

EMC TEST REPORT

Report No. : ACS-E18299

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

Product : LCD Monitor

Model No. : EA231WU-BK

Serial No. : N/A

Brand : NEC

Test Lab. : Audix Technology (Shenzhen) Co., Ltd.
No. 6, Kefeng Road, Science & Technology Park,
Nanshan District, Shenzhen, Guangdong, China
Tel: (0755) 26639496
Fax: (0755) 26632877

Date of Test : Aug.29~Sep.07, 2018

Date of Report : Sep.18, 2018



TABLE OF CONTENTS

Description	Page
Test Report Verification.....	5
1. SUMMARY OF STANDARDS AND RESULTS.....	6
1.1. Description of Standards and Results	6
2. GENERAL INFORMATION.....	7
2.1. Description of Device (EUT).....	7
2.2. Tested Supporting System Details	8
2.3. Block Diagram of connection between EUT and simulators	9
2.4. Test Facility	10
2.5. Measurement Uncertainty (95% confidence levels, k=2).....	10
3. CONDUCTED EMISSION AT MAINS TERMINALS TEST	11
3.1. Test Equipments	11
3.2. Block Diagram of Test Setup.....	11
3.3. Test Standard	11
3.4. Power Line Conducted Emission at Mains Terminals Limit.....	11
3.5. EUT Configuration on Test	12
3.6. Operating Condition of EUT	12
3.7. Test Procedure	12
3.8. Conducted Emission at Mains Terminals Test Results	13
4. RADIATED EMISSION MEASUREMENT	18
4.1. Test Equipments	18
4.2. Block Diagram of Test Setup.....	19
4.3. Test Standard	19
4.4. Radiated Emission Limit	20
4.5. EUT Configuration on Test	20
4.6. Operating Condition of EUT	20
4.7. Test Procedure	20
4.8. Radiated Emission Test Results.....	21
5. HARMONIC CURRENT TEST	31
5.1. Test Equipments	31
5.2. Block Diagram of Test Setup.....	31
5.3. Test Standard	31
5.4. Limits of Harmonic Current	31
5.5. EUT Configuration on Test	32
5.6. Operating Condition of EUT	32
5.7. Test Procedure	32
5.8. Test Results.....	32
6. VOLTAGE FLUCTUATIONS & FLICKER TEST	39
6.1. Test Equipment	39
6.2. Block Diagram of Test Setup.....	39
6.3. Test Standard	39
6.4. Limits of Voltage Fluctuation and Flick.....	39
6.5. EUT Configuration on Test	39
6.6. Operating Condition of EUT	39
6.7. Test Procedure	39
6.8. Test Results.....	39
7. IMMUNITY PERFORMANCE CRITERIA.....	41
8. ELECTROSTATIC DISCHARGE IMMUNITY TEST	42

8.1.	Test Equipments	42
8.2.	Block Diagram of Test Setup.....	42
8.3.	Test Standard	42
8.4.	Severity Levels and Performance Criterion.....	42
8.5.	EUT Configuration	42
8.6.	Operating Condition of EUT	42
8.7.	Test Procedure	43
8.8.	Test Results.....	43
8.9.	ESD TEST POINT PHOTOS	45
9.	RF FIELD STRENGTH SUSCEPTIBILITY TEST.....	48
9.1.	Test Equipments	48
9.2.	Block Diagram of Test Setup.....	48
9.3.	Test Standard	48
9.4.	Severity Levels and Performance Criterion.....	48
9.5.	EUT Configuration	48
9.6.	Operating Condition of EUT	49
9.7.	Test Procedure	49
9.8.	Test Results.....	49
10.	ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST	51
10.1.	Test Equipments	51
10.2.	Block Diagram of Test Setup.....	51
10.3.	Test Standard	51
10.4.	Severity Levels and Performance Criterion.....	51
10.5.	EUT Configuration	51
10.6.	Operating Condition of EUT	51
10.7.	Test Procedure	52
10.8.	Test Results.....	52
11.	SURGE TEST	54
11.1.	Test Equipments	54
11.2.	Block Diagram of Test Setup.....	54
11.3.	Test Standard	54
11.4.	Severity Levels and Performance Criterion.....	54
11.5.	EUT Configuration	54
11.6.	Operating Condition of EUT	54
11.7.	Test Procedure	55
11.8.	Test Results.....	55
12.	INJECTED CURRENTS SUSCEPTIBILITY TEST	57
12.1.	Test Equipments	57
12.2.	Block Diagram of Test Setup.....	57
12.3.	Test Standard	57
12.4.	Severity Levels and Performance Criterion.....	57
12.5.	EUT Configuration	57
12.6.	Operating Condition of EUT	58
12.7.	Test Procedure	58
12.8.	Test Results.....	58
13.	MAGNETIC FIELD IMMUNITY TEST	60
13.1.	Test Equipment.....	60
13.2.	Block Diagram of Test Setup.....	60
13.3.	Test Standard	60
13.4.	Severity Levels and Performance Criterion.....	60
13.5.	EUT Configuration on Test	60
13.6.	Operating Condition of EUT	60
13.7.	Test Procedure	61
13.8.	Test Results.....	61

14.	VOLTAGE DIPS AND INTERRUPTIONS TEST	63
14.1.	Test Equipment	63
14.2.	Block Diagram of Test Setup.....	63
14.3.	Test Standard	63
14.4.	Severity Levels and Performance Criterion.....	63
14.5.	EUT Configuration	63
14.6.	Operating Condition of EUT	63
14.7.	Test Procedure	63
14.8.	Test Results.....	63
15.	PHOTOGRAPHS	65
15.1.	Photos of Power Line Conducted Emission Test	65
15.2.	Photos of Radiated Emission Test (In 10m Anechoic Chamber)	66
15.3.	Photo of Harmonic / Flicker Test	67
15.4.	Photos of Electrostatic Discharge Immunity Test	68
15.5.	Photo of RF Strength Susceptibility Test	69
15.6.	Photo of Electrical Fast Transient/Burst Immunity Test	69
15.7.	Photo of Surge Test.....	70
15.8.	Photo of Injected Currents Susceptibility Test.....	70
15.9.	Photo of Magnetic Field Test	71
15.10.	Photo of Voltage Dips and interruptions test.....	71

TEST REPORT VERIFICATION

Applicant : TPV Electronics (FuJian) Co., Ltd.
 Product : LCD Monitor
 Model No. : EA231WU-BK
 Serial No. : N/A
 Brand : NEC
 Report No. : ACS-E18299
 Power Supply : AC 100-240V, 50/60Hz
 Test Voltage : AC 230V/50Hz, AC 110V/60Hz, AC 100V/50Hz
 Standards : EN 55032: 2012+AC: 2013 (Class B)
 EN 55032: 2015
 EN 55032: 2015+AC: 2016
 CISPR 32: 2012
 CISPR32: 2015/COR1: 2016 (AS/NZS CISPR 32: 2015)
 EN 61000-3-2: 2014, EN 61000-3-3: 2013
 EN 55024: 2010
 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, IEC 61000-4-11: 2004+A1: 2017)

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 : Aug.29~Sep.07, 2018 Report of date: Sep.18, 2018

Prepared by : Monica Liu Reviewed by : Bensun Chen
 Monica Liu / Assistant Bensun Chen / Deputy Manager



Approved & Authorized Signer :

Signature:

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 EN 55032: 2015 EN 55032: 2015+AC: 2016	PASS	Minimum passing margin is 15.32dB at 0.150MHz	
Conducted emission at telecommunication port	EN 55032: 2012+AC: 2013 EN 55032: 2015 EN 55032: 2015+AC: 2016	N/A	N/A	
Radiated emission (30-1000MHz)	EN 55032: 2012+AC: 2013 EN 55032: 2015 EN 55032: 2015+AC: 2016	PASS	Minimum passing margin is 4.31dB at 208.66MHz	
Radiated emission (1-6GHz)	EN 55032: 2012+AC: 2013 EN 55032: 2015 EN 55032: 2015+AC: 2016	PASS	Minimum passing margin is 15.05dB at 2496.33MHz	
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				
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+A1: 2017	PASS	B	A
Voltage dips, 30% reduction		PASS	C	A
Voltage interruptions		PASS	C	C
N/A is an abbreviation for Not Applicable.				

2. GENERAL INFORMATION

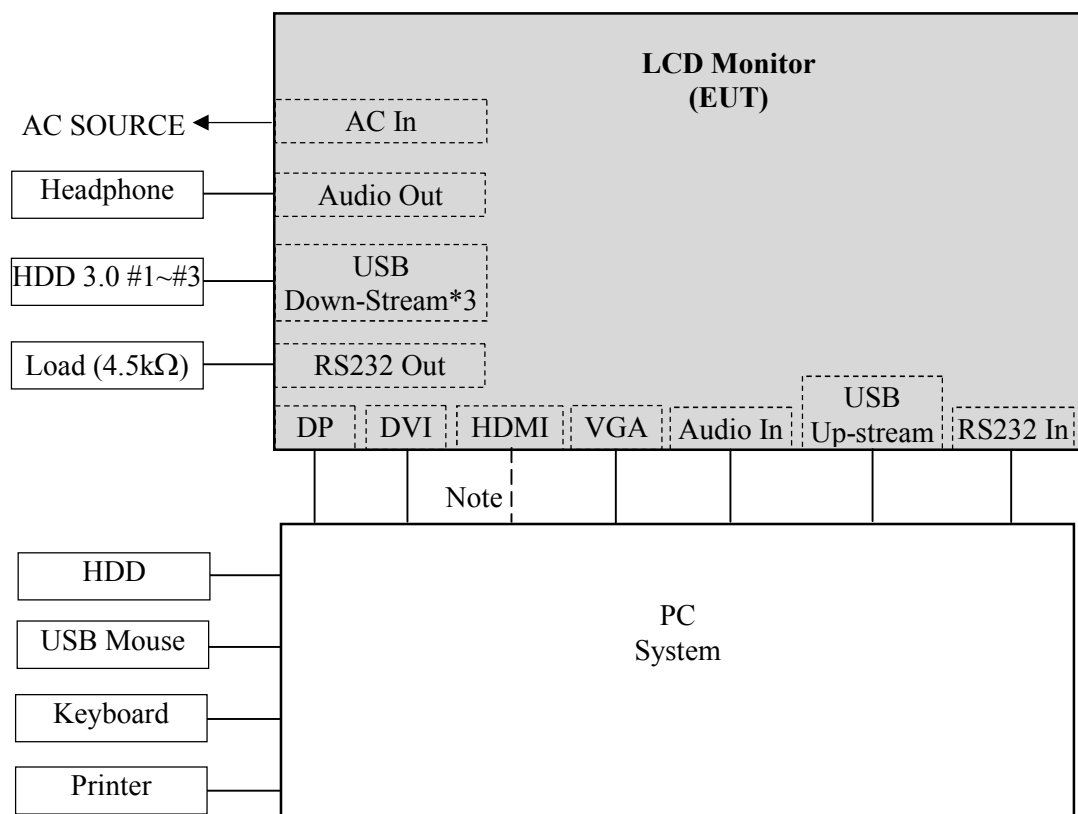
2.1. Description of Device (EUT)

Product	: LCD Monitor
Model no.	: EA231WU-BK
Brand	: NEC
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
I/O Port	: (1) One AC In Port (2) One DP Port (3) One DVI Port (4) One HDMI Port (5) One VGA Port (6) A Serial of RS232 In / Out Ports (7) One Audio In Port (8) One USB Up-stream Port (9) Three USB Down-stream Ports (10) One Audio Out Port
VGA Cable	: Shielded, Detachable, 1.8m/1.5m(with two cores)
DVI Cable	: Shielded, Detachable, 1.8m/1.5m(with two cores)
HDMI Cable	: Shielded, Detachable, 1.8m/1.5m
DP Cable	: Shielded, Detachable, 1.8m/1.5m
Audio Cable	: Shielded, Detachable, 1.8m/1.5m
USB Cable	: Shielded, Detachable, 1.8m/1.5m
Power Cord	: Unshielded, Detachable, 1.8m/1.5m (3 pins)
Date of Test	: Aug.29~Sep.07, 2018
Date of Receipt	: Aug.26, 2018
Sample Type	: Prototype production

2.2. Tested Supporting System Details

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	Personal Computer	Test PC Q	acer	Veriton T630	DTVMKCN00560900F629600
		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
		USB Cable: Shielded, Undetachable, 1.5m			
3.	USB Mouse	ACS-EMC-M03R	Dell	M0C5UO	512023253
		USB 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	ACS-EMC-DVD	PHILIPS	BDP3100/12	N/A
		Power Cord: Unshielded, Detachable, 1.0m			
7.	HDD 3.0#1	ACS-EMC-HDD33	WD	WD My Book Studio	WCAV5C987862
		USB Cable: Shielded, Detachable, 1.8m			
8.	HDD 3.0#2	ACS-EMC-HDD34	WD	WD My Book Studio	WCAV4302542
		USB Cable: Shielded, Detachable, 1.8m			
9.	HDD 3.0#3	ACS-EMC-HDD35	WD	WD My Book Studio	WCAV5D02502
		USB Cable: Shielded, Detachable, 1.8m			
10.	Headphone	ACS-EMC-EP01	OVANN	0V-T880V	N/A
		Data Cable: Shielded, Undetachable, 2.0m			

2.3. Block Diagram of connection between EUT and simulators



Note : PC Mode and 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

EMC Lab. : Certificated by DAkkS, Germany
Registration No: D-PL-12151-01-00
Valid Date: Dec.07, 2021

Accredited by NVLAP, USA
NVLAP Code: 200372-0
Valid Date: Mar.31, 2019

Certificated by FCC, USA
Designation No: CN5022
Valid Date: Mar.31, 2019

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)	3.6dB (30~200MHz, Polarization: H)
	3.8dB (30~200MHz, Polarization: V)
	4.0dB (200M~1GHz, Polarization: H)
	4.2dB (200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 10m chamber (1GHz-18GHz)	5.0dB (1-6GHz, Distance: 3m)
	5.4dB (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	1.5%
Uncertainty for Harmonic test	8.0%
Uncertainty for C/S Test	1.4dB (Using CDN test)
	3.2dB (Using EM clamp test)
Uncertainty for R/S Test	2.31dB (80MHz~200MHz)
	2.31dB (200MHz~1000MHz)
Uncertainty for Magnetic field immunity test	2%
Uncertainty for test site temperature and humidity and Pressure	0.6°C
	3%
	1kPa

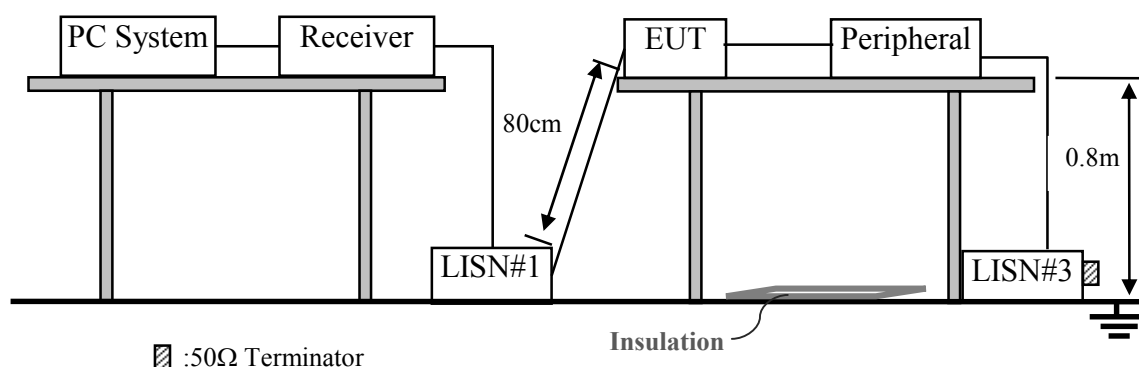
3. CONDUCTED EMISSION AT MAINS TERMINALS TEST

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.15,18	1 Year
2.	Test Receiver	Rohde & Schwarz	ESCI	100843	Oct.14,17	1 Year
3.	L.I.S.N.#1	Rohde & Schwarz	ENV4200	100041	Apr.23,18	1 Year
4.	L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	Apr.23,18	1 Year
5.	Terminator	Hubersuhner	50Ω	No.4	Apr.23,18	1 Year
6.	Terminator	Hubersuhner	50Ω	No.5	Apr.23,18	1 Year
7.	RF Cable	MIYAZAKI	3D-2W	No.1	Apr.23,18	1 Year
8.	Coaxial Switch	Anritsu	MP59B	6201397224	Apr.23,18	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

EN 55032: 2015

EN 55032: 2015+AC: 2016

3.4. Power Line Conducted Emission at Mains Terminals Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
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. : EA231WU-BK

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" to LCD Monitor (EUT) through VGA / DVI/ HDMI / DP ports.

3.6.4. For EMS: PC system ran the Self-test program "EMC Test" by windows 7 and sent "H" Character to LCD Monitor (EUT) through VGA/ DVI / HDMI / DP ports, the Screen of EUT displayed and filled with "H" pattern.

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

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

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

3.6.8. The EUT is designed with AC power of rating AC 230V/50Hz & AC 110V/60Hz (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.

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. #3). 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 ESCI) 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. : EA231WU-BK

Test Date: Aug.29, 2018 Temperature: 25.2℃ Humidity: 52% Pressure: 101.6kPa

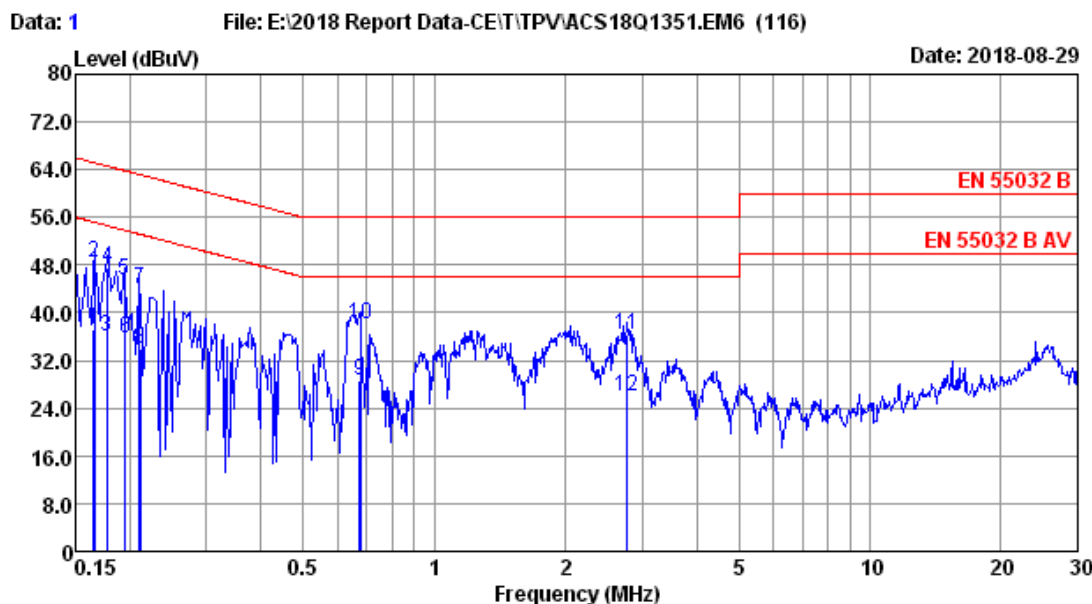
The EUT with following test modes were pre-tested:

No.	Test Voltage	Test Mode	Input Port	Cable Length	Resolution & Frequency
1.	AC 230V/50Hz	PC Mode	HDMI	1.8m	640*480@60Hz
2.					1280*1024@75Hz
3.					1920*1080@60Hz
4.					1080*1920@60Hz (Panel is Vertical)(+90°)
5.					1080*1920@60Hz (Panel is Vertical)(-90°)
6.			DP	1.5m	1920*1080@60Hz
7.				1.8m	640*480@60Hz
8.					1280*1024@75Hz
9.			VGA	1.8m	1920*1080@60Hz
10.					640*480@60Hz
11.					1280*1024@75Hz
12.			DVI	1.8m	1920*1080@60Hz
13.					640*480@60Hz
14.					1280*1024@75Hz
15.					1920*1080@60Hz
16.		DVD Mode	HDMI	1.8m	Color Bar
17.		Standby	---	---	---
18.	AC 110V/60Hz	PC Mode	HDMI	1.8m	1920*1080@60Hz

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	Cable Length	Test Mode	Input Port	Resolution & Frequency	Reference Test Data No.	
						Line	Neutral
1. *	AC 230V/50Hz	1.8m	PC (Running ITU-R BT 1729)	HDMI	1920*1080@60Hz	#1	#2
2.			PC (Running ITU-R BT 471-1)		1920*1080@60Hz	#3	#4

(* means the worst test mode)



Site no :2# Conduction Data No :1
 Dis./Lisn :2018 ENV4200 L LISN phase:LINE
 Limit :EN 55032 B Pre :101.6kPa
 Env./Ins. :25.2°C/52% Engineer :Apple
 EUT :EA231WU-BK
 Power Rating :AC 230V/50Hz
 Test Mode :Running ITU-R BT 1729
 HDMI:1920*1080@60Hz
 Line:1.8m

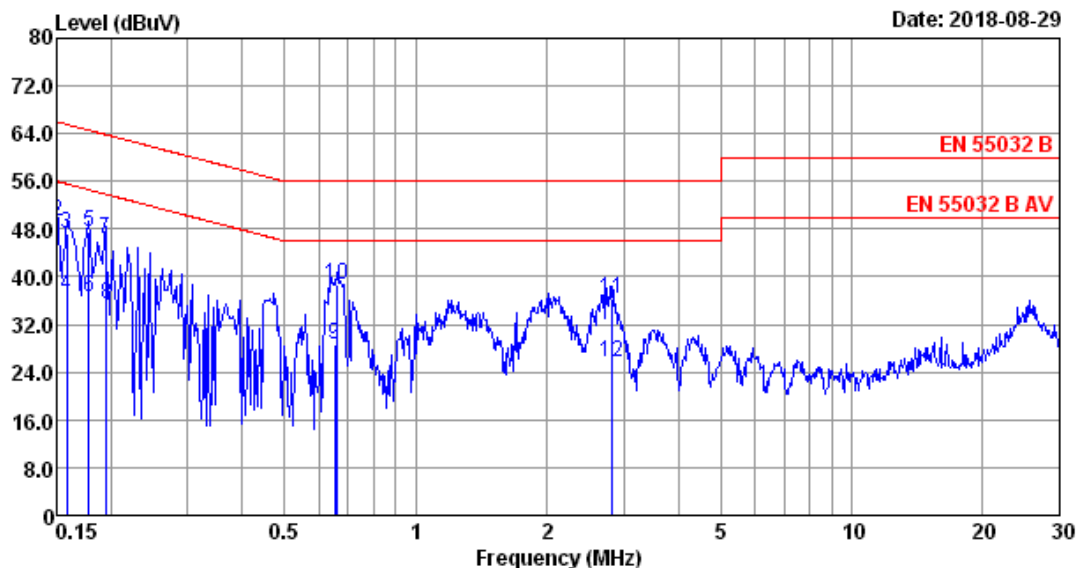
No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.165	10.15	0.14	26.85	37.14	55.21	18.07	Average
2	0.166	10.15	0.14	38.04	48.33	65.16	16.83	QP
3	0.177	10.15	0.14	25.67	35.96	54.63	18.67	Average
4	0.178	10.15	0.14	37.19	47.48	64.59	17.11	QP
5	0.194	10.15	0.14	35.18	45.47	63.84	18.37	QP
6	0.195	10.11	0.14	25.46	35.71	53.82	18.11	Average
7	0.211	10.11	0.14	33.82	44.07	63.18	19.11	QP
8	0.211	10.11	0.14	23.68	33.93	53.17	19.24	Average
9	0.674	9.94	0.14	18.62	28.70	46.00	17.30	Average
10	0.675	9.94	0.14	28.13	38.21	56.00	17.79	QP
11	2.765	9.89	0.13	26.27	36.29	56.00	19.71	QP
12	2.766	9.89	0.13	15.86	25.88	46.00	20.12	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.

Data: 2

File: E:\2018 Report Data-CE\TPV\ACS18Q1351.EM6 (116)

Date: 2018-08-29



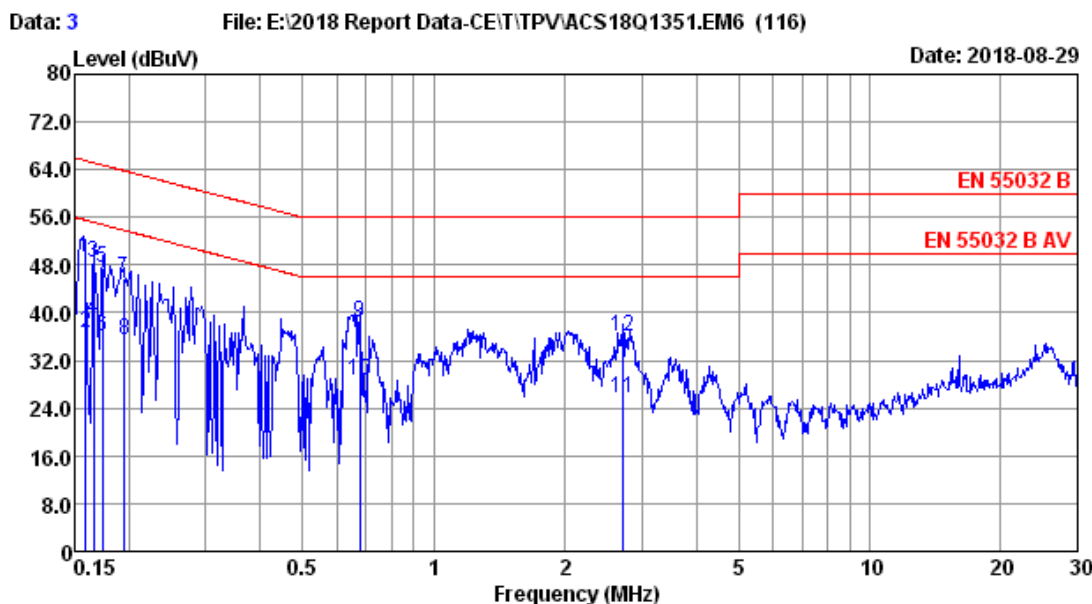
Site no :2# Conduction
Dis./Lisn :2018 ENV4200 N
Limit :EN 55032 B
Env./Ins. :25.2°C/52%
EUT :EA231WU-BK
Power Rating :AC 230V/50Hz
Test Mode :Running ITU-R BT 1729
HDMI:1920*1080@60Hz
Line:1.8m

Data No :2
LISN phase:NEUTRAL
Pre :101.6kPa
Engineer :Apple

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	10.02	0.14	30.52	40.68	56.00	15.32	Average
2	0.150	10.02	0.14	39.04	49.20	66.00	16.80	QP
3	0.158	10.02	0.14	37.18	47.34	65.56	18.22	QP
4	0.159	10.02	0.14	26.85	37.01	55.54	18.53	Average
5	0.178	10.02	0.14	37.28	47.44	64.59	17.15	QP
6	0.178	10.02	0.14	26.55	36.71	54.58	17.87	Average
7	0.194	10.02	0.14	36.30	46.46	63.84	17.38	QP
8	0.195	10.01	0.14	25.42	35.57	53.82	18.25	Average
9	0.653	10.06	0.14	18.55	28.75	46.00	17.25	Average
10	0.658	10.06	0.14	28.61	38.81	56.00	17.19	QP
11	2.824	9.98	0.13	26.23	36.34	56.00	19.66	QP
12	2.825	9.98	0.13	15.65	25.76	46.00	20.24	Average

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.

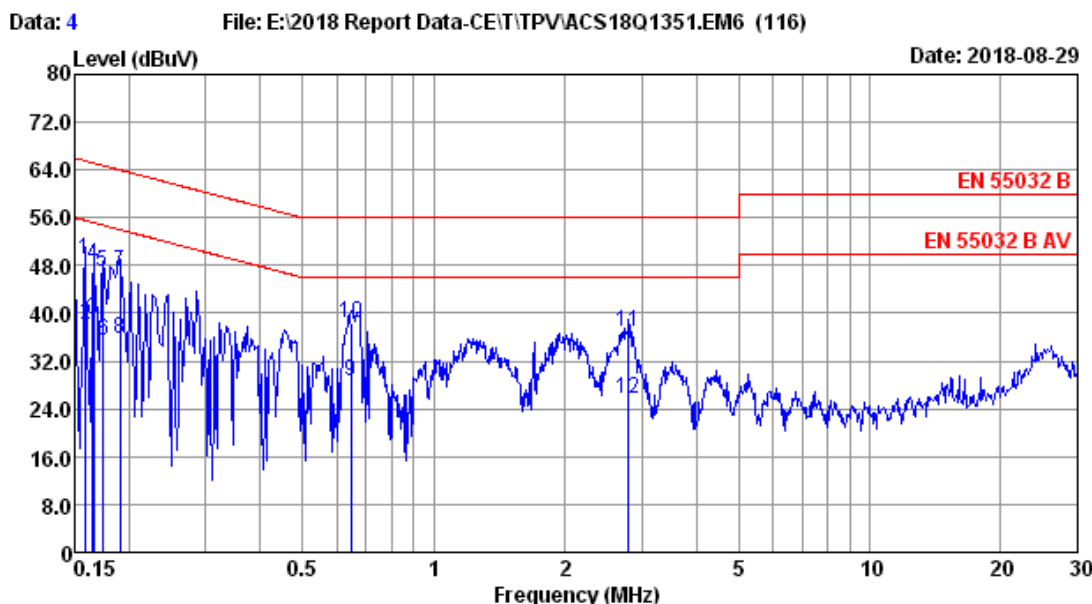
2.If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.



Site no :2# Conduction Data No :3
 Dis./Lisn :2018 ENV4200 L LISN phase:LINE
 Limit :EN 55032 B Pre :101.6kPa
 Env./Ins. :25.2°C/52% Engineer :Apple
 EUT :EA231WU-BK
 Power Rating :AC 230V/50Hz
 Test Mode :Running ITU-R BT 471-1
 HDMI: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	0.158	10.18	0.14	38.96	49.28	65.56	16.28	QP
2	0.159	10.18	0.14	26.35	36.67	55.52	18.85	Average
3	0.166	10.15	0.14	38.18	48.47	65.16	16.69	QP
4	0.166	10.15	0.14	28.55	38.84	55.16	16.32	Average
5	0.174	10.15	0.14	37.26	47.55	64.77	17.22	QP
6	0.174	10.15	0.14	25.67	35.96	54.77	18.81	Average
7	0.194	10.15	0.14	35.38	45.67	63.84	18.17	QP
8	0.195	10.11	0.14	25.32	35.57	53.82	18.25	Average
9	0.675	9.94	0.14	28.17	38.25	56.00	17.75	QP
10	0.676	9.94	0.14	18.52	28.60	46.00	17.40	Average
11	2.705	9.90	0.13	15.68	25.71	46.00	20.29	Average
12	2.707	9.90	0.13	25.96	35.99	56.00	20.01	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 :4
 Dis./Lisn :2018 ENV4200 N LISN phase:NEUTRAL
 Limit :EN 55032 B Pre :101.6kPa
 Env./Ins. :25.2°C/52% Engineer :Apple
 EUT :EA231WU-BK
 Power Rating :AC 230V/50Hz
 Test Mode :Running ITU-R BT 471-1
 HDMI: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	0.158	10.02	0.14	38.82	48.98	65.56	16.58	QP
2	0.159	10.02	0.14	27.87	38.03	55.52	17.49	Average
3	0.165	10.02	0.14	28.94	39.10	55.21	16.11	Average
4	0.166	10.02	0.14	38.07	48.23	65.16	16.93	QP
5	0.174	10.02	0.14	36.67	46.83	64.77	17.94	QP
6	0.175	10.02	0.14	25.31	35.47	54.74	19.27	Average
7	0.190	10.02	0.14	36.84	47.00	64.02	17.02	QP
8	0.191	10.02	0.14	25.45	35.61	53.99	18.38	Average
9	0.646	10.06	0.14	18.52	28.72	46.00	17.28	Average
10	0.647	10.06	0.14	28.28	38.48	56.00	17.52	QP
11	2.794	9.98	0.13	26.94	37.05	56.00	18.95	QP
12	2.795	9.98	0.13	15.43	25.54	46.00	20.46	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	Apr.15,18	1 Year
2.	Signal Analyzer	Rohde & Schwarz	FSV30	103669	Oct.15,17	1 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	103670	Oct.15,17	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR3	101931	Apr.23,18	1 Year
5.	Amplifier	EMCI	EMC9135	980347	Sep.07,18	1 Year
6.	Amplifier	Agilent	8447D	2944A10684	Apr.23,18	1 Year
7.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	429	Apr.19,18	1 Year
8.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	493	Jun.05,18	1 Year
9.	RF Cable	SPUMA	CFD400NL-LW	No.4	Sep.08,18	1 Year
10.	RF Cable	SPUMA	CFD400-NM-NM	160727+160728	Sep.08,18	1 Year
11.	Coaxial Switch	Anritsu	MP59B	6201397220	Apr.23,18	1 Year
12.	Coaxial Switch	Anritsu	MP59B	6201397221	Apr.23,18	1 Year
13.	Coaxial Switch	Anritsu	MP59B	6200766907	Apr.23,18	1 Year
14.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

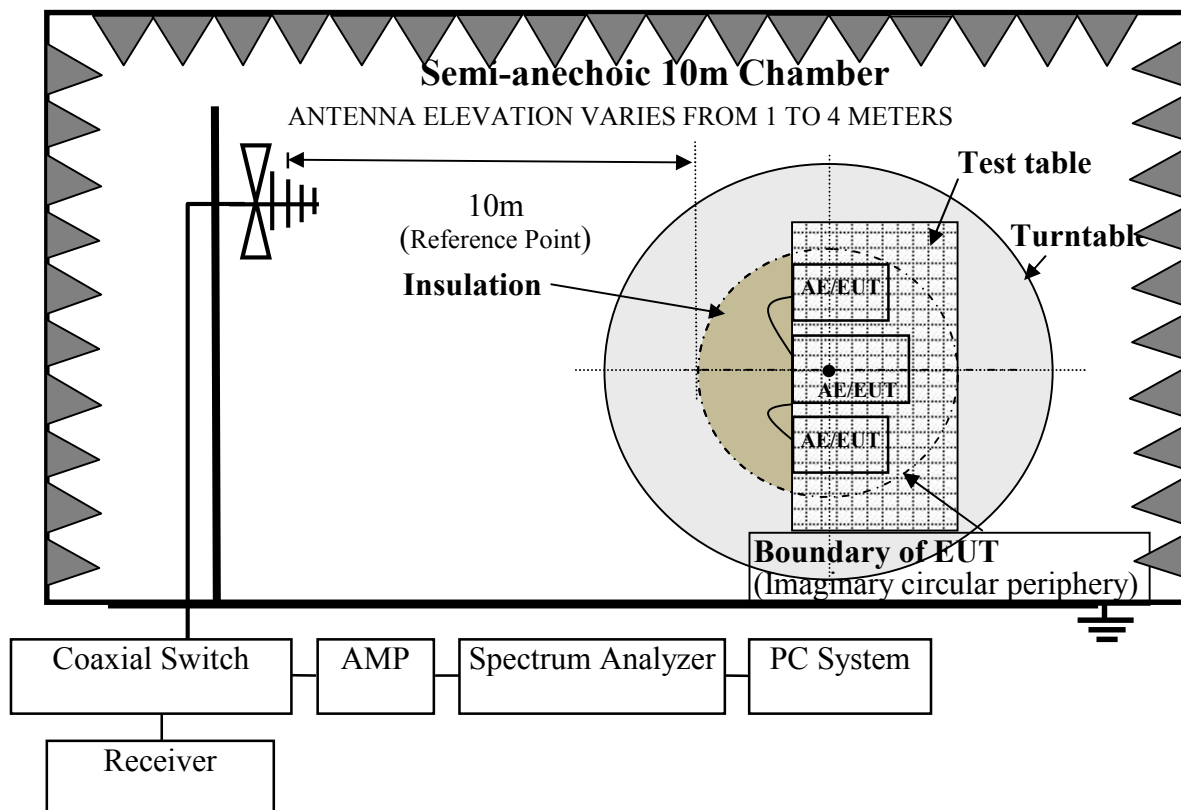
4.1.2. For frequency range 1GHz~6GHz (In 10m Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	10m Chamber	AUDIX	N/A	N/A	Apr.15,18	1 Year
2.	Signal Analyzer	Rohde & Schwarz	FSV30	103670	Oct.15,17	1 Year
3.	Horn Antenna	ETS	3115	9607-4877	Dec.01,17	1 Year
4.	Amplifier	KEYSIGHT	83017A	39500711	Jul.02,18	1 Year
5.	RF Cable	Hubersuhner	SUCOFLEX106	505238/6	Apr.23,18	1 Year
6.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

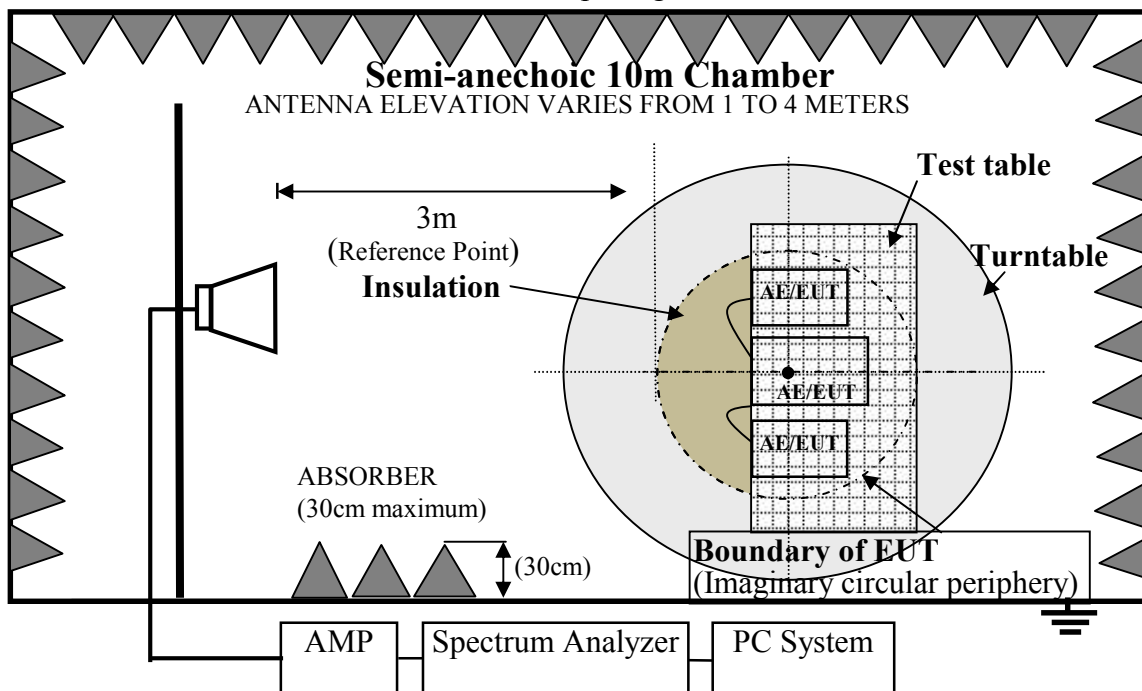
Note: N/A means Not applicable.

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
EN 55032: 2015
EN 55032: 2015+AC: 2016

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 (below 1000MHz)
Emission level = Antenna Factor -Amp Factor +Cable Loss + Reading (above 1000MHz)
(2) The lower limit shall apply at the transition frequencies.

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 periphery of test system 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 ESR3) is 120 kHz.

The resolution bandwidth of the Agilent Spectrum Analyzer FSV30 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. : EA231WU-BK

For frequency range 30MHz~1000MHz

Test Date: Sep.07, 2018 Temperature: 24.2℃ Humidity: 55% Pressure: 101.5kPa

The EUT with following test modes were pre-tested:

No.	Test Voltage	Test Mode	Input Port	Cable Length	Resolution & Frequency	
1.	AC 230V/50Hz	PC Mode	DP	1.8m	640*480@60Hz	
2.					1280*1024@75Hz	
3.					1920*1080@60Hz	
4.					1080*1920@60Hz (Panel is Vertical)(+90°)	
5.					1080*1920@60Hz (Panel is Vertical)(-90°)	
6.				1.5m	1920*1080@60Hz	
7.			VGA	1.8m	640*480@60Hz	
8.					1280*1024@75Hz	
9.					1920*1080@60Hz	
10.			DVI		640*480@60Hz	
11.					1280*1024@75Hz	
12.					1920*1080@60Hz	
13.			HDMI		640*480@60Hz	
14.					1280*1024@75Hz	
15.					1920*1080@60Hz	
16.		DVD Mode	HDMI	1.8m	Color Bar	
17.		Standby	---	---	---	
18.	AC 110V/60Hz	PC Mode	DP	1.8m	1920*1080@60Hz	

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	Cable Length	Test Mode	Input Port	Resolution & Frequency	Reference Test Data No.	
						Horizontal	Vertical
1. *	AC 230V/50Hz	1.8m	PC (Running ITU-R BT 1729)	DP	1920*1080@60Hz	#2	#1
2.			PC (Running ITU-R BT 471-1)		1920*1080@60Hz	#4	#3

(* means the worst test mode)

For frequency range 1GHz~6GHz

Test Date: Aug.30, 2018 Temperature: 21.4℃ Humidity: 52% Pressure: 101.4kPa

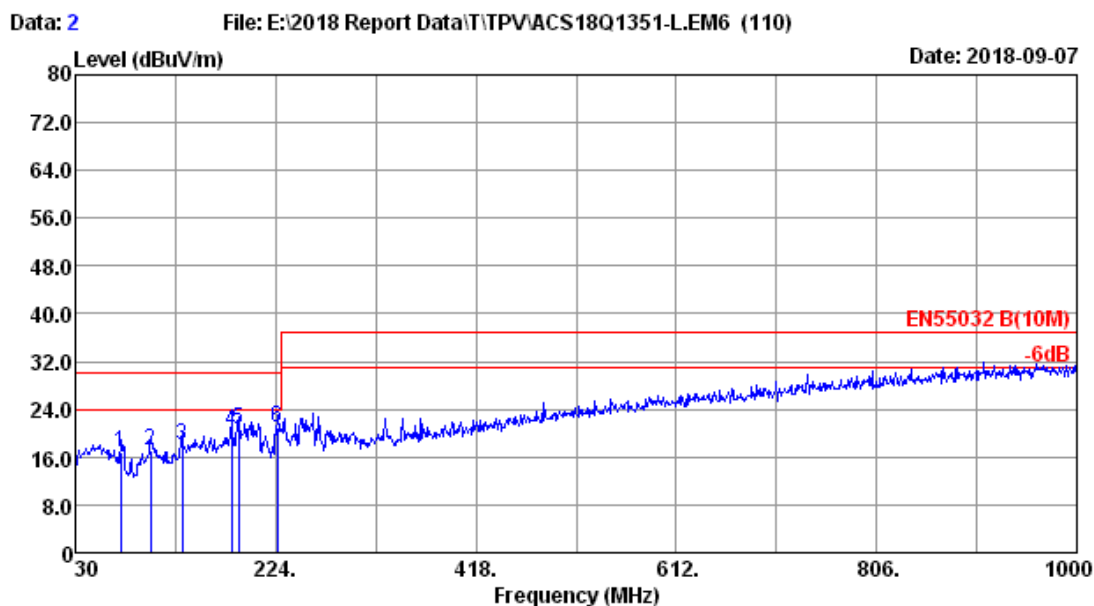
The EUT with following test modes were pre-tested:

No.	Test Voltage	Test Mode	Input Port	Cable Length	Resolution & Frequency
1.	AC 230V/50Hz	PC Mode	DP	1.8m	1280*1024@75Hz
2.					1920*1080@60Hz
3.					1080*1920@60Hz (Panel is Vertical)(+90°)
4.					1080*1920@60Hz (Panel is Vertical)(-90°)
5.				1.5m	1920*1080@60Hz
6.			VGA	1.8m	1280*1024@75Hz
7.					1920*1080@60Hz
8.			DVI		1280*1024@75Hz
9.					1920*1080@60Hz
10.			HDMI		1280*1024@75Hz
11.					1920*1080@60Hz
12.		DVD Mode	HDMI	1.8m	Color Bar
13.		Standby	---	---	---
14.	AC 110V/60Hz	PC Mode	DP	1.8m	1920*1080@60Hz

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	Cable Length	Test Mode	Input Port	Resolution & Frequency	Reference Test Data No.	
						Horizontal	Vertical
1. *	AC 230V/50Hz	1.8m	PC (Running ITU-R BT 1729)	DP	1920*1080@60Hz	#2	#1
2.			PC (Running ITU-R BT 471-1)		1920*1080@60Hz	#4	#3

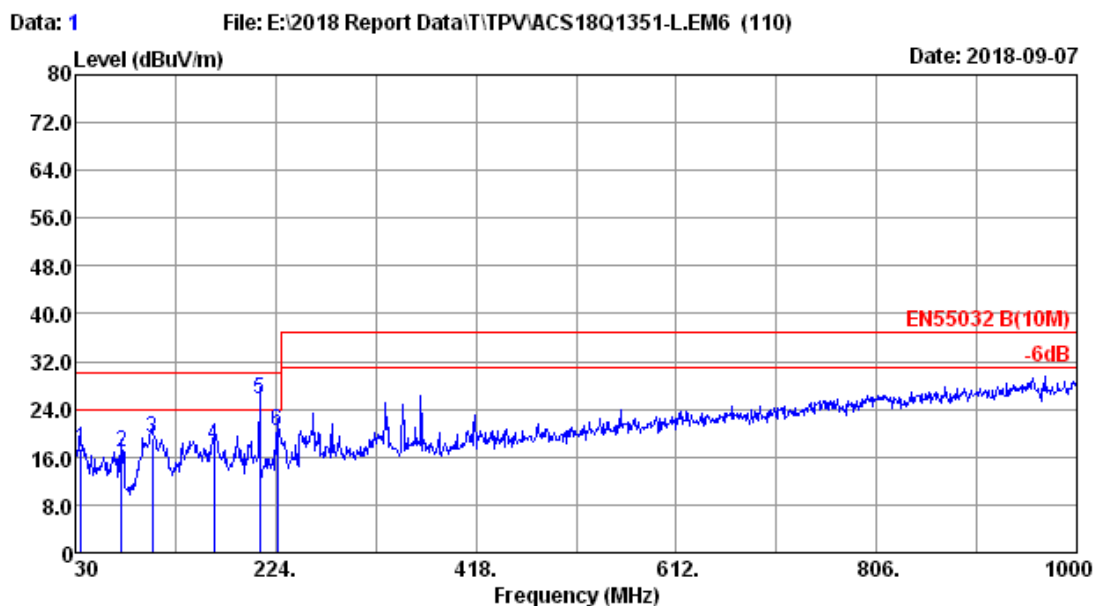
(* means the worst test mode)



Site no.	: 10m Chamber	Data no.	: 2
Dis. / Ant.	: 10m 2018 9168-493 10M	Ant. pol.	: HORIZONTAL
Limit	: EN55032 B(10M)	Pre	: 101.5kPa
Env. / Ins.	: 24.2°C/55%	Engineer	: Jack
EUT	: EA231WU-BK		
Power rating	: AC 230V/50Hz		
Test Mode	: Running ITU-R BT 1729		
	DP: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	73.65	16.14	0.65	0.05	16.84	30.00	13.16	QP
2	102.75	14.90	0.76	1.61	17.27	30.00	12.73	QP
3	133.79	18.17	0.85	-0.92	18.10	30.00	11.90	QP
4	181.32	17.24	0.98	2.16	20.38	30.00	9.62	QP
5	188.11	16.82	1.00	2.93	20.75	30.00	9.25	QP
6	225.94	16.04	1.10	3.82	20.96	30.00	9.04	QP*

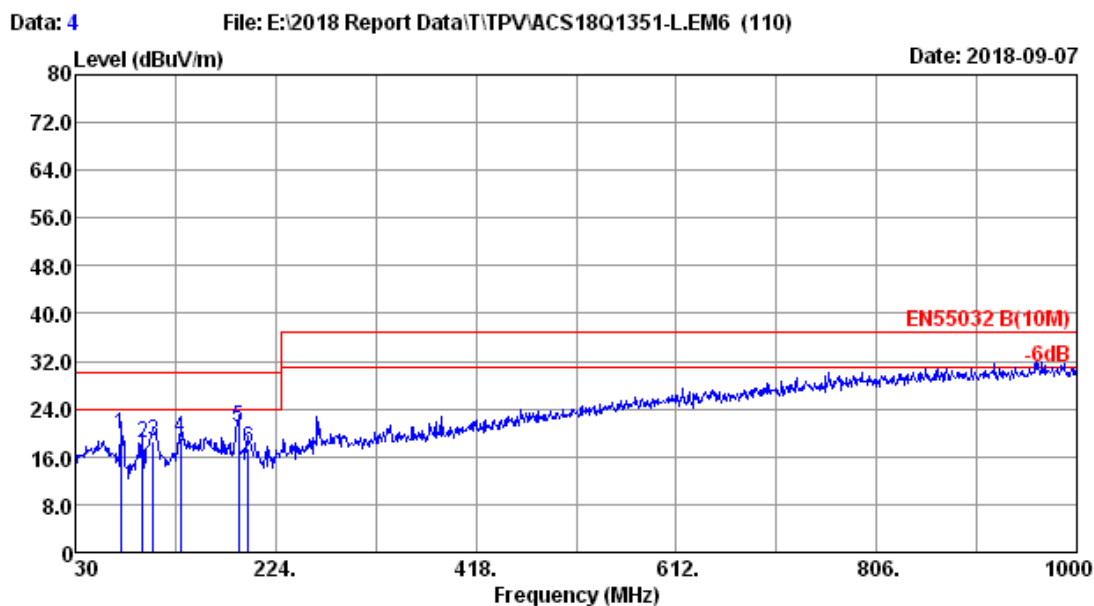
- Remarks:
1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. The worst emission was detected at 225.94MHz with corrected signal level of 20.96dBuV/m. (Antenna height 3.5m; Turntable degree 301°).
 4. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.



Site no. : 10m Chamber Data no. : 1
 Dis. / Ant. : 10m 2018 9168-429 10M Ant. pol. : VERTICAL
 Limit : EN55032 B(10M) Pre : 101.5kPa
 Env. / Ins. : 24.2°C/55% Engineer : Jack
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 1729
 DP: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	35.82	18.70	0.82	-2.03	17.49	30.00	12.51	QP
2	74.62	16.07	1.11	-0.29	16.89	30.00	13.11	QP
3	104.69	15.25	1.27	2.64	19.16	30.00	10.84	QP
4	163.86	18.61	1.56	-2.02	18.15	30.00	11.85	QP
5	208.66	15.63	1.77	8.29	25.69	30.00	4.31	QP*
6	225.94	15.97	1.83	2.69	20.49	30.00	9.51	QP

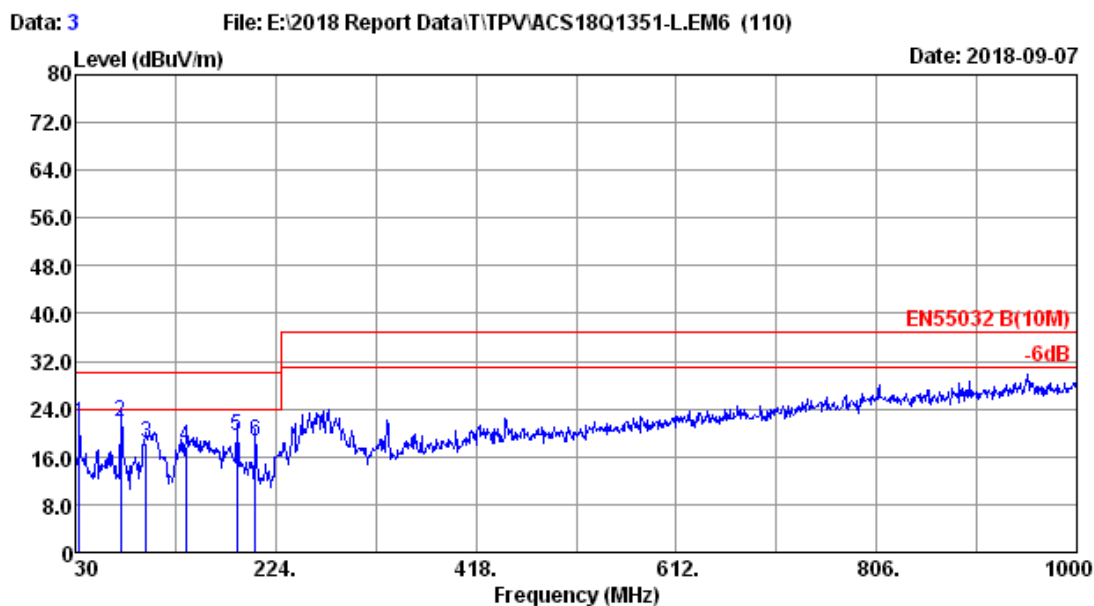
- Remarks:
1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. The worst emission was detected at 208.66MHz with corrected signal level of 25.69dBμV/m. (Antenna height 1.2m; Turntable degree 147°).
 4. 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.



Site no. : 10m Chamber Data no. : 4
 Dis. / Ant. : 10m 2018 9168-493 10M Ant. pol. : HORIZONTAL
 Limit : EN55032 B(10M) Pre : 101.5kPa
 Env. / Ins. : 24.2°C/55% Engineer : Jack
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 471-1
 DP: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	73.65	16.14	0.65	2.98	19.77	30.00	10.23	QP
2	94.99	13.90	0.73	3.59	18.22	30.00	11.78	QP
3	105.66	15.20	0.77	2.64	18.61	30.00	11.39	QP
4	131.85	17.96	0.84	0.52	19.32	30.00	10.68	QP
5	188.11	16.82	1.00	3.27	21.09	30.00	8.91	QP
6	197.81	16.22	1.02	0.22	17.46	30.00	12.54	QP

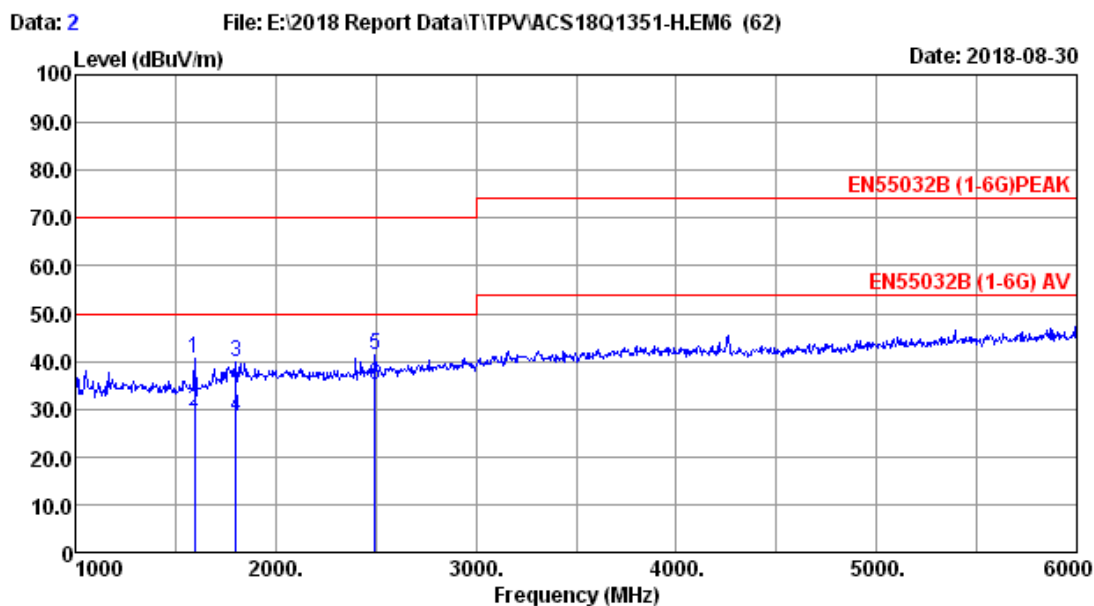
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 10m Chamber Data no. : 3
 Dis. / Ant. : 10m 2018 9168-429 10M Ant. pol. : VERTICAL
 Limit : EN55032 B(10M) Pre : 101.5kPa
 Env. / Ins. : 24.2°C/55% Engineer : Jack
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 471-1
 DP: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	33.88	18.60	0.80	2.07	21.47	30.00	8.53	QP
2	73.65	16.32	1.10	4.34	21.76	30.00	8.24	QP
3	98.87	14.68	1.24	2.27	18.19	30.00	11.81	QP
4	136.70	18.40	1.43	-2.12	17.71	30.00	12.29	QP
5	186.17	16.92	1.66	0.91	19.49	30.00	10.51	QP
6	204.60	15.70	1.75	1.26	18.71	30.00	11.29	QP

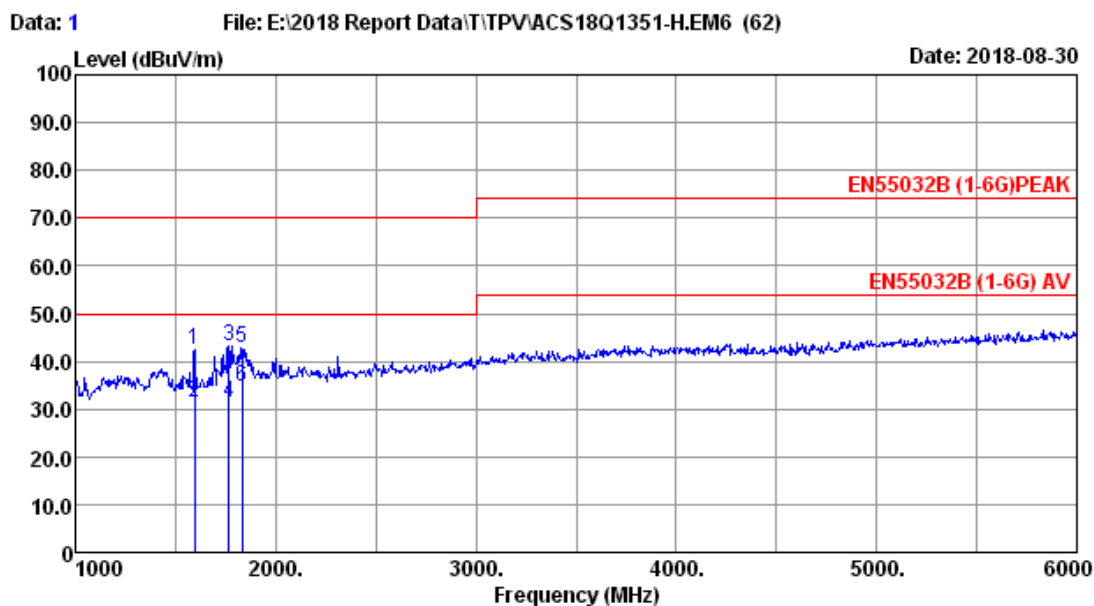
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 10m Chamber Data no. : 2
 Dis. / Ant. : 3m 2017 9607-4877 Ant. pol. : HORIZONTAL
 Limit : EN55032B (1-6G) PEAK Pre : 101.4kPa
 Env. / Ins. : 21.4°C/52% Engineer : Apple
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 1729
 DP:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1595.52	25.76	2.33	33.86	46.45	40.68	70.00	29.32	Peak
2	1596.52	25.76	2.33	33.86	35.25	29.48	50.00	20.52	Average
3	1800.52	26.96	2.50	33.39	43.78	39.85	70.00	30.15	Peak
4	1802.74	26.96	2.50	33.39	32.52	28.59	50.00	21.41	Average
5	2495.85	28.80	2.99	32.46	42.05	41.38	70.00	28.62	Peak
6	2496.33	28.80	2.99	32.46	35.62	34.95	50.00	15.05	Average

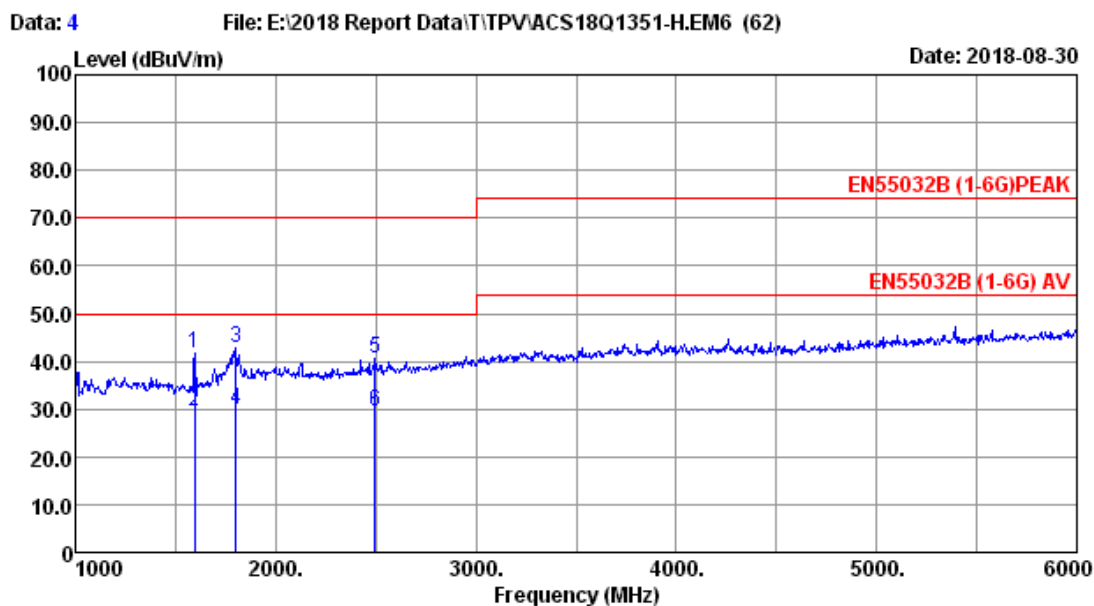
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp Factor
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 10m Chamber Data no. : 1
 Dis. / Ant. : 3m 2017 9607-4877 Ant. pol. : VERTICAL
 Limit : EN55032B (1-6G) PEAK Pre : 101.4kPa
 Env. / Ins. : 21.4°C/52% Engineer : Apple
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 1729
 DP:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1595.82	25.76	2.33	33.86	48.34	42.57	70.00	27.43	Peak
2	1596.63	25.76	2.33	33.86	36.95	31.18	50.00	18.82	Average
3	1765.74	26.72	2.47	33.45	47.58	43.32	70.00	26.68	Peak
4	1766.88	26.72	2.47	33.45	35.62	31.36	50.00	18.64	Average
5	1830.85	27.20	2.53	33.33	46.49	42.89	70.00	27.11	Peak
6	1832.64	27.20	2.53	33.33	38.26	34.66	50.00	15.34	Average

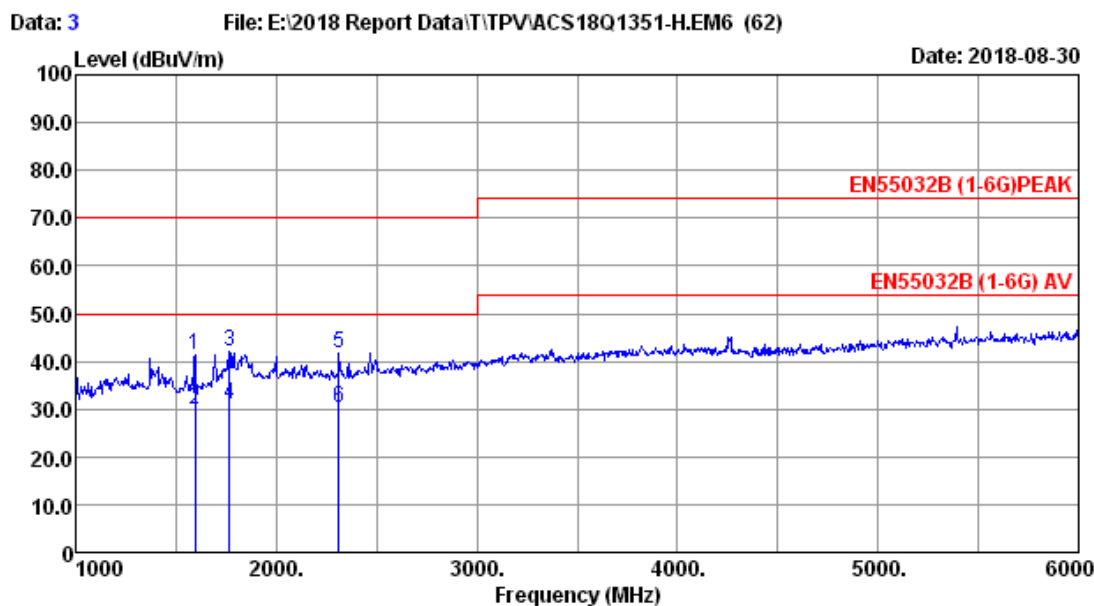
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp Factor
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 10m Chamber Data no. : 4
 Dis. / Ant. : 3m 2017 9607-4877 Ant. pol. : HORIZONTAL
 Limit : EN55032B (1-6G) PEAK Pre : 101.4kPa
 Env. / Ins. : 21.4°C/52% Engineer : Apple
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 471-1
 DP:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1595.85	25.76	2.33	33.86	47.39	41.62	70.00	28.38	Peak
2	1596.33	25.76	2.33	33.86	35.23	29.46	50.00	20.54	Average
3	1800.72	26.96	2.50	33.39	46.73	42.80	70.00	27.20	Peak
4	1802.30	26.96	2.50	33.39	33.65	29.72	50.00	20.28	Average
5	2495.52	28.80	2.99	32.46	41.16	40.49	70.00	29.51	Peak
6	2496.72	28.80	2.99	32.46	30.26	29.59	50.00	20.41	Average

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. : 3
 Dis. / Ant. : 3m 2017 9607-4877 Ant. pol. : VERTICAL
 Limit : EN55032B (1-6G) PEAK Pre : 101.4kPa
 Env. / Ins. : 21.4°C/52% Engineer : Apple
 EUT : EA231WU-BK
 Power rating : AC 230V/50Hz
 Test Mode : Running ITU-R BT 471-1
 DP:1920*1080@60Hz
 Line:1.8m

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1595.52	25.76	2.33	33.86	47.21	41.44	70.00	28.56	Peak
2	1596.33	25.76	2.33	33.86	35.62	29.85	50.00	20.15	Average
3	1765.75	26.72	2.47	33.45	46.30	42.04	70.00	27.96	Peak
4	1766.35	26.72	2.47	33.45	35.23	30.97	50.00	19.03	Average
5	2310.85	27.94	2.87	32.63	43.69	41.87	70.00	28.13	Peak
6	2313.33	27.94	2.87	32.63	32.11	30.29	50.00	19.71	Average

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.

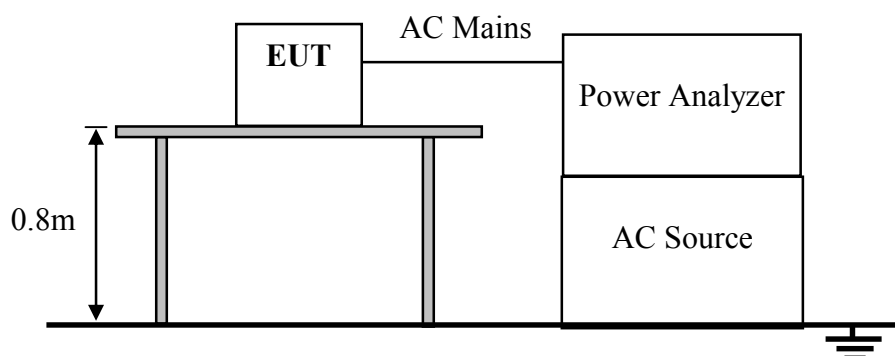
5. HARMONIC CURRENT TEST

5.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Source	California Instruments	500Lix	58481	Oct.14,17	1 Year
2.	Impedance Network	California Instruments	OMNI 1-18i	1247A02235	Oct.14,17	1 Year
3.	Power Analyzer	California Instruments	PACS-1	72627	Oct.14,17	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: EA231WU-BK
 Test category: Class-D per Ed. 4.0 (2014) (European limits)
 Test date: 2018-08-30 Start time: 15:09:23
 Test duration (min): 2.5 Data file name: H-000439.cts_data
 Comment: Running "H" Pattern And 1KHz Playing
 Customer: TPV

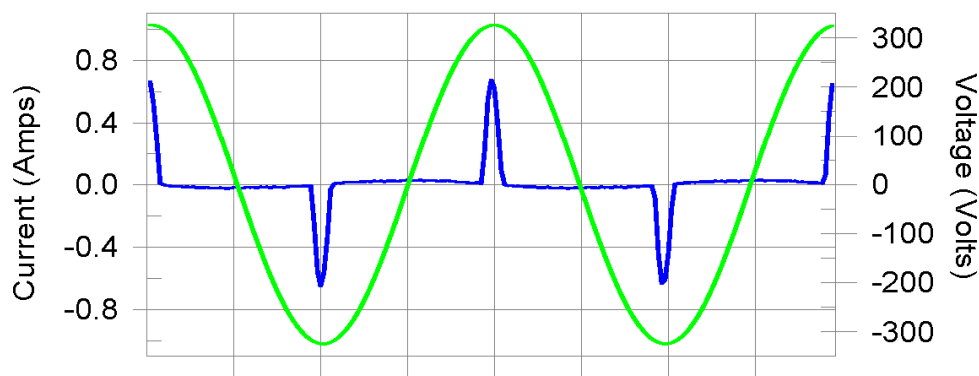
Tested by: Kennen

Test Margin: 100

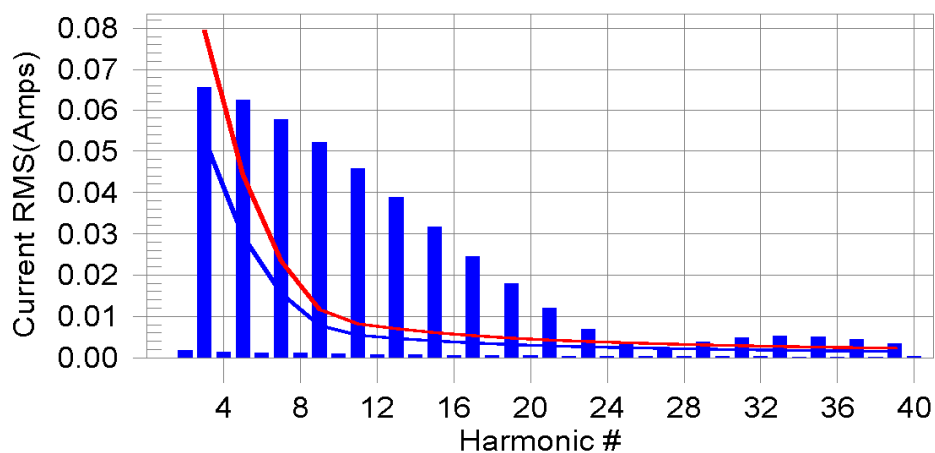
End time: 15:12:04

Test Result: N/L Source qualification: Normal

Current & voltage waveforms



Harmonics and Class D limit line European Limits



Test result: N/L Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Current Test Result Summary (Run time)

EUT: EA231WU-BK Tested by: Kennen
 Test category: Class-D per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 2018-08-30 Start time: 15:09:23 End time: 15:12:04
 Test duration (min): 2.5 Data file name: H-000439.cts_data
 Comment: Running "H" Pattern And 1KHz Playing
 Customer: TPV

Test Result: N/L Source qualification: Normal
 THCA: 0.142 I-THD(%): 201.3 POHC(A): 0.018 POHC Limit(A): 0.007

Highest parameter values during test:

V_RMS (Volts): 230.09 Frequency(Hz): 50.00
 I_Peak (Amps): 0.692 I_RMS (Amps): 0.159
 I_Fund (Amps): 0.070 Crest Factor: 4.360
 Power (Watts): 15.6 Power Factor: 0.429

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	0.000	N/A	0.003	0.000	N/A	N/L
3	0.065	0.053	N/A	0.066	0.079	N/A	N/L
4	0.001	0.000	N/A	0.002	0.000	N/A	N/L
5	0.062	0.030	N/A	0.062	0.044	N/A	N/L
6	0.001	0.000	N/A	0.001	0.000	N/A	N/L
7	0.058	0.016	N/A	0.058	0.023	N/A	N/L
8	0.001	0.000	N/A	0.001	0.000	N/A	N/L
9	0.052	0.008	N/A	0.052	0.012	N/A	N/L
10	0.001	0.000	N/A	0.001	0.000	N/A	N/L
11	0.046	0.005	N/A	0.046	0.008	N/A	N/L
12	0.001	0.000	N/A	0.001	0.000	N/A	N/L
13	0.039	0.005	N/A	0.039	0.007	N/A	N/L
14	0.001	0.000	N/A	0.001	0.000	N/A	N/L
15	0.032	0.004	N/A	0.032	0.006	N/A	N/L
16	0.001	0.000	N/A	0.001	0.000	N/A	N/L
17	0.025	0.004	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	0.018	0.003	N/A	0.018	0.005	N/A	N/L
20	0.000	0.000	N/A	0.000	0.000	N/A	N/L
21	0.012	0.003	N/A	0.012	0.004	N/A	N/L
22	0.000	0.000	N/A	0.000	0.000	N/A	N/L
23	0.007	0.003	N/A	0.007	0.004	N/A	N/L
24	0.000	0.000	N/A	0.000	0.000	N/A	N/L
25	0.003	0.002	N/A	0.003	0.004	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	0.004	0.002	N/A	0.004	0.003	N/A	N/L
30	0.000	0.000	N/A	0.000	0.000	N/A	N/L
31	0.005	0.002	N/A	0.005	0.003	N/A	N/L
32	0.000	0.000	N/A	0.000	0.000	N/A	N/L
33	0.005	0.002	N/A	0.005	0.003	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	0.003	N/A	N/L
36	0.000	0.000	N/A	0.000	0.000	N/A	N/L
37	0.004	0.002	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	0.003	0.002	N/A	0.003	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: EA231WU-BK Tested by: Kennen
 Test category: Class-D per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 2018-08-30 Start time: 15:09:23 End time: 15:12:04
 Test duration (min): 2.5 Data file name: H-000439.cts_data
 Comment: Running "H" Pattern And 1KHz Playing
 Customer: TPV

Test Result: N/L Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 230.09	Frequency(Hz): 50.00
I_Peak (Amps): 0.692	I_RMS (Amps): 0.159
I_Fund (Amps): 0.070	Crest Factor: 4.360
Power (Watts): 15.6	Power Factor: 0.429

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.081	0.460	17.70	OK
3	0.461	2.070	22.28	OK
4	0.054	0.460	11.72	OK
5	0.034	0.920	3.73	OK
6	0.026	0.460	5.57	OK
7	0.032	0.690	4.71	OK
8	0.012	0.460	2.72	OK
9	0.036	0.460	7.73	OK
10	0.014	0.460	3.13	OK
11	0.029	0.230	12.43	OK
12	0.010	0.230	4.37	OK
13	0.032	0.230	13.95	OK
14	0.004	0.230	1.83	OK
15	0.022	0.230	9.37	OK
16	0.010	0.230	4.27	OK
17	0.024	0.230	10.58	OK
18	0.011	0.230	4.72	OK
19	0.022	0.230	9.41	OK
20	0.007	0.230	2.88	OK
21	0.016	0.230	7.09	OK
22	0.003	0.230	1.41	OK
23	0.011	0.230	4.70	OK
24	0.004	0.230	1.91	OK
25	0.007	0.230	3.14	OK
26	0.002	0.230	0.96	OK
27	0.006	0.230	2.62	OK
28	0.003	0.230	1.11	OK
29	0.008	0.230	3.36	OK
30	0.002	0.230	1.08	OK
31	0.008	0.230	3.27	OK
32	0.002	0.230	0.93	OK
33	0.009	0.230	3.72	OK
34	0.002	0.230	1.06	OK
35	0.009	0.230	3.80	OK
36	0.002	0.230	1.03	OK
37	0.007	0.230	3.26	OK
38	0.003	0.230	1.22	OK
39	0.006	0.230	2.54	OK
40	0.003	0.230	1.26	OK

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

EUT: EA231WU-BK

Test category: Class-D per Ed. 4.0 (2014) (European limits)

Test date: 2018-08-30

Test duration (min): 2.5

Comment: Default Mode

Customer: TPV

Tested by: Kennen

Test Margin: 100

Start time: 15:13:45

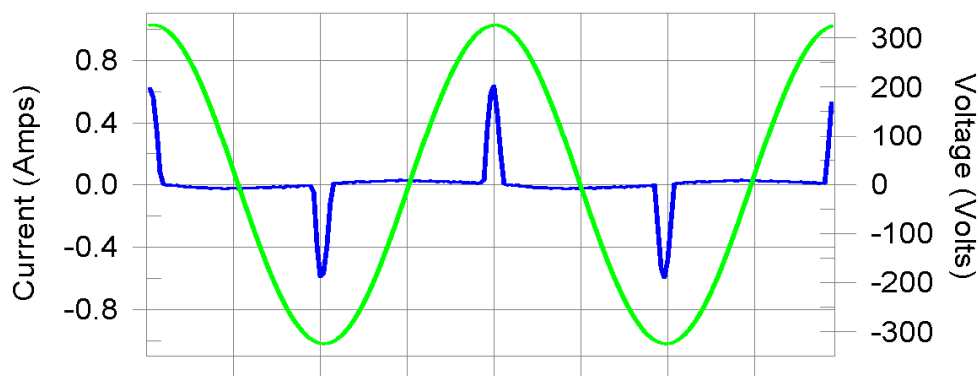
End time: 15:16:26

Data file name: H-000440.cts_data

Test Result: N/L

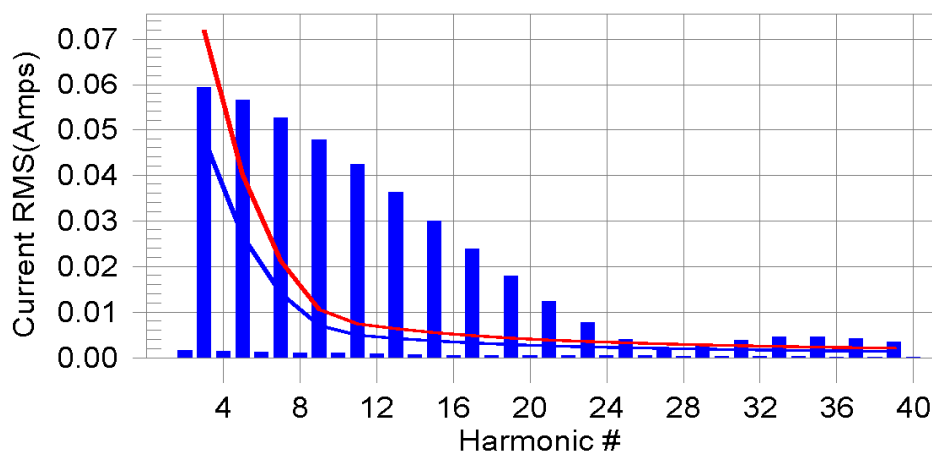
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class D limit line

European Limits



Test result: N/L Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Current Test Result Summary (Run time)

EUT: EA231WU-BK
 Test category: Class-D per Ed. 4.0 (2014) (European limits)
 Test date: 2018-08-30
 Test duration (min): 2.5
 Comment: Default Mode
 Customer: TPV

Tested by: Kennen
 Test Margin: 100
 Start time: 15:13:45
 End time: 15:16:26
 Data file name: H-000440.cts_data

Test Result: N/L Source qualification: Normal
 THC(A): 0.130 I-THD(%): 203.2 POHC(A): 0.018 POHC Limit(A): 0.006

Highest parameter values during test:

V_RMS (Volts): 230.08
 I_Peak (Amps): 0.655
 I_Fund (Amps): 0.064
 Power (Watts): 14.1

Frequency(Hz): 50.00
 I_RMS (Amps): 0.146
 Crest Factor: 4.513
 Power Factor: 0.423

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	0.000	N/A	0.003	0.000	N/A	N/L
3	0.059	0.048	N/A	0.060	0.072	N/A	N/L
4	0.001	0.000	N/A	0.002	0.000	N/A	N/L
5	0.056	0.027	N/A	0.057	0.040	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	0.053	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	0.048	0.011	N/A	N/L
10	0.001	0.000	N/A	0.001	0.000	N/A	N/L
11	0.042	0.005	N/A	0.042	0.007	N/A	N/L
12	0.001	0.000	N/A	0.001	0.000	N/A	N/L
13	0.036	0.004	N/A	0.036	0.006	N/A	N/L
14	0.001	0.000	N/A	0.001	0.000	N/A	N/L
15	0.030	0.004	N/A	0.030	0.005	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	0.024	0.005	N/A	N/L
18	0.000	0.000	N/A	0.001	0.000	N/A	N/L
19	0.018	0.003	N/A	0.018	0.004	N/A	N/L
20	0.000	0.000	N/A	0.000	0.000	N/A	N/L
21	0.012	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	0.003	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	0.005	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: EA231WU-BK Tested by: Kennen
 Test category: Class-D per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 2018-08-30 Start time: 15:13:45 End time: 15:16:26
 Test duration (min): 2.5 Data file name: H-000440.cts_data
 Comment: Default Mode
 Customer: TPV

Test Result: N/L Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 230.08	Frequency(Hz): 50.00
I_Peak (Amps): 0.655	I_RMS (Amps): 0.146
I_Fund (Amps): 0.064	Crest Factor: 4.513
Power (Watts): 14.1	Power Factor: 0.423

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.075	0.460	16.30	OK
3	0.459	2.070	22.20	OK
4	0.054	0.460	11.64	OK
5	0.038	0.920	4.08	OK
6	0.027	0.460	5.81	OK
7	0.034	0.690	4.93	OK
8	0.012	0.460	2.71	OK
9	0.035	0.460	7.52	OK
10	0.015	0.460	3.29	OK
11	0.027	0.230	11.65	OK
12	0.011	0.230	4.80	OK
13	0.031	0.230	13.29	OK
14	0.005	0.230	2.25	OK
15	0.022	0.230	9.60	OK
16	0.010	0.230	4.37	OK
17	0.024	0.230	10.48	OK
18	0.011	0.230	4.92	OK
19	0.022	0.230	9.54	OK
20	0.007	0.230	3.15	OK
21	0.017	0.230	7.58	OK
22	0.004	0.230	1.80	OK
23	0.012	0.230	5.35	OK
24	0.004	0.230	1.84	OK
25	0.008	0.230	3.62	OK
26	0.002	0.230	1.01	OK
27	0.005	0.230	2.19	OK
28	0.004	0.230	1.54	OK
29	0.008	0.230	3.47	OK
30	0.003	0.230	1.18	OK
31	0.007	0.230	3.04	OK
32	0.002	0.230	1.02	OK
33	0.008	0.230	3.64	OK
34	0.003	0.230	1.28	OK
35	0.008	0.230	3.66	OK
36	0.003	0.230	1.52	OK
37	0.008	0.230	3.63	OK
38	0.003	0.230	1.14	OK
39	0.007	0.230	3.08	OK
40	0.003	0.230	1.29	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 Ed. 3.0 (2013) (Run time)

EUT: EA231WU-BK

Tested by: Kennen

Test category: All parameters (European limits)

Test Margin: 100

Test date: 2018-08-30

Start time: 15:17:35

End time: 15:28:02

Test duration (min): 10

Data file name: F-000441.cts_data

Comment: Running "H" Pattern And 1KHz Playing

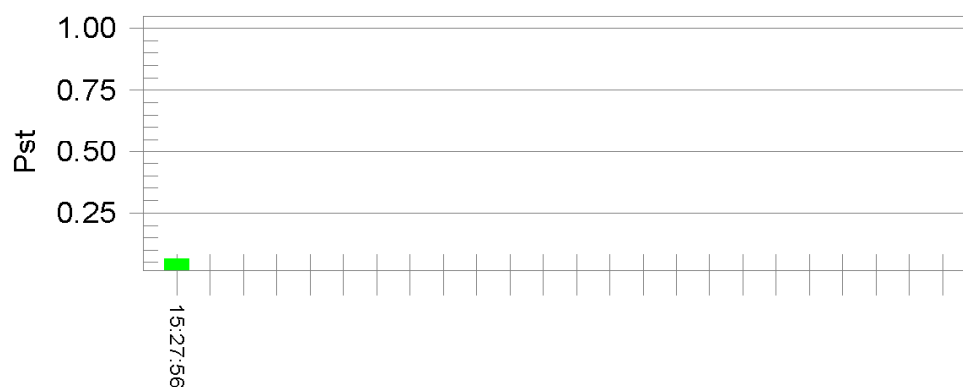
Customer: TPV

Test Result: Pass

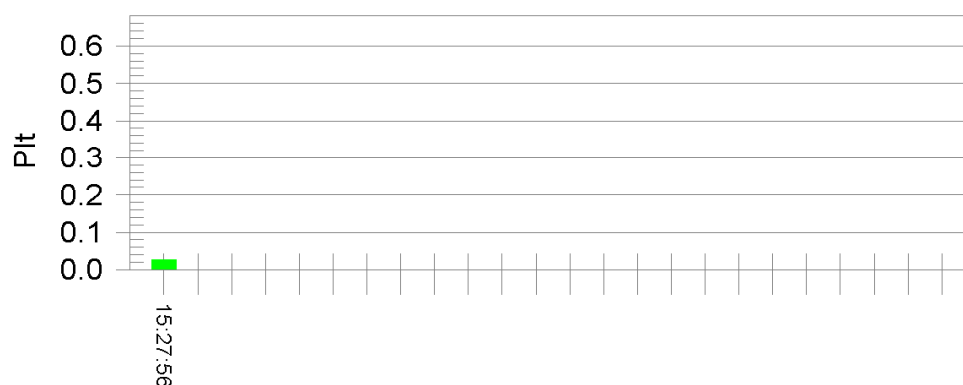
Status: Test Completed

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 230.11

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 (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

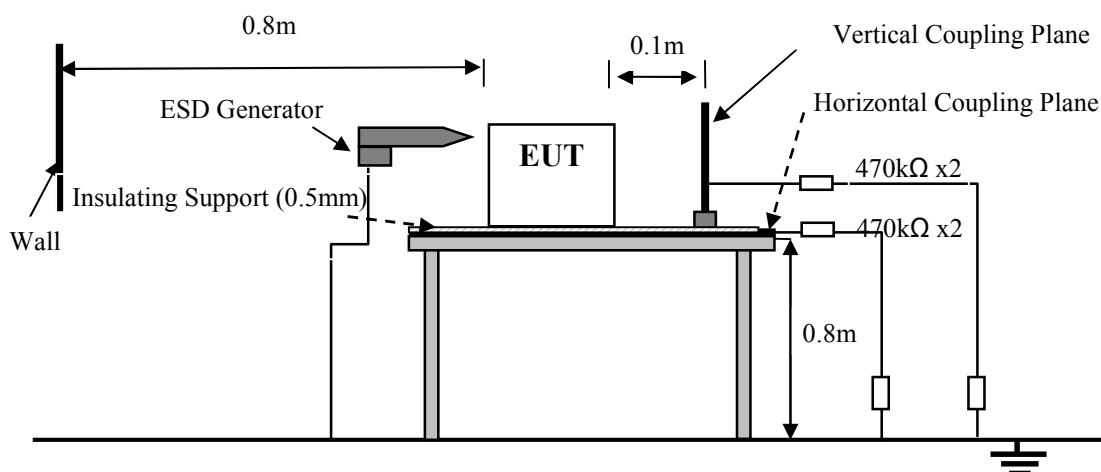
Failures which are not self-recovered after removal of the external disturbance, but which can be recovered to normal operation by reset or reboot are permissible.

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	EM Test	Dito	P1723199429	Oct.17.17	1 Year

8.2. Block Diagram of Test Setup



8.3. Test Standard

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.

EUT	LCD Monitor	Model No.	EA231WU-BK
Test Date	Aug.30, 2018	Temperature	24.3±0.6°C
Input Power	AC 230V/50Hz	Humidity	50%
Test Mode	DP, "H" Pattern 1920*1080@60Hz	Pressure	101.6kPa
Tested By	Kennen	Result	Pass

Air Discharge	Voltage Level Kv / Discharge per polarity 10 / Observation Criterion								
Test Location	+2	-2	+4	-4	+8	-8	---	---	Comments
AC In (1)	ND	ND	ND	ND	ND	ND	---	---	---
DP Port (2)	A	A	A	A	B*	B*	---	---	---
DVI Port (3)	A	A	A	A	B*	B*	---	---	---
HDMI Port (4)	A	A	A	A	B*	B*	---	---	---
VGA Port (5)	A	A	A	A	B*	B*	---	---	---
RS232 Ports(6)	ND	ND	ND	ND	ND	ND	---	---	---
USB Ports (7)	A	A	A	A	A	A	---	---	---
Headphone (8)	ND	ND	ND	ND	ND	ND	---	---	---
Audio In Port (9)	ND	ND	ND	ND	ND	ND	---	---	---
Slots(10)	ND	ND	ND	ND	ND	ND	---	---	---
Screen(11)	ND	ND	ND	ND	B*	B*	---	---	---
LED(12)	ND	ND	ND	ND	ND	ND	---	---	---
Buttons(13)	ND	ND	ND	ND	A	A	---	---	---
Keylock(14)	ND	ND	ND	ND	ND	ND	---	---	---

Contact Discharge	Voltage Level Kv / Discharge per polarity 25 / Observation Criterion								
Test Location	+2	-2	+4	-4	---	---	---	---	Comments
Metal (15)	A	A	B*	B*	---	---	---	---	---
Screws(16)	A	A	B*	B*	---	---	---	---	---

Indirect Contact	Voltage kV Level / Discharge per polarity 25 / Observation Criterion								
Test Location	+2	-2	+4	-4	---	---	---	---	Comments
VCP Front	A	A	A	A	---	---	---	---	---
VCP Right	A	A	A	A	---	---	---	---	---
VCP Left	A	A	A	A	---	---	---	---	---
VCP Back	A	A	A	A	---	---	---	---	---
HCP Bottom	A	A	A	A	---	---	---	---	---

Additional Notes

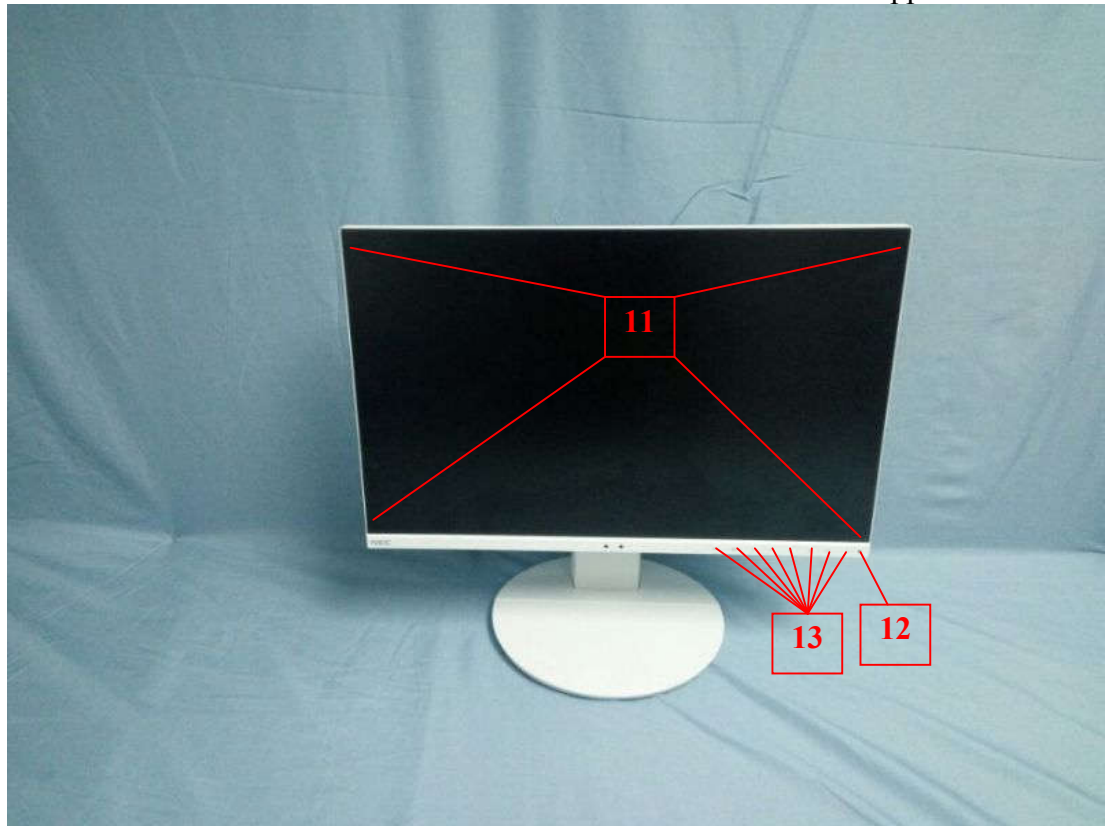
Measurement Points Please refer to the Photos of ESD Test Points

ND=No Discharge; Meets criteria but unable to obtain an electrostatic discharge (ESD) at this test point.
Note: The class "B*" means the screen of EUT will be twinkle during test, but it can recover by itself after test.

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).

8.9. ESD TEST POINT PHOTOS

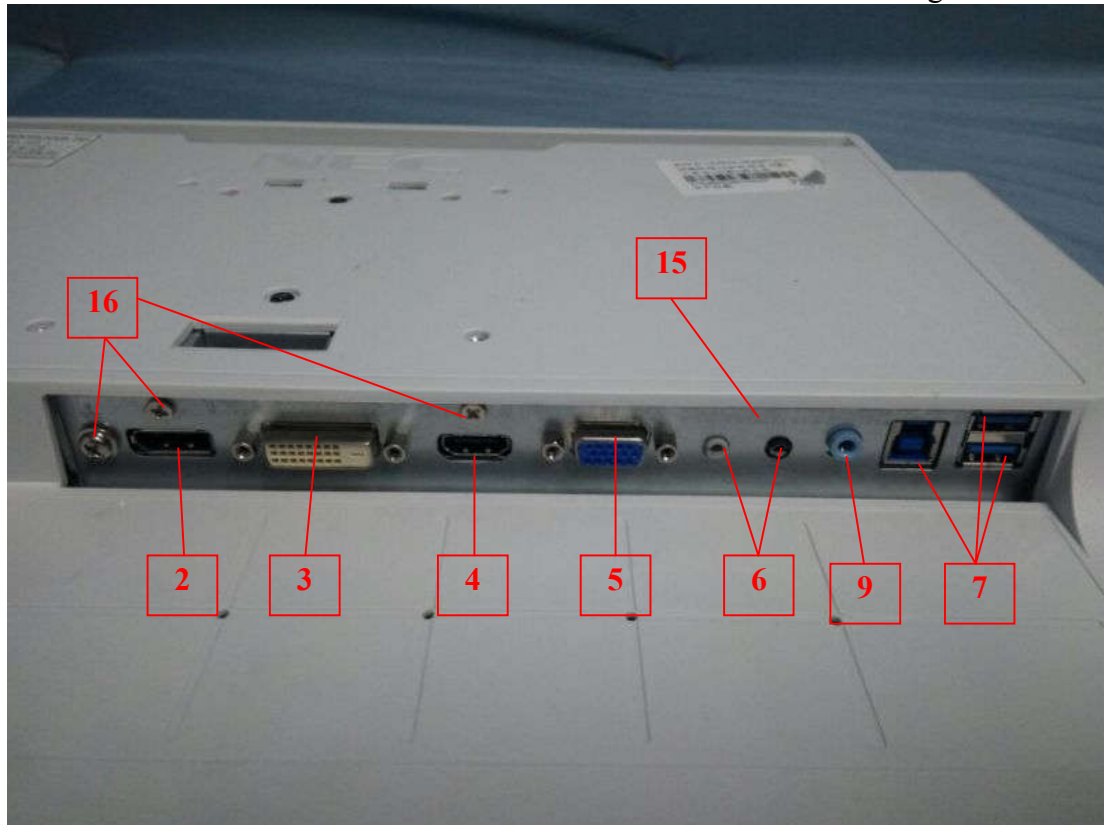
ESD Figure 1
General Appearance of the EUT



ESD Figure 2
General Appearance of the EUT



ESD Figure 3
Signal Port of the EUT



ESD Figure 4
Signal Port of the EUT



ESD Figure 5
Signal Port of the EUT



9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

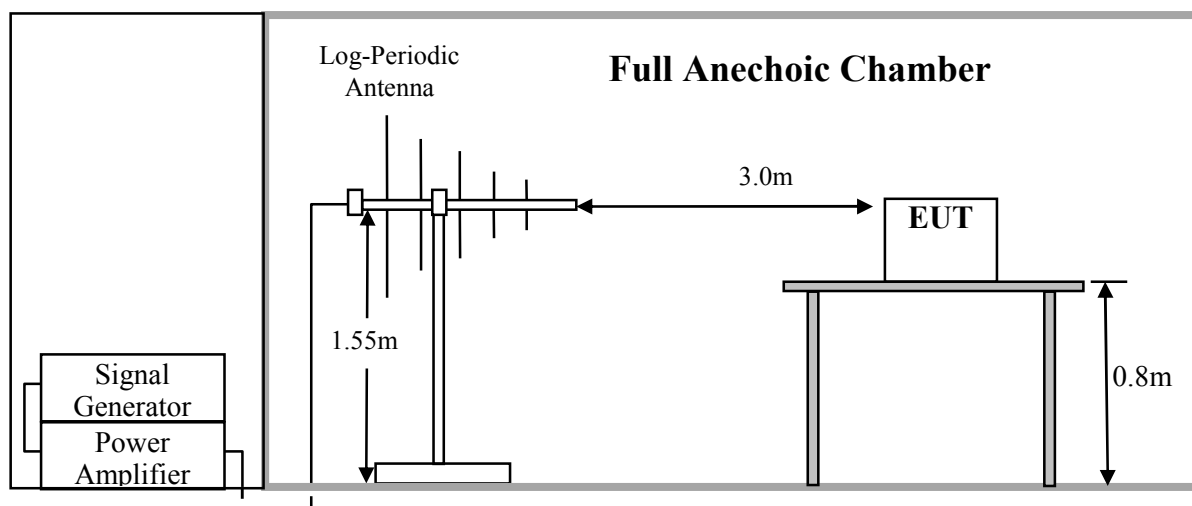
9.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	2#Chamber	AUDIX	N/A	N/A	Apr.15,18	1Year
2.	MXG analog signal genertor	Agilent	N5181A	MY49061013	Oct.14,17	1Year
3.	Amplifier	A&R	100W1000 M1	17028	NCR	NCR
4.	Four Port Junction Pad	A&R	DC6180	19325	Apr.23,18	1Year
5.	Power Meter	Anritsu	ML2487A	6K00002472	Oct.14,17	1Year
6.	Power Sensor	Anritsu	MA2491A	0033005	Oct.14,17	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: NCR means no calibration required(calibrated with system).

Notes:N/A means Not applicable.

9.2. Block Diagram of Test Setup



9.3. Test Standard

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.

EUT	LCD Monitor	Model No.	EA231WU-BK
Test Date	Sep.05, 2018	Temperature	23.6±0.6°C
Input Power	AC 230V/50Hz	Humidity	50±3 %
Test Mode	DP, "H" Pattern 1920*1080@60Hz	Pressure	101.5±1kPa
Tested By	Hogen	Result	Pass

Modulation: ☒ AM ☐ Pulse ☐ none 1kHz 80%

Frequency Range :80MHz -1000MHz

	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

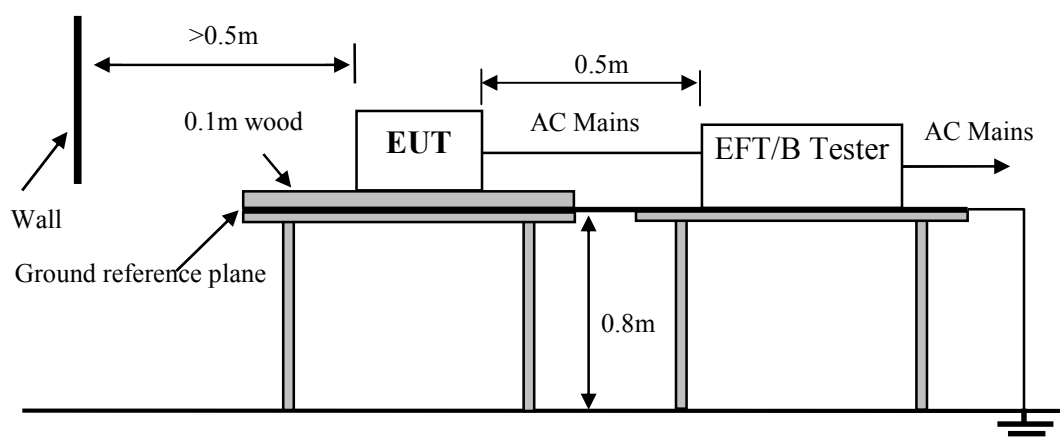
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	TESEQ	NSG3025	28017	Sep.02,17	1 Year
2.	CDN	TESEQ	CDN8014	29638	Apr.23.18	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

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.	0.5 kV	0.25 kV	B
2.	1 kV	0.5 kV	
3.	2 kV	1 kV	
4.	4 kV	2 kV	
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.

EUT	LCD Monitor	Model No.	EA231WU-BK
Test Date	Sep.02, 2018	Temperature	24.1±0.6°C
Input Power	AC 230V/50Hz	Humidity	50±3 %
Test Mode	DP, "H" Pattern 1920*1080@60Hz	Pressure	101.6±1kPa
Tested By	Kennen	Result	Pass

Repetition Frequency : 5 kHz Burst Duration : 15ms Burst Period: 300ms

Inject Time(s): 120s Inject Method: Direct

Inject Line: ☒ AC Mains ☐ DC Supply ☐ Signal

Line	Test Voltage	Performance			Result (Pass/Fail)
		Required	Observation(+)	Observation(-)	
L	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	Pass
N	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	Pass
PE	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	Pass
L N	0.5kV	B	A	A	Pass
	1kV	B	B*	B*	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.

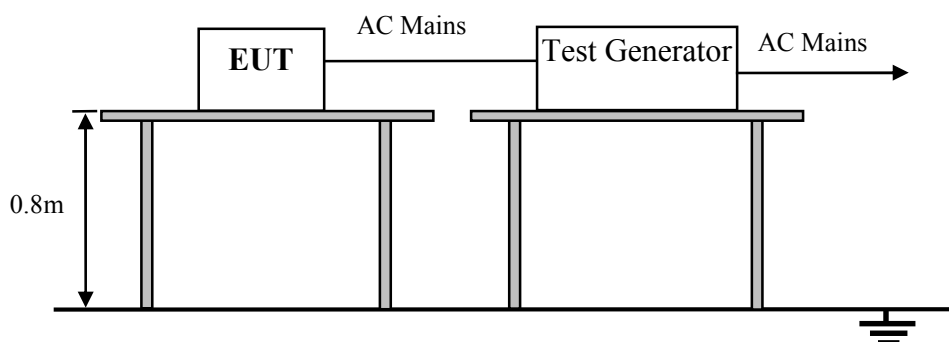
11.SURGE TEST

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,03,18	1 Year
2.	CDN	EMC PARTNER	CDN2000-06-25	CDN2000-06-25 0111	Oct.14,17	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

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.

EUT	LCD Monitor	Model No.	EA231WU-BK
Test Date	Sep.02, 2018	Temperature	24.1±0.6°C
Input Power	AC 230V/50Hz	Humidity	50±3 %
Test Mode	DP, "H" Pattern 1920*1080@60Hz	Pressure	101.6±1kPa
Tested By	Kennen	Result	Pass

No.of pluse: ±5 Interval:60 Seconds

Line : ☒ AC Mains ☐ DC Supply ☐ Signal

Location	Volt	500V			1kV			2kV			Result
	Phase	Performance			Performance			Performance			(Pass/Fail)
		Required	+	-	Required	+	-	Required	+	-	
L-N	0°	B	A	A	B	A	A	---	---	---	Pass
	90°	B	A	A	B	A	A	---	---	---	Pass
	180°	B	A	A	B	A	A	---	---	---	Pass
	270°	B	A	A	B	A	A	---	---	---	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	A	A	B	B*	B*	Pass
	270°	B	A	A	B	A	A	B	B*	B*	Pass
N-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	A	A	B	B*	B*	Pass
	270°	B	A	A	B	A	A	B	B*	B*	Pass
Signal Line	---	---	---	---	---	---	---	---	---	---	---

Remark: The class "B*" Means the screen of the monitor will twinkle during test, but it can recover by itself.

12. INJECTED CURRENTS SUSCEPTIBILITY TEST

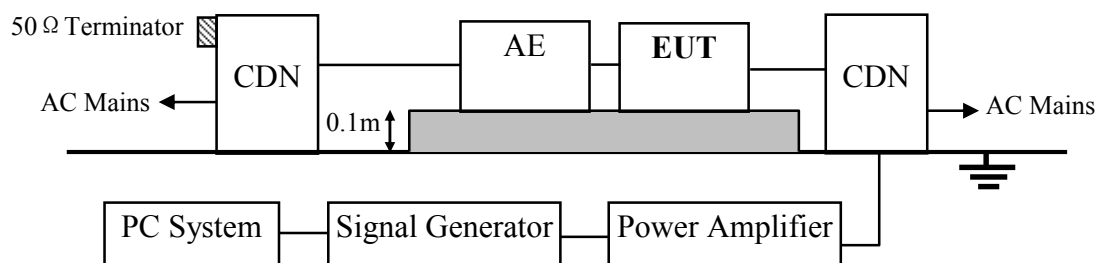
12.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	MXG analog signal genertor	Agilent	N5181A	MY49061013	Oct.14,17	1 Year
2.	Signal Generator	Marconi	2031	119606/058	Apr.23,18	1 Year
3.	Amplifier	AR	25A250	19152	NCR	NCR
4.	Power meter	HP	436A	2016A07891	Apr.23,18	1 Year
5.	Power sensor	Agilent	8482B	MY41090514	Oct.14,17	1 Year
6.	CDN	FCC	FCC-801-M2-25	47	Apr.23,18	1 Year
7.	CDN	FCC	FCC-801-M2-25A	07035	Apr.23,18	1 Year
8.	CDN	FCC	FCC-801-M3-25A	07045	Apr.23,18	1 Year
9.	CDN	TESEQ	CDN M016	34609	Apr.23,18	1 Year
10.	Attenuator	Weinschel	40-6-34	LJ092	Apr.23,18	1 Year
11.	Terminator	Hubersuhner	50Ω	No.3	Apr.23,18	1 Year
12.	RF Cable	MICABLE	A04-07-07-2M	09111340	NCR	NCR
13.	RF Cable	STORM	MFR-57500	90-195-4MTR	NCR	NCR
14.	Test Software	AUDIX	i2	3.2010-1-8	N/A	N/A

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

N/A means Not applicable.

12.2. Block Diagram of Test Setup



12.3. Test Standard

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 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.

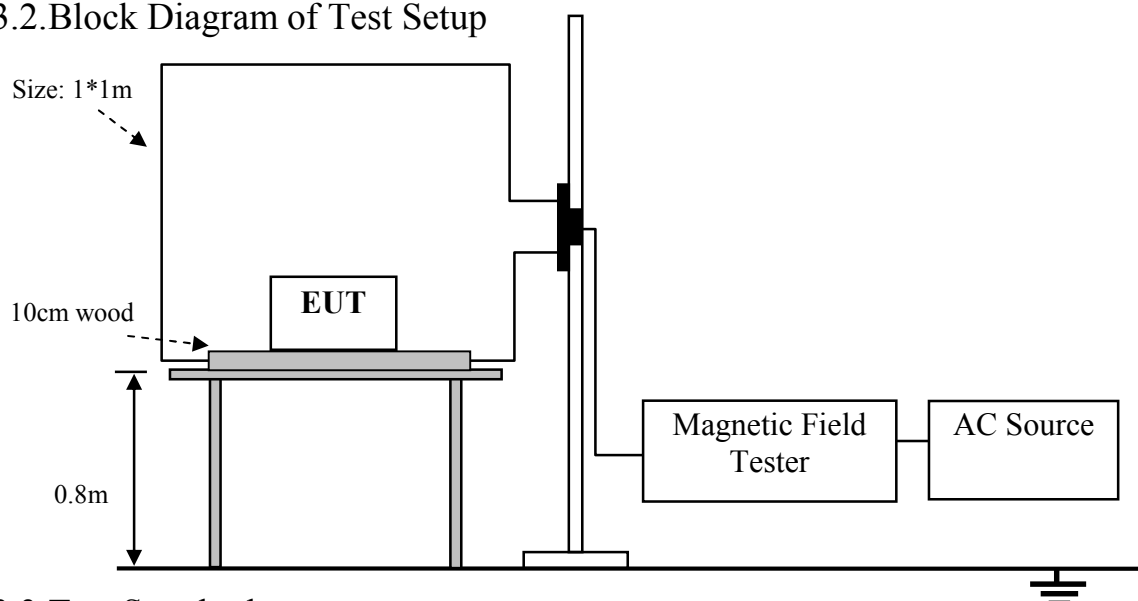
EUT	LCD Monitor		Model No.		EA231WU-BK
Test Date	Sep.05, 2018		Temperature		24.2±0.6°C
Input Power	AC 230V/50Hz		Humidity		51±3 %
Test Mode	DP, "H" Pattern 1920*1080@60Hz		Pressure		101.6±1kPa
Tested By	Hogen		Result		Pass
Frequency Range (MHz)	Injected Position	Voltage Level (e.m.f.)	Required	Observation	Result
					(Pass / Fail)
0.15 ~ 20	Main (Input AC Power Line)	3V	A	A	PASS
20 ~ 80	Main (Input AC Power Line)	3V	A	A	PASS
Modulation Signal:1kHz 80% AM					
Remark:					

13. MAGNETIC FIELD IMMUNITY TEST

13.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	Mag100.1	083858-10	Apr.23,18	1 Year
2.	Line Disturbances Tester	HAEFELY	PLINE 1610	083690-05	Sep.20,17	1 Year

13.2. Block Diagram of Test Setup



13.3. Test Standard

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 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.

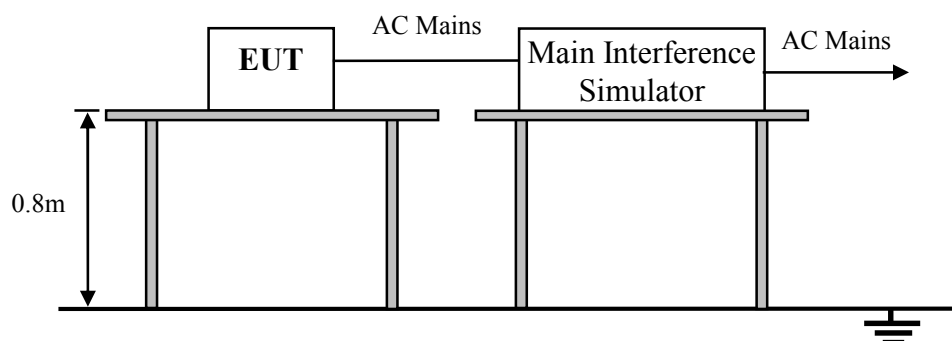
EUT	LCD Monitor		Model No.	EA231WU-BK	
Test Date	Sep.05, 2018		Temperature	24.1±0.6°C	
Input Power	AC 230V/50Hz		Humidity	51±3 %	
Test Mode	DP, "H" Pattern 1920*1080@60Hz		Pressure	101.5±1kPa	
Tested By	Hogen		Result	Pass	
Test Level	Testing Duration	Coil Orientation	Required	Observation	Result
					(Pass/Fail)
1A/m	5 min / coil	X-axis	A	A	PASS
1A/m	5 min / coil	Y-axis	A	A	PASS
1A/m	5 min / coil	Z-axis	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.	Line Disturbances Tester	HAEFELY	PLINE 1610	083690-05	Sep.20,17	1 Year

14.2. Block Diagram of Test Setup



14.3. Test Standard

IEC 61000-4-11: 2004,
IEC-61000-4-11: 2004+A1: 2017

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	250/300 ^{Note}	C
0	100	0.5	B
70	30	25/30 ^{Note}	C

Note: "25/30 Cycles" means "25 cycles for 50Hz test" and "30 cycles for 60Hz test".
"250/300 Cycles" means "250 cycles for 50Hz test" and "300 cycles for 60Hz test"

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.

EUT	LCD Monitor	Model No.	EA231WU-BK
Test Date	Sep.05, 2018	Temperature	24.1±0.6°C
Input Power	AC 230V/50Hz & AC 100V/50Hz	Humidity	50±3 %
Test Mode	DP, "H" Pattern 1920*1080@60Hz	Pressure	101.6±1kPa
Tested By	Hogen	Result	Pass

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	C*	PASS

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	C*	PASS

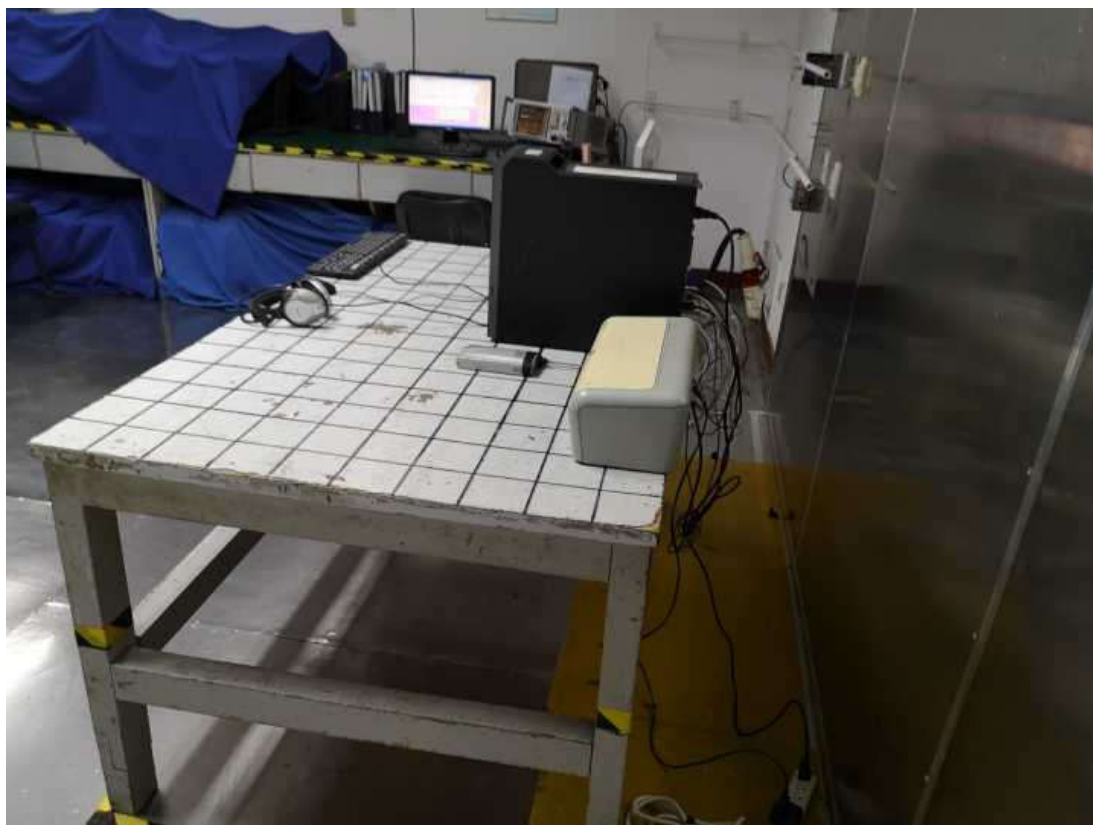
Note 1: U_T is the rated voltage for the equipment.

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.

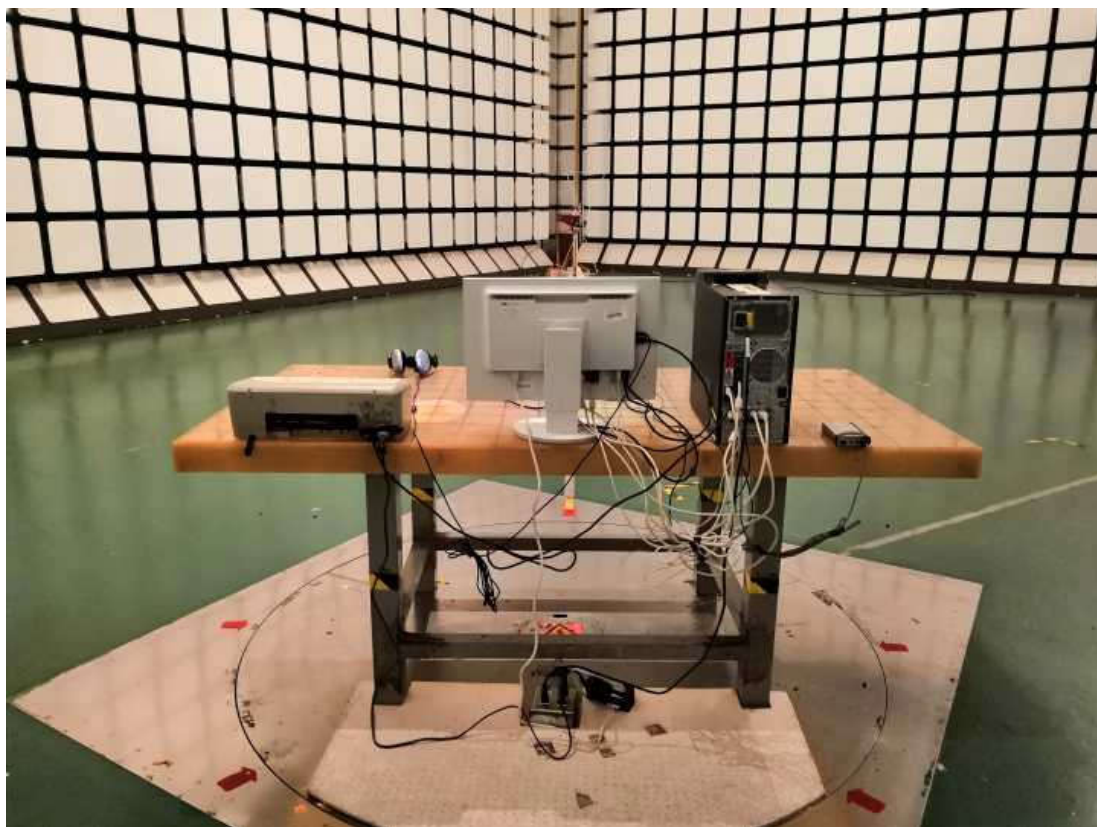
Remark: The Class "C*" means the screen of EUT will black, it need recover to normal by manual.

15. PHOTOGRAPHS

15.1. Photos of Power Line Conducted Emission Test



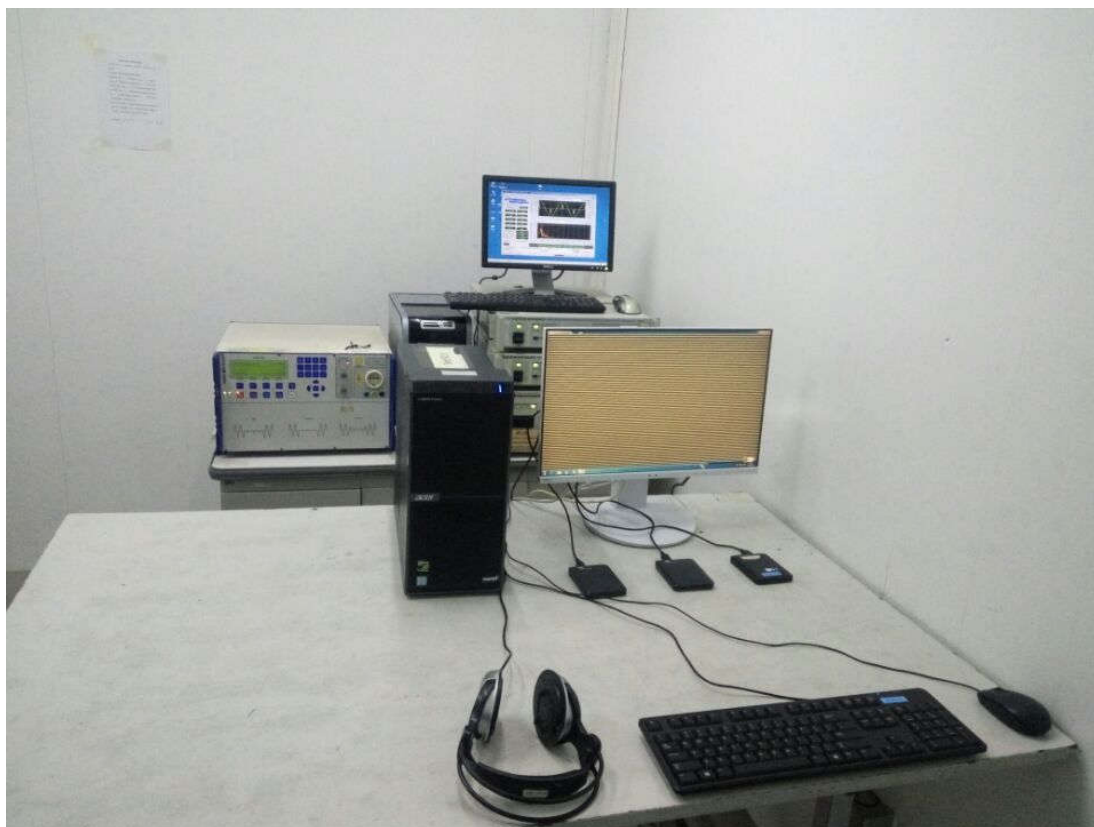
15.2. Photos of Radiated Emission Test (In 10m Anechoic Chamber)



In 10m Anechoic Chamber Test 1GHz – 6GHz



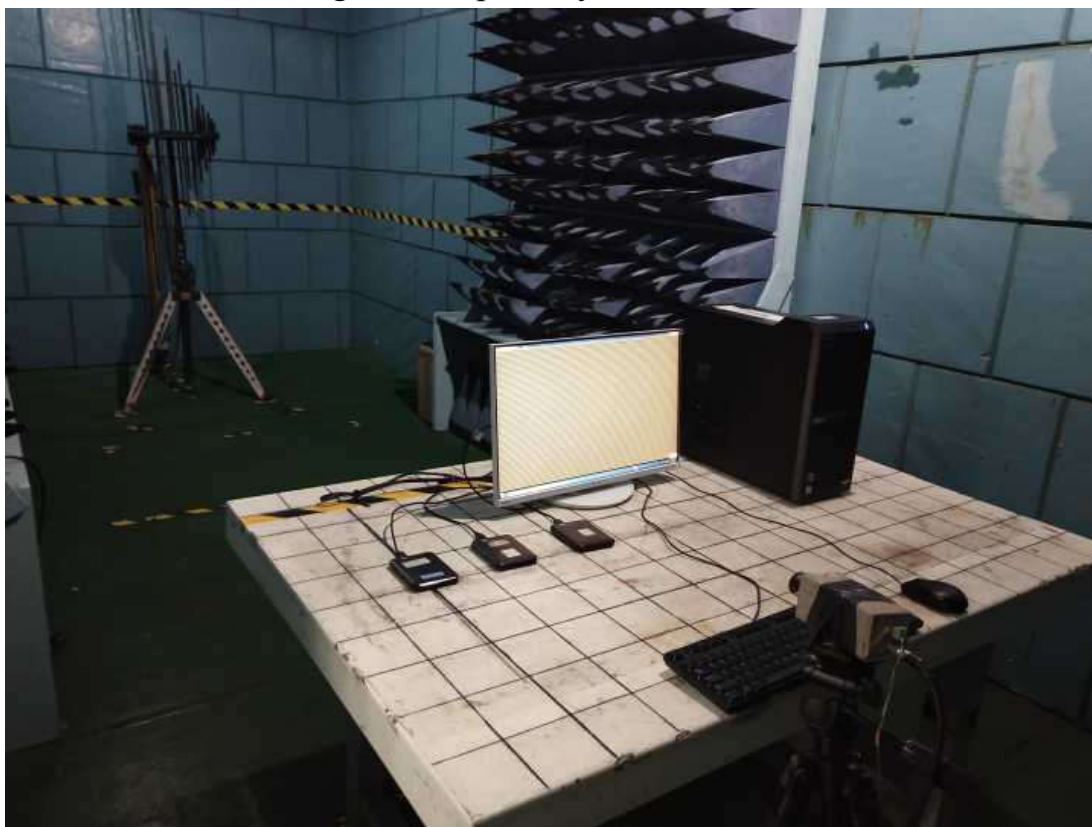
15.3.Photo of Harmonic / Flicker Test



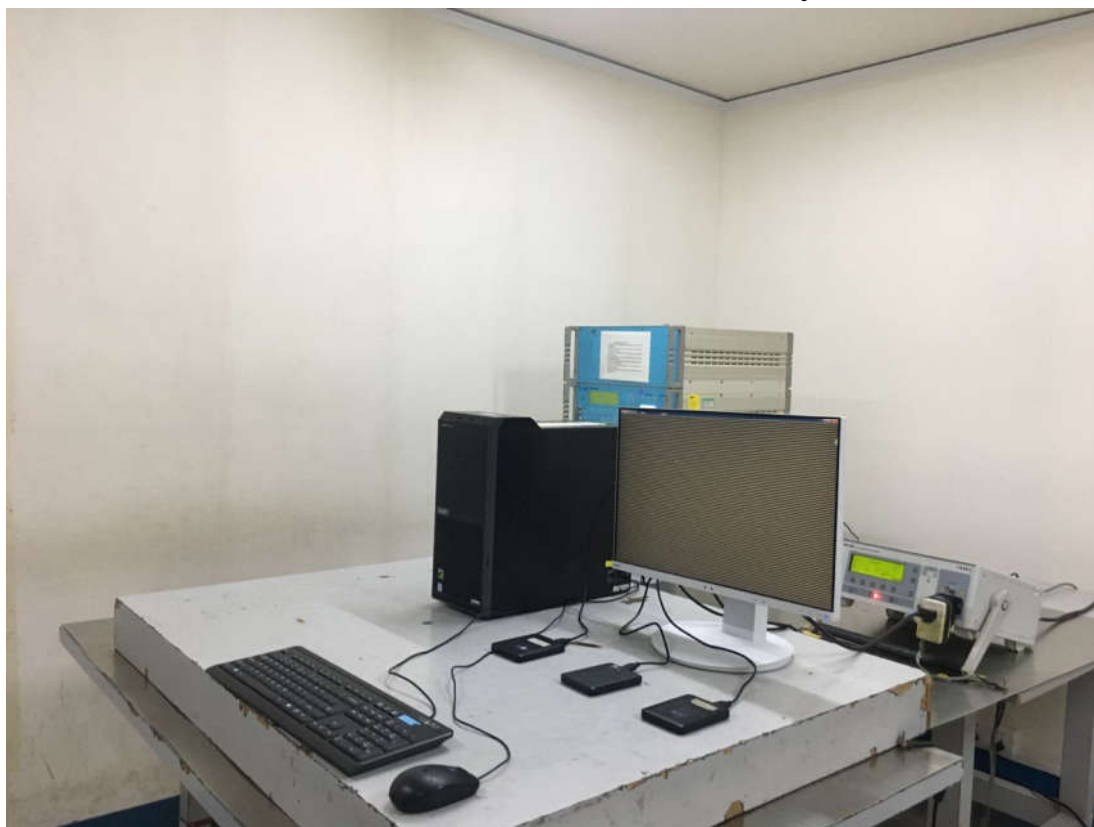
15.4. Photos of Electrostatic Discharge Immunity Test



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

