

**EMC TEST REPORT**  
For

**INVT POWER SYSTEM (SHENZHEN) CO., LTD.**

**Uninterruptible Power System**

**Model Number: HR1100.8L, HR1100.8S, HR1101L, HR1101S**

Prepared for : INVT POWER SYSTEM (SHENZHEN) CO., LTD.  
Address : 5<sup>th</sup> Floor, 1# Building, Gaofa Industrial Park, Longjing,  
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Date of Test : January 08, 2014 to January 15, 2014  
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## TEST REPORT DESCRIPTION

Applicant : INVT POWER SYSTEM (SHENZHEN) CO., LTD.  
Manufacturer : INVT POWER SYSTEM (SHENZHEN) CO., LTD.  
Trademark : INVT  
EUT : Uninterruptible Power System  
Model Number : HR1100.8L, HR1100.8S, HR1101L, HR1101S  
Power Supply : Please refer to the page 8

### Measurement Procedure Used:

EN 62040-2:2006  
EN 61000-3-2:2014  
EN 61000-3-3:2013  
(IEC 61000-4-2:2008, IEC 61000-4-3:2006+A1:2007+A2:2010, IEC 61000-4-4:2012,  
IEC 61000-4-5:2014, IEC 61000-4-6:2013, IEC 61000-4-8:2009, IEC 61000-4-11:2004,  
EN 61000-2-2:2002)


The device described above is tested by EMTEK(SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK(SHENZHEN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 62040-2 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK(SHENZHEN) CO., LTD.

Date of Test : January 08, 2014 to January 15, 2014

Prepared by :   
Bunny Zhang/Editor

Reviewer :   
Jessie Hu/Supervisor

Approved & Authorized Signer :   
Lisa Wang/Manager

## Modified History

Version	Report No.	Revision Date	Summary
Ver.1.0	ES130130241E	/	Original Report
Ver.1.2	ES130130241E-2	2014-01-16	Test The Product
Ver.1.0	ES160629002E	June 29, 2016	Update EMC directive and standards

## 1. SUMMARY OF TEST RESULT

<b>EMISSION</b>			
Description of Test Item	Standard	Limits	Results
Conducted Disturbance at Mains Terminals	EN 62040-2:2006	C2	Pass
Radiated Disturbance	EN 62040-2:2006	C2	Pass
Harmonic Current Emissions	EN 61000-3-2:2014	Class A	Pass
Voltage Fluctuation and Flicker	EN 61000-3-3:2013	Section 5	Pass
<b>IMMUNITY (C2)</b>			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008	B	Pass
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2006+A1:2007+A2:2010	A	Pass
EFT/B Immunity	IEC 61000-4-4:2012	B	Pass
Surge Immunity	IEC 61000-4-5:2014	B	Pass
Conducted RF Immunity	IEC 61000-4-6:2013	A	Pass
Power Frequency Magnetic Field	IEC 61000-4-8:2009	A	Pass
Voltage Dips, >95% Reduction	IEC 61000-4-11:2004	A	Pass
Voltage Dips, 30% Reduction			
Voltage Interruptions			
Low Frequency Signals	EN 61000-2-2:2002	A	Pass
Note: N/A is an abbreviation for Not Applicable.			

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

EUT	: Uninterruptible Power System
Model Number	: HR1100.8L, HR1100.8S, HR1101L, HR1101S (Note: All models have the same constructions, circuit diagram and PCB layout except their model model no., appearance and rating. We prepare HR1101S for EMS test.)
Input Rating	: Model no.: HR1100.8L,HR1100.8S AC Input: 200/208/220/230/240Vac, 1 $\phi$ +N+PE, 50Hz/60Hz, 7A max, Battery. Input: 36VDC, 32A max Model no.: HR1101L,HR1101S AC Input: 200/208/220/230/240Vac, 1 $\phi$ +N+PE, 50Hz/60Hz, 8A max, Battery. Input: 36VDC, 35A max
Output Rating	: Model no.: HR1100.8L,HR1100.8S 200/208/220/230/240VAC, 1 $\phi$ +N+PE, 4A max, 50Hz/60HZ, 800VA/720W Model no.: HR1101L,HR1101S 200/208/220/230/240VAC, 1 $\phi$ +N+PE, 5A max, 50Hz/60HZ, 1000VA/900W
Test Voltage	: AC 230V/50Hz
Applicant	: INVT POWER SYSTEM (SHENZHEN) CO., LTD.
Address	: 5 <sup>th</sup> Floor, 1# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055
Manufacturer	: INVT POWER SYSTEM (SHENZHEN) CO., LTD.
Address	: 5 <sup>th</sup> Floor, 1# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055
Date of Received	: January 08, 2014
Date of Test	: January 08, 2014 to January 15, 2014

### 2.2. Description of Support Device

N/A



## 2.3. Description of Test Facility

Site Description

EMC Lab.

: Accredited by CNAS, 2013.10.29  
The certificate is valid until 2016.10.28  
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)  
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2010.5.25  
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, April 17, 2013  
The Certificate Registration Number is 709623.

Accredited by Industry Canada, November 24, 2015  
The Certificate Registration Number is 4480A.

Name of Firm

: EMTEK(SHENZHEN) CO., LTD.

Site Location

: Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## 2.4. Measurement Uncertainty

Test Item	Uncertainty
Conducted Emission Uncertainty	: 2.6dB
Radiated Emission Uncertainty (3m Chamber)	: 3.3dB (30M~1GHz Polarize: H) 3.2dB (30M~1GHz Polarize: V)
Uncertainty for Flicker test	: 0.07%
Uncertainty for Harmonic test	: 1.8%
Uncertainty for C/S Test	: 1.45(Using CDN Test)
Uncertainty for R/S Test	: 2.10dB(80MHz-200MHz) 1.76dB(200MHz-1000MHz)
Uncertainty for test site temperature and humidity	: 0.6°C 4%

### 3. MEASURING DEVICE AND TEST EQUIPMENT

#### 3.1. For Power Line Conducted Emission Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	May 29, 2012	1 Year
<input checked="" type="checkbox"/>	L.I.S.N.	Schwarzbeck	NNLK8129	8129-203	May 29, 2012	1 Year
<input type="checkbox"/>	L.I.S.N.	ROHDE & SCHWARZ	ESH3-Z6	100011	May 29, 2012	1 Year
<input type="checkbox"/>	L.I.S.N.	ROHDE & SCHWARZ	ESH3-Z6	100253	May 29, 2012	1 Year
<input type="checkbox"/>	L.I.S.N.	ROHDE & SCHWARZ	ESH3-Z5	100191	May 29, 2012	1 Year
<input checked="" type="checkbox"/>	50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
<input checked="" type="checkbox"/>	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 29, 2012	1 Year
<input type="checkbox"/>	Voltage Probe	Rohde & Schwarz	TK9416	N/A	May 29, 2012	1 Year

#### 3.2. For Radiated Emission Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	R&S/DE	ESR3	1316.300K03-101707-Z 1	Dec.14, 2013	1Year
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	R&S/DE	ESCI3	1166.5950K03-101384- Bw	Dec.14, 2013	1Year
<input checked="" type="checkbox"/>	Frequency Analyser	R&S/DE	FSV40	132.1.3008K39-100967- AP	Dec.14, 2013	1Year
<input checked="" type="checkbox"/>	Broadband Antenna (30M-3GHz)	Schwarzbeck/D E	VULP916 3	659/660/661	Dec.14, 2013	1Year
<input type="checkbox"/>	Horn Antenna (1G-18GHz)	Schwarzbeck/D E	BBHA912 0D	1177/1178	Dec.14, 2013	1Year
<input type="checkbox"/>	Horn Antenna (15G-26.5GHz)	Schwarzbeck/D E	BBHA917 0	547	Dec.14, 2013	1Year
<input type="checkbox"/>	Horn Antenna (26.5G-40GHz)	AHS/USA	SAS-573	184/185	Dec.14, 2013	1Year
<input checked="" type="checkbox"/>	Pre-Amplifier (10M-1GHz 40dB)	Lunar EM	PM01-1-4 0	N/A	Dec.14, 2013	1Year
<input type="checkbox"/>	Pre-Amplifier (1G-18GHz 40dB)	Lunar EM	PM1-18-4 0	J101121229001	Dec.14, 2013	1Year
<input type="checkbox"/>	Pre-Amplifier (1G-18GHz 48dB)	Lunar EM	PM1-18-4 8	DS131115120D1177	Dec.14, 2013	1Year
<input type="checkbox"/>	Pre-Amplifier(18G-26.5GHz 40dB)	Lunar EM	PM18-26- 40	J1012131010001	Dec.14, 2013	1Year
<input type="checkbox"/>	Pre-Amplifier (18G-26.5GHz 48dB)	Lunar EM	PM18-26- 48	J1013131010001	Dec.14, 2013	1Year
<input type="checkbox"/>	Pre-Amplifier(26.5 G-40GHz 40dB)	Lunar EM	PM26-40- 40	J1013131028001	Dec.14, 2013	1Year

### 3.3. For Harmonic Current & Flick Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	45KVA AC Power source	Teseq/Germany	NSG 1007-45/45KVA	1305A02873	April 25, 2013	1 Year
<input checked="" type="checkbox"/>	Signal conditioning Unit	Teseq/Germany	CCN 1000-3	1305A02873	April 25, 2013	1 Year
<input checked="" type="checkbox"/>	Three phase impedance network	Teseq/Germany	INA2197/37A	1305A02873	April 25, 2013	1 Year
<input type="checkbox"/>	Three phase impedance network	Teseq/Germany	INA 2196/75A	1305A02874	April 25, 2013	1 Year

### 3.4. For Electrostatic Discharge Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	ESD Tester	TESEQ AG	NSG 438A	130	Jun 11, 2012	1 Year
<input checked="" type="checkbox"/>	Impulse Module	TESEQ AG	INA 4380-150pF/330Ohm	403-550/1712	Jun 11, 2012	1 Year

### 3.5. For RF Strength Susceptibility Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Signal Generator	Agilent	N5181A	MY5014518 7	Nov 04, 2013	1 Year
<input checked="" type="checkbox"/>	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2013	1 Year
<input checked="" type="checkbox"/>	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/3423 8	May 29, 2013	1 Year
<input checked="" type="checkbox"/>	Field Strength Meter	DARE	RSS1006A	10100037SO 22	Nov 04, 2013	1 Year
<input checked="" type="checkbox"/>	50ohm Diode Power Sensor	BOONTON	51011EMC	36164	Nov 04, 2013	1 Year
<input checked="" type="checkbox"/>	Power Amplifier	MILMEGA	80RF1000-175	1059345	May 29, 2013	1 Year
<input type="checkbox"/>	Power Amplifier	MILMEGA	AS0102-55	1018770	May 29, 2013	1 Year
<input type="checkbox"/>	Power Amplifier	MILMEGA	AS1860-50	1059346	Nov 04, 2013	1 Year
<input checked="" type="checkbox"/>	Log.-Per. Antenna	SCHWARZBE CK	VULP 9118E	N/A	May 11, 2013	1 Year
<input type="checkbox"/>	Broad-Band Horn Antenna	SCHWARZBE CK	STLP 9149	9149-227	Nov 04, 2013	1 Year
<input checked="" type="checkbox"/>	Multi-function interface system	DARE	CTR1009B	12100250SN O72	N/A	N/A
<input checked="" type="checkbox"/>	Automatic switch group	DARE	RSW1004A	N/A	N/A	N/A

### 3.6. For Electrical Fast Transient / Burst Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Burst Tester	HAEFELY	PEFT4010	080981-16	May 29, 2013	1 Year
<input type="checkbox"/>	Coupling Clamp	HAEFELY	IP-4A	147147	May 29, 2013	1 Year

### 3.7. For Surge Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Surge Controller	HAEFELY	Psurge 8000	174031	May 29, 2013	1Year
<input checked="" type="checkbox"/>	Impulse Module	HAEFELY	PIM 100	174124	May 29, 2013	1Year
<input checked="" type="checkbox"/>	Coupling Decoupling Filter	HAEFELY	PCD 130	172181	May 29, 2013	1Year
<input type="checkbox"/>	Coupling Module	HAEFELY	PCD122	174354	May 29, 2013	1Year
<input type="checkbox"/>	Surge Impulse Module	HAEFELY	PIM 120	174435	May 29, 2013	1Year
<input type="checkbox"/>	Coupling Module	HAEFELY	PCD 126A	174387	May 29, 2013	1Year
<input type="checkbox"/>	Impulse Module	HAEFELY	PIM 110	174391	May 29, 2013	1Year

### 3.8. For Injected Current Susceptibility Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Simulator	EMTEST	CWS500C	0900-12	May 29, 2013	1 Year
<input type="checkbox"/>	CDN	EMTEST	CDN-M2	5100100100	May 29, 2013	1 Year
<input checked="" type="checkbox"/>	CDN	EMTEST	CDN-M3	0900-11	May 29, 2013	1 Year
<input type="checkbox"/>	Injection Clamp	EMTEST	F-2031-23M M	368	May 29, 2013	1 Year
<input checked="" type="checkbox"/>	Attenuator	EMTEST	ATT6	0010222A	May 29, 2013	1 Year

### 3.9. For Magnetic Field Immunity Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Magnetic Field Tester	HAEFELY	MAG100	250040.1	May 29, 2013	1 Year

### 3.10. For Voltage Dips and Interruptions Test

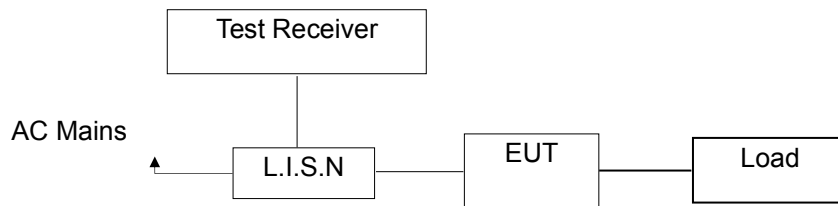
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	45KVA AC Power source	Teseq/Germany	NSG 1007-45/45KVA	1305A02873	April 25, 2013	1 Year
<input type="checkbox"/>	Signal conditioning Unit	Teseq/Germany	CCN 1000-3	1305A02873	April 25, 2013	1 Year
<input type="checkbox"/>	Three phase impedance network	Teseq/Germany	INA2197/37A	1305A02873	April 25, 2013	1 Year
<input type="checkbox"/>	Three phase impedance network	Teseq/Germany	INA 2196/75A	1305A02874	April 25, 2013	1 Year
<input checked="" type="checkbox"/>	Proflin 2100 AC Switching Unit	Teseq/Germany	NSG2200-3	A22714	April 25, 2013	1 Year

### 3.11. Low Frequency Signals Test

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Programmable AC Source	CHROMA	6530	/	May 29, 2013	1 Year

## 4. POWER LINE CONDUCTED EMISSION MEASUREMENT

### 4.1. Block Diagram of Test Setup



(EUT: Uninterruptible Power System)

### 4.2. Measuring Standard

EN 62040-2:2006 Category C2

Power Line Conducted Emission Limits:

Frequency (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60

### 4.3. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 62040-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

Uninterruptible Power System (EUT)

Model Number : HR1101S

Serial Number : N/A

### 4.4. Operating Condition of EUT

4.4.1. Setup the EUT as shown on Section 4.1.

4.4.2. Turn on the power of all equipments.

4.4.3. Let the EUT work in measuring mode (Line mode, Bat mode) and measure it.

### 4.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 62040-2 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9kHz in 150kHz~30MHz and 200Hz in 9kHz~150kHz.

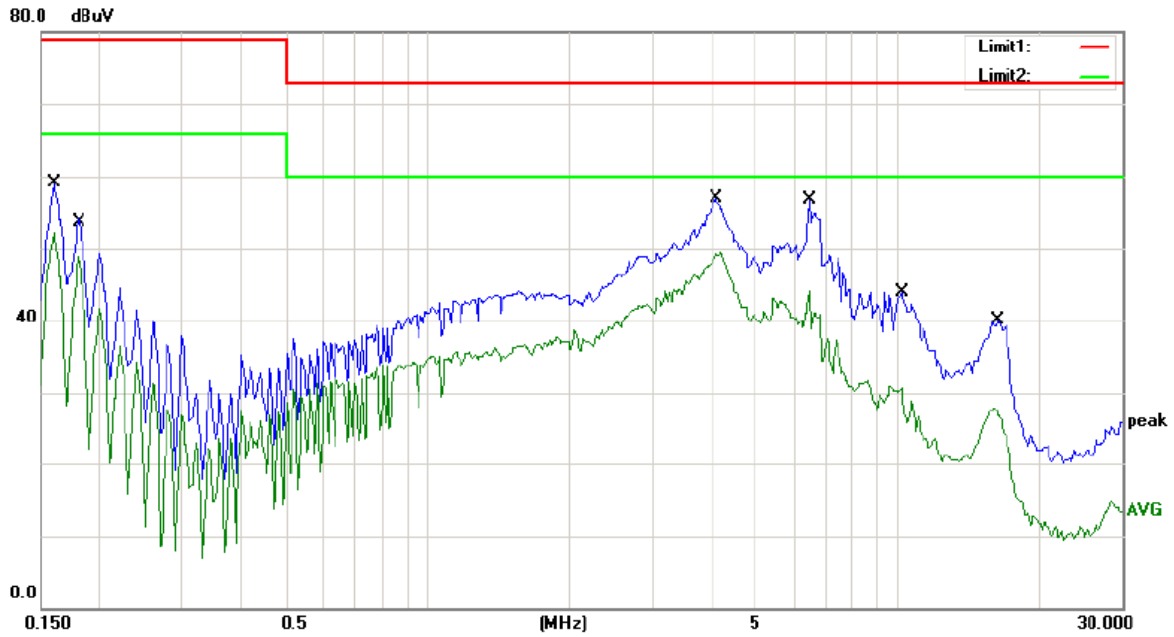
The frequency range from 150kHz to 30MHz is investigated.

All the scanning waveform is put in the following pages.

#### 4.6. Measuring Results

**PASS.**

Please refer to the following pages.



Site Conduction #2

Phase: **L1**

Temperature: 22

Limit: (CE)EN62040-2 C2\_QP

Power: AC 230V/50Hz

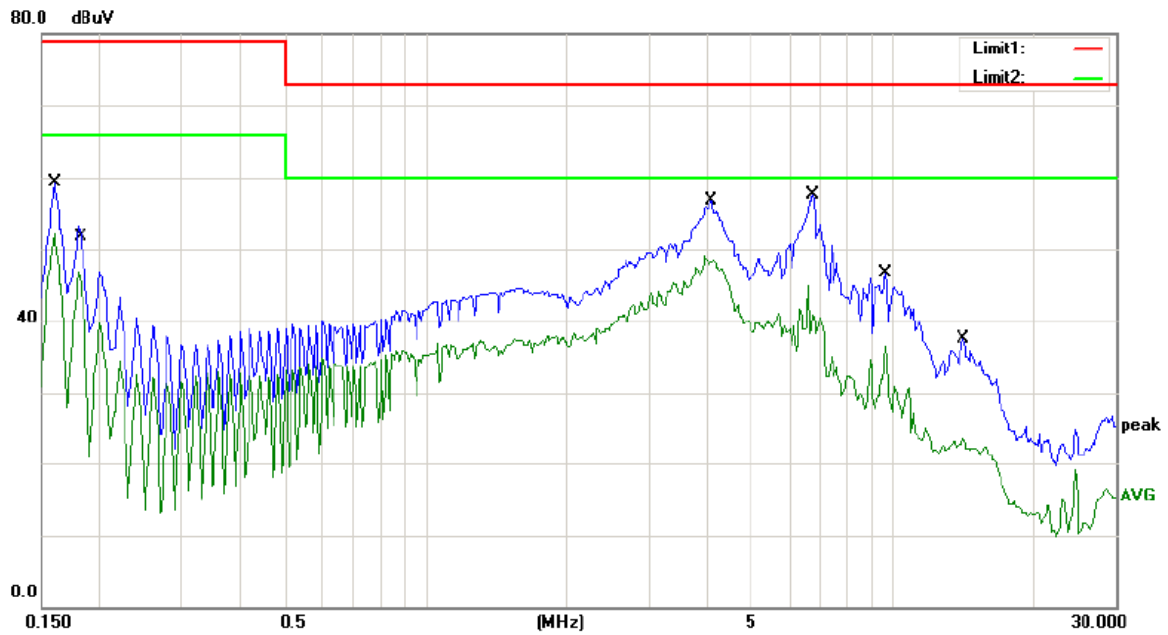
Humidity: 53 %

Mode: LINE MODE

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1600	59.07	0.00	59.07	79.00	-19.93	QP	
2		0.1600	52.12	0.00	52.12	66.00	-13.88	AVG	
3		0.1825	51.56	0.00	51.56	79.00	-27.44	QP	
4		0.1825	48.82	0.00	48.82	66.00	-17.18	AVG	
5		4.1000	56.85	0.00	56.85	73.00	-16.15	QP	
6	*	4.1000	49.50	0.00	49.50	60.00	-10.50	AVG	
7		6.5000	56.79	0.00	56.79	73.00	-16.21	QP	
8		6.5000	44.04	0.00	44.04	60.00	-15.96	AVG	
9		10.2000	43.85	0.00	43.85	73.00	-29.15	QP	
10		10.2000	30.69	0.00	30.69	60.00	-29.31	AVG	
11		16.3750	40.02	0.00	40.02	73.00	-32.98	QP	
12		16.3750	27.87	0.00	27.87	60.00	-32.13	AVG	

\*:Maximum data    x:Over limit    !:over margin    Comment: Factor build in receiver.    Operator: HE

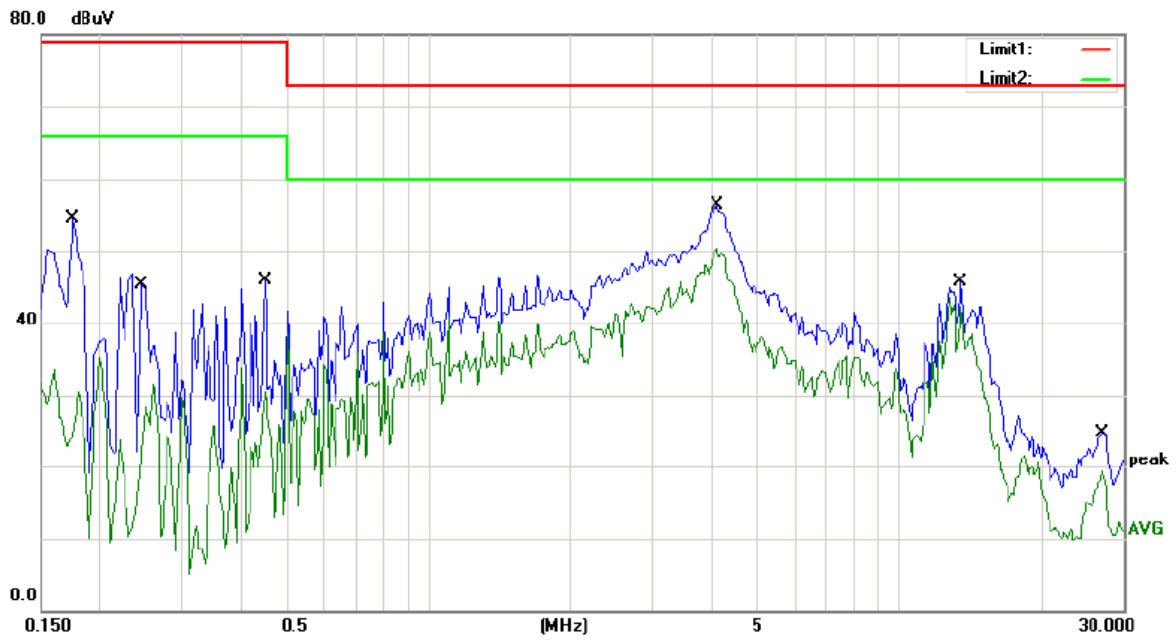


Site Conduction #2 Phase: **N** Temperature: 22  
 Limit: (CE)EN62040-2 C2\_QP Power: AC 230V/50Hz Humidity: 53 %  
 Mode: LINE MODE  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1600	59.31	0.00	59.31	79.00	-19.69	QP	
2		0.1600	52.05	0.00	52.05	66.00	-13.95	AVG	
3		0.1835	49.49	0.00	49.49	79.00	-29.51	QP	
4		0.1835	46.95	0.00	46.95	66.00	-19.05	AVG	
5		4.0900	56.69	0.00	56.69	73.00	-16.31	QP	
6	*	4.0900	49.09	0.00	49.09	60.00	-10.91	AVG	
7		6.7600	57.45	0.00	57.45	73.00	-15.55	QP	
8		6.7600	44.91	0.00	44.91	60.00	-15.09	AVG	
9		9.6800	46.74	0.00	46.74	73.00	-26.26	QP	
10		9.6800	36.52	0.00	36.52	60.00	-23.48	AVG	
11		14.1500	37.56	0.00	37.56	73.00	-35.44	QP	
12		14.1500	23.58	0.00	23.58	60.00	-36.42	AVG	

\*:Maximum data    x:Over limit    !:over margin    Comment: Factor build in receiver.    Operator: HE

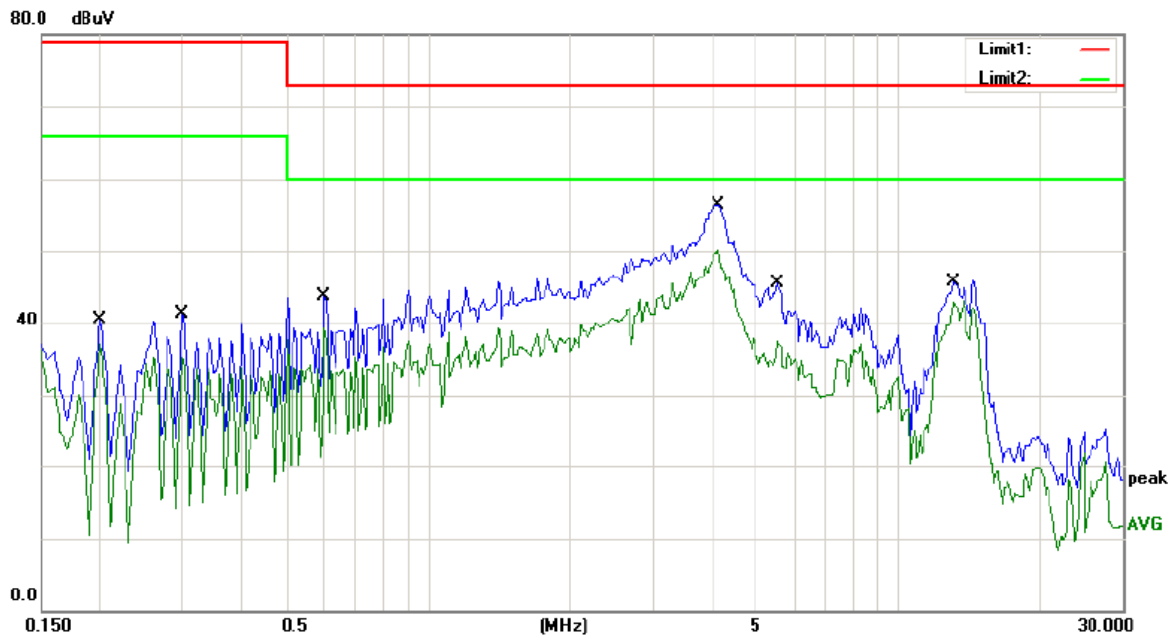




Site Conduction #2 Phase: **L1** Temperature: 22  
 Limit: (CE)EN62040-2 C2\_QP Power: AC 230V/50Hz Humidity: 53 %  
 Mode: BAT MODE  
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1750	54.54	0.00	54.54	79.00	-24.46	QP	
2		0.1750	30.47	0.00	30.47	66.00	-35.53	AVG	
3		0.2450	45.33	0.00	45.33	79.00	-33.67	QP	
4		0.2450	28.40	0.00	28.40	66.00	-37.60	AVG	
5		0.4500	45.82	0.00	45.82	79.00	-33.18	QP	
6		0.4500	30.47	0.00	30.47	66.00	-35.53	AVG	
7		4.1000	56.35	0.00	56.35	73.00	-16.65	QP	
8	*	4.1000	50.27	0.00	50.27	60.00	-9.73	AVG	
9		13.5000	45.75	0.00	45.75	73.00	-27.25	QP	
10		13.5000	43.48	0.00	43.48	60.00	-16.52	AVG	
11		27.1000	24.65	0.00	24.65	73.00	-48.35	QP	
12		27.1000	19.28	0.00	19.28	60.00	-40.72	AVG	

\*:Maximum data    x:Over limit    !:over margin    Comment: Factor build in receiver.    Operator: HE



Site Conduction #2 Phase: **N** Temperature: 22  
 Limit: (CE)EN62040-2 C2\_QP Power: AC 230V/50Hz Humidity: 53 %  
 Mode: BAT MODE  
 Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
		MHz	Level	Factor	ment				
			dBuV	dB	dBuV	dBuV	dB		
1		0.2000	40.48	0.00	40.48	79.00	-38.52	QP	
2		0.2000	37.13	0.00	37.13	66.00	-28.87	AVG	
3		0.3000	41.35	0.00	41.35	79.00	-37.65	QP	
4		0.3000	35.38	0.00	35.38	66.00	-30.62	AVG	
5		0.6000	43.72	0.00	43.72	73.00	-29.28	QP	
6		0.6000	39.33	0.00	39.33	60.00	-20.67	AVG	
7		4.1400	56.35	0.00	56.35	73.00	-16.65	QP	
8	*	4.1400	50.12	0.00	50.12	60.00	-9.88	AVG	
9		5.5200	45.43	0.00	45.43	73.00	-27.57	QP	
10		5.5200	37.43	0.00	37.43	60.00	-22.57	AVG	
11		13.1000	45.62	0.00	45.62	73.00	-27.38	QP	
12		13.1000	43.04	0.00	43.04	60.00	-16.96	AVG	

\*:Maximum data    x:Over limit    !:over margin    Comment: Factor build in receiver.    Operator: HE

## 5. RADIATED EMISSION MEASUREMENT

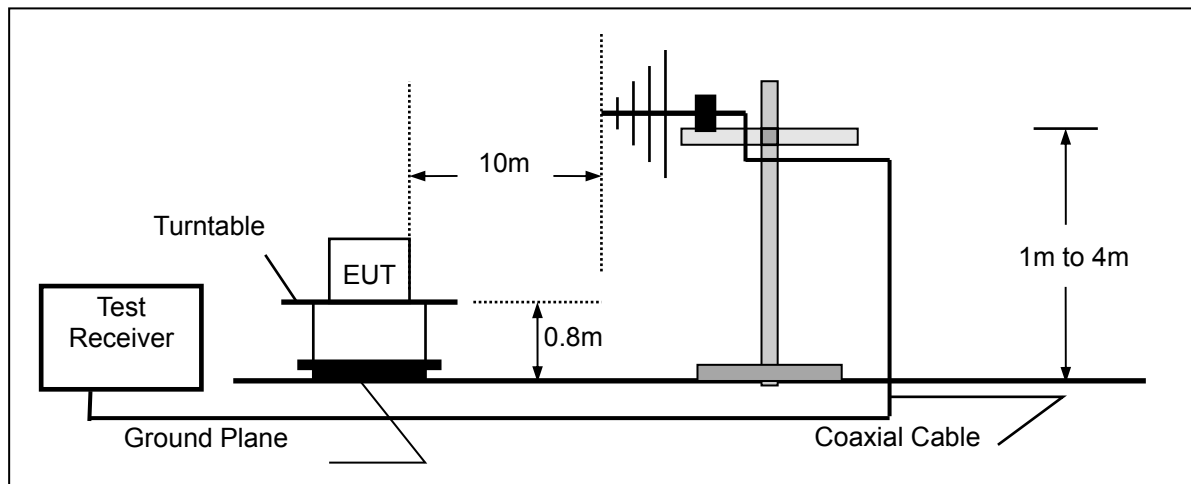
### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Uninterruptible Power System)

#### 5.1.2. Block diagram of test setup (In chamber)



(EUT: Uninterruptible Power System)

### 5.2. Measuring Standard

EN 62040-2:2006 Category C2

### 5.3. Radiated Emission Limits

All emanations from device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB $\mu$ V/m)
30 ~ 230	10	40
230 ~ 1000	10	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.  
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

### 5.4. EUT Configuration on Test

The EN 62040-2 regulations test method must be used to find the maximum emission during radiated emission measurement.

## 5.5. Operating Condition of EUT

5.5.1. Turn on the power.

5.5.2. After that, let the EUT work in test mode (Line mode, Bat mode) and measure it.

## 5.6. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the Receiver is set at 120kHz.

All the scanning curves are attached in the following pages.

## 5.7. Measuring Results

**PASS.**

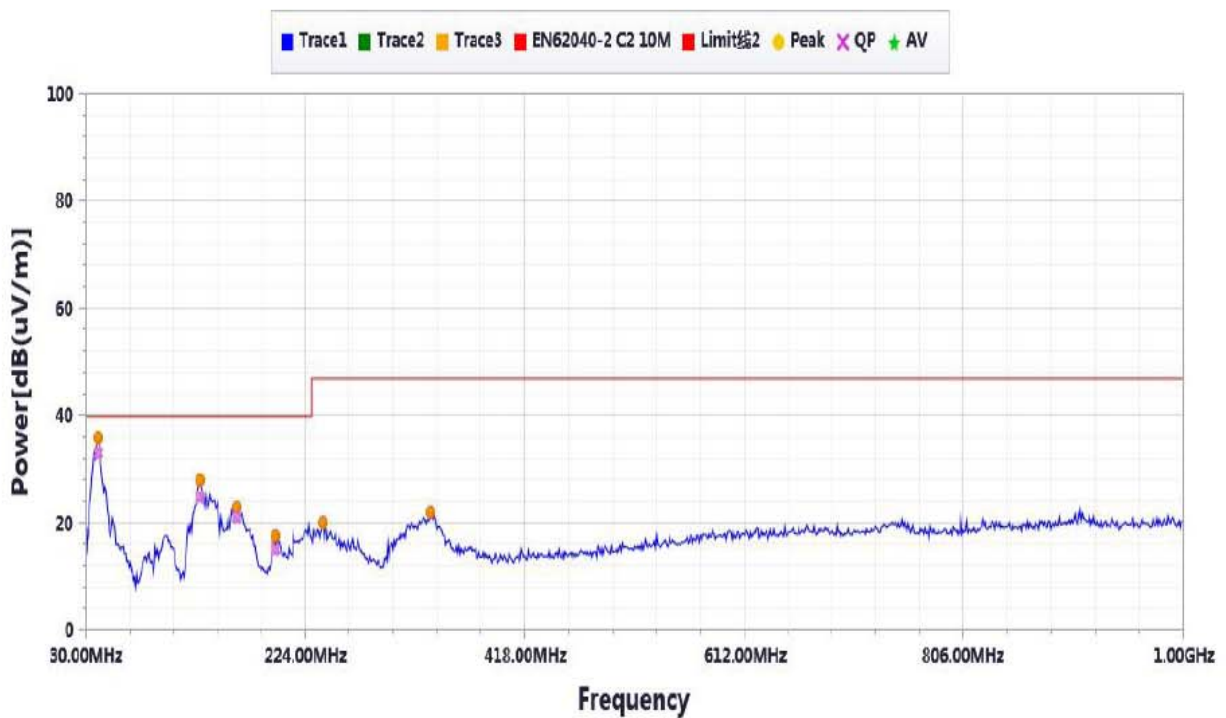
The frequency range from 30MHz to 1000MHz is investigated.

Please refer to the following pages.

## 1. Settings

Start: 30MHz	Stop: 1GHz	
RBW: 100KHz	VBW: 300KHz	Ref: 100
RFAtt: 10	PreAmp: True	Polarization: Vertical
Tester: CSL	Model: HR1101L(10A)	Customer: TEL:
Test Time:2014/1/11 9:16	Temperature:20	Humidity:54
Power:AC 230V/50Hz	Test Distance:10M	EUT:UPS
Note:LINE MODE		

## 2. Chart



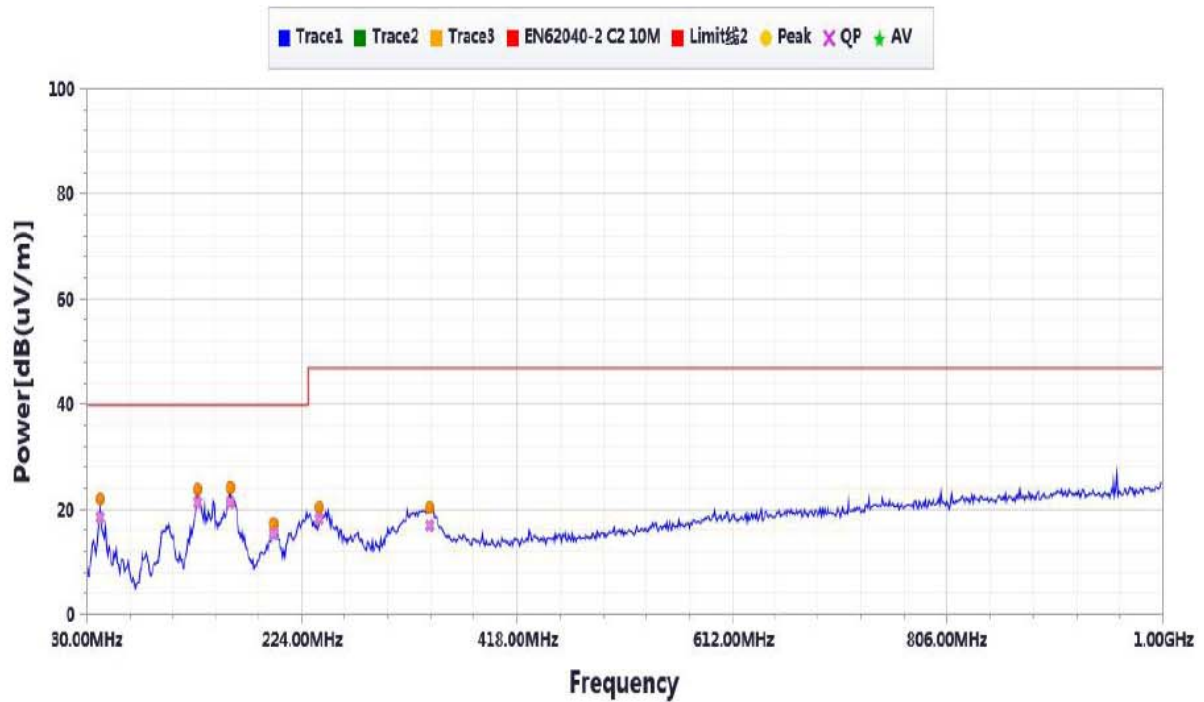
## 3. Result

Frequency Hz	Peak dB (uV/m)	QP dB (uV/m)	Fac	Res	Limit1 dB (uV/m)	Pe. L1	Qp. L1	Deg. °	Hig. cm	Result
41.63MHz	36.06	33.1	-30.26	66.32	40	3.94	6.9			Pass
131.75MHz	27.94	24.9	-35.03	62.97	40	12.06	15.1			Pass
163.73MHz	23.15	21	-34.28	57.43	40	16.85	19			Pass
197.64MHz	17.66	15.2	-31.54	49.2	40	22.34	24.8			Pass
240.28MHz	20.15	16.5	-30.27	50.42	47	26.85	30.5			Pass
335.24MHz	22.06	19.4	-27.22	49.28	47	24.94	27.6			Pass

## 1. Settings

Start: 30MHz	Stop: 1GHz	
RBW: 100KHz	VBW: 300KHz	Ref: 100
RFAtt: 10	PreAmp: True	Polarization: Horizontal
Tester: CSL	Model: HR1101L (10A)	Customer: TEL:
Test Time: 2014/1/11 9:16	Temperature: 20	Humidity: 54
Power: AC 230V/50Hz	Test Distance: 10M	EUT: UPS
Note: LINE MODE		

## 2. Chart



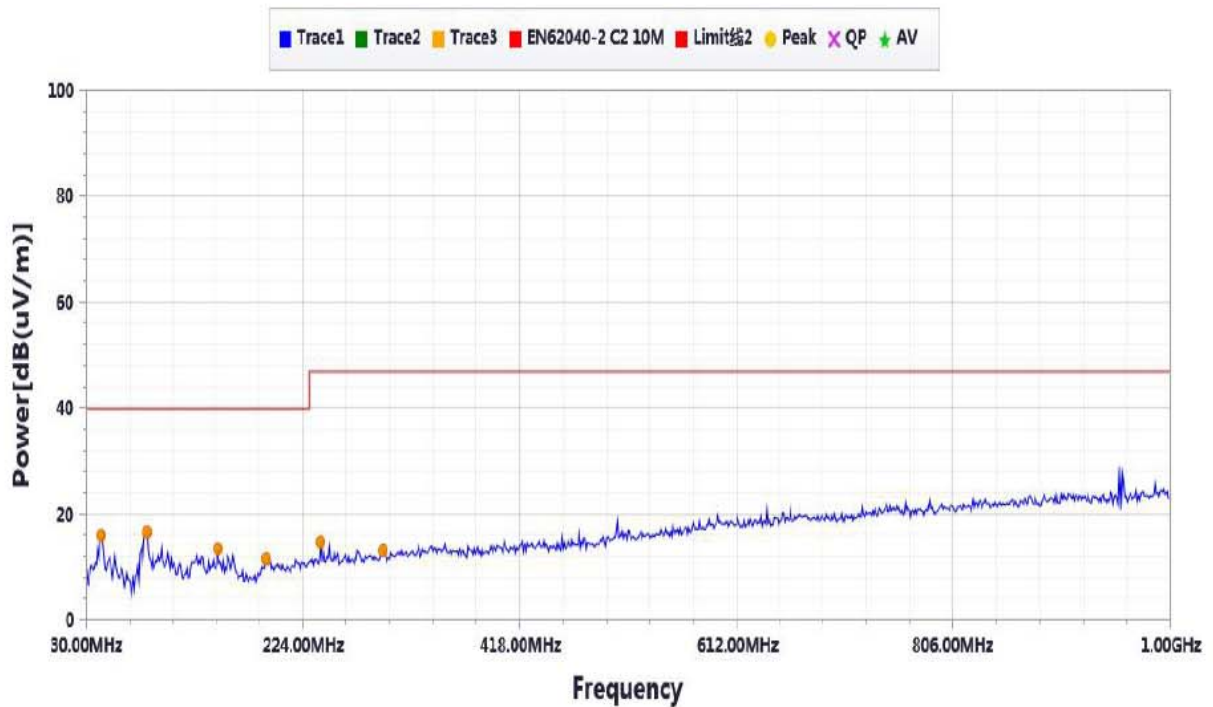
## 3. Result

Frequency Hz	Peak dB (uV/m)	QP dB (uV/m)	Fac	Res	Limit1 dB (uV/m)	Pe. L1	Qp. L1	Deg. °	Hig. cm	Result
42.60MHz	21.95	18.6	-29.68	51.63	40	18.05	21.4			Pass
130.78MHz	24.08	21.4	-34.12	58.2	40	15.92	18.6			Pass
159.85MHz	24.16	21.3	-33.42	57.58	40	15.84	18.7			Pass
199.58MHz	17.48	15.6	-30.31	47.79	40	22.52	24.4			Pass
240.28MHz	20.42	18.4	-29.14	49.56	47	26.58	28.6			Pass
340.09MHz	20.45	16.9	-26.02	46.47	47	26.55	30.1			Pass

## 1. Settings

Start: 30MHz	Stop: 1GHz	
RBW: 100KHz	VBW: 300KHz	Ref: 100
RFAtt: 10	PreAmp: True	Polarization: Horizontal
Tester: CSL	Model: HR1101L(10A)	Customer: TEL:
Test Time:2014/1/11 9:19	Temperature:20	Humidity:54
Power:AC 230V/50Hz	Test Distance:10M	EUT:UPS
Note:BAT MODE		

## 2. Chart



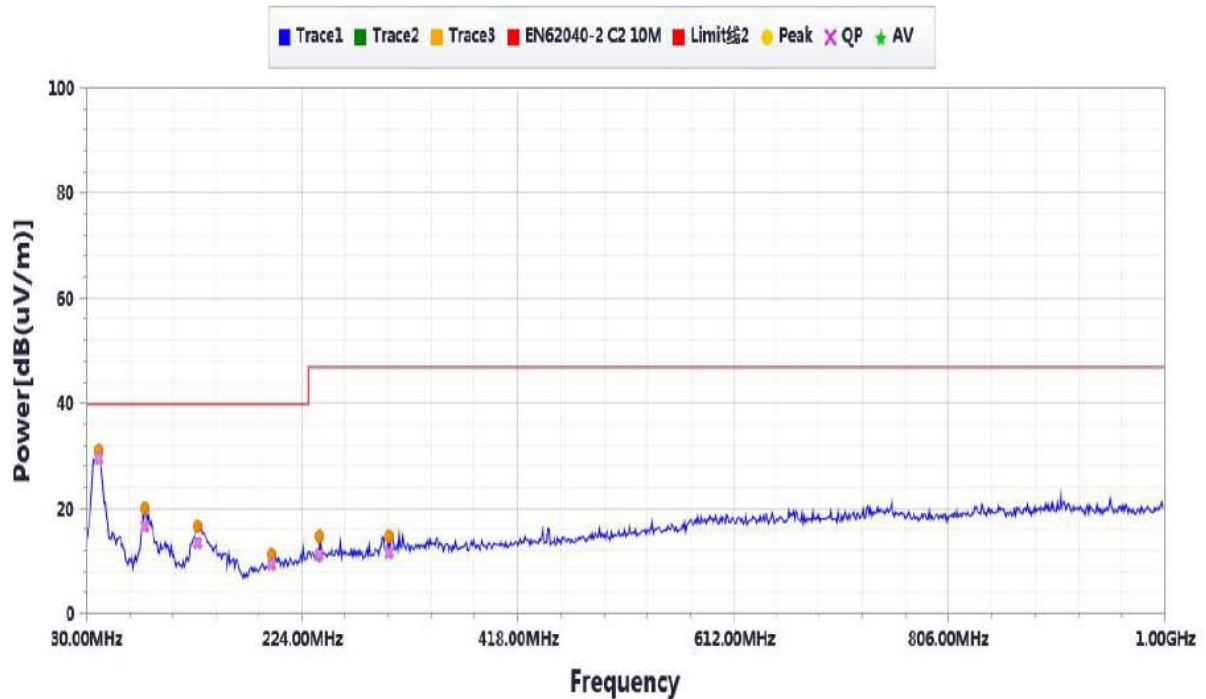
## 3. Result

Frequency Hz	Peak dB (uV/m)	QP dB (uV/m)	Fac	Res	Limit1 dB (uV/m)	Pe. L1	Qp. L1	Deg. °	Hig. cm	Result
43.57MHz	16.06	13.5	-29.58	45.64	40	23.94	26.5			Pass
85.23MHz	16.79	13.2	-34.01	50.8	40	23.21	26.8			Pass
148.22MHz	13.52	10.4	-34.24	47.76	40	26.48	29.6			Pass
191.83MHz	11.77	9.6	-30.87	42.64	40	28.23	30.4			Pass
240.28MHz	14.71	11.7	-29.14	43.85	47	32.29	35.3			Pass
296.48MHz	13.3	10.3	-27.83	41.13	47	33.7	36.7			Pass

## 1. Settings

Start: 30MHz	Stop: 1GHz	
RBW: 100KHz	VBW: 300KHz	Ref: 100
RFAtt: 10	PreAmp: True	Polarization: Vertical
Tester: CSL	Model: HR1101L(10A)	Customer: TEL:
Test Time:2014/1/11 9:19	Temperature:20	Humidity:54
Power:AC 230V/50Hz	Test Distance:10M	EUT:UPS
Note:BAT MODE		

## 2. Chart



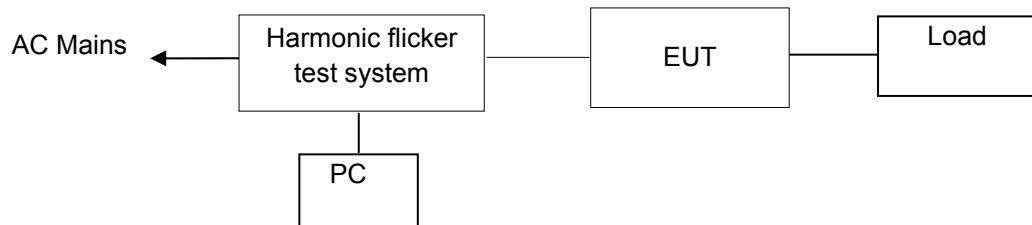
## 3. Result

Frequency Hz	Peak dB (uV/m)	QP dB (uV/m)	Fac	Res	Limit1 dB (uV/m)	Pe. L1	Qp. L1	Deg. °	Hig. cm	Result
41.63MHz	31.28	29.6	-30.26	61.54	40	8.72	10.4			Pass
83.30MHz	20.04	16.8	-35.08	55.12	40	19.96	23.2			Pass
130.78MHz	16.69	13.7	-34.97	51.66	40	23.31	26.3			Pass
196.67MHz	11.23	9.6	-31.56	42.79	40	28.77	30.4			Pass
240.28MHz	14.78	11.2	-30.27	45.05	47	32.22	35.8			Pass
302.30MHz	14.95	11.7	-28.68	43.63	47	32.05	35.3			Pass



## 6. HARMONIC CURRENT EMISSION MEASUREMENT

### 6.1. Block Diagram of Test Setup



(EUT: Uninterruptible Power System)

### 6.2. Measuring Standard

EN 61000-3-2:2014 CLASS A

### 6.3. Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 6.1.

### 6.4. Measuring Results

**PASS.**

Please see the attached pages.

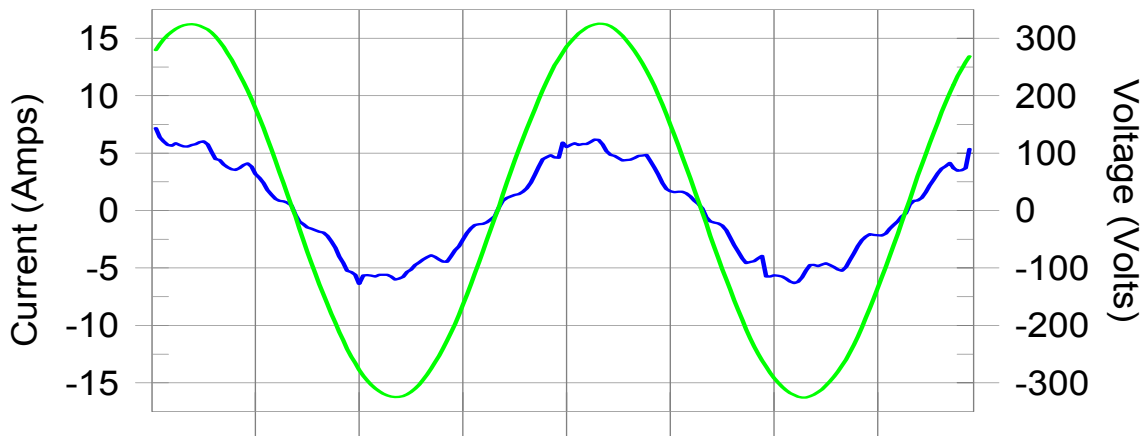
**Harmonics – Class-A per Ed. 3.2 (2009)(Run time)**

EUT: UPS(HP1101L) Tested by: YU  
 Test category: Class-A per Ed. 3.2 (2009) (European limits) Test Margin: 100  
 Test date: 2014-1-13 Start time: 02:18:24 End time: 02:21:16  
 Test duration (min): 2.5 Data file name: WIN2105\_H-000035.cts\_data  
 Comment: Foll Load  
 Customer: YU

Test Result: Pass

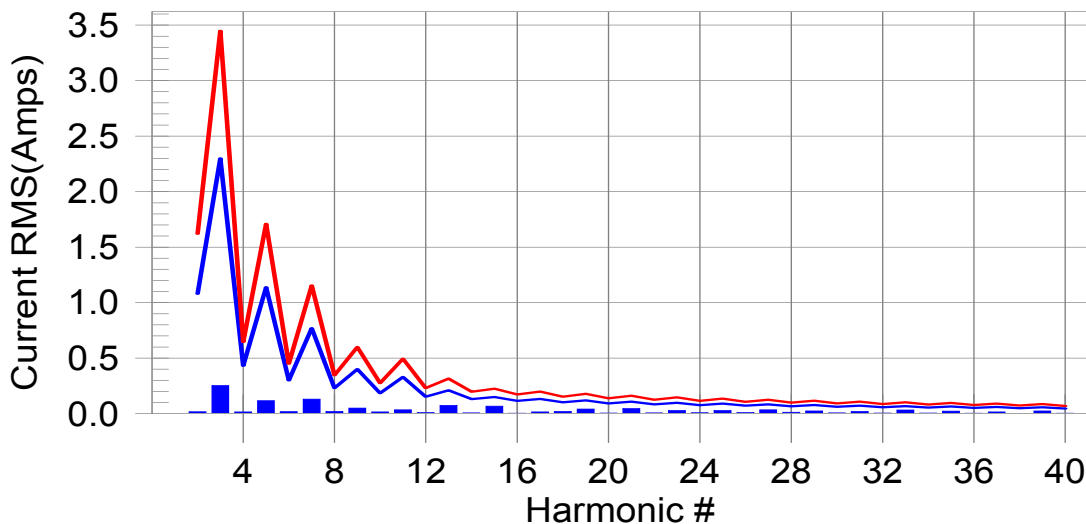
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #33 with 46.12% of the limit.

-  
-

**Current Test Result Summary (Run time)**

EUT: UPS(HP1101L) Tested by: YU  
 Test category: Class-A per Ed. 3.2 (2009) (European limits) Test Margin: 100  
 Test date: 2014-1-13 Start time: 02:18:24 End time: 02:21:16  
 Test duration (min): 2.5 Data file name: WIN2105\_H-000035.cts\_data  
 Comment: Foll Load  
 Customer: YU

Test Result: Pass Source qualification: Normal  
 THC(A): 0.329 I-THD(%): 4.201 POHC(A): 0.069 POHC Limit(A): 0.288  
 Highest parameter values during test:  
 V\_RMS (Volts): 229.83 Frequency(Hz): 50.00  
 I\_Peak (Amps): 7.175 I\_RMS (Amps): 4.060  
 I\_Fund (Amps): 4.046 Crest Factor: 1.768  
 Power (Watts): 923.4 Power Factor: 0.991

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.015	1.080	0.0	0.017	1.620	1.07	Pass
3	0.247	2.300	10.7	0.253	3.450	7.33	Pass
4	0.014	0.430	0.0	0.015	0.645	2.29	Pass
5	0.113	1.140	9.9	0.116	1.710	6.78	Pass
6	0.015	0.300	0.0	0.018	0.450	4.00	Pass
7	0.127	0.770	16.5	0.132	1.155	11.39	Pass
8	0.015	0.230	0.0	0.020	0.345	5.83	Pass
9	0.043	0.400	10.7	0.050	0.600	8.33	Pass
10	0.012	0.184	0.0	0.016	0.276	5.96	Pass
11	0.030	0.330	9.2	0.034	0.495	6.85	Pass
12	0.009	0.153	0.0	0.010	0.230	4.48	Pass
13	0.073	0.210	34.7	0.074	0.315	23.44	Pass
14	0.006	0.131	0.0	0.007	0.197	3.36	Pass
15	0.064	0.150	42.8	0.067	0.225	29.67	Pass
16	0.003	0.115	0.0	0.005	0.173	2.90	Pass
17	0.014	0.132	0.0	0.017	0.199	8.32	Pass
18	0.017	0.102	0.0	0.020	0.153	12.97	Pass
19	0.039	0.118	33.1	0.041	0.178	23.03	Pass
20	0.004	0.092	0.0	0.006	0.138	4.45	Pass
21	0.044	0.107	41.2	0.046	0.161	28.72	Pass
22	0.003	0.084	0.0	0.007	0.125	5.30	Pass
23	0.026	0.098	26.9	0.029	0.147	19.75	Pass
24	0.005	0.077	0.0	0.007	0.115	6.49	Pass
25	0.027	0.090	29.7	0.029	0.135	21.18	Pass
26	0.007	0.071	0.0	0.010	0.106	9.78	Pass
27	0.034	0.083	40.7	0.035	0.125	27.93	Pass
28	0.007	0.066	0.0	0.012	0.099	11.96	Pass
29	0.021	0.078	0.0	0.024	0.116	20.82	Pass
30	0.003	0.061	0.0	0.007	0.092	7.56	Pass
31	0.018	0.073	0.0	0.019	0.109	17.75	Pass
32	0.003	0.058	0.0	0.006	0.086	6.79	Pass
33	0.031	0.068	46.1	0.032	0.102	31.82	Pass
34	0.004	0.054	0.0	0.005	0.081	6.50	Pass
35	0.020	0.064	0.0	0.022	0.096	22.77	Pass
36	0.003	0.051	0.0	0.004	0.077	4.76	Pass
37	0.015	0.061	0.0	0.017	0.091	18.18	Pass
38	0.001	0.048	0.0	0.002	0.073	2.74	Pass
39	0.023	0.058	40.6	0.024	0.087	28.15	Pass
40	0.002	0.046	0.0	0.003	0.069	4.53	Pass

**Voltage Source Verification Data (Run time)**

EUT: UPS(HP1101L) Tested by: YU  
 Test category: Class-A per Ed. 3.2 (2009) (European limits) Test Margin: 100  
 Test date: 2014-1-13 Start time: 02:18:24 End time: 02:21:16  
 Test duration (min): 2.5 Data file name: WIN2105\_H-000035.cts\_data  
 Comment: Foll Load  
 Customer: YU

**Test Result: Pass** **Source qualification: Normal**  
 Measured source distortion is within the requirements of the standards  
 Measurements are compliant with IEC/EN61000-3-2(2001:10) & IEC/EN61000-4-7

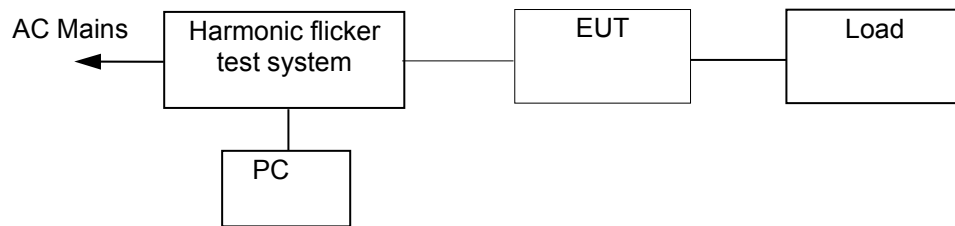
**Highest parameter values during test:**

Voltage (Vrms):	229.83	Frequency(Hz):	50.00
I_Peak (Amps):	7.175	I_RMS (Amps):	4.060
I_Fund (Amps):	4.046	Crest Factor:	1.768
Power (Watts):	923.4	Power Factor:	0.991

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.085	0.460	18.59	OK
3	0.147	2.068	7.09	OK
4	0.031	0.460	6.70	OK
5	0.090	0.919	9.85	OK
6	0.025	0.460	5.40	OK
7	0.172	0.689	25.01	OK
8	0.036	0.460	7.93	OK
9	0.123	0.460	26.68	OK
10	0.034	0.460	7.50	OK
11	0.111	0.230	48.39	OK
12	0.016	0.230	6.82	OK
13	0.124	0.230	54.06	OK
14	0.016	0.230	6.76	OK
15	0.097	0.230	42.23	OK
16	0.012	0.230	5.30	OK
17	0.059	0.230	25.88	OK
18	0.029	0.230	12.51	OK
19	0.092	0.230	40.20	OK
20	0.017	0.230	7.62	OK
21	0.086	0.230	37.53	OK
22	0.015	0.230	6.74	OK
23	0.039	0.230	16.97	OK
24	0.017	0.230	7.49	OK
25	0.061	0.230	26.76	OK
26	0.021	0.230	9.15	OK
27	0.072	0.230	31.40	OK
28	0.023	0.230	9.82	OK
29	0.044	0.230	19.34	OK
30	0.015	0.230	6.40	OK
31	0.032	0.230	13.80	OK
32	0.014	0.230	6.11	OK
33	0.068	0.230	29.72	OK
34	0.015	0.230	6.50	OK
35	0.048	0.230	21.10	OK
36	0.010	0.230	4.36	OK
37	0.019	0.230	8.36	OK
38	0.010	0.230	4.54	OK
39	0.054	0.230	23.49	OK
40	0.014	0.230	6.17	OK

## 7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

### 7.1. Block Diagram of Test Setup



(EUT: Uninterruptible Power System)

### 7.2. Measuring Standard

EN 61000-3-3:2013

### 7.3. Operation Condition of EUT

Same as Section 4.4, except the test setup replaced as Section 7.1.

### 7.4. Measuring Results

**PASS.**

Please see the attached page.



## 8. IMMUNITY PERFORMANCE CRITERIA DESCRIPTION

### Performance Level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

1. Based on the used product standard
2. Based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

Definition: normal performance within limits specified by the manufacturer, requestor and purchaser.

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Criterion B:

Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

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. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Criterion C:

Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention.

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Criterion D

Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data.



## 9. ELECTROSTATIC DISCHARGE IMMUNITY TEST

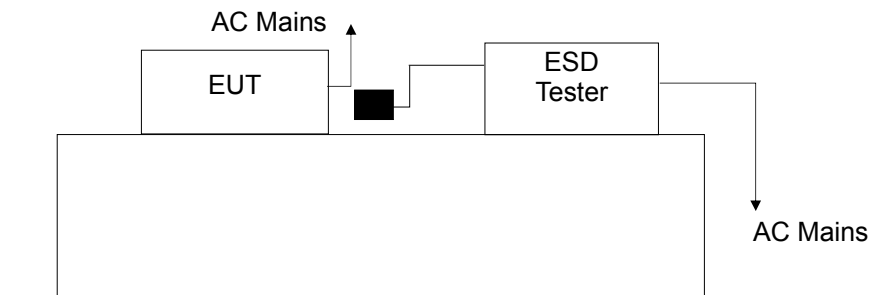
### 9.1. Block Diagram of Test Setup

#### 9.1.1. Block diagram of connection between the EUT and simulators



(EUT: Uninterruptible Power System)

#### 9.1.2. Block diagram of ESD test setup



(EUT: Uninterruptible Power System)

### 9.2. Test Standard

IEC 61000-4-2:2008 (Air Discharge:  $\pm 8\text{kV}$ , Contact Discharge:  $\pm 4\text{kV}$ )

### 9.3. Severity Levels and Performance Criterion

#### 9.3.1. Severity level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1	$\pm 2$	$\pm 2$
2	$\pm 4$	$\pm 4$
3	$\pm 6$	$\pm 8$
4	$\pm 8$	$\pm 15$
X	Special	Special

#### 9.3.2. Performance criterion: B

##### Performance criteria for immunity tests

	Criterion A	Criterion B
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily

## 9.4. EUT Configuration

The configurations of EUT are listed in Section 4.3.

## 9.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.4. except the test set up was replaced by Section 9.1.

## 9.6. Test Procedure

### 9.6.1. 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

### 9.6.2. Contact Discharge:

All the procedure shall be same as Section 9.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

### 9.6.3. 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.

### 9.6.4. 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.

## 9.7. Test Results

**PASS**

Please refer to the following page.

## Electrostatic Discharge Test Result

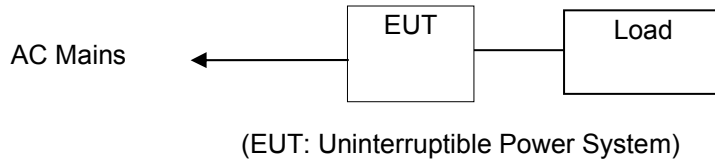
EMTEK(SHENZHEN) CO., LTD.

Applicant : INVT POWER SYSTEM (SHENZHEN) CO., LTD. <hr/> EUT : Uninterruptible Power System <hr/> M/N : HR1101S <hr/> Power Supply : AC 230V/50Hz <hr/> Test Mode : Line mode, Bat mode <hr/> Test Engineer : HE	Test Date : January 13, 2014 <hr/> Temperature : 22°C <hr/> Humidity : 50% <hr/> Criterion : B <hr/> Air discharge : ±8.0kV <hr/> Contact discharge : ±4.0kV	
Location	Kind A-Air Discharge C-Contact Discharge	Result
Slot	A	A
Port	A,C	A
Metal	C	A
Button	A	A
Screen	A	A
HCP	C	A
VCP of front	C	A
VCP of rear	C	A
VCP of left	C	A
VCP of right	C	A

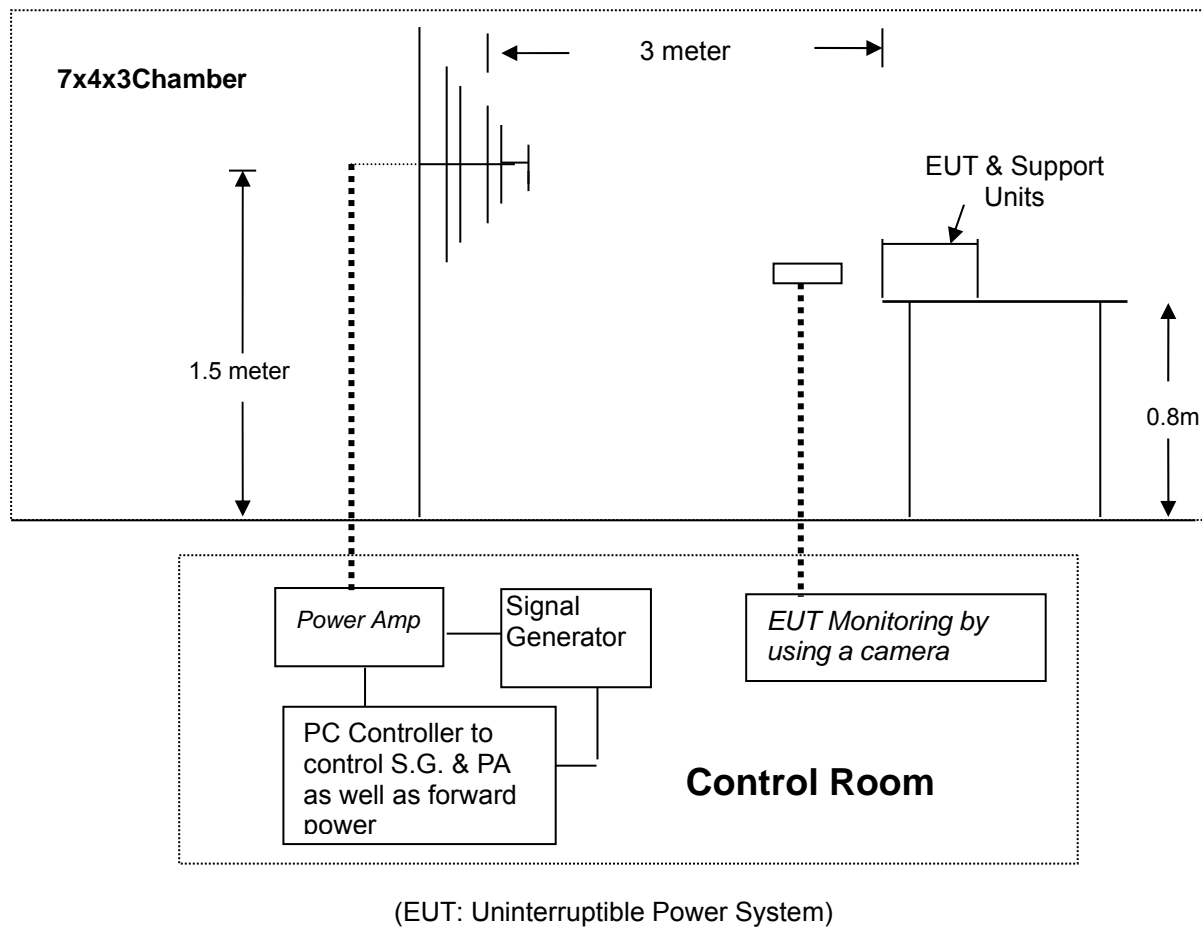
## 10. RF FIELD STRENGTH SUSCEPTIBILITY TEST

### 10.1. Block Diagram of Test Setup

#### 10.1.1. Block diagram of connection between the EUT and Load



#### 10.1.2. Block diagram of RS test setup



### 10.2. Test Standard

IEC 61000-4-3:2006+A1:2007+A2:2010 (Level 3: 10V/m)

### 10.3. Severity Levels and Performance Criterion

#### 10.3.1. Severity Levels

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

#### 10.3.2. Performance Criterion: A

##### Performance criteria for immunity tests

	Criterion A	Criterion B
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily

### 10.4. EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

### 10.5. Operating Condition of EUT

Same as radiated emission measurement which is listed in Section 4.4, except the test setup replaced as Section 10.1.

### 10.6. 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 it. All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	10V/m
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

### 10.7. Test Results

**PASS.**

Please refer to the following page.

## RF Field Strength Susceptibility Test Results

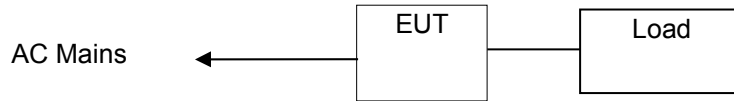
EMTEK(SHENZHEN) CO., LTD.

<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border-bottom: 1px solid black;">Applicant</td><td style="border-bottom: 1px solid black;">: INVT POWER SYSTEM (SHENZHEN) CO., LTD.</td></tr> <tr><td style="border-bottom: 1px solid black;">EUT</td><td style="border-bottom: 1px solid black;">: Uninterruptible Power System</td></tr> <tr><td style="border-bottom: 1px solid black;">M/N</td><td style="border-bottom: 1px solid black;">: HR1101S</td></tr> <tr><td style="border-bottom: 1px solid black;">Field Strength</td><td style="border-bottom: 1px solid black;">: 10V/m</td></tr> <tr><td style="border-bottom: 1px solid black;">Power Supply</td><td style="border-bottom: 1px solid black;">: AC 230V/50Hz</td></tr> <tr><td style="border-bottom: 1px solid black;">Test Engineer</td><td style="border-bottom: 1px solid black;">: He</td></tr> </table>	Applicant	: INVT POWER SYSTEM (SHENZHEN) CO., LTD.	EUT	: Uninterruptible Power System	M/N	: HR1101S	Field Strength	: 10V/m	Power Supply	: AC 230V/50Hz	Test Engineer	: He	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border-bottom: 1px solid black;">Test Mode:</td><td style="border-bottom: 1px solid black;">Line mode, Bat mode</td></tr> <tr><td style="border-bottom: 1px solid black;">Temperature:</td><td style="border-bottom: 1px solid black;">22°C</td></tr> <tr><td style="border-bottom: 1px solid black;">Humidity :</td><td style="border-bottom: 1px solid black;">50%</td></tr> <tr><td style="border-bottom: 1px solid black;">Criterion:</td><td style="border-bottom: 1px solid black;">A</td></tr> <tr><td style="border-bottom: 1px solid black;">Test Date</td><td style="border-bottom: 1px solid black;">January 13, 2014</td></tr> <tr><td style="border-bottom: 1px solid black;">Frequency Range:</td><td style="border-bottom: 1px solid black;">80 to 1000 MHz</td></tr> </table>	Test Mode:	Line mode, Bat mode	Temperature:	22°C	Humidity :	50%	Criterion:	A	Test Date	January 13, 2014	Frequency Range:	80 to 1000 MHz
Applicant	: INVT POWER SYSTEM (SHENZHEN) CO., LTD.																								
EUT	: Uninterruptible Power System																								
M/N	: HR1101S																								
Field Strength	: 10V/m																								
Power Supply	: AC 230V/50Hz																								
Test Engineer	: He																								
Test Mode:	Line mode, Bat mode																								
Temperature:	22°C																								
Humidity :	50%																								
Criterion:	A																								
Test Date	January 13, 2014																								
Frequency Range:	80 to 1000 MHz																								
Modulation: <input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM    1kHz    80%																									
	Frequency Rang 1: 80~ 1000MHz	Frequency Rang 2: N/A																							
	Horizontal	Vertical	Horizontal	Vertical																					
Front	A	A																							
Right	A	A																							
Rear	A	A																							
Left	A	A																							
<b>Test Equipment :</b> 1. Signal Generator: N5181A (Agilent) 2. Power Amplifier: 80RF1000-175 (MILMEGA) & AS1860-50 (MILMEGA) 3. Log.-Per. Antenna: VULP 9118E (SCHWARZBECK) 4. RF Power Meter. Dual Channel: 4232A (BOONTON) 5. Field Strength Meter: RSS1006A (DARE)																									

## 11. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

### 11.1. Block Diagram of Test Setup

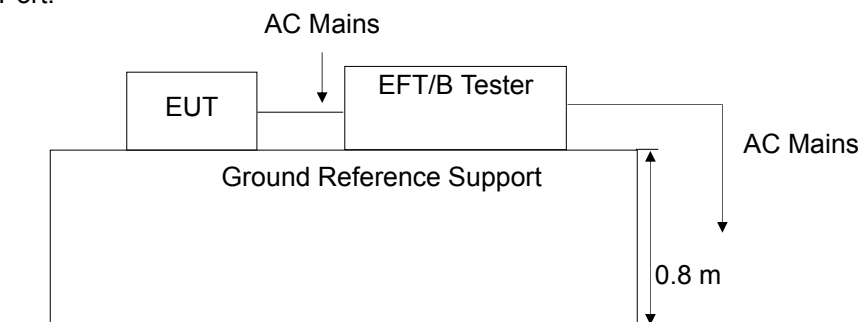
#### 11.1.1. Block Diagram of the EUT



(EUT: Uninterruptible Power System)

#### 11.1.2. EFT Test Setup

AC Port:



(EUT: Uninterruptible Power System)

### 11.2. Test Standard

IEC 61000-4-4:2012 (Level 3: 2kV/5kHz for AC mains)

### 11.3. Severity Levels and Performance Criterion

#### 11.3.1. Severity level

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

#### 11.3.2. Performance criterion: B

##### Performance criteria for immunity tests

	Criterion A	Criterion B
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily

## 11.4.EUT Configuration

The configurations of EUT are listed in Section 4.3.

## 11.5.Operating Condition of EUT

11.5.1.Setup the EUT as shown in Section 11.1.

11.5.2.Turn on the power of all equipments.

11.5.3.Let the EUT work in test mode (Line mode, Bat mode) and measure it.

## 11.6.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.

11.6.1.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 mins.

11.6.2.For signal lines and control lines ports:

It's unnecessary to test.

11.6.3.For DC output line ports:

It's unnecessary to test.

## 11.7.Test Result

**PASS.**

Please refer to the following page.



## Electrical Fast Transient/Burst Test Results

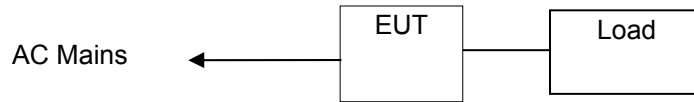
EMTEK(SHENZHEN) CO., LTD.

Standard: IEC 61000-4-4		Result: <input checked="" type="checkbox"/> PASS / <input type="checkbox"/> FAIL	
Applicant : <u>INVT POWER SYSTEM (SHENZHEN) CO., LTD.</u>			
EUT : <u>Uninterruptible Power System</u>			
M/N : <u>HR1101S</u>			
Input Voltage: <u>AC 230V/50Hz</u>			
Criterion : <u>B</u>			
Ambient Condition : <u>23 °C</u>		<u>55% RH</u>	
Operation Mode: Line mode, Bat mode			
Line : <input checked="" type="checkbox"/> AC Mains		Line : <input type="checkbox"/> Signal <input type="checkbox"/> I/O Cable	
Coupling : <input checked="" type="checkbox"/> Direct		Coupling : <input type="checkbox"/> Capacitive	
Test Time : 120s			
Line	Test Voltage	Result(+)	Result(-)
AC input power ports:			
L	2kV	A	A
N	2KV	A	A
PE	2KV	A	A
L、N	2KV	A	A
L、PE	2KV	A	A
N、PE	2KV	A	A
L、N、PE	2KV	A	A
AC output power ports: L	2kV	A	A
N	2kV	A	A
PE	2kV	A	A
L、N	2kV	A	A
L、PE	2kV	A	A
N、PE	2kV	A	A
L、N、PE	2kV	A	A
Test Equipment: Burst Tester Model : PEFT 4010			

## 12. SURGE IMMUNITY TEST

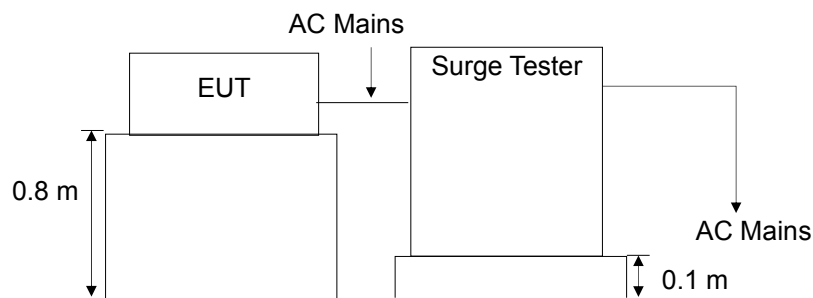
### 12.1. Block Diagram of Test Setup

#### 12.1.1. Block Diagram of the EUT



(EUT: Uninterruptible Power System)

#### 12.1.2. Surge Test Setup



(EUT: Uninterruptible Power System)

### 12.2. Test Standard

IEC 61000-4-5:2014 (Line to Line: Level 2, 1.0kV, Line to earth: Level 3, 2.0kV)

### 12.3. Severity Levels and Performance Criterion

#### 12.3.1. Severity level

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

#### 12.3.2. Performance criterion: B

##### Performance criteria for immunity tests

	Criterion A	Criterion B
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily

## 12.4.EUT Configuration

The configurations of EUT are listed in Section 4.3.

## 12.5.Operating Condition of EUT

12.5.1.Setup the EUT as shown in Section 12.1.

12.5.2.Turn on the power of all equipments.

12.5.3.Let the EUT work in test mode (Line mode) and measure it.

## 12.6.Test Procedure

- 1) Set up the EUT and test generator as shown on Section 12.1.2.  
For line to line coupling mode, provide a 1.0 kV 1.2/50us voltage surge  
For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge.  
(at open-circuit condition) and 8/20us current surge to EUT selected points.
- 2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 3) Different phase angles are done individually.
- 4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

## 12.7.Test Result

**PASS.**

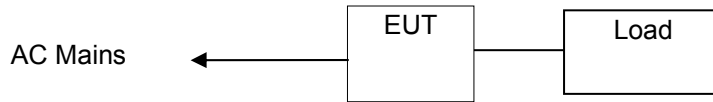
Please refer to the following page.



## 13. INJECTED CURRENTS SUSCEPTIBILITY TEST

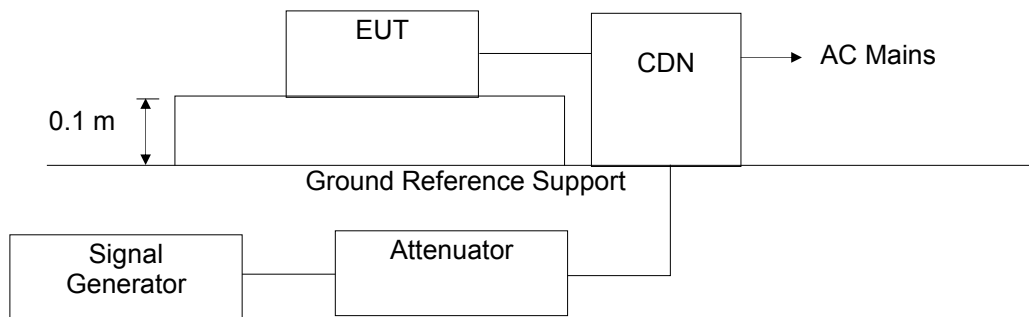
### 13.1. Block Diagram of Test Setup

#### 13.1.1. Block Diagram of the EUT



(EUT: Uninterruptible Power System)

#### 13.1.2. Block Diagram of Test Setup



(EUT: Uninterruptible Power System)

### 13.2. Test Standard

IEC 61000-4-6:2013 (Level 3: 10V (rms), (0.15MHz ~ 80MHz))

### 13.3. Severity Levels and Performance Criterion

#### 13.3.1. Severity level

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

### 13.3.2.Performance criterion: A

#### Performance criteria for immunity tests

	Criterion A	Criterion B
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily

### 13.4.EUT Configuration

The configurations of EUT are listed in Section 4.3.

### 13.5.Operating Condition of EUT

13.5.1.Setup the EUT as shown in Section 13.1.

13.5.2.Turn on the power of all equipments.

13.5.3.Let the EUT work in test mode (Line mode) and measure it.

### 13.6.Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 13.1.2.
- 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 device) 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 10V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
- 7) The rate of sweep shall not exceed  $1.5 \cdot 10^{-3}$  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.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

### 13.7.Test Results

**PASS.**

Please refer to the following page.

## Injected Currents Susceptibility Test Results

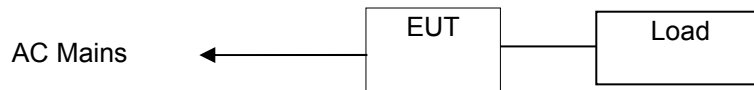
EMTEK(SHENZHEN) CO., LTD.

Applicant : <u>INVT POWER SYSTEM (SHENZHEN) CO., LTD.</u> EUT : <u>Uninterruptible Power System</u> M/N : <u>HR1101S</u> Power Supply : <u>AC 230V/50Hz</u> Test Engineer : <u>HE</u>			Test Date: <u>January 13, 2014</u> Temperature : <u>23°C</u> Humidity : <u>50%</u>	
Test Mode : <u>Line mode</u>				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	10V	A	A
0.15 ~ 80	AC Output	10V	A	A
Remark : 1. Modulation Signal:1kHz 80% AM Measurement Equipment : Simulator: CWS 500 (SWITZERLAND EMTEST) CDN : <input type="checkbox"/> CDN-M2 (SWITZERLAND EMTEST) <input checked="" type="checkbox"/> CDN-M3 (SWITZERLAND EMTEST) <input type="checkbox"/> Injection Clamp (EMTEST F-2031-23MM)				

## 14. MAGNETIC FIELD SUSCEPTIBILITY TEST

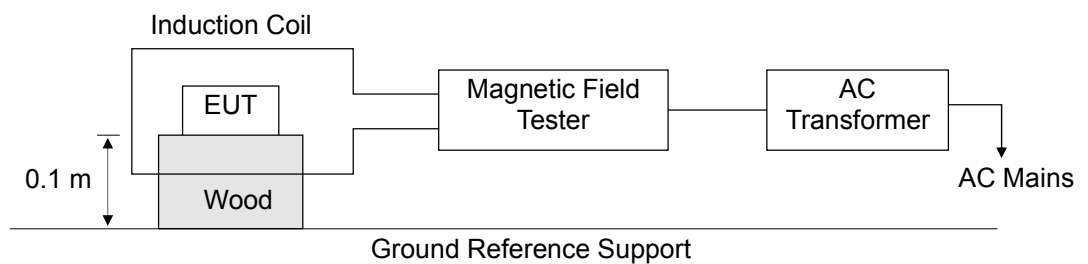
### 14.1. Block Diagram of Test Setup

#### 14.1.1. Block diagram of test setup



(EUT: Uninterruptible Power System)

#### 14.1.2. Magnetic field test setup



(EUT: Uninterruptible Power System)

### 14.2. Test Standard

IEC 61000-4-8:2009 (Severity Level 4: 30A/m)

### 14.3. Severity Levels and Performance Criterion

#### 14.3.1. Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

#### 14.3.2. Performance Criterion: A

##### Performance criteria for immunity tests

	Criterion A	Criterion B
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily



#### 14.4.EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

#### 14.5.Test Procedure

The EUT is placed in the middle of a induction coil (1\*1m), under which is a 1\*1\*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

#### 14.6.Test Results

**PASS.**

Please refer to the following page.

## Magnetic Field Immunity Test Result

EMTEK(SHENZHEN) CO., LTD.

Standard: IEC 61000-4-8	Result: <input checked="" type="checkbox"/> Pass / <input type="checkbox"/> Fail			
<p>Applicant : <u>INVT POWER SYSTEM (SHENZHEN) CO., LTD.</u></p> <hr/> <p>EUT : <u>Uninterruptible Power System</u> M/N: <u>HR1101S</u></p> <p>Input Voltage : <u>230V</u> / <u>50Hz</u></p> <p>Date of Test : <u>January 13, 2014</u> Test Engineer: <u>HE</u></p> <p>Ambient Condition : Temp : <u>22°C</u> Humid: <u>50%</u></p> <p>Criterion : A</p>				
Operation Mode : <u>Line mode, Bat mode</u>				
Test Level (A/m)	Testing Duration	Coil Orientation	Criterion	Result
30	5 mins	X	A	A
30	5 mins	Y	A	A
30	5 mins	Z	A	A
Test Equipment : Magnetic Field Test : HEAFELY MAG 100.1				

## 15. VOLTAGE DIPS AND INTERRUPTIONS TEST

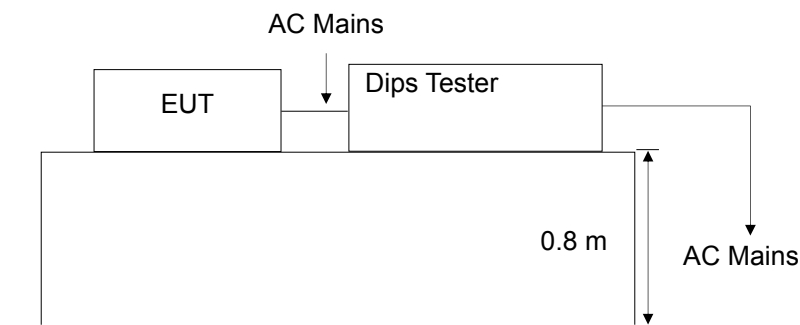
### 15.1. Block Diagram of Test Setup

#### 15.1.1. Block Diagram of the EUT



(EUT: Uninterruptible Power System)

#### 15.1.2. Dips Test Setup



(EUT: Uninterruptible Power System)

### 15.2. Test Standard

IEC 61000-4-11:2004

### 15.3. Severity Levels and Performance Criterion

#### 15.3.1. Severity level

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

15.3.2.Performance criterion: A

**Performance criteria for immunity tests**

	<b>Criterion A</b>	<b>Criterion B</b>
Output characteristics	Voltage permitted to vary only within the steady-state characteristics applicable ( 100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)	Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3)
External and internal indications and metering	Change only during test	Change only during test
Control signals to external devices	No change	Change only temporarily in consistency with the actual UPS mode of operation
Mode of operation	No change	Change only temporarily

**15.4.EUT Configuration**

The configurations of EUT are listed in Section 4.3.

**15.5.Operating Condition of EUT**

15.5.1.Setup the EUT as shown in Section 15.1.

15.5.2.Turn on the power of all equipments.

15.5.3.Let the EUT work in test mode (Line mode) and measure it.

**15.6.Test Procedure**

15.6.1.Set up the EUT and test generator as shown on Section 15.1.2.

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

15.6.3.Record any degradation of performance.

**15.7.Test Result**

**PASS.**

Please refer to the following page.

## Voltage Dips and Interruptions Test Results

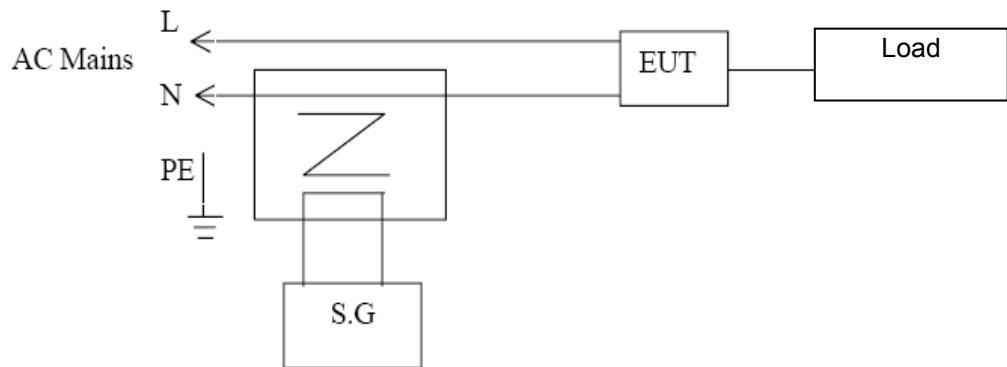
EMTEK(SHENZHEN) CO., LTD.

Applicant: <u>INVT POWER SYSTEM (SHENZHEN) CO., LTD.</u>		Test Date : <u>January 13, 2014</u>		
EUT : <u>Uninterruptible Power System</u>		Temperature : <u>22°C</u>		
M/N : <u>HR1101S</u>		Humidity : <u>50%</u>		
Power Supply : <u>AC230V/50Hz</u>		Test Engineer : <u>HE</u>		
Test Mode: <u>Line mode</u>				
Test Level % U <sub>T</sub>	Voltage Dips & Short Interruptions % U <sub>T</sub>	Duration (in periods)	Criterion <input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D	Result
0	100	0.5P	B	A
0	100	1P	B	A
70	30	25P	B	A
0	100	250P	B	A
Test Equipment : HEAFELY: Pline1610				

## 16. LOW FREQUENCY SIGNALS TEST

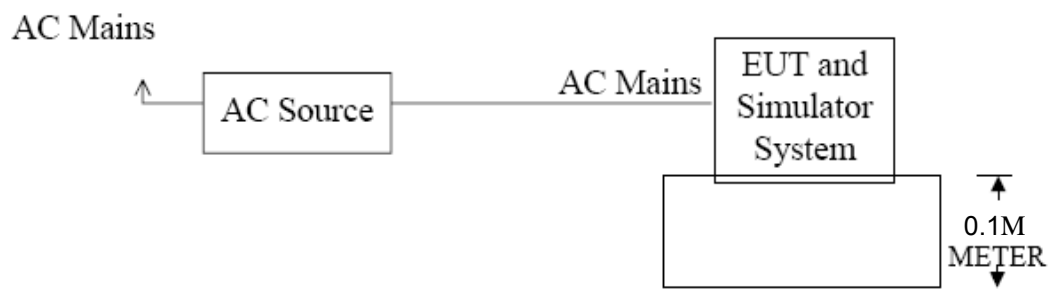
### 16.1. Block Diagram of Test Setup

#### 16.1.1. Block Diagram of the EUT



(EUT: Uninterruptible Power System)

#### 16.1.2. Block Diagram of Test Setup



(EUT: Uninterruptible Power System)

### 16.2. Test Standard

EN 61000-2-2:2002, Performance: A

### 16.3. Operating Condition of EUT

Same as Section 4.5, Except the test setup replaced by Section 16.1.

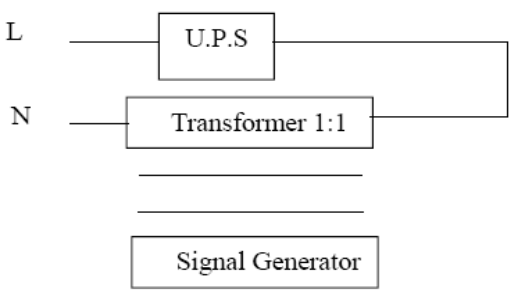
### 16.4. Test Results

**PASS.**

Please refer to following page.

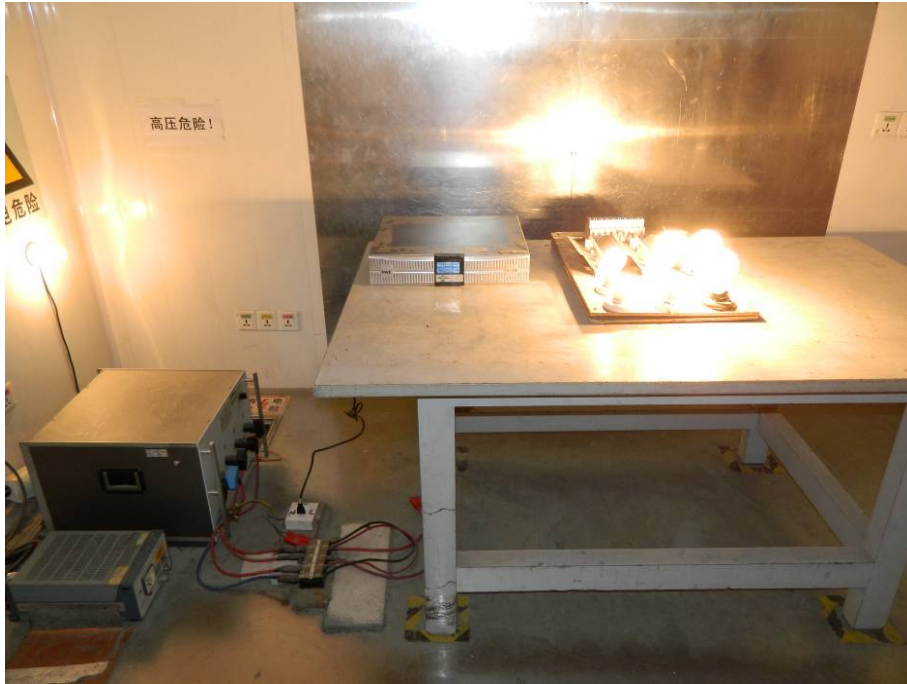
## Low Frequency Signals Test Result

EMTEK(SHENZHEN) CO., LTD.

Applicant : <u>INVT POWER SYSTEM (SHENZHEN) CO., LTD.</u> EUT : <u>Uninterruptible Power System</u> M/N : <u>HR1101S</u> Power Supply : <u>AC 230V/50Hz</u> Test Engineer : <u>HE</u>			Test Date: <u>January 13, 2014</u> Temperature : <u>21°C</u> Humidity : <u>50%</u> Test Mode : <u>Line mode, Bat mode</u>	
Frequency Range (Hz)	Position	Strength	Result	Note
140	See Fig.1	10V(rms) Sinusoidal	A	N/A
160			A	
200			A	
240			A	
280			A	
320			A	
360			A	
Note: 			Test Equipment: 1. Isolation transformer Primary: Secondary=1:1 2. Signal Generator AC Source: 65930 (Chroma)	

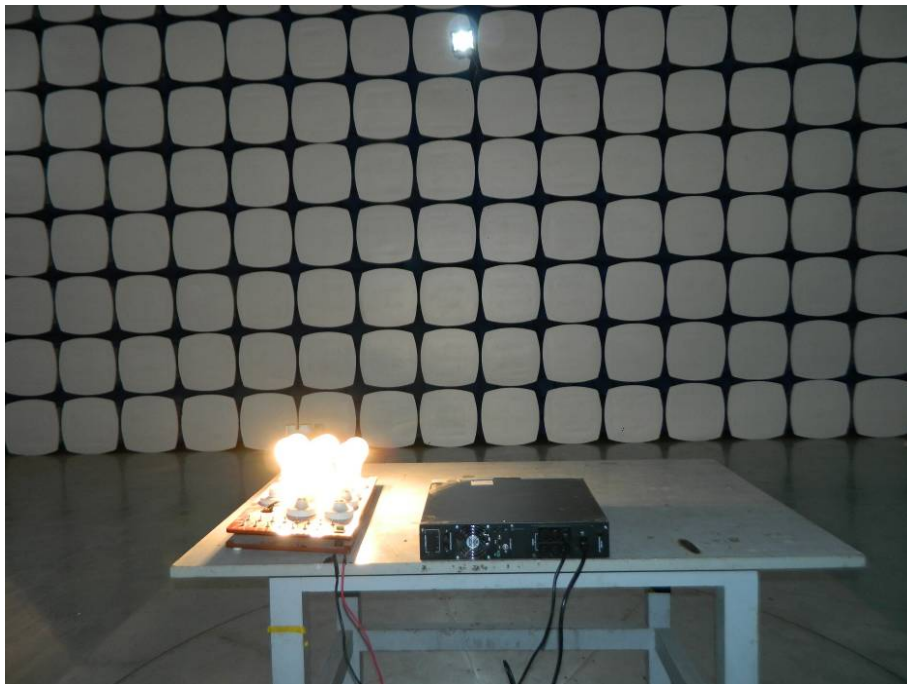
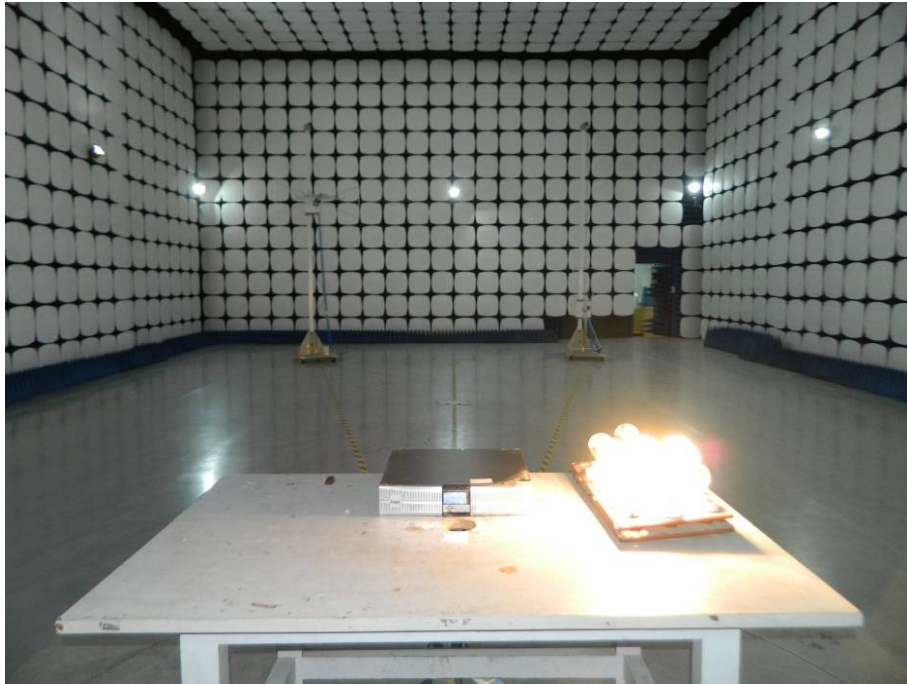
## 17. TEST PHOTOGRAPHS

### 17.1. Photo of Conducted Emission Measurement





17.2.Photo of Radiation Emission Measurement



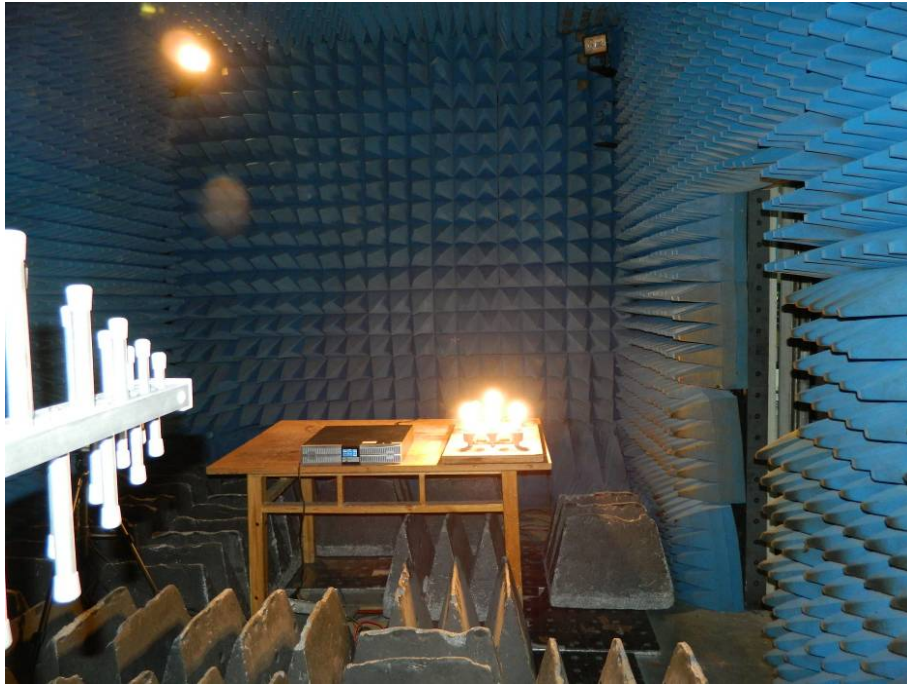
### 17.3.Photo of Harmonic / Flick Measurement



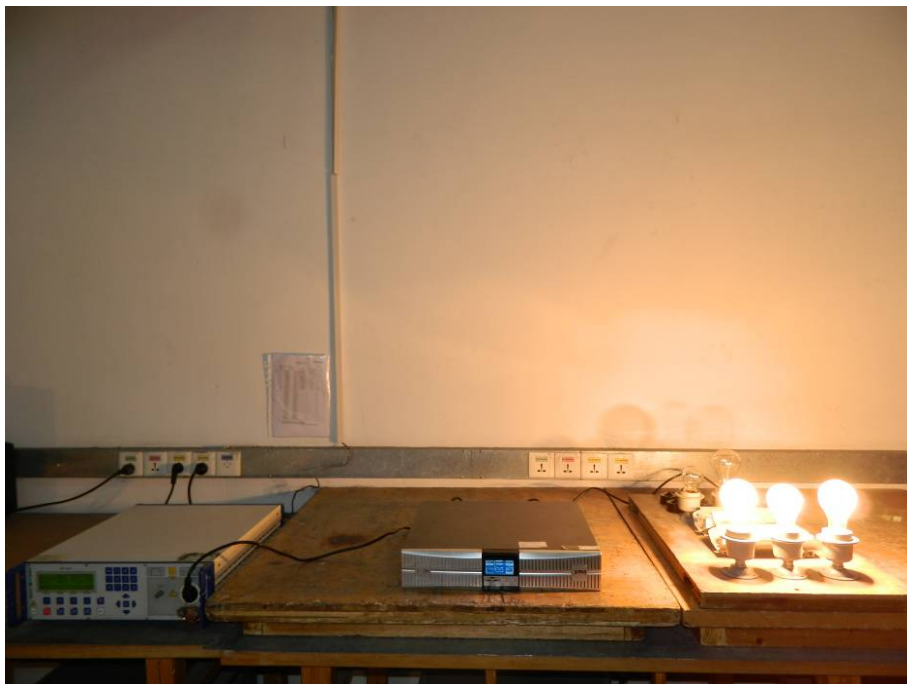
### 17.4.Photo of Electrostatic Discharge Test



17.5. Photo of RF Field Strength Susceptibility Test

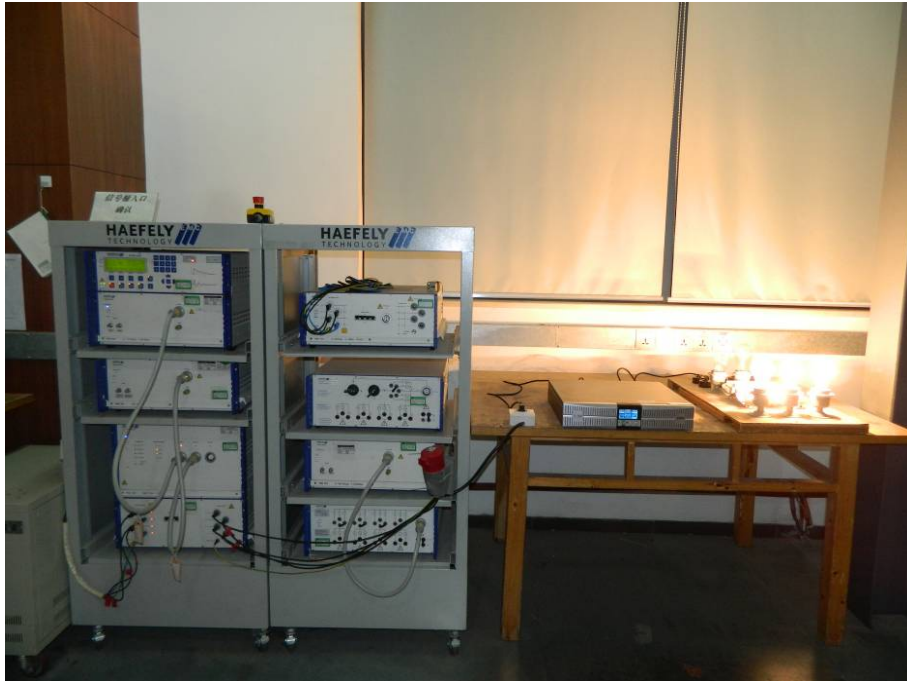


17.6. Photo of Electrical Fast Transient / Burst Test





17.7.Photo of Surge Test



17.8.Photo of Injected Currents Susceptibility Test



17.9.Photo of Magnetic Field Immunity Test



17.10.Photo of Voltage Dips and Interruptions Test



17.11.Photo of Low Frequency Signals Test



# APPENDIX (PHOTOS OF EUT)







