

# TECHNICAL REPORT



Report No.: EMC 1904165

File reference No.: 2019-04-30

Applicant:

Product: Charging Cable

Brand Name: N/A

Model No.: MC19A

Test Standards: EN 55032:2015  
EN61000-3-2:2014  
EN 55024: 2010+A1:2015  
EN 61000-3-3: 2013

Test result: The EMC testing has been performed on the submitted samples and found in compliance with council EMC Directive 2014/30/EU.

Approved By

A handwritten signature in blue ink, appearing to read 'Terry Tang', is written over a circular blue stamp.

Terry Tang  
Manager

Dated: April 30, 2019

**Results appearing herein relate only to the sample tested**

**The technical reports is issued errors and omissions exempt and is subject to withdrawal at**

**SHENZHEN TIMEWAY TESTING LABORATORIES.**

**Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road  
West, Tong Le Village, Nanshan District, Shenzhen, China**

Tel (755) 83448688 Fax (755) 83442996 Email: info@timeway-lab.com



### **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

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## 1.0 General Details

### 1.1 Test Lab Details

SHENZHEN TIMEWAY TESTING LABORATORIES.

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel(086) 755-83448688 Fax (086) 755-83442996

#### Test Location

**All tests were performed at:**

SHENZHEN TIMEWAY TESTING LABORATORIES.

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel(086) 755-83448688 Fax (086) 755-83442996

No tests were sub-contracted.

### 1.2 Applicant Details

Applicant:

Address:

Telephone:

Fax: --

Manufacturer:

Address:

Telephone: --

Fax: --

### 1.3 Description of EUT

Product: Charging Cable

Brand Name: N/A

Model Number: MC19A

Adding Model Number: N/A

Rating: Input: --

Remark: --

### 1.4 Submitted Sample(s)

1 Sample

### 1.5 Test Duration

Date of Receipt of Test Item: April 26, 2019

Date of Test: April 26, 2019 ~ April 30, 2019

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#### 1.6 Additional information of EUT

|                                   | Submitted                           | Not Available            |
|-----------------------------------|-------------------------------------|--------------------------|
| User Manual                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Part List                         | <input type="checkbox"/>            | <input type="checkbox"/> |
| Circuit Diagram                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Printed circuit board[PCB] Layout | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Block Diagram                     | <input type="checkbox"/>            | <input type="checkbox"/> |

#### 1.7 Test Engineer

The sample(s) tested by

Print Name: Leo Lau/ Engineer



This test report is not valid without personnel's signatures of SHENZHEN TIMEWAY TESTING LABORATORIES

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## 2.0 List of Measurement Equipment

### 2.1 Conducted Emission Test

| Name              | Model No.  | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|-------------------|------------|------------|--------------|------------------|-------------------|
| EMI Test Receiver | ESH3       | 860905/006 | RS           | 2018.06.11       | 1 Year            |
| Spectrum Analyzer | ESA-L1500A | US37451154 | HP           | 2018.06.11       | 1 Year            |
| PULSE LIMITER     | ESH3-Z2    | 100281     | RS           | 2018.06.11       | 1 Year            |
| LISN              | ESH3-Z5    | 100294     | RS           | 2018.06.11       | 1 Year            |
| LISN              | ESH3-Z5    | 100253     | RS           | 2018.06.11       | 1 Year            |

### 2.2 Radiated Disturbance Test

| Name              | Model No | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|-------------------|----------|------------|--------------|------------------|-------------------|
| EMI Test Receiver | ESVD     | 100008     | RS           | 2018.06.11       | 1 Year            |
| Coaxial Switch    | MP59B    | M70585     | ANRITSU      | N/A              | N/A               |
| Spectrum Analyzer | 8595E    | 3441A00893 | HP           | 2018.06.11       | 1 Year            |
| Amplifier         | 8447D    | 2727A05017 | HP           | 2018.06.11       | 1 Year            |
| Bilog Antenna     | VULB9163 | 9163/340   | Schwarebeck  | 2018.06.11       | 1 Year            |

### 2.3 Harmonic & Flicker Test

| Name                          | Model No. | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|-------------------------------|-----------|------------|--------------|------------------|-------------------|
| Harmonics Flicker Test System | PACS-1    | 72305      | CI           | 2018.06.11       | 1 Year            |
| 5K VA AC Power Source         | 5001iX    | 56060      | CI           | 2018.06.11       | N/A               |

### 2.4 ESD Test

| Name          | Model No. | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|---------------|-----------|------------|--------------|------------------|-------------------|
| ESD Simulator | DITO      | 0404-24    | EM TEST      | 2018.06.11       | 1 Year            |

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## 2.5 RF field Strength Susceptibility

| Name             | Model No. | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|------------------|-----------|------------|--------------|------------------|-------------------|
| Signal Generator | SMT03     | 100059     | RS           | 2018.06.11       | 1 Year            |
| Power Meter      | NRVS      | ---        | RS           | 2018.06.11       | 1 Year            |
| Voltage Probe    | URV5-Z2   | 100012     | RS           | 2018.06.11       | 1 Year            |
| Voltage Probe    | URV5-Z2   | 100013     | RS           | 2018.06.11       | 1 Year            |
| Power Amplifier  | 150W1000  | 300999     | AR           | 2018.06.11       | 1 Year            |
| Power Amplifier  | 25S1G4AM1 | 305993     | AR           | 2018.06.11       | 1 Year            |
| Field Probe      | CBL6111C  | 2576       | Holaday      | 2018.06.11       | 1 Year            |
| Bilog Antenna    | MCDC      | ---        | Chase        | 2018.06.11       | 1 Year            |

## 2.6 Electrical Fast Transient/Burst (EFT/B) Immunity test

| Name          | Model No.  | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|---------------|------------|------------|--------------|------------------|-------------------|
| EFT Generator | UCS 500 M4 | 0304-42    | EM TEST      | 2018.06.11       | 1 Year            |
| Power Source  | MV2616     | 0104-14    | EM TEST      | 2018.06.11       | 1 Year            |

## 2.7 Surge Test

| Name                    | Model No.  | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|-------------------------|------------|------------|--------------|------------------|-------------------|
| Ultra Compact Simulator | UCS 500 M4 | 0304-42    | EM TEST      | 2018.06.11       | 1 Year            |
| Power Source            | MV2616     | 0104-14    | EM TEST      | 2018.06.11       | 1 Year            |

## 2.8 Conducted Immunity Test

| Name                      | Model No. | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|---------------------------|-----------|------------|--------------|------------------|-------------------|
| Continuous Wave Simulator | CWS 500C  | 0407-05    | EM TEST      | 2018.06.11       | 1 Year            |

## 2.9 Power-frequency Magnetic Field

| Name                      | Model No.  | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|---------------------------|------------|------------|--------------|------------------|-------------------|
| Continuous Wave Simulator | UCS 500 M4 | 0304-42    | EM TEST      | 2018.06.11       | 1 Year            |
| Power Source Network      | MV 2616    | 0104-14    | EM TEST      | 2018.06.11       | 1 Year            |
| Current Transformer       | MC2630     | --         | EM TEST      | 2018.06.11       | 1 Year            |

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|               |       |         |         |            |        |
|---------------|-------|---------|---------|------------|--------|
| Magnetic Coil | MS100 | 0304-42 | EM TEST | 2018.06.11 | 1 Year |
|---------------|-------|---------|---------|------------|--------|

#### 2.10 Voltage Dips/Interruption Immunity Test

| Name                    | Model No.  | Serial No. | Manufacturer | Calibration Date | Calibration Cycle |
|-------------------------|------------|------------|--------------|------------------|-------------------|
| Ultra Compact Simulator | UCS 500 M4 | 0304-42    | EM TEST      | 2018.06.11       | 1 Year            |
| Power Source            | MV2616     | 0104-14    | EM TEST      | 2018.06.11       | 1 Year            |

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### 3.0 Technical Details

#### 3.1 Investigations Requested

Perform Electromagnetic Interference [EMI] & Electromagnetic Susceptibility[ EMS]  
tests for CE Marking

#### 3.2 Test Standards

| Test Standards        |  |                                     |
|-----------------------|--|-------------------------------------|
| EN 55032:2015         | Electromagnetic compatibility of multimedia equipment - Emission Requirements  |                                     |
| EN61000-3-2:2014      | Electromagnetic compatibility(EMC)- Part 3-2:Limits-Limits for harmonic current emissions(equipment input current $\leq 16A$ per phase)  |                                     |
| EN 61000-3-3:2013     | Electromagnetic compatibility (EMC)- Part 3-3:Limits-Limitation of voltage changes, Voltage fluctuations and flicker in public low-voltage supply systems. For equipment with rated current $\leq 16A$ per phase and not subject to conditional connection |                                     |
| EN 55024:2010+A1:2015 | Information technology equipment — Immunity characteristics — Limits and methods of measurement  |                                     |
|                       | EN 61000-4-2:2009  | Electrostatic discharge             |
|                       | EN 61000-4-3:2006  | RF field strength susceptibility    |
|                       | EN 61000-4-4:2012  | Electrical Fast transients          |
|                       | EN 61000-4-5:2014  | Surge                               |
|                       | EN 61000-4-6:2009  | Conducted susceptibility            |
|                       | EN 61000-4-8:2010  | Power-frequency Magnetic Field      |
|                       | EN 61000-4-11:2004   | Dips/Voltage Interruption Variation |

#### 3.3 Performance Criteria

| Criterion | Description  |
|-----------|--|
| <b>A</b>  | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| <b>B</b>  | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| <b>C</b>  | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

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### 3.4 Test standards and Results Summary Tables

| Test Condition  | Test Requirement       | Test Method         | Test Result |
|---|------------------------|---------------------|-------------|
| <b>EMISSION Results Summary</b>                                   |                        |                     |             |
| Conducted Emission on AC Mains, 150kHz to 30MHz                   | EN 55032:2015          | EN 55032:2015       | Pass        |
| Conducted Emission on at telecommunication ports, 150KHz to 30MHz | EN 55032:2015          | EN 55032:2015       | N/A         |
| Radiated Emissions, 30MHz to 1GHz                                 | EN 55032:2015          | EN 55032:2015       | Pass        |
| Harmonic Emissions on AC supply                                   | EN61000-3-2:2014       | EN61000-3-2:2014    | N/A         |
| Voltage fluctuations on AC supply                                 | EN 61000-3-3: 2013     | EN 61000-3-3: 2013  | N/A         |
| <b>IMMUNITY Results Summary</b>                                   |                        |                     |             |
| Electrostatic Discharge   | EN 55024: 2010+A1:2015 | EN 61000-4-2: 2009  | Pass        |
| Electrical Fast transients /Burst Immunity                        | EN 55024: 2010+A1:2015 | EN 61000-4-4: 2012  | Pass        |
| RF field strength susceptibility                                  | EN 55024: 2010+A1:2015 | EN 61000-4-3: 2006  | Pass        |
| Surge   | EN 55024: 2010+A1:2015 | EN 61000-4-5: 2014  | Pass        |
| Conducted susceptibility  | EN 55024: 2010+A1:2015 | EN 61000-4-6: 2009  | Pass        |
| Power-frequency Magnetic Field                                    | EN 55024: 2010+A1:2015 | EN61000-4-8: 2010   | N/A         |
| Dips/Voltage Interruption Variation                               | EN 55024: 2010+A1:2015 | EN 61000-4-11: 2004 | Pass        |

**Note: N/A-Not applicable**

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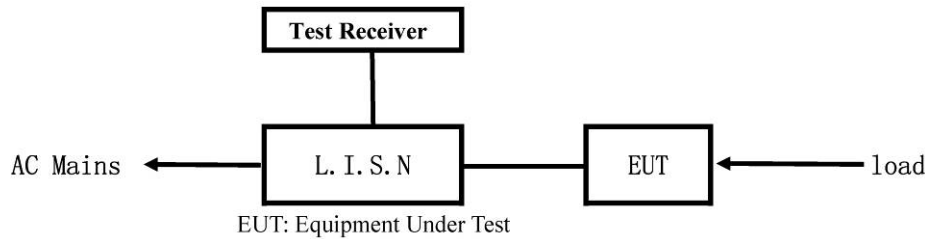
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4.0 Electromagnetic Interference Test results

4.1 Power line Conducted Emission Test

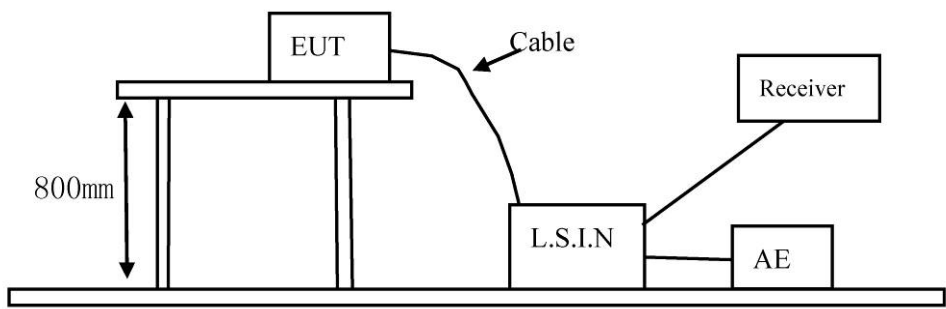
4.1.1 Schematics of the test



4.1.2 Test Method:

The test was performed in accordance with EN 55032:2015

Block diagram of Test setup



4.1.3 Power line conducted Emission Limit

| Frequency(MHz) | Limits dB( $\mu$ V) |               |                   |               |
|----------------|---------------------|---------------|-------------------|---------------|
|                | Class A Equipment   |               | Class B Equipment |               |
|                | Quasi-peak Level    | Average Level | Quasi-peak Level  | Average Level |
| 0.15 ~ 0.50    | 79.0                | 66.0          | 66.0~56.0*        | 56.0~46.0*    |
| 0.50 ~ 5.00    | 73.0                | 60.0          | 56.0              | 46.0          |
| 5.00 ~ 30.00   | 73.0                | 60.0          | 60.0              | 50.0          |

- Notes: 1. \*decreasing linearly with logarithm of frequency.  
2. The lower limit shall apply at the transition frequencies

4.1.4 Test Results

Limits for Conducted Emission test, Please refer to limit line (Quasi-peak)and Average in the following diagram labelled as (QP)&AV

Remark:

Calculated measurement uncertainty=3.6dB

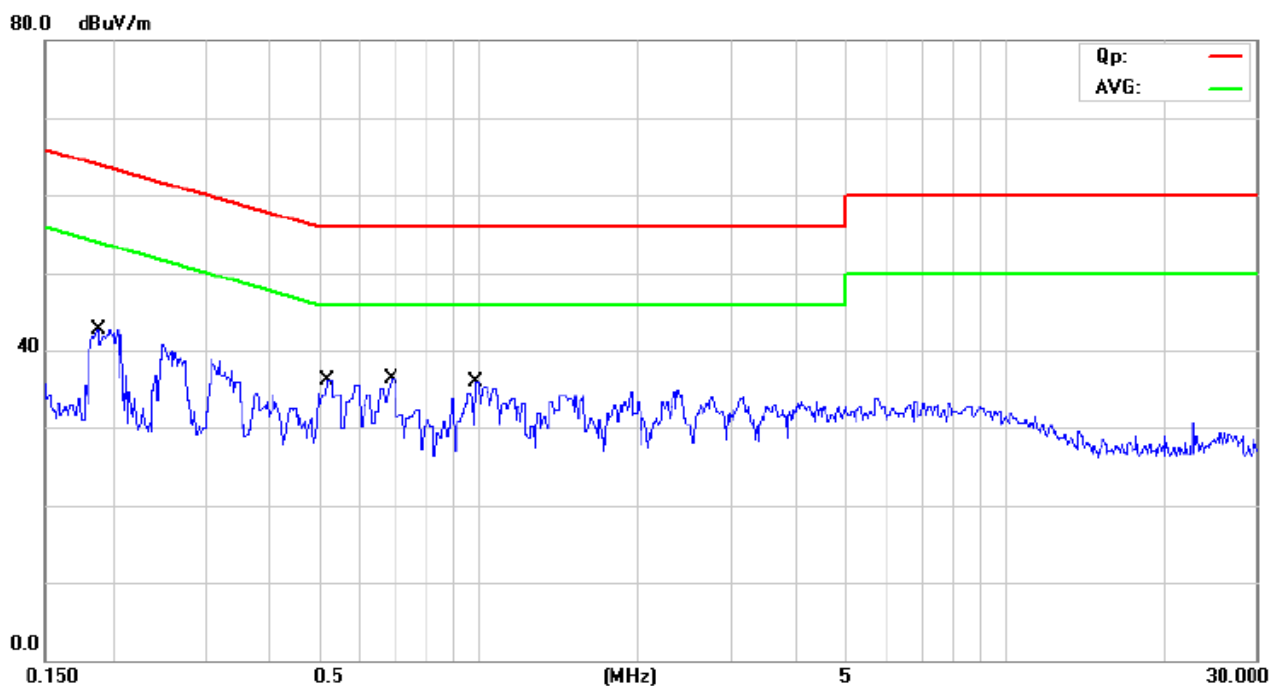
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**A: Conducted Emission on Live Terminal (150kHz to 30MHz)****EUT Operating Environment**

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

**EUT set Condition: Charging****Equipment Level: Class B****Results: Pass**

Please refer to following diagram for individual



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measure-ment | Limit  | Over   |          |         |
|-----|-----|--------|---------------|----------------|--------------|--------|--------|----------|---------|
|     |     | MHz    | dBuV/m        | dB             | dBuV/m       | dBuV/m | dB     | Detector | Comment |
| 1   |     | 0.1887 | 28.60         | 9.89           | 38.49        | 64.09  | -25.60 | QP       |         |
| 2   |     | 0.1887 | 11.40         | 9.89           | 21.29        | 54.09  | -32.80 | AVG      |         |
| 3   |     | 0.5175 | 19.40         | 10.30          | 29.70        | 56.00  | -26.30 | QP       |         |
| 4   |     | 0.5175 | -6.10         | 10.30          | 4.20         | 46.00  | -41.80 | AVG      |         |
| 5   | *   | 0.6846 | 21.00         | 10.51          | 31.51        | 56.00  | -24.49 | QP       |         |
| 6   |     | 0.6846 | -1.90         | 10.51          | 8.61         | 46.00  | -37.39 | AVG      |         |
| 7   |     | 0.6846 | -2.00         | 10.51          | 8.51         | 46.00  | -37.49 | AVG      |         |
| 8   |     | 0.9893 | 16.70         | 10.89          | 27.59        | 56.00  | -28.41 | QP       |         |
| 9   |     | 0.9893 | -6.50         | 10.89          | 4.39         | 46.00  | -41.61 | AVG      |         |

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**B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)**

**EUT Operating Environment**

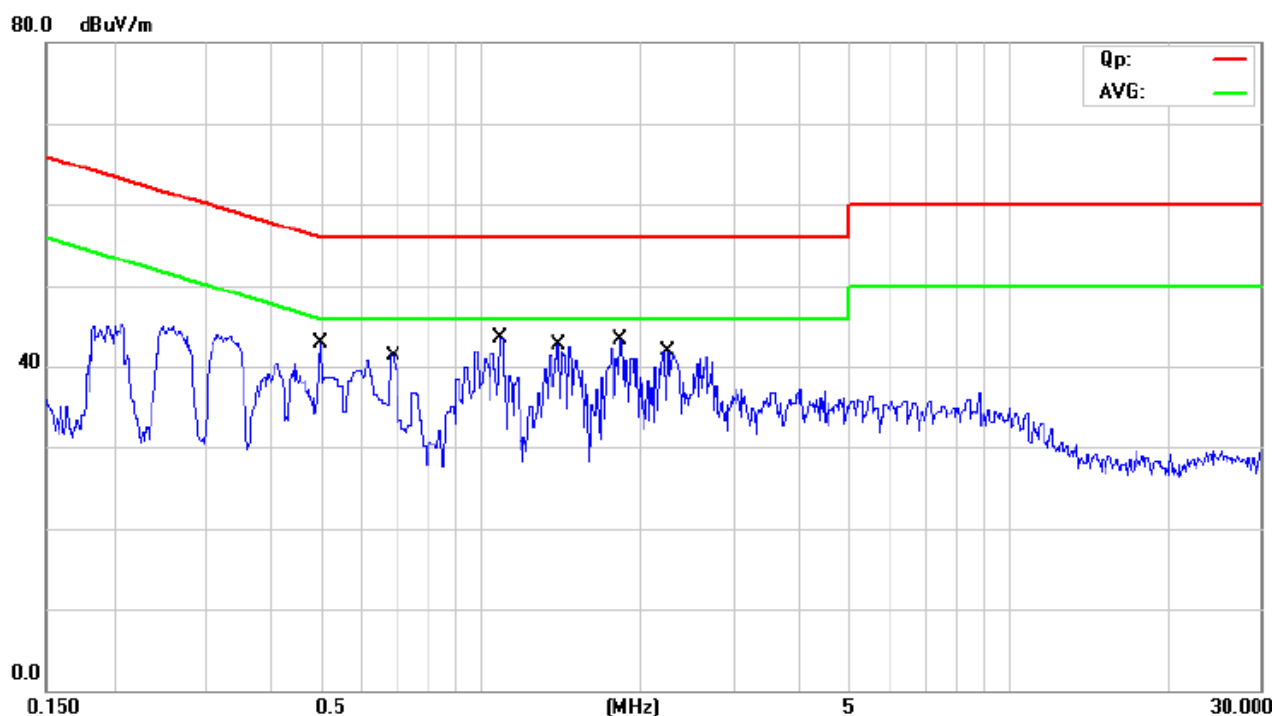
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

**EUT set Condition: Charging**

**Equipment Level: Class B**

**Results: Pass**

Please refer to following diagram for individual



| No. | Mk. | Freq.  | Reading | Correct | Measure- | Limit  | Over   |          |         |
|-----|-----|--------|---------|---------|----------|--------|--------|----------|---------|
|     |     | MHz    | Level   | Factor  | ment     |        |        | Detector | Comment |
|     |     |        | dBuV/m  | dB      | dBuV/m   | dBuV/m | dB     |          |         |
| 1   |     | 0.4972 | 23.10   | 10.27   | 33.37    | 56.05  | -22.68 | QP       |         |
| 2   |     | 0.4972 | -6.90   | 10.27   | 3.37     | 46.05  | -42.68 | AVG      |         |
| 3   | *   | 0.6834 | 24.40   | 10.51   | 34.91    | 56.00  | -21.09 | QP       |         |
| 4   |     | 0.6834 | 0.30    | 10.51   | 10.81    | 46.00  | -35.19 | AVG      |         |
| 5   |     | 1.0914 | 21.70   | 10.90   | 32.60    | 56.00  | -23.40 | QP       |         |
| 6   |     | 1.0914 | -0.50   | 10.90   | 10.40    | 46.00  | -35.60 | AVG      |         |
| 7   |     | 1.4013 | 20.80   | 10.89   | 31.69    | 56.00  | -24.31 | QP       |         |
| 8   |     | 1.4013 | -1.70   | 10.89   | 9.19     | 46.00  | -36.81 | AVG      |         |
| 9   |     | 1.8300 | 19.60   | 10.88   | 30.48    | 56.00  | -25.52 | QP       |         |
| 10  |     | 1.8300 | 0.90    | 10.88   | 11.78    | 46.00  | -34.22 | AVG      |         |
| 11  |     | 2.2250 | 18.50   | 10.88   | 29.38    | 56.00  | -26.62 | QP       |         |
| 12  |     | 2.2250 | 0.90    | 10.88   | 11.78    | 46.00  | -34.22 | AVG      |         |

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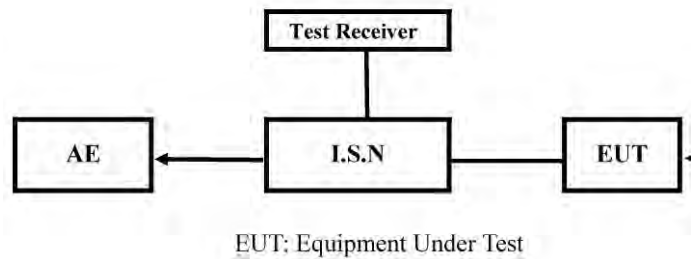
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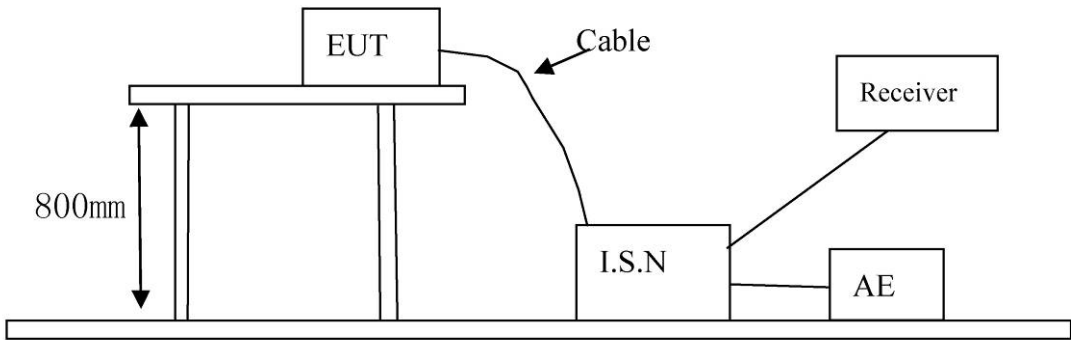
4.2 Telecommunication ports Conducted Emission Test

4.2.1 Schematics of the test



4.2.2 Test Method:

The test was performed in accordance with EN 55032:2015  
Block diagram of Test setup



4.2.3 Telecommunication ports conducted Emission Limit

| Frequency(MHz) | Class A Limits    |                   |                   |                   | Class B Limits    |                   |                   |                   |
|----------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                | Quasi-peak Level  |                   | Average Level     |                   | Quasi-peak Level  |                   | Average Level     |                   |
|                | Vlotage<br>dB(uV) | Current<br>dB(uA) | Vlotage<br>dB(uV) | Current<br>dB(uA) | Vlotage<br>dB(uV) | Current<br>dB(uA) | Vlotage<br>dB(uV) | Current<br>dB(uA) |
| 0.15 ~ 0.50    | 97 to 87          | 53 to 43          | 84 to 74          | 40 to 30          | 84 to 74          | 40 to 30          | 74 to 64          | 30 to 20          |
| 0.50 ~ 30.00   | 87                | 43                | 74                | 30                | 74                | 30                | 64                | 20                |

- Notes: 1. \*decreasing linearly with logarithm of frequency.  
2. The tighter limit shall apply at the transition frequencies

4.2.4 Test Results

Limits for Conducted Emission test, Please refer to limit line (Quasi-peak)and Average in the following diagram labelled as (QP)&AV  
**Remark:**  
Calculated measurement uncertainty=1.9dB

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Report No.: EMC1904165  
Date: 2019-04-30



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**A: Conducted Emission on Telecommunication port (150kHz to 30MHz)**

**EUT Operating Environment**

Temperature: 25°C      Humidity: 75 %RH      Atmospheric Pressure: 101 kPa

**EUT set Condition: Normal operation mode**

**Equipment Level: Class B**

**Results: N/A**

Please refer to following diagram for individual

| Frequency<br>(MHz) | Port | Reading(dBμV) |         | Limit(dBμV) |         |
|--------------------|------|---------------|---------|-------------|---------|
|                    |      | Quasi-peak    | Average | Quasi-peak  | Average |
| --                 | LAN  | --            | --      | --          | --      |
| --                 | LAN  | --            | --      | --          | --      |

Note: No such port, not applicable.

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Date: 2019-04-30



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**B: Conducted Emission on Telecommunication port (150kHz to 30MHz)**

**EUT Operating Environment**

Temperature: 25°C      Humidity: 75 %RH      Atmospheric Pressure: 101 kPa

**EUT set Condition: Normal operation mode**

**Equipment Level: ClassB**

**Results: N/A**

Please refer to following diagram for individual

| Frequency<br>(MHz) | Port | Reading(dBμA) |         | Limit(dBμA) |         |
|--------------------|------|---------------|---------|-------------|---------|
|                    |      | Quasi-peak    | Average | Quasi-peak  | Average |
| --                 | LAN  | --            | --      | --          | --      |

Note: No such port, not applicable.

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#### 4.3 Radiated Disturbance Test

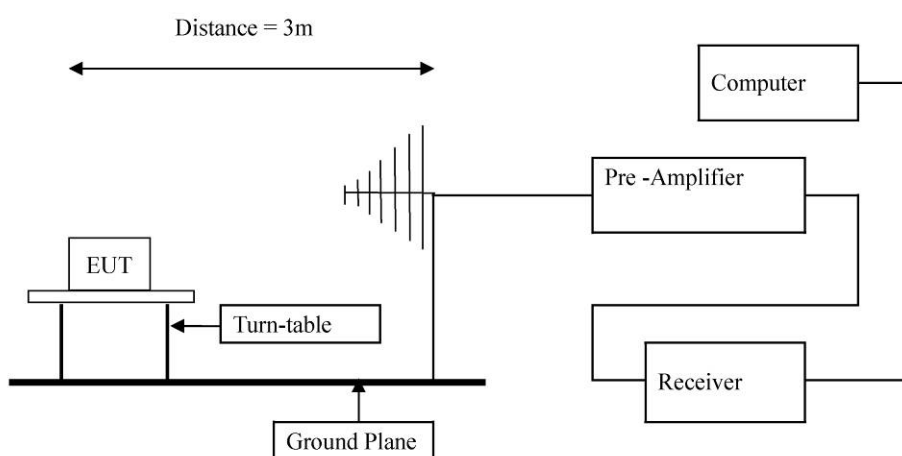
##### 4.3.1 Schematics of the test



##### 4.3.2 Test Method:

The test was performed in accordance with EN 55032:2015

##### Block diagram of Test setup



##### 4.3.3 Radiated Disturbance Test Limit

| Frequency Range (MHz) | Quasi-Peak limits (dB $\mu$ V/m) |                |
|-----------------------|----------------------------------|----------------|
|                       | Class A Limits                   | Class B Limits |
| 30-230                | 50.00                            | 40.00          |
| 230-1000              | 57.00                            | 47.00          |

Note: The lower limit shall apply at the transition frequencies

##### 4.3.4 Test result

Limits for Radiated Disturbance test, Please refer to limit line (Quasi-peak) in the following diagram labelled as (QP)

##### Remark:

Calculated measurement uncertainty=4.7dB

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**A: Radiated Disturbance (30MHz----1000MHz)**

Project Number: CASE1

Test Time: 2019-04-28\_10.05.0 2

EUT Name: CHARGING CABLE

Remark:

Manufacturer: N.A

Model: MC19A

Temp.(oC): 25

Hum.: 65%

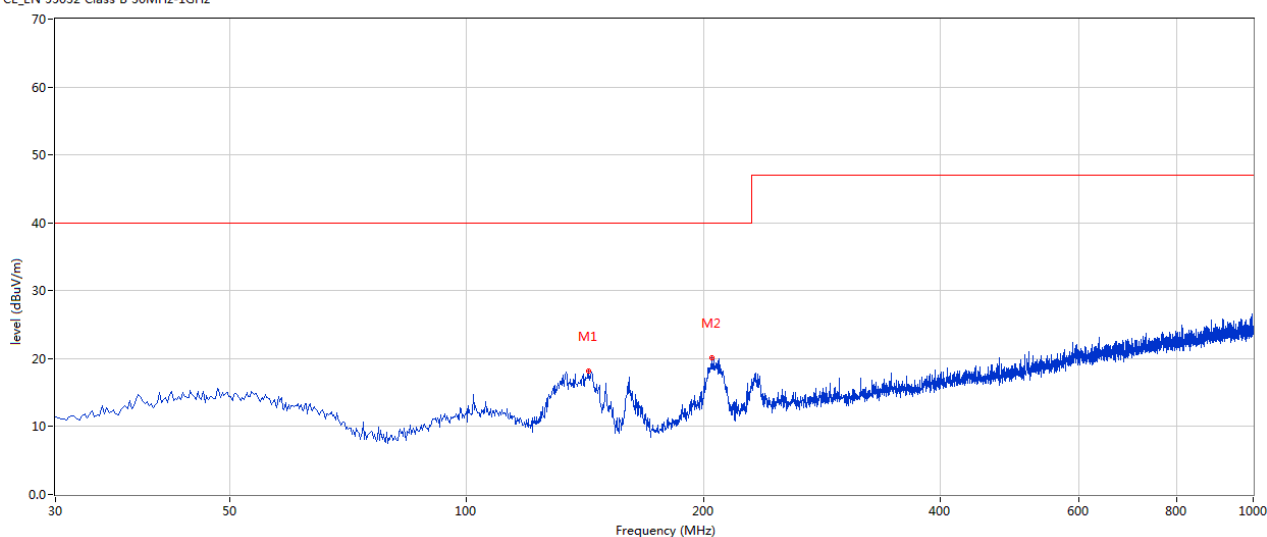
Test Engineer: CHARLES

Test Standard: EN 55032

Work Addition: CAHRGING

Load:

CE\_EN 55032 Class B 30MHz-1GHz



| No. | Frequen<br>cy (MHz) | Results<br>(dBuV/m<br>) | Factor<br>(dB) | Limit<br>(dBuV/m<br>) | Over<br>Limit<br>(dB) | Detector | Table (o) | Height<br>(cm) | ANT | Verdict |
|-----|---------------------|-------------------------|----------------|-----------------------|-----------------------|----------|-----------|----------------|-----|---------|
| 1   | 142.734             | 18.22                   | -17.30         | 40.0                  | -21.78                | Peak     | 360.00    | 200            | H   | Pass    |
| 2   | 205.284             | 20.17                   | -13.61         | 40.0                  | -19.83                | Peak     | 360.00    | 200            | H   | Pass    |

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Date: 2019-04-30

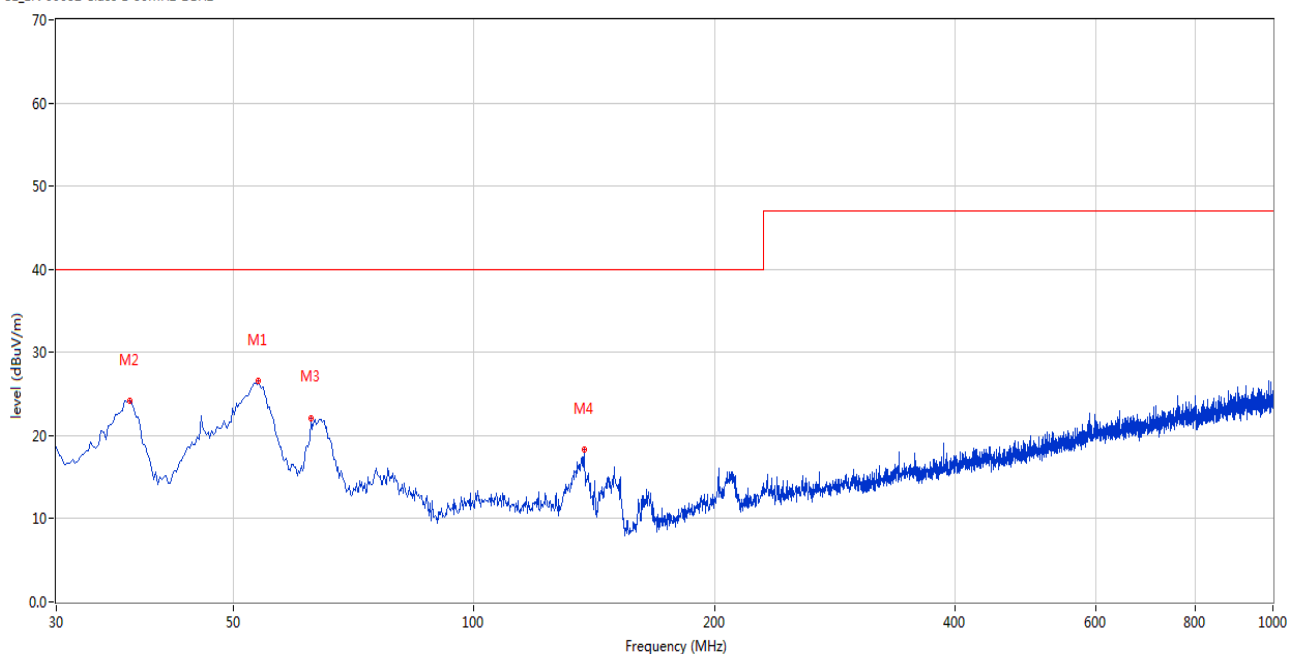


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## B: Radiated Disturbance (30MHz----1000MHz)

|                 |                |                   |                     |
|-----------------|----------------|-------------------|---------------------|
| Project Number: | CASE1          | Test Time:        | 2019-04-28_10.07.23 |
| EUT Name:       | CHARGING CABLE | Remark:           |                     |
| Manufacturer:   | N.A            | Name:             |                     |
| Model:          | MC19A          | Project Template: |                     |
| Temp.(oC):      | 25             | Manufacture:      |                     |
| Hum.:           | 65%            | Model Name:       |                     |
| Test Engineer:  | CHARLES        | Templ.(oC):       |                     |
| Test Standard:  | EN 55032       | Hum:              |                     |
| Work Addition:  | CHARGING       | Work Additon:     |                     |
| Load:           |                |                   |                     |

CE\_EN 55032 Class B 30MHz-1GHz



| No. | Frequency (MHz) | Results (dBUV/m) | Factor (dB) | Limit (dBUV/m) | Over Limit (dB) | Detector | Table (o) | Height (cm) | ANT | Verdict |
|-----|-----------------|------------------|-------------|----------------|-----------------|----------|-----------|-------------|-----|---------|
| 1   | 53.759          | 26.60            | -11.53      | 40.0           | -13.40          | Peak     | 226.00    | 100         | V   | Pass    |
| 2   | 37.031          | 24.21            | -13.17      | 40.0           | -15.79          | Peak     | 43.00     | 100         | V   | Pass    |
| 3   | 62.487          | 22.12            | -13.28      | 40.0           | -17.88          | Peak     | 306.00    | 200         | V   | Pass    |
| 4   | 137.401         | 18.35            | -17.23      | 40.0           | -21.65          | Peak     | 360.00    | 100         | V   | Pass    |

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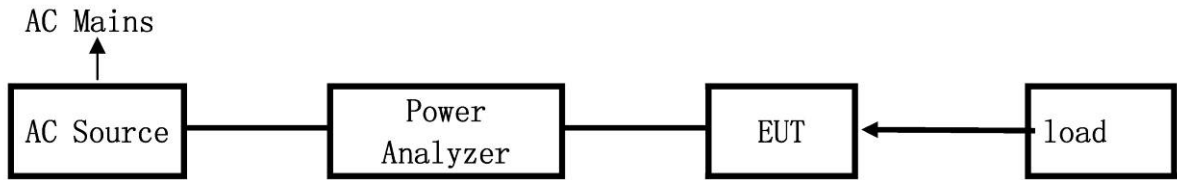
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4.4 Harmonic Current Emission Test

4.4.1 Schematic of the test



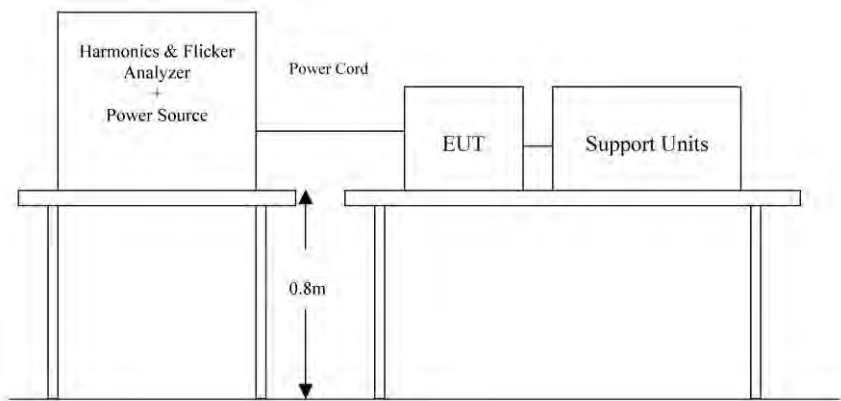
EUT: Equipment Under Test

4.4.2 Test Method:

The test was performed in accordance with EN61000-3-2:2014

\*: The Level of the product is : CLASS D

Block diagram of Test setup



4.4.3 Limits of Harmonic Current Emission For Class A

| Harmonic order<br>n | Maximum permissible<br>harmonic current<br>A |
|---------------------|--|
| Odd harmonics       |  |
| 3                   | 2,30   |
| 5                   | 1,14   |
| 7                   | 0,77   |
| 9                   | 0,40   |
| 11                  | 0,33   |
| 13                  | 0,21   |
| 15 ≤ n ≤ 39         | 0,15 $\frac{15}{n}$                          |
| Even harmonics      |  |
| 2                   | 1,08   |
| 4                   | 0,43   |
| 6                   | 0,30   |
| 8 ≤ n ≤ 40          | 0,23 $\frac{8}{n}$                           |

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#### 4.4.4 Test Results

Please refer to the following pages

##### Harmonic Current Emission Test

##### EUT Operating Environment

Temperature: 25°C      Humidity: 53%RH      Atmospheric Pressure: 101 Kpa

##### EUT set Condition:

Results: N/A

Please refer to following diagram for individual

Harmonic results as a% of the limits

| No | (Test<br>result/Limit)% | No | (Test<br>result/Limit)% | No | (Test<br>result/Limit)% | No | (Test<br>result/Limit)% |
|----|-------------------------|----|-------------------------|----|-------------------------|----|-------------------------|
| 1  |                         | 11 |                         | 21 |                         | 31 |                         |
| 2  |                         | 12 |                         | 22 |                         | 32 |                         |
| 3  |                         | 13 |                         | 23 |                         | 33 |                         |
| 4  |                         | 14 |                         | 24 |                         | 34 |                         |
| 5  |                         | 15 |                         | 25 |                         | 35 |                         |
| 6  |                         | 16 |                         | 26 |                         | 36 |                         |
| 7  |                         | 17 |                         | 27 |                         | 37 |                         |
| 8  |                         | 18 |                         | 28 |                         | 38 |                         |
| 9  |                         | 19 |                         | 29 |                         | 39 |                         |
| 10 |                         | 20 |                         | 30 |                         | 40 |                         |

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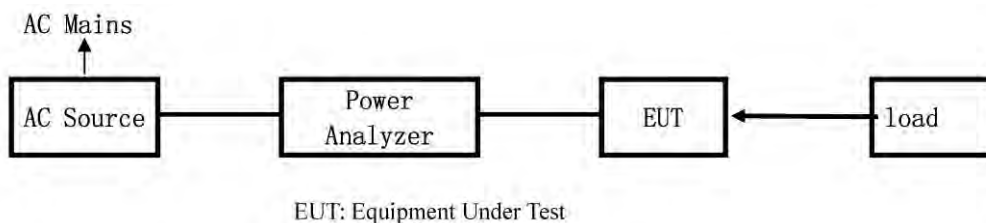
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#### 4.5 Voltage Fluctuations & Flicker Test

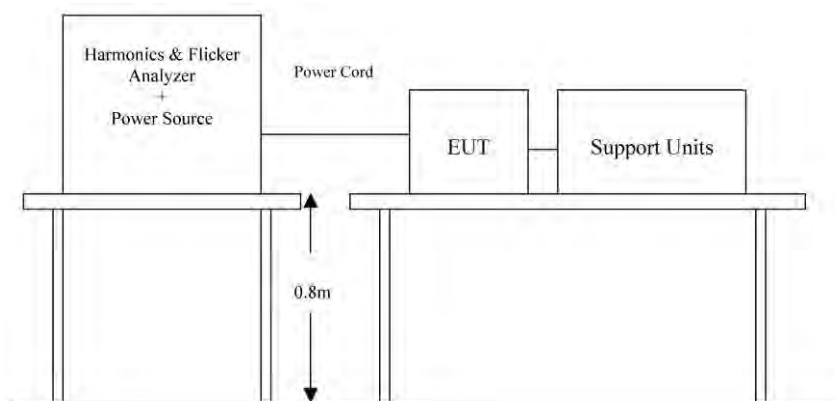
##### 4.5.1 Schematic of the test



##### 4.5.2 Test Method:

The test was performed in accordance with EN 61000-3-3:2013

##### Block diagram of Test setup



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#### 4.5.3 Test Results

Result: N/A

Please refer to following diagram for individual

Maximum Occurring Levels:

Ut: 230.1 (EUT Test RMS Voltage)

|        |        |       |   |
|--------|--------|-------|---|
| Pst:   | Limit= | 1.0   | (The Highest short Term Flicker Value)                    |
| Plt:   | Limit= | 0.65  | (The Highest Long Term Flicker Value)                     |
| dt(%): | Limit= | 3.3%  | (The Highest instantaneous Voltage Change (10ms))         |
| dc(%): | Limit= | 3.3%  | (The highest Relative steady state voltage change (1sec)) |
| dmax:  | Limit= | 4%    | (The highest Max Relative voltage change)                 |
| Tdt:   | Limit= | 500ms | ( The Max Time(in milli-sec) that dt exceeds 3%)          |

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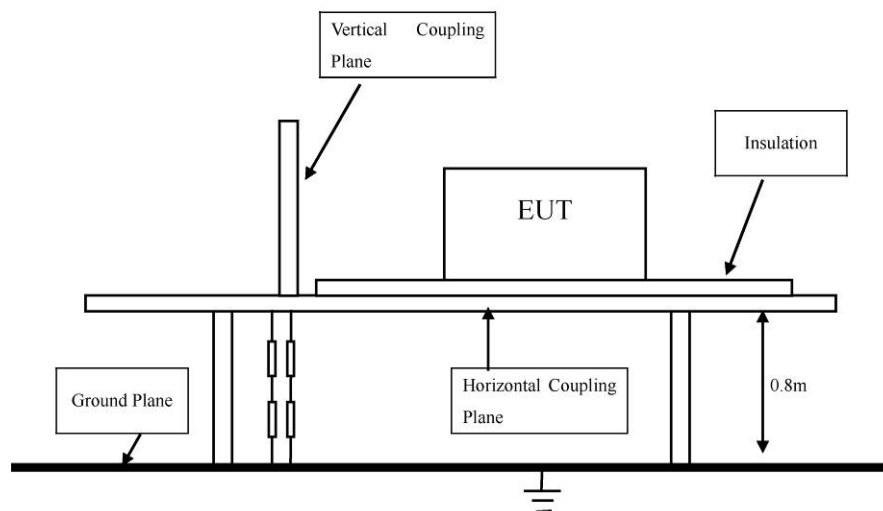
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## 5.0 Immunity Test

### 5.1 Electrostatic Discharge

#### 5.1.1 Schematic of the test



#### 5.1.2 Test method

The test was performed in accordance with EN 61000-4-2: 2009

#### 5.1.3 Test severity

$\pm 4\text{Kv}$  for direct & in-direct Contact Discharge

$\pm 8\text{Kv}$  for air Discharge

Performance Criterion Require: **B** (Please see following table)

#### 5.1.4 Susceptibility performance Criteria and Severity level

| Criterion | Description  |
|-----------|--|
| <b>A</b>  | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| <b>B</b>  | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| <b>C</b>  | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

#### Severity Level

| Level | Test Voltage Direct & in-direct contact Discharge (Kv) | Test Voltage Air discharge(Kv) |
|-------|--|--------------------------------|
| 1     | $\pm 2\text{Kv}$                                       | $\pm 2\text{Kv}$               |
| 2     | $\pm 4\text{Kv}$                                       | $\pm 4\text{Kv}$               |
| 3     | $\pm 6\text{Kv}$                                       | $\pm 8\text{Kv}$               |
| 4     | $\pm 8\text{Kv}$                                       | $\pm 15\text{Kv}$              |

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### 5.1.5 Test Result

#### EUT Operating Environment

Temperature: 25°C      Humidity: 53%RH      Atmospheric Pressure: 101 Kpa

Please refer to the following table for individual results.

| Location  | Discharge Method  | Test Voltage                                     | Results |
|-----------|-------------------|--|---------|
| HCP       | In-Direct         | $\pm 2\text{kV}, \pm 4\text{kV}$                 | Pass    |
| VCP       | In-Direct         | $\pm 2\text{kV}, \pm 4\text{kV}$                 | Pass    |
| Metal     | Contact Discharge | $\pm 2\text{kV}, \pm 4\text{kV}$                 | Pass    |
|           |                   |  |         |
| Gap       | Air Discharge     | $\pm 2\text{kV}, \pm 4\text{kV}, \pm 8\text{kV}$ | Pass    |
| Enclosure | Air Discharge     | $\pm 2\text{kV}, \pm 4\text{kV}, \pm 8\text{kV}$ | Pass    |

**Remark:** Calculated measurement uncertainty= 0.2kV

The report refers only to the sample tested and does not apply to the bulk.

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## 5.2 RF field strength susceptibility (80MHz----- 1000MHz)

### 5.2.1 Schematics of the test



### 5.2.2 Test Method:

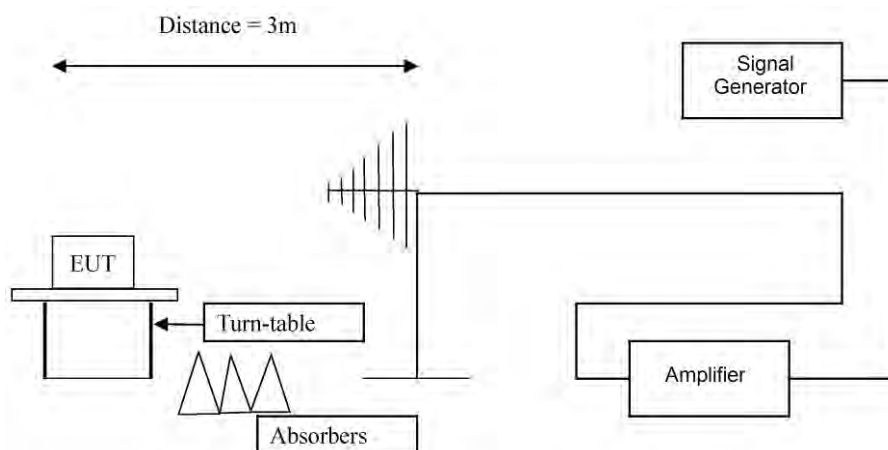
The test was performed in accordance with EN 61000-4-3:2006

Severity: Level 2 (3V/m)

Modulation: 80% AM

Performance Criterion Require: A (Please see following table)

#### Block diagram of Test setup



### 5.2.3 Susceptibility performance Criteria and severity Level

#### Susceptibility performance Criteria

| Criterion | Description  |
|-----------|--|
| <b>A</b>  | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| <b>B</b>  | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| <b>C</b>  | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

#### Severity Level

| Level | Field Strength (V/m) |
|-------|----------------------|
| 1     | 1                    |
| 2     | 3                    |
| 3     | 10                   |

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#### 5.2.4 Test Result:

##### EUT Operating Environment

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 kPa

Please refer to the following table for individual results.

| Frequency<br>(MHz) | Face | Polarity   | Level<br>(V/m) | Dwell<br>Time(s) | Sweep<br>Rate (%) | Results |
|--------------------|------|------------|----------------|------------------|-------------------|---------|
| 80-1000            | 0°   | Horizontal | 3              | 1                | 1                 | Pass    |
| 80-1000            | 90°  | Horizontal | 3              | 1                | 1                 | Pass    |
| 80-1000            | 180° | Horizontal | 3              | 1                | 1                 | Pass    |
| 80-1000            | 270° | Horizontal | 3              | 1                | 1                 | Pass    |
| 80-1000            | 0°   | Vertical   | 3              | 1                | 1                 | Pass    |
| 80-1000            | 90°  | Vertical   | 3              | 1                | 1                 | Pass    |
| 80-1000            | 180° | Vertical   | 3              | 1                | 1                 | Pass    |
| 80-1000            | 270° | Vertical   | 3              | 1                | 1                 | Pass    |

**Remark:** Calculated measurement uncertainty= 80MHz to 1000MHz (+3.7/ -1.3) V/m

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### 5.3 Electrical Fast Transient/Burst (EFT/B) immunity test

#### 5.3.1 Schematics of the test



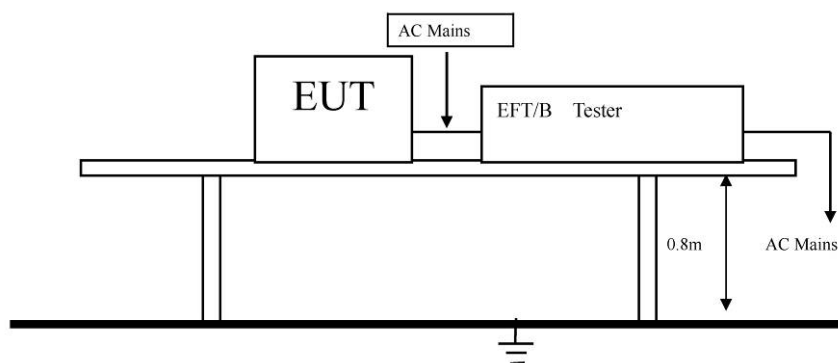
#### 5.3.2 Test Method

The test was performed in accordance with EN 61000-4-4:2012

Severity: Level 2 (1kV)

Performance Criterion Require: **B** (Please see following table)

#### Block diagram of Test setup



#### 5.3.3 Susceptibility performance Criteria and Severity Level

| Criterion | Description  |
|-----------|--|
| <b>A</b>  | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| <b>B</b>  | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| <b>C</b>  | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

#### Severity Level

| Open Circuit output Test Voltage $\pm 10\%$ |                       |  |
|---|-----------------------|--|
| Level                                       | On power Supply Lines | On I/O (Input/output)<br>Signal data and control lines |
| 1   | 0.5kV                 | 0.5kV  |
| 2   | 1kV                   | 1kV  |
| 3   | 2kV                   | 2kV  |
| 4   | 4kV                   | 4kV  |
| X   | Special               | Special  |

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#### 5.3.4 Test Results

##### EUT Operating Environment

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 kPa

Please refer to following page.

Inject location: AC mains

| Inject Line | Voltage<br>kV | Inject<br>Times (s) | Method | Results |
|-------------|---------------|---------------------|--------|---------|
| L           | $\pm 1$       | 120                 | Direct | Pass    |
| N           | $\pm 1$       | 120                 | Direct | Pass    |
| L-N         | $\pm 1$       | 120                 | Direct | Pass    |

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5.4 Surge test

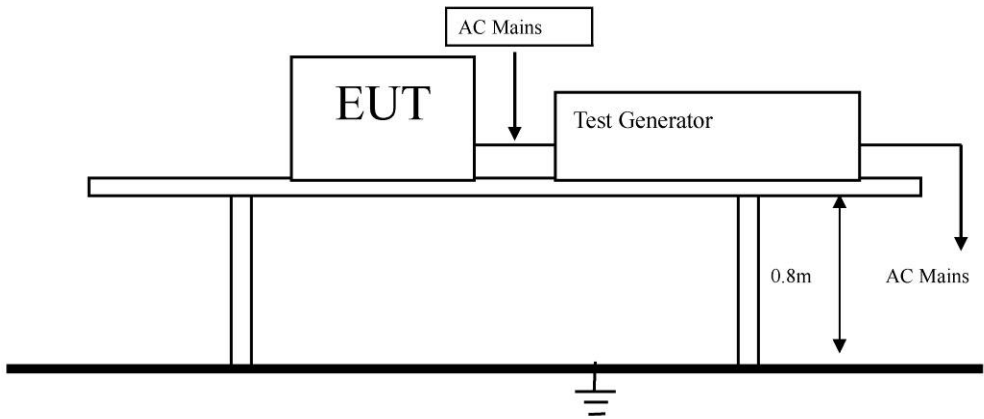
5.4.1 Schematics of the test



5.4.2 Test Method:

The test was performed in accordance with EN 61000-4-5:2014  
Severity: Level 2 (Line to Neutral at 1kV)  
Performance Criterion Require: B (Please see following table)

Block diagram of Test setup



5.4.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

| Criterion | Description  |
|-----------|--|
| A         | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| B         | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| C         | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

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#### Severity Level

| Severity Level | Open-Circuit Test Voltage<br>kV |
|----------------|---------------------------------|
| 1              | 0.5                             |
| 2              | 1.0                             |
| 3              | 2.0                             |
| 4              | 4.0                             |
| *              | Special                         |

#### 5.4.4 Test Results

##### EUT Operating Environment

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 kPa

Please refer to following page.

Test location:

| Location | Polarity | Phase<br>Angle | No of<br>Pulse | Pulse<br>Voltage(kV) | Results |
|----------|----------|----------------|----------------|----------------------|---------|
| L-N      | ±        | 0              | 5              | 1.0                  | Pass    |
|          | ±        | 90             | 5              | 1.0                  | Pass    |
|          | ±        | 180            | 5              | 1.0                  | Pass    |
|          | ±        | 270            | 5              | 1.0                  | Pass    |

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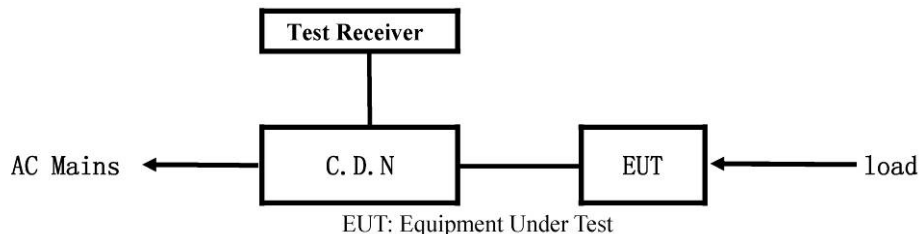
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## 5.5 Conducted Immunity test

### 5.5.1 Schematics of the test



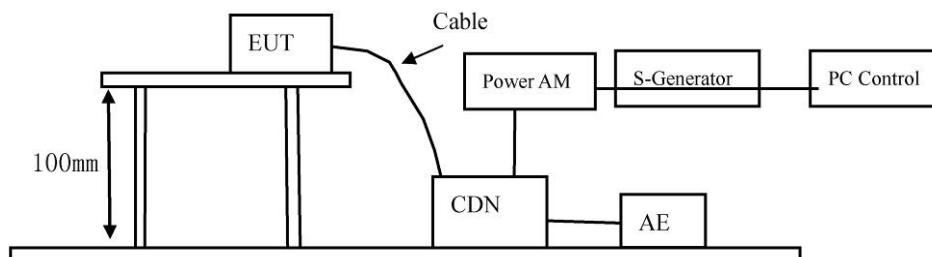
### 5.5.2 Test Method

The test was performed in accordance with EN 61000-4-6:2009

Severity: Level 2 (3 V rms), 0.15MHz—80MHz

Performance Criterion Require: A (Please see following table)

#### Block diagram of Test setup



### 5.5.3 Susceptibility performance Criteria and Severity Level

#### Susceptibility performance Criteria

| Criterion | Description  |
|-----------|--|
| <b>A</b>  | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| <b>B</b>  | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| <b>C</b>  | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

#### Severity Level

| Severity Level | Voltage Level (e.m.f) V |
|----------------|-------------------------|
| 1              | 1                       |
| 2              | 3                       |
| 3              | 10                      |
| *              | Special                 |

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#### 5.5.4 Test Results:

##### EUT Operating Environment

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 kPa

Please refer to the following page

| Frequency Range (MHz) | Injected Position | Strength                | Criterion | Observation | Result |
|-----------------------|-------------------|-------------------------|-----------|-------------|--------|
| 0.15 - 20             | AC Line           | 3V (rms)<br>Unmodulated | A         | A           | Pass   |
| 20 - 80               | AC Line           | 3V (rms)<br>Unmodulated | A         | A           | Pass   |

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## 5.6 Power-Frequency magnetic field test

### 5.6.1 Schematics of the test



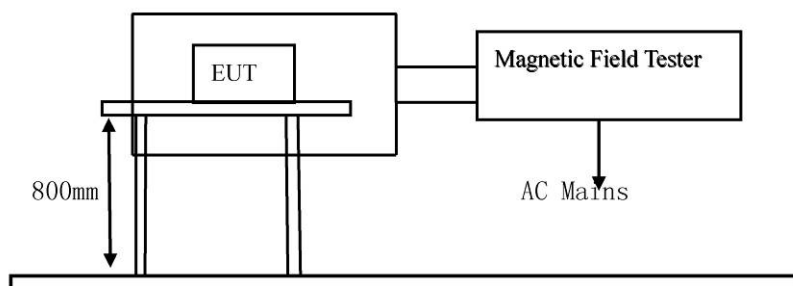
### 5.6.2 Test Method

The test was performed in accordance with EN 61000-4-8:2010

Severity: Level 1 (1A/m),

Performance Criterion Require: A (Please see following table)

#### Block diagram of Test setup



### 5.6.3 Susceptibility performance Criteria and Severity Level

#### Susceptibility performance Criteria

| Criterion | Description  |
|-----------|--|
| <b>A</b>  | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| <b>B</b>  | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| <b>C</b>  | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

#### Severity Level

| Severity Level | Magnetic Field Strength A/m |
|----------------|-----------------------------|
| 1              | 1                           |
| 2              | 3                           |
| 3              | 10                          |
| 4              | 30                          |
| 5              | 100                         |
| *              | Special                     |

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#### 5.6.4 Test Results:

##### EUT Operating Environment

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 kPa

Please refer to the following page

| Test Level | Testing Duration | Coil Orientation | Criterion | Result |
|------------|------------------|------------------|-----------|--------|
| 1A/m       | 5 Mins           | X                | A         | N/A    |
| 1A/m       | 5 Mins           | Y                | A         | N/A    |
| 1A/m       | 5 Mins           | Z                | A         | N/A    |

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5.7 Voltage Dips/Interruptions immunity test

5.7.1 Schematics of the test

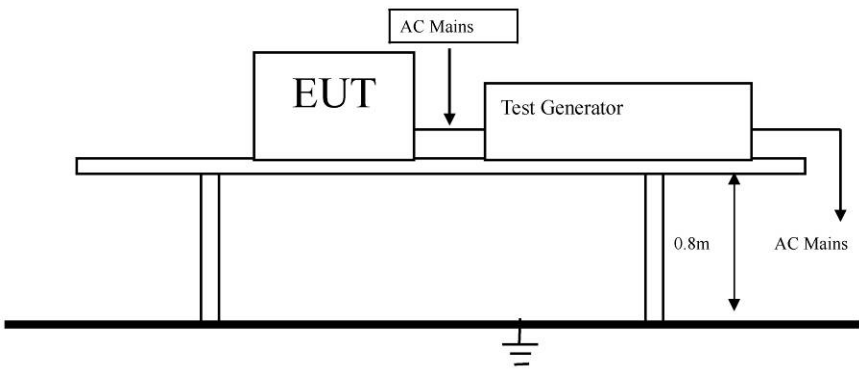


5.7.2 Test Method:

The test was performed in accordance with EN 61000-4-11:2004

Performance Criterion Require: C&B (Please see following table)

Block diagram of Test setup



5.7.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

| Criterion | Description  |
|-----------|--|
| A         | No change in operational mode or degradation of performance outside of specification and no change in stored parameters.           |
| B         | Degradation of performance allowed during the test the EUT returning to intended operation after the test.                         |
| C         | Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls. |

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#### Severity Level

| Voltage<br>Dip           | Test Level %Ut | Reduction | Duration<br>(Periods) | Performance<br>Criteria |
|--------------------------|----------------|-----------|-----------------------|-------------------------|
|                          | <5             | >95       | 0.5                   | B                       |
|                          | 70             | 30        | 25                    | C                       |
|                          |                |           |                       |                         |
| Voltage<br>Interceptions | Test Level %Ut | Reduction | Duration<br>(Periods) | Performance<br>Criteria |
|                          | <5             | >95       | 250                   | C                       |

#### 5.7.4 Test Result:

##### EUT Operating Environment

Temperature: 25°C Humidity: 75%RH Atmospheric Pressure: 101 kPa

Please refer to the following page

Voltage Dip:

| Test Level<br>% Ut | Reduction | Duration<br>(periods) | Phase Angle | Meet<br>Criterion | Result |
|--------------------|-----------|-----------------------|-------------|-------------------|--------|
| 0                  | 100       | 0.5                   | 0° - 360°   | A                 | Pass   |
| 70                 | 30        | 25                    | 0° - 360°   | A                 | Pass   |

Voltage Interceptions:

| Test Level<br>% Ut | Reduction | Duration<br>(periods) | Phase Angle | Meet<br>Criterion | Result |
|--------------------|-----------|-----------------------|-------------|-------------------|--------|
| 0                  | 100       | 250                   | 0° - 360°   | B                 | Pass   |

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## 6.0 Product Labelling

### 6.1 CE Mark label specification

Text of the mark is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.



### 6.2 Mark Location: Rear enclosure

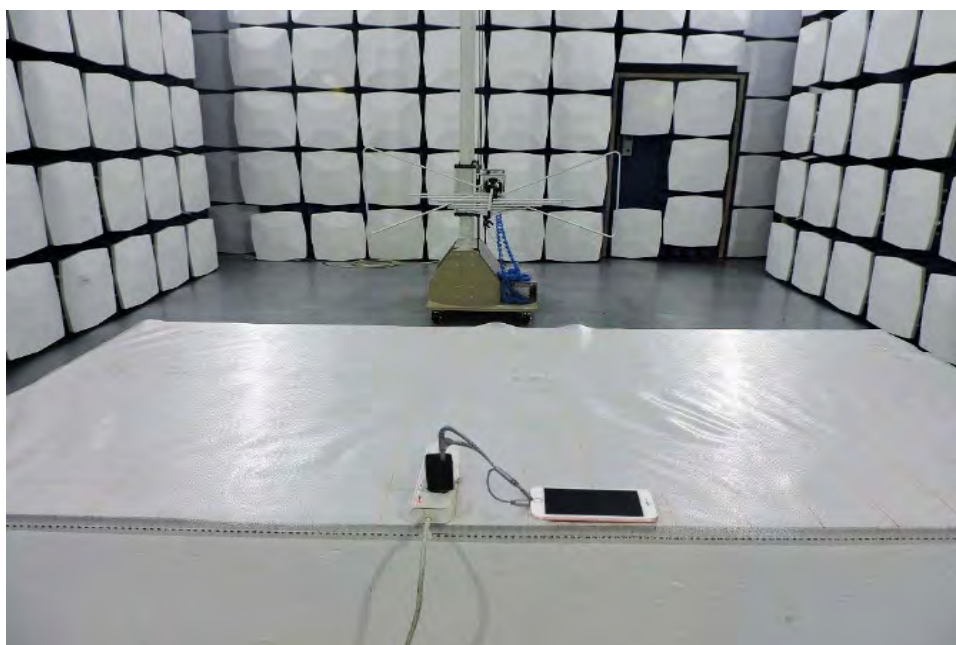
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## 7.0 Photo of testing



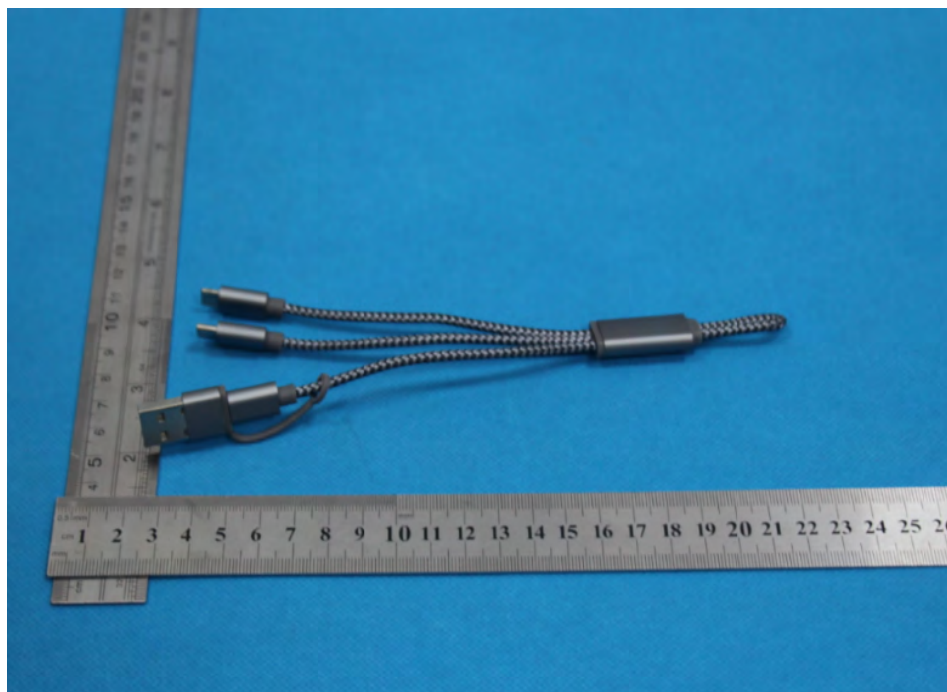
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Photo for the EUT



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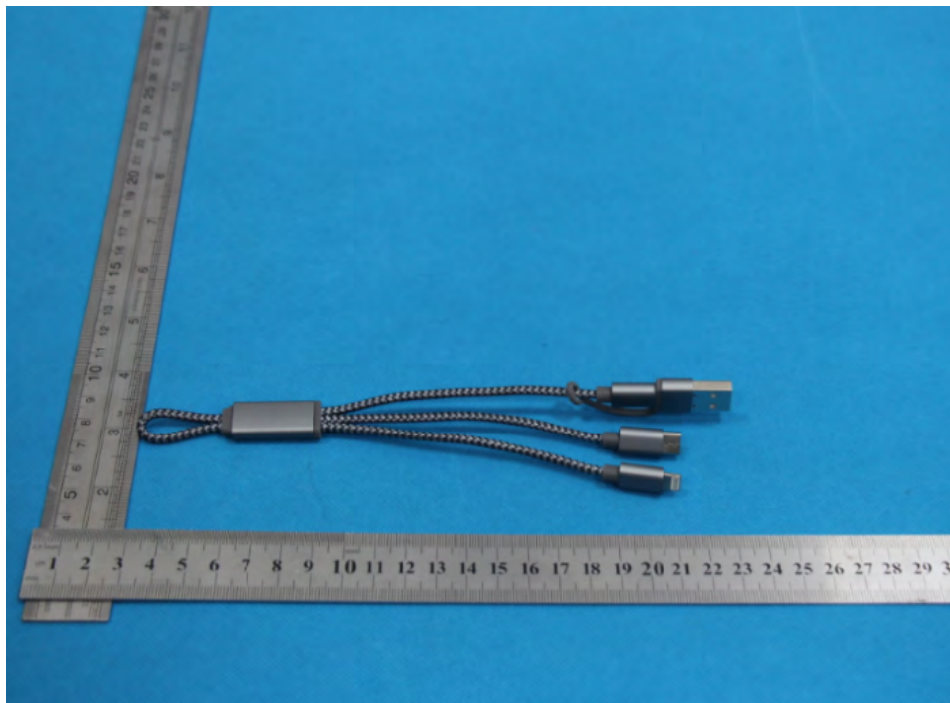
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Photo for the EUT



**-End of the report-**

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