

EN 55032: 2015&EN 55024: 2010+A1:2015
EN 61000-3-2: 2014&EN 61000-3-3: 2013+A1:2017

MEASUREMENT AND TEST REPORT

For

Shenzhen Shen Wangda Technology Co.,Ltd.

4th floor,buiding C, KeLunTe Low-carbonindustrial park, HuaRong Road, Longhua area,
ShenZhen

Model:

TBK588, TBK005, TBK006, TBK007, TBK008, TBK009, TBK218, TBK228, TBK238, TBK248,
TBK258, TBK268, TBK278, TBK288, TBK298, TBK318, TBK328, TBK338, TBK348, TBK358,
TBK368, TBK378, TBK388, TBK518, TBK528, TBK538, TBK548, TBK558, TBK568, TBK578,
TBK598, TBK918, TBK928, TBK938, TBK948, TBK958, TBK968, TBK978, TBK988, TBK998

May 31, 2019

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Refrigeration separator
Test Engineer: Jayson / <i>Jayson</i>	
Report Number: HY19ER-009E	
Test Date: May 21-31, 2019	
Reviewed By: Ivan / <i>Liu</i>	
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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 HuaYu Test Technology Co.,Ltd.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: **Shenzhen Shen Wangda Technology Co.,Ltd.**
Address of applicant: 4th floor,buiding C, KeLunTe Low-carbonindustrial park, HuaRong Road, Longhua area, ShenZhen
Manufacturer: **Shenzhen Shen Wangda Technology Co.,Ltd.**
Address of manufacturer: 4th floor,buiding C, KeLunTe Low-carbonindustrial park, HuaRong Road, Longhua area, ShenZhen

General Description of E.U.T

EUT Description: **Refrigeration separator**
Trademark: **TBK**
Model No.: **TBK588, TBK005, TBK006, TBK007, TBK008, TBK009, TBK218, TBK228, TBK238, TBK248, TBK258, TBK268, TBK278, TBK288, TBK298, TBK318, TBK328, TBK338, TBK348, TBK358, TBK368, TBK378, TBK388, TBK518, TBK528, TBK538, TBK548, TBK558, TBK568, TBK578, TBK598, TBK918, TBK928, TBK938, TBK948, TBK958, TBK968, TBK978, TBK988, TBK998**
Power Rating: 220VAC 50Hz/110VAC 60Hz 10A
Model difference: --

Remark: * *The test data gathered are from the production sample provided by the manufacturer.*

1.2 Test Standards

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

EN 55032: 2015

EN 55024: 2010+A1:2015

EN 61000-3-2: 2014

EN 61000-3-3: 2013+A1:2017

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

1.3 Test Summary

For the EUT described above. The standards used were EN 55032 Class B for Emissions & EN 55024 for Immunity.

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Table 1 : Tests Carried Out Under EN 55032: 2015

Standard	Test Items	Status
EN 55032: 2015	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	√
	Radiated Disturbances (30MHz To 1000MHz)	√

√ Indicates that the test is applicable

× Indicates that the test is not applicable

Table 2 : Tests Carried Out Under EN 61000-3-2: 20014/ EN 61000-3-3: 2013+A1:2017

Standard	Test Items	Status
EN 61000-3-2: 2014	Harmonic Current Test	√
EN 61000-3-3: 2013+A1:2017	Voltage Fluctuations and Flicker Test	√

√ Indicates that the test is applicable

× Indicates that the test is not applicable

Table 3 : Tests Carried Out Under EN 55024: 2010+A1:2015

Standard	Test Items	Status
EN61000-4-2	Electrostatic discharge Immunity	√
EN61000-4-3	Radiated Susceptibility (80MHz to 1GHz)	√
EN61000-4-4	Electrical Fast Transient/Burst Immunity	√
EN61000-4-5	Surge Immunity	√
EN61000-4-6	Conducted Susceptibility (150kHz to 80MHz)	√
EN61000-4-8	Power Frequency Magnetic Field Immunity (50/60Hz)	X
EN61000-4-11	Voltage Dips, Short Interruptions Immunity	√

√ 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: 2002, radio disturbance and immunity measuring apparatus, and CISPR16-2: 2002, Method of measurement of disturbances and immunity.

All measurement required was performed at Shenzhen HuaYu Test Technology Co.,Ltd.

1.5 Test Facility

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

FCC – Registration No.: 752058

Shenzhen HuaYu Test Technology Co.,Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752058, March, 2008.

Shenzhen HuaYu Test Technology Co.,Ltd.

1.6 Test Equipment List and Details

Test equipments list of Shenzhen HuaYu Test Technology Co.,Ltd..

Equipment	Manufacturer	Model No.	calibration date	calibration date
EMI Test Receiver	R&S	ESCI	2019-5-22	2020-5-21
EMI Test Receiver	R&S	ESPI	2019-5-22	2020-5-21
Amplifier	HP	8447D	2019-5-22	2020-5-21
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2019-5-22	2020-5-21
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2019-5-22	2020-5-21
Power Clamp	SCHWARZBECK	MDS-21	2019-5-22	2020-5-21
Positioning Controller	C&C	CC-C-1F	2019-5-22	2020-5-21
Electrostatic Discharge Simulator	TESEQ	NSG437	2019-5-22	2020-5-21
Fast Transient Burst Generator	SCHAFFNER	MODULA6150	2019-5-22	2020-5-21
Fast Transient Noise Simulator	Noiseken	FNS-105AX	2019-5-22	2020-5-21
Capacitive Coupling Clamp	TESEQ	CDN8014	2019-5-22	2020-5-21
High Field Bucolical Antenna	ELECTRO-METRICS	EM-6913	2019-5-22	2020-5-21
Log Periodic Antenna	ELECTRO-METRICS	EM-6950	2019-5-22	2020-5-21
Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	2019-5-22	2020-5-21
TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	2019-5-22	2020-5-21
Horn Antenna	SCHWARZBECK	BBHA9120A	2019-5-22	2020-5-21
Toe Line Single Phase Module	SCHWARZBECK	NSLK8128	2019-5-22	2020-5-21
10dB attenuator	SCHWARZBECK	MTAIMP-136	2019-5-22	2020-5-21
Electric Bridge	Zentech	100 LCR METER	2019-5-22	2020-5-21
RF Current Probe	FCC	F-33-4	2019-5-22	2020-5-21
SIGNAL GENERATOR	HP	8647A	2019-5-22	2020-5-21
MICROWAVE AMPLIFIER	HP	8349B	2019-5-22	2020-5-21
Triple-Loop Antenna	EVERFINE	LLA-2	2019-5-22	2020-5-21

2 - SYSTEM TEST CONFIGURATI

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

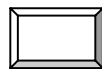
The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

2.3 Special Accessories

As shown in section 2.5, interface cable used for compliance testing is shielded as normally supplied by **Shenzhen Shen Wangda Technology Co.,Ltd.** and its respective support equipment manufacturers.

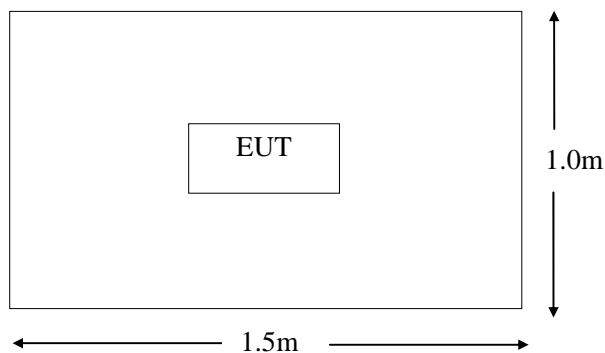
2.4 Equipment Modifications

The EUT tested was not modified by HY.



EUT

2.5 Test Setup Diagram



3 - DISTURBANCE VOLTAGE 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 3.4 dB.

3.2 Limit of Disturbance Voltage At The Mains Terminals (Class B)

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

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup

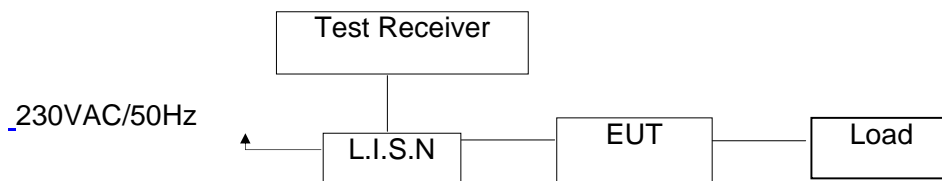
The setup of EUT is according with CISPR 16-1: 2002, CISPR16-2: 2002 measurement procedure. The specification used was the EN 55032 limits.

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.



(EUT: Refrigeration separator)

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

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 μ V of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the EN 55032 Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (°C)	22~25
Humidity (%RH)	50~60
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

Test data see following pages

3.8 Test Result

PASS

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 4.0 dB.

4.2 Limit of Radiated Disturbances (Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	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.

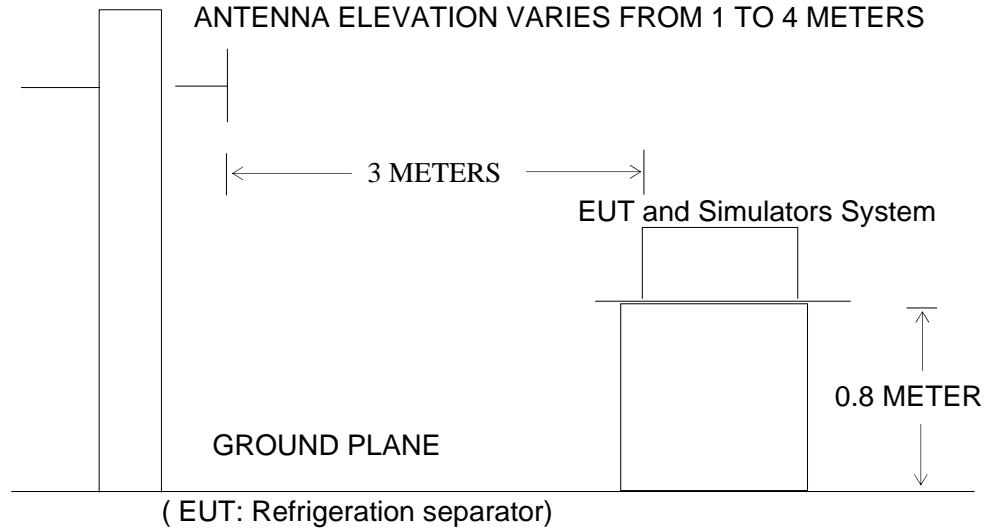
4.3 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN 55032 Class B 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.

Block diagram of test setup (In chamber)



4.4 Test Receiver Setup

According to EN 55032 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

4.5 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 μ 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 μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

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

4.7 Radiated Emissions Test Result

Temperature (°C)	22~25
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

4.8 Test Result

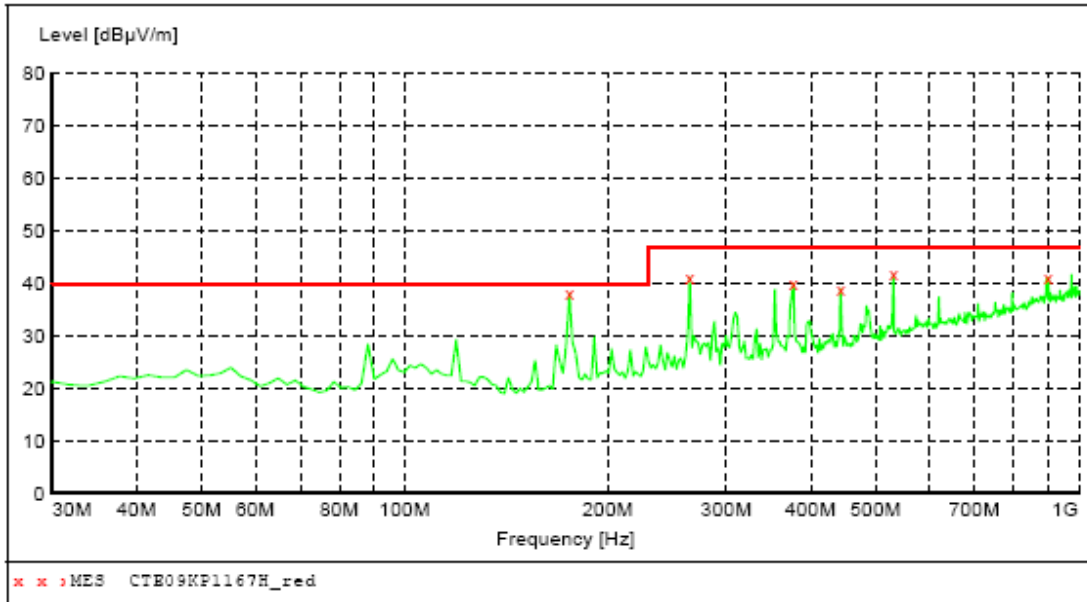
PASS

Radiated Emission Test Data

EUT:	Refrigeration separator	M/N: TBK588
Operating Condition:	ON	
Test Site:	3m CHAMBER	
Operator:	Yang	
Test Specification:	230VAC/50Hz	
Comment:	Polarization: Horizontal	

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

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



MEASUREMENT RESULT: "CTE09KP1166H_red"

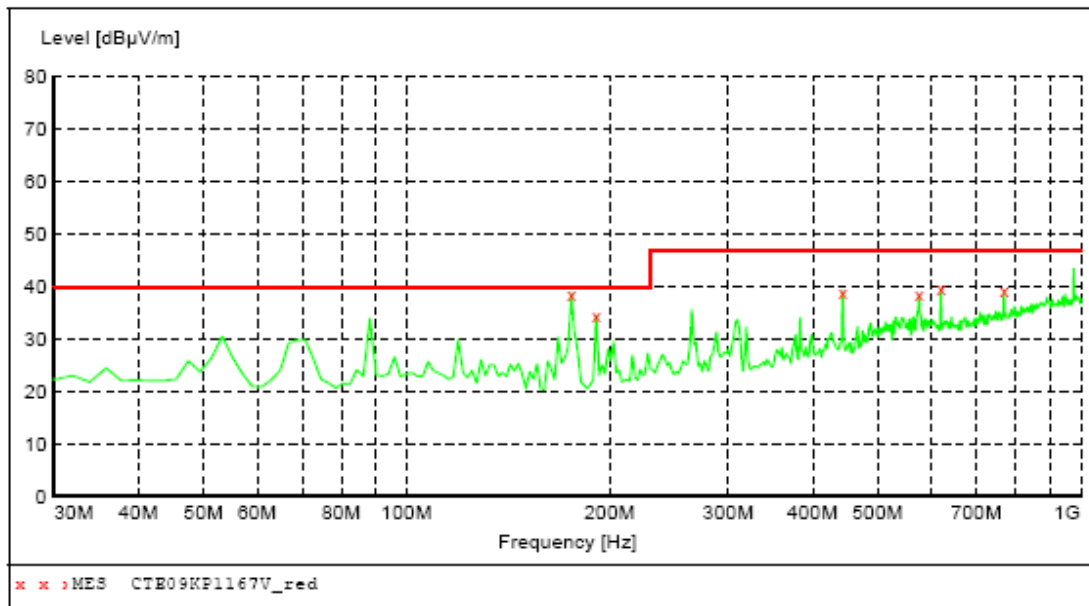
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
175.500000	38.10	14.7	40.0	1.9	QP	100.0	0.00	HORIZONTAL
264.740000	41.20	17.8	47.0	5.8	QP	100.0	0.00	HORIZONTAL
377.260000	40.10	20.9	47.0	6.9	QP	100.0	0.00	HORIZONTAL
443.220000	39.10	22.4	47.0	7.9	QP	100.0	0.00	HORIZONTAL
530.520000	41.80	24.7	47.0	5.2	QP	100.0	0.00	HORIZONTAL
901.060000	41.10	31.2	47.0	5.9	QP	100.0	0.00	HORIZONTAL

Radiated Emission Test Data

EUT:	Refrigeration separator	M/N: TBK588
Operating Condition:	ON	
Test Site:	3m CHAMBER	
Operator:	Yang	
Test Specification:	230VAC/50Hz	
Comment:	Polarization: Vertical	

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SWEEP TABLE: "test (30M-1G)"
Short Description:      Field Strength
Start      Stop      Detector Meas.  IF      Transducer
Frequency  Frequency
30.0 MHz   1.0 GHz   MaxPeak  Coupled 100 kHz  VULB9163 NEW
    
```



MEASUREMENT RESULT: "CTE09KP1166V_red"

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
175.500000	38.70	14.7	40.0	1.3	QP	100.0	0.00	VERTICAL
191.020000	34.60	16.1	40.0	5.4	QP	100.0	0.00	VERTICAL
443.220000	39.10	22.4	47.0	7.9	QP	100.0	0.00	VERTICAL
575.140000	38.40	25.8	47.0	8.6	QP	100.0	0.00	VERTICAL
619.760000	39.60	26.6	47.0	7.4	QP	100.0	0.00	VERTICAL
769.140000	39.40	28.9	47.0	7.6	QP	100.0	0.00	VERTICAL

5 - HARMONIC CURRENT TEST (EN 61000-3-2)

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 Measurement Data

Note: For detailed test data, refer to the following pages:

Standard used:	EN/IEC 61000-3-2 A14 (2000+A2:2005) Quasi-stationary - Equipment class D
Observation time:	150s
E. U. T.:	Refrigeration separator
M/N	TBK588
Operation Mode	ON

5.3 Test Results

PASS

6 - VOLTAGE FLUCTUATIONS AND FLICKER TEST (EN 61000-3-3)

6.1 Application 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.

6.2 Measurement Data

Note: For detailed test data, refer to the following pages:

Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	10 min (1 Flicker measurement)
Flickermeter:	230VAC/50Hz
E. U. T.:	Refrigeration separator
M/N	TBK588
Operation Mode	ON

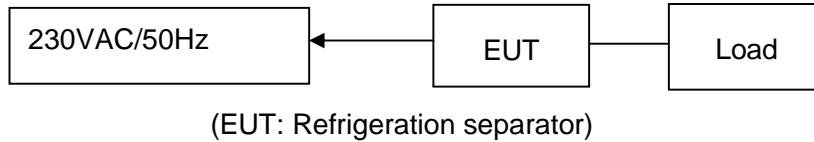
6.3 Test Results

PASS

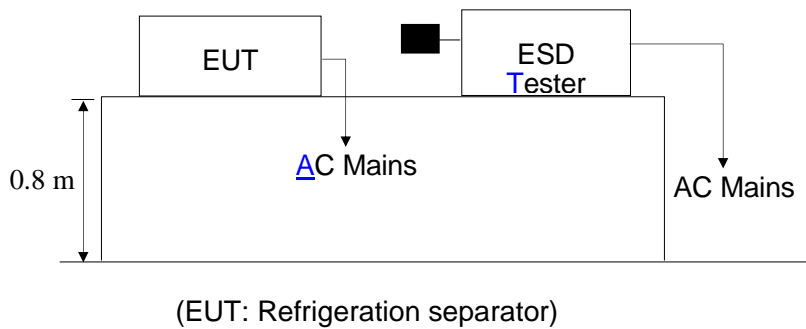
7 - Electrostatic Discharge immunity Test (IEC 61000-4-2)

7.1 Block Diagram of Test Setup

7.1.1 Block diagram of connection between the EUT and Load



7.1.2 Block diagram of ESD test setup



7.2 Test Standard

EN55024: 2010+A1:2015, (EN61000-4-2: 2001 Severity Level: 3 / Air Discharge: $\pm 8\text{KV}$ Level: 2 / Contact Discharge: $\pm 4\text{KV}$)

7.3 Severity Levels and Performance Criterion

7.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X	Special	Special

7.3.2 Performance criterion : B

7.4 Operating Condition of EUT

- 7.4.1 Setup the EUT as shown on Section 7.1.
- 7.4.2 Turn on the power of all equipments.
- 7.4.3 Let the EUT work in measuring mode (ON) and measure it

7.5 Test Procedure

7.5.1 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.

7.5.2 Contact Discharge:

All the procedure shall be same as Section 5.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

7.5.3 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.

7.5.4 Indirect discharge for vertical coupling plane

At least 10 single discharge (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.

7.6 Test Results

PASS

Please refer to the following pages

Shenzhen HuaYu Test Technology Co.,Ltd.

Temperature (°C)	22~24
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

Table 1: Electrostatic Discharge Immunity (Air Discharge)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Gap	A	A	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
N/A	/	/	/	/	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

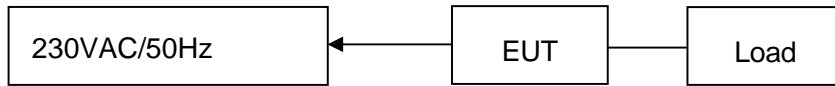
Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

8 - RF Field Strength susceptibility TEST (IEC 61000-4-3)

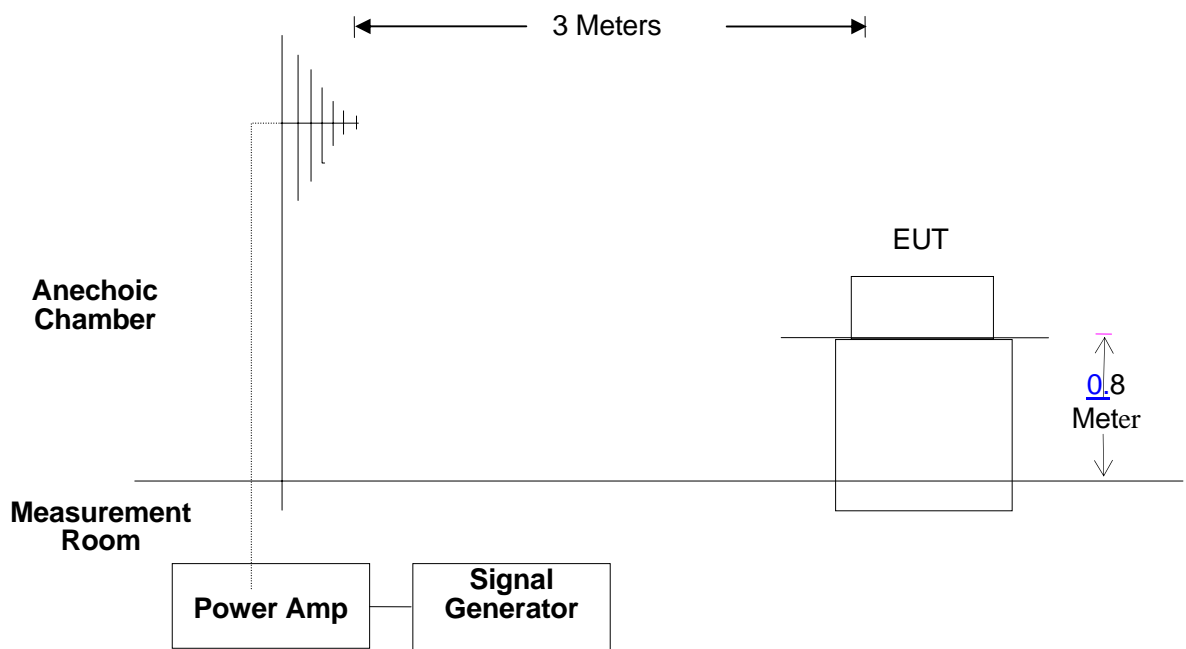
8.1 Block Diagram of Test

8.1.1 Block diagram of connection between the EUT and Load



(EUT: Refrigeration separator)

8.1.2 Block diagram of RS test setup



8.2 Test Standard

EN55024: 2010+A1:2015, (EN61000-4-3: 2006, Severity Level 3: 10V / m)

8.3 Severity Levels and Performance Criterion

8.3.1 Severity Levels

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

8.3.2 Performance Criterion: A

8.4 Operating Condition of EUT

- 8.4.1 Setup the EUT as shown on Section 8.1.
- 8.4.2 Turn on the power of all equipments.
- 8.4.3 Let the EUT work in measuring mode (ON) and measure it..

8.5 Test Procedure

The EUT are placed on a table which is 0.8 meter high above the ground. The EUT is set 3 meters 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 the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor its screen . All the scanning conditions are as following:

Condition of Test	Remark
<ul style="list-style-type: none"> 1. Fielded Strength 2. Radiated Signal 3. Scanning Frequency 4. Sweep time of radiated 5. Dwell Time 	3V/m (Severity Level 2) Modulated 80-1000MHz 0.0015 Decade/s 1 Sec.

8.6 Test Results

PASS

Please refer to the following page.

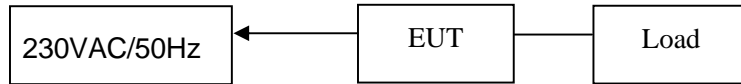
Temperature (°C)	22~24
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

Frequency Range (MHz)	Front (10 V/m)		Rear (10 V/m)		Left Side (10 V/m)		Right Side (10 V/m)	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A

9 - Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)

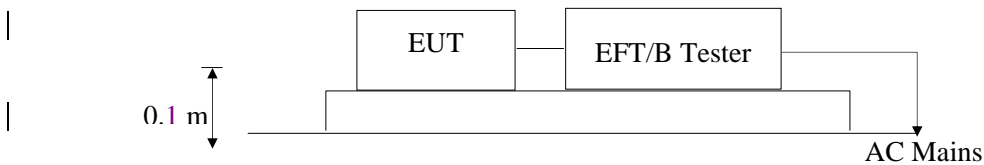
9.1 Block Diagram of Test Setup

9.1.1. Block Diagram of the EUT



(EUT: Refrigeration separator)

9.1.2. Block Diagram of the AC Mains



(EUT: Refrigeration separator)

9.2 Test Standard

EN55024: 2010+A1:2015, (EN61000-4-4:Severity Level, Level 3: 2KV)

9.3 Severity Levels and Performance Criterion

9.3.1 Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On MicroSD Card Reader MP3 Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

9.3.2 Performance criterion : B

9.4 Operating Condition of EUT

9.4.1 Setup the EUT as shown in Section 9.1.

9.4.2 Turn on the power of all equipments.

9.4.3 Let the EUT work in test mode (ON) and measure it.

9.5 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.

9.5.1 For input and output AC power ports:
It's unnecessary to test

9.5.2 For signal lines and control lines ports:
It's unnecessary to test.

9.5.3 For DC Input line ports:
The EUT is connected to the DC power mains by using a coupling device which couples the EFT interference signal to DC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

9.6 Test Result

PASS

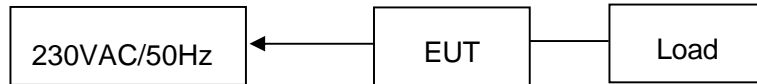
Temperature (°C)	22~24
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

IEC 61000-4-4 Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
Power Supply	L1	A	A	A	A	A	A	/	/
	L2	A	A	A	A	A	A	/	/
	Earth	A	A	A	A	A	A	/	/
Power Line of EUT	L1+L2	A	A	A	A	A	A	/	/
	L1 + Earth	A	A	A	A	A	A	/	/
	L2 + Earth	A	A	A	A	A	A	/	/
	L1+L2+Earth	A	A	A	A	A	A	/	/

10 - Surge Immunity Test (IEC 61000-4-5)

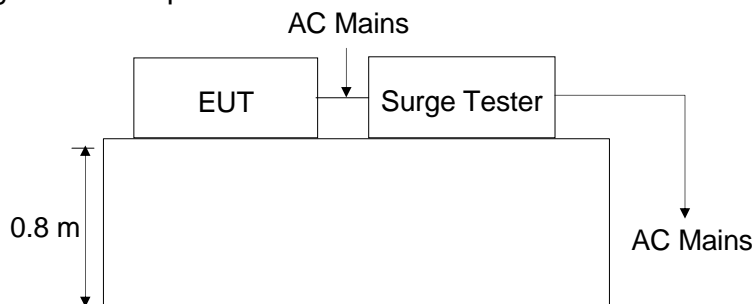
10.1 Block Diagram of Test Setup

10.1.1 Block Diagram of the EUT



(EUT: Refrigeration separator)

10.1.2. Surge Test Setup



10.2 Test Standard

EN55024: 2010+A1:2015, (EN61000-4-5: 2005 Level *: L to N, Level *: 6KV,L to PE , Level *: 6KV, N to PE , Level 4: 6KV)

10.3 Severity Levels and Performance Criterion

10.3.1. Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

10.3.2 Performance criterion : B

10.4 Operating Condition of EUT

10.4.1 Setup the EUT as shown in Section 10.1.

10.4.2. Turn on the power of all equipments.

10.4.3. Let the EUT work in test mode (ON) and measure it.

10.5 Test Procedure

- 1)Set up the EUT and test generator as shown on Section 12.1.2.
- 2)For DC port coupling mode, provide a 1 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3)At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4)Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

10.6 Test Result

PASS

Temperature (°C)	22~24
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

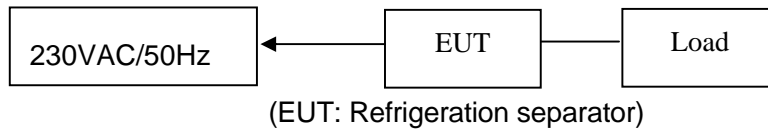
Table 1: Surge Power Supply

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	L-N	A	/
2	1kV	±	L-N	A	/
3	2kV	±	L-PE, N-PE	A	/
4	4kV	±	L-N, L-PE, N-PE	A	/
*	6kV	±	L-N, L-PE, N-PE	A	/

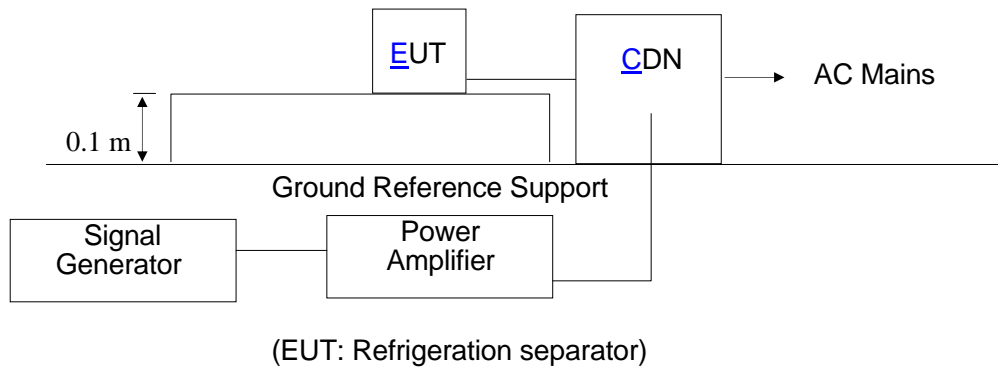
11 - Conducted Susceptibility Test (IEC 61000-4-6)

11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT



11.1.2 Block Diagram of Test Setup



11.2 Test Standard

EN55024: 2010+A1:2015 (EN61000-4-6, Severity Level 3: 10V (rms)).(0.15MHz ~ 80MHz)

11.3 Severity Levels and Performance Criterion

11.3.1 Severity level

Level	Field Strength V(rms)
1.	1
2.	3
3.	10
X	Special

11.3.2 Performance criterion: A

11.4 Operating Condition of EUT

11.4.1 Setup the EUT as shown in Section 11.1.

11.4.2 Turn on the power of all equipments.

11.4.3 Let the EUT work in test mode (ON) and measure it.

11.5 Test Procedure

11.5.1 For AC Mains
It's unnecessary to test.

11.5.2 For signal lines and control lines ports:
It's unnecessary to test.

11.5.3 For DC Input line ports:

- 1) Set up the EUT, CDN and test generators as shown on Section 13.1.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling network) is placed on the ground plane about 0.3m 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).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-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.

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

11.6 Test Results

PASS

Frequency Range (MHz): 0.15~80MHz
Modulation: Amplitude 80%, 1kHz sinewave
Severity Level: 3Vr.m.s.

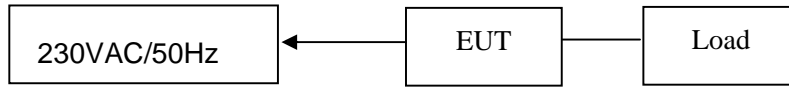
Temperature (°C)	22~24
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

Level	Voltage Level (e.m.f.) U ₀	Pass	Fail
1	1	/	/
2	3	/	/
3	10	A	/
X	Special	/	/

12 - Voltage Dips, Short Interruptions Immunity Tests (IEC 61000-4-11)

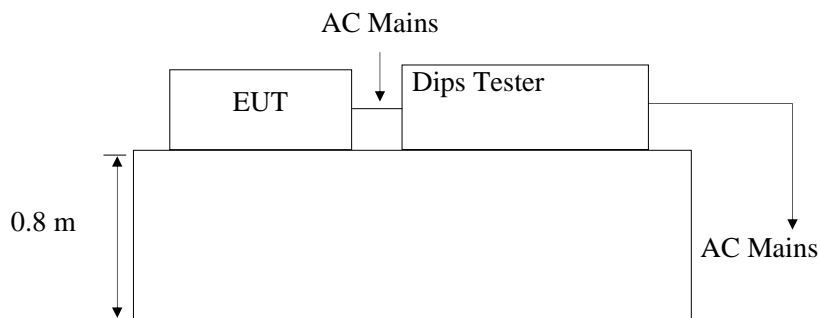
12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT



(EUT: Refrigeration separator)

12.1.2 Dips Test Setup



12.2 Test Standard

EN55024: 2010+A1:2015, EN61000-6-2 (EN61000-4-11)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5 1
40	60	5 10
70	30	25 50 *

12.3.2 Performance criterion : A&B

12.4 EUT Configuration

The configuration of EUT is listed in Section 12.4.

12.5 Operating Condition of EUT

12.5.1 Turn on the power of all equipments.

12.5.2 Let the EUT work in test mode (ON) and measure it.

12.6 Test Procedure

- 1)Set up the EUT and test generator as shown on Section 14.1.2.
- 2)The interruption is introduced at selected phase angles with specified duration.
- 3)Record any degradation of performance.

12.7 Test Result

PASS

Temperature (°C)	22~24
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	Refrigeration separator
M/N	TBK588
Operating Mode	ON

Level	U2	td	Phase Angle	N	Pass	Fail
1	>95%	10ms	0/90/180/270	3	A	/
2	30%	500ms	N/A	3	B	/
3	>95%	5000ms	N/A	3	B	/

Note:

- A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacturer as a permissible loss of performance.
- B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
- C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.

13 - TEST RESULTS

The following tests were performed on the **Shenzhen Shen Wangda Technology Co.,Ltd.**'s product; model: **TBK588** ; the actual test results are contained within the Test Data section of this report.

13.1 IEC 61000-4-2 Electrostatic Discharge Immunity Test Configuration

The EUT was subjected to the electrostatic discharge tests required by EN 55024 and all lower levels specified in IEC 61000-4-2.

The EUT continued to perform as intended during and after the application of the ESD. Test setup photographs presented in Appendix C.

13.2 IEC 61000-4-3 Radiated Susceptibility Test Configuration

The EUT was subjected to a 3-volt/meter, 80% Amplitude, 1 kHz Sine wave field as required by EN 55024 and all lower levels specified in IEC 61000-4-3.

The EUT continued to perform as intended during and after the application of the electromagnetic field. Test setup photographs presented in Appendix C.

13.3 IEC 61000-4-4 Electrical Fast Transient/Burst Immunity Test Configuration

The EUT was subjected to the electrical fast transient tests required by EN 55024 and all lower levels specified in IEC 61000-4-4.

The EUT continued to perform as intended during and after the application of the EFT/B. Test setup photographs presented in Appendix C.

13.4 IEC 61000-4-5 Surge Immunity Test Configuration

The EUT was subjected to the Surge Immunity tests required by EN 55024 and all lower levels specified in IEC 61000-4-5.

The EUT continued to perform as intended during and after the application of the Surge Immunity Test. Test setup photographs presented in Appendix C.

13.5 IEC 61000-4-6 Conducted Susceptibility Test Configuration

The EUT was subjected to the Conducted Susceptibility tests required by EN 55024 and all lower levels specified in IEC 61000-4-6.

The EUT continued to perform as intended during and after the application of the Conducted Susceptibility Test.

13.6 IEC 61000-4-11 Voltage Dips, Short Interruptions Immunity Tests Configuration

The EUT was subjected to the Voltage Dips/Interruptions tests required by EN 55024 and all lower levels specified in IEC 61000-4-11.

The EUT continued to perform as intended during and after the application of the Voltage Dips/Interruptions Test. Test setup photographs presented in Appendix C.

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

EUT Rear View/Proposed CE Marking Location

APPENDIX B - EUT PHOTOGRAPHS

