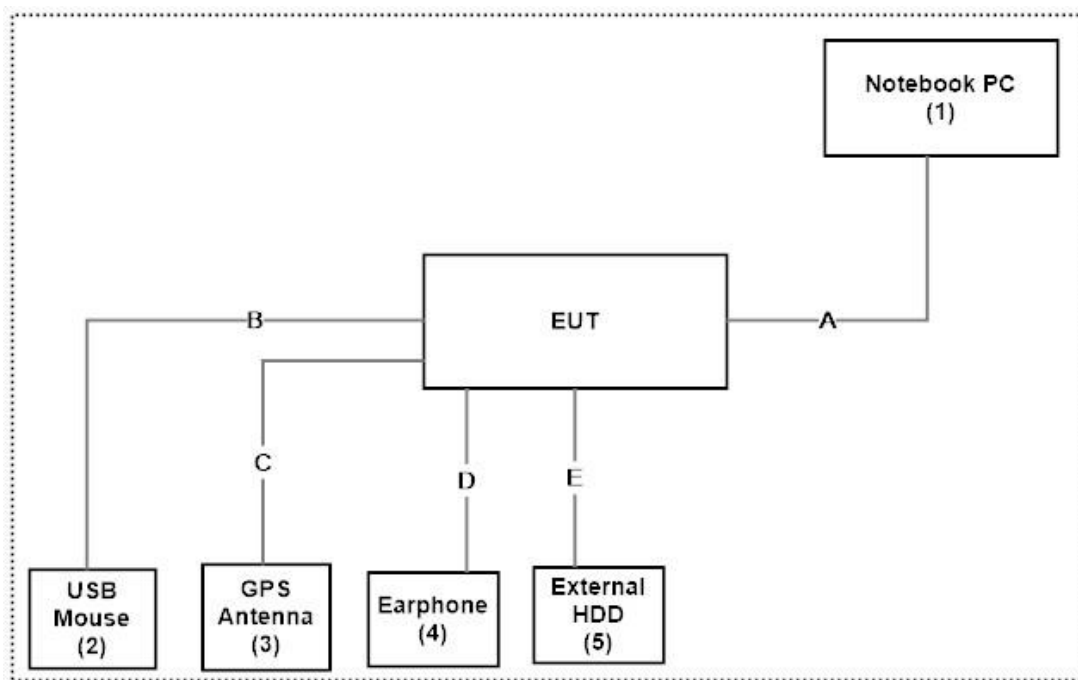
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

|     | Product      | Manufacturer | Model No.     | Serial No.               | Power Cord         |
|-----|--------------|--------------|---------------|--------------------------|--------------------|
| (1) | Notebook PC  | DELL         | Latitude 5580 | 2HRD7H2                  | Non-shielded, 1.8m |
| (2) | USB Mouse    | Dell         | MS111-L       | CN-09RRC7-44751-06T-0G73 | N/A                |
| (3) | GPS Antenna  | N/A          | SG-76G        | N/A                      | N/A                |
| (4) | Earphone     | RONEVER      | MOE241        | N/A                      | N/A                |
| (5) | External HDD | Transcend    | TS1T5J25H3B   | F21786-0019              | N/A                |

| Signal Cable Type | Signal cable Description           |
|-------------------|------------------------------------|
| A                 | Signal Cable<br>Shielded, 1.0m     |
| B                 | Signal Cable<br>Non-shielded, 5.0m |
| C                 | Mouse Cable<br>Non-shielded, 1.8m  |
| D                 | Earphone Cable<br>Shielded, 1.2m   |
| E                 | USB Cable<br>Shielded, 0.5m        |

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute " Turn on NFC" on the EUT.
- (3) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Performed Item    | Items            | Required | Actual  |
|-------------------|------------------|----------|---------|
| Radiated Emission | Temperature (°C) | 10~40 °C | 23.2 °C |
|                   | Humidity (%RH)   | 10~90 %  | 61.5 %  |
| Conductive        | Temperature (°C) | 10~40 °C | 23.6 °C |
|                   | Humidity (%RH)   | 10~90 %  | 72.3 %  |

**USA : FCC Registration Number: TW3023**

Site Description: Accredited by TAF  
Accredited Number: 3023

Test Laboratory: DEKRA Testing and Certification Co., Ltd  
Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,  
Taiwan, R.O.C.

Phone number: 886-2-8601-3788

Fax number: 886-2-8601-3789

Email address: [info.tw@dekra.com](mailto:info.tw@dekra.com)

Website: <http://www.dekra.com.tw>

## 1.7. List of Test Equipment

### For Conducted measurements /CB3/SR8

|   | Equipment             | Manufacturer | Model No. | Serial No.   | Cali. Date | Due. Date  |
|---|-----------------------|--------------|-----------|--------------|------------|------------|
|   | Temperature Chamber   | WIT GROUP    | TH-1S-B   | EQ-201-00146 | 2020/04/06 | 2021/04/05 |
| X | Spectrum Analyzer     | Agilent      | N9010A    | MY53470892   | 2019/09/25 | 2020/09/24 |
| X | Peak Power Analyzer   | Keysight     | 8990B     | MY51000410   | 2019/07/30 | 2020/07/29 |
| X | Wideband Power Sensor | Keysight     | N1923A    | MY56080003   | 2019/07/30 | 2020/07/29 |
| X | Wideband Power Sensor | Keysight     | N1923A    | MY56080004   | 2019/07/30 | 2020/07/29 |
|   | EMI Test Receiver     | R&S          | ESCS 30   | 100369       | 2019/11/27 | 2020/11/26 |
|   | LISN                  | R&S          | ENV216    | 101105       | 2020/04/27 | 2021/04/26 |
|   | LISN                  | R&S          | ESH3-Z5   | 836679/014   | 2020/04/26 | 2021/04/25 |
|   | Coaxial Cable         | DEKRA        | RG 400    | LC018-RG     | 2020/06/20 | 2021/06/19 |

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test SystemV9.0.5.



**For Radiated measurements /Site3/CB8**

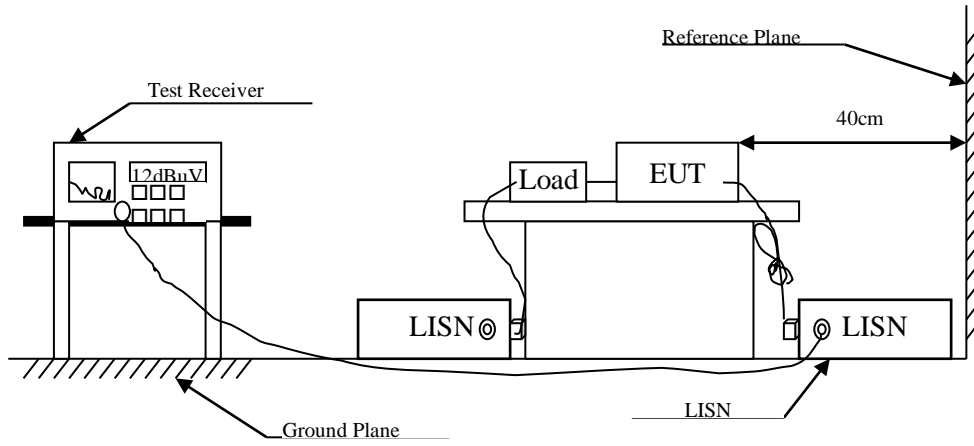
|   | Equipment         | Manufacturer    | Model No.   | Serial No.        | Cali. Date | Due. Date  |
|---|-------------------|-----------------|-------------|-------------------|------------|------------|
| X | Test Receiver     | R&S             | ESR7        | 101602            | 2019/12/16 | 2020/12/15 |
| X | Signal Analyzer   | R&S             | FSV40       | 101869            | 2019/07/04 | 2020/07/03 |
| X | Loop Antenna      | Teseq           | HLA6121     | 37133             | 2020/10/15 | 2021/10/14 |
| X | Bilog Antenna     | Schaffner Chase | CBL6112B    | 2916              | 2020/01/20 | 2021/01/19 |
| X | Coaxial Cable     | DEKRA           | L1907-001C  | 280280.F141.1000D | 2019/07/10 | 2020/07/09 |
| X | Amplifier         | EMCI            | EMC001330   | 980254            | 2019/08/22 | 2020/08/21 |
|   | Horn Antenna      | ETS-LINDGREN    | 3117        | 00228113          | 2020/05/28 | 2021/05/27 |
|   | Coaxial Cable     | DEKRA           | L1907-002C  | 280280.F141.1000D | 2019/07/10 | 2020/07/09 |
|   | Amplifier         | EMCI            | EMC05820SE  | 980362            | 2019/06/26 | 2020/06/25 |
|   | Amplifier         | EMCI            | EMC051845SE | 980632            | 2019/08/08 | 2020/08/07 |
|   | Horn Antenna      | Com-Power       | AH-1840     | 101101            | 2019/10/31 | 2020/10/30 |
|   | Amplifier + Cable | EMCI            | EMC184045SE | 980369            | 2020/04/23 | 2021/04/22 |
|   | Bilog Antenna     | Schaffner Chase | CBL6112B    | 2925              | 2020/02/20 | 2021/02/19 |
|   | Coaxial Cable     | DEKRA           | L1907-003C  | 00100A1B3A120M    | 2019/07/10 | 2020/07/09 |
|   | Amplifier         | EMCI            | EMC001330   | 980255            | 2020/03/17 | 2021/03/16 |
|   | Filter            | MICRO-TRONICS   | BRM50702    | G270              | 2019/08/08 | 2020/08/07 |
|   | Filter            | MICRO-TRONICS   | BRM50716    | G196              | 2019/08/08 | 2020/08/07 |

## Note:

1. Loop Antenna is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Test SystemV1.1.

## 2. Conducted Emission

### 2.1. Test Setup



## 2.2. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit |                      |                      |
|---|----------------------|----------------------|
| Frequency<br>MHz                                    | Limits               |                      |
|   | QP                   | AV                   |
| 0.15 - 0.50   | 66-56 <sup>(註)</sup> | 56-46 <sup>(註)</sup> |
| 0.50-5.0  | 56                   | 46                   |
| 5.0 - 30  | 60                   | 50                   |

## 2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.4. Uncertainty

± 2.26 dB

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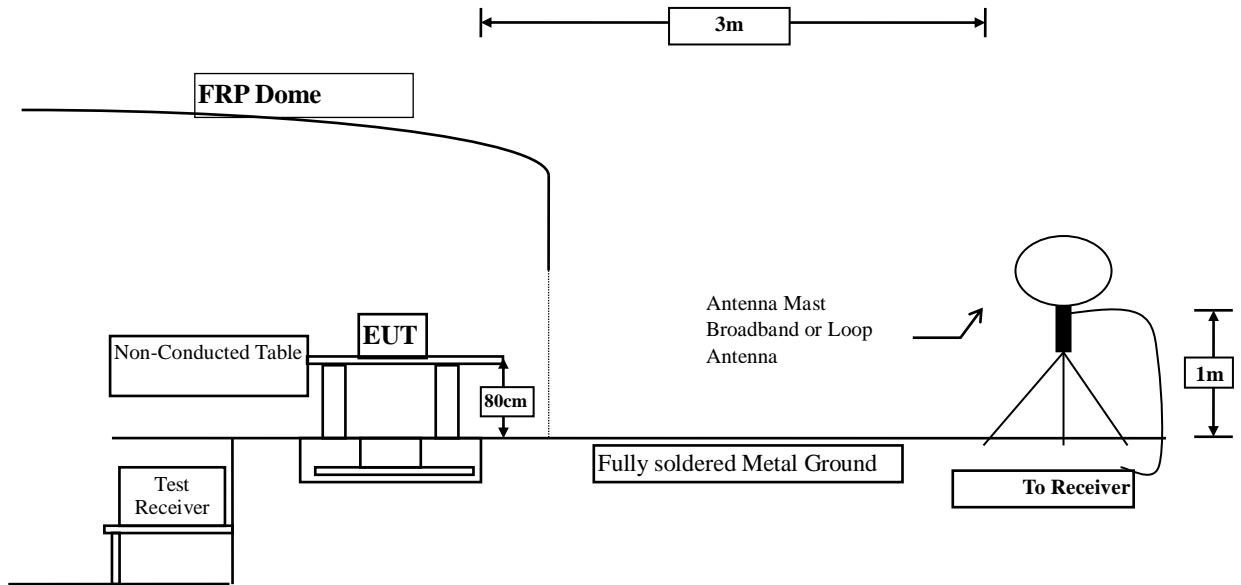
## **2.5. Test Result of Conducted Emission**

Owing to the EUT use DC supply voltage, this test item is not performed.

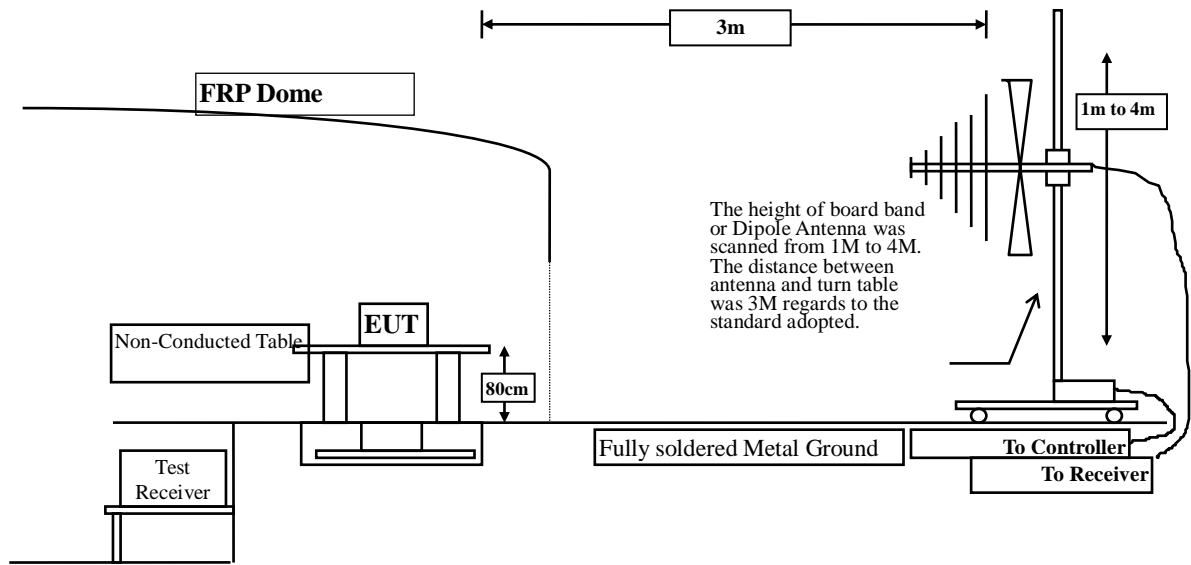
### 3. Radiated Emission

#### 3.1. Test Setup

9kHz~30MHz



30MHz~1GHz



### 3.2. Limits

➤ Fundamental electric field strength Limit

| FCC Part 15 Subpart C Paragraph 15.225 Limits |                               |                     |        |                     |
|---|-------------------------------|---------------------|--------|---------------------|
| Fundamental Frequency<br>MHz                  | Field strength of fundamental |                     |        |                     |
|   | uV/m                          | Distance<br>(meter) | dBuV/m | Distance<br>(meter) |
| 13.553 – 13.567                               | 15848                         | 30                  | 124    | 3                   |
| 13.410 – 13.553 and 13.567 – 13.710           | 334                           | 30                  | 90.47  | 3                   |
| 13.110 – 13.410 and 13.710 – 14.010           | 106                           | 30                  | 80.50  | 3                   |
| Outside of the 13.110 – 14.010                | See 15.209 Limits             |                     |        |                     |

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

► Spurious electric field strength Limit

| FCC Part 15 Subpart C Paragraph 15.209 Limits |              |                         |                                 |
|---|--------------|-------------------------|---------------------------------|
| Frequency<br>MHz                              | uV/m         | dBuV/m                  | Measurement distance<br>(meter) |
| 0.009-0.490                                   | 2400/F(kHz)  | See Remark <sup>1</sup> | 300                             |
| 0.490-1.705                                   | 24000/F(kHz) | See Remark <sup>1</sup> | 30                              |
| 1.705-30                                      | 30           | 29.5                    | 30                              |
| 30-88   | 100          | 40                      | 3                               |
| 88-216  | 150          | 43.5                    | 3                               |
| 216-960                                       | 200          | 46                      | 3                               |
| Above 960                                     | 500          | 54                      | 3                               |

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### 3.3. Test Procedure

Fundamental electric field strength:

The EUT and its simulators are placed on a turn table which is 1 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum electric field strength.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna which is 1 meter above ground. All X-axis, Y-axis and Z-axis polarization of the antenna are set on measurement.

Spurious electric field strength:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C6310: 2013 on radiated measurement.

On any frequency the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as

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measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

The frequency range from 9kHz to 10th harmonics is checked.

### **3.4. Uncertainty**

± 4.08 dB above 1GHz

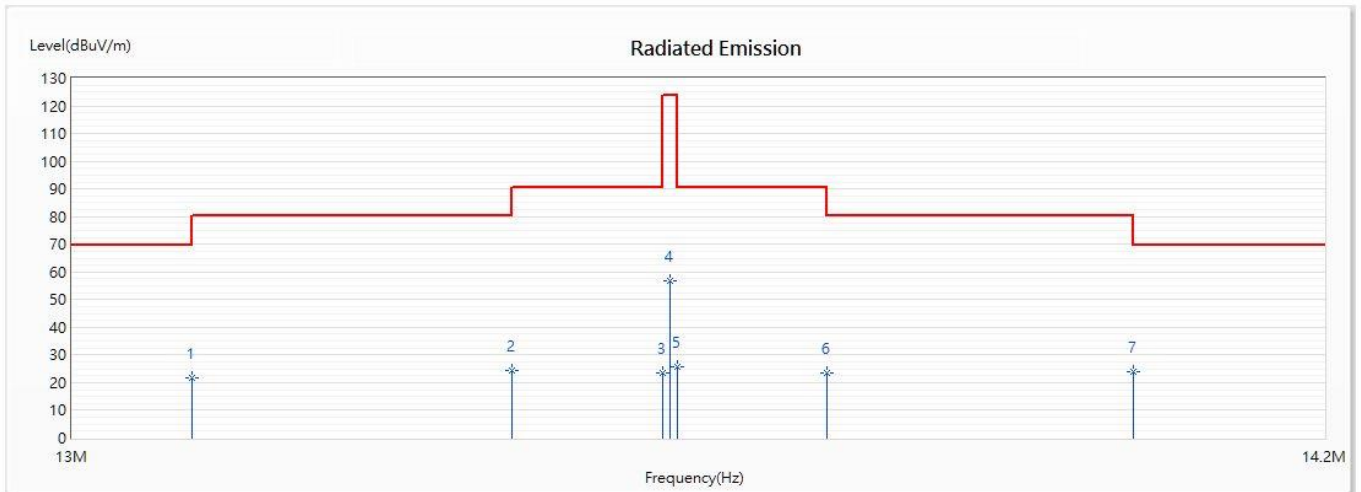
± 4.22 dB below 1GHz



### 3.5. Test Result of Radiated Emission

Product : Mobile Data Terminal  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

#### HORIZONTAL - X



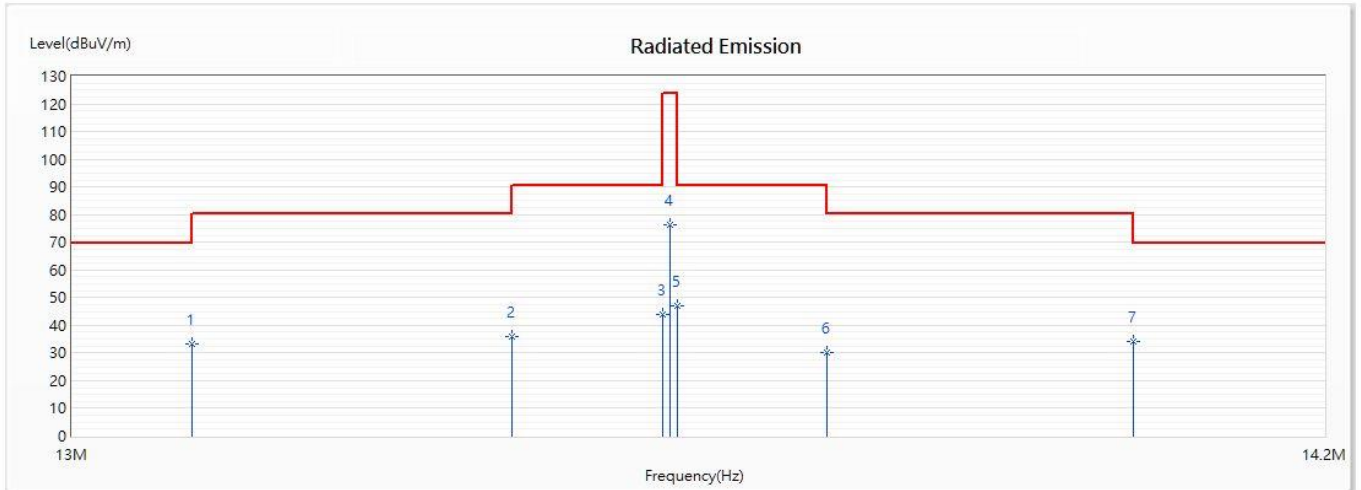
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| 1   | 13.11           | 21.93                   | 69.50          | -47.57      | 0.24                 | 21.69                 | QP            |
| 2   | 13.41           | 24.22                   | 80.50          | -56.28      | 2.52                 | 21.70                 | QP            |
| 3   | 13.553          | 23.69                   | 90.47          | -66.78      | 1.98                 | 21.71                 | QP            |
| 4   | 13.56           | 56.99                   | 124.00         | -67.01      | 35.28                | 21.71                 | QP            |
| 5   | 13.567          | 25.71                   | 90.47          | -64.76      | 4.00                 | 21.71                 | QP            |
| 6   | 13.71           | 23.47                   | 80.50          | -57.03      | 1.76                 | 21.71                 | QP            |
| * 7 | 14.01           | 23.86                   | 69.50          | -45.64      | 2.14                 | 21.72                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**VERTICAL - X**



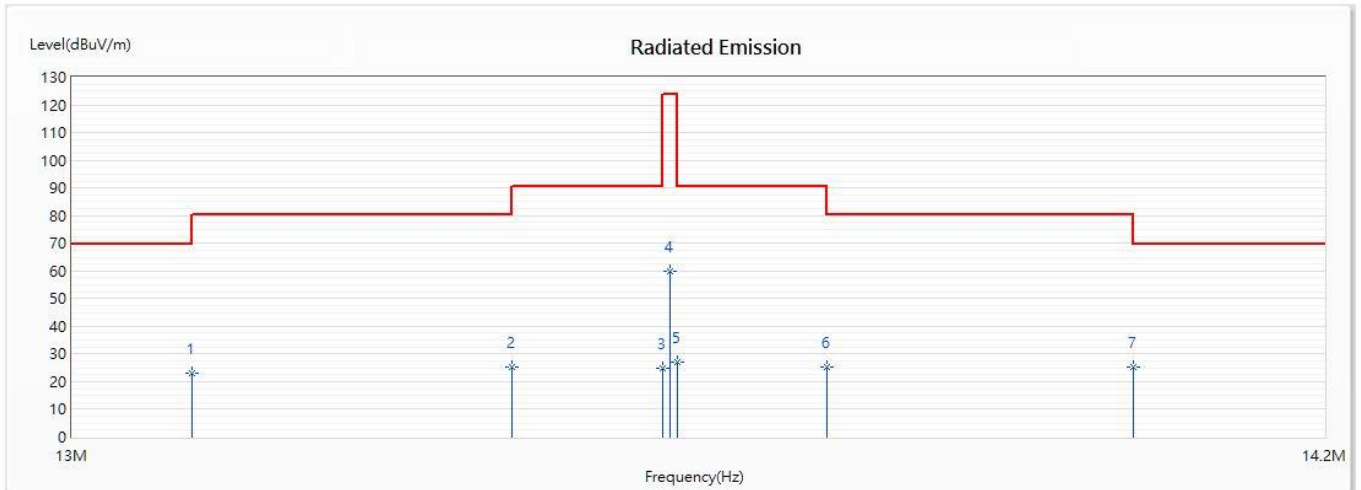
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| 1   | 13.11           | 33.45                   | 69.50          | -36.05      | 11.76                | 21.69                 | QP            |
| 2   | 13.41           | 35.86                   | 80.50          | -44.64      | 14.16                | 21.70                 | QP            |
| 3   | 13.553          | 43.85                   | 90.47          | -46.62      | 22.14                | 21.71                 | QP            |
| 4   | 13.56           | 76.47                   | 124.00         | -47.53      | 54.76                | 21.71                 | QP            |
| 5   | 13.567          | 47.05                   | 90.47          | -43.42      | 25.34                | 21.71                 | QP            |
| 6   | 13.71           | 30.37                   | 80.50          | -50.13      | 8.66                 | 21.71                 | QP            |
| * 7 | 14.01           | 34.21                   | 69.50          | -35.29      | 12.49                | 21.72                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**HORIZONTAL - Y**



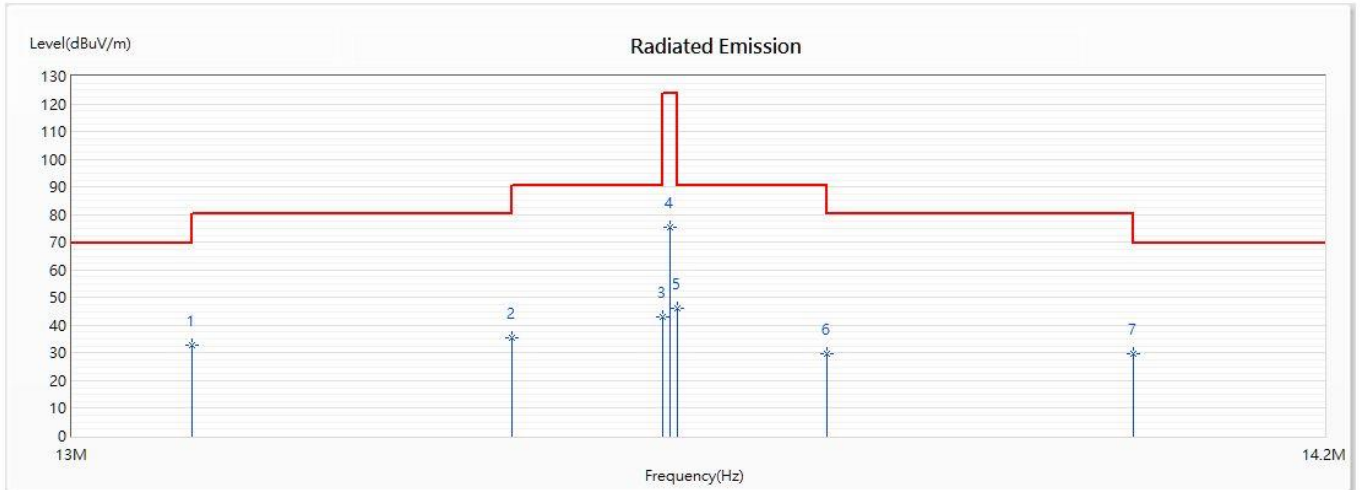
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| 1   | 13.11           | 23.03                   | 69.50          | -46.47      | 1.34                 | 21.69                 | QP            |
| 2   | 13.41           | 25.17                   | 80.50          | -55.33      | 3.47                 | 21.70                 | QP            |
| 3   | 13.553          | 24.85                   | 90.47          | -65.62      | 3.14                 | 21.71                 | QP            |
| 4   | 13.56           | 60.02                   | 124.00         | -63.98      | 38.31                | 21.71                 | QP            |
| 5   | 13.567          | 26.95                   | 90.47          | -63.52      | 5.24                 | 21.71                 | QP            |
| 6   | 13.71           | 25.11                   | 80.50          | -55.39      | 3.40                 | 21.71                 | QP            |
| * 7 | 14.01           | 25.15                   | 69.50          | -44.35      | 3.43                 | 21.72                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**VERTICAL - Y**



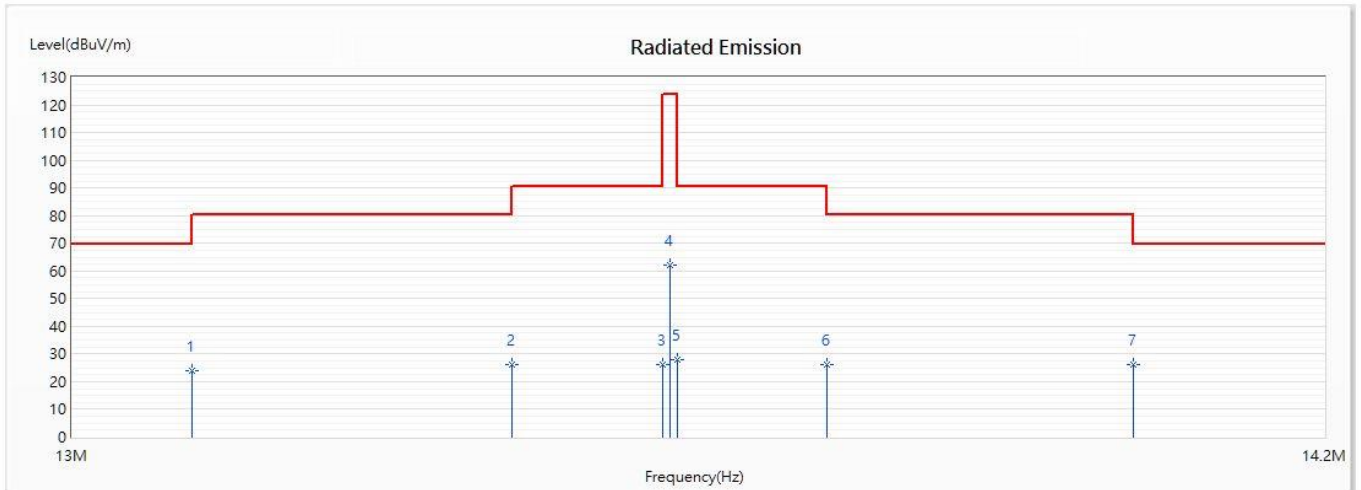
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| * 1 | 13.11           | 33.01                   | 69.50          | -36.49      | 11.32                | 21.69                 | QP            |
| 2   | 13.41           | 35.28                   | 80.50          | -45.22      | 13.58                | 21.70                 | QP            |
| 3   | 13.553          | 43.17                   | 90.47          | -47.30      | 21.46                | 21.71                 | QP            |
| 4   | 13.56           | 75.52                   | 124.00         | -48.48      | 53.81                | 21.71                 | QP            |
| 5   | 13.567          | 46.22                   | 90.47          | -44.25      | 24.51                | 21.71                 | QP            |
| 6   | 13.71           | 29.88                   | 80.50          | -50.62      | 8.17                 | 21.71                 | QP            |
| 7   | 14.01           | 29.78                   | 69.50          | -39.72      | 8.06                 | 21.72                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**HORIZONTAL - Z**



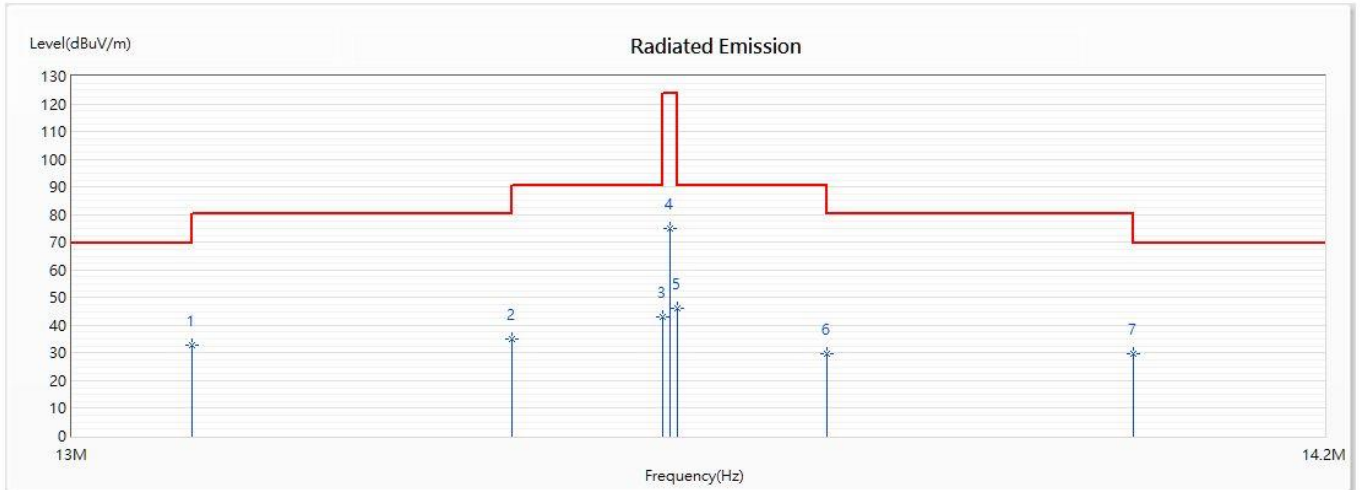
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| 1   | 13.11           | 23.75                   | 69.50          | -45.75      | 2.06                 | 21.69                 | QP            |
| 2   | 13.41           | 26.26                   | 80.50          | -54.24      | 4.56                 | 21.70                 | QP            |
| 3   | 13.553          | 26.15                   | 90.47          | -64.32      | 4.44                 | 21.71                 | QP            |
| 4   | 13.56           | 62.02                   | 124.00         | -61.98      | 40.31                | 21.71                 | QP            |
| 5   | 13.567          | 27.78                   | 90.47          | -62.69      | 6.07                 | 21.71                 | QP            |
| 6   | 13.71           | 26.12                   | 80.50          | -54.38      | 4.41                 | 21.71                 | QP            |
| * 7 | 14.01           | 26.21                   | 69.50          | -43.29      | 4.49                 | 21.72                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**VERTICAL - Z**



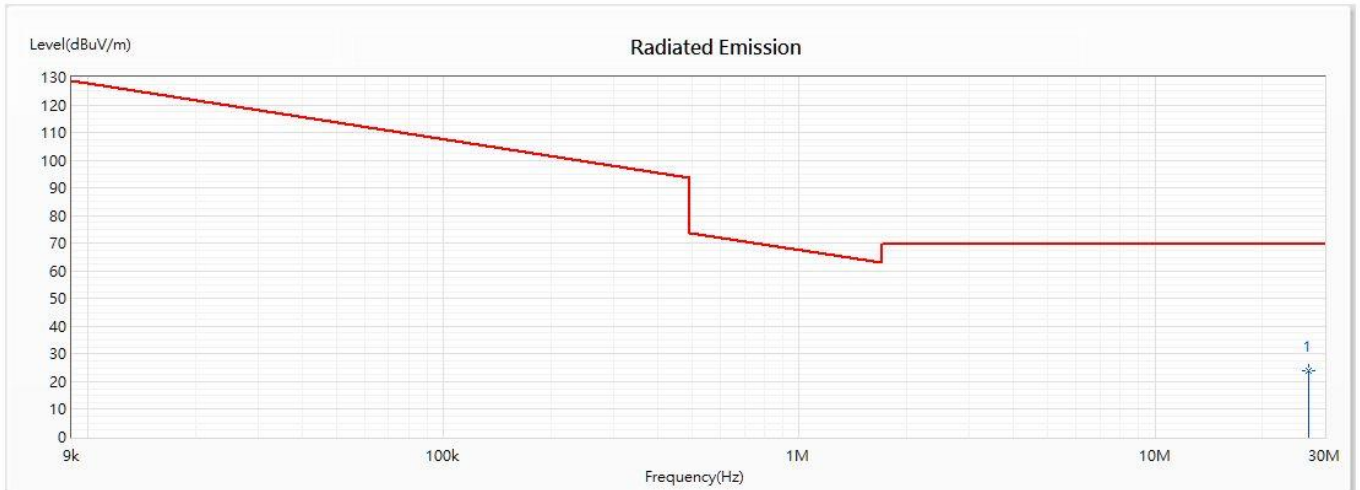
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| * 1 | 13.11           | 32.95                   | 69.50          | -36.55      | 11.26                | 21.69                 | QP            |
| 2   | 13.41           | 35.18                   | 80.50          | -45.32      | 13.48                | 21.70                 | QP            |
| 3   | 13.553          | 42.98                   | 90.47          | -47.49      | 21.27                | 21.71                 | QP            |
| 4   | 13.56           | 75.06                   | 124.00         | -48.94      | 53.35                | 21.71                 | QP            |
| 5   | 13.567          | 45.95                   | 90.47          | -44.52      | 24.24                | 21.71                 | QP            |
| 6   | 13.71           | 29.67                   | 80.50          | -50.83      | 7.96                 | 21.71                 | QP            |
| 7   | 14.01           | 29.65                   | 69.50          | -39.85      | 7.93                 | 21.72                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : General Radiated Emission Data (below 30MHz)  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**Horizontal**



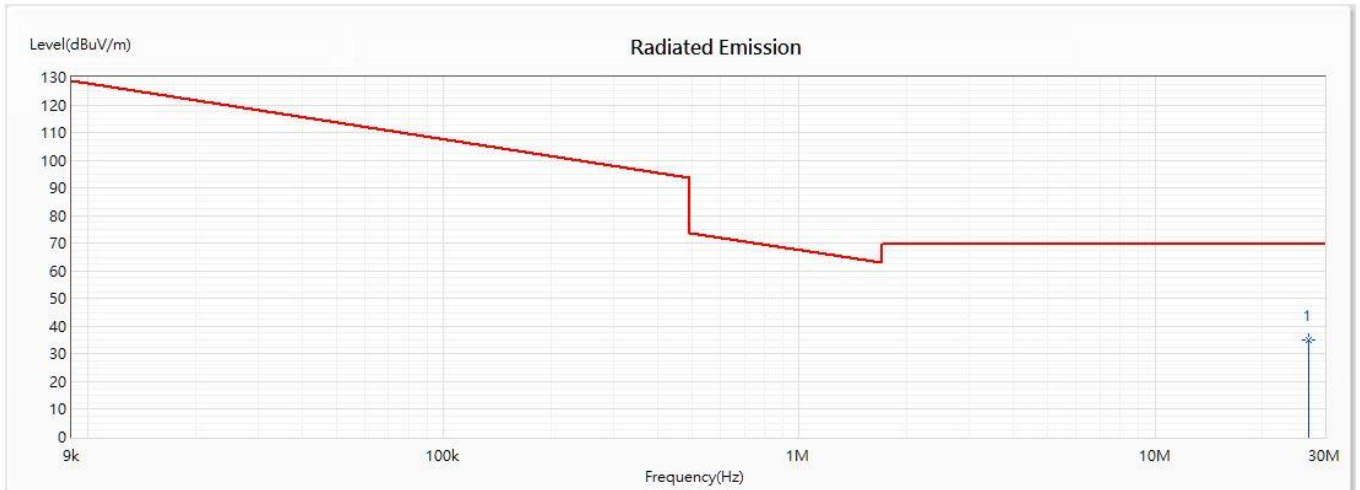
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| * 1 | 27.12           | 23.75                   | 69.54          | -45.79      | 1.85                 | 21.90                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : General Radiated Emission Data (below 30MHz)  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**VERTICAL**



| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| * 1 | 27.12           | 35.27                   | 69.54          | -34.27      | 13.37                | 21.90                 | QP            |

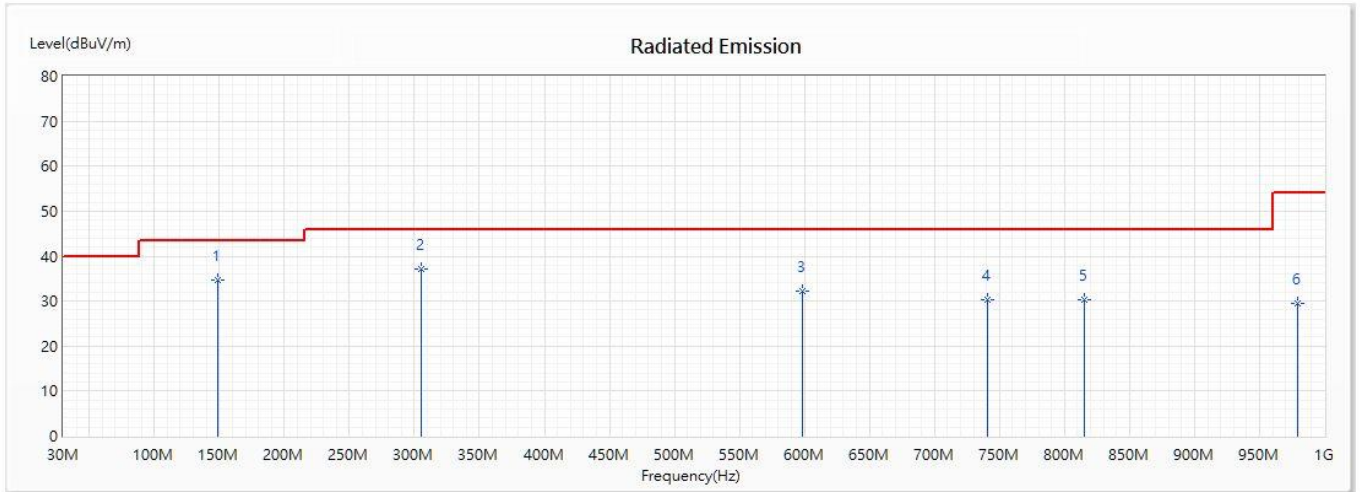
**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.



Product : Mobile Data Terminal  
 Test Item : General Radiated Emission Data (above 30MHz)  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**Horizontal**



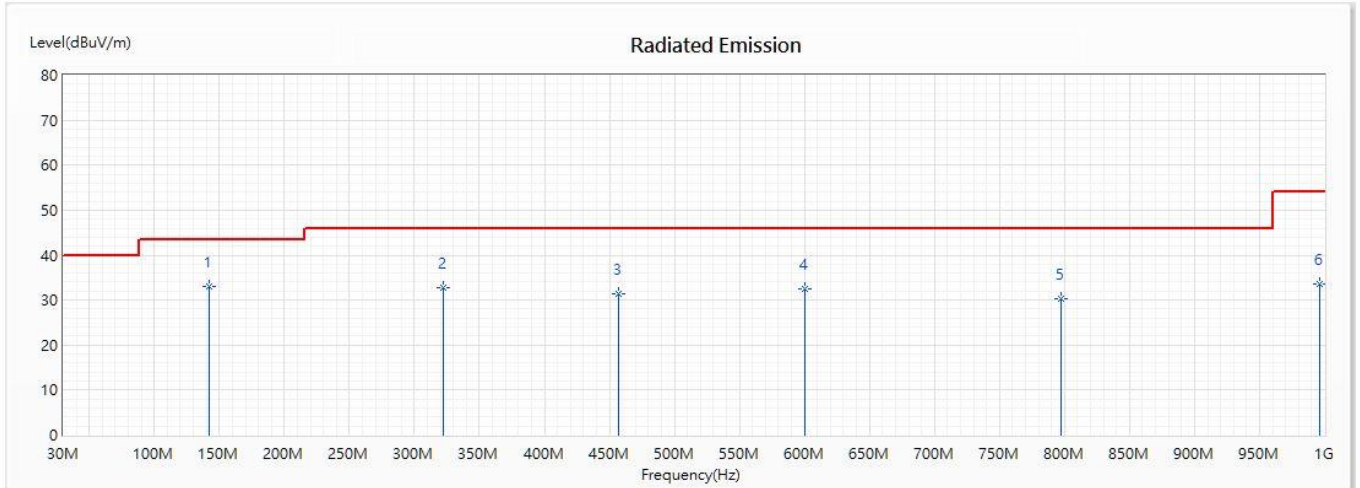
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| * 1 | 148.34          | 34.72                   | 43.50          | -8.78       | 47.45                | -12.73                | QP            |
| 2   | 305.48          | 37.03                   | 46.00          | -8.97       | 45.10                | -8.07                 | QP            |
| 3   | 598.42          | 32.31                   | 46.00          | -13.69      | 32.53                | -0.22                 | QP            |
| 4   | 741.01          | 30.32                   | 46.00          | -15.68      | 29.75                | 0.57                  | QP            |
| 5   | 815.7           | 30.28                   | 46.00          | -15.72      | 33.10                | -2.82                 | QP            |
| 6   | 979.63          | 29.54                   | 54.00          | -24.46      | 31.13                | -1.59                 | QP            |

**Remark:**

- "\*" means this data is the worst emission level;
- Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
- Margin= Emission Level- Limit.

Product : Mobile Data Terminal  
 Test Item : General Radiated Emission Data (above 30MHz)  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**VERTICAL**



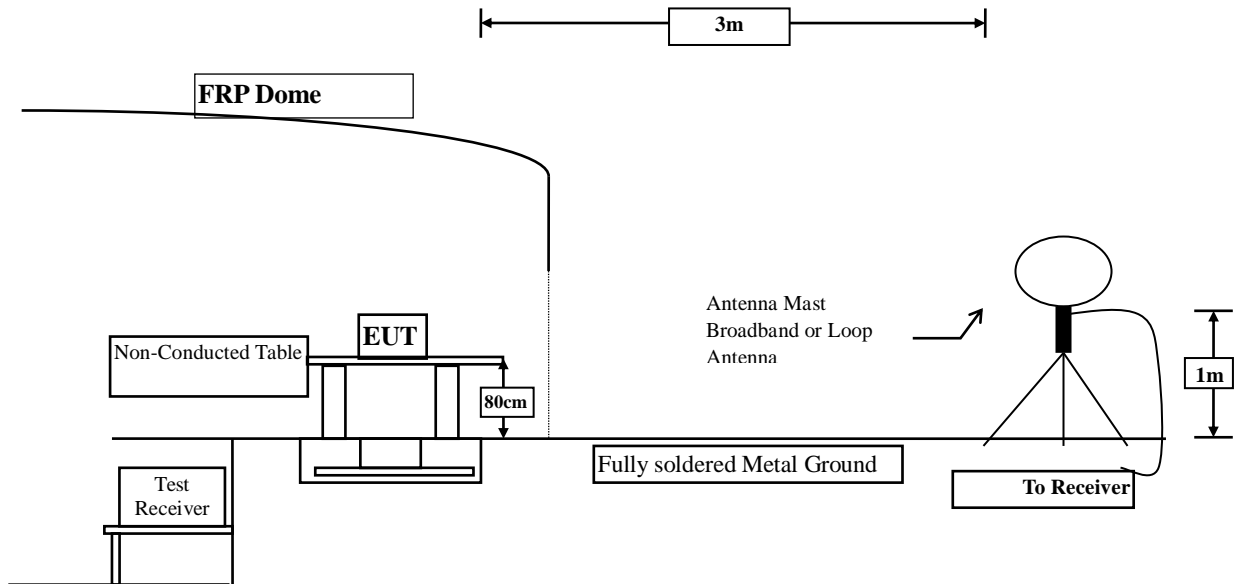
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| * 1 | 142.52          | 33.13                   | 43.50          | -10.37      | 44.49                | -11.36                | QP            |
| 2   | 321.97          | 32.73                   | 46.00          | -13.27      | 40.47                | -7.74                 | QP            |
| 3   | 456.8           | 31.47                   | 46.00          | -14.53      | 35.50                | -4.03                 | QP            |
| 4   | 600.36          | 32.57                   | 46.00          | -13.43      | 32.75                | -0.18                 | QP            |
| 5   | 797.27          | 30.39                   | 46.00          | -15.61      | 33.04                | -2.65                 | QP            |
| 6   | 996.12          | 33.72                   | 54.00          | -20.28      | 35.51                | -1.79                 | QP            |

**Remark:**

1. "\*" means this data is the worst emission level;
2. Emission Level=Reading Level + Correct Factor  
(Correct Factor=Ant Factor+ Cable Loss- Pre Amp).
3. Margin= Emission Level- Limit.

#### 4. Band Edge

##### 4.1. Test Setup



## 4.2. Limits

In any 9 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 dB below that in the 9 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 4.3. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

## 4.4. Uncertainty

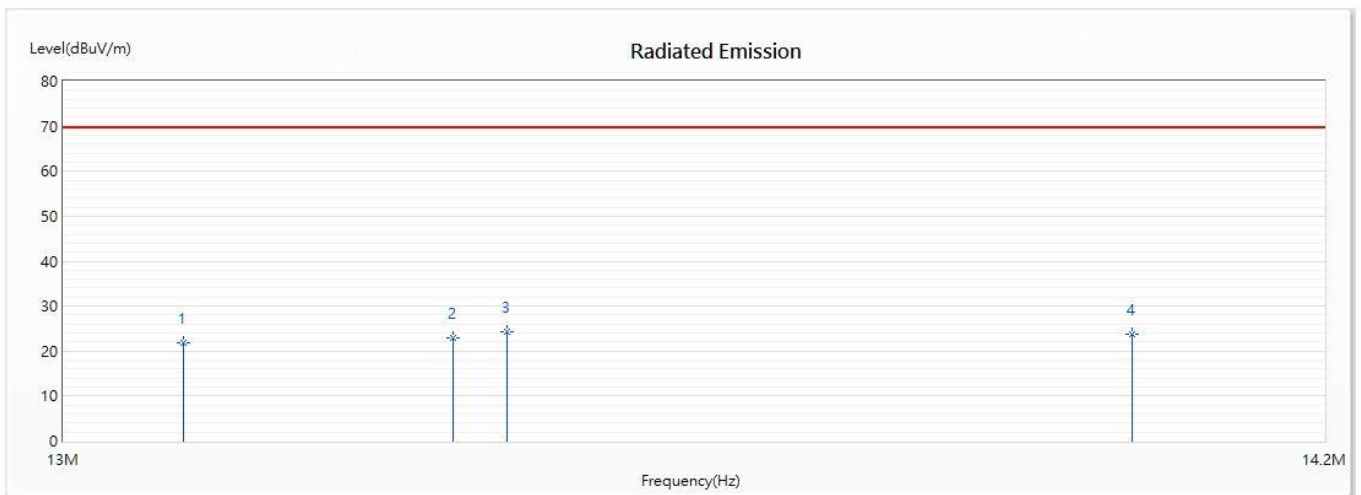
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

#### 4.5. Test Result of Band Edge

Product : Mobile Data Terminal  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

#### HORIZONTAL



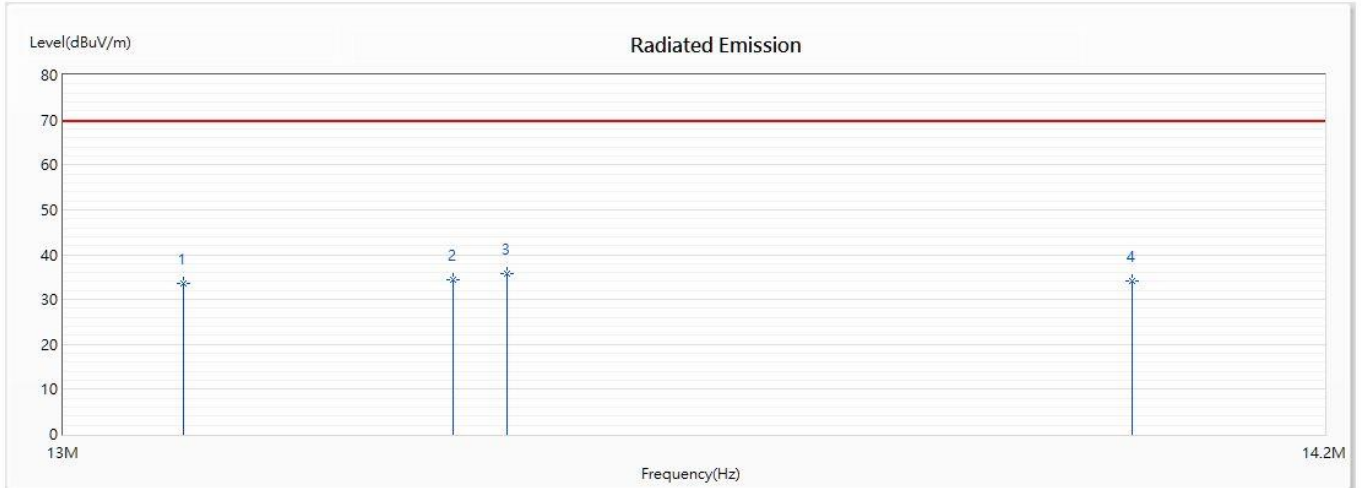
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| 1   | 13.11           | 21.93                   | 69.54          | -47.61      | 0.24                 | 21.69                 | QP            |
| 2   | 13.36           | 22.89                   | 69.54          | -46.65      | 1.19                 | 21.70                 | QP            |
| * 3 | 13.41           | 24.22                   | 69.54          | -45.32      | 2.52                 | 21.70                 | QP            |
| 4   | 14.01           | 23.86                   | 69.54          | -45.68      | 2.14                 | 21.72                 | QP            |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Mobile Data Terminal  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test date : 2020/05/29  
 Test Mode : Mode 1: Transmit

**VERTICAL**



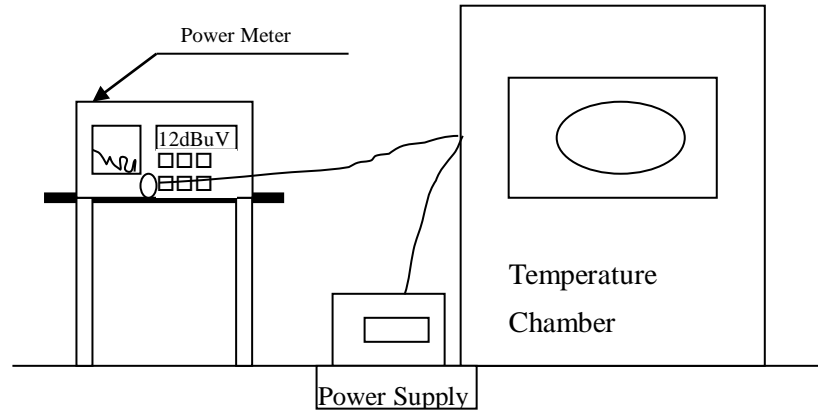
| No  | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Reading Level (dBuV) | Correct Factor (dB/m) | Detector Type |
|-----|-----------------|-------------------------|----------------|-------------|----------------------|-----------------------|---------------|
| 1   | 13.11           | 33.45                   | 69.54          | -36.09      | 11.76                | 21.69                 | QP            |
| 2   | 13.36           | 34.36                   | 69.54          | -35.18      | 12.66                | 21.70                 | QP            |
| * 3 | 13.41           | 35.86                   | 69.54          | -33.68      | 14.16                | 21.70                 | QP            |
| 4   | 14.01           | 34.21                   | 69.54          | -35.33      | 12.49                | 21.72                 | QP            |

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

## 5. Frequency Tolerance

### 5.1. Test Setup



### 5.2. Limits

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency.

### 5.3. Test Procedure

The over operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 5.4. Uncertainty

$\pm 283$  Hz

### 5.5. Test Result of Frequency Stability

Product : Mobile Data Terminal  
 Test Item : Frequency Tolerance  
 Test Site : Temperature Chamber  
 Test date : 2020/05/06  
 Test Mode : Mode 1: Transmit

| Temperature (°C) | Voltage (V) | Observe Time | Declared Frequency (MHz) | Read Frequency (MHz) | Tolerance (%) | Limit (%) |
|------------------|-------------|--------------|--------------------------|----------------------|---------------|-----------|
| 20               | 24          | start        | 13.56                    | 13.56000             | 0.000000      | ± 0.01 %  |
|                  |             | 2mins        | 13.56                    | 13.56000             | 0.000000      |           |
|                  |             | 5mins        | 13.56                    | 13.56000             | 0.000000      |           |
|                  |             | 10mins       | 13.56                    | 13.56020             | 0.001475      |           |
| 20               | 27.6        | start        | 13.56                    | 13.56000             | 0.000000      | ± 0.01 %  |
|                  |             | 2mins        | 13.56                    | 13.56000             | 0.000000      |           |
|                  |             | 5mins        | 13.56                    | 13.56000             | 0.000000      |           |
|                  |             | 10mins       | 13.56                    | 13.56010             | 0.000737      |           |
| 20               | 20.4        | start        | 13.56                    | 13.56000             | 0.000000      | ± 0.01 %  |
|                  |             | 2mins        | 13.56                    | 13.56000             | 0.000000      |           |
|                  |             | 5mins        | 13.56                    | 13.56010             | 0.000737      |           |
|                  |             | 10mins       | 13.56                    | 13.56100             | 0.007375      |           |
| 50               | 24          | start        | 13.56                    | 13.56000             | 0.000000      | ± 0.01 %  |
|                  |             | 2mins        | 13.56                    | 13.55900             | -0.007375     |           |
|                  |             | 5mins        | 13.56                    | 13.55905             | -0.007006     |           |
|                  |             | 10mins       | 13.56                    | 13.55910             | -0.006637     |           |
| 40               | 24          | start        | 13.56                    | 13.55900             | -0.007375     | ± 0.01 %  |
|                  |             | 2mins        | 13.56                    | 13.55900             | -0.007375     |           |
|                  |             | 5mins        | 13.56                    | 13.55905             | -0.007006     |           |
|                  |             | 10mins       | 13.56                    | 13.55905             | -0.007006     |           |
| 30               | 24          | start        | 13.56                    | 13.56000             | 0.000000      | ± 0.01 %  |
|                  |             | 2mins        | 13.56                    | 13.56000             | 0.000000      |           |
|                  |             | 5mins        | 13.56                    | 13.56010             | 0.000737      |           |
|                  |             | 10mins       | 13.56                    | 13.56020             | 0.001475      |           |



|     |    |        |       |          |           |          |
|-----|----|--------|-------|----------|-----------|----------|
| 10  | 24 | start  | 13.56 | 13.56000 | 0.000000  | ± 0.01 % |
|     |    | 2mins  | 13.56 | 13.56000 | 0.000000  |          |
|     |    | 5mins  | 13.56 | 13.55900 | -0.007375 |          |
|     |    | 10mins | 13.56 | 13.56050 | 0.003687  |          |
| 0   | 24 | start  | 13.56 | 13.55900 | -0.007375 | ± 0.01 % |
|     |    | 2mins  | 13.56 | 13.55900 | -0.007375 |          |
|     |    | 5mins  | 13.56 | 13.55950 | -0.003687 |          |
|     |    | 10mins | 13.56 | 13.56020 | 0.001475  |          |
| -10 | 24 | start  | 13.56 | 13.56050 | 0.003687  | ± 0.01 % |
|     |    | 2mins  | 13.56 | 13.56050 | 0.003687  |          |
|     |    | 5mins  | 13.56 | 13.56100 | 0.007375  |          |
|     |    | 10mins | 13.56 | 13.56100 | 0.007375  |          |
| -20 | 24 | start  | 13.56 | 13.56000 | 0.000000  | ± 0.01 % |
|     |    | 2mins  | 13.56 | 13.55900 | -0.007375 |          |
|     |    | 5mins  | 13.56 | 13.56100 | 0.007375  |          |
|     |    | 10mins | 13.56 | 13.56100 | 0.007375  |          |

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**6. EMI Reduction Method During Compliance Testing**

No modification was made during testing.