


EN 62040-2:2006  
EN 61000-3-3:2013  
EN 61000-3-2:2014  
Test Report For

**Magnizon power systems LTD**

71-75, Shelton Street, London, Greater London, WC2H 9JQ, UNITED KINGDOM  
Registered in UNITED KINGDOM, Number 11983678

Product Name:	UPS backup machine
Model/Type No.:	MU500VS, MU650VS, MU800VS, MU1000VS, MU1500VS, MU2000VS, MU3000VS
Prepared By:	Shenzhen Hongcai Testing Technology Co., Ltd. 1-2/F., Building C, Shuanghuan Xinyidai Hi-Tech Industrial Park, No.8, Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen, Guangdong, China. Tel: 86-755-86337020 Fax: 86-755-86337028
Report Number:	HCT18GR-5215E
Tested Date:	July 10~November 02, 2018
Issued Date:	November 02, 2018
Tested By:	Savitar Liu/ 

Reviewed By:



Owen Yang

EMC Technical Supervisor

Approved By:



Tony Wu

EMC Technical Manager

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Hongcai Testing Technology Co., Ltd.

**TABLE OF CONTENTS**

**1- GENERAL INFORMATION ..... 4**

1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)..... 4

1.2 TEST STANDARDS ..... 5

1.3 TEST SUMMARY ..... 5

1.4 TEST METHODOLOGY ..... 6

**2- SYSTEM TEST CONFIGURATION ..... 7**

2.1 JUSTIFICATION ..... 7

2.2 EUT EXERCISE SOFTWARE ..... 7

2.3 EQUIPMENT MODIFICATIONS ..... 7

2.4 BASIC CONFIGURATION OF TEST SYSTEM..... 7

**3- CONDUCTED DISTURBANCE AT THE MAINS TERMINALS..... 8**

3.1 MEASUREMENT UNCERTAINTY ..... 8

3.2 LIMIT OF CONDUCTED DISTURBANCE AT THE MAINS TERMINALS ..... 8

3.3 EUT SETUP ..... 8

3.4 INSTRUMENT SETUP ..... 9

3.5 TEST PROCEDURE ..... 9

3.6 TEST EQUIPMENT LIST AND DETAILS ..... 10

3.7 TEST DATA..... 10

**4- RADIATED DISTURBANCES ..... 15**

4.1 MEASUREMENT UNCERTAINTY..... 15

4.2 LIMIT OF RADIATED DISTURBANCES ..... 15

4.3 EUT SETUP ..... 15

4.4 TEST RECEIVER SETUP ..... 16

4.5 TEST PROCEDURE ..... 16

4.6 CORRECTED AMPLITUDE & MARGIN CALCULATION ..... 17

4.7 TEST DATA..... 17

4.8 TEST EQUIPMENT LIST AND DETAILS ..... 17

**5- HARMONIC CURRENT TEST ..... 22**

5.1 APPLICATION OF HARMONIC CURRENT EMISSION ..... 22

5.2 BLOCK DIAGRAM OF TEST SETUP: ..... 22

5.3 TEST PROCEDURE: ..... 22

5.4 TEST EQUIPMENT LIST AND DETAILS ..... 23

5.5 TEST RESULT ..... 23

**6- VOLTAGE FLUCTUATIONS AND FLICKER TEST ..... 24**

6.1 APPLICATION AND LIMIT OF VOLTAGE FLUCTUATIONS AND FLICKER TEST ..... 24

6.2 BLOCK DIAGRAM OF TEST SETUP: ..... 24

6.3 TEST PROCEDURE: ..... 25

6.4 TEST EQUIPMENT LIST AND DETAILS ..... 25

6.5 TEST RESULT ..... 25

**7- IMMUNITY TEST DESCRIPTION ..... 26**

7.1 GENERAL DESCRIPTION ..... 26

7.2 THE PHENOMENA ALLOWED DURING AND AFTER TEST IN EACH CRITERION ARE CLEARLY STATED IN THE FOLLOWING TABLE ... 27

7.3 DEVIATIONS FROM THE STANDARD ..... 27

**8- IMMUNITY TEST RESULTS..... 28**

8.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST ..... 28

8.1.1 TEST SPECIFICATION..... 28

8.1.2 TEST SETUP .....	28
8.1.3 TEST PROCEDURE .....	29
8.1.4 TEST EQUIPMENT LIST AND DETAILS .....	29
8.1.5 PERFORMANCE CRITERION REQUIRED & TEST RESULT .....	30
8.2 RADIATED SUSCEPTIBILITY TEST .....	31
8.2.1 TEST SPECIFICATION.....	31
8.2.2 TEST SETUP.....	31
8.2.3 TEST PROCEDURE .....	31
8.2.4 TEST EQUIPMENT LIST AND DETAILS .....	32
8.2.5 PERFORMANCE CRITERION REQUIRED & TEST RESULT .....	32
8.3 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST .....	33
8.3.1 TEST SPECIFICATION.....	33
8.3.2 TEST SETUP.....	33
8.3.3 TEST PROCEDURE .....	34
8.3.4 TEST EQUIPMENT LIST AND DETAILS .....	34
8.3.5 PERFORMANCE CRITERION REQUIRED & TEST RESULT .....	34
8.4 SURGE IMMUNITY TEST .....	35
8.4.1 TEST SPECIFICATION.....	35
8.4.2 TEST SETUP.....	35
8.4.3 TEST PROCEDURE .....	36
8.4.4 TEST EQUIPMENT LIST AND DETAILS.....	36
8.4.5 PERFORMANCE CRITERION REQUIRED & TEST RESULT .....	36
8.5 CONDUCTED SUSCEPTIBILITY TEST.....	37
8.5.1 TEST SPECIFICATION.....	37
8.5.2 TEST SETUP .....	37
8.5.3 TEST PROCEDURE .....	37
8.5.4 TEST EQUIPMENT LIST AND DETAILS .....	38
8.5.5 PERFORMANCE CRITERION REQUIRED & TEST RESULT .....	38
<b>APPENDIX A - EUT PHOTOGRAPHS .....</b>	<b>39</b>
<b>APPENDIX B - TEST SETUP PHOTOGRAPHS.....</b>	<b>43</b>

## 1- GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test (EUT)

#### Client Information

Applicant:	Magnizon power systems LTD
Address of applicant:	71-75, Shelton Street, London, Greater London, WC2H 9JQ, UNITED KINGDOM Registered in UNITED KINGDOM, Number 11983678
Manufacturer:	Magnizon power systems LTD
Address of Manufacturer:	71-75, Shelton Street, London, Greater London, WC2H 9JQ, UNITED KINGDOM Registered in UNITED KINGDOM, Number 11983678

#### General Description of E.U.T

EUT Name:	UPS backup machine
Trade Mark:	MAGNIZON
Model No.:	MU500VS, MU650VS, MU800VS, MU1000VS, MU1500VS, MU2000VS MU3000VS
Test Model No.:	MU3000VS
Power Supply:	Input: AC 220V, 50Hz, 13.64A, 3000W Output: AC 220V, 50Hz, 8.18A, 1800W

#### Template Release Date

Version	Rev.01
Issued Date	June 12, 2017

Remark: \* The test data gathered are from the production sample provided by the manufacturer.  
 \* Supplementary models have the different output, others are the same.  
 \* HCT18GR-5215E is produced on the basis of HCT18GR-0884E.

## 1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

EN 62040-2: 2006

EN 61000-3-11: 2000

EN 61000-3-12: 2011

Reference Standards:

EN 61000-4-2: 2009

EN 61000-4-3: 2006+A2:2010

EN 61000-4-4: 2012

EN 61000-4-5: 2014

EN 61000-4-6: 2014

EN 61000-4-8: 2010

EN 61000-4-11: 2004

The objective of the manufacturer is to demonstrate compliance with the described standards above.

## 1.3 Test Summary

Table 1:

Standard	Test Items	Status
EN 62040-2:2006	Conducted Disturbance at The Mains Terminals (150KHz to 30MHz)	<input checked="" type="checkbox"/>
	Conducted Disturbance at The Telecommunication Ports	<input type="checkbox"/>
	Radiated Disturbances (30MHz to 1000MHz)	<input checked="" type="checkbox"/>

Table 2:

Standard	Test Items	Status
EN 61000-3-12	Harmonic Current Test	<input checked="" type="checkbox"/>
EN 61000-3-11	Voltage Fluctuations and Flicker Test	<input checked="" type="checkbox"/>

Table 3:

Standard	Test Items	Status
EN 62040:	Test items as below listed	<input checked="" type="checkbox"/>
EN 61000-4-2	Electrostatic discharge Immunity	<input checked="" type="checkbox"/>
EN 61000-4-3	Radiated Susceptibility (80MHz to 1GHz)	<input checked="" type="checkbox"/>
EN 61000-4-4	Electrical Fast Transient/Burst Immunity	<input checked="" type="checkbox"/>
EN 61000-4-5	Surge Immunity	<input checked="" type="checkbox"/>
EN 61000-4-6	Conducted Susceptibility (150kHz to 80MHz)	<input checked="" type="checkbox"/>
EN 61000-4-8	Power Frequency Magnetic Field Immunity (50/60Hz)	<input type="checkbox"/>
EN 61000-4-11	Voltage Dips, Short Interruptions Immunity	<input type="checkbox"/>

Note:  Indicates that the test is applicable,  Indicates that the test is not applicable

#### 1.4 Test Methodology

All measurements contained in this report were conducted with CISPR 16-1-1: 2006, radio disturbance and immunity measuring apparatus, and CISPR16-2-3: 2010, Method of measurement of disturbances and immunity.

All measurement required was performed at Shenzhen Hongcai Testing Technology Co., Ltd. at 1-2/F., Building C, Shuanghuan Xinyidai Hi-Tech Industrial Park, No.8, Baoqing Road, Baolong Industrial Zone, Longgang District, Shenzhen, Guangdong, China.

HONGCAI TESTING



## 2- SYSTEM TEST CONFIGURATION

### 2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

### 2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being Battery Mode/Line Mode.

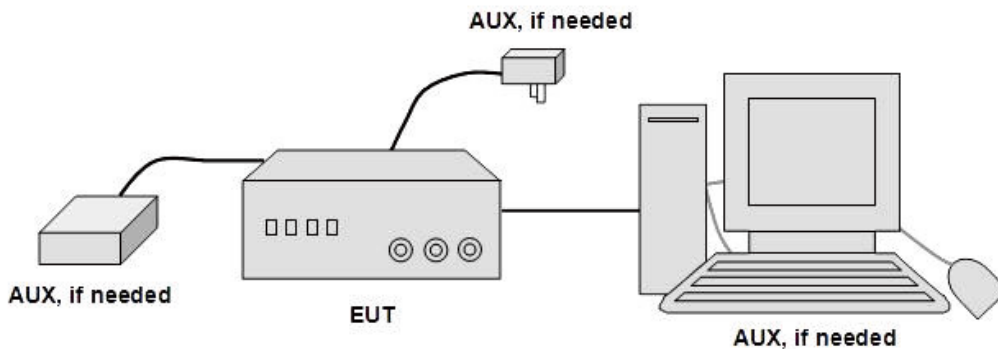
### 2.3 Equipment Modifications

The EUT tested was not modified by HCT.

### 2.4 Basic Configuration of Test System

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

Immunity: The equipment under test (EUT) was configured to the representative operating mode and conditions.



### 3- CONDUCTED DISTURBANCE AT THE MAINS TERMINALS

#### 3.1 Measurement Uncertainty

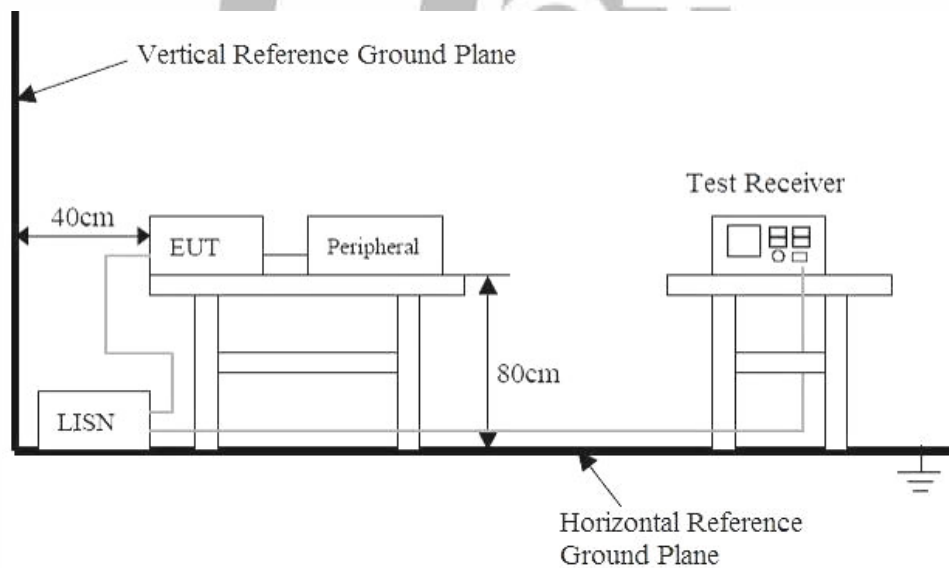
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN. The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is  $\pm 3.4$  dB.

#### 3.2 Limit of Conducted Disturbance at The Mains Terminals

Frequency Range (MHz)	Class B Equipment Limits	
	Quasi-Peak (dBuV)	Average (dBuV)
0.150~0.500(2)	66~56(1)	56~46(1)
0.500~5.000(2)	56	46
5.000~30.00	60	50

NOTE 1: The limits decrease linearly with the logarithm of the frequency.  
NOTE 2: The lower limit shall apply at the transition frequency.

#### 3.3 EUT Setup





The setup of EUT is according with CISPR 16-1-1: 2006, CISPR16-2-3: 2010 measurement procedure. The specification used was the EN62040-2 limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

### 3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz  
Detector.....Peak & Quasi-Peak & Average  
Sweep Speed.....Auto  
IF Band Width.....9 KHz

### 3.5 Test Procedure

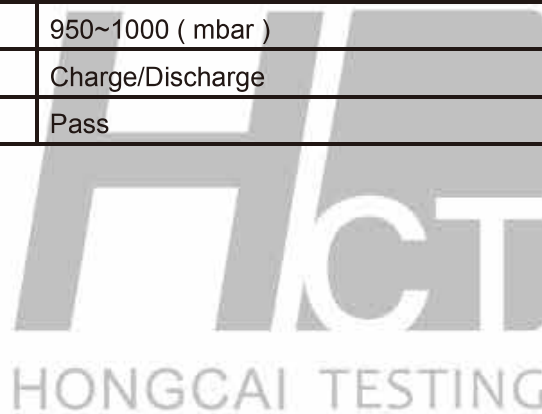
1. During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.
2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.
3. All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

### 3.6 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC001	EMI Test Receiver	R&S	ESCI	100687	2018-08-13	2019-08-12
2	HCT-EMC020	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	8128247	2018-08-13	2019-08-12
3	HCT-EMC032	10dB attenuator	SCHWARZBECK	9510-F061	9510-F061234	2018-08-13	2019-08-12

### 3.7 Test Data

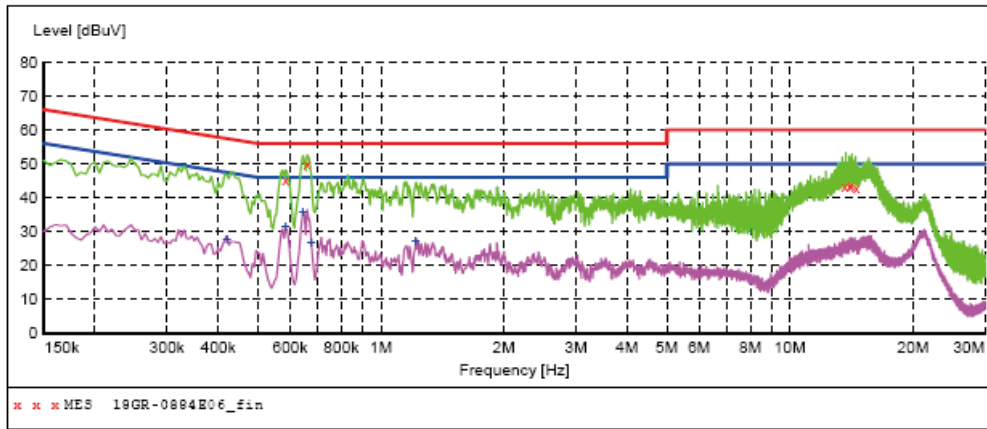
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Charge/Discharge
Test Result:	Pass



**Conducted Emission Test Data**

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge  
Test Site: Shielded Room  
Operator: LYM  
Test Specification: AC 230V 50Hz  
Comment: Live Line  
Start of Test: Tem:23°C Hum:50%

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



**MEASUREMENT RESULT: "18GR-0884E06\_fin"**

7/27/2018 12:02PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.585000	45.10	10.4	56	10.9	QP	L1	GND
0.660000	50.00	10.4	56	6.0	QP	L1	GND
13.595000	43.30	11.4	60	16.7	QP	L1	GND
14.015000	43.30	11.5	60	16.7	QP	L1	GND
14.075000	43.70	11.5	60	16.3	QP	L1	GND
14.550000	42.80	11.6	60	17.2	QP	L1	GND

**MEASUREMENT RESULT: "18GR-0884E06\_fin2"**

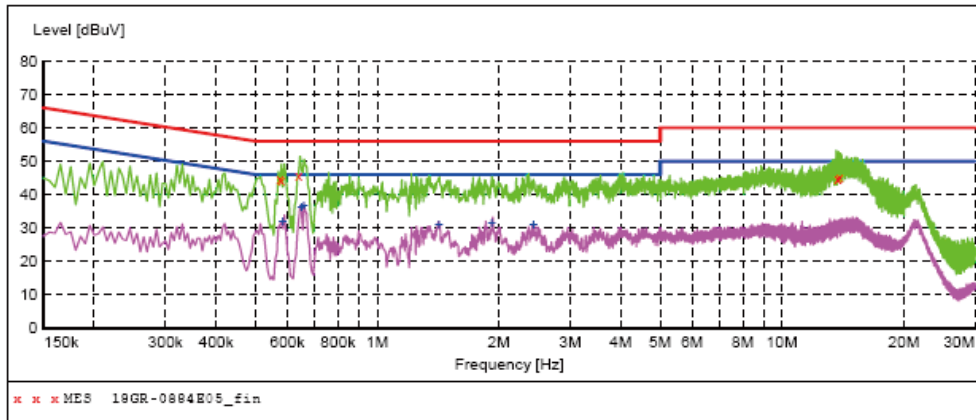
7/27/2018 12:02PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.420000	27.60	11.0	47	19.8	AV	L1	GND
0.585000	31.30	10.4	46	14.7	AV	L1	GND
0.645000	35.80	10.4	46	10.2	AV	L1	GND
0.675000	26.80	10.3	46	19.2	AV	L1	GND
1.215000	27.00	10.7	46	19.0	AV	L1	GND

### Conducted Emission Test Data

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge  
Test Site: Shielded Room  
Operator: LYM  
Test Specification: AC 230V 50Hz  
Comment: Neutral Line  
Start of Test: Tem:23°C Hum:50%

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



#### MEASUREMENT RESULT: "18GR-0884E05\_fin"

7/27/2018 11:56AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.575000	45.00	10.4	56	11.0	QP	N	GND
0.580000	44.30	10.4	56	11.7	QP	N	GND
0.640000	45.90	10.4	56	10.1	QP	N	GND
13.720000	44.80	11.4	60	15.2	QP	N	GND
13.800000	44.80	11.4	60	15.2	QP	N	GND
13.910000	45.20	11.4	60	14.8	QP	N	GND

#### MEASUREMENT RESULT: "18GR-0884E05\_fin2"

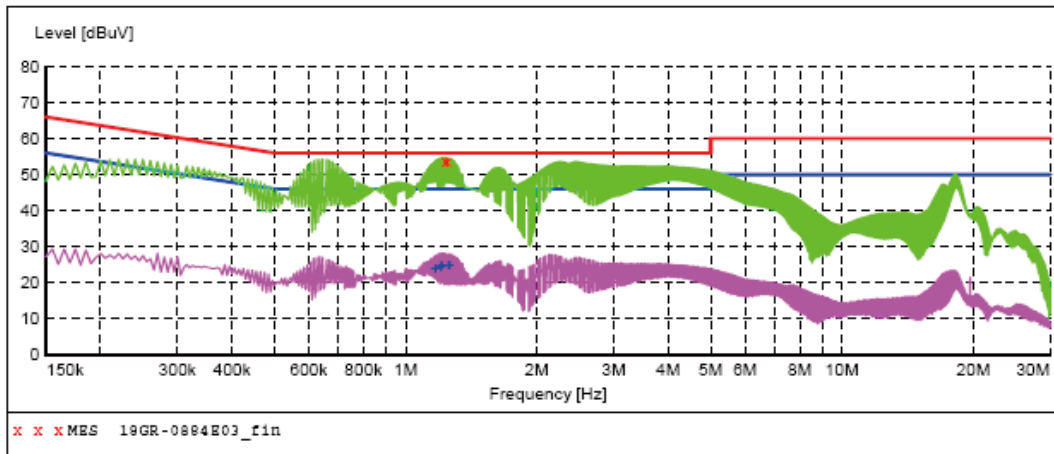
7/27/2018 11:56AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.585000	32.10	10.4	46	13.9	AV	N	GND
0.650000	36.10	10.4	46	9.9	AV	N	GND
0.660000	36.50	10.4	46	9.5	AV	N	GND
1.420000	31.10	10.8	46	14.9	AV	N	GND
1.920000	31.40	11.2	46	14.6	AV	N	GND
2.435000	31.00	10.8	46	15.0	AV	N	GND

**Conducted Emission Test Data**

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge/Discharge  
Test Site: Shielded Room  
Operator: LYM  
Test Specification: AC 230V 50Hz  
Comment: Live Line  
Start of Test: Tem:23°C Hum:50%

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



**MEASUREMENT RESULT: "18GR-0884E03\_fin"**

7/16/2018 9:06AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
1.230000	53.70	20.7	56	2.3	QP	L1	GND
1.235000	53.80	20.7	56	2.2	QP	L1	GND
1.250000	53.90	20.7	56	2.1	QP	L1	GND

**MEASUREMENT RESULT: "18GR-0884E03\_fin2"**

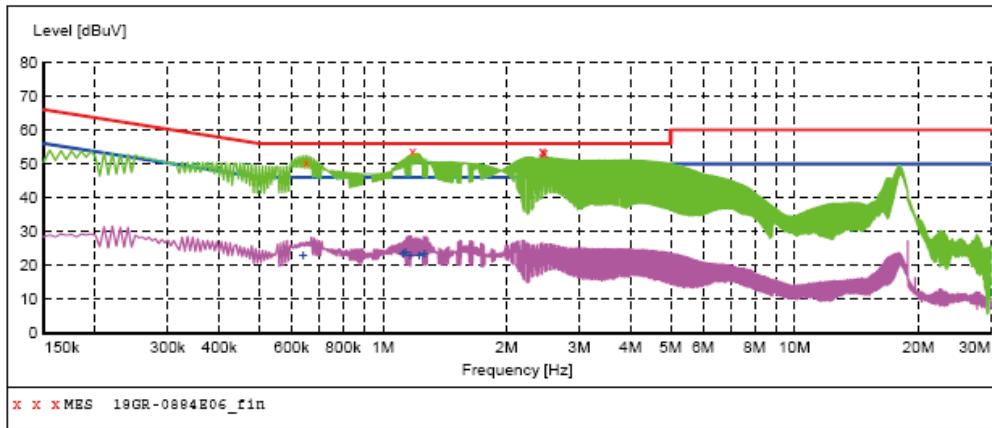
7/16/2018 9:06AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
1.170000	24.10	20.6	46	21.9	AV	L1	GND
1.205000	24.40	20.6	46	21.6	AV	L1	GND
1.210000	24.60	20.6	46	21.4	AV	L1	GND
1.255000	24.70	20.7	46	21.3	AV	L1	GND
1.260000	24.70	20.7	46	21.3	AV	L1	GND

### Conducted Emission Test Data

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge/Discharge  
Test Site: Shielded Room  
Operator: LYM  
Test Specification: AC 230V 50Hz  
Comment: Neutral Line  
Start of Test: Tem:23°C Hum:50%

**SCAN TABLE: "Voltage (150K-30M) FIN"**  
Short Description: 150K-30M Voltage



#### MEASUREMENT RESULT: "18GR-0884E06\_fin"

7/16/2018 9:30AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.650000	51.80	20.4	56	4.2	QP	N	GND
1.180000	53.90	20.6	56	2.1	QP	N	GND
2.440000	53.90	20.8	56	2.1	QP	N	GND
2.455000	53.80	20.8	56	2.2	QP	N	GND
2.465000	53.80	20.8	56	2.2	QP	N	GND

#### MEASUREMENT RESULT: "18GR-0884E06\_fin2"

7/16/2018 9:43AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.640000	24.00	20.4	46	22.0	AV	N	GND
1.120000	24.50	20.6	46	21.5	AV	N	GND
1.135000	24.90	20.6	46	21.1	AV	N	GND
1.165000	24.30	20.6	46	21.7	AV	N	GND
1.225000	24.40	20.7	46	21.6	AV	N	GND
1.260000	24.50	20.7	46	21.5	AV	N	GND



## 4- RADIATED DISTURBANCES

### 4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 4.0$  dB.

### 4.2 Limit of Radiated Disturbances

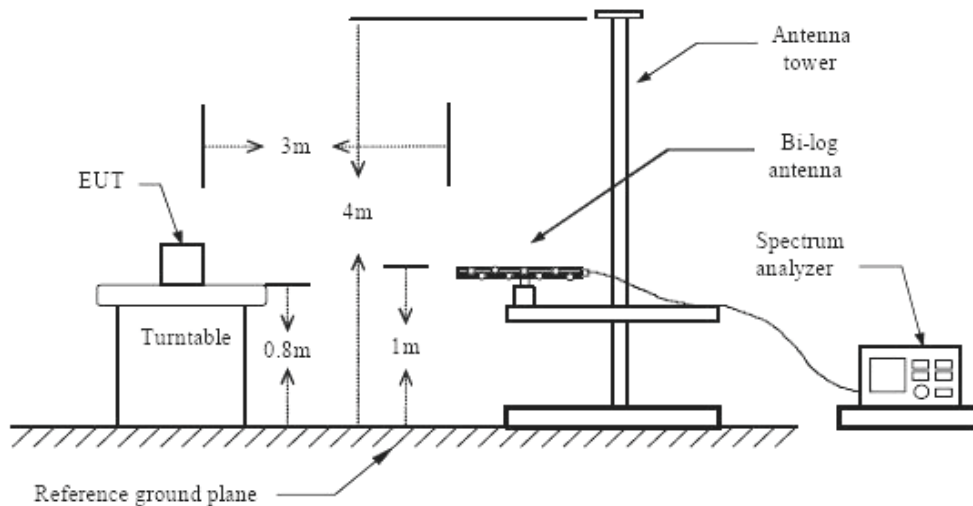
Frequency (MHz)	Distance (Meters)	Quasi-Peak (dB $\mu$ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

NOTE 1: The lower limit shall apply at the transition frequency.

NOTE 2 : Additional provisions may be required for cases where interference occurs.

### 4.3 EUT Setup

#### Below 1 GHz



The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the CISPR 16-1-1: 2006, CISPR16-2-3: 2010. The specification used was EN62040-2 Class 3 limits.

The EUT was placed on the center of the test table. Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

#### 4.4 Test Receiver Setup

The test receiver was set with the following configurations:

Test Receiver Setting below 1000MHz:

Detector.....Peak & Quasi-Peak  
IF Band Width.....120KHz  
Frequency Range.....30MHz to 1000MHz  
Turntable Rotated.....0 to 360 degrees

Test Receiver Setting above 1000MHz:

Detector.....Peak & Average  
IF Band Width.....1MHz  
Frequency Range.....1000MHz to 6000MHz  
Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m  
Polarity.....Horizontal and Vertical

#### 4.5 Test Procedure

1. Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.
2. All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits), and are distinguished with a "QP" in the data table.

#### 4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB $\mu$ V means the emission is 7dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

#### 4.7 Test Data

Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Charge/Discharge
Test Result:	Pass

#### 4.8 Test Equipment List and Details

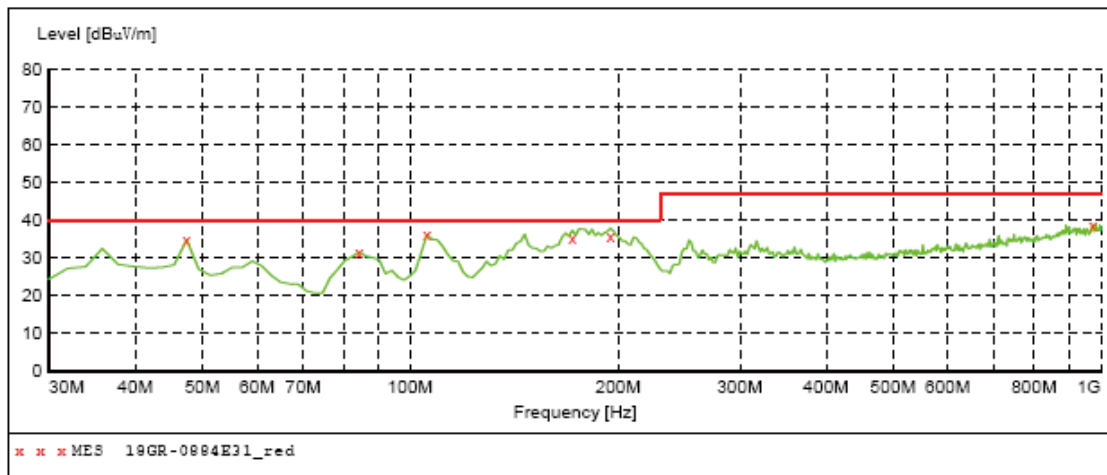
No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC001	EMI Test Receiver	R&S	ESCI	100687	2018-08-13	2019-08-12
2	HCT-EMC018	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2018-08-13	2019-08-12
3	HCT-EMC019	Horn Antenna	SCHWARZBECK	BBHA9120A	0499	2018-08-13	2019-08-12
4	HCT-EMC037	Broadband preamplifier	SCHWARZBECK	BBV9718	9718-182	2018-08-13	2019-08-12

### Radiated Emission Test Data of Below 1GHz

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge  
Test Site: CHAMBER  
Operator: ZHQ  
Test Specification: AC 230V 50Hz  
Comment: Polarization: Horizontal  
Start of Test: Tem:23°C Hum:50%

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength				Transducer
Start	Stop	Detector	Meas. Time	IF Bandw.		
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015	



**MEASUREMENT RESULT: "18GR-0884E31\_red"**

2018-7-23 08:41PM

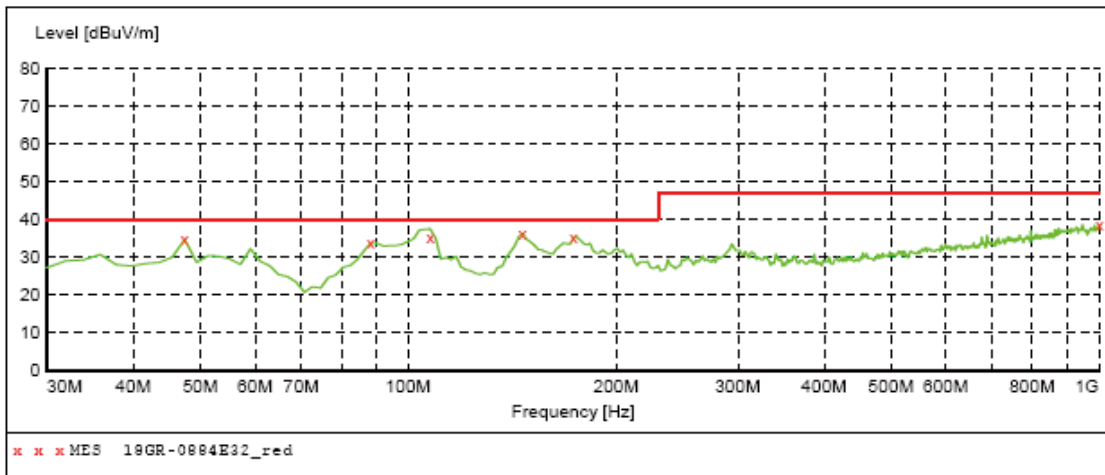
Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	34.90	16.7	40.0	5.1	QP	200.0	0.00	HORIZONTAL
84.320000	31.70	11.8	40.0	8.3	QP	200.0	0.00	HORIZONTAL
105.660000	36.20	12.0	40.0	3.8	QP	200.0	0.00	HORIZONTAL
171.620000	35.40	12.5	40.0	4.6	QP	200.0	0.00	HORIZONTAL
194.900000	35.90	13.7	40.0	4.1	QP	100.0	0.00	HORIZONTAL
972.840000	38.90	25.5	47.0	8.1	QP	100.0	0.00	HORIZONTAL

**Radiated Emission Test Data of Below 1GHz**

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge  
Test Site: CHAMBER  
Operator: ZHQ  
Test Specification: AC 230V 50Hz  
Comment: Polarization: Vertical  
Start of Test: Tem:23°C Hum:50%

***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength				Transducer
Start	Stop	Detector	Meas. Time	IF Bandw.		
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015	



***MEASUREMENT RESULT: "18GR-0884E32\_red"***

2018-7-23 08:43PM

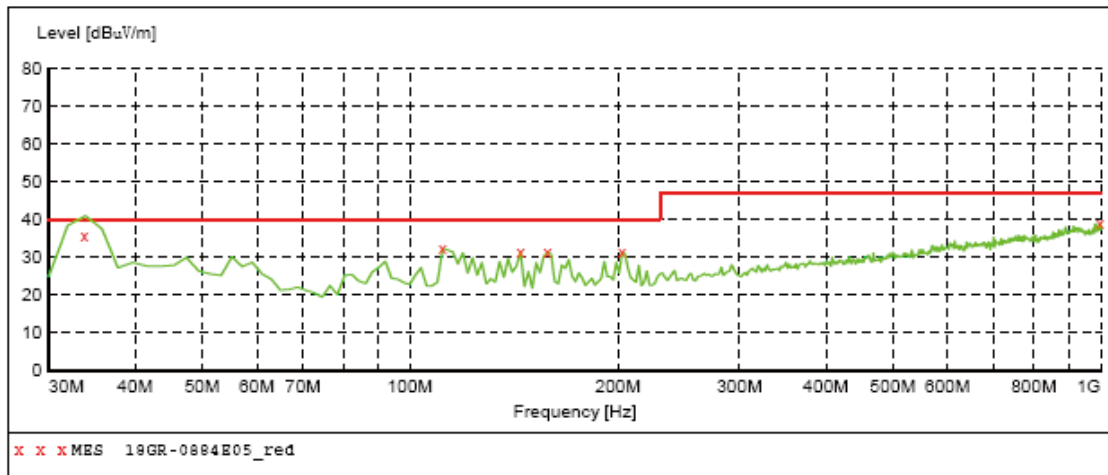
Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	34.80	16.7	40.0	5.2	QP	200.0	0.00	VERTICAL
88.200000	33.80	14.1	40.0	6.2	QP	100.0	0.00	VERTICAL
107.600000	35.50	12.2	40.0	4.5	QP	100.0	0.00	VERTICAL
146.400000	36.30	12.0	40.0	3.7	QP	100.0	0.00	VERTICAL
173.560000	35.40	12.4	40.0	4.6	QP	100.0	0.00	VERTICAL
1000.000000	38.70	25.9	47.0	8.3	QP	200.0	0.00	VERTICAL

### Radiated Emission Test Data of Below 1GHz

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge/Discharge  
Test Site: CHAMBER  
Operator: ZHQ  
Test Specification: AC 230V 50Hz  
Comment: Polarization: Horizontal  
Start of Test: Tem:23°C Hum:50%

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength				Transducer
Start	Stop	Detector	Meas. Time	IF Bandw.		
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz		9163-2015



**MEASUREMENT RESULT: "18GR-0884E05\_red"**

2018-7-16 10:57AM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
33.880000	35.00	15.1	40.0	5.0	QP	200.0	0.00	HORIZONTAL
111.480000	32.30	12.5	40.0	7.7	QP	100.0	0.00	HORIZONTAL
144.460000	31.40	12.2	40.0	8.6	QP	100.0	0.00	HORIZONTAL
158.040000	31.30	12.3	40.0	8.7	QP	200.0	0.00	HORIZONTAL
202.660000	31.30	14.0	40.0	8.7	QP	100.0	0.00	HORIZONTAL
996.120000	38.90	25.9	47.0	8.1	QP	200.0	0.00	HORIZONTAL

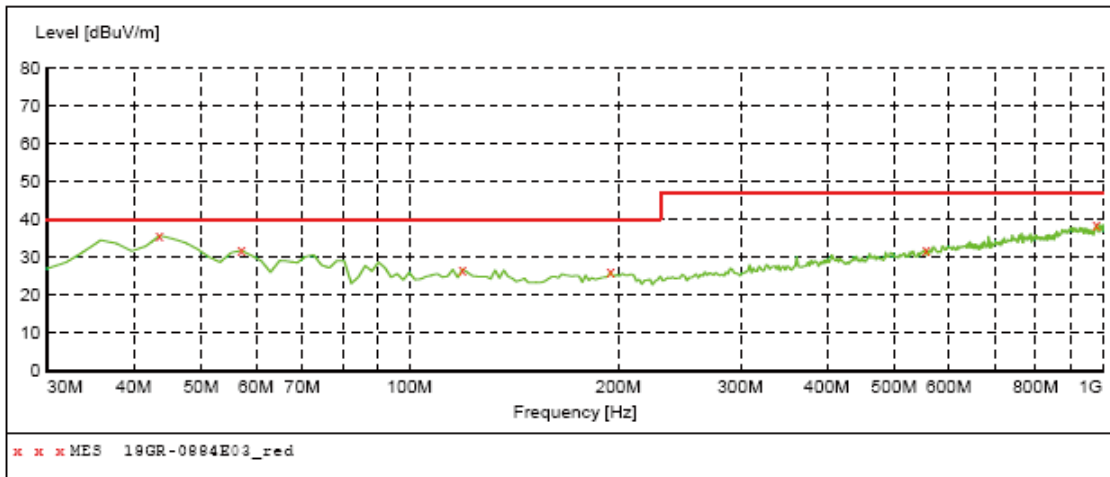


**Radiated Emission Test Data of Below 1GHz**

EUT: UPS backup machine  
M/N: MU3000VS  
Operating Condition: Charge/Discharge  
Test Site: CHAMBER  
Operator: ZHQ  
Test Specification: AC 230V 50Hz  
Comment: Polarization: Vertical  
Start of Test: Tem:23°C Hum:50%

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength				Transducer
Start	Stop	Detector	Meas. Time	IF Bandw.		
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz		9163-2015



**MEASUREMENT RESULT: "18GR-0884E03\_red"**

2018-7-19 08:37PM

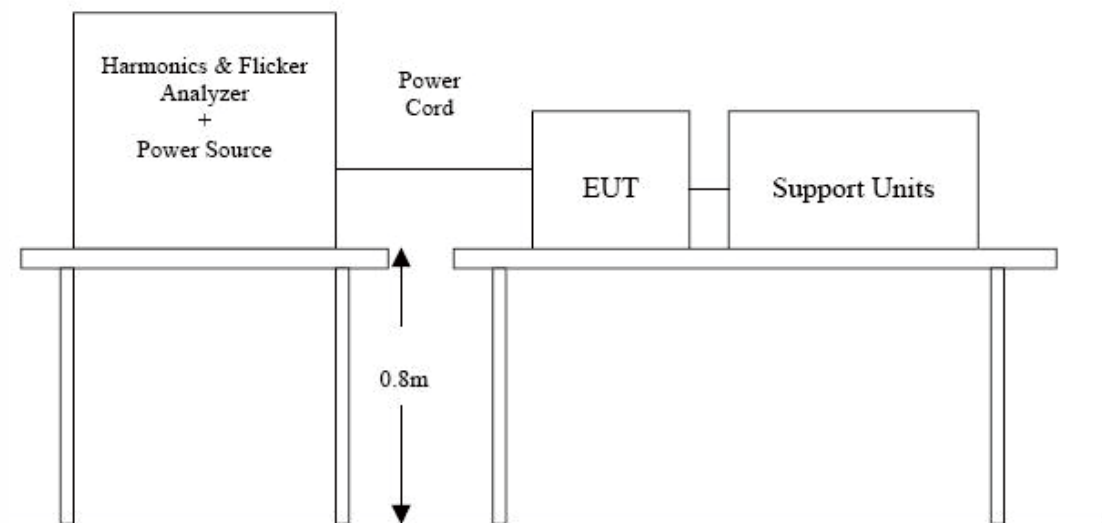
Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	35.80	15.8	40.0	4.2	QP	100.0	0.00	VERTICAL
57.160000	31.90	15.7	40.0	8.1	QP	200.0	0.00	VERTICAL
119.240000	26.90	13.2	40.0	13.1	QP	100.0	0.00	VERTICAL
194.900000	26.20	13.7	40.0	13.8	QP	200.0	0.00	VERTICAL
555.740000	32.00	20.4	47.0	15.0	QP	100.0	0.00	VERTICAL
978.660000	38.70	25.7	47.0	8.3	QP	200.0	0.00	VERTICAL

## 5- HARMONIC CURRENT TEST

### 5.1 Application of Harmonic Current Emission

Compliance to these standards ensures that tested equipment will not generate harmonic currents at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

### 5.2 Block Diagram of Test Setup:



### 5.3 Test Procedure:

1. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
2. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

#### 5.4 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC035	HRMONICS&FLICKR E ANALYSER	VOLTECH	PM6000	200006700433	2018-08-13	2019-08-12

#### 5.5 Test Result

Basic Standard:	EN/IEC 61000-3-2: 2014 Quasi-stationary
Observation time	150s
Windows width:	10 periods - (EN/IEC 61000-4-7 Edition 2000)
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode
Test Result:	Pass
Note:	The input power of the EUT is less than 75W, then this EUT could be deemed to comply with the requirements of EN61000-3-12 : 2011 without test.

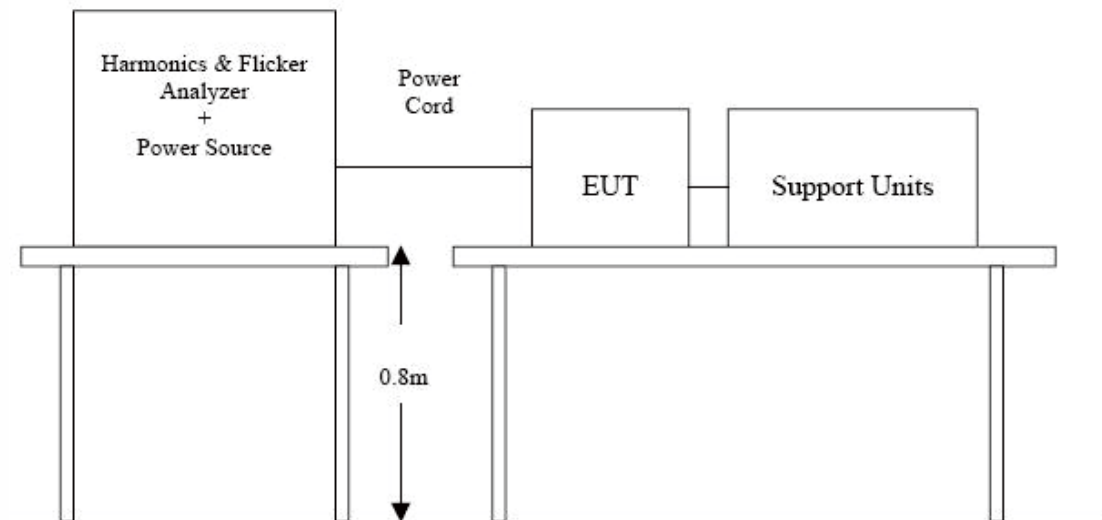
## 6- VOLTAGE FLUCTUATIONS AND FLICKER TEST

### 6.1 Application and Limit of Voltage Fluctuations and Flicker Test

Compliance to these standards ensures that tested equipment will not generate flickers and voltage change at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

Test Item	Limit	Remark
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%	dmax means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

### 6.2 Block Diagram of Test Setup:



### 6.3 Test Procedure:

1. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
2. During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

### 6.4 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC035	HRMONICS&FLICKR E ANALYSER	VOLTECH	PM6000	200006700433	2018-08-13	2019-08-12

### 6.5 Test Result

Basic Standard:	EN/IEC 61000-3-11
Short time (Pst)	10 min
Observation time	10 min (1 Flicker measurement)
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode
Test Result:	Pass

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.086	0.005	0.160	0

## 7- IMMUNITY TEST DESCRIPTION

### 7.1 General Description

Product Standard	EN 62040-2:2006	
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 1000 MHz, 10V/m, 80% AM (1kHz), Performance Criterion A
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: 2kV, Signal line: 2kV, Performance Criterion B
	EN 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power Line: line to line 1 kV, line to ground 2 kV Signal line: line to ground: outdoor: 1kV indoor: 1kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15 ~ 80 MHz, 10Vrms, 80% AM, 1kHz, Performance Criterion A

HONGCAI TESTING



**7.2 The phenomena allowed during and after test in each criterion are clearly stated in the following table**

Performance criteria		
Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).
<p><b>NOTE 1:</b> Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p> <p><b>NOTE 2:</b> No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.</p>		

**7.3 Deviations from the standard**

No deviations from EN 62040 were made when performing the tests described in this report.

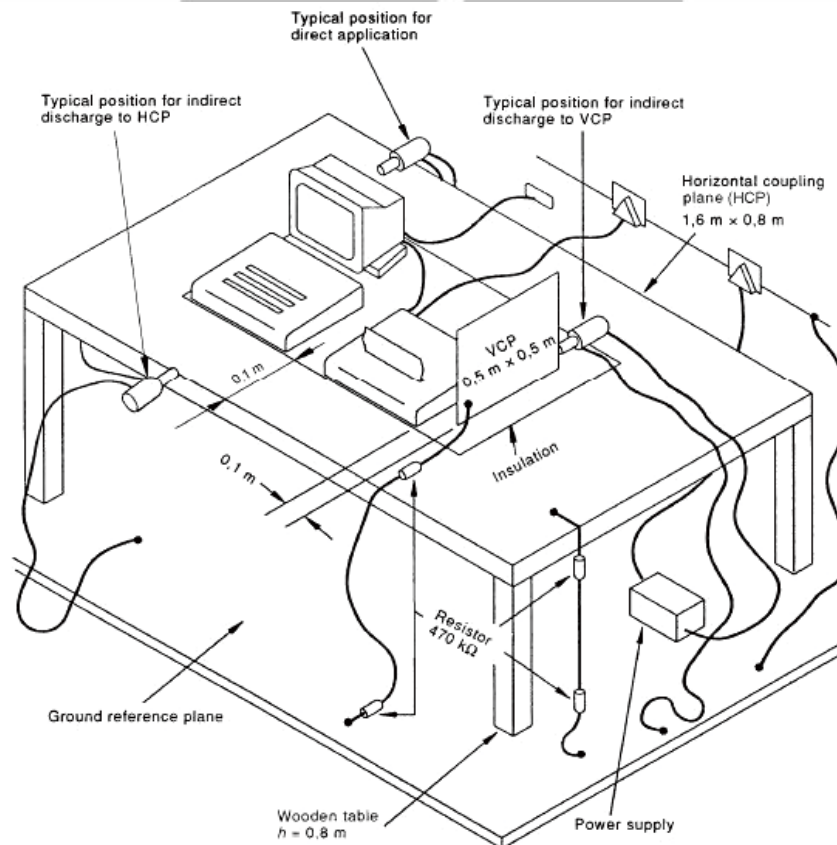
## 8- IMMUNITY TEST RESULTS

### 8.1 Electrostatic Discharge Immunity Test

#### 8.1.1 Test Specification

Basic Standard:	IEC/EN 61000-4-2
Test Level:	± 2, 4, 8 kV (Air Discharge) ± 2, 4 kV (Contact Discharge) ± 2, 4 kV (Indirect Contact HCP) ± 2, 4 kV (Indirect Contact VCP)
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode

#### 8.1.2 Test Setup



### 8.1.3 Test Procedure

1. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during Battery Mode/Line Mode.
2. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
3. The time interval between two successive single discharges was at least 1 second.
4. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
5. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
6. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
7. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
8. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

### 8.1.4 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC008	Electrostatic Discharge Simulator	TESEQ	NSG437	125	2018-08-13	2019-08-12

### 8.1.5 Performance Criterion Required & Test Result

Table 1: Electrostatic Discharge Immunity (Air Discharge)

Test Level			Test Points	Observation Performance	Criterion Required
±2 kV	±4kV	±8kV			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Gap	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Button	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Indicator Light	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Screen	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Others	A	B

Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Level			Test Points	Observation Performance	Criterion Required
±2 kV	±4kV	±8kV			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Screw	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shell	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Others	A	B

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

Test Level			Test Points	Observation Performance	Criterion Required
±2 kV	±4kV	±8kV			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Front Side	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Back Side	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left Side	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Right Side	A	B

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

Test Level			Test Points	Observation Performance	Criterion Required
±2 kV	±4kV	±8kV			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Front Side	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Back Side	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Left Side	A	B
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Right Side	A	B

Test Result: Pass

Report No.: HCT18GR-5215E

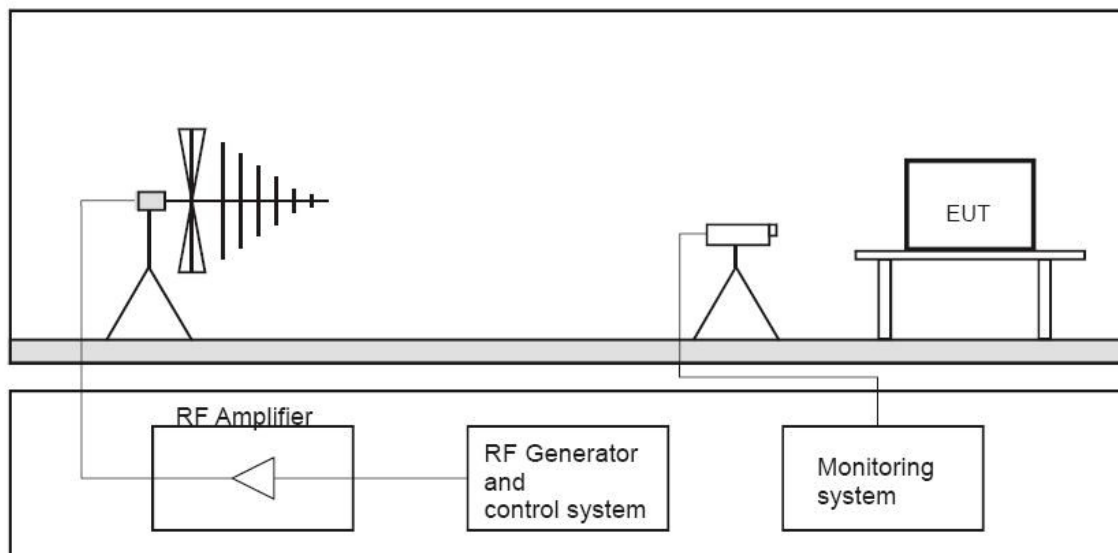
Page 30 of 45

## 8.2 Radiated Susceptibility Test

### 8.2.1 Test Specification

Basic Standard:	IEC/EN 61000-4-3
Frequency Range:	80~1000MHz (MHz)
Modulation:	Amplitude 80%, 1kHz sinewave
Test Level:	10V/m
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode

### 8.2.2 Test Setup



### 8.2.3 Test Procedure

1. The testing was performed in a fully-anechoic chamber.
2. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
3. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
4. The field strength level was 10V/m.
5. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 8.2.4 Test Equipment List and Details

No.	Equipment	Manufacturer	Model No.	S/N	Calibration Date	Next Calibration Date
1	3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	2018-08-13	2019-08-12
2	ESG Vector signal generators	Agilent	E4438C	MY45095744	2018-08-13	2019-08-12
3	Power Amplifier	AR	150W1000	0322288	2018-08-13	2019-08-12
4	Power Amplifier	AR	25S1G4A	0321112	2018-08-13	2019-08-12
5	TRILOG Broadband Antenna	schwarzbeck	VULB 9136	401	2018-08-13	2019-08-12
6	Horn Antenna	ETS-LINGREN	3117	00057407	2018-08-13	2019-08-12
7	3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	2018-08-13	2019-08-12
8	Spectrum Analyzer	Agilent	E4440A	MY46185649	2018-08-13	2019-08-12
9	TRILOG Broadband Antenna	schwarzbeck	VULB 9136	401	2018-08-13	2019-08-12
10	Multi device Controller	ETS-LINGREN	2090	00057230	N/A	N/A
11	Horn Antenna	ETS-LINGREN	3117	00057407	2018-08-13	2019-08-12
12	Microwave Preamplifier	Agilent	8449B	3008A02425	2018-08-13	2019-08-12

### 8.2.5 Performance Criterion Required & Test Result

Frequency Band (MHz)	Test Level	Test Points	Observation Performance	Criterion Required
80-1000	3V/m	Front Side	A	A
80-1000	3V/m	Rear Side	A	A
80-1000	3V/m	Left Side	A	A
80-1000	3V/m	Right Side	A	A

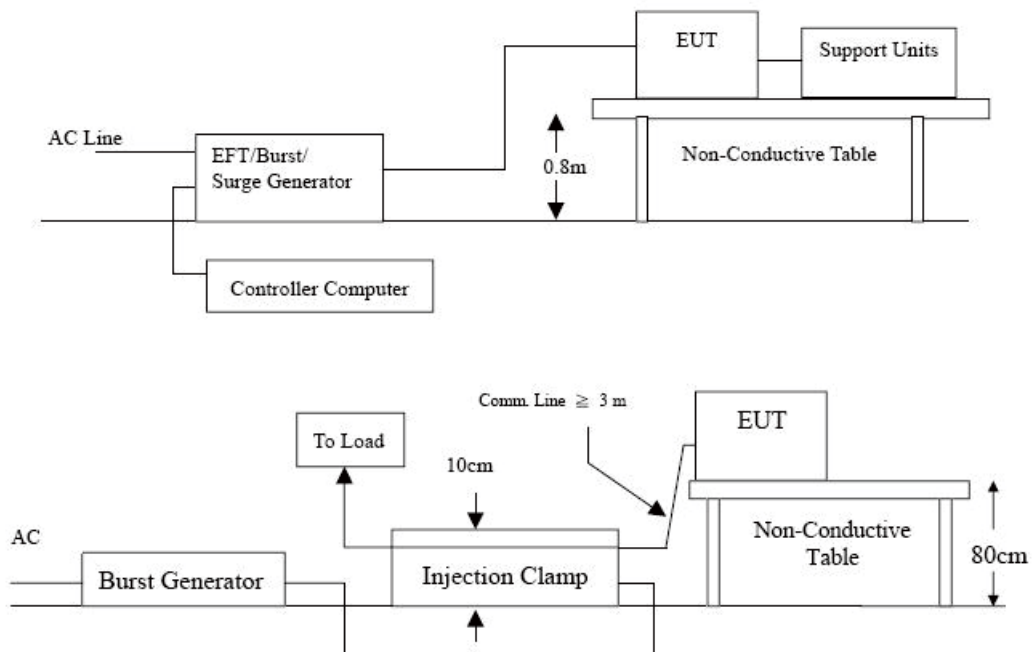
Test Result: Pass

### 8.3 Electrical Fast Transient/Burst Immunity Test

#### 8.3.1 Test Specification

Basic Standard :	IEC/EN 61000-4-4
Test Level:	±2 kV for AC Power Line ±2 kV for signal ports (If applicable)
Impulse Frequency:	5kHz
Impulse Wave-shape:	5/50ns
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	1 min.
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode

#### 8.3.2 Test Setup





### 8.3.3 Test Procedure

1. Both positive and negative polarity discharges were applied.
2. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should be 0.5m.
3. The duration time of each test sequential was 1 minute.
4. The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.

### 8.3.4 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC009	Fast Transient Burst Generator	SCHAFFNER	MODULA6150	34572	2018-08-13	2019-08-12

### 8.3.5 Performance Criterion Required & Test Result

Voltage	Test Points	Observation Performance	Criterion Required
±2kV	L	A	B
±2kV	N	A	B
±2kV	Earth	A	B
±2kV	L+N	A	B
±2kV	L + Earth	A	B
±2kV	N + Earth	A	B
±2kV	L+N+Earth	A	B
±2kV	Control Line	/	/
±2kV	DSL (RJ11)	/	/
±2kV	LAN (RJ45)	/	/

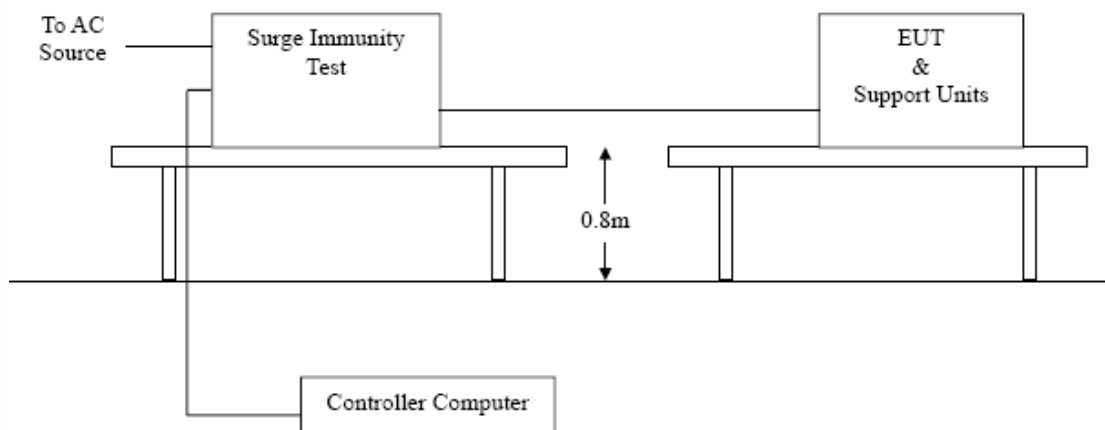
Test Result: Pass

## 8.4 Surge Immunity Test

### 8.4.1 Test Specification

Basic Standard :	IEC/EN 61000-4-5
Test Level:	±1 kV (Line to Line) for AC Power Line ±2 kV (Line(s) to Ground) for AC Power Line ±1 kV for unshielded unsymmetrically operated interconnection lines (If applicable)
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8/20 us Short Circuit Current
Generator Impedance:	42 ohm between signal line and ground 2 ohm between networks
Phase Angle:	0° /90°/180°/270°
Pulse Repetition Rate:	1 time / min
Number of Tests:	5 positive and 5 negative at selected points
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode

### 8.4.2 Test Setup



### 8.4.3 Test Procedure

1. For EUT power supply:

The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

2. For test applied to unshielded unsymmetrically operated interconnection lines of EUT: (If applicable)

The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

### 8.4.4 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC009	Fast Transient Burst Generator	SCHAFFNER	MODULA6150	34572	2018-08-13	2019-08-12

### 8.4.5 Performance Criterion Required & Test Result

Voltage	Test Points	Observation Performance	Criterion Required
±1kV	L-N	A	B
±1kV	L-N	A	B
±2kV	L-PE, N-PE	A	B
±4kV	L-N, L-PE, N-PE	A	B
±1kV	Control Line	/	/
±1kV	DSL (RJ11)	/	/
±1kV	LAN (RJ45)	/	/

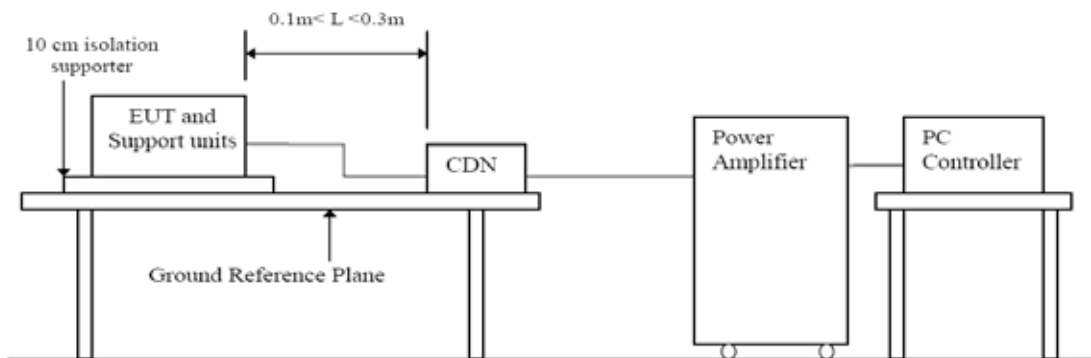
Test Result: Pass

## 8.5 Conducted Susceptibility Test

### 8.5.1 Test Specification

Basic Standard:	IEC/EN 61000-4-6
Test Level:	10Vr.m.s
Frequency Range:	0.15~80MHz (MHz)
Modulation:	Amplitude 80%, 1kHz sinewave
Frequency Step:	1 % of preceding frequency value
Temperature:	22~23 ( °C )
Humidity:	50~54 ( %RH )
Barometric Pressure:	950~1000 ( mbar )
Operating Mode:	Inversion mode

### 8.5.2 Test Setup



### 8.5.3 Test Procedure

1. The test was performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
2. The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was  $1.5 \times 10^{-3}$  decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

3. The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.
4. Attempts was made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

#### 8.5.4 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	HCT-EMC026	RF POWER AMPLIFIER	FRANKONIA	FLL-75	1020A1109	2018-08-13	2019-08-12
2	HCT-EMC027	CDN	FRANKONIA	CDN M2+M3	A3027019	2018-08-13	2019-08-12
3	HCT-EMC029	6DB Attenuator	FRANKONIA	75-A-FFN-06	1001698	2018-08-13	2019-08-12
4	HCT-EMC030	EM Injection clamp	FCC	F-203I-23mm	091536	2018-08-13	2019-08-12

#### 8.5.5 Performance Criterion Required & Test Result

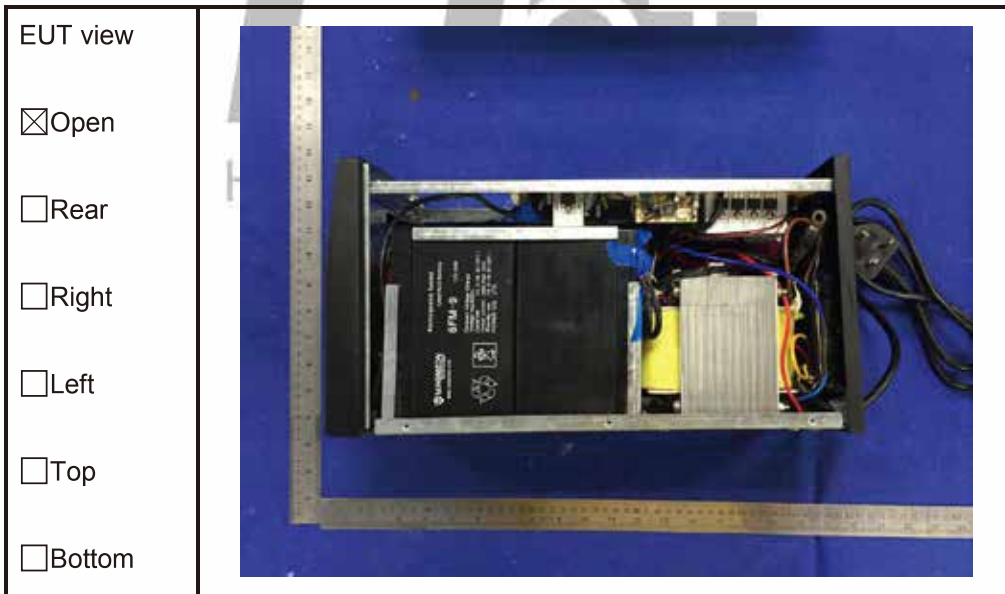
Frequency Band (MHz)	Voltage (Vrms)	Test Points	Observation Performance	Criterion Required
0.15-80	10	AC Line	A	B

Test Result: Pass

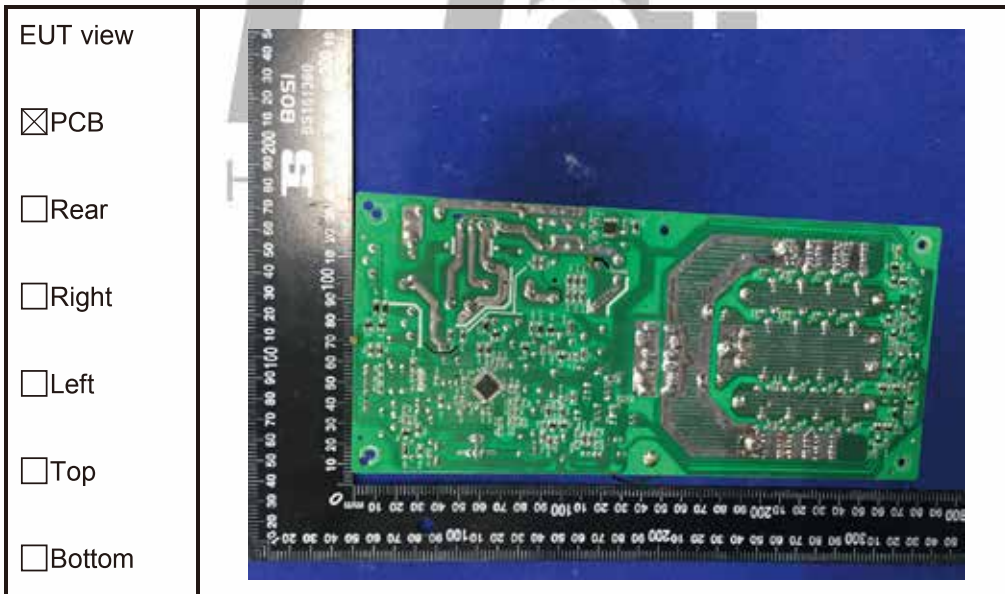
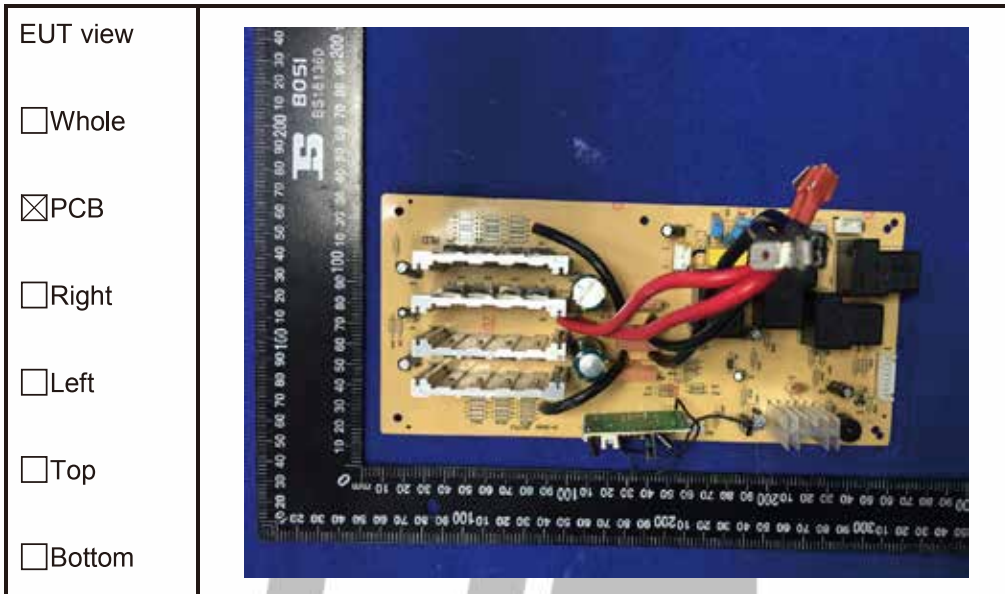
## APPENDIX A - EUT PHOTOGRAPHS













## APPENDIX B - TEST SETUP PHOTOGRAPHS

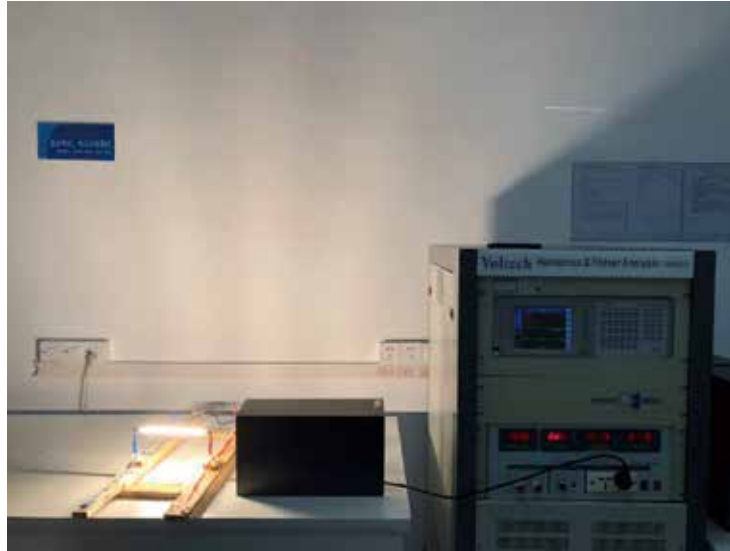
### Conducted Disturbance at The Mains Terminals



### Radiated Emission



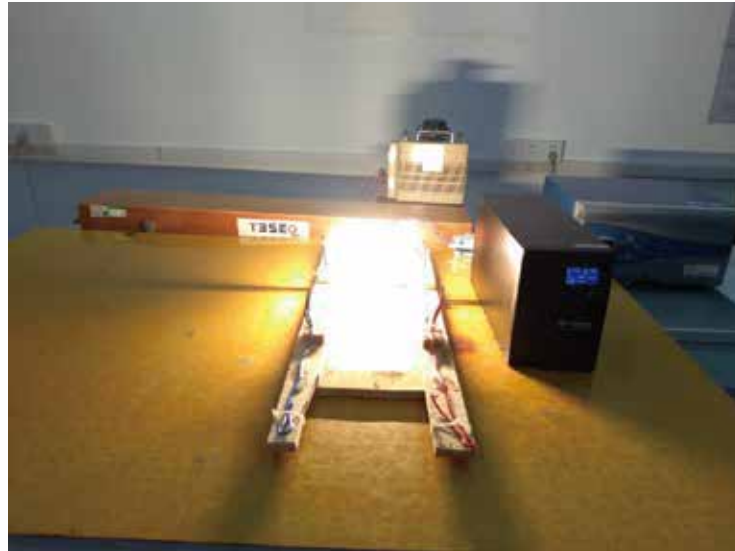
**Harmonic Current Test / Voltage Fluctuations And Flicker Test**



**Electrostatic Discharge Immunity Test**



**Electrical Fast Transient / Surge / Voltage Dips, Short Interruptions Immunity Test**



**Conducted Susceptibility Test for power port**

