



## EMC TEST REPORT

For

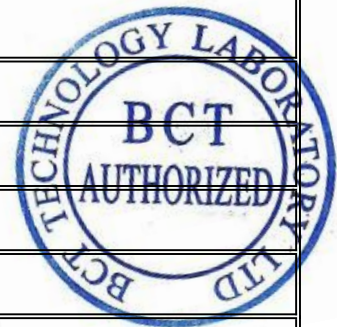
### Shenzhen Consnant Technology Co., Ltd.

Building B6, Junfeng Industrial Park, Yonghe Road, Fuhai Sub-District, Bao'an District,  
Shenzhen City, 518103 P.R.China.

Test Model: APF-150A

Additional Model No.: APF-30A, APF-50A, APF-75A, APF-100A, APF-200A

<b>Equipment Under Test</b>	: Active Power Filter
<b>Date of receipt of test sample</b>	: June 08, 2020
<b>Test Date</b>	: June 08, 2020 - June 17, 2020
<b>Issue Date</b>	: June 20, 2023
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**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 BCT Technology Co., Ltd.

**TABLE OF CONTENTS**

<b>1. GENERAL INFORMATION.....</b>	<b>4</b>
1.1. Product Description for Equipment Under Test (EUT) .....	4
1.2. Test Standards .....	4
1.3. Description of Test Facility .....	5
1.4. Support equipment List .....	5
1.5. External I/O .....	5
1.6. Description Of Test Modes .....	5
1.7. List Of Measuring Equipment .....	6
<b>2. SUMMARY OF TEST .....</b>	<b>8</b>
<b>3. RADIATED DISTURBANCES.....</b>	<b>9</b>
3.1 Measurement Uncertainty.....	9
3.2 Limit of Radiated Disturbances.....	9
3.3 EUT Setup.....	9
3.4 Test Receiver Setup .....	9
3.5 Test Procedure.....	9
3.6 Corrected Amplitude & Margin Calculation .....	10
3.7 Disturbance power Test Result.....	10
<b>4.CONDUCTED DISTURBANCES.....</b>	<b>12</b>
4.1 Measurement Uncertainty.....	12
4.2 Limit of Conducted Disturbances.....	12
4.3 EUT Setup.....	12
4.4 Instrument Setup .....	12
4.5 Test Procedure.....	13
4.6 Summary of Test Results .....	13
4.7Test Result.....	13
<b>5. HARMONIC CURRENT EMISSIONS .....</b>	<b>15</b>
5.1. Test Configuration .....	15
5.2. Test Standard .....	15
5.3. Test Data .....	15
<b>6. VOLTAGE FLUCTUATION AND FLICKER .....</b>	<b>16</b>
6.1. Test Configuration .....	16
6.2. Test Standard .....	16
6.3. Test Data .....	16
<b>7. PERFORMANCE CRITERIA.....</b>	<b>17</b>
7.1. General performance criteria .....	17
7.2. Performance criteria A .....	17
7.3. Performance criteria B .....	17
7.4. Performance criteria C .....	17
<b>8. CONTINUOUS RADIO FREQUENCY DISTURBANCE.....</b>	<b>18</b>
8.1. Test Configuration .....	18
8.2. Test Standard .....	18
8.3. Severity Level .....	18
8.4. Test Procedure .....	19
8.5. Test Result .....	19

<b>9. ELECTROSTATIC DISCHARGE (ESD)</b> .....	<b>20</b>
9.1. Test Configuration .....	20
9.2. Test Procedure .....	20
9.3. Test Data .....	21
<b>10. ELECTRICAL FAST TRANSIENTS(EFT)</b> .....	<b>22</b>
10.1. Test Configuration .....	22
10.2. Test Standard .....	22
10.3. Test Procedure .....	22
10.4. Test Data .....	23
<b>11. CONTINUOUS CONDUCTED DISTURBANCE</b> .....	<b>24</b>
11.1. Test Configuration .....	24
11.2. Test Standard .....	24
11.3. Test Procedure .....	24
11.4. Test Data.....	25
<b>12. SURGES</b> .....	<b>26</b>
12.1. Test Configuration .....	26
12.2. Test Standard .....	26
12.3. Test Procedure .....	26
12.4. Test Data .....	27
<b>13. VOLTAGE DIPS AND INTERRUPTIONS</b> .....	<b>28</b>
13.1. Test Configuration .....	28
13.2. Test Standard .....	28
13.3. Test Procedure .....	28
13.4. Test Data .....	29
<b>APPENDIX A - PRODUCT LABELING</b> .....	<b>30</b>
<b>APPENDIX B - EUT EXTERIOR AND INTERIOR PHOTOGRAPHS</b> .....	<b>31</b>

## 1. GENERAL INFORMATION

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

#### Client Information

Applicant: Shenzhen Consnant Technology Co., Ltd.  
Address of applicant: Building B6, Junfeng Industrial Park, Yonghe Road, Fuhai  
Sub-District, Bao'an District, Shenzhen City, 518103 P.R.China.  
Manufacturer: Shenzhen Consnant Technology Co., Ltd.  
Address of manufacturer: Building B6, Junfeng Industrial Park, Yonghe Road, Fuhai  
Sub-District, Bao'an District, Shenzhen City, 518103 P.R.China.

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

EUT Description: Active Power Filter  
Trade Name: CONSNANT  
EUT Model No.: APF-150A  
Supplementary Model: APF-30A, APF-50A, APF-75A, APF-100A, APF-200A  
Remark: supplementary models are only different in exterior with tested  
Model and with the same circuit construction.  
Power Supply: Input: AC400V, 50Hz, 150A, 100kvar

*Note: This Report is based on report **BCT200608R-005EA**, In addition to the applicant's name and address, no further test need.*

### 1.2 Test Standards

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

EN IEC 61000-6-4:2019

EN IEC 61000-6-2:2019

EN 61000-4-13: 2002+A2: 2016

IEC 61000-3-11: 2017

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

### 1.3 Description of Test Facility

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

EMC Lab. Description: There is one 10m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 22/EN 61000 requirements.

Name of Firm : CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.  
 Site Location : Electronic Testing Building, No.43 ShaHe Road, XiLi Street, Nanshan District, Shenzhen, GuangDong, China

Instrument Tolerance: All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.

### 1.4. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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### 1.5. External I/O

I/O Port Description	Quantity	Cable
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### 1.6. Description Of Test Modes

There was 1 test Modes.

**TM1** : No-load Mode

**TM2** :

\*\*\*Note: All test modes were tested, but we only recorded the worst case in this report.

## 1.7. List Of Measuring Equipment

Table 1: Test Equipment for Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
Spectrum Analyzer	ANRITSU	MS2651B	6200238856	2023.05.06	1 year
EMI Test Receiver	ROHDE&SCHWARZ	ESCS30	100307	2023.05.06	1 year
LISN	ROHDE&SCHWARZ	ESH3-Z5	100305	2023.05.06	1 year
Pulse Limiter	ROHDE&SCHWARZ	ESH3-Z2	100305	2023.05.06	1 year
Bilog Antenna	SCHWARZBECK	VULB 9163	9163-194	2023.05.06	1 year
50 $\Omega$ Coaxial Switch	ANRITSU CORP	MP59B	6200283933	2023.05.06	1 year
Power Clamp	ROHDE&SCHWARZ	MDS21	100142	2023.05.06	1 year
Loop Antenna	Laplace Instrument Ltd	RF300	8006	2023.05.06	1 year
Cable	Resenberger	N/A	NO.1	N/A	N/A
Cable	SCHWARZBECK	N/A	NO.2	N/A	N/A
Cable	SCHWARZBECK	N/A	NO.3	N/A	N/A
DC Power Filter	DuoJi	DL2 $\times$ 30B	N/A	N/A	N/A
Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	N/A	N/A
3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	N/A	N/A
AC Power Source	California Instruments	5001iX-400	55689	2023.05.06	1 year
Test analyzer	California Instruments	PACS-1	72254	2023.05.06	1 year

Table 2: Test Equipment for Immunity Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
ESD Tester	HAEFELY	PESD 1610	H4001552	2023.05.07	1 year
EMC PRO System	Thermo	PRO-BASE	0403271	2023.05.07	1 year
Capacitive Clamp	Thermo	PRO-CCL	0403272	2023.05.07	1 year
Coupler decoupler for telecom lines	Thermo	CM-TEL-CD	0403273	2023.05.07	1 year
Magnetic field Tester	HAEFELY	MAG 100	150577	2023.05.07	1 year
AC Transformer	CHOKUN	TDGC2J-5	N/A	2023.05.07	1 year
Signal Generator	IFR	2032	203002/100	2023.05.07	1 year
Amplifier	AR	150W1000	301584	2023.05.07	1 year
Dual Directional Coupler	AR	DC6080	301508	2023.05.07	1 year
Power Head	AR	PH2000	301193	2023.05.08	1 year
Power Meter	AR	PM2002	302799	2023.05.08	1 year
Transmitting Antenna	AR	AT1080	28570	2023.05.08	1 year
Simulator	EMTEST	CWS 500C	0900-12	2023.05.08	1 year
CDN	EMTEST	CDN-M2	510010010010	2023.05.08	1 year
CDN	EMTEST	CDN-M3	0900-11	2023.05.08	1 year
Injection Clamp	EMTEST	F-2031-23MM	368	2023.05.08	1 year
Attenuator	EMTEST	ATT 6	0010222A	2023.05.08	1 year

## 2. SUMMARY OF TEST

For the EUT described above.

Table 1: Tests Carried Out Under EN IEC 61000-6-4:2019

Standard	Test Items	Status
EN IEC 61000-6-4:2019	Conducted Emissions at Mains Terminals (150kHz-30MHz)	√
	Radiated Emissions (30MHz-1GHz)	√

- √ Indicates that the test is applicable  
 × Indicates that the test is not applicable

Table 2: Tests Carried Out Under EN IEC 61000-6-2:2019

Standard	Test Items	Status
EN61000-4-2: 2009	Electrostatic Discharge	√
EN 61000-4-3:2006+A1:2008 +A2:2010	Radiated Immunity (80MHz-2.7GHz)	√
EN61000-4-4: 2012	Electrical Fast Transients/Burst at Power Port	√
EN61000-4-5: 2014	Surge at Power Port	√
EN61000-4-6: 2014	Conducted Immunity at Power Port (150kHz-80MHz)	√
EN61000-4-11:2004	Voltage Dips and Interruptions	√

- √ Indicates that the test is applicable  
 × Indicates that the test is not applicable

Table 3: Tests Carried Out Under EN 61000-4-13: 2002+A2: 2016 & IEC 61000-3-11: 2017

Standard	Test Items	Status
IEC 61000-4-13	Harmonic Current Emission	√
IEC 61000-3-11: 2017	Voltage Fluctuations and Flicker	√

- √ Indicates that the test is applicable  
 × Indicates that the test is not applicable

**Note:**

*This product is beyond the standard requirements, so refer to EN 61000-3-2 & EN 61000-3-3, and make the evaluation test results according to the customer requirements, meeting the requirements.*



### 3. RADIATED DISTURBANCES

#### 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, 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.

#### 3.2 Limit of Radiated Disturbances

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30-230	10	40
230 ~ 1000	10	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.  
 (2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

#### 3.3 EUT Setup

The radiated emission tests were performed in the open area 10-meter test site, using the setup accordance with the CISPR 16-2-3 measurement procedure. The specification used was EN IEC 61000-6-4:2019 Clause 7 Radiation Disturbances Limit.

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.

#### 3.4 Test Receiver Setup

According to EN IEC 61000-6-4:2019 rules, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak

IF Band Width.....120 KHz

Frequency Range.....30MHz to 1000MHz

Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m

Polarity.....Horizontal and Vertical

### 3.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

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.

### 3.6 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:

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

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:

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

### 3.7 Disturbance power Test Result

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	Active Power Filter
M/N	APF-150A
Operating Mode	Operating

Remark:

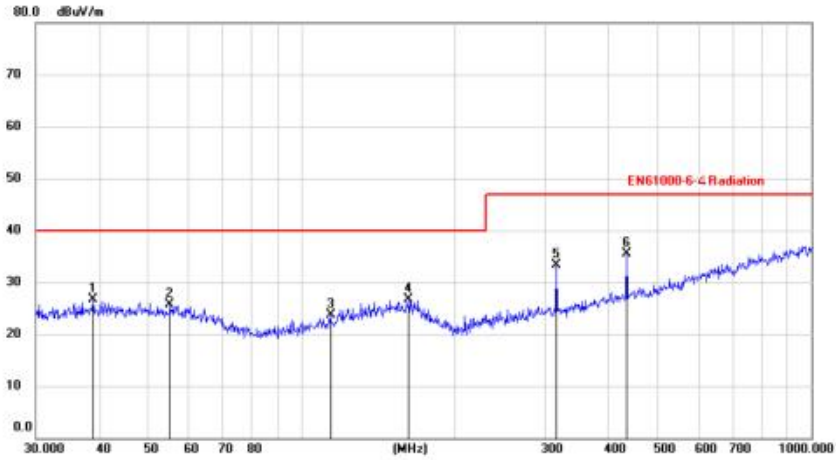
(1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded. (2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

Test data see following pages:

**Test Result: PASS**

**Vertical:**

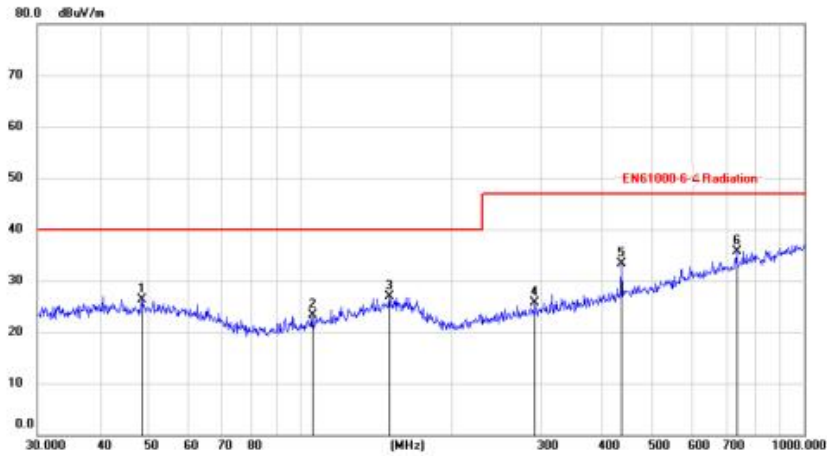
**Radiated Emission Measurement**



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Comment
1	39.0245	12.55	14.20	26.75	40.00	-13.25	peak		
2	55.0274	12.39	13.25	25.64	40.00	-14.36	peak		
3	113.7143	11.76	11.91	23.67	40.00	-16.33	peak		
4	162.6106	12.38	14.37	26.75	40.00	-13.25	peak		
5	316.5890	19.57	13.79	33.36	47.00	-13.64	peak		
6 *	434.0651	19.16	16.37	35.53	47.00	-11.47	peak		

**Horizontal:**

**Radiated Emission Measurement**



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Comment
1	48.5016	12.67	13.66	26.33	40.00	-13.67	peak		
2	105.2718	12.12	11.09	23.21	40.00	-16.79	peak		
3	150.0108	12.30	14.55	26.85	40.00	-13.15	peak		
4	292.0583	12.56	13.20	25.76	47.00	-21.24	peak		
5	434.0651	16.86	16.37	33.23	47.00	-13.77	peak		
6 *	734.4913	14.34	21.30	35.64	47.00	-11.36	peak		

## 4. CONDUCTED 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, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is +2.4 dB.

### 4.2. Limit of Conducted Disturbances

Frequency Range (MHz)	Limits ( dBuV)	
	Quasi-Peak	Average
0.150~0.500	79	66
0.500~30.00	73	60

### 4.3. EUT Setup

The setup of EUT is according with CISPR 16-2-1 measurement procedure. The specification used was the EN IEC 61000-6-4:2019 limits.

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

The 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.

### 4.4. 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

#### 4.5. Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

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**".

#### 4.6. Summary of Test Results

According to the data in section 3.6, the EUT complied with the EN IEC 61000-6-4:2019 Conducted margin, with the worst margin reading of:

##### EUT Configuration on Test

Active Power Filter

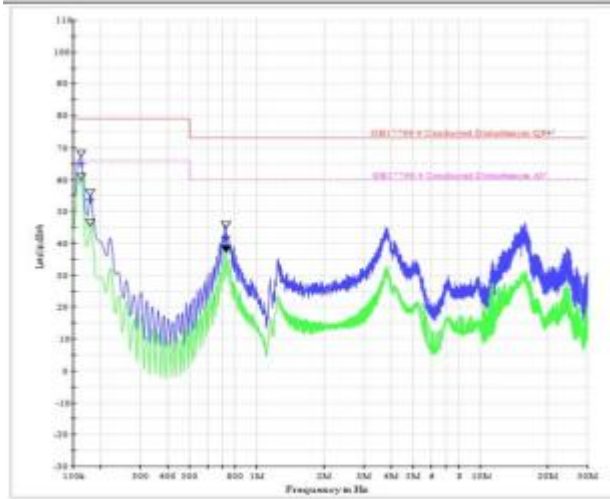
Model Number : APF-150A

Applicant : Shenzhen Consnant Technology Co., Ltd.

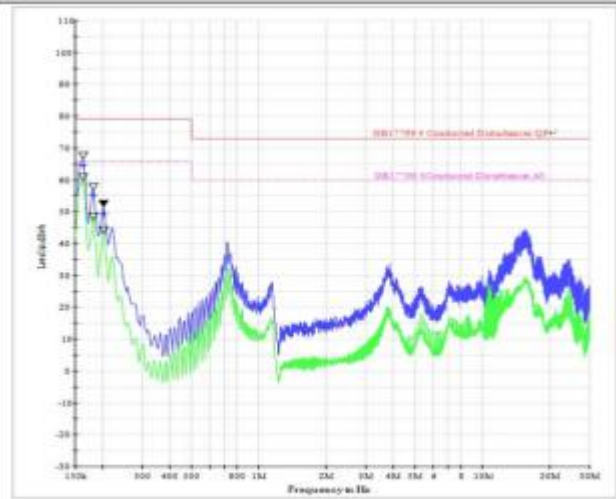
#### 4.7. Test Result

Please refer to the following pages.

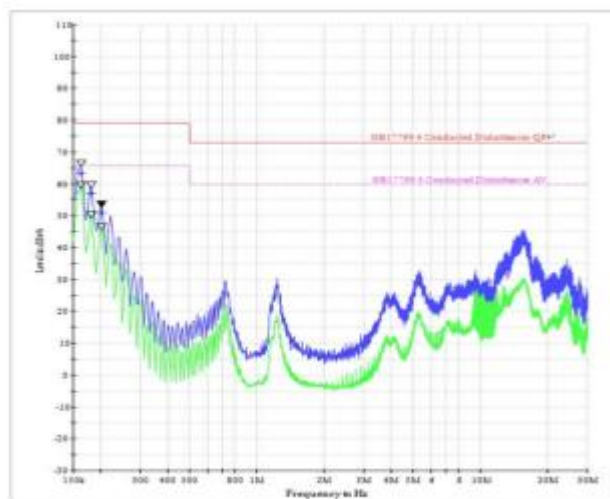
**Test Result: PASS**



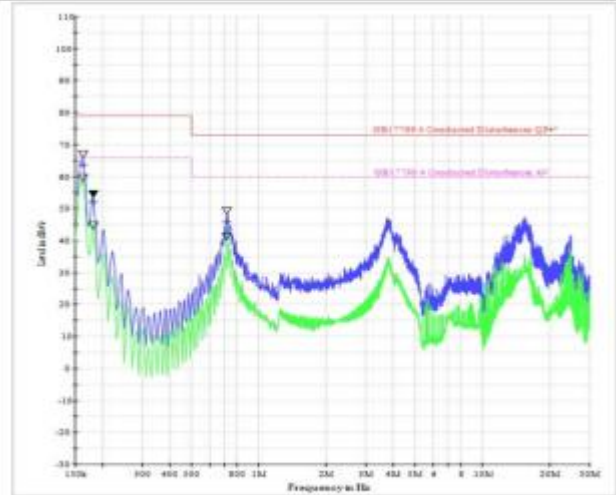
L1



L2



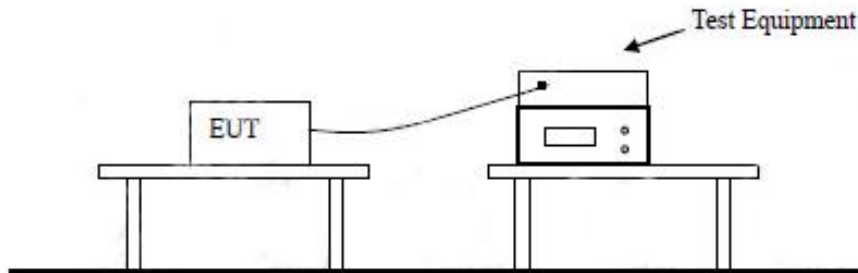
L3



N

## 5. HARMONIC CURRENT EMISSIONS

### 5.1 Test Configuration



### 5.2 Test Standard

According to EN 61000-4-13: 2002+A2: 2016 & EN 61000-3-2: 2014

### 5.3 Test Data

Overall Result:	<b>PASS</b>
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Class	Class A
Class Multiplier	1

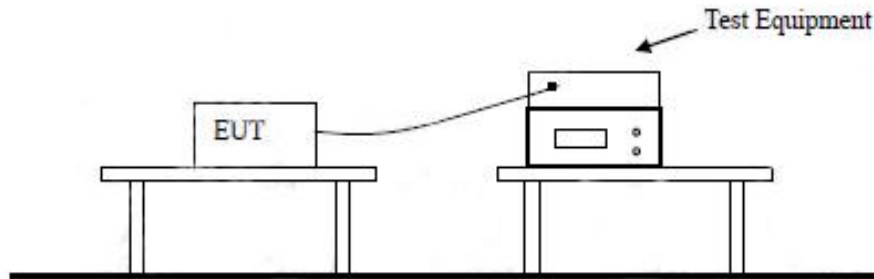
Har	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL	Har	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL
2	1.0800A	1.6200A	3.515mA	N/A	3.783mA	N/A	N/A	3	2.3000A	3.4500A	196.6mA	✓✓	197.3mA	✓	Pass
4	430.0mA	645.0mA	3.695mA	N/A	3.956mA	N/A	N/A	5	1.1400A	1.7100A	179.4mA	✓✓	179.9mA	✓	Pass
6	300.0mA	450.0mA	3.877mA	N/A	4.110mA	N/A	N/A	7	770.0mA	1.1050A	196.0mA	✓✓	196.3mA	✓	Pass
8	230.0mA	345.0mA	3.979mA	N/A	4.180mA	N/A	N/A	9	400.0mA	600.0mA	128.9mA	✓✓	129.4mA	✓	Pass
10	184.0mA	276.0mA	3.948mA	N/A	4.177mA	N/A	N/A	11	330.0mA	495.0mA	101.2mA	✓✓	101.9mA	✓	Pass
12	153.3mA	230.0mA	3.830mA	N/A	4.040mA	N/A	N/A	13	210.0mA	315.0mA	75.91mA	✓✓	76.77mA	✓	Pass
14	131.4mA	197.1mA	3.638mA	N/A	3.846mA	N/A	N/A	15	180.0mA	225.0mA	55.98mA	✓✓	56.80mA	✓	Pass
16	115.0mA	172.5mA	3.465mA	N/A	3.645mA	N/A	N/A	17	132.3mA	198.5mA	43.21mA	✓✓	43.96mA	✓	Pass
18	102.2mA	153.3mA	3.328mA	N/A	3.501mA	N/A	N/A	19	118.4mA	177.6mA	37.09mA	✓✓	37.73mA	✓	Pass
20	82.00mA	123.0mA	3.231mA	N/A	3.407mA	N/A	N/A	21	107.1mA	160.7mA	34.11mA	✓✓	34.65mA	✓	Pass
22	83.63mA	125.4mA	3.152mA	N/A	3.347mA	N/A	N/A	23	87.82mA	146.7mA	31.06mA	✓✓	31.57mA	✓	Pass
24	76.66mA	115.0mA	3.049mA	N/A	3.234mA	N/A	N/A	25	90.00mA	135.0mA	28.96mA	✓✓	27.48mA	✓	Pass
26	70.76mA	106.1mA	2.907mA	N/A	3.077mA	N/A	N/A	27	83.33mA	125.0mA	22.54mA	✓✓	23.08mA	✓	Pass
28	65.71mA	98.57mA	2.766mA	N/A	2.924mA	N/A	N/A	29	77.58mA	116.3mA	18.45mA	✓✓	18.91mA	✓	Pass
30	61.33mA	92.00mA	2.630mA	N/A	2.774mA	N/A	N/A	31	72.56mA	108.8mA	15.97mA	✓✓	16.27mA	✓	Pass
32	57.50mA	86.25mA	2.501mA	N/A	2.650mA	N/A	N/A	33	68.16mA	102.2mA	14.82mA	✓✓	15.04mA	✓	Pass
34	54.11mA	81.17mA	2.378mA	N/A	2.500mA	N/A	N/A	35	64.28mA	96.42mA	13.94mA	✓✓	14.14mA	✓	Pass
36	51.11mA	76.66mA	2.222mA	N/A	2.333mA	N/A	N/A	37	60.81mA	91.21mA	12.93mA	✓✓	13.14mA	✓	Pass
38	48.42mA	72.63mA	2.066mA	N/A	2.153mA	N/A	N/A	39	57.69mA	86.53mA	11.25mA	✓✓	11.48mA	✓	Pass
40	46.00mA	69.00mA	1.883mA	N/A	1.980mA	N/A	N/A								

<L1 : Reading is below limit 1.  
 <L2 : Reading is below limit 2.  
 N/A : Harmonic current below 0.6% of rated current or 5mA, whichever is greater, are disregarded.



## 6. VOLTAGE FLUCTUATIONS AND FLICKER TEST

### 6.1 Test Configuration



### 6.2 Test Standard

According to IEC 61000-3-11: 2017 & EN 61000-3-3: 2013

### 6.3 Test Data

Voltech IEC61000-3 Windows Software 1.24.12				
Type of Test:	Flickermeter Test - Table			
Power Analyzer:	Voltech PM6000 SN: 200006700495 Firmware Version: v1.22.07RC6			
Channel(s):	1. SN: 090015501951, 28 Adjusted Date: 16 APR 2013. 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None			
Shunt(s):	1. SN: 091024301771, 4 Adjusted Date: 16 APR 2013. 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None			
AC Source:	Mains / Manual Source			
Overall Result:	Notes: Measurement method - Voltage			
<b>PASS</b>				
	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	6.000	500
Reading 1	0.248	0.000	1.254	0



## **7. PERFORMANCE CRITERIA**

### **7.1 General performance criteria**

The manufacturer has the obligation to express the performance criteria in terms which relate to the performance of his specific product when used as intended.

The following performance criteria are applicable, and shall only be evaluated when the functions referred to are implemented.

### **7.2 Performance criteria A**

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended.

### **7.3 Performance criteria B**

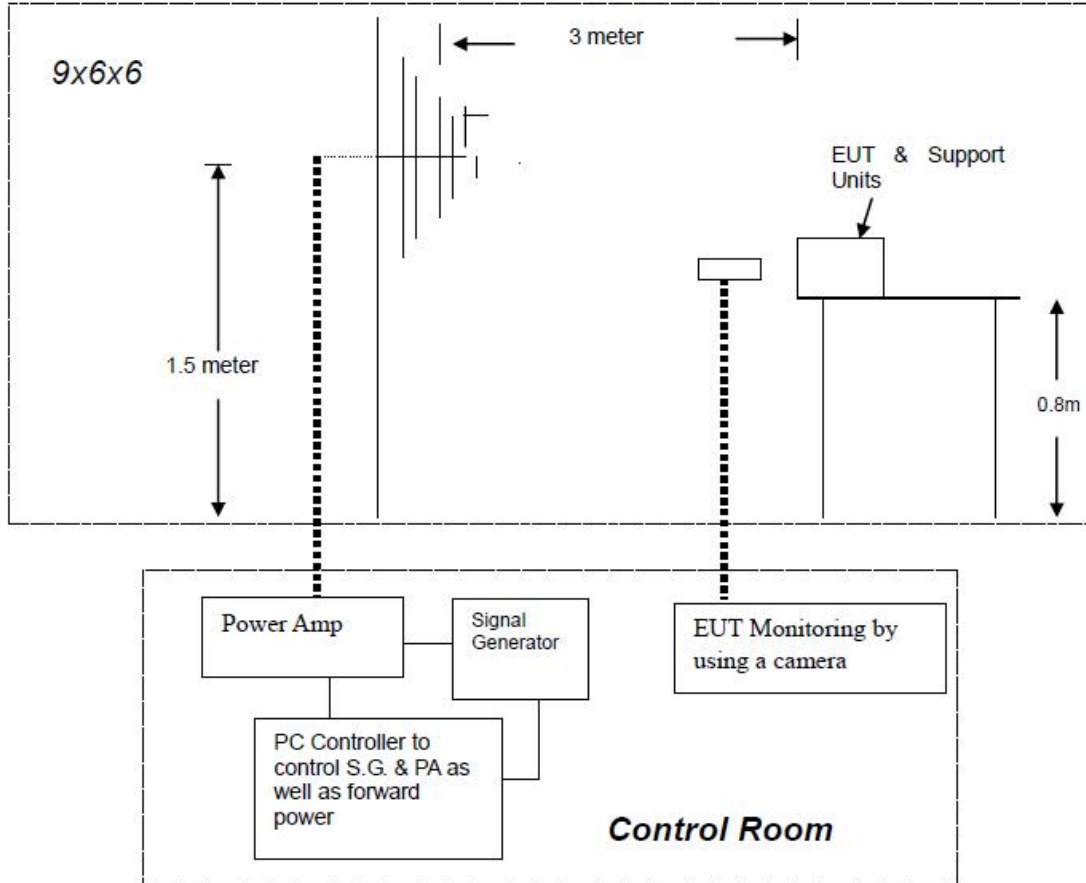
After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

### **7.4 Performance criteria C**

During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.

## 8. CONTINUOUS RADIO FREQUENCY DISTURBANCE

### 8.1 Test Configuration



### 8.2 Test Standard

EN 61000-4-3:2006 +A1:2008+A2:2010/ IEC 61000-4-3

Test level 3 at 10V / m. Test level 2 at 3V / m. Test level 1 at 1V / m.

### 8.3 Severity Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

**Performance criterion: A**

## 8.4 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen. All the scanning conditions are as follows:

Frequency Range: 80MHz to 1GHz, 1.4GHz to 2GHz, 2GHz to 2.7GHz

Antenna Polarisation: Vertical and Horizontal

Modulation: 1kHz,80% Amp. Mod,1% increment

## 8.5 Test Result

EUT Working Mode	Antenna Polarity	Frequency	Field Strength (V/m)	Position	Result (Pass/Fail)	
					Criterion A	Pass
No-Load Mode	Vertical	80MHz-1GHz	10	Front, Right, Left, Back	Criterion A	Pass
	Horizontal	80MHz-1GHz	10	Front, Right, Left, Back	Criterion A	Pass
	Vertical	1.4GHz-2GHz	3	Front, Right, Left, Back	Criterion A	Pass
	Horizontal	1.4GHz-2GHz	3	Front, Right, Left, Back	Criterion A	Pass
	Vertical	2GHz-2.7GHz	1	Front, Right, Left, Back	Criterion A	Pass
	Horizontal	2GHz-2.7GHz	1	Front, Right, Left, Back	Criterion A	Pass

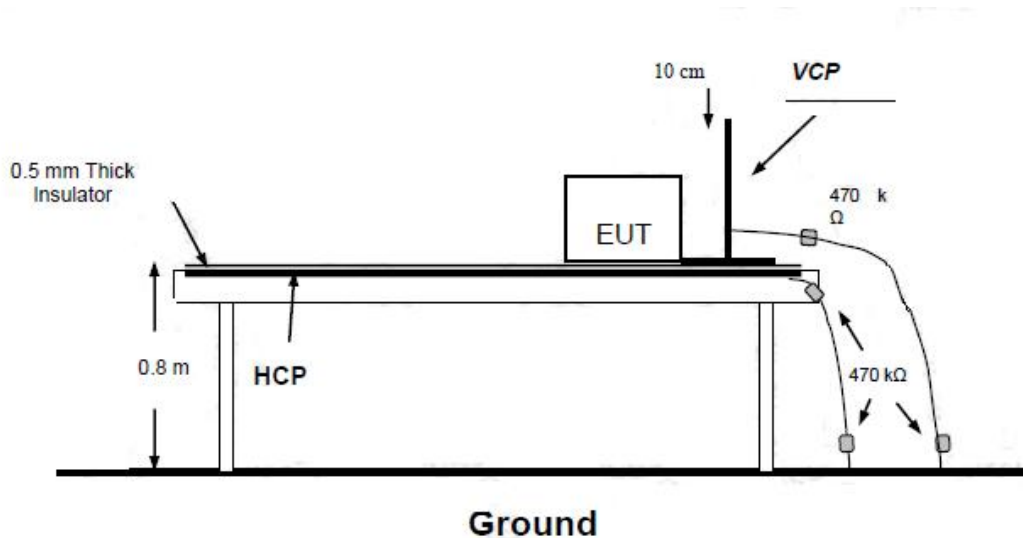
Note: Unintentional transmission is not founded from the EUT.

N/A: Not applicable

## 9. ELECTROSTATIC DISCHARGE (ESD)

Please refer to EN 61000-4-2/ IEC 61000-4-2.

### 9.1 Test Configuration



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.5 by 1.0-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

### 9.2 Test Procedure

EN 61000-4-2: 2009

Test level 3 for Air Discharge at  $\pm 8$  kV

Test level 2 for Contact Discharge at  $\pm 4$  kV

#### 9.2.1. Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

**9.2.2. Contact Discharge**

All the procedure shall be same as Section 9.2.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

**9.2.3. Indirect Discharge For Horizontal Coupling Plane**

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

**9.2.4. Indirect Discharge For Vertical Coupling Plane**

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

**9.3 Test Data**

**Pass.**

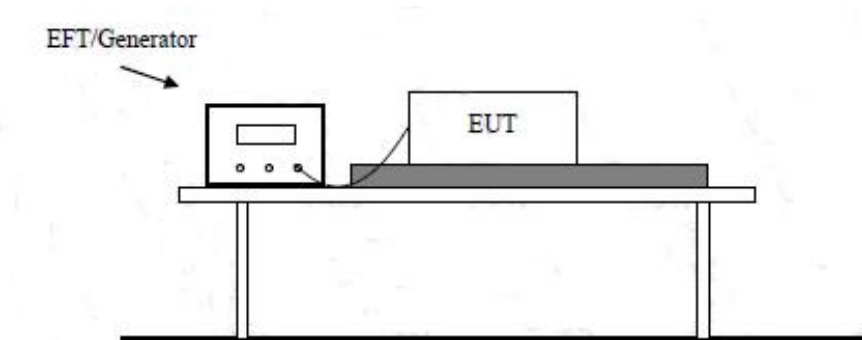
Test Result of TM1			
Test Voltage	Coupling	Result (Pass/Fail)	
±2KV, ±4kV	Contact Discharge	Criterion B	Pass
±2KV, ±4kV, ±8kV	Air Discharge	Criterion B	Pass
±2KV, ±4kV	Indirect Discharge HCP	Criterion B	Pass
±2KV, ±4kV	Indirect Discharge VCP	Criterion B	Pass

Note: The EUT performance complied with performance criteria A and there is no any degradation of performance and function.

N/A: Not applicable.

## 10. ELECTRICAL FAST TRANSIENTS(EFT)

### 10.1. Test Configuration



### 10.2. Test Standard

EN61000-4-4: 2012/ IEC 61000-4-4

Test level 3 at 2 kV

Test level

	Open Circuit Output Test Voltage $\pm 10\%$	
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5KV	0.25KV
2	1KV	0.5KV
3	2KV	1KV
4	4KV	2KV
X	Special	Special

Performance criterion: B

### 10.3. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.3.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

10.3.2.For signal lines and control lines ports: No I/O ports. It's unnecessary to test.

10.3.3.For DC output line ports: It's unnecessary to test.

#### 10.4. Test Data

**PASS.**

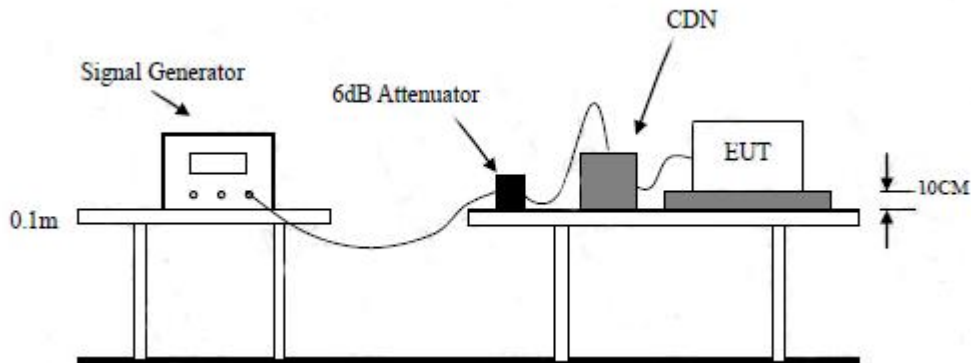
Test Result of TM1				
Coupling line	Test Voltage	Minimum requirement	Result (Pass/Fail)	
Signal Power port	±0.5KV	Criterion B	Criterion B	N/A
DC port	±0.5KV	Criterion B	Criterion B	N/A
AC port	±2KV	Criterion B	Criterion B	Pass

Note:

N/A: Not applicable.

## 11. CONTINUOUS CONDUCTED DISTURBANCE

### 11.1. Test Configuration



### 11.2. Test Standard

EN 61000-4-6: 2014/ IEC 61000-4-6  
 Test level 3 at 10 V (r.m.s.), 0.15 MHz ~ 80 MHz,  
 Modulation type: Amplitude Modulation  
 Modulation depth: 80%  
 Modulation signal: 1 kHz

#### Test level

Level	Voltage Level (r.m.s..) (V)
1	1
2	3
3	10
X	Special

#### Performance criterion: A

### 11.3. Test Procedure

11.3.1. Let the EUT work in test mode and test it.

11.3.2. The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

11.3.3. The disturbance signal described below is injected to EUT through CDN.



11.3.4. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

11.3.5. The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

11.3.6. The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

11.3.7. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

#### 11.4. Test Data

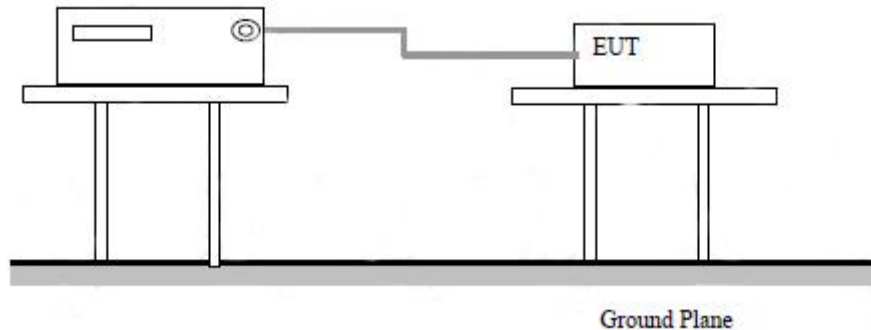
**PASS.**

Test Result of TM1				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result (Pass/Fail)	
0.15-80	AC power port	10V	Criterion A	Pass
Remark: 1. Modulation Signal:1kHz 80% Amplitude Modulation.				

N/A: Not applicable.

## 12. SURGES

### 12.1. Test Configuration



### 12.2. Test Standard

EN 61000-4-5: 2014

L-N: Test level 2 at 1 kV

L-PE, N-PE Test Level 3 at 2kV

#### Test level

	Open Circuit Output Test Voltage $\pm 10\%$	
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5KV	0.25KV
2	1KV	0.5KV
3	2KV	1KV
4	4KV	2KV
X	Special	Special

Performance criterion: B

### 12.3. Test Procedure

12.3.1. For line to line coupling mode, provide a 1 kV 1.2/50us voltage surge (at open-circuit condition). For signal port, provide a 6 kV 10us/700us voltage surge.

12.3.2. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

12.3.3. Different phase angles are done individually.

12.3.4. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

**12.4. Test Data**

**PASS.**

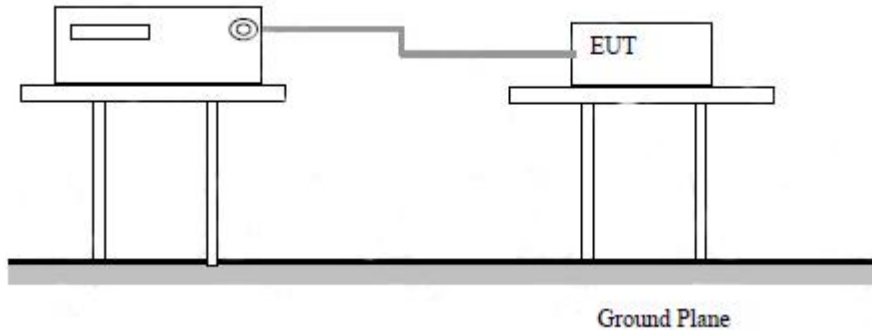
<b>Main power port</b>					
Mode	Open-circuit test voltage	Phase Angle	Number of Pulse	Result (Pass/Fail)	
L-N	±0.5KV	0° ,90° , 180° ,270°	5	Criterion A	Pass
L-N	±1KV	0° ,90° , 180° ,270°	5	Criterion A	Pass
L-PE, N-PE	±2KV	0° ,90° , 180° ,270°	5	Criterion A	Pass
L-N, L-PE, N-PE	±4KV	0° ,90° , 180° ,270°	5	Criterion A	Pass
<b>DC power port &amp; Signal port</b>					
Mode	Open-circuit test voltage	Phase Angle	Number of Pulse	Result (Pass/Fail)	
+ to - + to PE - to PE	±0.5KV	0° ,90° , 180° ,270°	5	Criterion A	N/A
<b>Signal port</b>					
Mode	Open-circuit test voltage	Phase Angle	Number of Pulse	Result (Pass/Fail)	
Line - PE	±0.5KV	0° ,90° , 180° ,270°	5	Criterion A	N/A
Line - PE	±1KV	0° ,90° , 180° ,270°	5	Criterion A	N/A
Line - PE	±6KV	0° ,90° , 180° ,270°	5	Criterion A	N/A

Note:

N/A: Not applicable.

## 13. VOLTAGE DIPS AND INTERRUPTIONS

### 13.1. Test Configuration



### 13.2. Test Standard

EN 61000-4-11: 2004

Test levels and Performance Criterion

#### Test level

Voltage Reduction $\%U_T$	Voltage dips $\%U_T$	Duration (in period)
100	0	0.5
100	0	1.0
30	70	25
Voltage Reduction $\%U_T$	Voltage dips $\%U_T$	Duration (in period)
100	0	250

Performance criterion: **B&C**

### 13.3. Test Procedure

13.3.1. The interruption is introduced at selected phase angles with specified duration.

13.3.2. Record any degradation of performance.

**13.4. Test Data****PASS.**

Test Result of TM1				
Test Level %U <sub>T</sub>	Voltage dip and short interruptions %U <sub>T</sub>	Duration (in period)	Result (Pass/Fail)	
0	100	0.5P	Criterion B	Pass
0	100	1.0P	Criterion B	Pass
70	30	25P	Criterion B	Pass
0	100	250P	Criterion C	Pass

Remark: The voltage was reduced during the test, but self-recoverable after the test.  
N/A: Not applicable.

**APPENDIX A - PRODUCT LABELING**

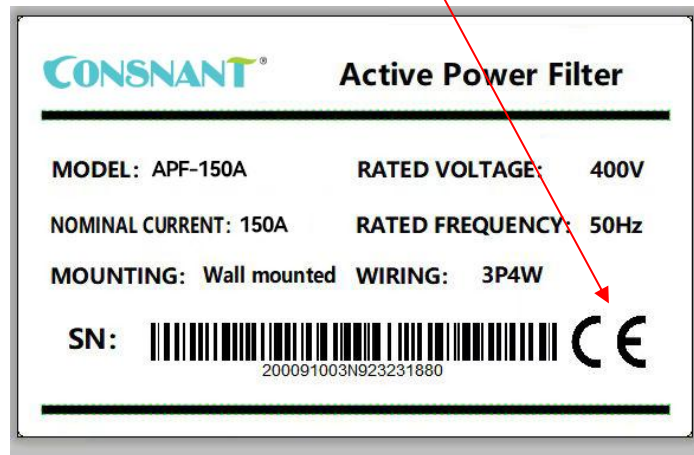
**CE Marking Label Specification**

Specification: Text 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.



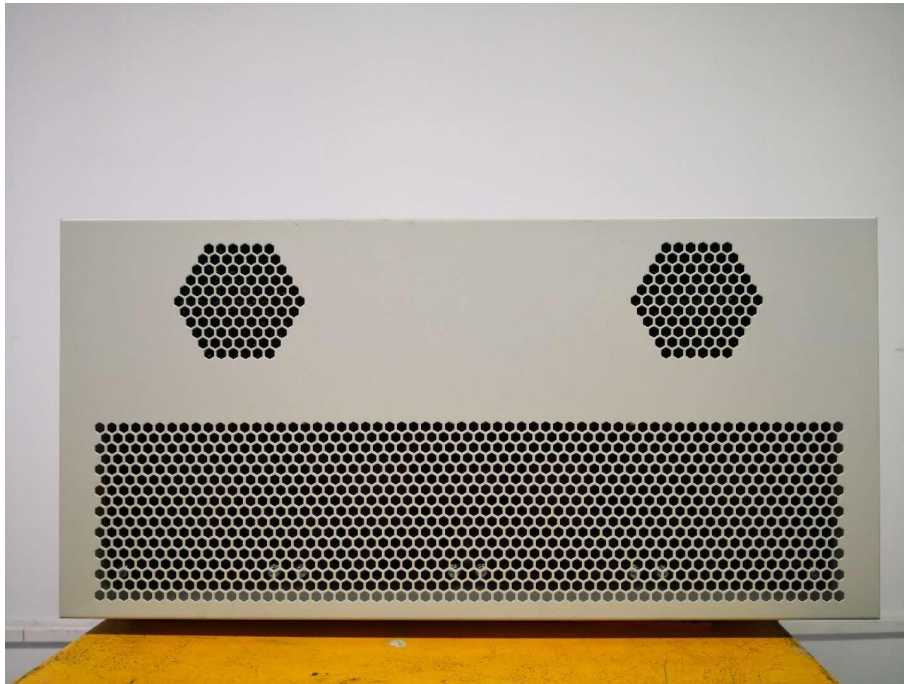
**Proposed Label Location on EUT**

CE marking Location



**APPENDIX B - EUT EXTERIOR AND INTERIOR PHOTOGRAPHS**









**--End Of The Report --**