

# EMC TEST REPORT

For  
NUUO INC.

Network Video Recorder

Model No.: NC-2xx0, NVC-2xx0, (xx = 00, 02, 04, 06, 08, 10, 12, 14, 16)

**Test Report Number : ESTSZ141201203E**



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## 1. GENERAL INFORMATION

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

#### Client Information

Applicant: **NUUO INC.**  
 Address of applicant: B1, No. 207-1, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City  
 231, Taiwan

Manufacturer: **SHENZHEN BAICHUAN SECURITY TECHNOLOGY CO., LTD**  
 Address of Manufacturer: 5th Floor, Building 7, Tangtuo 3rd Industrial Area, Shiyao Town,  
 Bao'an District, Shenzhen City, China

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

EUT Description: Network Video Recorder  
 Trade Name: NUUO  
 Model No.: NC-2xx0, NVC-2xx0 (xx = 00, 02, 04, 06, 08, 10, 12, 14, 16)  
 Test Model No.: NVC-2080  
 Rating: DC 12V via Adapter  
 Test Power Supply: AC 230V, 50Hz

### 1.2 Test Standards

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

EN 55022: 2010

EN 55024: 2010

EN 61000-3-2: 2006+A1: 2009+A2: 2009

EN 61000-3-3: 2013

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

Date of Test : Dec. 02 ~ 05, 2014

*Yoyo Deng*

Prepared by :

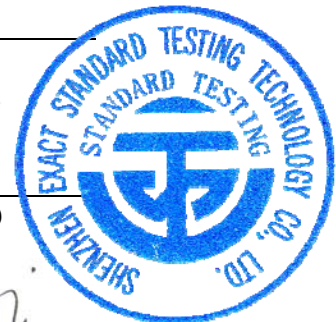
(Engineer: Yoyo Deng )

Reviewer :

(Project Manager: Charles Liu)

Approved & Authorized Signer :

(Manager: Ronnie Liu )



### 1.3 Test Summary

For the EUT described above. The standards used were EN 55022 & EN 55024 for Immunity.

Table 1: Tests Carried Out Under EN55022: 2010

Standard	Test Items	Status
EN 55022: 2010	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	√
	Radiated Disturbances (30MHz To 1000MHz)	√

√ Indicates that the test is applicable

× Indicates that the test is not applicable

Table 2: Tests Carried Out Under EN61000-3-2: 2006+A1: 2009+A2: 2009 / EN61000-3-3: 2013

Standard	Test Items	Status
EN 61000-3-2: 2006+A1: 2009 +A2: 2009	Harmonic Current Test	×
EN 61000-3-3: 2013	Voltage Fluctuations and Flicker Test	√

√ Indicates that the test is applicable

×

Table 3: Tests Carried Out Under EN 55024: 2010

Standard	Test Items	Status
IEC61000-4-2: 2008	Electrostatic discharge Immunity	√
IEC61000-4-3: 2010	Radiated Susceptibility (80MHz to 1GHz)	√
IEC61000-4-4: 2012	Electrical Fast Transient/Burst Immunity	√
IEC61000-4-5: 2005	Surge Immunity	√
IEC61000-4-6: 2013	Conducted Susceptibility (150kHz to 80MHz)	√
IEC61000-4-11: 2004	Voltage Dips, Short Interruptions Immunity	√

√ Indicates that the test is applicable

×

### 1.4 Test Methodology

All measurements contained in this report were conducted with CISPR 16-1: 2002, radio disturbance and immunity measuring apparatus, and CISPR16-2: 2002, Method of measurement of disturbances and immunity.

### 1.5 Test Facility

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

FCC – Registration No.: 600491

Global United Technology Service Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 600491

## 1.6 Test Equipment List and Details

Table 1: Test Equipment for Emission Test and Harmonic Current / Flicker Test

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
3m Semi-Anechoic Chamber	ZhongYu Electron	N/A	N/A	Apr.28, 2014	Apr.27, 2015
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Dec. 12, 2013	Dec. 11, 2014
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Coaxial cable	GTS	N/A	GTS400	Mar. 18, 2014	Mar. 17, 2015
BiConiLog Antenna (26-3000MHz)	SCHWARZBECK MESS- ELEKTRONIK	VULB9163	GTS204	Mar. 12, 2014	Mar. 11, 2015
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	Mar. 18, 2014	Mar. 17, 2015
Double-ridged horn (1-18GHz)	SCHWARZBECK MESS- ELEKTRONIK	9120D-829	GTS205	Mar. 12, 2014	Mar. 11, 2015
Pre-amplifier (1-18GHz)	Rohde & Schwarz	AFS42-00101800-25-S-42	SEL0081	Mar. 18, 2014	Mar. 17, 2015
Band filter	Amindeon	82346	SEL0094	Mar. 18, 2014	Mar. 17, 2015
Shielding Room	Zhong Yu Electron	N/A	GTS206	N/A	N/A
LISN	SCHWARZBECK MESS- ELEKTRONIK	NSLK 8127	GTS207	Mar. 18, 2014	Mar. 17, 2015
ISN	Rohde & Schwarz	ENY221109	EMC0114	Mar. 18, 2014	Mar. 17, 2015
ISN	Rohde & Schwarz	ENY411110	EMC0115	Mar. 18, 2014	Mar. 17, 2015
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Mar. 18, 2014	Mar. 17, 2015
Coaxial Cable	GTS	N/A	GTS400	Mar. 18, 2014	Mar. 17, 2015
AC Power Source	EMTEST	ACS500	GTS218	Mar. 27, 2014	Mar. 26, 2015
Power Analyzer	EMTEST	DPA500	GTS217	Mar. 27, 2014	Mar. 26, 2015
CTS3.0 Software	California Instruments	N/A	SEL0087	N/A	N/A

Table 2: Test Equipment for Immunity Test

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
ESD Simulator	EMPEK	ESD-2030A	GTS219	Mar. 03, 2014	Mar. 02, 2015
ESD Ground Plane	SGS 3m*3m	N/A	SEL0004	N/A	N/A
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	N/A	Apr.28, 2014	Apr. 27, 2015
Signal Generator	Rohde & Schwarz	SML03	SEL0068	Aug. 01, 2014	Jul. 31, 2015
RF Amplifier 30M-1GHz	Amplifier Research	250W 1000A	SEL0066	Nov. 12, 2014	Nov. 11, 2015
RF Amplifier 0.8M-3.0GHz	Amplifier Research	60S1G3	SEL0065	Nov. 12, 2014	Nov. 11, 2015
Power Meter	Rohde & Schwarz	NRVD	SEL0069	Mar. 18, 2014	Mar. 17, 2015
Power Meter	Rohde & Schwarz	URV5-Z2	SEL0071	Mar. 18, 2014	Mar. 17, 2015
Power Meter	Rohde & Schwarz	URV5-Z2	SEL0072	Mar. 18, 2014	Mar. 17, 2015
Software EMC32	Rohde & Schwarz	EMC32-S	SEL0082	N/A	N/A
Log-periodic Antenna	Amplifier Research	AT1080	SEL0073	N/A	N/A
Antenna Tripod	Amplifier Research	TP1000A	SEL0074	N/A	N/A
ProPLUS System	Thermo ELECTRON	N/A	SEL0007	Dec. 12, 2013	Dec. 11, 2014
Pro PLUS Capacitive Clamp	Thermo ELECTRON	N/A	SEL0008	N/A	N/A
CM-HCOIL H-field loop	Thermo ELECTRON	N/A	SEL0010	Dec. 12, 2013	Dec. 11, 2014
RF-Generator	SCHAFFNER	NSG2070	SEL0039	Dec. 12, 2013	Dec. 11, 2014
Coupling/Decoupling Network	SCHAFFNER	CDNM016	SEL0040	Dec. 12, 2013	Dec. 11, 2014
EM CLAMP	SCHAFFNER	KEMZ801	SEL0041	Dec. 12, 2013	Dec. 11, 2014

Table 3: General used equipment

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
Humidity/Temperature Indicator	Shanghai	ZJ1-2B	GTS250	Nov. 18, 2014	Nov. 17, 2015
Barometer	Changchun	DYM3	GTS251	Jun. 22, 2014	Jun. 21, 2015

## 2. SYSTEM TEST CONFIGURATION

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### 2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

### 2.2 EUT Exercise Software

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

### 2.3 Special Accessories

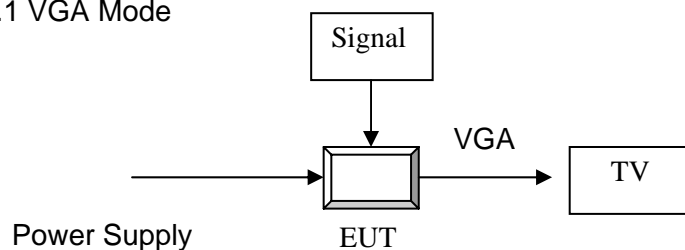
As shown in section 2.5, interface cable used for compliance testing is shielded as normally supplied by **NUUO INC.** and its respective support equipment manufacturers.

### 2.4 Equipment Modifications

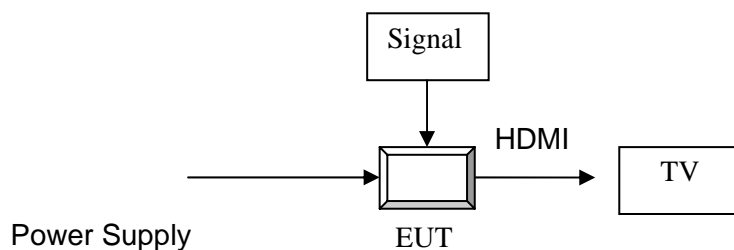
The EUT tested was not modified by SHENZHEN EXACT STANDARD TESTING TECHNOLOGY CO., LTD.

### 2.5 Configuration of Test System

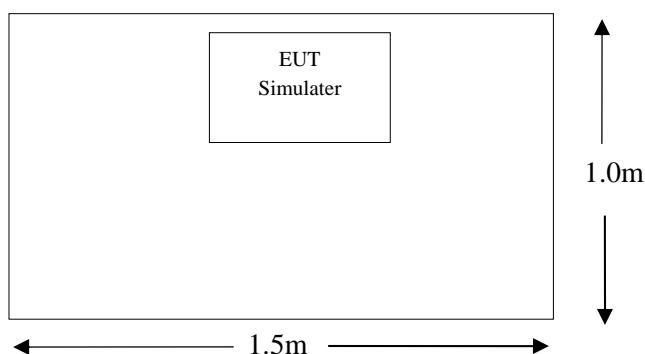
#### 2.5.1 VGA Mode



#### 2.5.2 HDMI Mode



### 2.6 Test Setup Diagram





### 3. DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

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#### 3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

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

#### 3.2 Limit of Disturbance Voltage At The Mains Terminals (EN 55022 Class B)

Frequency Range (MHz)	Limits ( dBuV)	
	Quasi-Peak	Average
0.150~0.500	66-56	56-46
0.5000~5.000	56	46
5.000~30.00	60	50

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

#### 3.3 EUT Setup

The setup of EUT is according with CISPR 16-1: 2002, CISPR16-2: 2002 measurement procedure. The specification used was the EN 55022 limits.

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

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

#### 3.4 Instruments Setup

The receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz  
 Detector.....Peak & Quasi-Peak & Average  
 Sweep Speed.....Auto  
 IF Band Width.....9 KHz

### 3.5 Test Procedure

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

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

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within  $-10 \text{ dB}_{\mu\text{V}}$  of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

### 3.6 Disturbance Voltage Test Data

Temperature ( °C )	24
Humidity ( %RH )	56
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	VGA Mode
Test Result	Pass

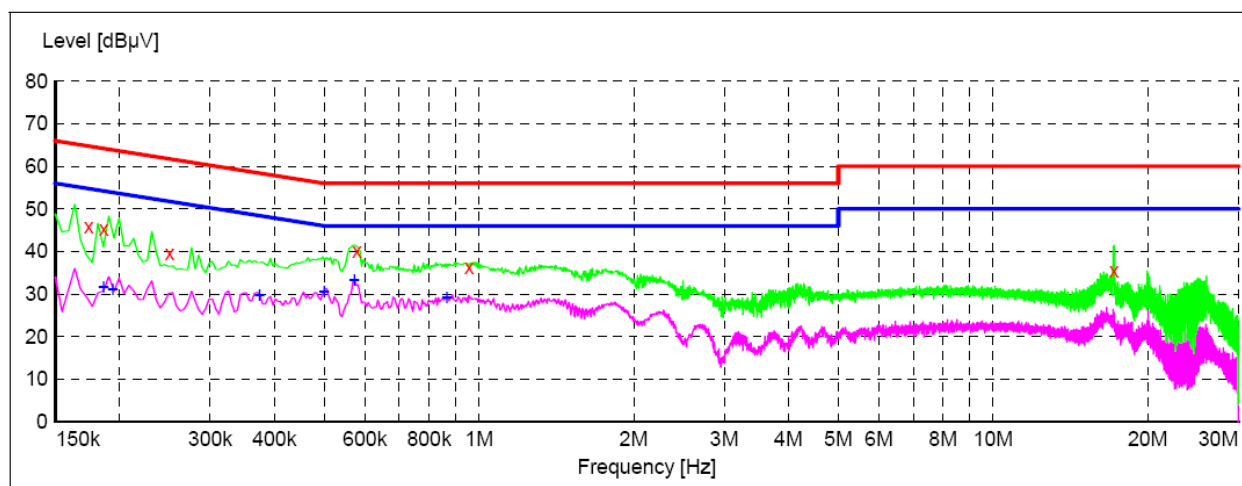
Test data see following pages

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

Conduction Emission Test Data	
EUT	Network Video Recorder
M/N	NVC-2080
Operating Condition	VGA Mode
Test Site	Shielding Room
Operator	HAPPY
Test Specification	AC 230V/50Hz

**SCAN TABLE: "Voltage (9K-30M) FIN"**

Short Description: 150K-30M Voltage

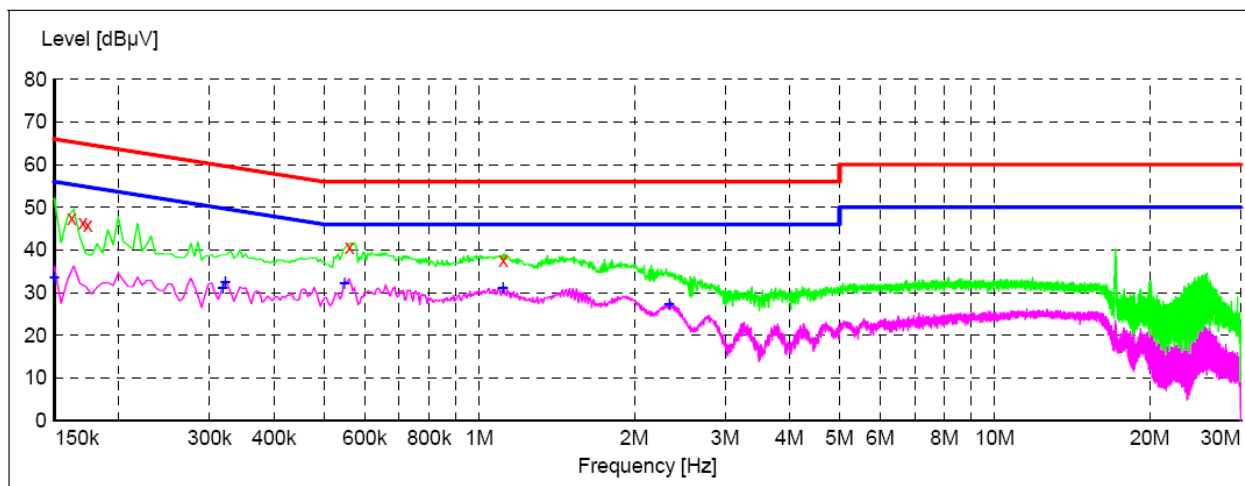


Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.174000	45.90	10.2	65	18.9	QP	L1	GND
0.186000	45.40	10.2	64	18.8	QP	L1	GND
0.250000	39.60	10.2	62	22.2	QP	L1	GND
0.578000	40.10	10.2	56	15.9	QP	L1	GND
0.956000	36.20	10.3	56	19.8	QP	L1	GND
17.162000	35.40	10.8	60	24.6	QP	L1	GND
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.186000	31.70	10.2	54	22.5	AV	L1	GND
0.194000	31.20	10.2	54	22.7	AV	L1	GND
0.374000	29.80	10.2	48	18.6	AV	L1	GND
0.500000	30.60	10.2	46	15.4	AV	L1	GND
0.572000	33.20	10.2	46	12.8	AV	L1	GND
0.866000	29.10	10.2	46	16.9	AV	L1	GND

Conduction Emission Test Data	
EUT	Network Video Recorder
M/N	NVC-2080
Operating Condition	VGA Mode
Test Site	Shielding Room
Operator	HAPPY
Test Specification	AC 230V/50Hz

**SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.162000	47.50	10.2	65	17.9	QP	N	GND
0.170000	46.40	10.2	65	18.6	QP	N	GND
0.174000	45.70	10.2	65	19.1	QP	N	GND
0.560000	40.70	10.2	56	15.3	QP	N	GND
1.112000	37.50	10.3	56	18.5	QP	N	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	33.50	10.2	56	22.5	AV	N	GND
0.318000	31.20	10.2	50	18.6	AV	N	GND
0.322000	32.40	10.2	50	17.3	AV	N	GND
0.548000	32.20	10.2	46	13.8	AV	N	GND
1.112000	31.00	10.3	46	15.0	AV	N	GND
2.336000	27.30	10.4	46	18.7	AV	N	GND

## 4. RADIATED DISTURBANCES

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### 4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 4.0$  dB.

### 4.2 Limit of Radiated Disturbances (EN 55022 Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

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

(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

### 4.3 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN 55022 Class B limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

### 4.4 Test Receiver Setup

According to EN 55022 rules, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak  
 IF Band Width.....120 KHz  
 Frequency Range.....30MHz to 1000MHz  
 Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m  
 Polarity.....Horizontal and Vertical

#### 4.5 Test Procedure

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

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits), and are distinguished with a "QP" in the data table.

#### 4.6 Radiated Emissions Test Result

Temperature ( °C )	24
Humidity ( %RH )	56
Barometric Pressure ( mbar )	1001.0
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	VGA & HDMI Mode
Test Result	Pass

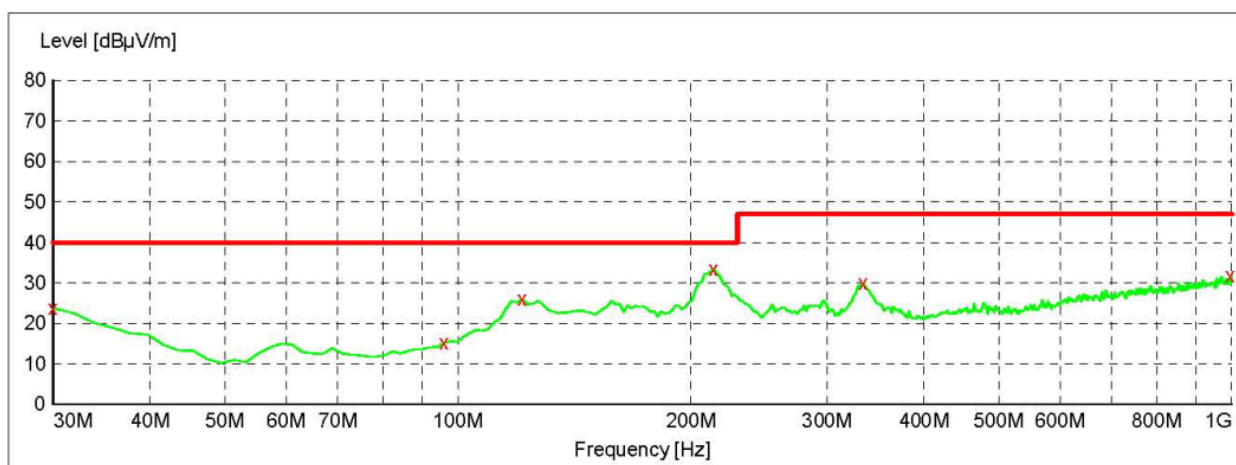
Test data see following pages

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

Radiated Emission Test Data	
EUT	Network Video Recorder
M/N	NVC-2080
Operating Condition	VGA Mode
Test Site	3m Chamber
Operator	SAM
Test Specification	AC 230V, 50Hz

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

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1

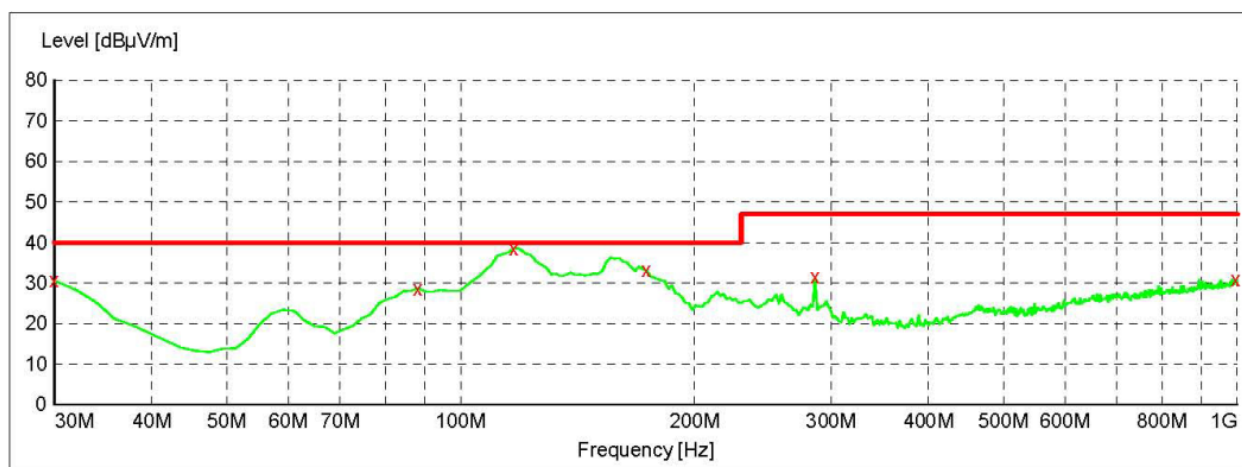


Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	23.80	21.1	40.0	16.2	---	0.0	0.00	HORIZONTAL
95.960000	15.20	10.6	40.0	24.8	---	0.0	0.00	HORIZONTAL
121.180000	26.10	15.1	40.0	13.9	---	0.0	0.00	HORIZONTAL
214.300000	33.50	14.3	40.0	6.5	---	0.0	0.00	HORIZONTAL
334.580000	30.00	16.4	47.0	17.0	---	0.0	0.00	HORIZONTAL
996.120000	31.80	27.3	47.0	15.2	---	0.0	0.00	HORIZONTAL

Radiated Emission Test Data	
EUT	Network Video Recorder
M/N	NVC-2080
Operating Condition	VGA Mode
Test Site	3m Chamber
Operator	SAM
Test Specification	AC 230V, 50Hz

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

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	MaxPeak	300.0 ms	120 kHz	JB1
30.0 MHz	1.0 GHz				



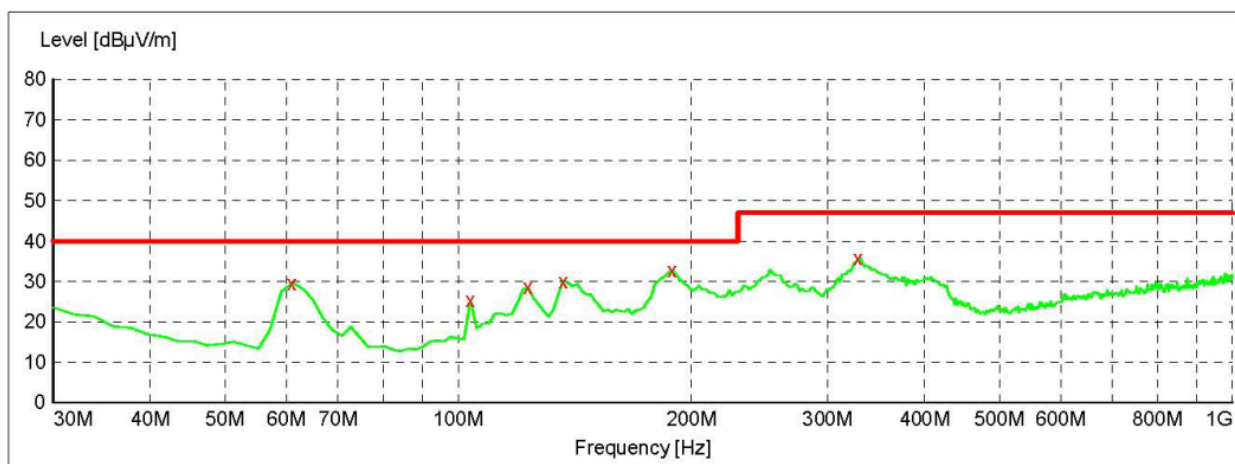
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	30.60	21.1	40.0	9.4	---	0.0	0.00	VERTICAL
88.200000	28.70	9.5	40.0	11.3	---	0.0	0.00	VERTICAL
117.300000	36.60	15.1	40.0	3.4	---	0.0	0.00	VERTICAL
173.560000	33.10	13.3	40.0	6.9	---	0.0	0.00	VERTICAL
286.080000	31.50	15.4	47.0	15.5	---	0.0	0.00	VERTICAL
996.120000	30.90	27.3	47.0	16.1	---	0.0	0.00	VERTICAL



Radiated Emission Test Data	
EUT	Network Video Recorder
M/N	NVC-2080
Operating Condition	HDMI Mode
Test Site	3m Chamber
Operator	SAM
Test Specification	AC 230V, 50Hz

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

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	MaxPeak	300.0 ms	120 kHz	JB1
30.0 MHz	1.0 GHz				

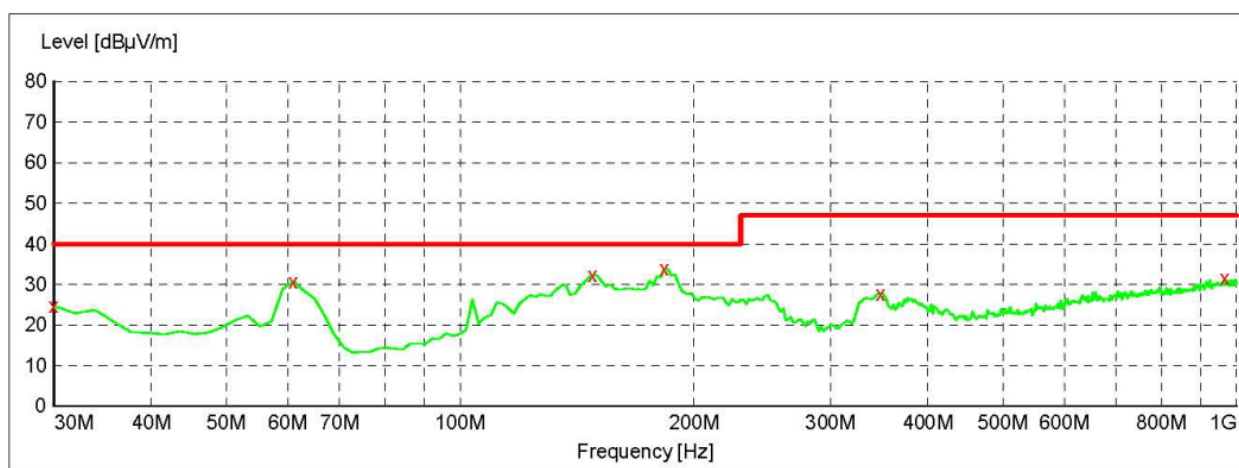


Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
61.040000	29.60	8.4	40.0	10.4	---	0.0	0.00	HORIZONTAL
103.720000	25.40	12.5	40.0	14.6	---	0.0	0.00	HORIZONTAL
123.120000	28.60	15.1	40.0	11.4	---	0.0	0.00	HORIZONTAL
136.700000	30.00	14.7	40.0	10.0	---	0.0	0.00	HORIZONTAL
189.080000	32.80	13.4	40.0	7.2	---	0.0	0.00	HORIZONTAL
328.760000	35.70	16.2	47.0	11.3	---	0.0	0.00	HORIZONTAL

Radiated Emission Test Data	
EUT	Network Video Recorder
M/N	NVC-2080
Operating Condition	HDMI Mode
Test Site	3m Chamber
Operator	SAM
Test Specification	AC 230V, 50Hz

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

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.70	21.1	40.0	15.3	---	0.0	0.00	VERTICAL
61.040000	30.70	8.4	40.0	9.3	---	0.0	0.00	VERTICAL
148.340000	32.30	14.2	40.0	7.7	---	0.0	0.00	VERTICAL
183.260000	33.90	13.3	40.0	6.1	---	0.0	0.00	VERTICAL
348.160000	27.80	16.9	47.0	19.2	---	0.0	0.00	VERTICAL
965.080000	31.50	26.8	47.0	15.5	---	0.0	0.00	VERTICAL

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

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### 5.1 Application of Harmonic Current Emission

Compliance to these standards ensures that tested equipment will not generate harmonic currents at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

### 5.2 Measurement Data

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

Standard used	EN/IEC 61000-3-2 A14 (2006) Quasi-stationary - Equipment class A
Observation time	180s
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	On

<b>Test Result</b>	<b>N/A</b>
--------------------	------------

### 5.3 Test Results

This EUT is deemed to comply with the requirements of EN 61000-3-2 without test since the power of EUT is less than 75W.

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

### 6.1 Application of Voltage Fluctuations and Flicker Test

Compliance to these standards ensures that tested equipment will not generate flickers and voltage change at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

### 6.2 Measurement Data

Standard used	EN/IEC 61000-3-3 Flicker
Short time (Pst)	10 min
Observation time	10 min (1 Flicker measurement)
Flicker meter	AC 230V / 50Hz
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	On

<b>Test Result</b>	<b>PASS</b>
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### 6.3 Test Results

The EUT was subjected to the voltage fluctuations and flicker test required by EN 61000-3-3.

*The EUT measured values of the Flicker test of the input current, including live current and neutral current, shall be compared with the limits given in section 6.2. Test setup photographs presented in Appendix B.*

The test results are shown in the following page.

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

EUT: Network Video Recorder

Test category: dt, dmax, dc and Pst (European limits)

Test date: 2014-12-03

Start time: 10:20:37

Tested by: David

Test Margin: 100

End time: 10:31:05

Test duration (min): 10

Model: NVC-2080

Comment: ON

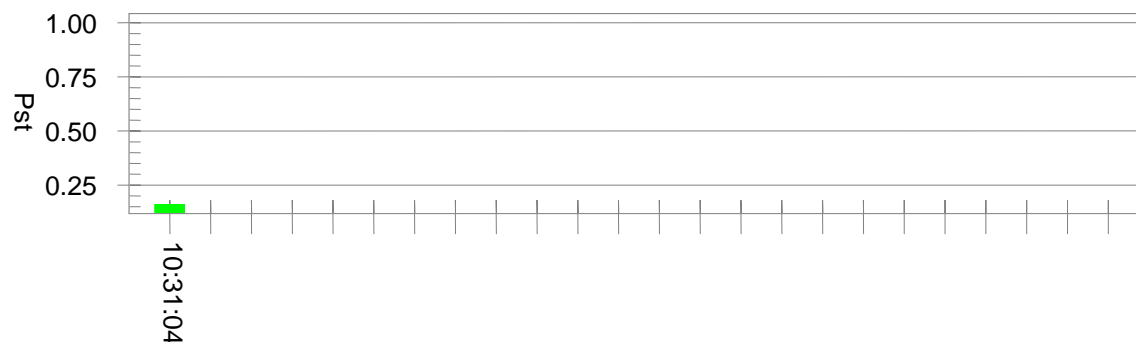
Customer: NUUO INC.

Test Result: Pass

Status: Test Completed

Pst<sub>i</sub> and limit line

European Limits



### Parameter values recorded during the test:

Vrms at the end of test (Volt): 230.11

Highest dt (%): 0.00

Time (mS) > dt: 0.0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.190

Test limit (%): 3.30 Pass

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

## **7. EN 55024 MEASUREMENT INSTRUMENTATION**

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### **7.1 Electrostatic Discharge Test System**

An ESD simulator is used for all testing. It is capable of applying Electrostatic discharges in both contact discharge modes to 4 kV and air discharge modes to 8 kV in both positive and negative polarities. This is in accordance with the IEC 61000-4-2 basic EMC publication.

### **7.2 Radiated Susceptibility Test System**

An signal generator and a Amplifier Research power amplifier are used to provide a signal at the appropriate power and frequency to a transmitting antenna to obtain the required electromagnetic field at the position of the EUT in accordance with the IEC 61000-4-3 basic EMC publication. The field was monitored by Amplifier Research field probe and Amplifier Research PM2002 power meter according the IEC 61000-4-3 standards. In order to judge the performance of the EUT, a set of monitor system is used.

### **7.3 Electrical Fast Transient/Burst Immunity Test System**

An Pro PLUS Capacitive Clamp Immunity test system is used for all testing. It is capable of applying fast transients to the AC line at any phase angle with respect to the AC line voltage wave form and to attached cables via a capacitive coupling clamp in accordance with the IEC 61000-4-4 basic EMC publication.

### **7.4 Surge Immunity Test System**

An Pro PLUS Capacitive Clamp Immunity test system is used for all testing. Both positive and negative polarities of voltage up to 2kV were applied to the AC input lines. The coupling network defined in the standard was used.

### **7.5 Conducted Susceptibility Test System**

An signal generator and a set of Amplifier Research test system are used for the testing. EUT was tested from 0.15 MHz to 80 MHz with 1 kHz sine wave, 80% modulation with 3Vr.m.s. CDN coupling and de-coupling networks and EM clamp was tested. During the tests, injected was applied to power line by using CDNs-6.2.2 method, and I/O lines was injected by using EM clamp injection-6.2.3.method.

### **7.6 Voltage Dips, Short Interruptions Immunity Tests System**

An Pro PLUS Capacitive Clamp Immunity test system is used for all testing. Test level as described in IEC 61000-4-11, section 5, titled "Test Levels".

## 7.7 Equipment Test Table

IEC 61000-4-2: 1995 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by *0.5-millimeter* thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

IEC 61000-4-3 and IEC 61000-4-4 specify that a tabletop EUT be placed on a non-conducting table 80 centimeters above a ground reference plane and that floor-mounted equipment shall be placed on an insulating support approximately 10 centimeters above a ground plane. During the IEC 61000-4-3 tests, the EUT is positioned on a table in a shielded semi-anechoic test chamber to reduce reflections from the internal surfaces of the chamber. During the IEC 61000-4-4 tests, the EUT is positioned on a table over a ground reference plane in conformance with this requirement.

## 7.8 Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications.

Extensive engineering efforts have been made to ensure test data reliability through Quality Control and regular equipment calibration schedules. However, the application of radio frequency fields and voltages are not without an unavoidable level of uncertainty. These include inaccuracies in antenna factors, chamber imperfections and possible test generator output uncertainties.

## 8. EN 55024 TEST PROCEDURES

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### 8.1 EUT and Cable Placement

The EUT and any peripherals are located at the center of the table for tabletop devices and in the center of the ground plane with the insulating support for floor-standing devices. The standards require that interconnecting cables to be connected to available ports of the unit and that the placement of the unit and the attached cables simulate a typical installation so far as to be practical.

### 8.2 Application of Electrostatic Discharge Immunity Test

The test is conducted in the following order according to the basic standard IEC 61000-4-2: Air Discharge, Direct Contact Discharge, Indirect Contact Horizontal Coupling Plane Discharge, and Indirect Contact Vertical Coupling Plane Discharge. The Electrostatic Discharge test levels are set and discharges for the different test modes are set appropriately. The Electrostatic Discharge is applied to the conductive surface of the computer in which the EUT is enclosed, and along all seams and control surfaces on the computer. When a discharge occurs and an error is caused, the type of error, discharge level and location is recorded.

### 8.3 Application of Radiated Susceptibility Test

The electromagnetic field is established at the front edge of the EUT. The frequency range is swept from 80 to 1000 MHz using a power level necessary to obtain a 3 volt/meter and 80% amplitude of a 1 kHz sine wave modulated field Strength is directed at the EUT. The test is performed with each of four sides of EUT facing the transmitting antenna. If an error is detected when the susceptible side of the EUT facing the transmitting antenna, the field is reduced until the error is not repeatable, the field is then manually increased until the error begins to occur. This threshold level, the frequency and the error created are noted before continuing. Both horizontal and vertical polarization of the antenna are set on test and measured individually

### 8.4 Application of Electrical Fast Transient/Burst Immunity Test

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

### 8.5 Application of Surge Immunity Test

The EUT was setup as described in IEC 61000-4-5 and the test shall be performed according to the test plan.

### 8.6 Application of Conducted Susceptibility Test

The EUT was setup according to the IEC 61000-4-6 and the test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF input ports of the coupling devices are terminated by a 50  $\Omega$  load resistor. The frequency range is 150 kHz to 80 MHz.

### 8.7 Application of Voltage Dips, Short Interruptions Immunity Tests

The EUT was setup according to the IEC 61000-4-11 and the test shall be done as the procedure described in the standard.

### 8.8 Deviations from the Standard

No deviations from EN 55024 were made when performing the tests described in this report.



## 9. TEST DATA

### 9.1 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Temperature ( °C )	24
Humidity ( %RH )	57
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	HDMI & VGA Mode

Table 1: Electrostatic Discharge Immunity (Air Discharge)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Slots 10 points	A	A	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact Discharge)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Metal of EUT 12 points	A	A	A	A	/	/	/	/	/	/
Screws 12points	A	A	A	A	/	/	/	/	/	/
Ports 12points	A	A	A	A	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact Discharge HCP)

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

Table 4: Electrostatic Discharge Immunity (Indirect Contact Discharge VCP)

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

## 9.2 Radiated Susceptibility Test (IEC 61000-4-3)

**Frequency Range (MHz):** 80~1000MHz

**Modulation:** Amplitude 80%, 1 kHz sine wave

**Severity Level:** 3V/m

Temperature ( °C )	24
Humidity ( %RH )	57
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	HDMI & VGA Mode

Frequency Range (MHz)	Front (3 V/m)		Rear (3 V/m)		Left Side (3 V/m)		Right Side (3 V/m)	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A

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

Temperature ( °C )	24
Humidity ( %RH )	57
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	ON

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

#### 9.4 Surge Immunity Test (IEC 61000-4-5)

Temperature ( °C )	24
Humidity ( %RH )	57
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	ON

Table 1: Surge Power Supply

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

#### 9.5 Conducted Susceptibility Test (IEC 61000-4-6)

**Frequency Range (MHz):** 0.15~80MHz

**Modulation:** Amplitude 80%, 1 kHz sine wave

**Severity Level:** 3Vr.m.s.

Temperature ( °C )	24
Humidity ( %RH )	57
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	ON

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

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

Temperature ( °C )	24
Humidity ( %RH )	57
Barometric Pressure ( mbar )	1001.1
EUT	Network Video Recorder
M/N	NVC-2080
Operating Mode	ON

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

Note:

- A ----- Continue to operate as intended during and after test.  
no degradation of performance or loss of function.
- B ----- Permissible loss of performance. No change of actual operating  
state or stored data.
- C ----- Temporary loss of function, self-recoverable or can be restored by  
the operation of controls.

## 10. TEST RESULTS

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The following tests were performed on the **NUUO INC.** product; model: **NVC-2080**; the actual test results are contained within the Test Data section of this report.

### 10.1 IEC 61000-4-2 Electrostatic Discharge Immunity Test Configuration

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

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

### 10.2 IEC 61000-4-3 Radiated Susceptibility Test Configuration

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

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

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

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

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

### 10.4 IEC 61000-4-5 Surge Immunity Test Configuration

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

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

### 10.5 IEC 61000-4-6 Conducted Susceptibility Test Configuration

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

*The EUT continued to perform as intended during and after the application of the Conducted Susceptibility Test. Test setup photographs presented in Appendix B.*

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

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

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

## APPENDIX A. EUT PHOTOGRAPHS

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**EUT - Front View**



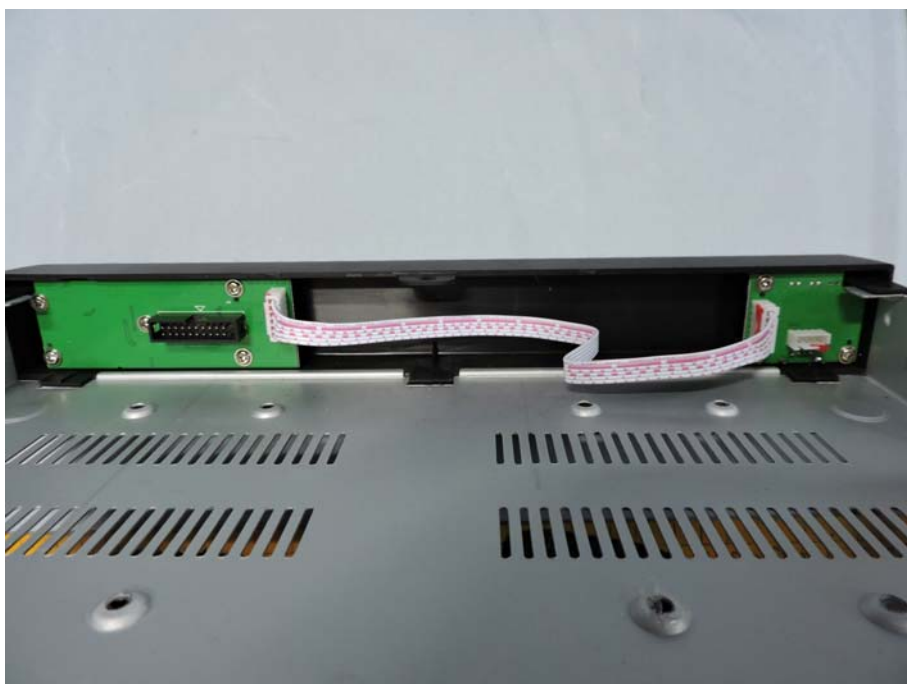
**EUT - Back View**



**EUT - Inside View**



**EUT - Inside View**



EUT - Inside View



EUT - Inside View





## APPENDIX B. TEST SETUP PHOTOGRAPHS

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### Conducted Emission



### Radiated Emission



## Radiated Susceptibility Test



## Voltage Fluctuations and Flicker Test



### Electrostatic Discharge Immunity Test



### Electrical Fast Transient/Burst Immunity, Surge Immunity, Voltage Dips, Short Interruptions Immunity Test

