

# TEST REPORT

**Product: Vitamine Devices**

**Model No.: Boisterous Berry, Marvelous Mint, Vintage Vanilla,  
Cool Citrus, Charming Cherry, Succulent Strawberry, Slim,  
Kama Sutra, Surge, Max Menthol, Freedom, Rejuvenate, Stress**

**Trade mark: **

**Report No.: TCT180926E014**

**Issued Date: Sep. 30, 2018**

Issued for:

**VitaCig Inc.**

**2375 Watermill Dr, Orange Park, Florida, 32073**

Issued By:

**Shenzhen TCT Testing Technology Co., Ltd.**

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The test results in the report only apply to the tested sample.

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## 1. Test Certification

|                              |  |
|------------------------------|--|
| <b>Product:</b>              | Vitamine Devices   |
| <b>Model No.:</b>            | Boisterous Berry, Marvelous Mint, Vintage Vanilla, Cool Citrus, Charming Cherry, Succulent Strawberry, Slim, Kama Sutra, Surge, Max Menthol, Freedom, Rejuvenate, Stress |
| <b>Applicant:</b>            | VitaCig Inc.   |
| <b>Address:</b>              | 2375 Watermill Dr, Orange Park, Florida, 32073   |
| <b>Manufacturer:</b>         | SURPASS INTERNATIONAL TECHNOLOGY   |
| <b>Address:</b>              | Area B, 2/F, Building C2, Fuyuan Industrial Zone, Tangwei, Fuyong Street, Bao'an District, Shenzhen  |
| <b>Test Voltage:</b>         | DC 3.7 V   |
| <b>Date of Test:</b>         | Sep. 28, 2018 ~ Sep. 30, 2018  |
| <b>Applicable Standards:</b> | EN 55014-1:2006+A1:2009+A2:2011<br>EN 55014-2:2015   |

The above equipment has been tested by Shenzhen TCT Testing Technology Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:**

*Zak*

Zak

**Date:**

Sep. 30, 2018

**Check By:**

*Howie*

Howie

**Date:**

Sep. 30, 2018

**Approved By:**

*Tomsin*

Tomsin

**Date:**

Sep. 30, 2018



## 2. Test Result Summary

| Emission                            |                                |        |
|-------------------------------------|--------------------------------|--------|
| Test Method                         | Item                           | Result |
| EN 55014-1:2006+A1:2009<br>+A2:2011 | Conducted Emission             | N/A    |
|                                     | Discontinuous Disturbance      | N/A    |
|                                     | Disturbance Power Measurement  | N/A    |
|                                     | Radiated Emission              | Pass   |
| EN61000-3-2:2014                    | Harmonic Current Emissions     | N/A    |
| EN 61000-3-3:2013                   | Voltage Fluctuations & Flicker | N/A    |

| Immunity (EN 55014-2:2015)        |  |        |
|-----------------------------------|--|--------|
| Test Method                       | Item   | Result |
| EN 61000-4-2:2009                 | Electrostatic Discharge (ESD)                                  | Pass   |
| EN 61000-4-3:2006+A1:2008+A2:2010 | Radio-frequency Electromagnetic Field Amplitude Modulated (RS) | Pass   |
| EN 61000-4-4:2012                 | Electrical Fast Transients (EFT)                               | N/A    |
| EN 61000-4-5:2014                 | Surges   | N/A    |
| EN 61000-4-6:2014                 | Radio-frequency Continuous Conducted (CS)                      | N/A    |
| EN 61000-4-11:2004                | Voltage Dips & Voltage Interruptions                           | N/A    |

**Note:**

1. Pass: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.
5. The information of measurement uncertainty is available upon the customer's request.

### 3. EUT Description

|                           |  |
|---------------------------|--|
| <b>Product Name:</b>      | Vitamine Devices   |
| <b>Model No.:</b>         | Boisterous Berry   |
| <b>Product Parameter:</b> | Battery Capacity: DC 3.7 V, 1.0 Wh   |
| <b>AC Mains:</b>          | <input type="checkbox"/> Shielded <input type="checkbox"/> Unshielded, <input type="checkbox"/> Detachable <input type="checkbox"/> Un-detachable<br><input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> Length: |
| <b>DC Line:</b>           | <input type="checkbox"/> Shielded <input type="checkbox"/> Unshielded, <input type="checkbox"/> Detachable <input type="checkbox"/> Un-detachable<br><input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> Length: |
| <b>Control Line:</b>      | <input type="checkbox"/> Shielded <input type="checkbox"/> Unshielded, <input type="checkbox"/> Detachable <input type="checkbox"/> Un-detachable<br><input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> Length: |

#### Model(s) List

| No.          | Model Number  | Tested With                         |
|--------------|---|-------------------------------------|
| 1            | Boisterous Berry  | <input checked="" type="checkbox"/> |
| Other models | Marvelous Mint , Vintage Vanilla, Cool Citrus, Charming Cherry, Succulent Strawberry, Slim, Kama Sutra, Surge, Max Menthol, Freedom, Rejuvenate, Stress | <input type="checkbox"/>            |

Note: Boisterous Berry is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names. So the test data of Boisterous Berry can represent the remaining models.

## 4. Test Methodology

### 4.1. Decision of Final Test Mode

The EUT was tested together with the thereafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were assessed:

| Test Mode       |
|-----------------|
| Mode 1: Working |

### 4.2. EUT System Operation

1. Set up EUT with the support equipments.
2. Make sure the EUT work normally during the test.

## 5. Setup of Equipment under Test

### 5.1. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Equipment | Model No. | Serial No. | FCC ID | Trade Name |
|-----------|-----------|------------|--------|------------|
| /         | /         | /          | /      | /          |

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 5.2. Configuration Of System Under Test

EUT

**(EUT: Vitamine Devices)**

## 6. Facilities and Accreditations

### 6.1. Facilities

All measurement facilities used to collect the measurement data are located at TCT Lab.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 32. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| No. | Item                          | MU                        |
|-----|-------------------------------|---------------------------|
| 1.  | Temperature                   | $\pm 0.1^{\circ}\text{C}$ |
| 2.  | Humidity                      | $\pm 1.0\%$               |
| 3.  | Spurious Emissions, Conducted | $\pm 2.56\text{ dB}$      |
| 4.  | All Emissions, Radiated       | $\pm 4.28\text{ dB}$      |

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of  $k=2$ .

## 7. Emission Test

### 7.1. Conducted Emission

#### 7.1.1. Test Specification

|                          |                   |
|--------------------------|-------------------|
| <b>Test Requirement:</b> | EN 55014-1        |
| <b>Test Method:</b>      | EN 55014-1        |
| <b>Frequency Range:</b>  | 150 kHz to 30 MHz |

#### 7.1.2. Limits

Household appliances and equipment causing similar disturbances and regulation controls incorporation semiconductor devices

| Frequency<br>(MHz) | At mains terminals   |                                | At load terminals and additional terminals |                                |
|--------------------|----------------------|--------------------------------|--|--------------------------------|
|                    | Quasi-peak<br>dB(uV) | Average <sup>a</sup><br>dB(uV) | Quasi-peak<br>dB(uV)                       | Average <sup>a</sup><br>dB(uV) |
| 0.15 - 0.5         | 66-56                | 59-46                          | 80   | 70                             |
| 0.5 - 5.0          | 56                   | 46                             | 74   | 64                             |
| 5.0 - 30.0         | 60                   | 50                             | 74   | 64                             |

a. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

#### Mains terminals of tools

| Frequency<br>(MHz) | Rated motor power not exceeding 700 W |                                | Rated motor power above 700 W and not exceeding 1000 W |                                | Rated motor power above 1000 W |                                |
|--------------------|---------------------------------------|--------------------------------|--|--------------------------------|--------------------------------|--------------------------------|
|                    | Quasi-peak<br>dB(uV)                  | Average <sup>a</sup><br>dB(uV) | Quasi-peak<br>dB(uV)                                   | Average <sup>a</sup><br>dB(uV) | Quasi-peak<br>dB(uV)           | Average <sup>a</sup><br>dB(uV) |
| 0.15 - 0.35        | 66-59                                 | 59-49                          | 70-63  | 63-53                          | 79-69                          | 69-59                          |
| 0.35 - 5.0         | 59                                    | 49                             | 63   | 53                             | 69                             | 59                             |
| 5.0 - 30.0         | 64                                    | 54                             | 68   | 58                             | 74                             | 64                             |

a. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

**Note:** The limits for the measurement with the average detector are tentative and may be modified after a period of experience.

**7.1.3. Test Instruments**

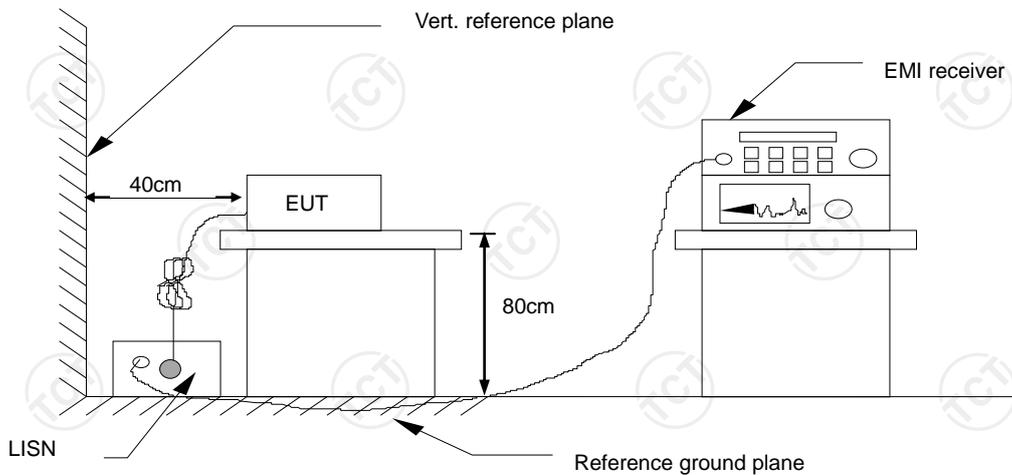
| Conducted Emission Shielding Room Test Site (843) |              |           |               |                 |
|---|--------------|-----------|---------------|-----------------|
| Equipment   | Manufacturer | Model     | Serial Number | Calibration Due |
| EMI Test Receiver                                 | R&S          | ESCS30    | 100139        | Aug. 27, 2019   |
| LISN  | Schwarzbeck  | NSLK 8126 | 8126453       | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**7.1.4. Test Method**

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN. Conducted voltage on load terminals and additional terminals were made by using a 1500 Ω probe.

**7.1.5. Block Diagram of Test Setup**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.1.6. Test Results**

**Note:** This test isn't applicable because the EUT doesn't have relative function.

## 7.2. Discontinuous Disturbance

### 7.2.1. Test Specification

|                          |                   |
|--------------------------|-------------------|
| <b>Test Requirement:</b> | EN 55014-1        |
| <b>Test Method:</b>      | EN 55014-1        |
| <b>Frequency Range:</b>  | 150 kHz to 30 MHz |

### 7.2.2. Limits

The click limit  $L_q$  is determined from the formula:

$$L_q = L + \Delta L$$

which the limits  $L$  for continuous disturbance shall be increased (see table 1):

which corresponding to the click rate  $N$  shall be calculated the amount  $\Delta L$  by

$$\Delta L = 44 \text{ dB for } N < 0,2$$

$$\Delta L = [20 \log(30/N)] \text{ dB for } 0,2 \leq N < 30$$

Table 1

| Frequency<br>(MHz) | At mians terminals   |                   | At load terminals and additional terminals |                   |
|--------------------|----------------------|-------------------|--|-------------------|
|                    | Quasi-peak<br>dB(uV) | Average<br>dB(uV) | Quasi-peak<br>dB(uV)                       | Average<br>dB(uV) |
| 0.15 - 0.35        | 66-56                | 59-46             | 80   | 70                |
| 0.35 - 5.0         | 56                   | 46                | 74   | 64                |
| 5.0 - 30.0         | 60                   | 50                | 74   | 64                |

### 7.2.3. Test Instruments

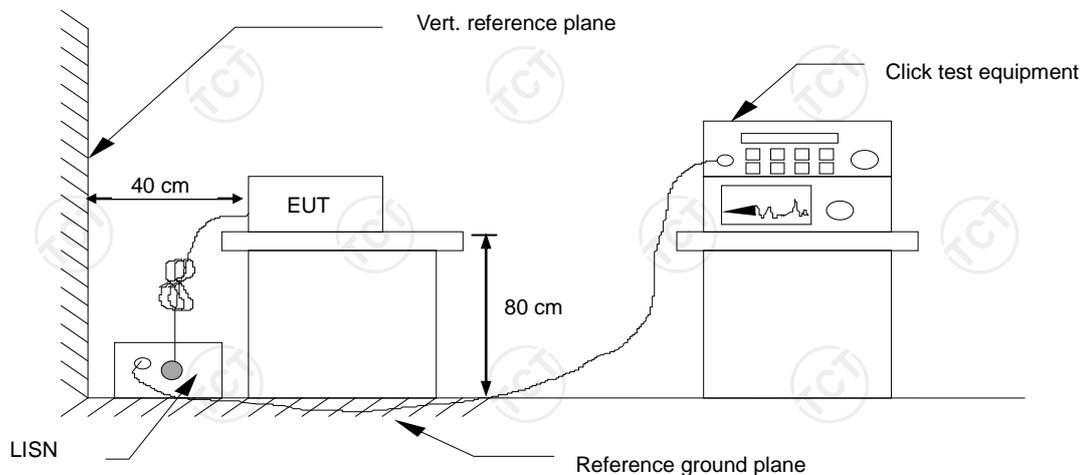
| Discontinuous Disturbance Shielding Room Test Site (843) |              |           |               |                 |
|--|--------------|-----------|---------------|-----------------|
| Equipment  | Manufacturer | Model     | Serial Number | Calibration Due |
| Clicker  | Schwarzbeck  | DIA1512D  | 21554         | Aug. 27, 2019   |
| LISN   | Schwarzbeck  | NSLK 8126 | 8126453       | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibration can be traced to international system unit (SI).

### 7.2.4. Test Method

Measurement of a disturbance, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms which is separated from a subsequent disturbance by at least 200 ms.

### 7.2.5. Block Diagram of Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.2.6. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

### 7.3. Disturbance Power Measurement

#### 7.3.1. Test Specification

|                          |                   |
|--------------------------|-------------------|
| <b>Test Requirement:</b> | EN 55014-1        |
| <b>Test Method:</b>      | EN 55014-1        |
| <b>Frequency Range:</b>  | 30 MHz to 300 MHz |

#### 7.3.2. Limits

| Frequency (MHz) | Household appliances and similar appliances            |                             | Rated motor power not exceeding 700 W |                             |
|-----------------|--|-----------------------------|---------------------------------------|-----------------------------|
|                 | Quasi-peak dB(pW)                                      | Average <sup>a</sup> dB(pW) | Quasi-peak dB(pW)                     | Average <sup>a</sup> dB(pW) |
| 30 ~ 300        | 45-55  | 35-45                       | 45-55                                 | 35-45                       |
| Frequency (MHz) | Rated motor power above 700 W and not exceeding 1000 W |                             | Rated motor power above 1000 W        |                             |
|                 | Quasi-peak dB(pW)                                      | Average <sup>a</sup> dB(pW) | Quasi-peak dB(pW)                     | Average <sup>a</sup> dB(pW) |
| 30 ~ 300        | 49-59  | 55-65                       | 55-65                                 | 35-45                       |

a. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

#### 7.3.3. Test Instruments

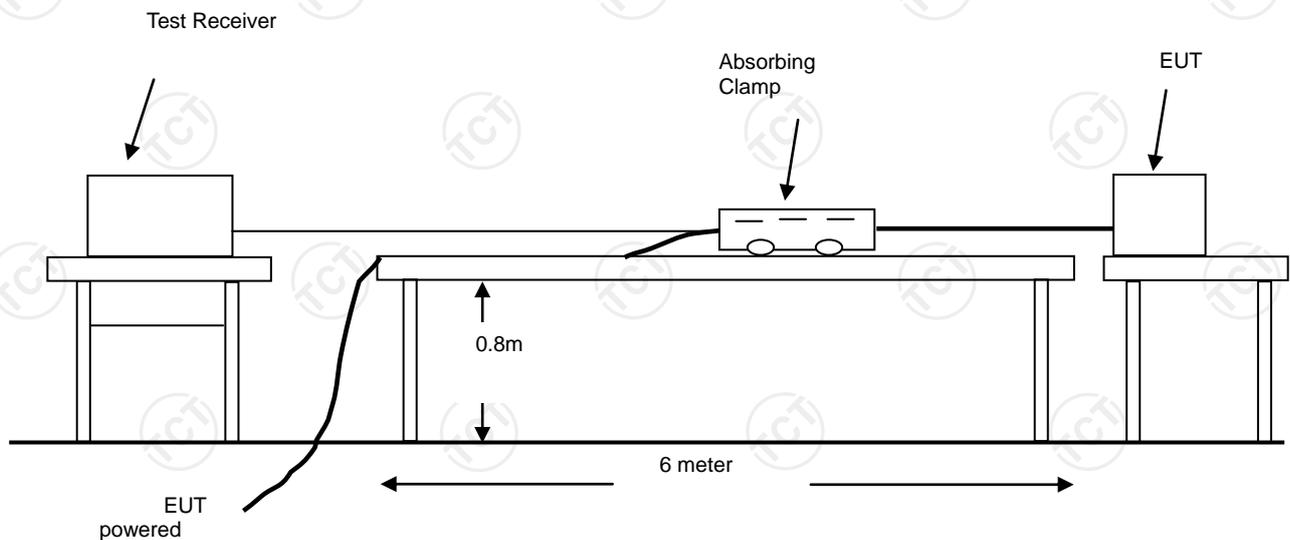
| Conducted Emission Shielding Room Test Site (843) |                          |         |               |                 |
|---|--------------------------|---------|---------------|-----------------|
| Equipment   | Manufacturer             | Model   | Serial Number | Calibration Due |
| EMI Test Receiver                                 | R&S                      | ESCS30  | 100139        | Aug. 27, 2019   |
| Absorption Power Clamp                            | Da Ze technology CO.,LTD | ZN23201 | 0811          | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 7.3.4. Test Method

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). The lead to be measured on is stretched in a straight line for a distance sufficient to accommodate the absorbing clamp, and to permit the necessary measuring adjustment of position for tuning. The clamp is placed around the lead so as to measure a quantity proportional to the disturbance on the lead.

### 7.3.5. Block Diagram of Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.3.6. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

## 7.4. Radiated Emission

### 7.4.1. Test Specification

|                              |                       |
|------------------------------|-----------------------|
| <b>Test Requirement:</b>     | EN 55014-1            |
| <b>Test Method:</b>          | EN 55014-1            |
| <b>Frequency Range:</b>      | 30 MHz to 1000 MHz    |
| <b>Measurement Distance:</b> | 3 m                   |
| <b>Antenna Polarization:</b> | Horizontal & Vertical |

### 7.4.2. Limits

| Frequency (MHz) | Limit (dBuV/m) (At 3m) |
|-----------------|------------------------|
| 30 - 230        | 40                     |
| 230 - 1000      | 47                     |

**Note:** The lower limit shall apply at the transition frequency.

### 7.4.3. Test Instruments

| Radiated Emission Test Site (966) |              |            |               |                 |
|-----------------------------------|--------------|------------|---------------|-----------------|
| Name of Equipment                 | Manufacturer | Model      | Serial Number | Calibration Due |
| EMI Test Receiver                 | R&S          | ESVD       | 100008        | Aug. 27, 2019   |
| Spectrum Analyzer                 | R&S          | FSEM       | 848597-001    | Aug. 27, 2019   |
| Amplifier                         | HP           | 8447D      | 2727A05017    | Aug. 27, 2019   |
| Amplifier                         | EM           | EM30265    | 07032613      | Aug. 27, 2019   |
| Broadband Antenna                 | Schwarzbeck  | VULB9163   | 340           | Aug. 27, 2019   |
| Horn Antenna                      | Schwarzbeck  | BBHA 9120D | 631           | Aug. 27, 2019   |

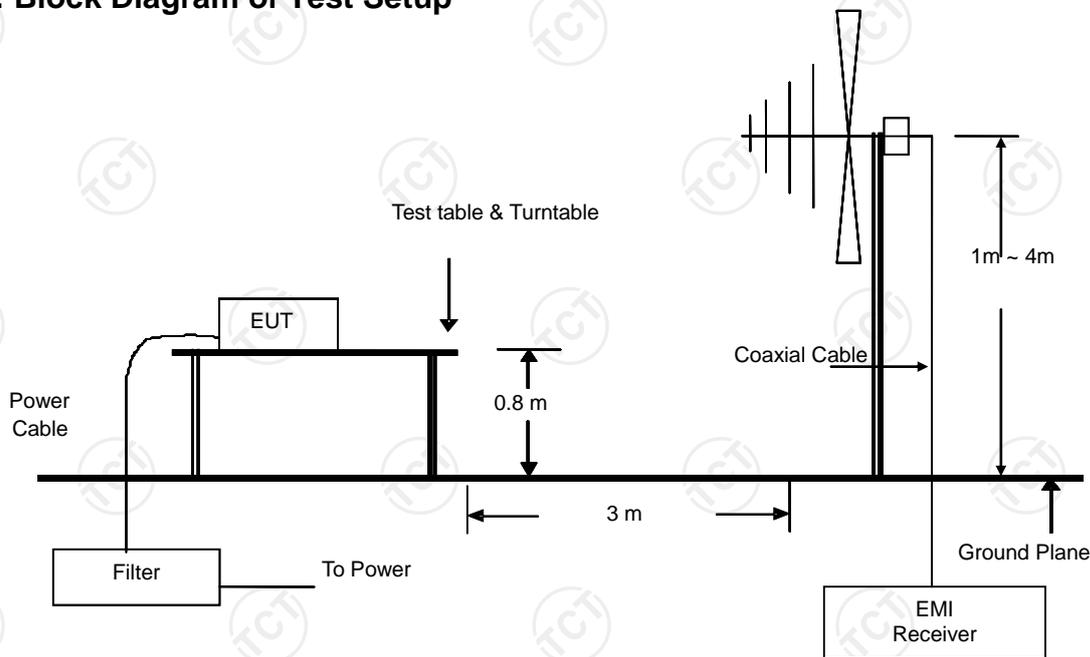
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 7.4.4. Test Method

Measurements were made in a 3-meter semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All

frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. Block Diagram of Test Setup.

**7.4.5. Block Diagram of Test Setup**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.4.6. Test Results**

|                          |              |              |                |
|--------------------------|--------------|--------------|----------------|
| <b>Test Environment:</b> | Temp.: 25 °C | Humid.: 55 % | Press.: 96 kPa |
| <b>Test Mode:</b>        | Mode 1       |              |                |
| <b>Test Voltage:</b>     | DC 3.7 V     |              |                |
| <b>Test Result:</b>      | Pass         |              |                |

**Note:**

Freq. = Emission frequency in MHz

Reading level (dBµV/m) = Receiver reading

Corr. Factor (dB) = Antenna Factor + Cable Loss - AMP Factor

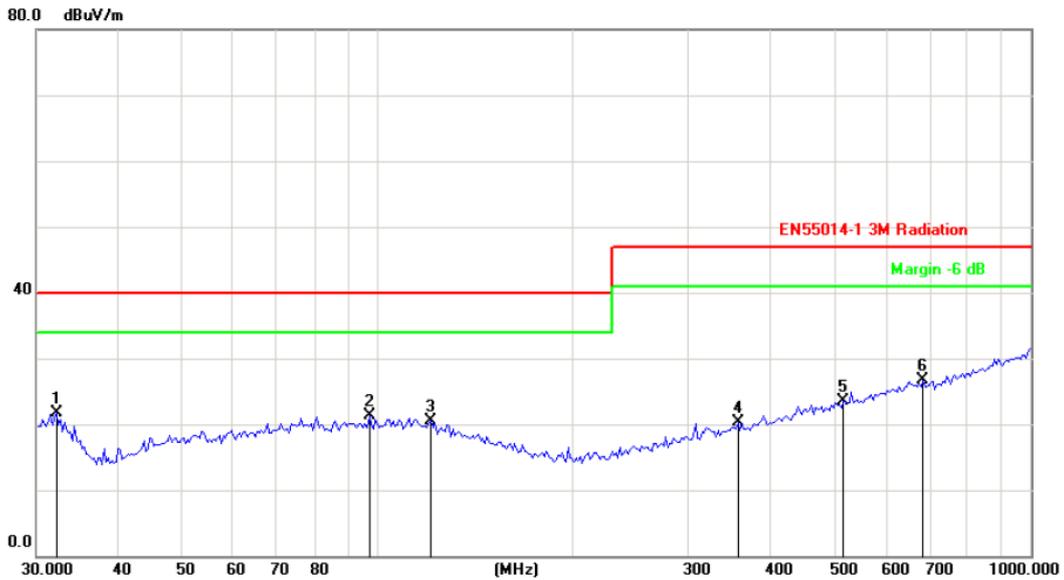
Measurement (dBµV/m) = Reading level (dBµV/m) + Corr. Factor (dB)

Limit (dBµV/m) = Limit stated in standard

Margin (dB) = Measurement (dBµV/m) – Limit (dBµV/m)

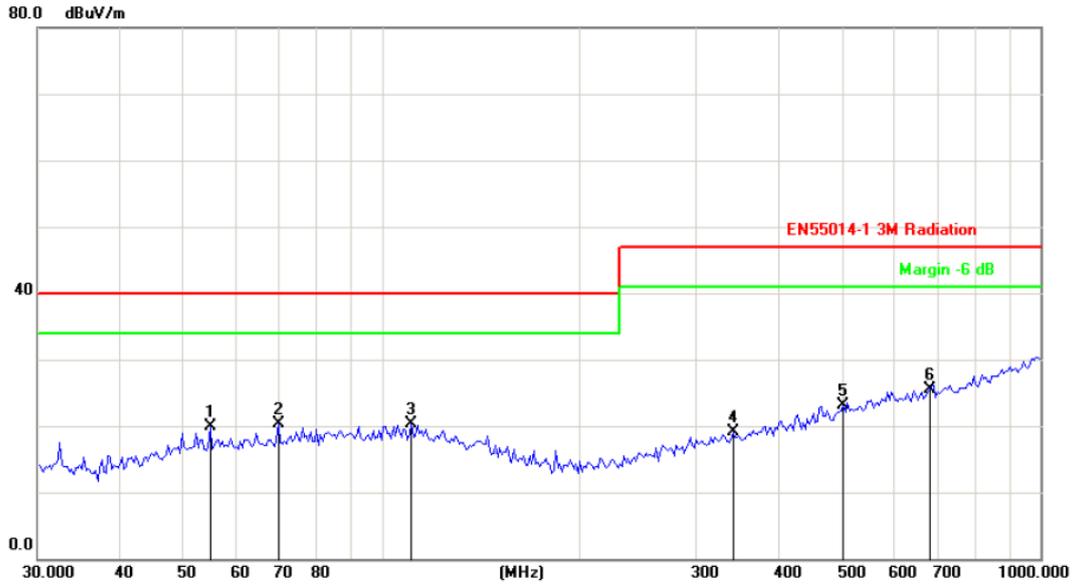
\* is meaning the worst frequency has been tested in the test frequency range

Please refer to following diagram for individual



Site: Polarization: **Horizontal** Temperature: 25  
 Limit: EN55014-1 3M Radiation Power: DC 3.7V Humidity: 55 %  
 Mode: Working  
 Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|-------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dB/m  | dB     | cm             | degree       | Comment |
| 1   | *   | 32.1840  | 32.68         | -11.01         | 21.67       | 40.00 | -18.33 |                |              | peak    |
| 2   |     | 97.0023  | 29.97         | -8.72          | 21.25       | 40.00 | -18.75 |                |              | peak    |
| 3   |     | 120.6118 | 32.21         | -11.68         | 20.53       | 40.00 | -19.47 |                |              | peak    |
| 4   |     | 355.9397 | 28.69         | -8.41          | 20.28       | 47.00 | -26.72 |                |              | peak    |
| 5   |     | 516.5651 | 28.97         | -5.51          | 23.46       | 47.00 | -23.54 |                |              | peak    |
| 6   |     | 684.2259 | 29.64         | -3.02          | 26.62       | 47.00 | -20.38 |                |              | peak    |



Site: Polarization: **Vertical** Temperature: 25  
 Limit: EN55014-1 3M Radiation Power: DC 3.7V Humidity: 55 %  
 Mode: Working  
 Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|-------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dB/m  | dB     | cm             | degree       | Comment |
| 1   |     | 54.9011  | 31.01         | -11.17         | 19.84       | 40.00 | -20.16 |                |              | peak    |
| 2   |     | 69.7179  | 35.76         | -15.55         | 20.21       | 40.00 | -19.79 |                |              | peak    |
| 3   | *   | 110.8581 | 29.28         | -9.05          | 20.23       | 40.00 | -19.77 |                |              | peak    |
| 4   |     | 341.2442 | 27.90         | -8.76          | 19.14       | 47.00 | -27.86 |                |              | peak    |
| 5   |     | 502.2473 | 28.80         | -5.68          | 23.12       | 47.00 | -23.88 |                |              | peak    |
| 6   |     | 679.4346 | 28.65         | -3.05          | 25.60       | 47.00 | -21.40 |                |              | peak    |

## 7.5. Harmonic Current Emissions

### 7.5.1. Test Specification

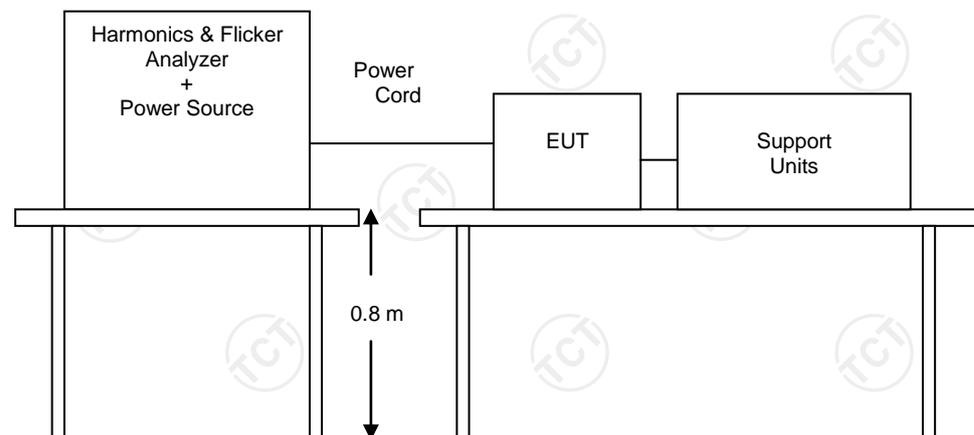
|                          |              |
|--------------------------|--------------|
| <b>Test Requirement:</b> | EN 61000-3-2 |
| <b>Test Method:</b>      | EN 61000-3-2 |
| <b>Limits:</b>           | Class A      |

### 7.5.2. Test Instruments

| Harmonic Test Equipment   |              |           |               |                 |
|---------------------------|--------------|-----------|---------------|-----------------|
| Name of Equipment         | Manufacturer | Model     | Serial Number | Calibration Due |
| AC Power Supply           | KIKUSUI      | PCR4000M  | UC002552      | Aug. 27, 2019   |
| Harmonic/Flicker Analyzer | KIKUSUI      | KHA1000   | UD002324      | Aug. 27, 2019   |
| Multi Outlet Unit         | KIKUSUI      | OT01-KHA  | UF003026      | Aug. 27, 2019   |
| Line Impedance Network    | KIKUSUI      | LIN1020JF | UC001738      | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 7.5.3. Block Diagram of Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.5.4. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

## 7.6. Flicker and Voltage Fluctuation

### 7.6.1. Test Specification

|                          |              |
|--------------------------|--------------|
| <b>Test Requirement:</b> | EN 61000-3-3 |
| <b>Test Method:</b>      | EN 61000-3-3 |

### 7.6.2. Limits

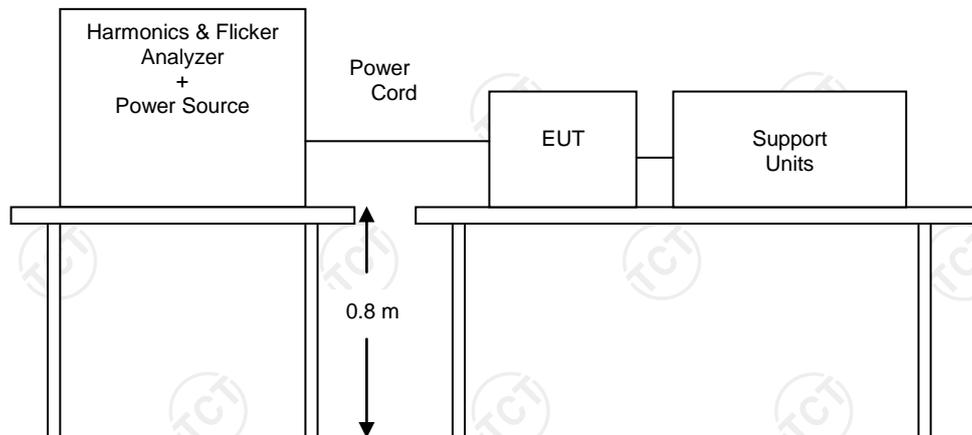
| Test Item | Limit | Note   |
|-----------|-------|--|
| Pst       | 1.0   | Pst means short-term flicker indicator         |
| Plt       | 0.65  | Plt means long-term flicker indicator          |
| Tdt (ms)  | 500   | Tdt means maximum time that dt exceeds 3 %.    |
| dmax (%)  | 4/6/7 | Dmax means maximum relative voltage change.    |
| dc (%)    | 3.3   | Dc means relative steady-state voltage change. |

### 7.6.3. Test Instruments

| Flicker Test Equipment    |              |           |               |                 |
|---------------------------|--------------|-----------|---------------|-----------------|
| Name of Equipment         | Manufacturer | Model     | Serial Number | Calibration Due |
| AC Power Supply           | KIKUSUI      | PCR4000M  | UC002552      | Aug. 27, 2019   |
| Harmonic/Flicker Analyzer | KIKUSUI      | KHA1000   | UD002324      | Aug. 27, 2019   |
| Multi Outlet Unit         | KIKUSUI      | OT01-KHA  | UF003026      | Aug. 27, 2019   |
| Line Impedance Network    | KIKUSUI      | LIN1020JF | UC001738      | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 7.6.4. Block Diagram of Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.6.5. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

## 8. Immunity Test

### 8.1. General Performance Criteria Description

|                     |  |
|---------------------|--|
| <b>Criterion A:</b> | The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.  |
| <b>Criterion B:</b> | The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended. |
| <b>Criterion C:</b> | Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.   |

## 8.2. Electrostatic Discharge (ESD)

### 8.2.1. Test Specification

|                               |  |
|-------------------------------|--|
| <b>Test Requirement:</b>      | EN 55014-2   |
| <b>Test Method:</b>           | EN 61000-4-2   |
| <b>Storage capacitor:</b>     | 150 pF   |
| <b>Discharge resistor:</b>    | 330 ohm  |
| <b>Discharge Voltage:</b>     | Contact Discharge: $\pm 4$ kV<br>Air Discharge: $\pm 8$ kV<br>Indirect application: $\pm 4$ kV               |
| <b>Polarity:</b>              | Positive & Negative  |
| <b>Number of Discharge:</b>   | Air Discharge: Minimum 20 times at each test point<br>Contact Discharge: Minimum 50 times at each test point |
| <b>Discharge Mode:</b>        | 1 time/s   |
| <b>Performance Criterion:</b> | B  |

### 8.2.2. Test Instruments

| Immunity Shielded Room            |              |            |               |                 |
|-----------------------------------|--------------|------------|---------------|-----------------|
| Name of Equipment                 | Manufacturer | Model      | Serial Number | Calibration Due |
| Electrostatic Discharge Generator | Prima        | ESD61002AG | PR12092502    | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 8.2.3. Test Method

#### 1. Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed.

#### 2. Contact Discharge:

The test was applied on accessible metallic parts of the EUT. The generator was re-triggered for a new single discharge and repeated 50 times for each pre-selected test point. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

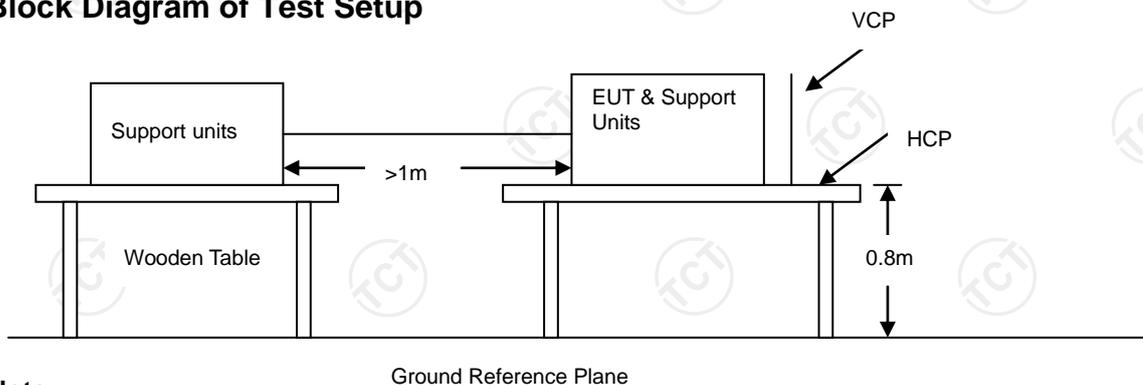
### 3. Indirect discharge for horizontal coupling plane:

At least 10 single discharges (in the most sensitive polarity) were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1 m from the EUT and with the discharge electrode touching the coupling plane.

### 4. Indirect discharge for vertical coupling plane:

At least 10 single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5 m X 0.5 m, was placed parallel to, and positioned at a distance of 0.1 m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

#### 8.2.4. Block Diagram of Test Setup



**Note:**

#### 1. Table-top Equipment

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25 mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6 m x 0.8 m) was placed on the table and attached to the **GRP** by means of a cable with 940 k total impedance.

The equipment under test was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5 mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

#### 2. Floor-standing Equipment

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25 mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

**8.2.5. Test Results**

|                          |              |              |                |
|--------------------------|--------------|--------------|----------------|
| <b>Test Environment:</b> | Temp.: 25 °C | Humid.: 55 % | Press.: 96 kPa |
| <b>Test Mode:</b>        | Mode 1       |              |                |
| <b>Test Voltage:</b>     | DC 3.7 V     |              |                |
| <b>Test Result:</b>      | Pass         |              |                |

| Air Discharge |                                     |                                     |                          |                       |  |  |
|---------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|--|--|
| Test Points   | Test Levels                         | Results                             |                          |                       |  |  |
|               | ± 8 kV                              | Pass                                | Fail                     | Performance Criterion | Observation  |  |
| Slot 2 Points | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | B                     | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |  |

| Contact Discharge |                                     |                                     |                          |                       |  |  |
|-------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------|--|--|
| Test Points       | Test Levels                         | Results                             |                          |                       |  |  |
|                   | ± 4 kV                              | Pass                                | Fail                     | Performance Criterion | Observation  |  |
| HCP 4 Points      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | B                     | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |  |
| VCP 4 Points      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | B                     | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |  |
| Metal 2 Points    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | B                     | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 |  |

**Note:**

1. There was no change compared with initial operation during the test.
2. The function of EUT is loss during the test and it can be recovered by itself operation after the test.
3. The function of EUT is loss during the test and it can be recoverable by manually operation after the test.

### 8.3. Radio-frequency Electromagnetic Field Amplitude Modulated (RS)

#### 8.3.1. Test Specification

|                               |                                  |
|-------------------------------|----------------------------------|
| <b>Test Requirement:</b>      | EN 55014-2                       |
| <b>Test Method</b>            | EN 61000-4-3                     |
| <b>Frequency Range:</b>       | 80 MHz -1000 MHz                 |
| <b>Test level:</b>            | 3 V/m (unmodulated, r.m.s)       |
| <b>Modulation:</b>            | 1 kHz, 80 % AM, sine wave        |
| <b>Frequency Step:</b>        | 1 % of preceding frequency value |
| <b>Polarity of Antenna:</b>   | Horizontal & Vertical            |
| <b>Antenna Height:</b>        | 1.5 m                            |
| <b>Performance Criterion:</b> | A                                |

#### 8.3.2. Test Instruments

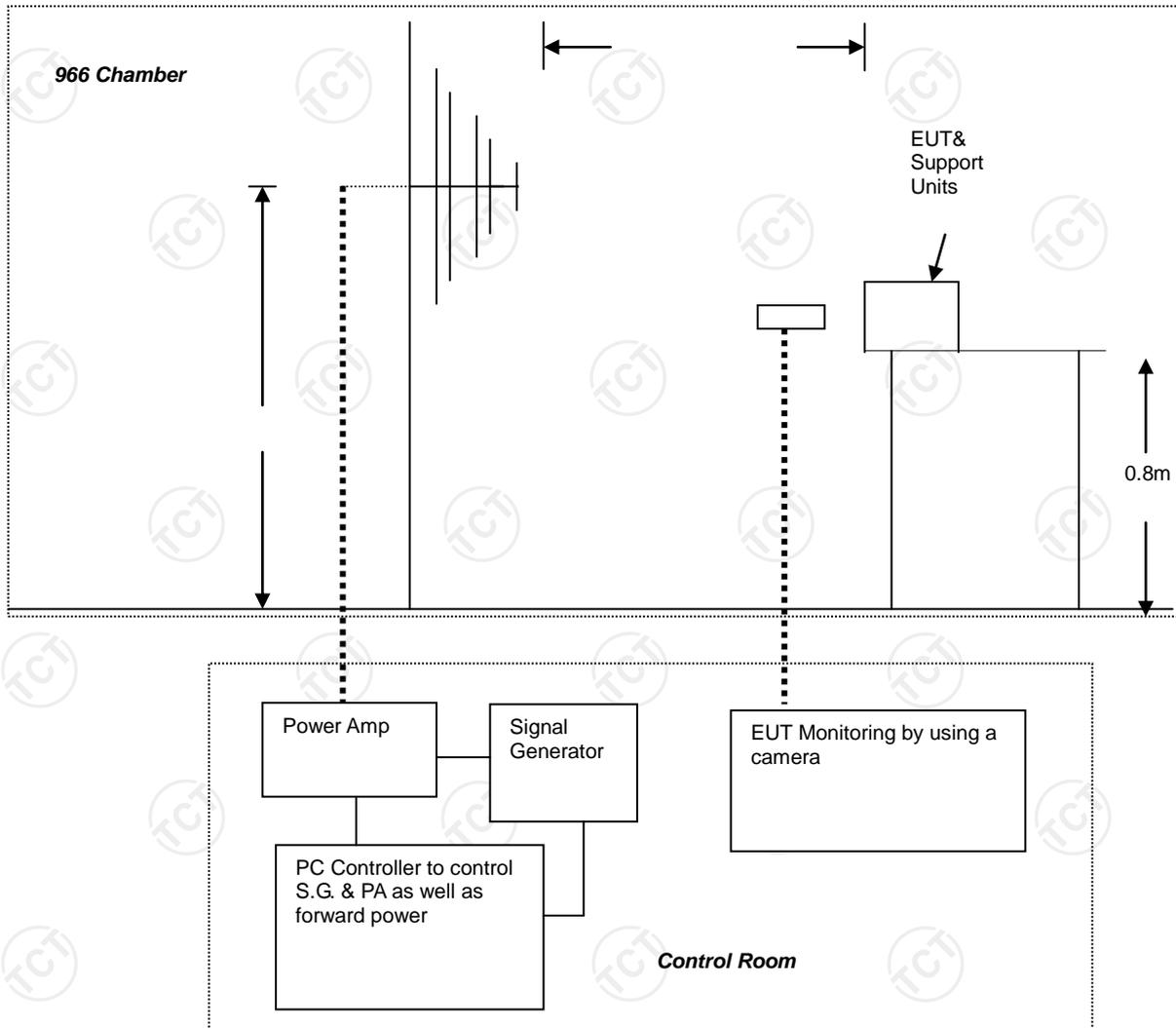
| 966 RS Chamber    |              |                  |               |                 |
|-------------------|--------------|------------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model            | Serial Number | Calibration Due |
| Signal Generator  | Maconi       | 2022D            | 119246/003    | Aug. 27, 2019   |
| Power Amplifier   | M2S          | A00181-1000      | 9801-112      | Aug. 27, 2019   |
| Power Amplifier   | M2S          | AC8113/ 800-250A | 9801-179      | Aug. 27, 2019   |
| Power Antenna     | SCHAFFNER    | CBL6140A         | 1204          | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

#### 8.3.3. Test Method

1. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
2. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1 kHz sine-wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s, where the frequency range is swept incrementally; the step size was 1% of preceding frequency value.
3. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond and was not less than 0,5 s.
4. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
5. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT.

### 8.3.4. Block Diagram of Test Setup



**Note:**

**1. Table-top Equipment**

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

**2. Floor-standing Equipment**

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

**8.3.5. Test Results**

|                          |              |              |                |
|--------------------------|--------------|--------------|----------------|
| <b>Test Environment:</b> | Temp.: 25 °C | Humid.: 55 % | Press.: 96 kPa |
| <b>Test Mode:</b>        | Mode 1       |              |                |
| <b>Test Voltage:</b>     | DC 3.7 V     |              |                |
| <b>Test Result:</b>      | Pass         |              |                |

| Frequency(MHz) | Polarity | Position | Field Strength(V/m) | Observation  |
|----------------|----------|----------|---------------------|--|
| 80 ~ 1000      | V&H      | Front    | 3                   | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 80 ~ 1000      | V&H      | Rear     | 3                   | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 80 ~ 1000      | V&H      | Left     | 3                   | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |
| 80 ~ 1000      | V&H      | Right    | 3                   | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 |

**Note:**

1. There was no change compared with initial operation during the test.
2. The function of EUT is loss during the test and it can be recovered by itself operation after the test.
3. The function of EUT is loss during the test and it can be recoverable by manually operation after the test.

## 8.4. Electrical Fast Transient (EFT)

### 8.4.1. Test Specification

|                               |   |
|-------------------------------|---|
| <b>Test Requirement:</b>      | EN 55014-2  |
| <b>Test Method:</b>           | EN 61000-4-4  |
| <b>Test Level:</b>            | signal lines and control lines: $\pm 0,5$ kV (peak)<br>Input and output d.c. power ports: $\pm 0,5$ kV (peak)<br>Input and output a.c. power ports: $\pm 1$ kV (peak) |
| <b>Polarity:</b>              | Positive & Negative   |
| <b>Impulse Frequency:</b>     | 5 kHz   |
| <b>Impulse Wave-shape:</b>    | 5/50 ns   |
| <b>Burst Duration:</b>        | 15 ms   |
| <b>Burst Period:</b>          | 300 ms  |
| <b>Test Duration:</b>         | 2 minutes per level & polarity  |
| <b>Performance Criterion:</b> | B   |

### 8.4.2. Test Instruments

| Immunity Shield Room           |              |            |               |                 |
|--------------------------------|--------------|------------|---------------|-----------------|
| Name of Equipment              | Manufacturer | Model      | Serial Number | Calibration Due |
| Fast Transient Burst Simulator | Prima        | EFT61004BG | PR12074375    | Aug. 27, 2019   |
| Capacitive coupling folder     | Prima        | EFT-CLAMP  | N/A           | Aug. 27, 2019   |
| Single-phase transformer       | Prima        | JMB-3KVA   | L12121902-2   | Aug. 27, 2019   |

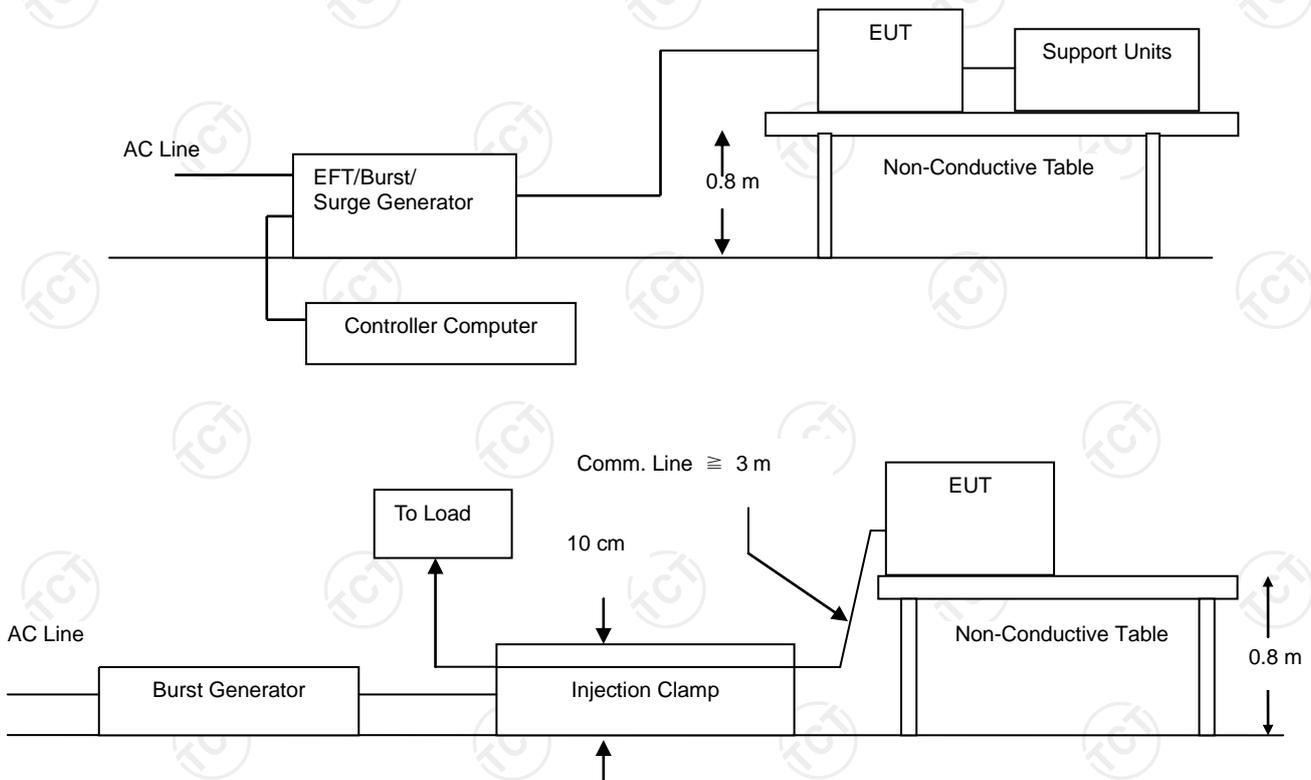
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 8.4.3. Test Method

1. The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1 m + 0.01 m thick. The ground reference plane was 1 m\*1 m metallic sheet with 0.65 mm minimum thickness.
2. This reference ground plane was project beyond the EUT by at least 0.1 m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5 m.
3. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.
4. The length of the signal and power lines between the coupling device and the EUT is 0.5 m.

5. The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal.
6. Each of the Line and Neutral conductors is impressed with burst noise for 2 minutes.

#### 8.4.4. Block Diagram of Test Setup



**Note:**

**1. Table-top Equipment**

The configuration consisted of a wooden table (0.8 m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25 mm thick and 2.5 m square) connected to the protective grounding system. A minimum distance of 0.5 m was provided between the EUT and the walls of the laboratory or any other metallic structure.

**2. Floor-standing Equipment**

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25 mm thick and 2.5 m square) connected to the protective grounding system.

#### 8.4.5. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

## 8.5. Surges

### 8.5.1. Test Specification

|                                    |   |
|------------------------------------|---|
| <b>Test Requirement:</b>           | EN 55014-2  |
| <b>Test Method:</b>                | EN 61000-4-5  |
| <b>Test Level:</b>                 | Input a.c. power ports:<br>Line to line: $\pm 1$ kV(peak)<br>Line to ground: $\pm 2$ kV(peak) |
| <b>Polarity:</b>                   | Positive & Negative   |
| <b>Wave-Shape:</b>                 | 1.2/50 us(8 /20 us)   |
| <b>Generator Source Impedance:</b> | 2 ohm between networks<br>12 ohm between network and ground                                   |
| <b>Test Interval:</b>              | 60 s between each surge   |
| <b>Number of Tests:</b>            | 5 positive at $90^\circ$ phase angle, and 5 negative at $270^\circ$ phase angle               |
| <b>Performance Criterion:</b>      | B   |

### 8.5.2. Test Instruments

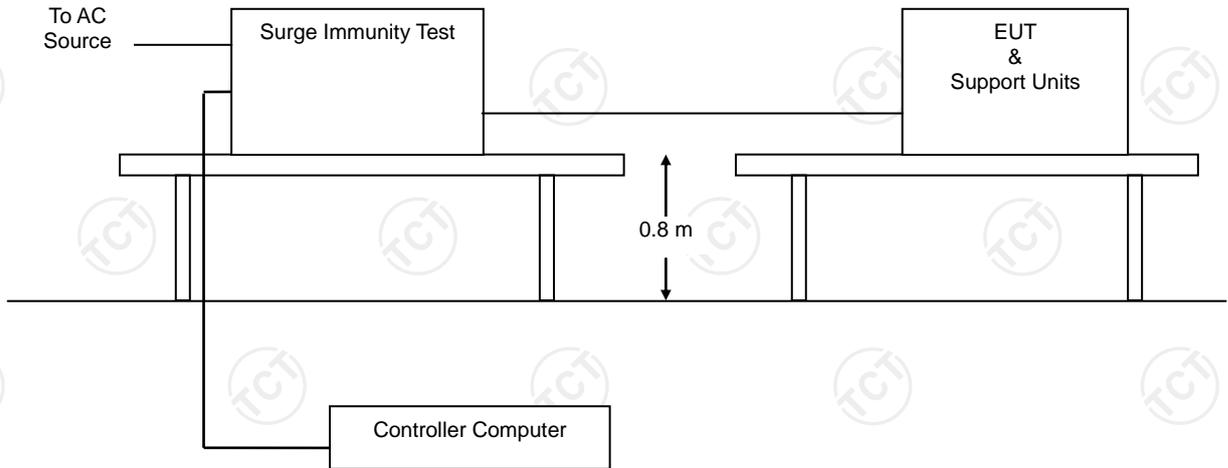
| Immunity Shield Room      |              |            |               |                 |
|---------------------------|--------------|------------|---------------|-----------------|
| Name of Equipment         | Manufacturer | Model      | Serial Number | Calibration Due |
| Lightning Surge Generator | Prima        | SUG61005BG | PR12125534    | Aug. 27, 2019   |
| Single-phase transformer  | Prima        | JMB-3KVA   | L12121902-2   | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 8.5.3. Test Method

- For line-to-line coupling mode, provide a 1 kV 1.2/50 us voltage surge (at open-circuit condition) and 8/20 us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2 kV.
- At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.
- Different phase angles are done individually.
- Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

### 8.5.4. Block Diagram of Test Setup



### 8.5.5. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

## 8.6. Radio-frequency Continuous Conducted (CS)

### 8.6.1. Test Specification

|                               |  |
|-------------------------------|--|
| <b>Test Requirement:</b>      | EN 55014-2   |
| <b>Test Method</b>            | EN 61000-4-6   |
| <b>Frequency Range:</b>       | 0.15 MHz - 230 MHz   |
| <b>Test Level:</b>            | signal lines and control lines: 1 V r.m.s. (unmodulated)<br>Input and output d.c. power ports: 1 V r.m.s. (unmodulated)<br>Input and output a.c. power ports: 3 V r.m.s. (unmodulated) |
| <b>Modulation:</b>            | 1 kHz, 80 % AM, sine wave  |
| <b>Performance Criterion:</b> | A  |

### 8.6.2. Test Instrument

| CS Test                            |              |              |               |                 |
|------------------------------------|--------------|--------------|---------------|-----------------|
| Name of Equipment                  | Manufacturer | Model        | Serial Number | Calibration Due |
| Conducted Disturbances Test System | Schloder     | CDG 6000-75  | 126B1290      | Aug. 27, 2019   |
| CDN                                | Schloder     | CDN M2+M3-16 | A2210281      | Aug. 27, 2019   |
| Attenuator                         | Schloder     | ATT-6DB-100  | A100W225      | Aug. 27, 2019   |
| EM-Clamp                           | Schloder     | EMCL-20      | 132A1194      | Aug. 27, 2019   |

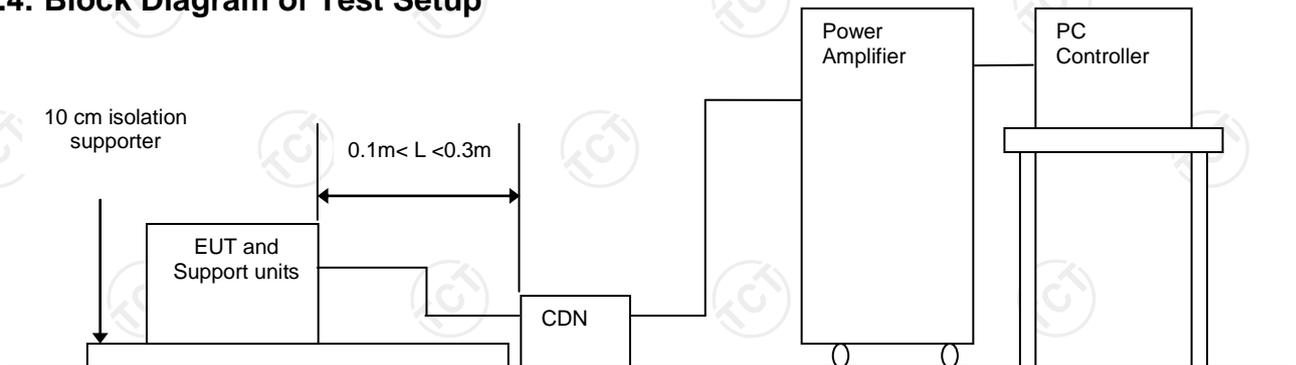
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 8.6.3. Test Method

1. The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
2. The disturbance signal described below is injected to EUT through CDN.
3. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

- The frequency range is swept from 0.150 MHz to 80 MHz using 3 V signal level, and with the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave.
- Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

#### 8.6.4. Block Diagram of Test Setup



**Note:**

**1. Table-Top and Floor-Standing Equipment**

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

#### 8.6.5. Test Results

Note: This test isn't applicable because the EUT doesn't have relative function.

## 8.7. Voltage Dip & Voltage Interruptions

### 8.7.1. Test Specification

|                               |  |
|-------------------------------|--|
| <b>Test Requirement:</b>      | EN 55014-2   |
| <b>Test Level:</b>            | Test specification(50Hz)<br>0 % of $U_T$ (Supply Voltage) for 0.5 period<br>40% of $U_T$ (Supply Voltage) for 10 periods<br>70 % of $U_T$ (Supply Voltage) for 25 periods<br>Test specification(60Hz)<br>0 % of $U_T$ (Supply Voltage) for 0.5 period<br>40% of $U_T$ (Supply Voltage) for 10 periods<br>70 % of $U_T$ (Supply Voltage) for 30 periods |
| <b>Performance Criterion:</b> | C  |

### 8.7.2. Test Instrument

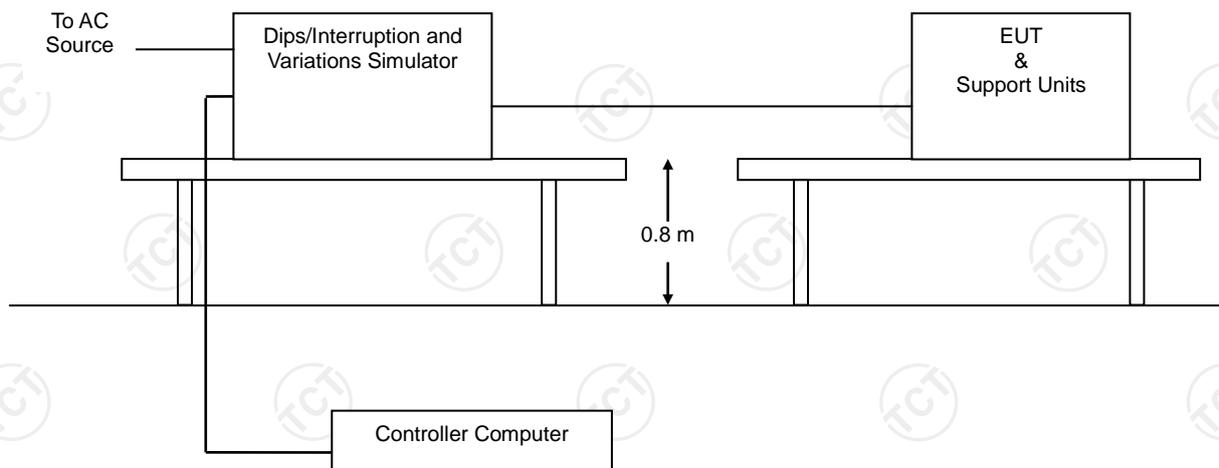
| Immunity shielded room   |              |            |               |                 |
|--------------------------|--------------|------------|---------------|-----------------|
| Name of Equipment        | Manufacturer | Model      | Serial Number | Calibration Due |
| Cycle Sag Simulator      | Prima        | DRP61011AG | PR12106201    | Aug. 27, 2019   |
| Single-phase transformer | Prima        | JMB-3KVA   | L12121902-2   | Aug. 27, 2019   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 8.7.3. Test Method

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

### 8.7.4. Block Diagram of Test Setup

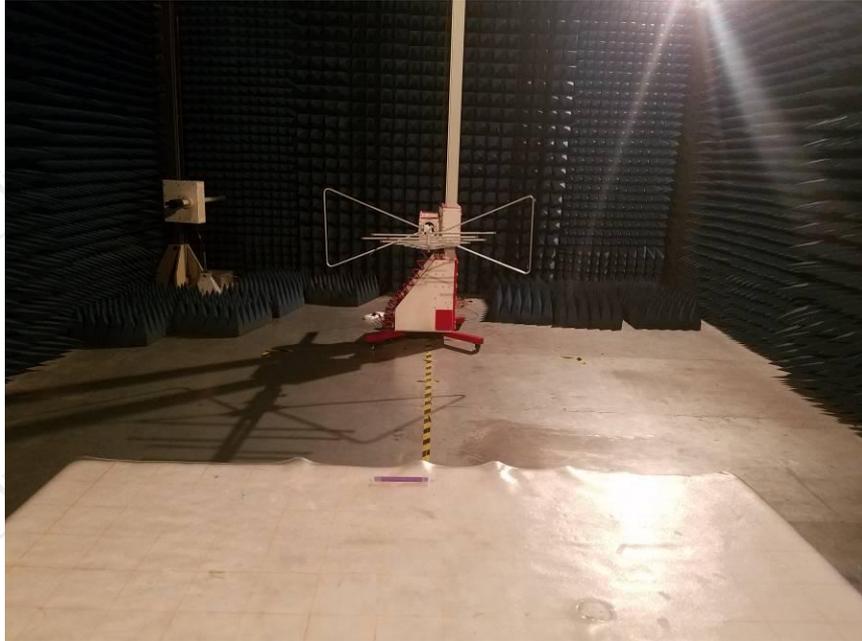


### 8.7.5. Test Results

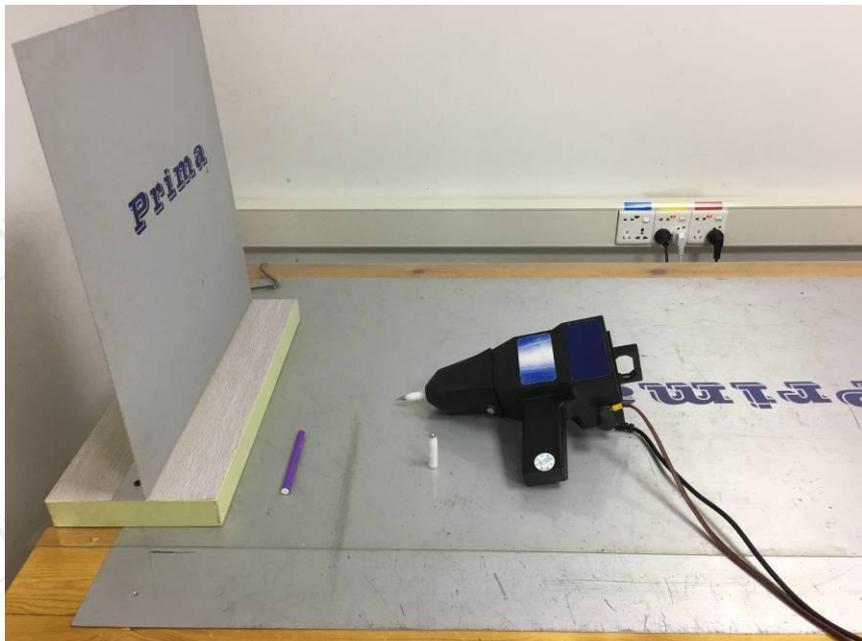
Note: This test isn't applicable because the EUT doesn't have relative function.

## 9. Photographs of Test Configuration

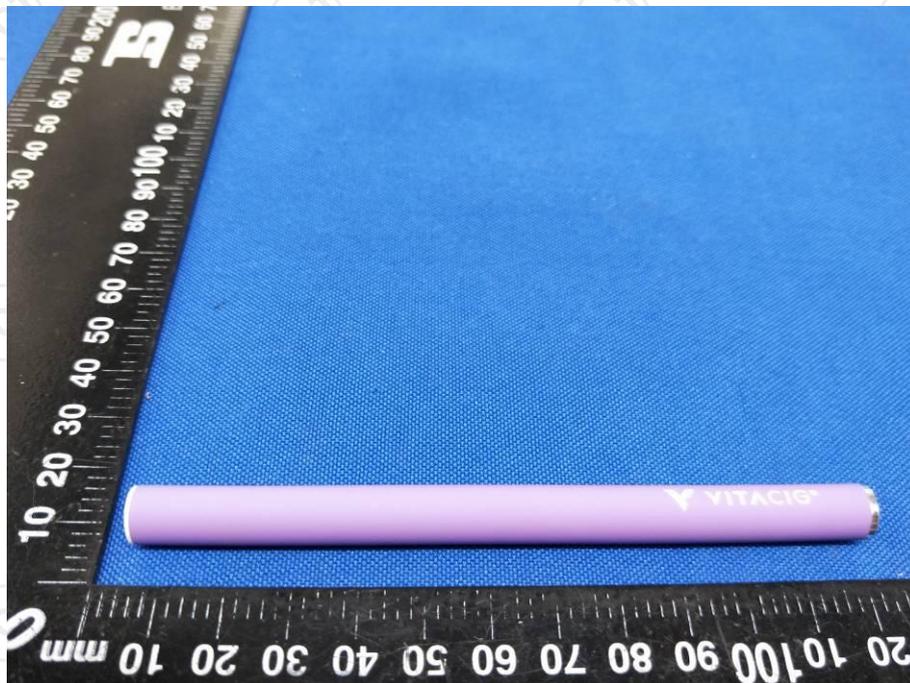
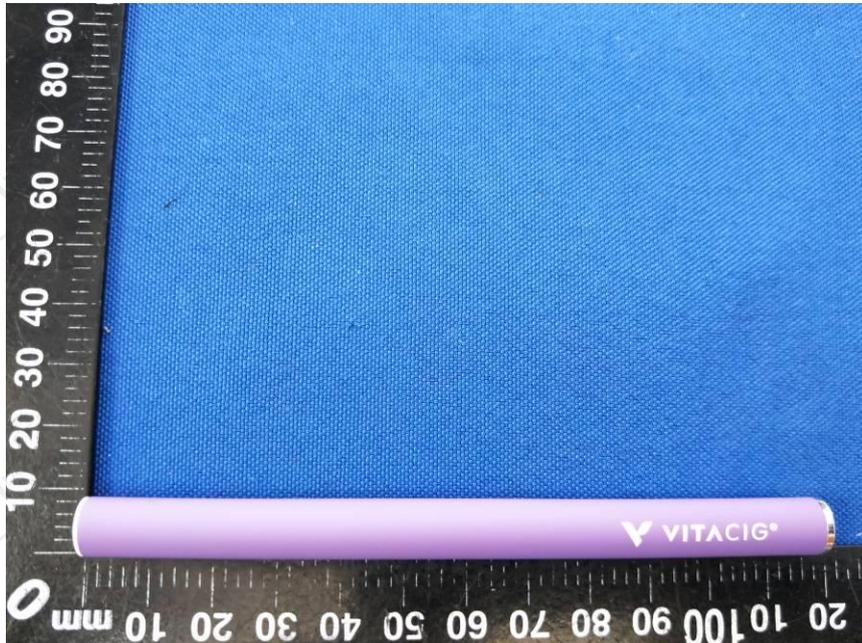
Radiated Emission Test View

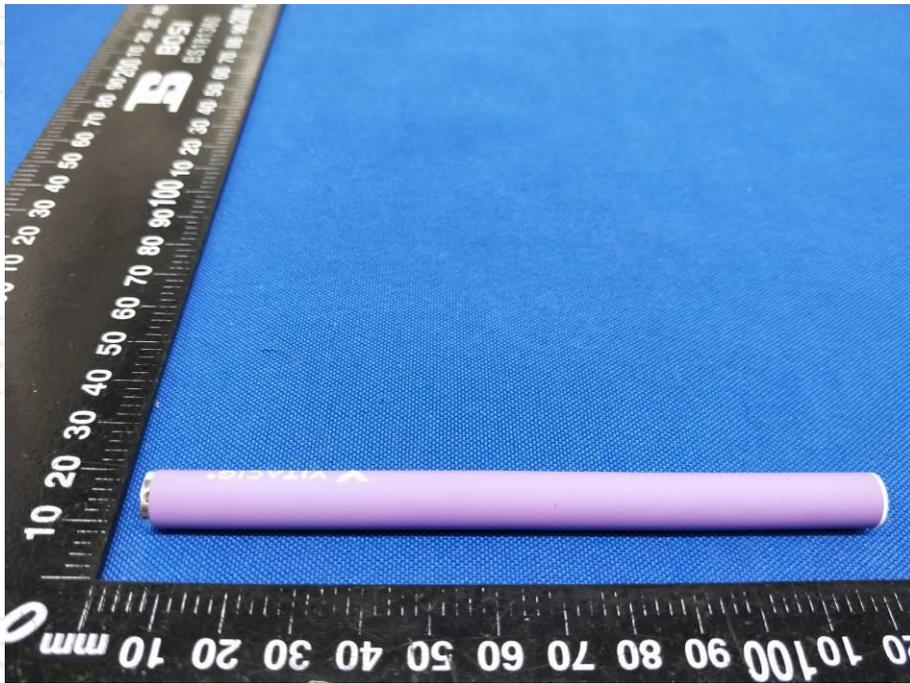
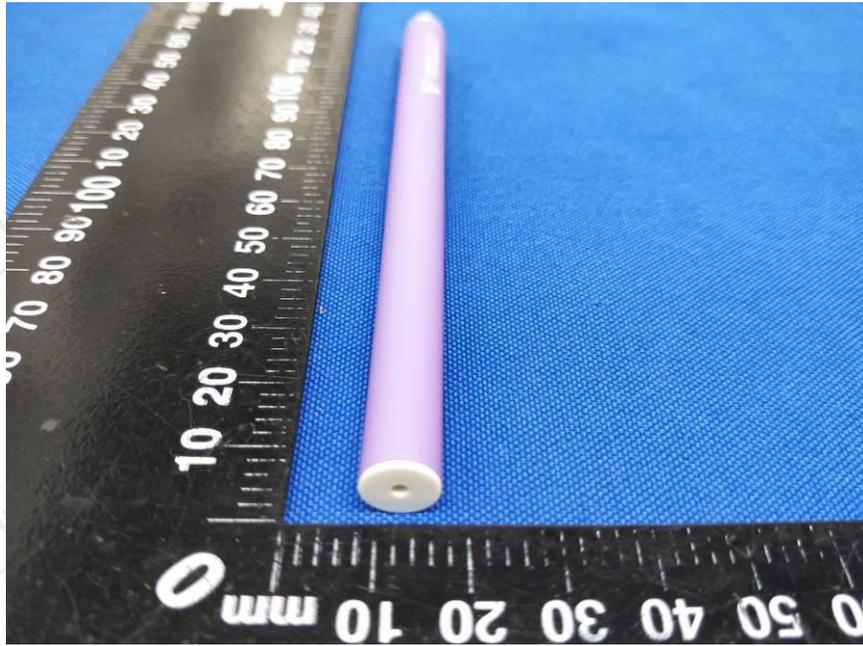


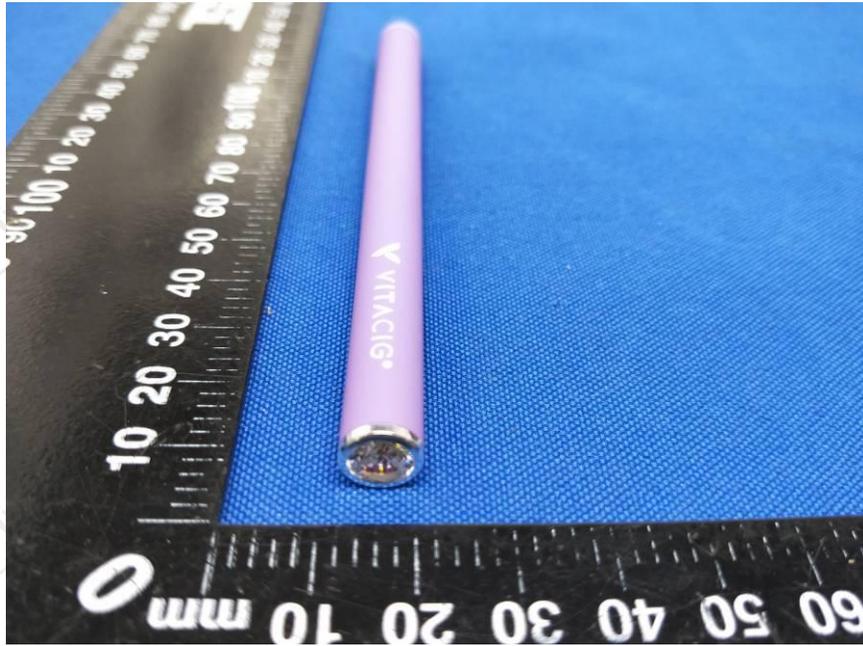
ESD Test View

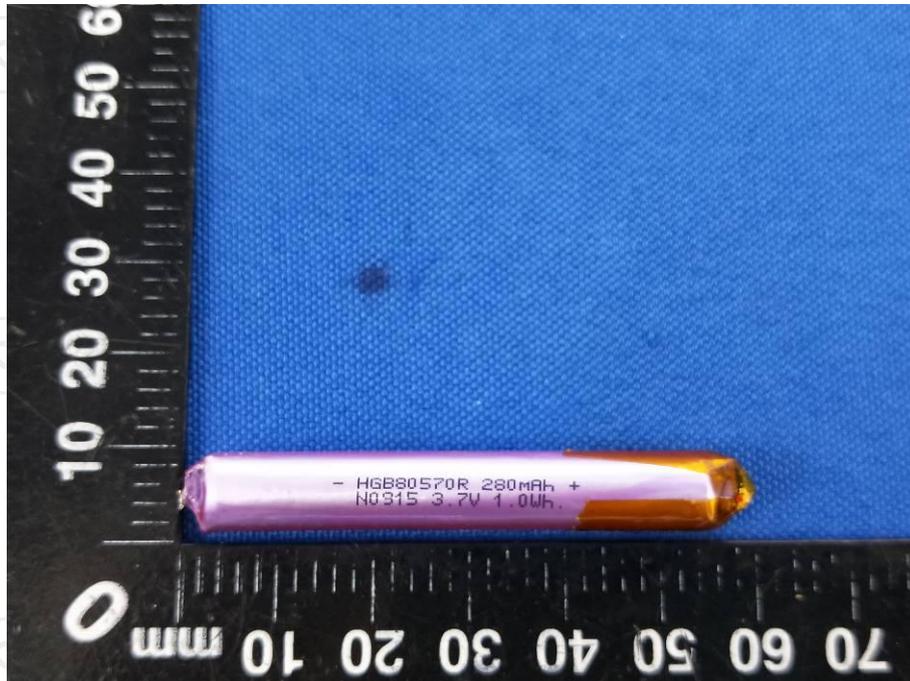
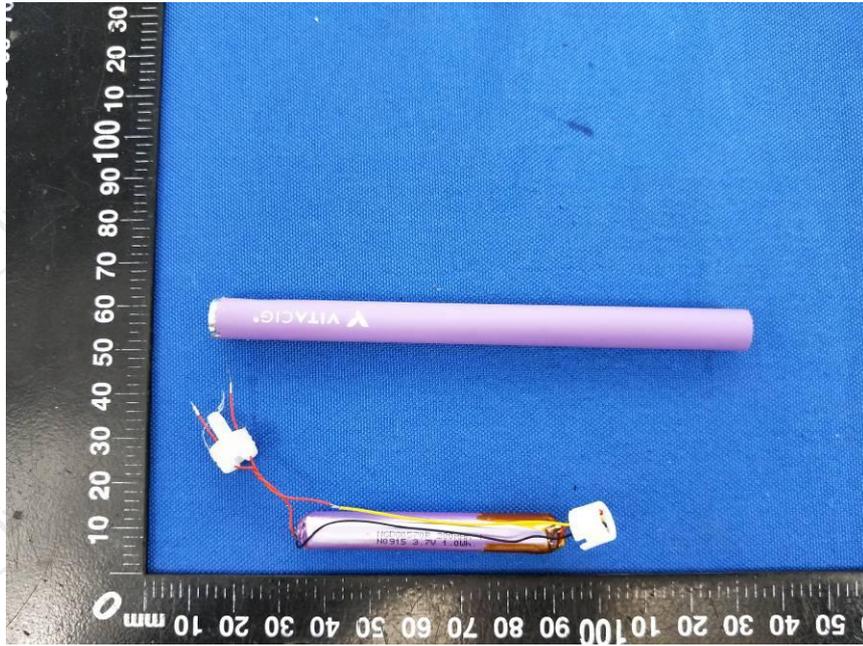


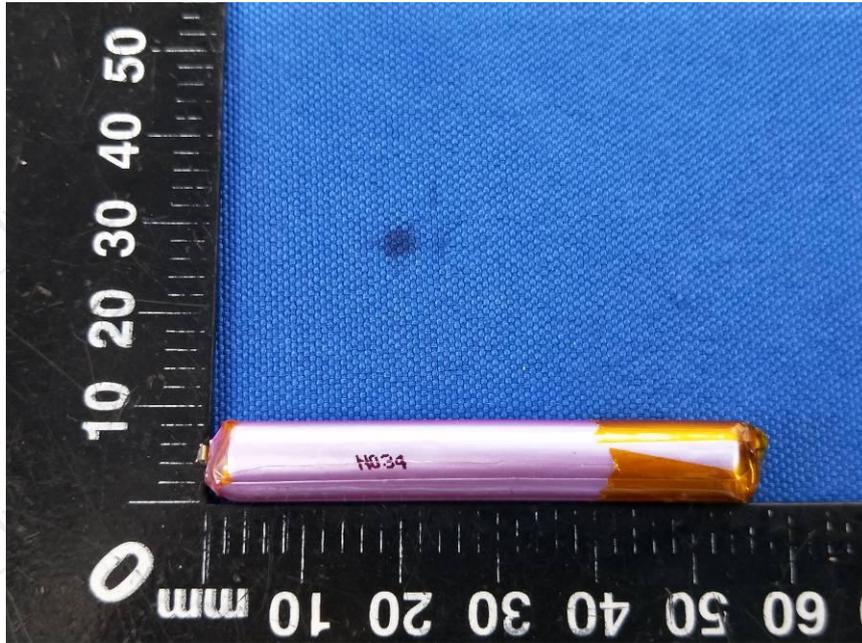
## 10. Photographs of EUT











\*\*\*\*\*END OF REPORT\*\*\*\*\*