

EMC TEST REPORT

for

TPV Electronics (FuJian) Co., Ltd.

LCD Monitor

Brand Name	Model Number
NEC	E221N
	M225AY

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TEST REPORT VERIFICATION

Applicant : TPV Electronics (FuJian) Co., Ltd.

Product : LCD Monitor

(A) Brand Name
& Model No

Brand Name	Model No
NEC	E221N
	M225AY

(B) Serial No : N/A

(C) Supply Voltage : AC 100V-240V, 50/60Hz

(D) Test Voltage : AC 230V/50Hz, AC 100V/50Hz

Measurement Standard Used:

EN 55032: 2012+AC: 2013

CISPR 32: 2012 (AS/NZS CISPR 32: 2013)

EN 61000-3-2: 2014, EN 61000-3-3: 2013

EN 55024: 2010+A1:2015

(IEC 61000-4-2: 2008, IEC 61000-4-3: 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)

The device described above is tested by Audix Technology (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 test results are contained in this test report and Audix Technology (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the requirements of EN 55032, EN 61000-3-2, EN 61000-3-3 and EN 55024 standards.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shenzhen) Co., Ltd.

Date of Test : Jul.28~Aug.05,2016

Report of date: Aug.11,2016

Prepared by :

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Brave Zhang / Assistant

Reviewed by :

Bensun Chen

Bensun Chen / Deputy Manager

Approved & Authorized Signer :



信華科技(深圳)有限公司
Audix Technology (Shenzhen) Co., Ltd.
EMC 部門報告專用章

Stamp only for EMC Dept. Report

Signature: *David Jin*

David Jin / Manager

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT has been tested according to the applicable standards as referenced below.

EMISSION				
Description of Test Item	Standard	Results	Remark	
Conducted emission at mains terminals	EN 55032: 2012+AC:2013	PASS	Minimum passing margin is 15.57dB at 2.594MHz	
Conducted emission at telecommunication port	EN 55032: 2012+AC:2013	N/A	N/A	
Radiated emission (30-1000MHz)	EN 55032: 2012+AC:2013	PASS	Minimum passing margin is 7.13dB at 115.36MHz	
Radiated emission (1-6GHz)	EN 55032: 2012+AC:2013	PASS	Minimum passing margin is 17.07dB at 1275.20MHz	
Harmonic current emissions	EN 61000-3-2: 2014	PASS	Meets the Class D requirement	
Voltage fluctuations & flicker	EN 61000-3-3: 2013	PASS	Meets the requirement	
IMMUNITY (EN 55024: 2010+A1:2015)				
Description of Test Item	Basic Standard	Results	Performance Criteria	Observation Criteria
Electrostatic discharge (ESD)	IEC 61000-4-2: 2008	PASS	B	A & B
Radiated, radio-frequency, electromagnetic field immunity test	IEC 61000-4-3: 2010	PASS	A	A
Electrical fast transient (EFT)	IEC 61000-4-4: 2012	PASS	B	A & B
Surge (Input a.c. power port)	IEC 61000-4-5: 2014	PASS	B	A & B
Surge(Telecommunication port)		N/A	N/A	N/A
Radio-frequency, Continuous conducted emission	IEC 61000-4-6: 2013	PASS	A	A
Power frequency magnetic field	IEC 61000-4-8: 2009	PASS	A	A
Voltage dips, >95% reduction	IEC 61000-4-11: 2004	PASS	B	A
Voltage dips, 30% reduction		PASS	C	A
Voltage interruptions		PASS	C	B
N/A is an abbreviation for Not Applicable.				

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product : LCD Monitor

Brand Name
& Model No.

Brand Name	Model No.
NEC	E221N
	M225AY

Above all models difference are in sales marketing.

Applicant : TPV Electronics (FuJian) Co., Ltd.
Rongqiao Economic and Technological Development Zone,
Fuqing City, Fujian Province, P.R. China

Max. Resolution : 1920*1080@60Hz

Max. Work Frequency : 148.5MHz

Panel : L&T, M/N: LM215WF9

I/O Port : (1)One AC In Port
(2)One HDMI Port
(3)One VGA Port
(4)One Display Port
(5)One Audio In Port
(6)One Audio Out Port

VGA Cable : Shielded, Detachable, 1.8m/1.5m(with two cores)

HDMI Cable : Shielded, Detachable, 1.8m/1.5m

Audio Cable : Shielded, Detachable, 1.8m/1.5m

Display Cable : Shielded, Detachable, 1.8m/1.5m

Power Cord : Unshielded, Detachable, 1.8m/1.5m (3 pins)

Date of Test : Jul.28~Aug.05,2016

Date of Receipt : Jul.25,2016

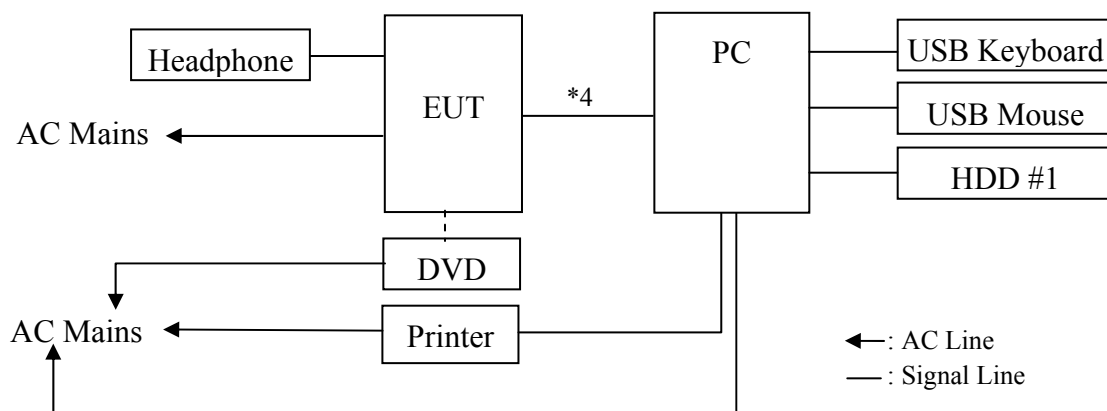
Sample Type : Prototype production

2.2. Tested Supporting System Details

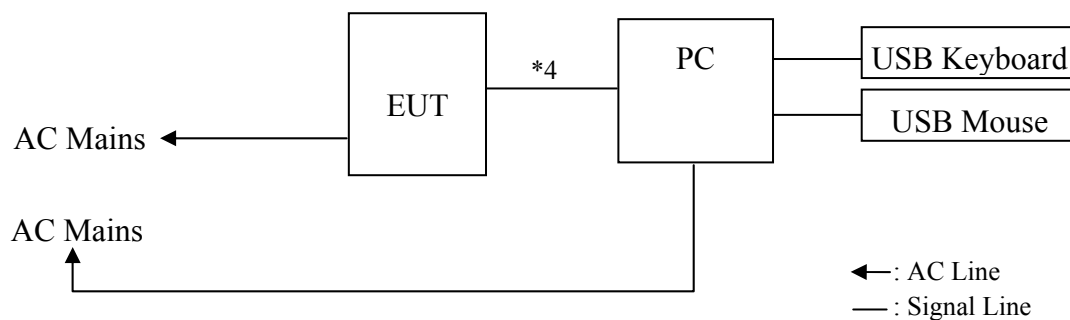
No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	Personal Computer	Test PC S	DELL	Vostro 470	2SP05W1
		Power Cord: Unshielded, Detachable, 1.8m Display Card: (VGA+DVI+HDMI)			
2.	USB Keyboard	ACS-EMC- K03R	DELL	SK-8120	CN-ODJ365-71616-2BE-0DCE-A00
		Data Cable: Shielded, Undetachable, 2.0m			
3.	USB Mouse	ACS-EMC-M03R	DELL	M0C5UO	512023253
		Data Cable: Shielded, Undetachable, 1.8m			
4.	Printer	ACS-EMC-PT04	HP	C9079A	--
		USB Cable: Shielded, Detachable, 1.8m Power Cord: Unshielded, Detachable, 1.8m			
5.	HDD	ACS-EMC-HDD01	Terasys	F12-UF	A0100215-5390031
		USB Cable: Shielded, Detachable, 1.8m			
6.	DVD Player	--	PHILIPS	BDP3100/12	--
		Power Cord: Unshielded, Detachable , 1.8m			
7.	Headphone	ACS-EMC-EP01	OVANN	OV880V	N/A
		Data Cable: Shielded, Undetachable, 1.2m			

2.3. Block Diagram of connection between EUT and simulators

For EMI Tests



For EMS Tests



**Remark: PC Mode, DVD Mode can not link the HDMI port at the same time.
(EUT: LCD Monitor)**

2.4. Test Facility

Site Description

Name of Firm	: Audix Technology (Shenzhen) Co., Ltd. No. 6, Kefeng Road, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China
3m Anechoic Chamber	: Certificated by FCC, USA Registration Number: 90454 Valid Date: Jul.12, 2017
3m & 10m Anechoic Chamber	: Certificated by FCC, USA Registration Number: 794232 Valid Date: Jul.12, 2017
EMC Lab.	: Certificated by DAkkS, Germany Registration No: D-PL-12151-01-00 Valid Date: Dec.15, 2016 Accredited by NVLAP, USA NVLAP Code: 200372-0 Valid Date: Mar.31, 2017

2.5. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test in No. 2 Conduction	2.4dB (150kHz to 30MHz)
Uncertainty for Radiation Emission test in 10m chamber (Distance: 10m)	3.0dB (30~200MHz, Polarization: H)
	3.0dB (30~200MHz, Polarization: V)
	3.2dB (200M~1GHz, Polarization: H)
	3.2dB (200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 10m chamber (1GHz-18GHz)	4.6dB (1-6GHz, Distance: 3m)
	4.8dB (6-18GHz, Distance: 3m)
Uncertainty for S_{VSWR} in 10m Chamber	2.8dB (1-6GHz, Distance: 3m)
	2.8dB (6-18GHz, Distance: 3m)
Uncertainty for Flicker test	5.2%
Uncertainty for Harmonic test	9.4%
Uncertainty for C/S Test	1.4dB (Using CDN test)
	3.2dB (Using EM clamp test)
Uncertainty for R/S Test	1.8dB (80MHz~200MHz)
	1.8dB (200MHz~1000MHz)
Uncertainty for Magnetic field immunity test	2%
Uncertainty for test site temperature and humidity and Pressure	0.6°C
	3%
	1kPa

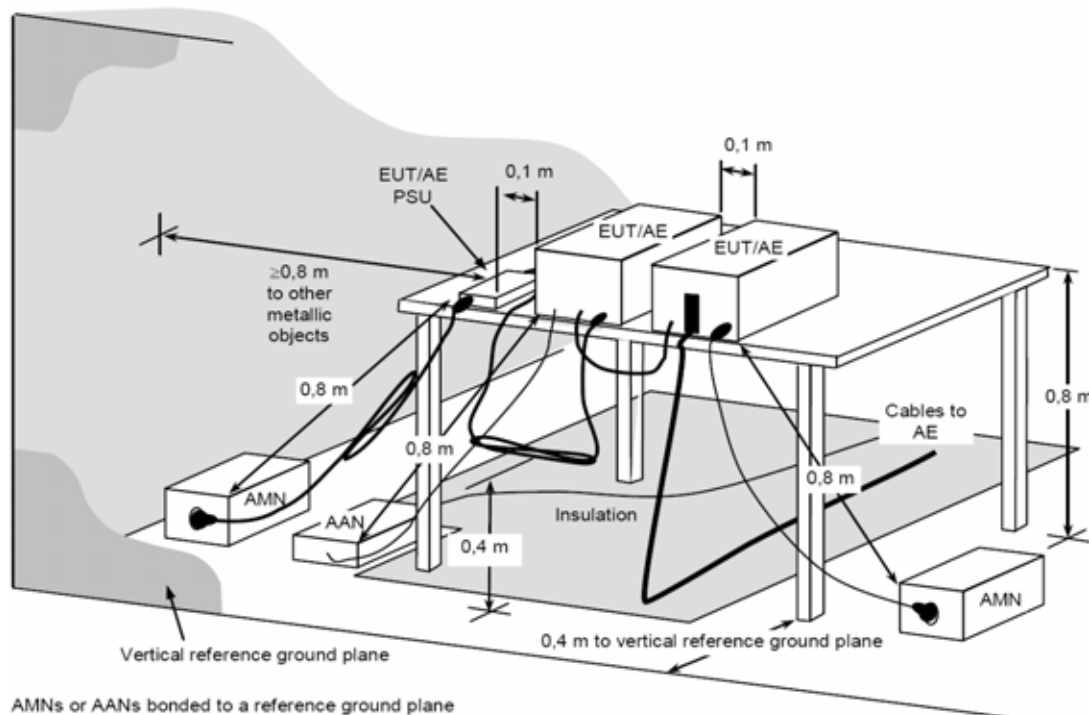
3. CONDUCTED EMISSION AT MAINS TERMINALS TEST

3.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	2# Shielding Room	AUDIX	N/A	N/A	Apr.17,16	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESR3	101931	Apr.24,16	1 Year
3.	L.I.S.N.#1	Rohde & Schwarz	ENV4200	100041	Apr.24,16	1 Year
4.	L.I.S.N.#2	Kyoritsu	KNW-407	8-1636-1	Apr.23,16	1 Year
5.	Terminator	Hubersuhner	50Ω	No.1	May.05.16	1 Year
6.	Terminator	Hubersuhner	50Ω	No.2	May.05.16	1 Year
7.	RF Cable	Fujikura	RG-55/U	No.1	Apr.24,16	1 Year
8.	Coaxial Switch	Anritsu	MP59B	6201397223	Apr.23,16	1 Year
9.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

3.2. Block Diagram of Test Setup



3.3. Test Standard

EN 55032: 2012+AC: 2013, Class B

3.4. Power Line Conducted Emission at Mains Terminals Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3.5. EUT Configuration on Test

The following equipments are installed on Conducted Emission Test to meet EN 55032 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.5.1. LCD Monitor (EUT)

Model No. : E221N

Serial No. : N/A

3.5.2. Support Equipment : As Tested Supporting System Detail, in Section 2.2.

3.6. Operating Condition of EUT

3.6.1. Setup the EUT and simulator as shown as Section 3.2.

3.6.2. Turn on the power of all equipments.

3.6.3. For EMI: PC system sent "Color Bars with moving picture element (ITU-R BT 1729)" to LCD Monitor (EUT) through VGA / Display / HDMI card.

3.6.4. For EMS: PC system ran the Self-test program "EMC Test. exe" by windows XP and sent "H" Character to LCD Monitor (EUT) through VGA / Display / HDMI card, the Screen of EUT displayed and filled with "H" pattern.

3.6.5. The PC system was running the program "1kHz signal playing" and sending sound to EUT.

3.6.6. DVD Mode: The DVD player played DVD Disk and sent "DVD 1kHz Signal Playing" image to the LCD Monitor (EUT).

3.6.7. The EUT is designed with AC power of rating AC 100V-240V, 50/60Hz. AC 230V/50Hz & AC 100V/50Hz (for EN55032 & CISPR 32 & AS/NZS CISPR 32) had been covered during the pre-test. The worst data was found at AC 230V/50Hz and recorded in the applied test report. (For Electromagnetic Interference)

3.6.8. The other peripheral devices were driven and operated in turn during all testing.

3.7. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N. #2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55032 Class B on conducted Emission test.

The bandwidth of test receiver (R & S ESR3) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked. These test results of the conducted disturbance are recorded in section 3.8.

3.8. Conducted Emission at Mains Terminals Test Results

PASS. (All emissions not reported below are too low against the prescribed limits.)

EUT: LCD Monitor

Model No. : E221N

Test Date: Aug.05,2016

Temperature: 23.3℃

Humidity: 51.5%

Pressure: 101.3kPa

The EUT with following test modes were pre-tested:

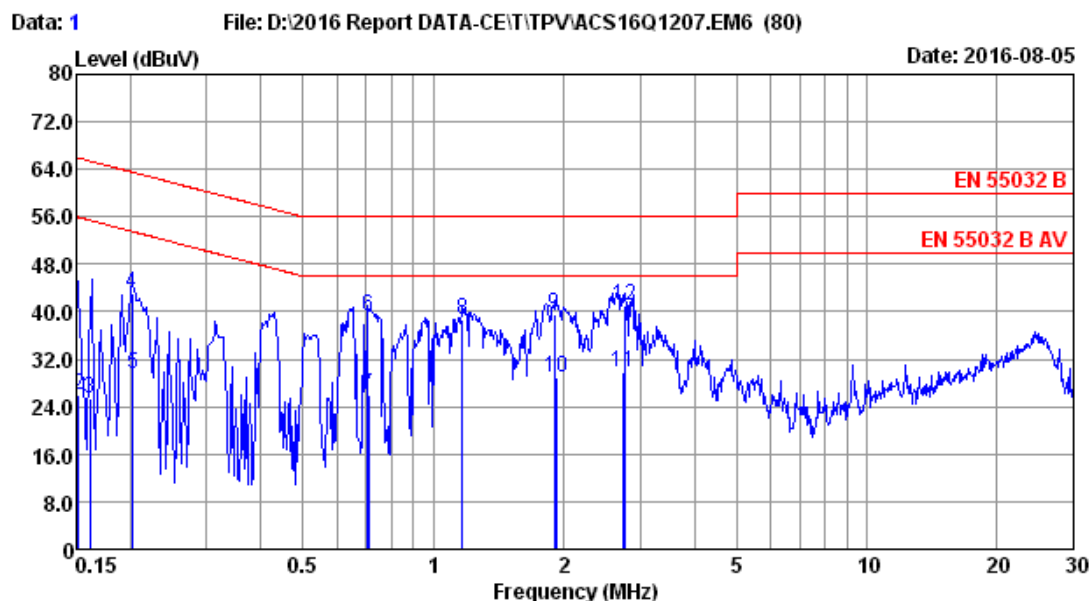
The ECU with following test modes were pre tested.

No.	Test Voltage	Test Mode	Cable Length	Input Port	Resolution & Frequency
1.	AC 230V/50Hz	PC Mode	1.8m	VGA	640*480/60Hz
2.					1280*1024/75Hz
3. ✖					1920*1080/60Hz
4.					1080*1920/60Hz (Panel is Vertical)
5.			1.5m	1920*1080/60Hz	
6.			1.8m	Display	640*480/60Hz
7.					1280*1024/75Hz
8.					1920*1080/60Hz
9.				HDMI	640*480/60Hz
10.					1280*1024/75Hz
11.					1920*1080/60Hz
12.		DVD Mode		HDMI	Color Bar
13.		Standby	---	---	---
14.	AC 100V/50Hz	PC Mode	1.8m	VGA	1920*1080/60Hz

(✖ Worst test mode)

The result of worst test mode is presented in the report as below and the test data are listed in next pages.

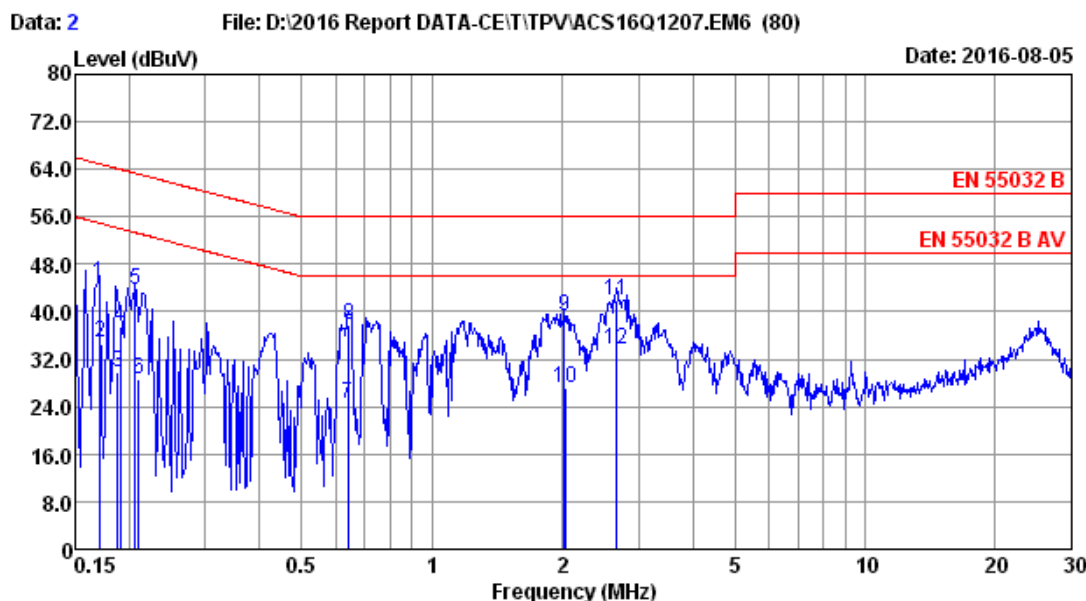
No.	Test Voltage	Test Mode	Cable Length	Input Port	Resolution & Frequency	Reference Test Data No.	
						Line	Neutral
1.	AC 230V/50Hz	PC Mode	1.8m	VGA	1920*1080/60Hz	#1	#2



Site no :2# Conduction Data No :1
 Dis./Lisn :16 ENV4200 L LISN phase:LINE
 Limit :EN 55032 B Pre :101.3kPa
 Env./Ins. :23.3°C/51.5% Engineer :Garry
 EUT :E221N
 Power Rating :AC 230V/50Hz
 Test Mode :VGA:1920*1080@60Hz
 Line:1.8m

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	9.26	0.01	35.33	44.60	66.00	21.40	QP
2	0.152	9.26	0.01	16.59	25.86	55.89	30.03	Average
3	0.162	9.24	0.01	15.99	25.24	55.39	30.15	Average
4	0.202	9.18	0.01	34.05	43.24	63.54	20.30	QP
5	0.203	9.18	0.01	20.35	29.54	53.49	23.95	Average
6	0.705	9.23	0.02	29.88	39.13	56.00	16.87	QP
7	0.710	9.23	0.02	16.59	25.84	46.00	20.16	Average
8	1.166	9.25	0.12	29.22	38.59	56.00	17.41	QP
9	1.898	9.22	0.11	30.21	39.54	56.00	16.46	QP
10	1.920	9.22	0.11	19.51	28.84	46.00	17.16	Average
11	2.750	9.24	0.10	20.48	29.82	46.00	16.18	Average
12	2.765	9.24	0.10	31.72	41.06	56.00	14.94	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector.
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.



Site no	:2# Conduction	Data No	:2
Dis./Lisn	:16 ENV4200 N	LISN phase:	NEUTRAL
Limit	:EN 55032 B	Pre	:101.3kPa
Env./Ins.	:23.3°C/51.5%	Engineer	:Garry
EUT	:E221N		
Power Rating	:AC 230V/50Hz		
Test Mode	:VGA:1920*1080@60Hz		
	Line:1.8m		

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.170	9.22	0.01	35.74	44.97	64.94	19.97	QP
2	0.171	9.22	0.01	25.59	34.82	54.91	20.09	Average
3	0.188	9.20	0.01	20.71	29.92	54.12	24.20	Average
4	0.191	9.19	0.01	28.26	37.46	63.99	26.53	QP
5	0.206	9.18	0.01	34.49	43.68	63.36	19.68	QP
6	0.210	9.18	0.01	19.58	28.77	53.21	24.44	Average
7	0.641	9.18	0.02	15.23	24.43	46.00	21.57	Average
8	0.642	9.18	0.02	28.68	37.88	56.00	18.12	QP
9	2.020	9.23	0.11	30.06	39.40	56.00	16.60	QP
10	2.030	9.23	0.11	17.83	27.17	46.00	18.83	Average
11	2.664	9.23	0.10	32.66	41.99	56.00	14.01	QP
12	2.665	9.23	0.10	24.23	33.56	46.00	12.44	Average

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipments

4.1.1. For frequency range 30MHz~1000MHz (In 10m Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	10m Chamber	AUDIX	N/A	N/A	Mar.01,16	1 Year
2.	EMC Analyzer	Agilent	E7403A	MY42000106	Apr.23,16	1 Year
3.	EMC Analyzer	Agilent	E7405A	MY45116588	Oct.18,15	1 Year
4.	Test Receiver	Rohde & Schwarz	ESCI	100843	Oct.17,15	1 Year
5.	Amplifier	Agilent	8447D	2944A10684	Apr.24,16	1 Year
6.	Amplifier	Agilent	8447D	2944A11140	Apr.24,16	1 Year
7.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-493	Jun.03,16	1 Year
8.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-429	Jan.08,16	1 Year
9.	RF Cable	MIYAZAKI	CFD400-LW(3.5M)	10m Chamber No.1	Apr.24,16	1 Year
10.	RF Cable	MIYAZAKI	CFD400-LW(3.5M)	10m Chamber No.2	Apr.24,16	1 Year
11.	RF Cable	MIYAZAKI	CFD400-LW(22M)	10m Chamber No.5	Apr.24,16	1 Year
12.	RF Cable	MIYAZAKI	CFD400-LW(22M)	10m Chamber No.6	Apr.24,16	1 Year
13.	Coaxial Switch	Anritsu	MP59B	6201397220	Apr.23,16	1 Year
14.	Coaxial Switch	Anritsu	MP59B	6201397221	Apr.23,16	1 Year
15.	Coaxial Switch	Anritsu	MP59B	620313662	Apr.23,16	1 Year
16.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

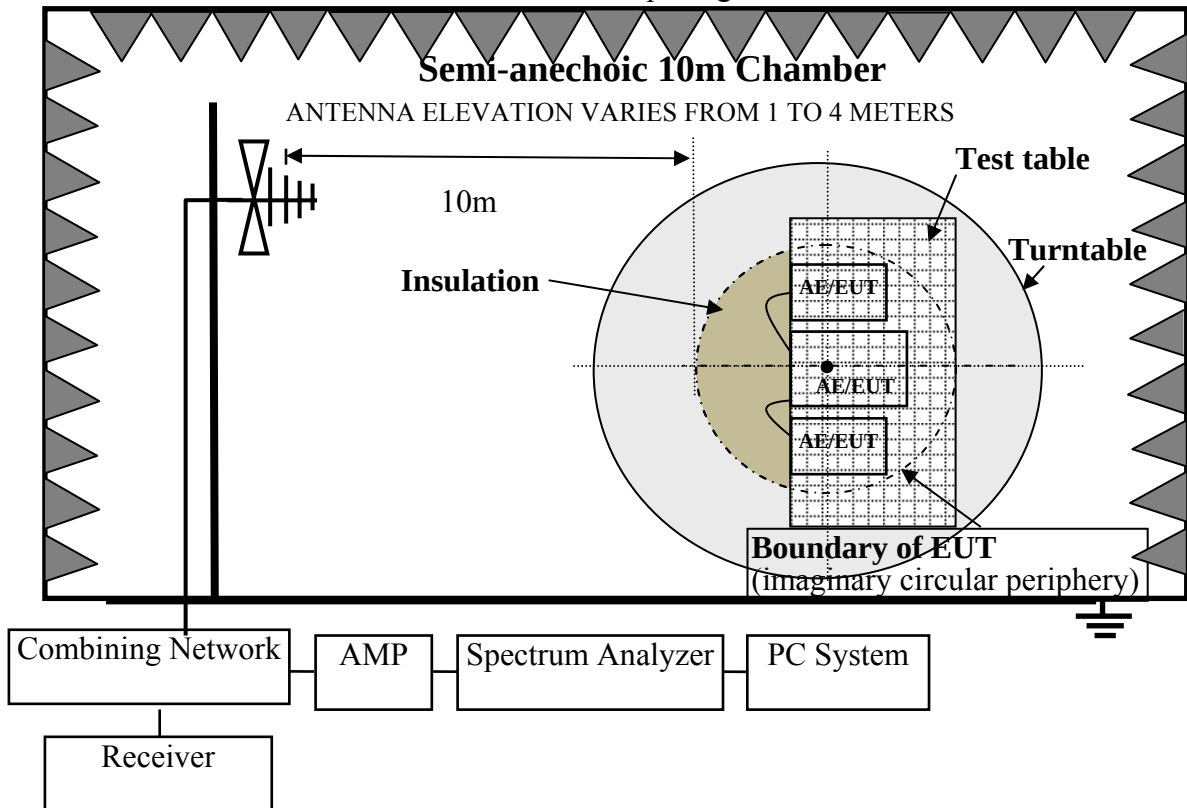
4.1.2. For frequency range 1GHz~6GHz (In 10m Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	10m Chamber	AUDIX	N/A	N/A	Mar.21,16	1 Year
2.	EMC Analyzer	Agilent	N9030A	MY51380221	Oct.18,15	1 Year
3.	Horn Antenna	ETS	3115	9510-4580	Oct.15,15	1 Year
4.	Amplifier	Agilent	83017A	MY53270085	May.17,16	1 Year
5.	RF Cable	Hubersuhner	SUCOFLEX106	505239/6	Apr.24,16	1 Year
6.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

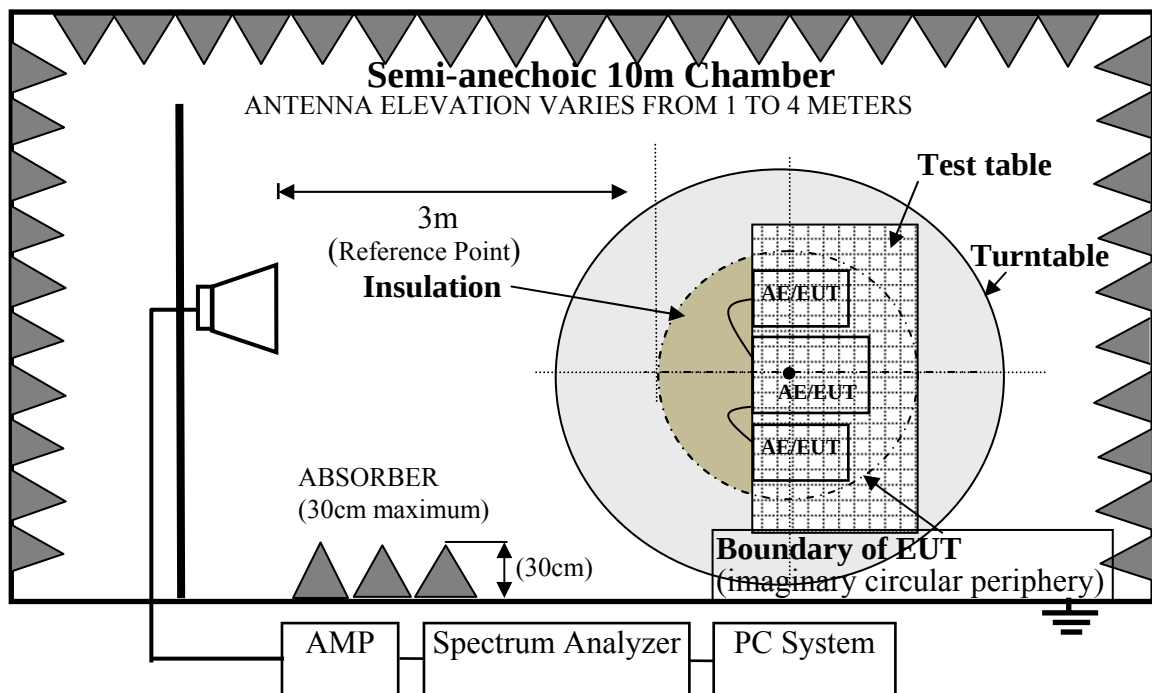
Note: N/A means Not applicable.

4.2. Block Diagram of Test Setup

4.2.1. In 10m Anechoic Chamber Test Setup Diagram for 30-1000MHz



4.2.2. In 10m Anechoic Chamber Test Setup Diagram for 1-6GHz



4.3. Test Standard

EN 55032: 2012+AC: 2013, Class B

4.4. Radiated Emission Limit

All emanations from a Class B computing devices 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 LIMITS (dB μ V/m)
30 ~ 230	10	30
230 ~ 1000	10	37
1000~3000	3	70(Peak) 50(Average)
3000~6000	3	74(Peak) 54(Average)

- Notes: (1) Emission level = Antenna Factor + Cable Loss + Reading
Emission level = Antenna Factor - Amp Factor + Cable Loss + Reading (above 1000MHz)
(2) The lower limit shall apply at the transition frequencies.
(3) Distance refers to the distance in meters between the test instrument antenna and the closed point of any part of the EUT.

4.5. EUT Configuration on Test

The configurations of EUT are listed in Section 3.5.

4.6. Operating Condition of EUT

Same as Conducted Emission test that listed in Section 3.6. Except the test set up replaced by Section 4.2.

4.7. Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane measurement distance was 10m at a semi-anechoic chamber. An antenna was located 10m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all the interface cables were changed according to EN 55032 Class B on Radiated Emission test.

The bandwidth setting on the test receiver (R&S ESCI) is 120 kHz.

The resolution bandwidth of the Agilent Spectrum Analyzer N9030A was set at 1MHz. (For above 1GHz)

The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values.

The frequency range from 1GHz to 6GHz was checked and all final readings of measurement were with Peak and Average detector, measurement distance was 3m at semi-anechoic chamber. The EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. The portion of the test volume that was obstructed by absorber placed on the floor (30cm maximum).

Finally, selected operating situations at Anechoic Chamber measurement, all the test results are listed in section 4.8.

4.8. Radiated Emission Test Results

PASS. (All emissions not reported below are too low against the prescribed limits.)

EUT: LCD Monitor

Model No. : E221N

For frequency range 30MHz~1000MHz

Test Date: Jul.31,2016 Temperature: 23.3℃ Humidity: 51.2% Pressure: 101.6kPa

The EUT with following test modes were pre-tested:

No.	Test Voltage	Test Mode	Cable Length	Input Port	Resolution & Frequency
1.	AC 230V/50Hz	PC Mode	1.8m	Display	640*480/60Hz
2.					1280*1024/75Hz
3. ✖					1920*1080/60Hz
4.					1920*1080/60Hz (Panel is Vertical)
5.			1.5m	1920*1080/60Hz	
6.			1.8m	VGA	640*480/60Hz
7.					1280*1024/75Hz
8.					1920*1080/60Hz
9.				HDMI	40*480/60Hz
10.					1280*1024/75Hz
11.					1920*1080/60Hz
12.		DVD Mode		HDMI	Color Bar
13.		Standby	---	---	---
14.	AC 100V/50Hz	PC Mode	1.8m	Display	1920*1080/60Hz

(✖ Worst test mode)

The result of worst test mode is presented in the report as below and the test data are listed in next pages.

No.	Test Voltage	Test Mode	Cable Length	Input Port	Resolution & Frequency	Reference Test Data No.	
						Horizontal	Vertical
1.	AC 230V/50Hz	PC Mode	1.8m	Display	1920*1080/60Hz	#4	#3

For frequency range 1GHz~6GHz

The EUT with below test modes were measured within Anechoic Chamber and the test results listed in next pages.

Test Date: Aug.04,2016 Temperature: 23.5℃ Humidity: 52.1% Pressure: 101.2kPa

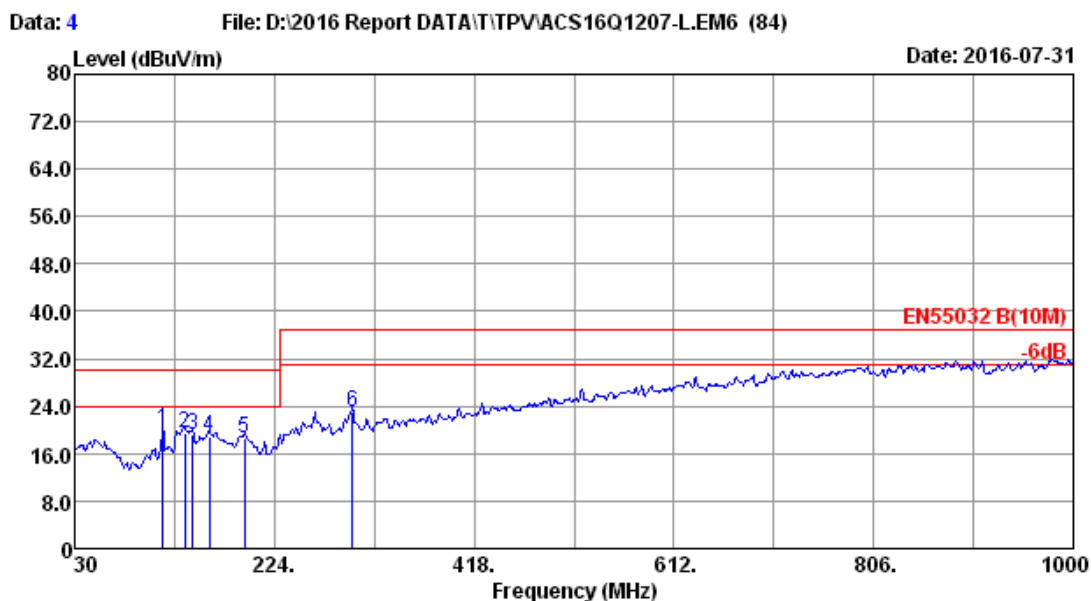
The EUT with following test modes were pre-tested:

No.	Test Voltage	Test Mode	Cable Length	Input Port	Resolution & Frequency
1.	AC 230V/50Hz	PC Mode	1.8m	HDMI	1280*1024/75Hz
2.					1920*1080/60Hz
3.					1080*1920/60Hz (Panel is Vertical)
4.			1.5m		1920*1080/60Hz
5.			1.8m	Display	1280*1024/75Hz
6.					1920*1080/60Hz
7.				VGA	1280*1024/75Hz
8.					1920*1080/60Hz
9.		DVD Mode		HDMI	Color Bar
10.		Standby	---	---	---
11.	AC 100V/50Hz	PC Mode	1.8m	HDMI	1920*1080/60Hz

(※ Worst test mode)

The result of worst test mode is presented in the report as below and the test data are listed in next pages.

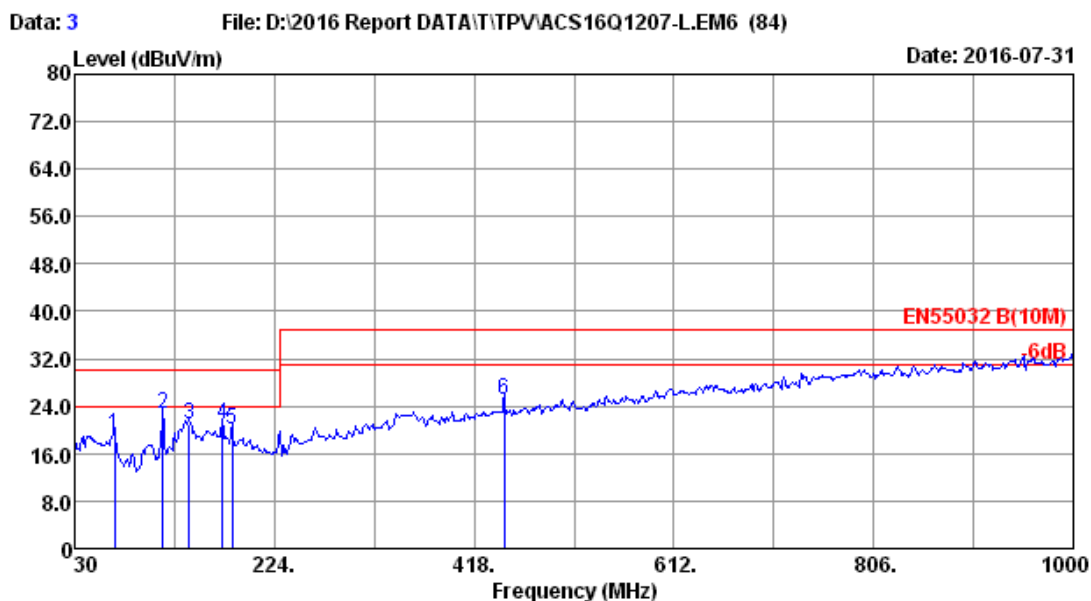
No.	Test Voltage	Test Mode	Cable Length	Input Port	Resolution & Frequency	Reference Test Data No.	
						Horizontal	Vertical
1.	AC 230V/50Hz	PC Mode	1.8m	HDMI	1920*1080/60Hz	#1	#2



Site no. : 10m Chamber Data no. : 4
 Dis. / Ant. : 10m 2016 9168-429 Ant. pol. : HORIZONTAL
 Limit : EN55032 B(10M) Pre : 101.6kPa
 Env. / Ins. : 23.3°C/51.2% Engineer : Augus
 EUT : E221N
 Power rating : AC 230V/50Hz
 Test Mode : Display:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	115.36	10.38	4.74	4.86	19.98	30.00	10.02	QP
2	136.70	12.64	4.83	2.06	19.53	30.00	10.47	QP
3	144.46	13.00	4.86	1.21	19.07	30.00	10.93	QP
4	160.95	12.94	4.93	1.05	18.92	30.00	11.08	QP
5	194.90	10.36	5.07	3.06	18.49	30.00	11.51	QP
6	299.66	13.39	5.61	4.11	23.11	37.00	13.89	QP

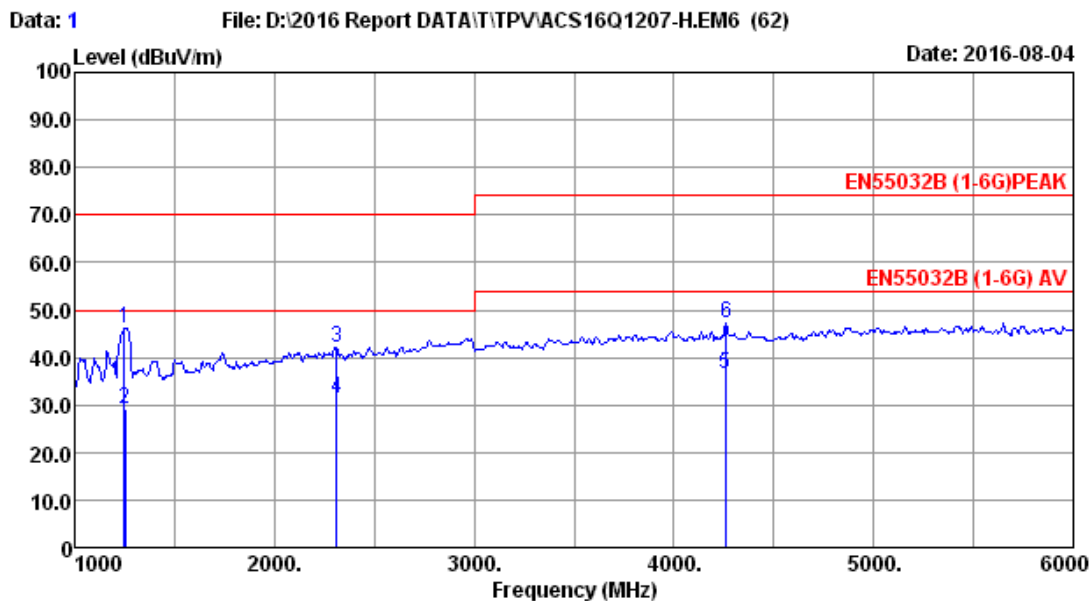
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. The worst emission was detected at 115.36MHz with corrected signal level of 19.98dBuV/m. (Antenna height 4.0m; Turntable degree 133°).
 4. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.



Site no.	: 10m Chamber	Data no.	: 3
Dis. / Ant.	: 10m 2016 9168-493	Ant. pol.	: VERTICAL
Limit	: EN55032 B(10M)	Pre	: 101.6kPa
Env. / Ins.	: 23.3°C/51.2%	Engineer	: Augus
EUT	: E221N		
Power rating	: AC 230V/50Hz		
Test Mode	: Display:1920*1080@60Hz		
	: Line:1.8m		

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	68.80	12.26	4.10	2.90	19.26	30.00	10.74	QP
2	115.36	10.63	4.36	7.88	22.87	30.00	7.13	QP
3	141.55	12.40	4.49	4.07	20.96	30.00	9.04	QP
4	173.56	12.24	4.64	3.95	20.83	30.00	9.17	QP
5	183.26	11.27	4.69	4.08	20.04	30.00	9.96	QP
6	447.10	16.91	5.64	2.62	25.17	37.00	11.83	QP

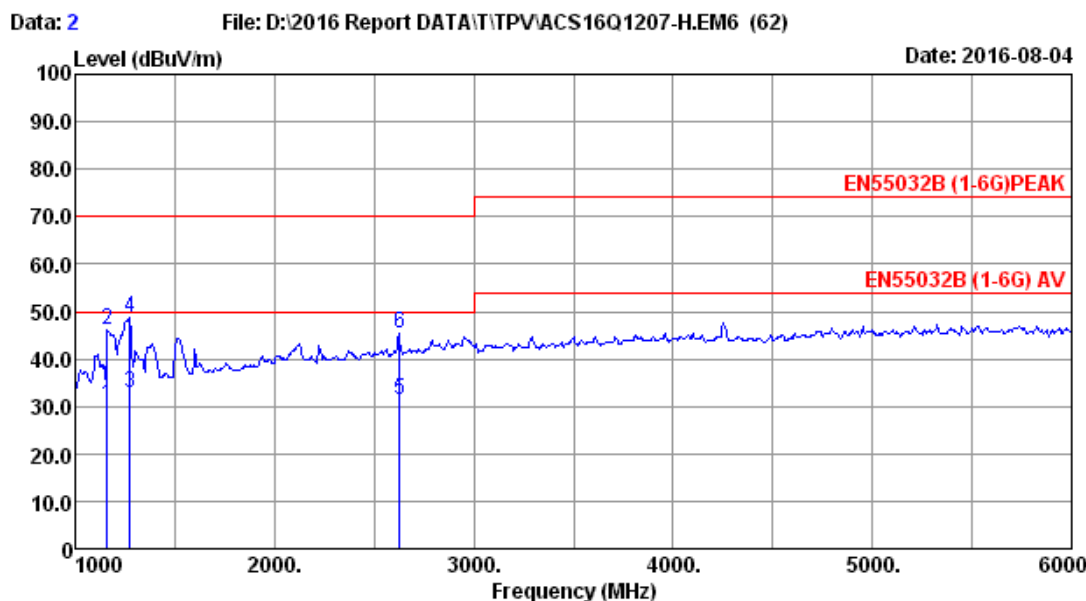
- Remarks:
1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. The worst emission was detected at 115.36MHz with corrected signal level of 22.87dB μ V/m. (Antenna height 1.0m; Turntable degree 309°).
 4. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.



Site no. : 10m Chamber Data no. : 1
 Dis. / Ant. : 3m 2015 3115-4580 Ant. pol. : HORIZONTAL
 Limit : EN55032B (1-6G) PEAK Pre : 101.2kPa
 Env. / Ins. : 23.5°C/52.1% Engineer : Frank
 EUT : E221N
 Power rating : AC 230V/50Hz
 Test Mode : HDMI:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1250.25	25.56	1.86	49.89	31.14	46.17	70.00	23.83	Peak
2	1250.80	25.56	1.86	33.04	31.14	29.32	50.00	20.68	Average
3	2310.35	28.19	2.68	42.71	31.44	42.14	70.00	27.86	Peak
4	2310.70	28.19	2.68	34.69	34.04	31.52	50.00	18.48	Average
5	4260.10	32.25	3.69	33.59	32.95	36.58	54.00	17.42	Average
6	4260.45	32.25	3.69	42.53	31.29	47.18	74.00	26.82	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp Factor
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 10m Chamber Data no. : 2
 Dis. / Ant. : 3m 2015 3115-4580 Ant. pol. : VERTICAL
 Limit : EN55032B (1-6G) PEAK Pre : 101.2kPa
 Env. / Ins. : 23.5°C/52.1% Engineer : Frank
 EUT : E221N
 Power rating : AC 230V/50Hz
 Test Mode : HDMI:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1160.10	25.42	1.79	39.59	36.55	30.25	50.00	19.75	Average
2	1160.50	25.42	1.79	50.09	31.09	46.21	70.00	23.79	Peak
3	1275.20	25.59	1.88	41.69	36.23	32.93	50.00	17.07	Average
4	1275.65	25.59	1.88	52.42	31.15	48.74	70.00	21.26	Peak
5	2625.80	28.70	2.91	33.71	33.89	31.43	50.00	18.57	Average
6	2625.85	28.70	2.91	45.16	31.35	45.42	70.00	24.58	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp Factor
 2. The emission levels that are 20dB below the official
 limit are not reported.

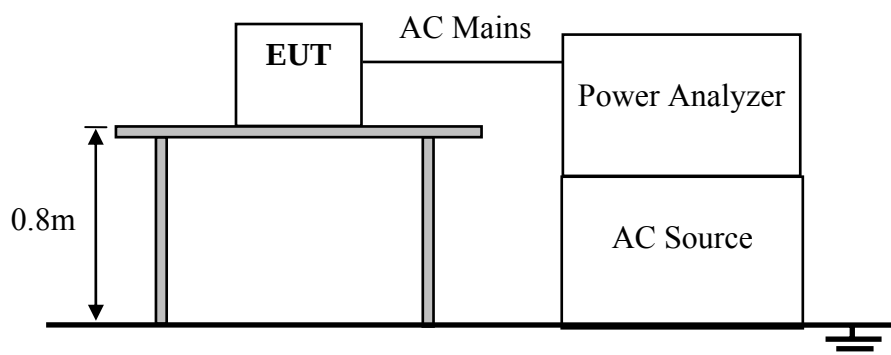
5. HARMONIC CURRENT TEST

5.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Source	California Instruments	5001ix	58481	Oct.17,15	1 Year
2.	Impedance Network	California Instruments	OMNI 1-18i	1247A02235	Oct.17,15	1 Year
3.	Power Analyzer	California Instruments	PACS-1	72627	Oct.17,15	1 Year
4.	Test Software	California Instruments	CTS 4.0	V 4.2.12	N/A	N/A

Note: N/A means Not applicable.

5.2. Block Diagram of Test Setup



5.3. Test Standard

EN 61000-3-2: 2014; Class D

5.4. Limits of Harmonic Current

Limits for Class D Equipment		
Harmonic order (n)	Maximum permissible harmonic current per watt (mA/W)	Maximum permissible harmonic current (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15≤n≤39 (odd harmonic only)	3.85/n	0.15×15/n

Remark: if the EUT Power level is below 75 Watts and therefore has no defined limits.

5.5. EUT Configuration on Test

The configurations of EUT are listed in Section 3.5.

5.6. Operating Condition of EUT

Same as Conducted Emission test that listed in Section 3.6. except the test set up replaced by Section 5.2.

5.7. Test Procedure

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

5.8. Test Results

PASS. (Test results are recorded in next page)

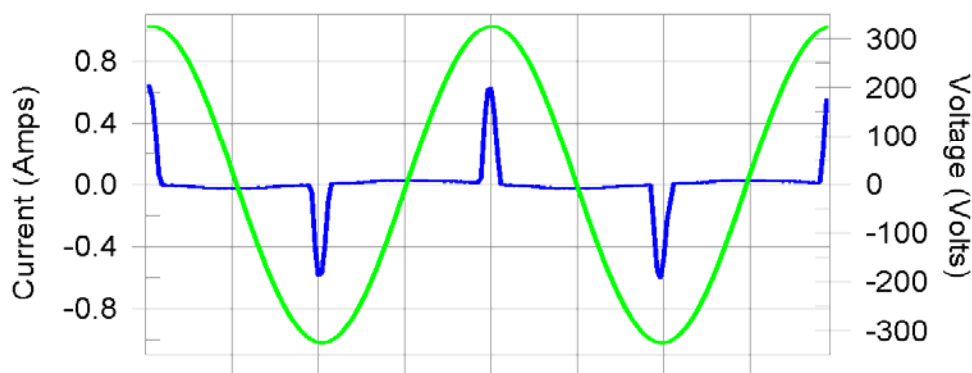
Harmonics – Class-D per Ed. 4.0 (2014)(Run time)

EUT: E221N
 Test category: Class-D per Ed. 4.0 (2014) (European limits)
 Test date: 2016-08-03 Start time: 20:49:39
 Test duration (min): 2.5 Data file name: H-000196.cts_data
 Comment: TPV
 Customer: Running "H" Pattern And 1KHz Playing

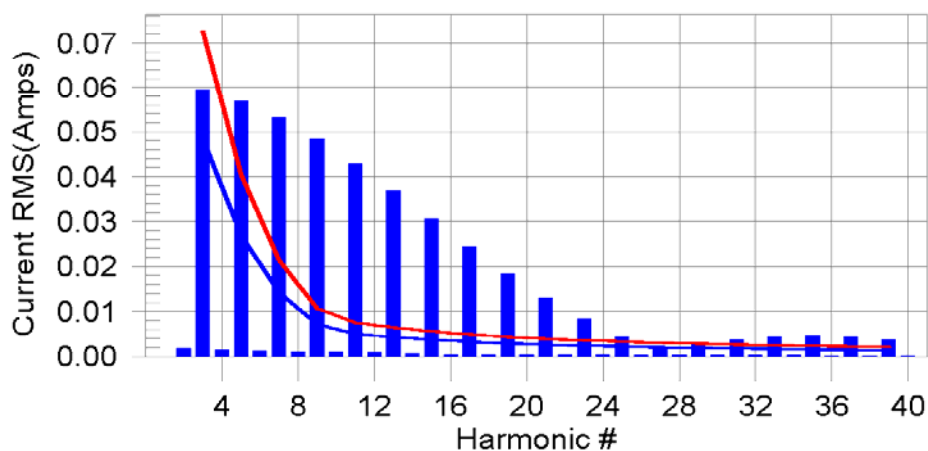
Tested by: Aaron
 Test Margin: 100
 End time: 20:52:30

Test Result: N/L Source qualification: Normal

Current & voltage waveforms



Harmonics and Class D limit line European Limits



Test result: N/L Worst harmonic was #13 with 862.4% of the limit.

Current Test Result Summary (Run time)

EUT: E221N **Tested by: Aaron**
Test category: Class-D per Ed. 4.0 (2014) (European limits) **Test Margin: 100**
Test date: 2016-08-03 **Start time: 20:49:39** **End time: 20:52:30**
Test duration (min): 2.5 **Data file name: H-000196.cts_data**
Comment: TPV
Customer: Running "H" Pattern And 1KHz Playing

Test Result: N/L **Source qualification: Normal**
THC(A): 0.000 **I-THD(%): 0.0** **POHC(A): 0.000** **POHC Limit(A): 0.000**
Highest parameter values during test:
V_RMS (Volts): 230.10 **Frequency(Hz): 50.00**
I_Peak (Amps): 0.652 **I_RMS (Amps): 0.148**
I_Fund (Amps): 0.065 **Crest Factor: 4.448**
Power (Watts): 14.2 **Power Factor: 0.422**

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	0.000	N/A	0.002	0.000	N/A	N/L
3	0.060	0.048	N/A	0.061	0.073	N/A	N/L
4	0.001	0.000	N/A	0.002	0.000	N/A	N/L
5	0.057	0.027	N/A	0.057	0.041	N/A	N/L
6	0.001	0.000	N/A	0.001	0.000	N/A	N/L
7	0.053	0.014	N/A	0.054	0.021	N/A	N/L
8	0.001	0.000	N/A	0.001	0.000	N/A	N/L
9	0.048	0.007	N/A	0.049	0.011	N/A	N/L
10	0.001	0.000	N/A	0.001	0.000	N/A	N/L
11	0.043	0.005	N/A	0.043	0.007	N/A	N/L
12	0.001	0.000	N/A	0.001	0.000	N/A	N/L
13	0.037	0.004	N/A	0.037	0.006	N/A	N/L
14	0.001	0.000	N/A	0.001	0.000	N/A	N/L
15	0.031	0.004	N/A	0.031	0.006	N/A	N/L
16	0.001	0.000	N/A	0.001	0.000	N/A	N/L
17	0.024	0.003	N/A	0.025	0.005	N/A	N/L
18	0.000	0.000	N/A	0.001	0.000	N/A	N/L
19	0.019	0.003	N/A	0.019	0.004	N/A	N/L
20	0.000	0.000	N/A	0.000	0.000	N/A	N/L
21	0.013	0.003	N/A	0.013	0.004	N/A	N/L
22	0.000	0.000	N/A	0.000	0.000	N/A	N/L
23	0.008	0.002	N/A	0.008	0.004	N/A	N/L
24	0.000	0.000	N/A	0.000	0.000	N/A	N/L
25	0.004	0.002	N/A	0.004	0.003	N/A	N/L
26	0.000	0.000	N/A	0.000	0.000	N/A	N/L
27	0.002	0.002	N/A	0.002	0.003	N/A	N/L
28	0.000	0.000	N/A	0.000	0.000	N/A	N/L
29	0.002	0.002	N/A	0.003	0.003	N/A	N/L
30	0.000	0.000	N/A	0.000	0.000	N/A	N/L
31	0.004	0.002	N/A	0.004	0.003	N/A	N/L
32	0.000	0.000	N/A	0.000	0.000	N/A	N/L
33	0.004	0.002	N/A	0.005	0.002	N/A	N/L
34	0.000	0.000	N/A	0.000	0.000	N/A	N/L
35	0.005	0.002	N/A	0.005	0.002	N/A	N/L
36	0.000	0.000	N/A	0.000	0.000	N/A	N/L
37	0.004	0.001	N/A	0.004	0.002	N/A	N/L
38	0.000	0.000	N/A	0.000	0.000	N/A	N/L
39	0.004	0.001	N/A	0.004	0.002	N/A	N/L
40	0.000	0.000	N/A	0.000	0.000	N/A	N/L

Note: The EUT power level is below 75.0 Watts and therefore has no defined limits

Voltage Source Verification Data (Run time)

EUT: E221N **Tested by: Aaron**
Test category: Class-D per Ed. 4.0 (2014) (European limits) **Test Margin: 100**
Test date: 2016-08-03 **Start time: 20:49:39** **End time: 20:52:30**
Test duration (min): 2.5 **Data file name: H-000196.cts_data**
Comment: TPV
Customer: Running "H" Pattern And 1KHz Playing

Test Result: N/L **Source qualification: Normal**

Highest parameter values during test:

Voltage (Vrms): 230.10	Frequency(Hz): 50.00
I_{Peak} (Amps): 0.652	I_{RMS} (Amps): 0.148
I_{Fund} (Amps): 0.065	Crest Factor: 4.448
Power (Watts): 14.2	Power Factor: 0.422

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.077	0.460	16.71	OK
3	0.456	2.071	22.02	OK
4	0.052	0.460	11.22	OK
5	0.043	0.920	4.67	OK
6	0.029	0.460	6.35	OK
7	0.041	0.690	5.92	OK
8	0.009	0.460	1.85	OK
9	0.035	0.460	7.57	OK
10	0.014	0.460	3.07	OK
11	0.027	0.230	11.68	OK
12	0.012	0.230	5.07	OK
13	0.031	0.230	13.51	OK
14	0.006	0.230	2.42	OK
15	0.020	0.230	8.91	OK
16	0.010	0.230	4.16	OK
17	0.025	0.230	10.96	OK
18	0.011	0.230	4.65	OK
19	0.021	0.230	9.32	OK
20	0.007	0.230	3.20	OK
21	0.017	0.230	7.43	OK
22	0.003	0.230	1.19	OK
23	0.014	0.230	5.89	OK
24	0.004	0.230	1.80	OK
25	0.009	0.230	3.80	OK
26	0.003	0.230	1.26	OK
27	0.004	0.230	1.85	OK
28	0.003	0.230	1.15	OK
29	0.008	0.230	3.31	OK
30	0.003	0.230	1.10	OK
31	0.007	0.230	3.19	OK
32	0.002	0.230	0.98	OK
33	0.008	0.230	3.34	OK
34	0.002	0.230	0.84	OK
35	0.008	0.230	3.35	OK
36	0.002	0.230	0.82	OK
37	0.008	0.230	3.41	OK
38	0.002	0.230	1.06	OK
39	0.007	0.230	2.86	OK
40	0.003	0.230	1.15	OK

6. VOLTAGE FLUCTUATIONS & FLICKER TEST

6.1. Test Equipment

Same as Section 5.1.

6.2. Block Diagram of Test Setup

Same as Section 5.2.

6.3. Test Standard

EN 61000-3-3: 2013

6.4. Limits of Voltage Fluctuation and Flick

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{max}	500ms	T_{max} means maximum time that $d(t)$ exceeds 3.3%
$d_{max}(\%)$	4%	d_{max} means maximum relative voltage change.
$d_c(\%)$	3.3%	d_c means relative steady-state voltage change.

6.5. EUT Configuration on Test

The configurations of EUT are listed in Section 3.5.

6.6. Operating Condition of EUT

Same as Section 5.6.

6.7. Test Procedure

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

6.8. Test Results

PASS. (Test results are recorded in next page)

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: E221N
 Test category: All parameters (European limits)
 Test date: 2016-08-03 Start time: 20:55:06
 Test duration (min): 10 Data file name: F-000197.cts_data
 Comment: TPV
 Customer: Running "H" Pattern And 1KHz Playing

Tested by: Aaron
 Test Margin: 100
 End time: 21:05:37

Test Result: Pass

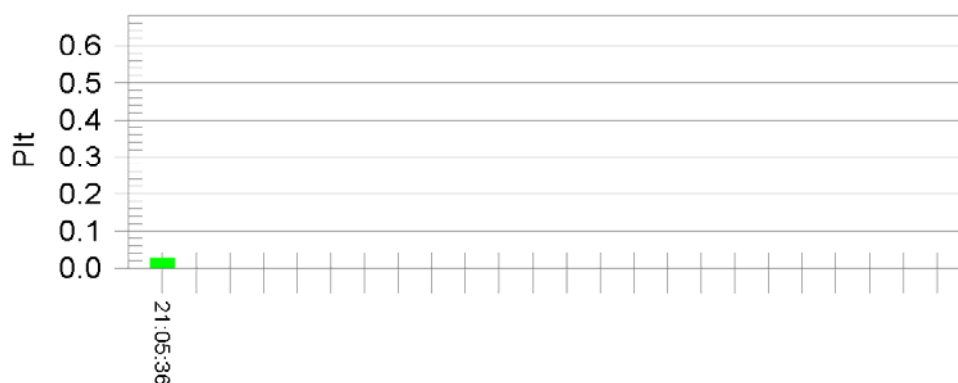
Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.97
 Highest dt (%): 0.00
 T-max (mS): 0
 Highest dc (%): 0.00
 Highest dmax (%): 0.00
 Highest Pst (10 min. period): 0.064
 Highest Plt (2 hr. period): 0.028

Test limit (%):	N/A	N/A
Test limit (mS):	500.0	Pass
Test limit (%):	3.30	Pass
Test limit (%):	4.00	Pass
Test limit:	1.000	Pass
Test limit:	0.650	Pass

7. IMMUNITY PERFORMANCE CRITERIA

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

Performance criterion A

When seen from the normal viewing distance, the EUT shall operate with no change beyond the manufacturer's specification, in flicker, color, focus and jitter (except for the power frequency magnetic field test).

Power frequency magnetic field test

For CRT monitors, the following also applies:

The jitter shall be measured using a measuring microscope as specified in 6.6.14 of ISO 9241-3.

The jitter (in mm) shall not exceed the value $\frac{(\text{character height in mm} + 0,3) \times 2,5}{33,3}$ when the monitor is immersed in a continuous magnetic field of 1A/m (r.m.s.) at one of the power frequencies of 50Hz.

Alternatively, a field of 50A/m may be applied, and a transparent graduated mask used to assess the jitter. In that case, the jitter shall not exceed 50 times the value in the above formula.

NOTE-This test level is used to simplify the measurement of jitter. Lesser values of the test level may be used if non-linearity is experienced, due to, for example, saturation of screening material.

The EUT shall be tested in two positions, both perpendicular to the magnetic field.

Performance criterion B

Screen disturbances during the application of the test are permissible.

Performance criterion C

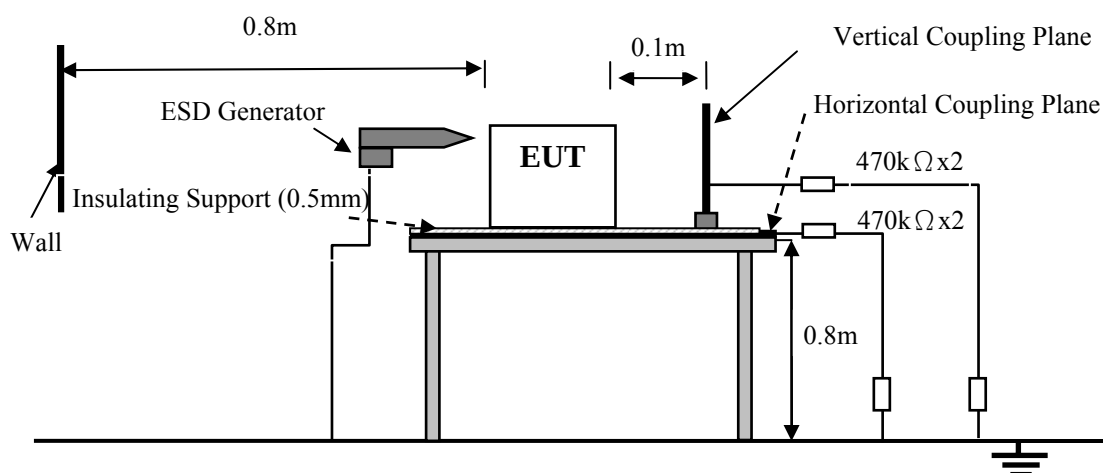
Failures which are not self-recovered after removal of the external disturbance, but which can be recovered to normal operation by reset or reboot are permissible.

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	Noise Ken	ESS-2000	ESS0868382	Nov,09,15	1 Year

8.2. Block Diagram of Test Setup



8.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-2: 2008)

(Severity for Air Discharge was Level 1 at ± 2 kV & Level 2 at ± 4 kV & Level 3 at ± 8 kV, for Contact Discharge was Level 1 at ± 2 kV & Level 2 at ± 4 kV)

8.4. Severity Levels and Performance Criterion

Severity Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)	Performance criterion
1.	2	2	B
2.	4	4	
3.	6	8	
4.	8	15	
X	Special	Special	

8.5. EUT Configuration

The configurations of EUT are listed in Section 3.5.

8.6. Operating Condition of EUT

Same as Conducted Emission test that listed in Section 3.6. except the test set up replaced by Section 8.2.

8.7. Test Procedure

8.7.1. Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed

8.7.2. Contact Discharge:

All the procedure was same as Section 8.7.1. except that the generator was re-triggered for a new single discharge and repeated 50 times for each pre-selected test point. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

8.7.3. Indirect discharge for horizontal coupling plane:

At least 25 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

8.7.4. Indirect discharge for vertical coupling plane:

At least 25 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.8. Test Results

PASS. (Test results are recorded in next page)

Electrostatic Discharge Test Results

Audix Technology (Shenzhen) Co., Ltd.

Applicant	: TPV Electronics (FuJian) Co., Ltd.	Test Date	: Aug.03,2016
EUT	: LCD Monitor	Temperature	: 23.5±0.6℃
M/N	: E221N	Humidity	: 51±3%
Test Voltage	: AC 230V/50Hz	Test Mode	: Same as section 3.6
Test Engineer	: Aaron	Pressure	: 101.2±1kPa
Required Performance	: B	Actual Performance	: A & B*

Air Discharge: ±2kV ±4kV ±8kV # For Air Discharge each point positive 10 times and negative 10 times discharge.

Contact Discharge: ±2kV ±4KV # For Contact Discharge each point positive 25 times and negative 25 times discharge

For the time interval between successive single discharges an initial value of one second.

Discharge Voltage (kV)	Type of discharge	Dischargeable Points	Performance		Result (Pass/Fail)
			Required	Observation	
± 2	Contact	2,3,8	B	B*	Pass
± 4	Contact	2,3,8	B	B*	Pass
± 2	Air	1,2,3,4,5,6,7,9,10	B	A	Pass
± 4	Air	1,2,3,4,5,6,7,9,10	B	A	Pass
± 8	Air	1,2,3,4,5,6,7,9,10	B	B*	Pass
± 2	HCP-Bottom	Edge of the HCP	B	A	Pass
± 2	VCP-Front	Center of the VCP	B	A	Pass
± 2	VCP-Left	Center of the VCP	B	A	Pass
± 2	VCP-Back	Center of the VCP	B	A	Pass
± 2	VCP-Right	Center of the VCP	B	A	Pass
± 4	HCP-Bottom	Edge of the HCP	B	A	Pass
± 4	VCP-Front	Center of the VCP	B	A	Pass
± 4	VCP-Left	Center of the VCP	B	A	Pass
± 4	VCP-Back	Center of the VCP	B	A	Pass
± 4	VCP-Right	Center of the VCP	B	A	Pass

Discharge Points Description

<u>1</u>	AC In Port	<u>7</u>	Key lock
<u>2</u>	VGA Port	<u>8</u>	Metal/Screws
<u>3</u>	Display/HDMI Ports	<u>9</u>	Buttons
<u>4</u>	Slots	<u>10</u>	Audio In/Headphone Ports
<u>5</u>	LED	<u>11</u>	
<u>6</u>	Screen	<u>12</u>	

Remark: The class “B*” means the screen of EUT will be twinkle, but it will recover to normal by itself.

After discharge to the ungrounded part of EUT, it needs the bleeder resistor to remove the charge prior to next ESD pulse. Discharge was considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

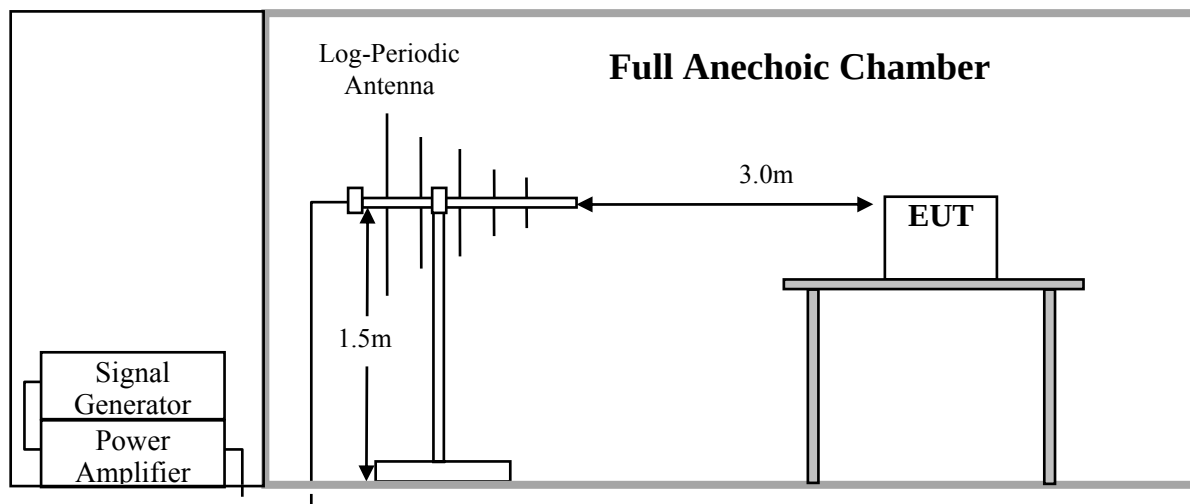
9.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	2#Chamber	AUDIX	N/A	N/A	Sep.28,15	1Year
2.	Signal Generator	Marconi	2031	119606/058	Apr.23,16	1 Year
3.	Amplifier	A&R	100W/1000M1	17028	NCR	NCR
4.	Four Port Junction Pad	A&R	DC6180	19325	Apr.24,16	1Year
5.	Power Meter	Anritsu	ML2487A	6K00002472	Oct.17,15	1Year
6.	Power Sensor	Anritsu	MA2491A	0033005	Oct.17,15	1Year
7.	Log-periodic Antenna	A&R	AT1080	16512	NCR	NCR
8.	Test Software	AUDIX	i2	3.2010-1-8	N/A	N/A

Notes:(1) NCR means no calibration required(calibrated with system).

(2) N/A means Not applicable.

9.2. Block Diagram of Test Setup



9.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-3: 2010)

(Severity Level: 2 at 3V/m)

9.4. Severity Levels and Performance Criterion

Severity Level	Test Field Strength V/m	Performance Criteria
1.	1	A
2.	3	
3.	10	
X.	Special	

9.5. EUT Configuration

The configurations of EUT are listed in Section 3.5.

9.6. Operating Condition of EUT

Same as Conducted Emission test that listed in Section 3.6. Except the test set up replaced by Section 9.2.

9.7. Test Procedure

Testing was performed in a fully anechoic chamber as recommended by IEC 61000-4-3. The EUT was placed on an 80cm high non-conductive table located in the area of field uniformity. The radiating antenna was placed 3m in front of the EUT and Support system, and dwell time of the radiated interference was controlled by an automated, computer-controlled system. The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental. The signal was amplitude modulated 80% over the frequency range 80MHz to 1GHz at a level of 3V/m. The dwell time was set at 3s. Field presence was monitored during testing via a field probe placed in close proximity to the EUT. Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization.

All the scanning conditions are as follows:

Test conditions	
Frequency	80MHz-1GHz
Frequency increments step	1% of momentary used
Test level	3V/m (un-modulated)
Dwell time	3s
Test signal	80% amplitude modulated by 1kHz sinusoidal audio signal

9.8. Test Results

PASS. (Test results are recorded in next page)

RF Field Strength Susceptibility Test Results

Audix Technology(Shenzhen) Co.,Ltd.

Applicant : TPV Electronics (FuJian) Co., Ltd. EUT : LCD Monitor M/N : E221N Test Voltage : AC 230V/50Hz Test Engineer : Carl Required Performance : A	Test Date : Jul.28,2016 Temperature : 24±0.6℃ Humidity : 42±3% Pressure : 101±1kPa Test Mode : Same as section 3.6 Actual Performance : A																																				
Modulation: ☒ AM ☐ Pulse ☐ none 1kHz 80%																																					
Frequency Range :80MHz -1000MHz																																					
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th colspan="2">Horizontal</th> <th colspan="2">Vertical</th> <th>Result</th> </tr> <tr> <th></th> <th>Required</th> <th>Observation</th> <th>Required</th> <th>Observation</th> <th>(Pass / Fail)</th> </tr> <tr> <td>Front</td> <td>A</td> <td>A</td> <td>A</td> <td>A</td> <td>Pass</td> </tr> <tr> <td>Right</td> <td>A</td> <td>A</td> <td>A</td> <td>A</td> <td>Pass</td> </tr> <tr> <td>Rear</td> <td>A</td> <td>A</td> <td>A</td> <td>A</td> <td>Pass</td> </tr> <tr> <td>Left</td> <td>A</td> <td>A</td> <td>A</td> <td>A</td> <td>Pass</td> </tr> </table>		Horizontal		Vertical		Result		Required	Observation	Required	Observation	(Pass / Fail)	Front	A	A	A	A	Pass	Right	A	A	A	A	Pass	Rear	A	A	A	A	Pass	Left	A	A	A	A	Pass
	Horizontal		Vertical		Result																																
	Required	Observation	Required	Observation	(Pass / Fail)																																
Front	A	A	A	A	Pass																																
Right	A	A	A	A	Pass																																
Rear	A	A	A	A	Pass																																
Left	A	A	A	A	Pass																																

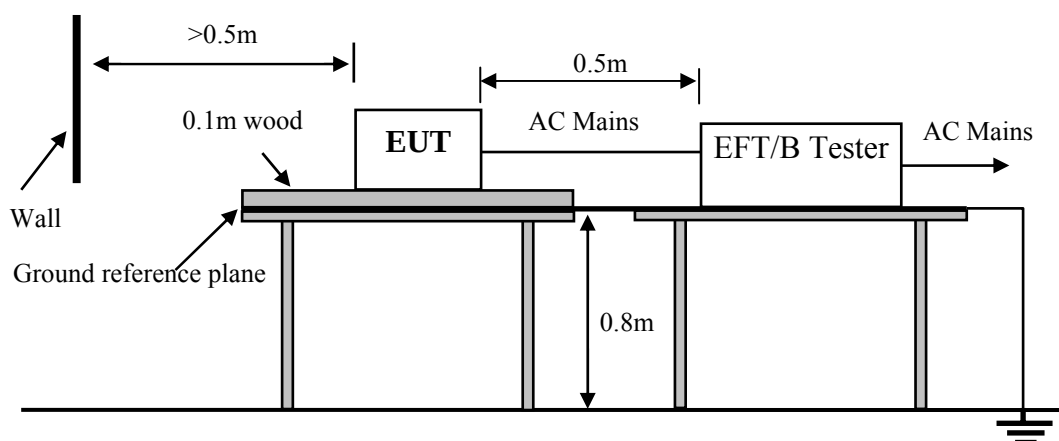
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	TESEQ	NSG3025	28017	Apr.24,16	1 Year
2.	CDN	TESEQ	CDN8014	29638	Apr.24,16	1 Year
3.	Test Software	Schaffner	Win3025	V 4.00	N/A	N/A

Note: N/A means Not applicable.

10.2. Block Diagram of Test Setup



10.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-4: 2012)
(Severity Level: Level 1 at 0.5kV, Level 2 at 1kV)

10.4. Severity Levels and Performance Criterion

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

10.5. EUT Configuration

The configurations of EUT are listed in Section 3.5.

10.6. Operating Condition of EUT

Same as Conducted Emission test that listed in Section 3.6. except the test set up replaced by Section 10.2.

10.7. Test Procedure

The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support $0.1\text{m} \pm 0.01\text{m}$ thick. The ground reference plane was $1\text{m} \times 1\text{m}$ metallic sheet with 0.65mm minimum thickness. This reference ground plane was 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 was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

10.7.1. For input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can't less than 1min.

10.7.2. For signal lines and control lines ports:

It's unnecessary to test.

10.7.3. For DC input and DC output power ports:

It's unnecessary to test.

10.8. Test Results

PASS. (Test results are recorded in next page)

Electrical Fast Transient/Burst Test Results

Audix Technology (Shenzhen) Co., Ltd.

Applicant : <u>TPV Electronics (FuJian) Co., Ltd.</u> EUT : <u>LCD Monitor</u> M/N : <u>E221N</u> Test Voltage : <u>AC 230V/50Hz</u> Test Engineer : <u>Aaron</u> Required Performance : <u>B</u>	Test Date : <u>Aug.03,2016</u> Temperature : <u>23.3±0.6℃</u> Humidity : <u>51±3%</u> Test Mode : <u>Same as section 3.6</u> Pressure : <u>101.3±1kPa</u> Actual Performance : <u>A&B*</u>				
Repetition Frequency : <u>5 kHz</u> Burst Duration : <u>15ms</u> Burst Period: <u>300ms</u>					
Inject Time(s): <u>120s</u> Inject Method: <u>Direct</u> Inject Line: ☒ AC Mains ☐ DC Supply ☐ Signal					
Line	Test Voltage	Performance			Result
		Required	Observation(+)	Observation(-)	(Pass/Fail)
L	0.5kV	B	A	A	Pass
	1kV	B	A	A	Pass
N	0.5kV	B	A	A	Pass
	1kV	B	A	A	Pass
PE	0.5kV	B	A	A	Pass
	1kV	B	A	A	Pass
L N	0.5kV	B	A	A	Pass
	1kV	B	A	A	Pass
L PE	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	Pass
N PE	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	Pass
L N PE	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	Pass
Signal Line	---	---	---	---	---
Remark: The class “B*” means the screen of EUT will be twinkle, but it will recover to normal by itself.					

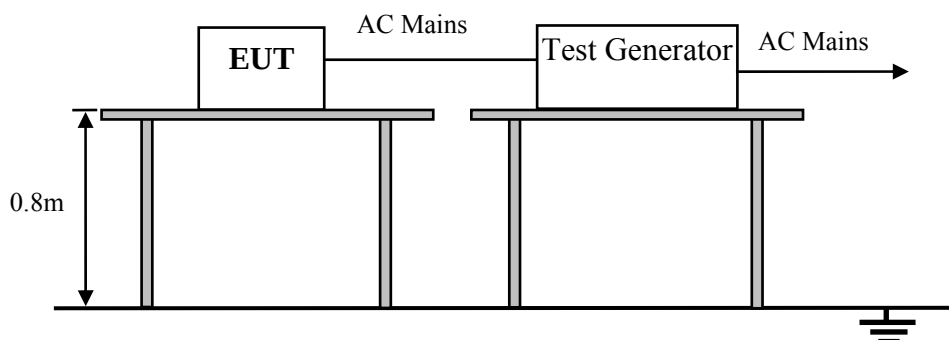
11. SURGE TEST

11.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Transient Test System	EMC PARTNER	TRANSIENT 2000	TRA2006 F-S-T-D-R -1500	Jul.23,15	1 Year
2.	CDN	EMC PARTNER	CDN-UTP8	CDN-UTP8-1508	Oct.17,15	1 Year
3.	Test Software	EMC PARTNER	Genecs	V3.25	N/A	N/A

Note:N/A means Not applicable.

11.2. Block Diagram of Test Setup



11.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-5: 2014)

(Severity Level: Line to Line was Level 1 at 0.5kV& Level 2 at 1kV,

Line to Ground Level 1 at 0.5kV& Level 2 at 1kV& Level 3 at 2kV)

11.4. Severity Levels and Performance Criterion

Severity Level	Open-Circuit Test Voltage kV	Performance criterion
1	0.5	B
2	1.0	
3	2.0	
4	4.0	
*	Special	

11.5. EUT Configuration

The configurations of EUT are listed in Section 3.5.

11.6. Operating Condition of EUT

Same as Conducted Emission test that listed in Section 3.6. except the test set up replaced by Section 11.2

11.7. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 11.2.
- 2) For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.8. Test Results

PASS. (Test results are recorded in next page)

Surge Immunity Test Results

Audix Technology (Shenzhen) Co., Ltd.

Applicant : TPV Electronics (FuJian) Co., Ltd. EUT : LCD Monitor M/N : E221N Power Supply : AC 230V/50Hz Test Engineer : Aaron Required Performance : B	Test Date : Aug.03,2016 Temperature : 23.1±0.6℃ Humidity : 52±3% Test Mode : Same as section 3.6 Pressure : 101.6±1kPa Actual Performance : A & B*										
No.of pluse: ±5 Interval:60 Seconds											
Line : ☒ AC Mains ☐ DC Supply ☐ Signal											
Location	Volt	500V			1kV			2kV			Result (Pass/Fail)
	Phase	Performance			Performance			Performance			
		Required	+	-	Required	+	-	Required	+	-	
L-N	0°	B	A	A	B	A	A	---	---	---	Pass
	90°	B	A	A	B	B*	B*	---	---	---	Pass
	180°	B	A	A	B	B*	B*	---	---	---	Pass
	270°	B	A	A	B	B*	B*	---	---	---	Pass
L-PE	0°	B	A	A	B	A	A	B	B*	B*	Pass
	90°	B	A	A	B	A	A	B	B*	B*	Pass
	180°	B	A	A	B	B*	B*	B	B*	B*	Pass
	270°	B	A	A	B	B*	B*	B	B*	B*	Pass
N-PE	0°	B	A	A	B	B*	B*	B	B*	B*	Pass
	90°	B	A	A	B	B*	B*	B	B*	B*	Pass
	180°	B	A	A	B	A	A	B	B*	B*	Pass
	270°	B	A	A	B	B*	B*	B	B*	B*	Pass
Signal Line	---	---	---	---	---	---	---	---	---	---	---
Remark: The class "B*" means the screen of EUT will be twinkle, but it will recover to normal by itself.											

12. INJECTED CURRENTS SUSCEPTIBILITY TEST

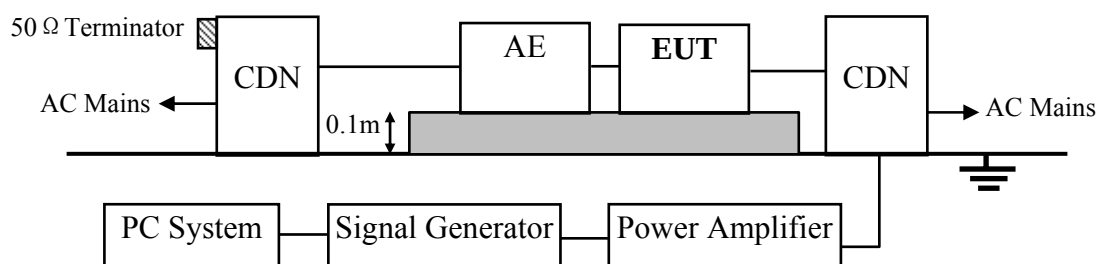
12.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Marconi	2031	119606/058	Apr.23,16	1 Year
2.	Amplifier	AR	25A250A	19152	NCR	NCR
3.	Amplifier	AR	100A250	19368	NCR	NCR
4.	Power meter	HP	436A	2016A07891	Apr.23,16	1 Year
5.	Power sensor	Agilent	8482B	MY41090514	Oct.18,15	1 Year
6.	CDN	TESEQ	CDN M016	34608	May.03.16	1 Year
7.	CDN	TESEQ	CDN M016	34609	May.03.16	1 Year
8.	CDN	TESEQ	CDN T800	30865	Oct.17,15	1 Year
9.	CDN	TESEQ	CDN T400A	26543	Oct.17,15	1 Year
10.	CDN	TESEQ	CDN T200A	26957	Oct.17,15	1 Year
11.	EM Injection Clamp	FCC	F-203I-23mm	403	May.03,16	1 Year
12.	Attenuator	Weinschel	40-6-34	LJ092	Apr.23,16	1 Year
13.	RF Cable	MICABLE	A04-07-07-2M	09111340	NCR	NCR
14.	RF Cable	STORM	MFR-57500	90-195-2MTR	NCR	NCR
15.	Test Software	AUDIX	i2	3.2010-1-8	N/A	N/A

Notes:(1)NCR means no calibration required(calibrated with system).

(2)N/A means Not applicable.

12.2. Block Diagram of Test Setup



12.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-6: 2013)

(Severity Level 2 at 3V (r.m.s.) and frequency is from 0.15MHz to 80MHz)

12.4. Severity Levels and Performance Criterion

Severity Level	Voltage Level (e.m.f.) V	Performance criterion
1	1	A
2	3	
3	10	
X	Special	

12.5. EUT Configuration

The configurations of EUT are listed in Section 3.5.

12.6. Operating Condition of EUT

Same as Conducted Emission test that is listed in Section 3.6. except the test set up replaced by Section 12.2.

12.7. Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 12.2.
- 2) Let the EUT work in test mode and test 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 10 and 30 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 0.150MHz 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.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.8. Test Results

PASS. (Test results are recorded in next page)

Injected Currents Susceptibility Test Results

Audix Technology (Shenzhen)Co.,Ltd.

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Applicant</td> <td style="width: 30%;">: TPV Electronics (FuJian) Co., Ltd.</td> </tr> <tr> <td>EUT</td> <td>: LCD Monitor</td> </tr> <tr> <td>M/N</td> <td>: E221N</td> </tr> <tr> <td>Power Supply</td> <td>: AC 230V/50Hz</td> </tr> <tr> <td>Test Engineer</td> <td>: Carl</td> </tr> <tr> <td>Required Performance</td> <td>: A</td> </tr> </table>	Applicant	: TPV Electronics (FuJian) Co., Ltd.	EUT	: LCD Monitor	M/N	: E221N	Power Supply	: AC 230V/50Hz	Test Engineer	: Carl	Required Performance	: A	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Test Date</td> <td style="width: 30%;">: Jul.28,2016</td> </tr> <tr> <td>Temperature</td> <td>: 25±0.6℃</td> </tr> <tr> <td>Humidity</td> <td>: 43±3%</td> </tr> <tr> <td>Test Mode</td> <td>: Same as section 3.6</td> </tr> <tr> <td>Pressure</td> <td>: 101±1kPa</td> </tr> <tr> <td>Actual Performance</td> <td>: A</td> </tr> </table>	Test Date	: Jul.28,2016	Temperature	: 25±0.6℃	Humidity	: 43±3%	Test Mode	: Same as section 3.6	Pressure	: 101±1kPa	Actual Performance	: A
Applicant	: TPV Electronics (FuJian) Co., Ltd.																								
EUT	: LCD Monitor																								
M/N	: E221N																								
Power Supply	: AC 230V/50Hz																								
Test Engineer	: Carl																								
Required Performance	: A																								
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Temperature	: 25±0.6℃																								
Humidity	: 43±3%																								
Test Mode	: Same as section 3.6																								
Pressure	: 101±1kPa																								
Actual Performance	: A																								

Frequency Range (MHz)	Injected Position	Voltage Level (e.m.f.)	Required	Observation	Result (Pass / Fail)
0.15 ~ 20	AC Mains	3V	A	A	PASS
20 ~ 80	AC Mains	3V	A	A	PASS

Modulation Signal:1kHz 80% AM

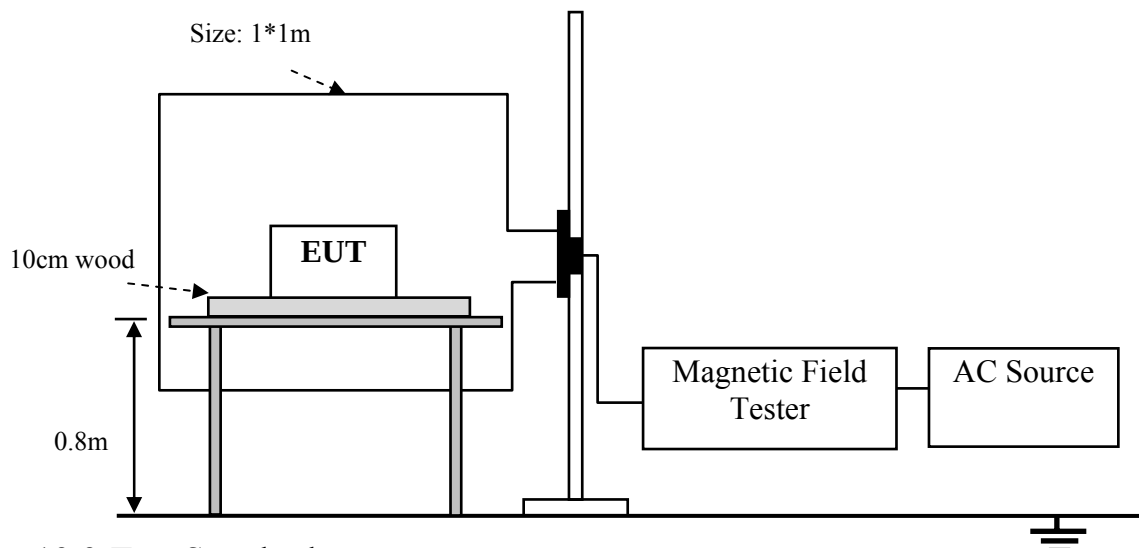
Remark:

13. MAGNETIC FIELD IMMUNITY TEST

13.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	MAG100.1	083858-10	Apr.24,16	1 Year

13.2. Block Diagram of Test Setup



13.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-8: 2009)
(Severity Level 1 at 1A/m)

13.4. Severity Levels and Performance Criterion

Severity Level	Magnetic Field Strength A/m	Performance criterion
1.	1	A
2.	3	
3.	10	
4.	30	
5.	100	
X.	Special	

13.5. EUT Configuration on Test

The configurations of EUT are listed in Section 3.5.

13.6. Operating Condition of EUT

Same as Conducted Emission test that is listed in Section 3.6. except the test set up replaced by Section 13.2.

13.7. Test Procedure

The EUT was subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 13.2. The induction coil was then rotated by 90° in order to expose the EUT to the test field with different orientations.

13.8. Test Results

PASS. (Test results are recorded in next page)

Magnetic Field Immunity Test Results

Audix Technology (Shenzhen) Co., Ltd.

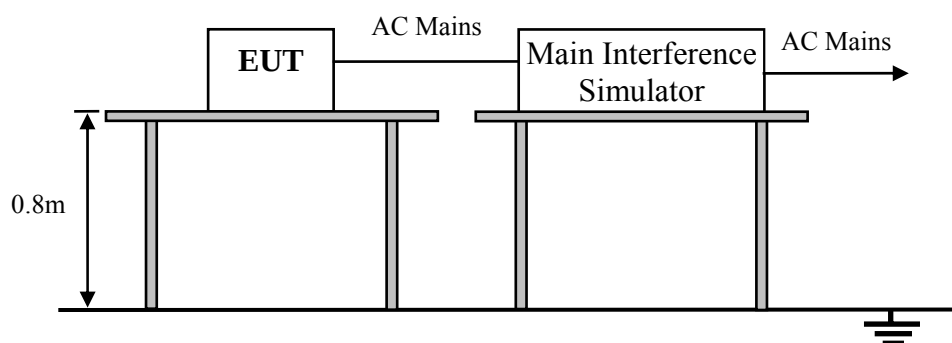
Applicant	:	TPV Electronics (FuJian) Co., Ltd.	Test Date	:	Jul.28,2016
EUT	:	LCD Monitor	Temperature	:	24±0.6℃
M/N	:	E221N	Humidity	:	43±3%
Test Voltage	:	AC 230V/50Hz	Test Mode	:	Same as section 3.6
Test Engineer	:	Carl	Pressure	:	101±1kPa
Required Performance	:	A	Actual Performance	:	A
Test Level	Testing Duration	Coil Orientation	Required	Observation	Result (Pass/Fail)
1A/m	5 min / coil	X	A	A	PASS
1A/m	5 min / coil	Y	A	A	PASS
1A/m	5 min / coil	Z	A	A	PASS

14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Main Interference Simulator	HAEFELY	PLINE 1610	083690-05	Apr.24,16	1 Year

14.2. Block Diagram of Test Setup



14.3. Test Standard

EN 55024: 2010+A1:2015 (IEC 61000-4-11: 2004)

14.4. Severity Levels and Performance Criterion

Test Level %U _T	Voltage dip and short interruptions %U _T	Duration (in period)	Performance Criterion
0	100	250	C
0	100	0.5	B
70	30	25	C

14.5. EUT Configuration

The configurations of EUT are listed in Section 3.5.

14.6. Operating Condition of EUT

Same as Conducted Emission test that is listed in Section 3.6. except the test set up replaced by Section 14.2.

14.7. Test Procedure

- 1) The EUT and test generator were setup as shown on Section 14.2.
- 2) The interruption is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

14.8. Test Results

PASS. (Test results are recorded in next page)

Voltage Dips And Interruptions Test Results

Audix Technology (Shenzhen) Co., Ltd.

Applicant	: TPV Electronics (FuJian) Co., Ltd.	Test Date	: Jul.28,2016
EUT	: LCD Monitor	Temperature	: 24±0.6℃
M/N	: E221N	Humidity	: 45±3%
Power Supply	: AC 230V/50Hz & AC 100V/50Hz	Test Mode	: Same as section 3.6
Test Engineer	: Carl	Pressure	: 101±1kPa
Required Performance	: B & C	Actual Performance	: A&B*

Power Supply:AC 230V/50Hz

Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in period)	Phase Angle	Required	Observation	Result (Pass / Fail)
0	100	0.5P	0°,90°,180°,270°	B	A	PASS
70	30	25P	0°,90°,180°,270°	C	A	PASS
0	100	250P	0°,90°,180°,270°	C	B*	PASS

Power Supply:AC 100V/50Hz

Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in period)	Phase Angle	Required	Observation	Result (Pass / Fail)
0	100	0.5P	0°,90°,180°,270°	B	A	PASS
70	30	25P	0°,90°,180°,270°	C	A	PASS
0	100	250P	0°,90°,180°,270°	C	B*	PASS

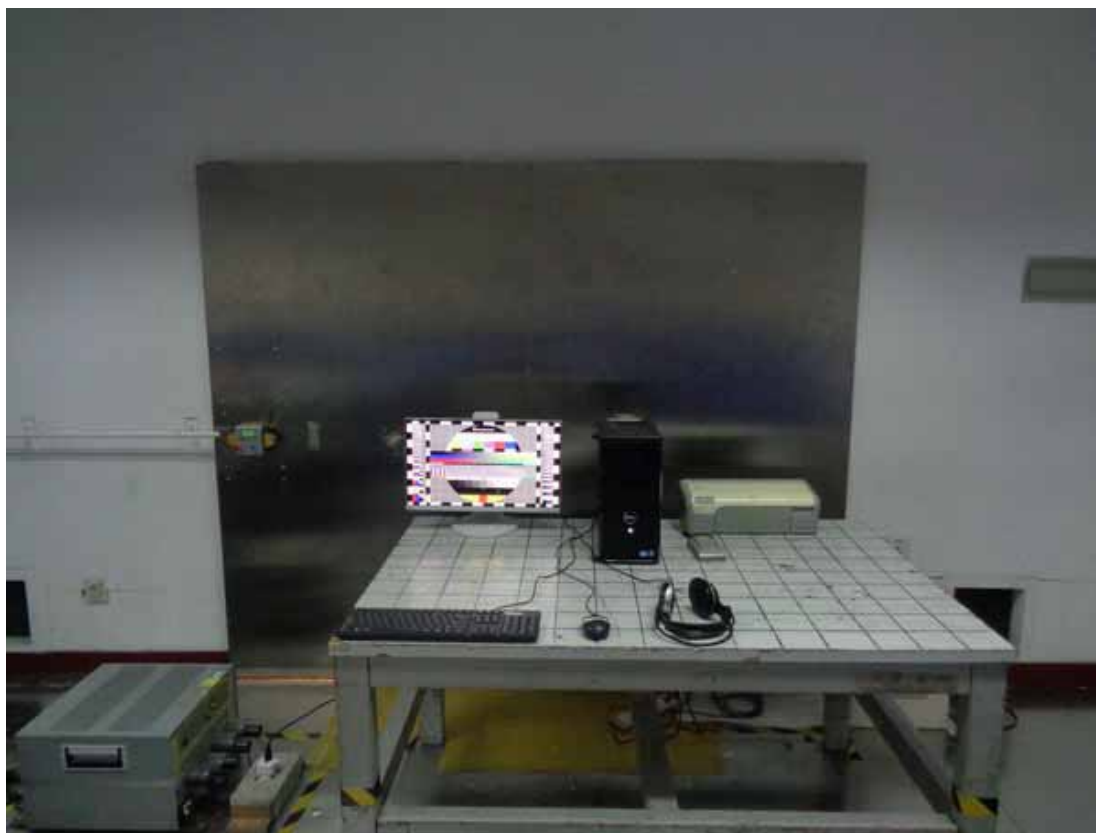
Note 1: U_T is the rated voltage for the equipment.

Note 2: The frequency of the test voltage shall be within ±2% of the rated frequency, the output voltage shall be within ±5% of the rated voltage.

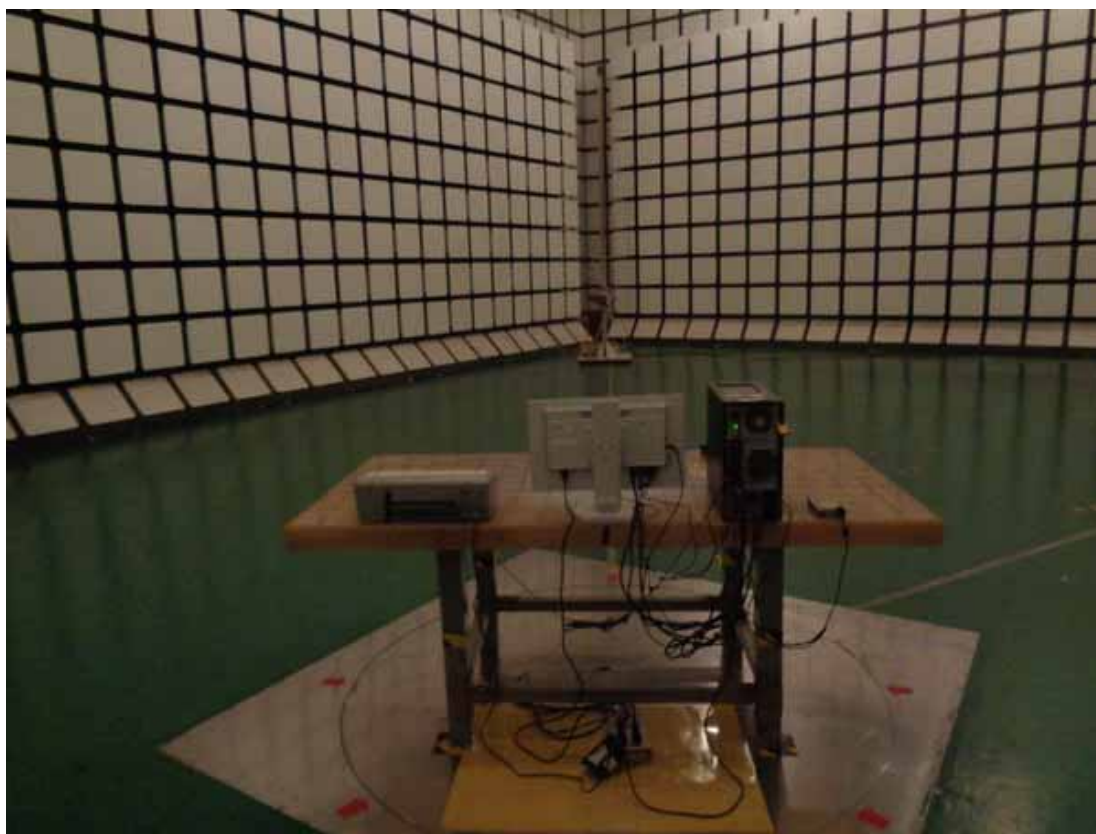
Remark: The class “B*” means the EUT will restart, but it can recover by itself.

15. PHOTOGRAPHS

15.1. Photos of Power Line Conducted Emission Test



15.2. Photos of Radiated Emission Test (In 10m Anechoic Chamber)



In 10m Anechoic Chamber Test 1GHz – 6GHz



15.3.Photo of Harmonic / Flicker Test



15.4.Photos of Electrostatic Discharge Immunity Test



15.5.Photo of RF Strength Susceptibility Test



15.6.Photo of Electrical Fast Transient/Burst Immunity Test



15.7.Photo of Surge Test



15.8.Photo of Injected Currents Susceptibility Test



15.9. Photo of Magnetic Field Test



15.10. Photo of Voltage Dips and Interruptions Test

