

No.	N1607CR8888-00193-Y
Total page	40



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TESTING
CNA S L0462

TEST REPORT

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Product Name : Orbital Automotive NVR

Type and Specification : DS-MP35XX-RS/XX/YY

Test Category : Entrusted Test

Factory : Hangzhou Hikvision Technology Co.,Ltd.

Client: Hangzhou Hikvision Digital Technology Co., Ltd.



**China Electronic Product Reliability And
Environmental Testing Research Institute**
China CEPREI Laboratory

TEST REPORT

Report reference No	N1607CR8888-00193-Y
Total number of pages	40
Test item description	Orbital Automotive NVR
Trademark	/
Model and/or type reference	DS-MP35XX-RS/XX/YY
Factory's Name	Hangzhou Hikvision Technology Co.,Ltd.
Address	No. 700 Dongliu Road, Binjiang District, Hangzhou 310052,Zhejiang , China
Client's Name	Hangzhou Hikvision Digital Technology Co., Ltd.
Address	No. 555 Qianmo Road, Binjiang District, Hangzhou 310052,Zhejiang , China
Testing Laboratory Name	China CEPREI Laboratory/ China Electronic Product Reliability and Environmental Testing Research Institute
Address	No.110 Dongguanhuang Rd., Tianhe District,Guangzhou, Guangdong, 510610, China
Testing location	China CEPREI Laboratory
Test specification	
Standard.....	EN50155:2007;IEC 60068-2-1:2007;IEC 60068-2-2:2007; IEC 60068-2-30:2005;IEC 60068-2-64:1993;IEC 61373:1999;
Test category	Entrusted Test
Number of test item.....	1
Date of receipt of test item	2016.06.15
Date(s) of performance of test.....	2016.06.24-2016.07.19
Ambient Condition.....	
Test Instruments and Equipment.....	See Equipment List of This Report.
Summary of Testing and Conclusions	
PASS.	
Tested by (printed name and signature).....	Li Tiehua (李铁华)
Reviewed by (printed name and signature).....	Li junyong (黎俊勇)
Approved by (printed name and signature).....	Yang Lin (杨林)
Date of issue	2016-7-20



Test case verdicts

Test case does not apply to the test object.....:	N
Test item does meet the requirement(Pass).....:	Pass
Test item does not meet the requirement(Fail).....:	F
Test case does not apply caused by the testing equipment.....:	ND

General remarks

1. Report without "specific stamp" of inspection organization or the authority will be regarded as invalid.
2. Duplicated report without original "specific stamp" of inspection organization or the authority will be regarded as invalid.
3. Report without the signatures of Tester, Reviewer or Approval will be regarded as invalid.
4. Test report if altered will be regarded as invalid.
5. Any dispute about the report must be submitted to inspection organization within 15 days upon report received, it will be rejected if out of the period.
6. Generally, the entrusted test only responsible for the samples.

General product information:

The sample of the Orbital Automotive NVR can take up to 16 cameras by the switch.

Testing Laboratory Contact Info:

China CEPREI Laboratory/ China Electronic Product Reliability and Environmental Testing Research Institute

Address: No.110 Dongguanzhuang Rd., Tianhe District,Guangzhou, Guangdong, 510610, China

Post: P.O.Box1501-07,Guangzhou

Postcode: 510610

TEL: +86-20-85131111

FAX: +86-20-87236171, +86-20-85131313

Technical Consultant: +86-20-87237178, +86-20-85131260

Business Contact: +86-20-87237177,market@ceprei.biz

Enquiry: +86-20-87237150, +86-20-85131123,info@ceprei.biz

Complaint: +86-20-87237622, +86-20-87236789,qic@ceprei.biz

EMC Standards Compliance List / Test summary

The following standards have been applied to ensure the product conforms to the protection requirements of the client.

Electromagnetic Emissions				
Test Item	Class	Standard	Result	
Conducted Emission at mains terminals (0.15-30MHz)	/	EN50155: 2007	PASS	
Radiated Emission(30-1000MHz)	/	EN50155: 2007	PASS	
Electromagnetic Immunity				
Test Item	Performance Criteria	Standard	Test Level	Result
Electrical Fast Transient/Burst Immunity	A	EN 50155: 2007	2kV, signal or TE port 5/50 Tr/Th ns 5kHz Repetition frequency	PASS
Radio-frequency Electromagnetic Fields Immunity	A	EN 50155: 2007	80-1000 MHz, 10 V/m; 800-1000 MHz, 20 V/m; 1400-2100 MHz, 10 V/m; 2100-2500 MHz, 5 V/m; (unmodulated, r.m.s) 80 % AM (1kHz)	PASS
Radio-frequency Conducted Disturbance Immunity	A	EN 50155: 2007	0.15-80 MHz 10V (unmodulated, r.m.s) 80% AM (1kHz)	PASS
Surge immunity	B	EN 50155: 2007 EN 50121-3-2:2006	Power:1kV L-N; 1.2/50 (8/20) Tr/Th μ s	PASS
Electrostatic Discharge Immunity	B	EN 50155: 2007	6 kV(Contact/indirect Discharge) 8 kV(Air discharge)	PASS
Voltage dips, short interruptions immunity	B	EN 50155: 2007	60-140% change linear 0.1s 125-140% change linear 0.1s 100% reduction 10ms	PASS
Supply overvoltages	D	EN 50155: 2007	/	PASS

Environment Standards Compliance List and Test equipment

The following standards have been applied to ensure the product conforms to the protection requirements of the client.

Environment Standards			
Test Item	Standard	Result	
Visual Inspection	EN 50155:2007	PASS	
Insulation Resistance Test	EN 50155:2007	PASS	
Dielectric Strength Test	EN 50155:2007	PASS	
Low Temperature Test	IEC 60068-2-1:2007	PASS	
Low Temperature Storage Test	IEC 60068-2-1:2007	PASS	
High temperature Test	IEC 60068-2-2:2007	PASS	
Damp Heat Cyclic Test	IEC 60068-2-30:2005	PASS	
Random Vibration Test	IEC 60068-2-64:1993	PASS	
Mechanical Shock Test	IEC 61373:1999	PASS	
Environment Test equipment			
Test Equipment	Model	Serial No.	Due Date
Environment Test Chamber	CEEC-WSJ-2000B	12024-3	Dec.09, 2016
Electrodynamic Vibration System	DC-3200-36	071023	Nov.26, 2016
Withstanding Voltage and Insulation Resistance tester	TOS9201	TC001054	Dec.08, 2016

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Section 1 General Information

1.1 Introduction

This report documents the emission and immunity test results for the Orbital Automotive NVR.

1.2 EUT general and technical Descriptions

EUT Name:	Orbital Automotive NVR
EUT Model:	DS-MP35XX-RS/XX/YY
EUT Trademark:	/
Input Voltage:	DC 110V(60~160)
Frequency:	/
Input Power/Current:	/
Power Cable Description:	/
Other Cables Description:	/
Function(s) Description:	/

Section 2 Electromagnetic Emissions

2.1 Conducted Emission at Mains Terminals

2.1.1 Conducted Emission Test Information (mains terminal)

Temperature:	21°C	Humidity:	54%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V	Tested Range:	150kHz to 30MHz
Tested by:	Li tiehua	Date of test:	2016-06-27
Test Reference:	EN 50155: 2007		
Results:	The Conducted Emission at Mains Terminals of EUT Met the requirement of the standard EN50155.		

2.1.2 Measurement Equipments Used for Conducted Emission (mains terminal)

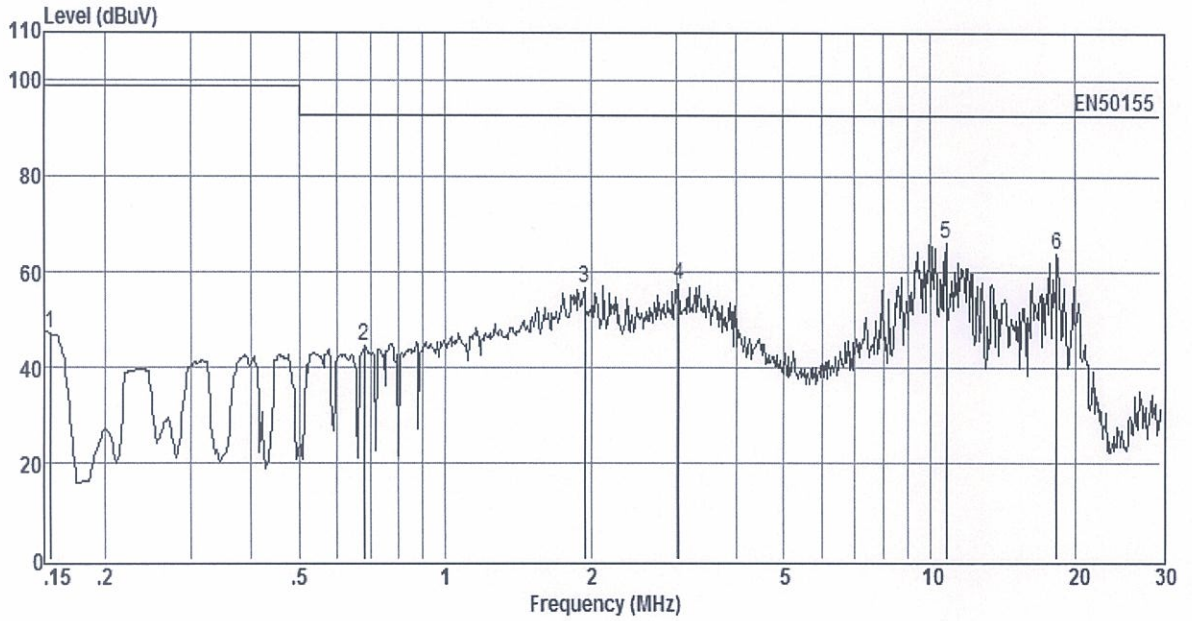
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	R&S	ESC17	100940	2016-06-06	2017-06-05
LISN	R&S	ESH2-Z5	100378	2016-06-06	2017-06-05
Shielded Room	ETS	CT000568	1167	2015-01-14	2017-01-13

2.1.3 Test Data

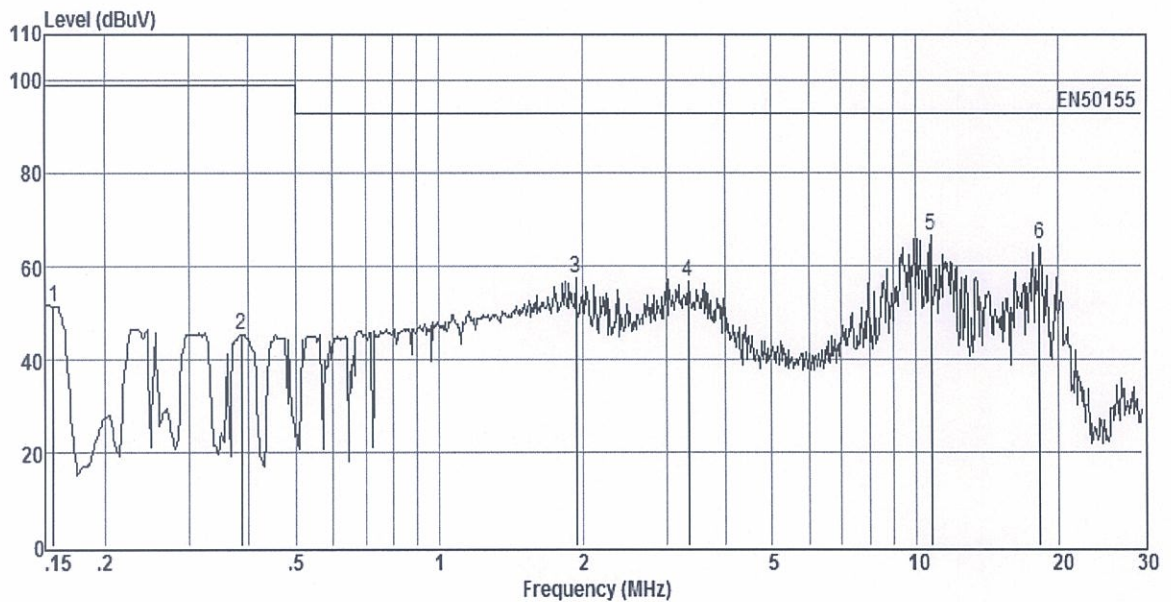
Line Positive (INPUT LINE, LINE)							
No.	Frequency (MHz)	Corrected P Level (dBμV)	Limits QP (dBμV)	Margin P (dB)	Corrected AVE Level (dBμV)	Limits AVE (dBμV)	Margin AVE (dB)
1	0.154	47.2	99.0	/	/	/	/
2	0.679	44.5	93.0	/	/	/	/
3	1.939	56.6	93.0	/	/	/	/
4	3.041	57.4	93.0	/	/	/	/
5	10.79	66.3	93.0	/	/	/	/
6	18.23	63.8	93.0	/	/	/	/
Line Negative (INPUT LINE, RETURN)							
No.	Frequency (MHz)	Corrected P Level (dBμV)	Limits QP (dBμV)	Margin P (dB)	Corrected AVE Level (dBμV)	Limits AVE (dBμV)	Margin AVE (dB)
1	0.156	51.5	99.0	/	/	/	/
2	0.385	45.5	99.0	/	/	/	/
3	1.939	57.4	93.0	/	/	/	/
4	3.346	56.7	93.0	/	/	/	/
5	10.79	66.5	93.0	/	/	/	/
6	18.23	64.7	93.0	/	/	/	/

Note: The Corrected P Level included The Cable attenuation.

2.1.4 Test curves



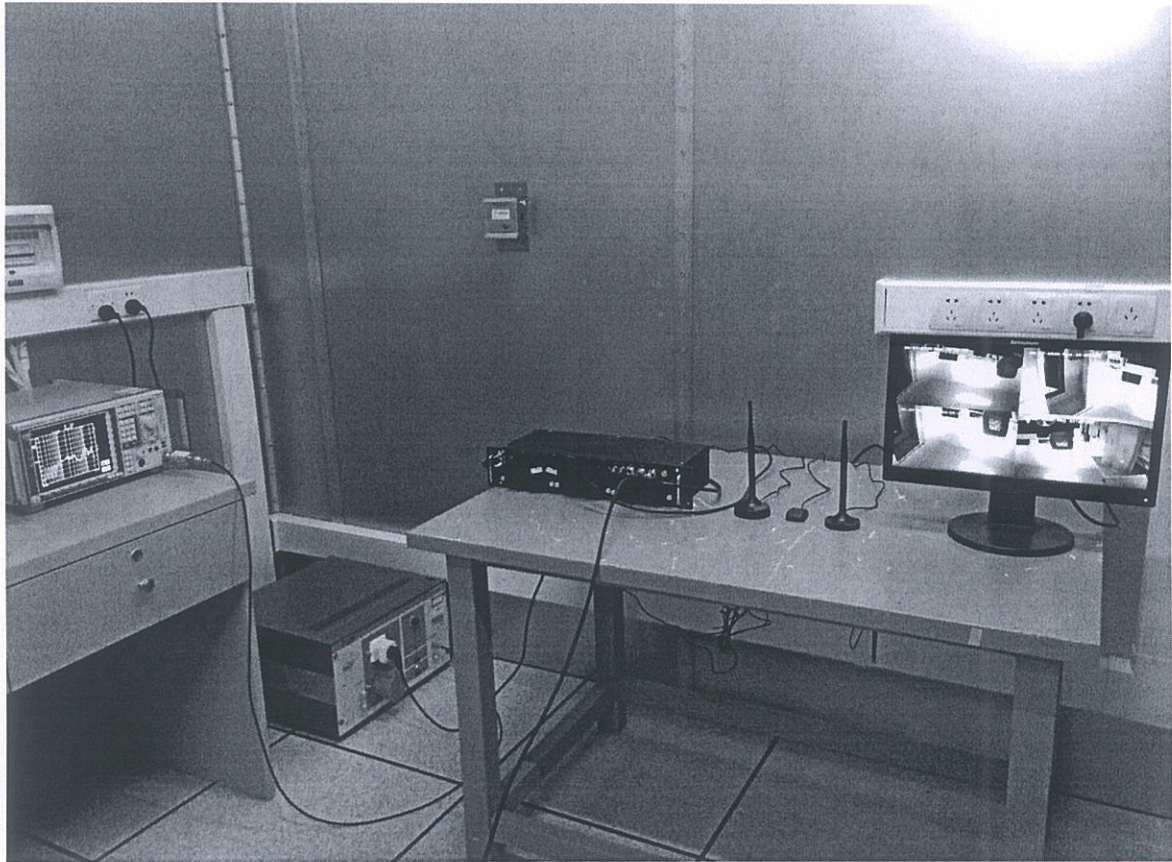
Line Positive (INPUT LINE DC110V, LINE) Conducted Emission Graph



Line Negative (INPUT LINE DC110V, RETURN) Conducted Emission Graph

Note: The curves included The Cable attenuation.

2.1.5 Test Setup



Conducted Emission at mains terminal Test Set-up Front View

/

2.2 Radiated Emission (30-1000MHz)

2.2.1 Radiated Emission Test Information

Temperature:	20°C	Humidity:	68%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V	Tested Range:	30MHz to 1000MHz
Tested by:	Li tiehua	Date of test:	2016-06-24
Test Reference:	EN 50155: 2007		
Results:	The Radiated Emission of EUT Met the requirement of the standard EN50155.		

2.2.2 Measurement Equipments Used for Radiated emission

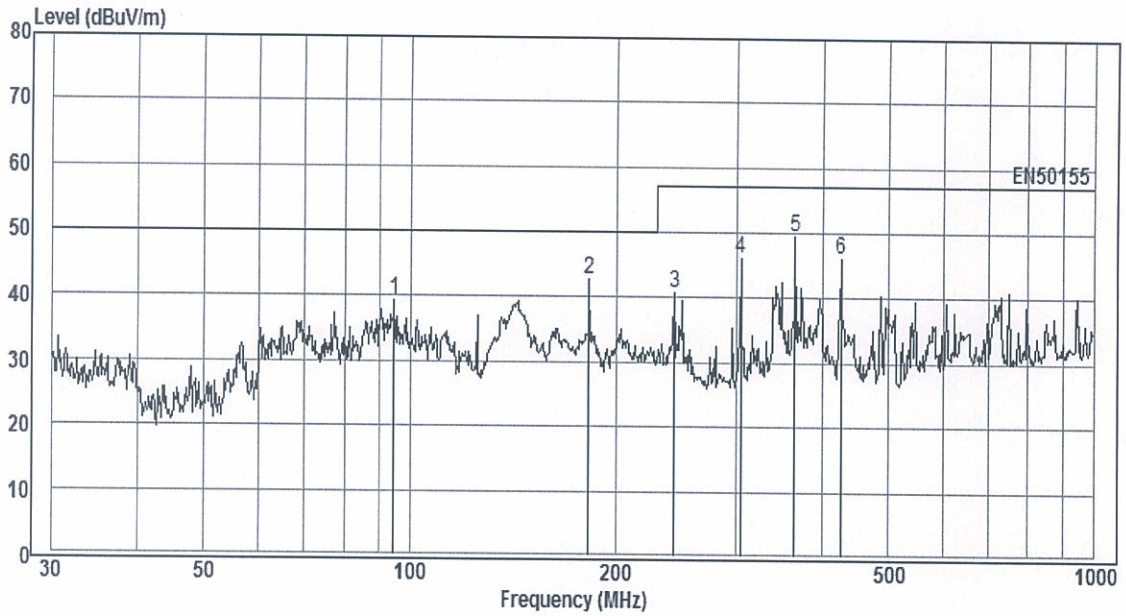
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	R&S	ESR	101294	2016-06-06	2017-06-05
Periodic-Log antenna	ETS	3142E	144754	2015-06-27	2016-06-26
Anechoic Chamber	ETS	RFD-F/A-100	5374	2015-01-14	2017-01-13

2.2.3 Test Data

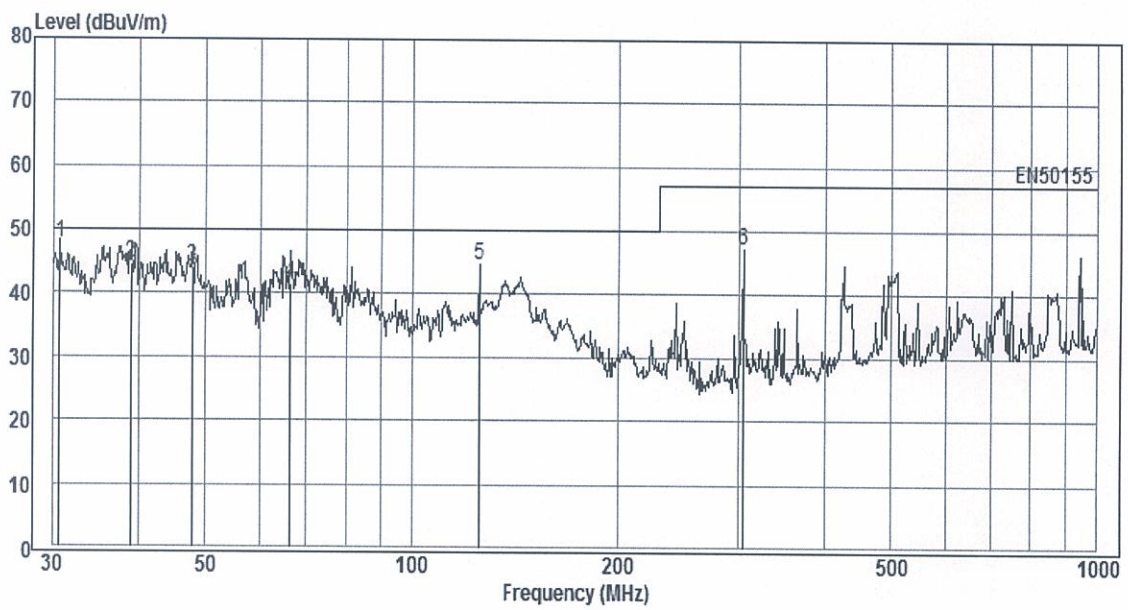
Horizontal						
No.	Frequency (MHz)	Corrected QP Level dB(μV/m)	3 Meter Limits dB(μV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	94.4	39.2	50.0	/	/	/
2	182.6	42.7	50.0	/	/	/
3	243.4	40.8	57.0	/	/	/
4	304.6	46.1	57.0	/	/	/
5	365.5	49.3	57.0	/	/	/
6	426.5	46.2	57.0	/	/	/
Vertical						
No.	Frequency (MHz)	Corrected QP Level dB(μV/m)	3 Meter Limits dB(μV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	30.6	47.6	50.0	/	/	/
2	38.9	44.8	50.0	/	/	/
3	47.8	44.1	50.0	/	/	/
4	66.3	41.5	50.0	/	/	/
5	125.0	44.6	50.0	/	/	/
6	304.6	47.1	57.0	/	/	/

Note: The Corrected QP Level included The Cable attenuation and The Antenna Factor.

2.2.4 Test Curves



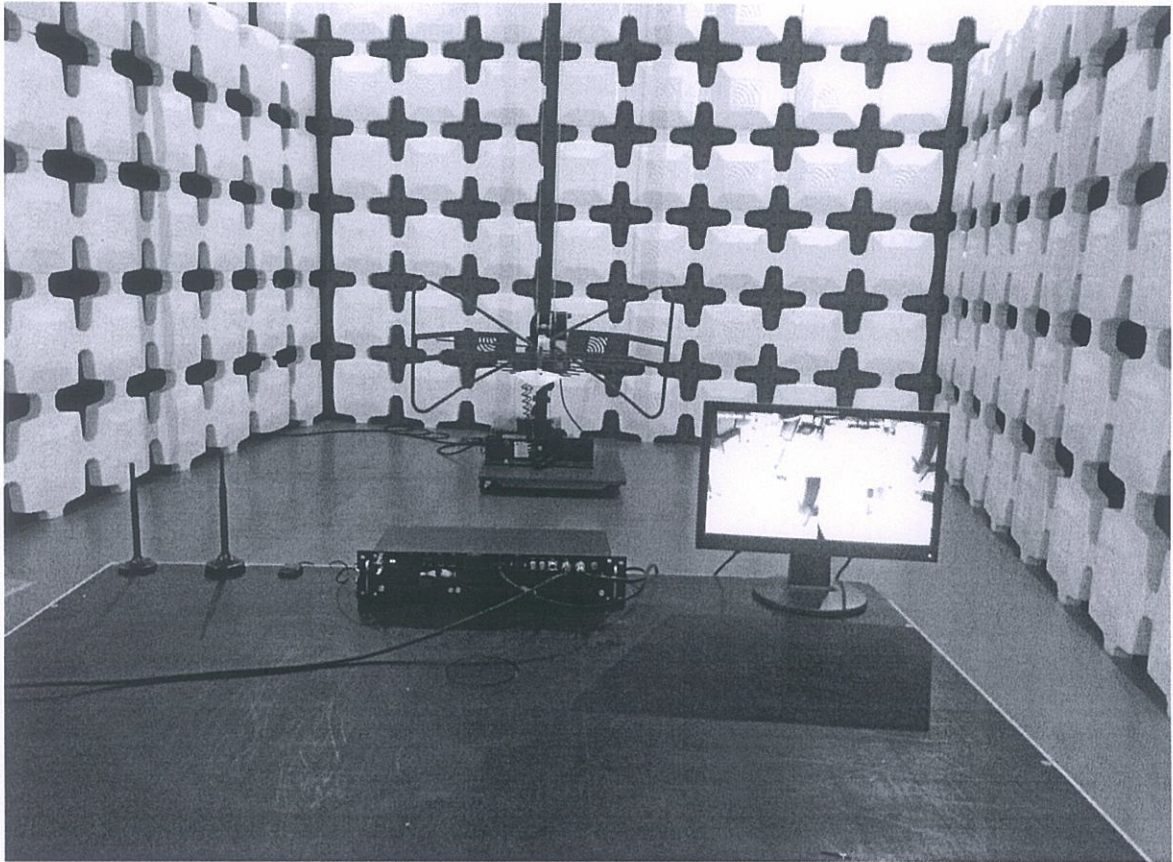
Horizontal Radiated Emission Graph (Peak, Max Hold Mode)



Vertical Radiated Emission Graph (Peak, Max Hold Mode)

Note: The Curves included The Cable attenuation and The Antenna Factor.

2.2.5 Test Setup



Radiated Emission Test Set-Up – Front View

Section 3 Electromagnetic Immunity

3.1 Electrical Fast Transient/Burst Immunity

3.1.1 Electrical Fast Transient/Burst Immunity test information

Temperature:	22°C	Humidity:	62%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-07-06
Test Reference:	EN 50155: 2007		
Performance Criteria:	A		
Results:	The Electrical Fast Transient/Burst Immunity of EUT Met the requirement of the standard EN50155.		

3.1.2 Measurement Equipment Used for Electrical Fast Transient/Burst Immunity test

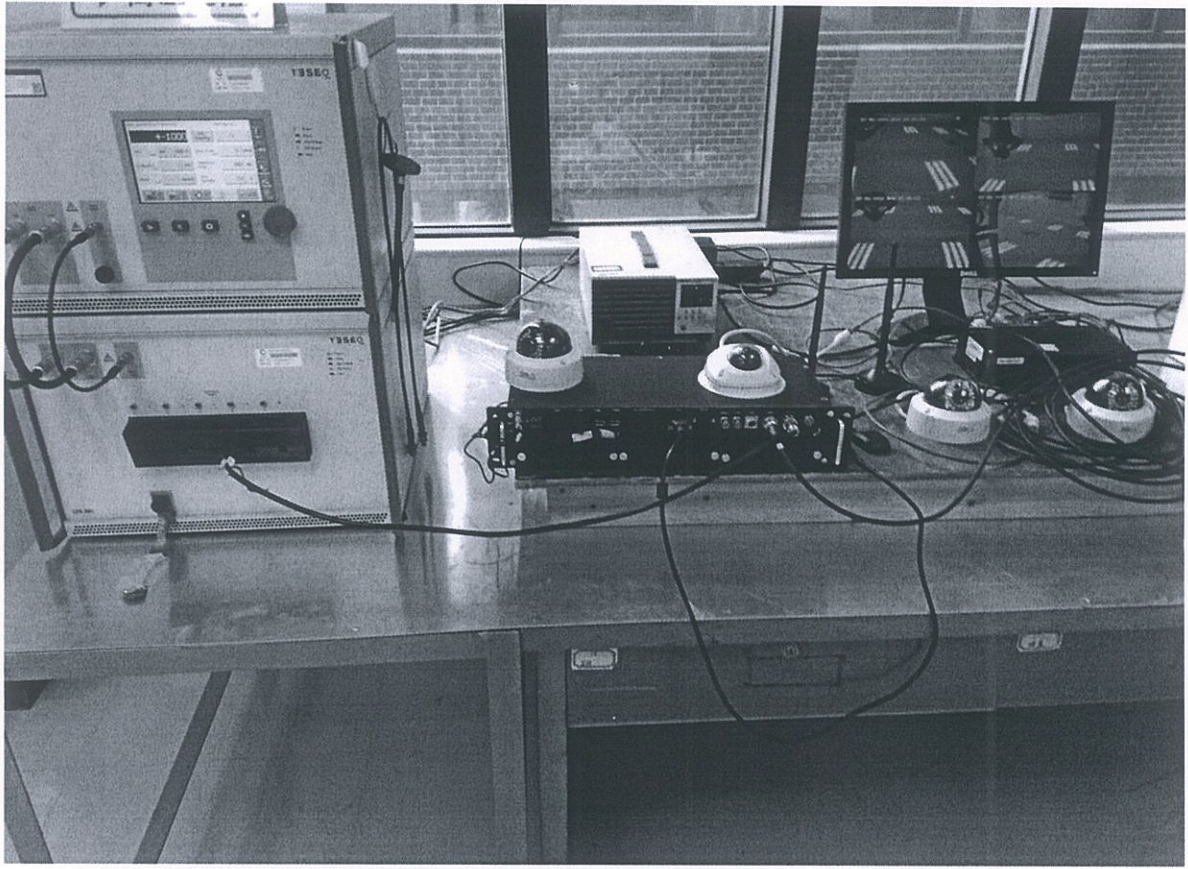
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMS Testing system	TESEQ	NSG3060	1916	2016-06-08	2017-06-07

3.1.3 Test Data

Injected position	Waveform (ns)	Voltage peak (kV) Power port PE				Repetition rate (kHz)	Test time at each polarity (s)	EUT performance comply to criteria	Result
		0.5	1	2	4				
		+/-	+/-	+/-	+/-				
Power line	5/50	/	/	P/P	/	5	60	A	PASS
Return line	5/50	/	/	P/P	/	5	60	A	PASS
Power line & Return line	5/50	/	/	P/P	/	5	60	A	PASS
Signal line	5/50	/	/	P/P	/	5	60	A	PASS

The performance criteria are classified into four groups:
 A ---- Normal performance within the specification limits;
 B ---- Temporary degradation or loss of function or performance which is self-recoverable;
 C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;
 D ---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

3.1.4 Test Setup



Electrical Fast Transient/Burst Immunity Test Set-Up –Front View(POWER LINE)

/

3.2 Radio-frequency Electromagnetic Fields Immunity

3.2.1 Radio-frequency Electromagnetic Fields Immunity test information

Temperature:	21°C	Humidity:	63%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-06-19
Test Reference:	EN 50155: 2007		
Performance Criteria:	A		
Results:	The Radio-frequency Electromagnetic Fields Immunity of EUT Met the requirement of the standard EN50155.		

3.2.2 Measurement Equipment Used for Radio-frequency Electromagnetic Fields Immunity test

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Signal Generator	R&S	SMB100A	102984	2016-06-08	2017-06-07
RF power Amplifier	AR	500W1000A	7161990011-02	2016-06-08	2017-06-07
RF power Amplifier	AR	50S1G4A	7161990011-03	2016-06-08	2017-06-07
Electrical field monitor system	HOLADAY	HI-6005	82913	2016-06-08	2017-06-07

3.2.3 Test Data

Frequency Range (MHz)	Strength (V/m)	1kHz AM Mod. %	EUT Tuned degree	EUT performance comply to criteria	Result
80-1000	10	80	0° ,90° ,180° ,270°	A	PASS
1400-2100	20	80	0° ,90° ,180° ,270°	A	PASS
1400-2100	10	80	0° ,90° ,180° ,270°	A	PASS
2100-2500	5	80	0° ,90° ,180° ,270°	A	PASS

Note:

The performance criteria are classified into four groups:

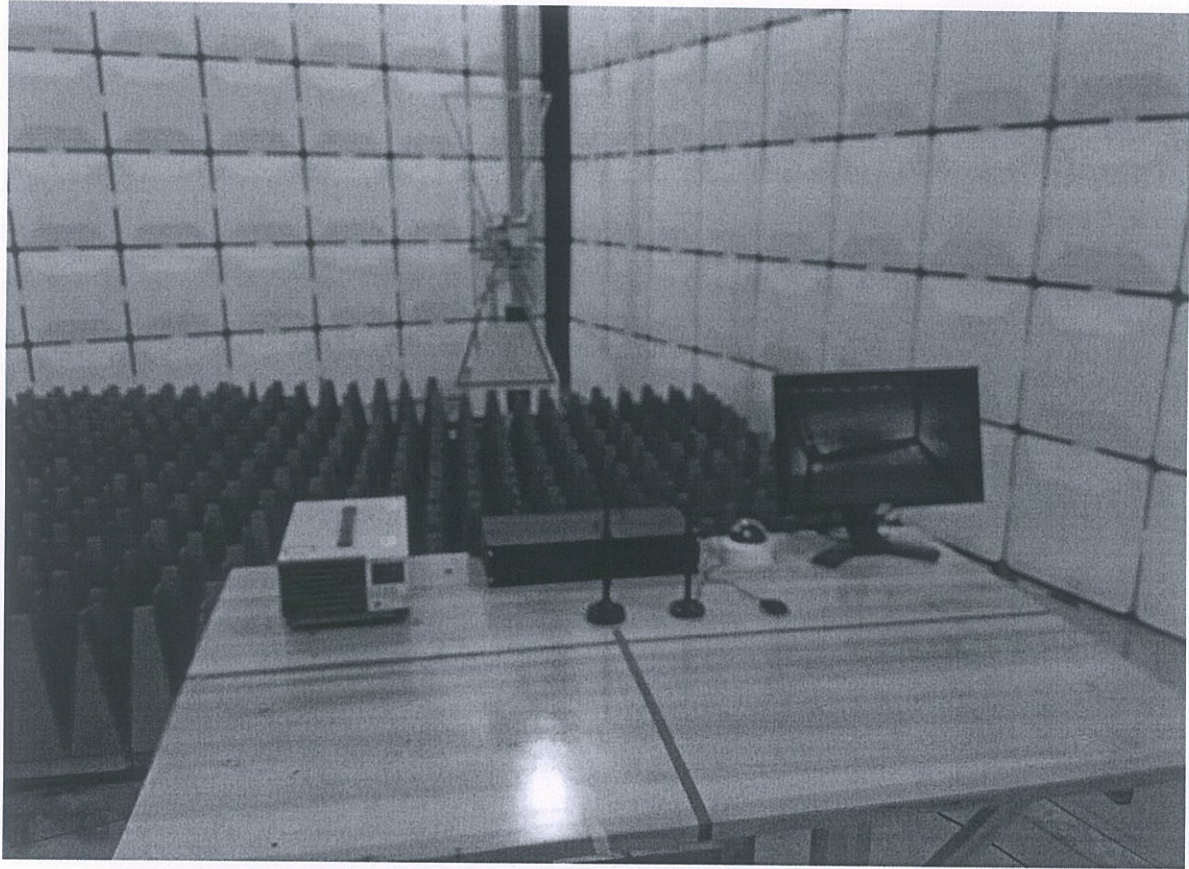
A ---- Normal performance within the specification limits;

B ---- Temporary degradation or loss of function or performance which is self-recoverable;

C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;

D ---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

3.2.4 Test Setup



Radio-frequency Electromagnetic Fields Immunity Test Set-Up –Front View

3.3 Radio-frequency Conducted Disturbance Immunity

3.3.1 Radio-frequency Conducted Disturbance Immunity test information

Temperature:	22°C	Humidity:	62%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-07-06
Test Reference:	EN 50155: 2007		
Performance Criteria:	A		
Results:	The Radio-frequency Conducted Disturbance Immunity of EUT Met the requirement of the standard EN50155.		

3.3.2 Measurement Equipment Used for Radio-frequency Conducted Disturbance Immunity test

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EM TEST	EM	CWS 500C	640101047	2016-06-08	2017-06-07
EM TEST CDN	EM	M1	640101047-01	2016-06-08	2017-06-07

3.3.3 Test Data

Injected position	Frequency Range (MHz)	Strength (rms) (unmodulated)	1kHz AM Mod. %	EUT performance comply to criteria	Result
Power line	0.15~80	10V	80	A	PASS
Return line	0.15~80	10V	80	A	PASS
Signal line	0.15~80	10V	80	A	PASS

Note:

The performance criteria are classified into four groups:

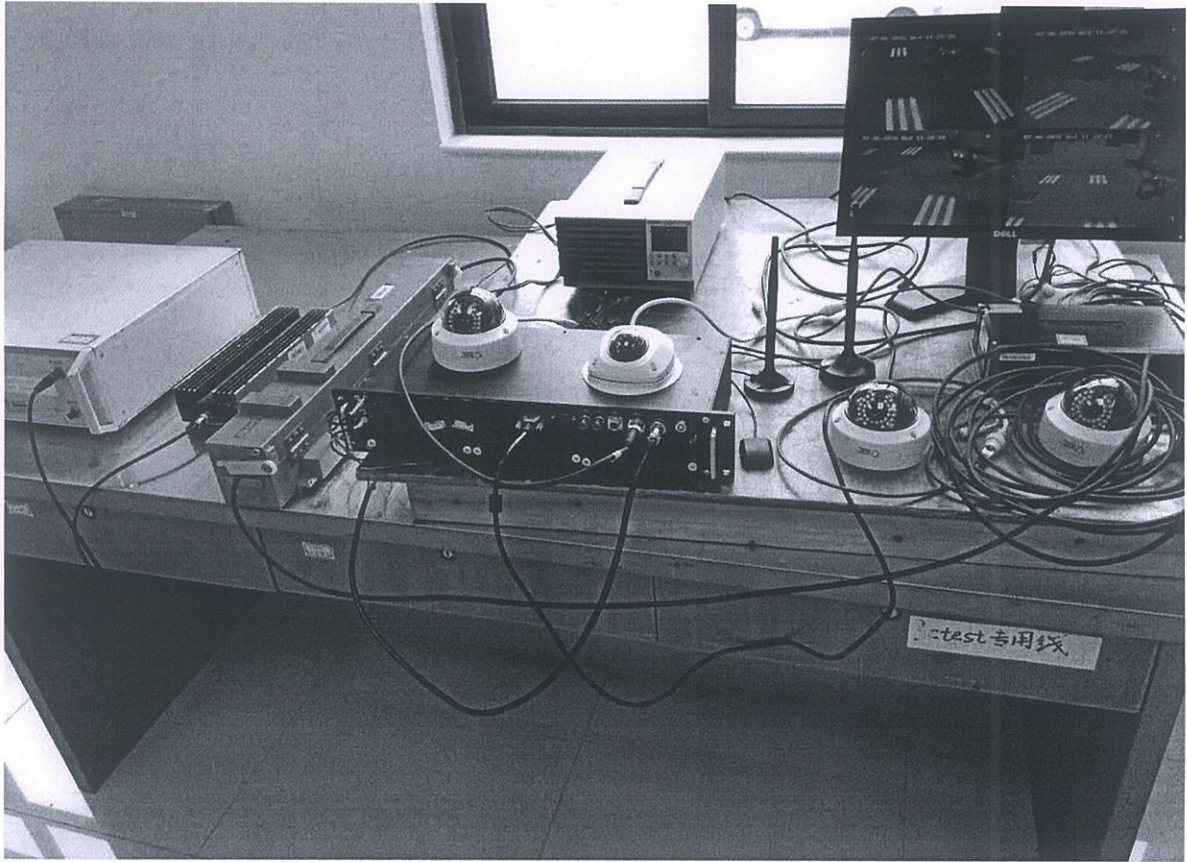
A ---- Normal performance within the specification limits;

B ---- Temporary degradation or loss of function or performance which is self-recoverable;

C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;

D ---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

3.3.4 Test Setup



Radio-frequency Conducted Disturbance Immunity Test Set-Up –Front View

/

3.4 Surge immunity

3.4.1 Surge immunity test information

Temperature:	22°C	Humidity:	62%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-07-19
Test Reference:	EN 50155: 2007		
Performance Criteria:	B		
Results:	The Surge immunity of EUT Met the requirement of the standard EN50155.		

3.4.2 Measurement Equipment Used for Surge immunity test

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Surge pulse generator	SCHAFFNER	NSG 2050	640101035	2016-06-08	2017-06-07
Surge wave integrated network	SCHAFFNER	PNW 2050	640101035-02	2016-06-08	2017-06-07

3.4.3 Test Data

Test position	Waveform Tr/Td μ s	Test voltage kV				Test times at each polarity	Coupling phase	EUT performance comply to criteria	Result
		0.5	1	2	4				
		+/-	+/-	+/-	+/-				
LINE -RETURN	1.2/50	/	P/P	/	/	5	/	A	PASS

Note:

The performance criteria are classified into four groups:

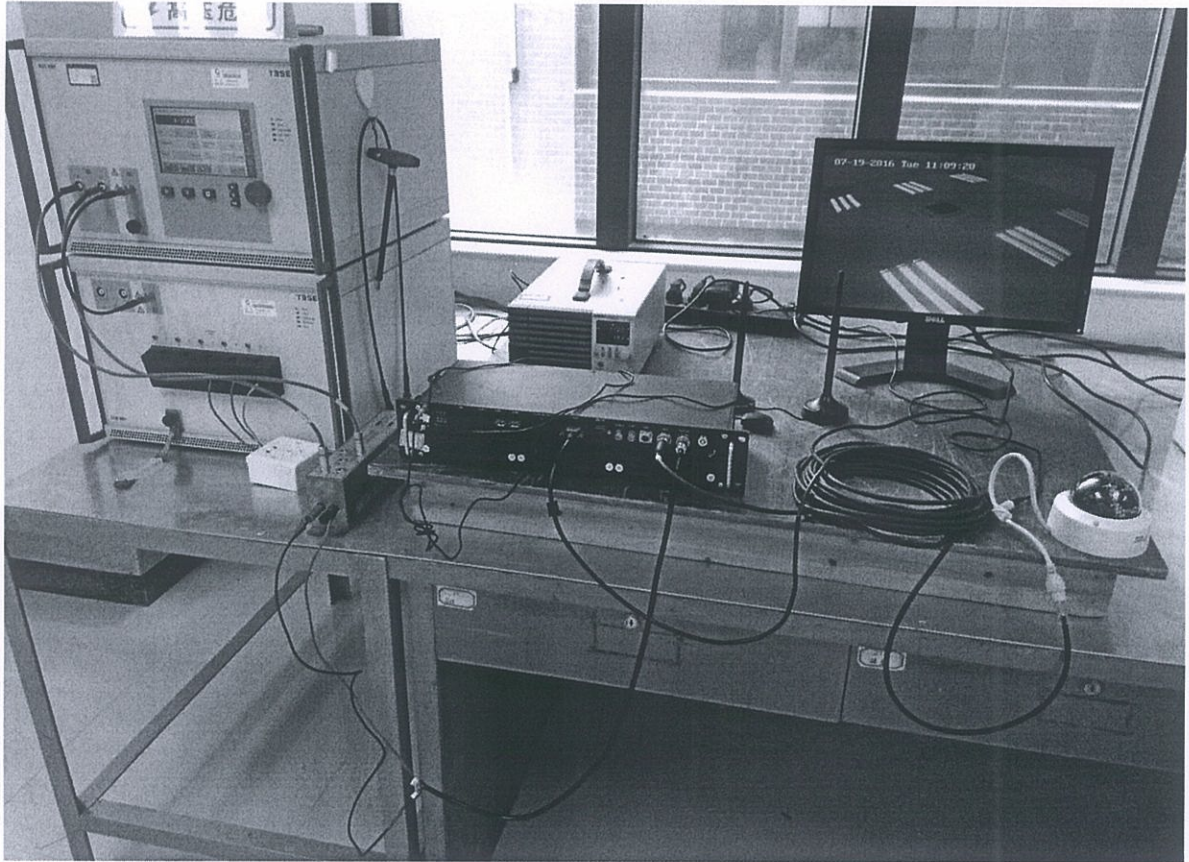
A ---- Normal performance within the specification limits;

B ---- Temporary degradation or loss of function or performance which is self-recoverable;

C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;

D ---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

3.4.4 Test Setup



Surge immunity Test Set-Up –Front View

3.5 Electrostatic Discharge Immunity

3.5.1 Electrostatic Discharge Immunity Test Information

Temperature:	22°C	Humidity:	55%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-07-19
Test Reference:	EN 50155: 2007		
Performance Criteria:	B		
Results:	The electrostatic discharge immunity of EUT Met the requirement of the standard EN50155.		

3.5.2 Measurement Equipment Used for Electrostatic Discharge Immunity

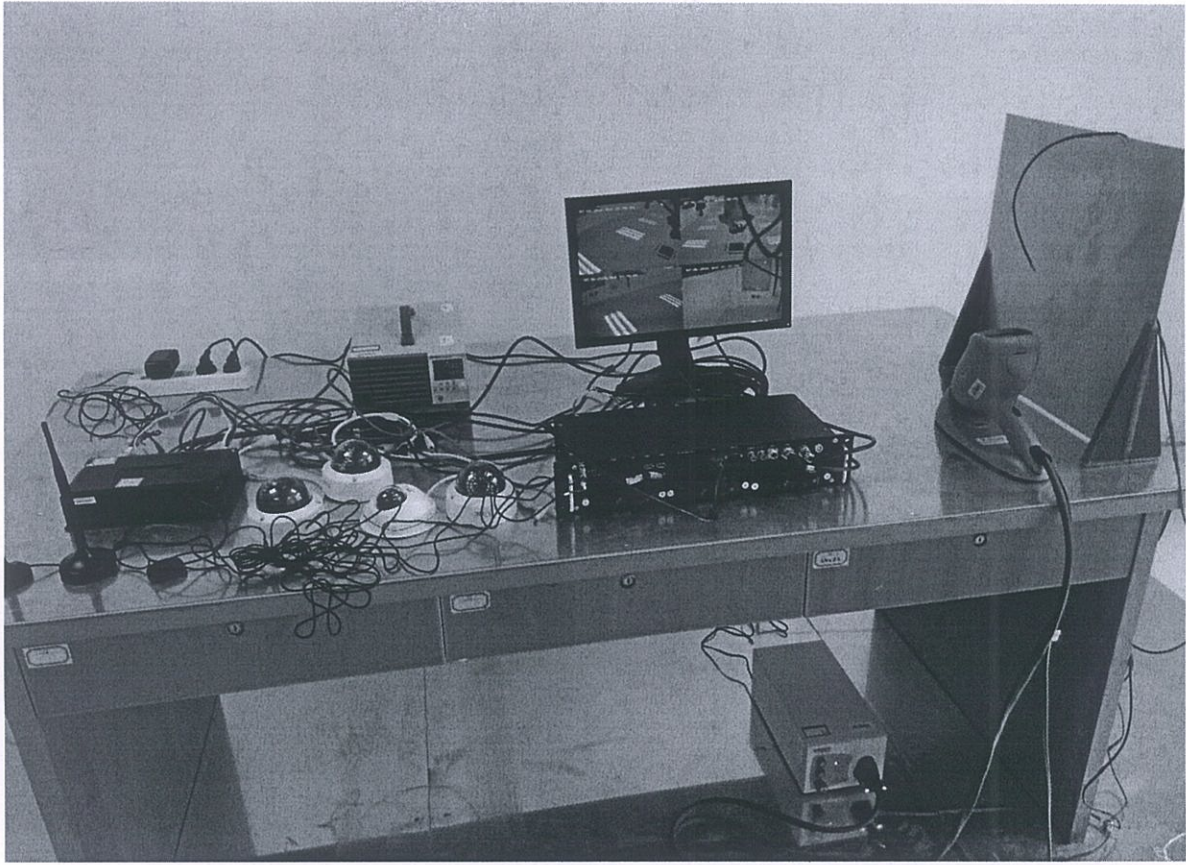
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
ESD Generator	SCHAFFNER	NSG438	640101065	2016-06-08	2017-06-07

3.5.3 Test Data

Test Point	Test Voltage (kV)				Discharge type	Repetition Rate Hz	Number Of Discharge at each polarity	EUT performance comply to criteria	Result
	2 +/-	4 +/-	6 +/-	8 +/-					
HCP	/	/	P/P	/	Contact discharge	1Hz	10	A	PASS
VCP	/	/	P/P	/	Contact discharge	1Hz	10	A	PASS
Screws	/	/	P/P	/	Contact discharge	1Hz	10	B	PASS
Metal shell	/	/	P/P	/	Contact discharge	1Hz	10	B	PASS
Metal terminal	/	/	P/P	/	Contact discharge	1Hz	10	B	PASS
Test Point	Test Voltage (kV)				Discharge type	Repetition Rate Hz	Number Of Discharge at each polarity	EUT performance comply to criteria	Result
	2 +/-	4 +/-	8 +/-	15 +/-					
Gap	/	/	P/P	/	Air discharge	1Hz	10	A	PASS
Lights	/	/	P/P	/	Air discharge	1Hz	10	A	PASS

The performance criteria are classified into four groups:
 A ---- Normal performance within the specification limits;
 B ---- Temporary degradation or loss of function or performance which is self-recoverable;
 C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;
 D ---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

3.5.4 Test Setup



Electromagnetic Immunity Test Set-Up –Front View

3.6 Voltage dips, short interruptions immunity

3.6.1 Voltage dips, short interruptions immunity test information

Temperature:	20°C	Humidity:	68%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-06-28
Test Reference:	EN 50155: 2007		
Performance Criteria:	B		
Results:	The Voltage dips, short interruptions immunity of EUT Met the requirement of the standard EN50155.		

3.6.2 Measurement Equipment Used for Voltage dips, short interruptions immunity test

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Multifunction AC-DC power supply	KIKUSUI	PCR2000LE	TG002751	2015-12-09	2016-12-08

3.6.3 Test Data

Test item	Test levels %UT(stat)	Test levels %UT(end)	Patterns of change	lasting time	EUT performance comply to criteria	Result
Voltage Change	60	140	Linear	0.1s	A	PASS
Voltage Change	125	140	Linear	0.1s	A	PASS
Voltage short interruptions	100	0	Linear	10ms	B	PASS

The performance criteria are classified into four groups:

A ---- Normal performance within the specification limits;

B ---- Temporary degradation or loss of function or performance which is self-recoverable;

C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;

D---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

the requirement of the client.

1. Voltage fluctuations (e.g. during start-up of auxiliary equipment or voltage oscillations of battery chargers) lying between 0.6 Un and 1.4 Un and not exceeding 0.1 s shall not cause deviation of function.

Voltage fluctuations lying between 1.25 Un and 1.4 Un and not exceeding 0.1 s shall not cause damage.

2. Interruptions of up to 10 ms may occur on input voltage as defined below:

- Class S1: no interruptions

- Class S2: 10 ms interruptions

This shall not cause any equipment failure.

3.6.4 Test Setup



Voltage dips, Short Interruptions Immunity Test Set-Up –Front View

/

3.7 Supply over voltages

3.7.1 Supply over voltages test information

Temperature:	20°C	Humidity:	68%RH
ATM Pressure:	101 k Pa	Grounding:	/
Test Voltage:	DC110V		
Tested by:	Li tiehua	Date of test:	2016-06-28
Test Reference:	EN 50155: 2007		
Performance Criteria:	D		
Results:	The Voltage dips, short interruptions immunity of EUT Met the requirement of the standard EN50155.		

3.7.2 Measurement Equipment Used for Voltage dips, short interruptions immunity test

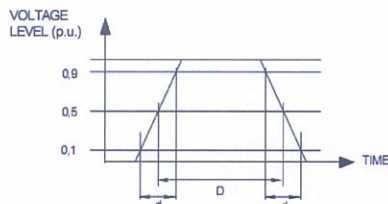
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Multifunction AC-DC power supply	KIKUSUI	PCR2000LE	TG002751	2015-12-09	2016-12-08

3.7.3 Test Data

Test item	Test levels %UT(stat)	Test levels %UT(end)	Patterns of change	lasting time	EUT performance comply to criteria	Result
Over voltages	100	140	Linear	1s	A	PASS

The performance criteria are classified into four groups:
 A ---- Normal performance within the specification limits;
 B ---- Temporary degradation or loss of function or performance which is self-recoverable;
 C ---- Temporary degradation or loss of function or performance which requires operator intervention or system reset;
 D---- Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data.

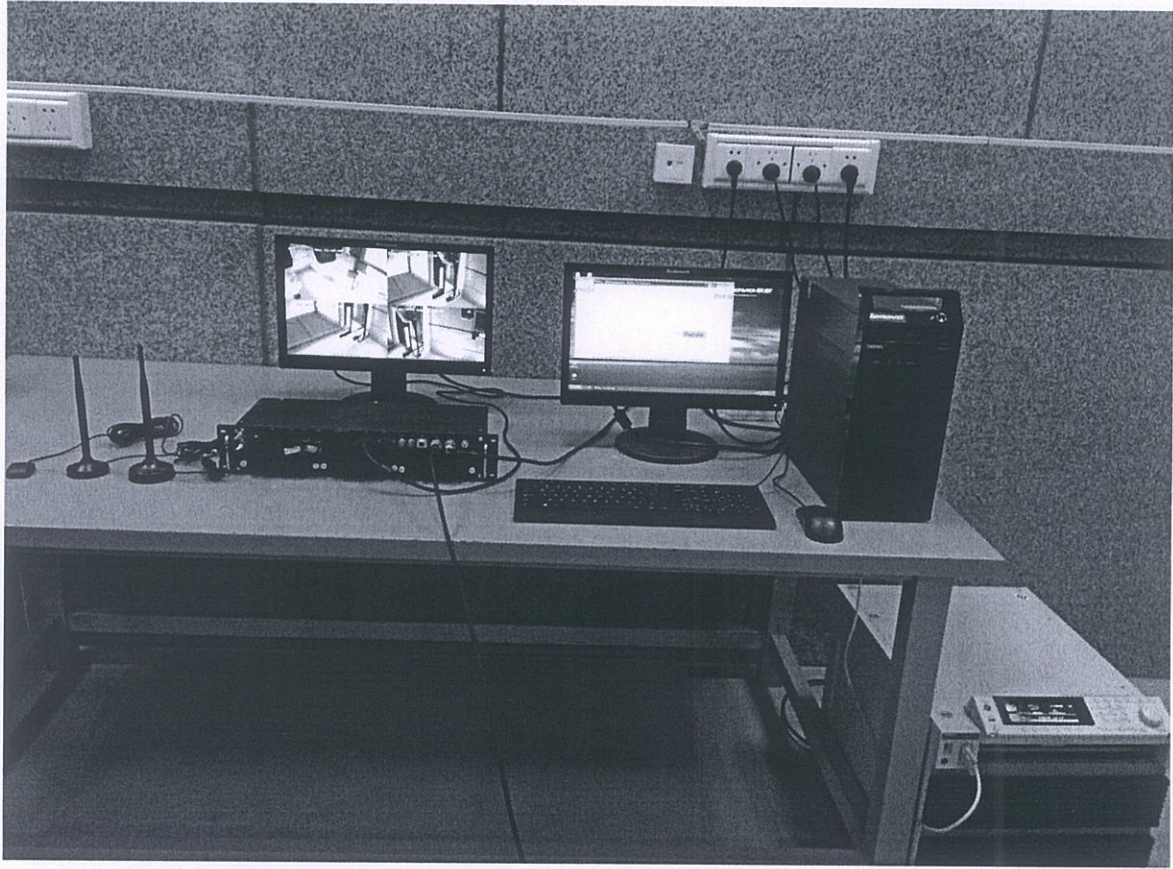
The test waveform of the requirement of the standard.



Voltage level min.	Duration d max.	Duration D max.	Series resistor (Tol. ± 10 %)
1,4 U _n	0,1 s	1,0 s	1 Ω

test acceptance requirement : This shall not cause any equipment failure.

3.7.4 Test Setup



Supply over voltages Immunity Test Set-Up –Front View

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Section 4 Environment Test

4.1 Test purpose

In order to show the endurance about the sample of Camera in condition of the High & Low temperature, damp heat cyclic, vibration and shock test environment.

4.2 Test procedure

4.2.1 Visual Inspection

Check standard: no breakage, damage.

4.2.2 Insulation Resistance Test

Testmethod: Measure insulation resistance of all leads to shell of the sample applied 500VDC by Insulation Resistance Meter.

Check standard: $\geq 50M\Omega$.

4.2.3 Dielectric Strength Test

Testmethod: All leads to shell of the sample applied 1000V/50Hz voltage within 60s.

Check standard: leakagecurrent $\leq 1mA$, no breakdown and flashover phenomenon.

The sample of camera visual inspection, insulation resistance test and dielectric strength test results referring to Table 1.

Table 1: The sample of camera performance test results

Product Name	Camera		Product NO.	/
Conclusion	Meet Check standard		Remarks	/
NO	Test Item		Check standard	Test record
1	Visual Inspection		no breakage, damage.	Pass
2	Insulation Resistance	all lead - shell	$\geq 50M\Omega$	Pass
3	Dielectric Strength	all lead - shell	$\leq 1mA$ (1000V/50Hz)	Pass

4.2.4 Low Temperature Test

Test Requirement:

The sample is placed in the Environment Test Chamber (the mounting see the Figure 1);

Storage time at -25°C for 2h;

At the end of this period, the sample shall be switched on and check the performance parameter according to 2.2/2.3 Tests require.

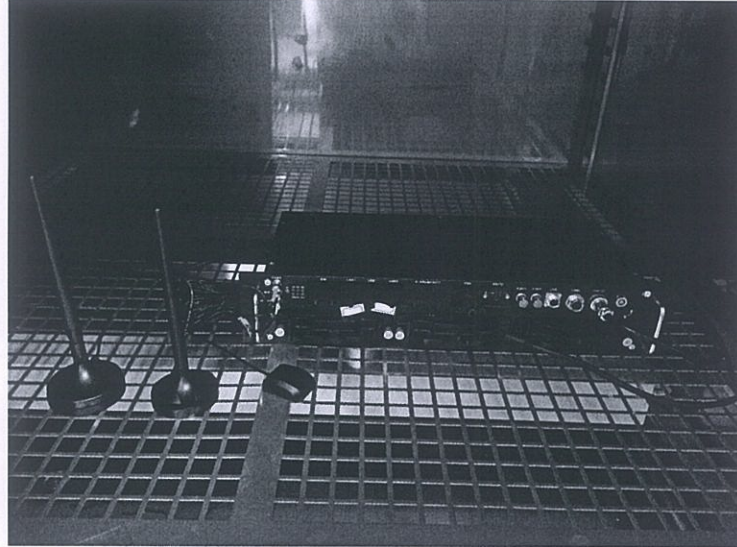


Figure 1: The mounting of the sample in the Environment Test Chamber.

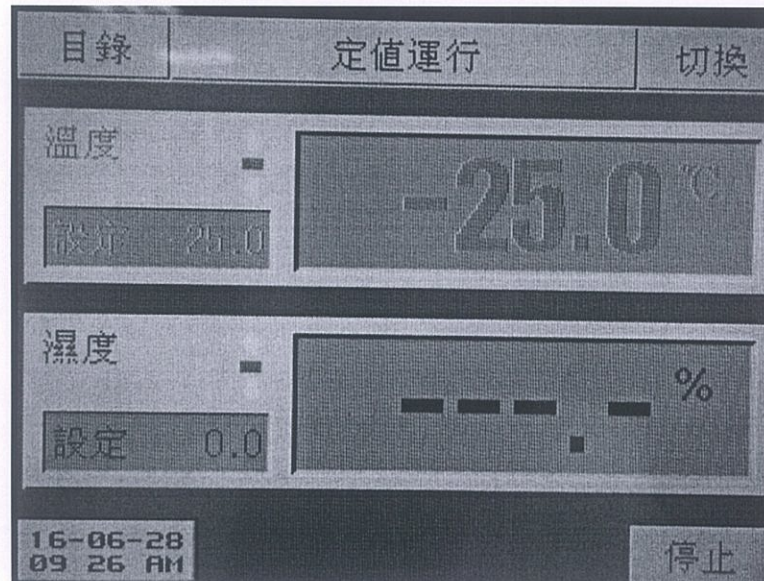


Figure 2: The actual running state of the Environment Test Chamber.

After Low temperature test, the sample of the camera was no deformation, breakage, damage.

4.2.5 Low Temperature Storage Test

Test Requirement:

The sample is placed in the Environment Test Chamber (the mounting see the Figure 3);

Storage time at -40°C for 16h;

After test, check the performance parameter according to 2.2/2.3 Tests require.

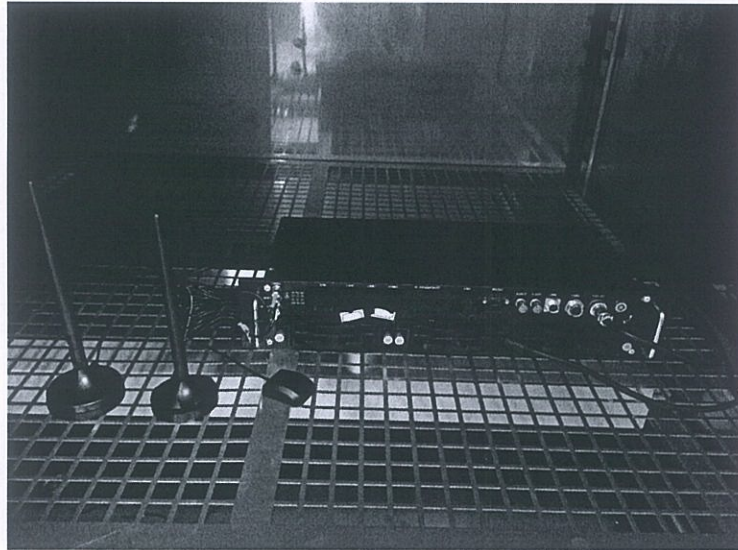


Figure 3: The mounting of the sample in the Environment Test Chamber.

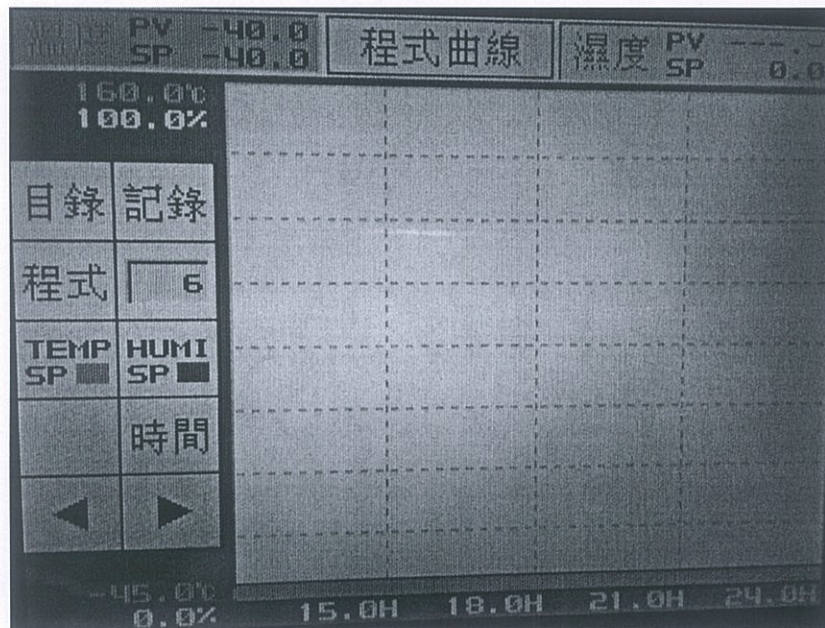


Figure 4: The actual running state of the Environment Test Chamber.

After Low temperature storage test, the sample of the camera was no deformation, breakage, damage.

4.2.6 High Temperature Test

Test Requirement:

The sample with voltage supplied, is placed in the Environment Test Chamber (the mounting see the Figure 5);

Storage time at 70°C for 6h;

At the end of this period, the sample shall be checked the performance parameter according to 2.2/2.3 Tests require.

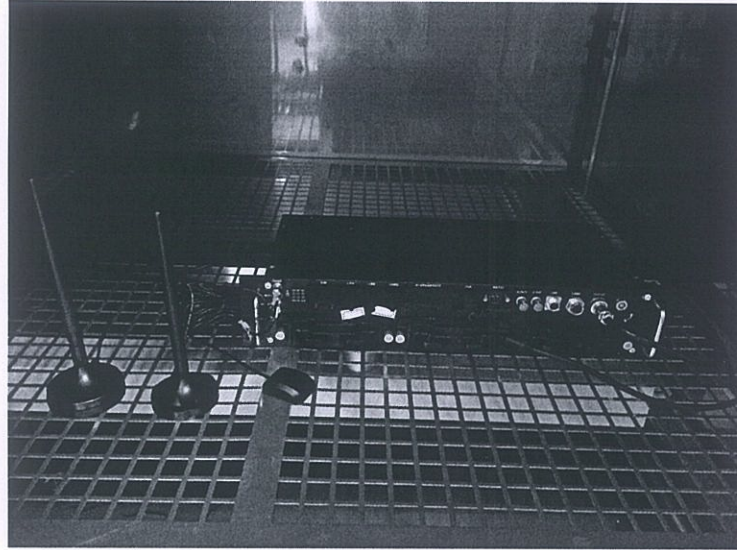


Figure 5: The mounting of the sample in the Environment Test Chamber.

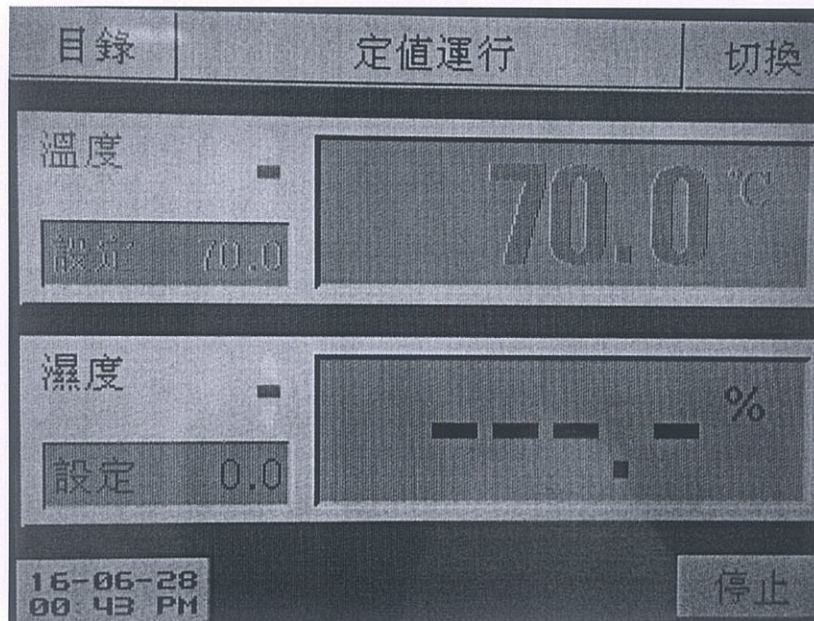


Figure 6: The actual running state of the Environment Test Chamber.

After High temperature test, the sample of the camera was no deformation, breakage, damage.

4.2.7 Damp Heat Cyclic Test

Test Requirement:

The sample is placed in the Environment Test Chamber (the mounting see the Figure 7);

According to EN 60068-2-30, Test Db. Temperature: +55°C and +25°C;

Number of cycle: 2; Time: 48 hours;

At the end of test, the sample shall be checked the performance parameter according to 2.2/2.3 Tests require.

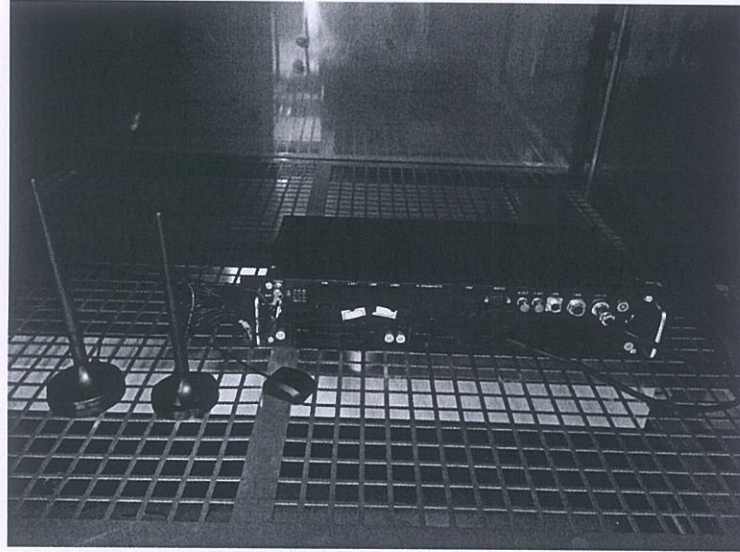


Figure 7: The mounting of the sample in the Environment Test Chamber.

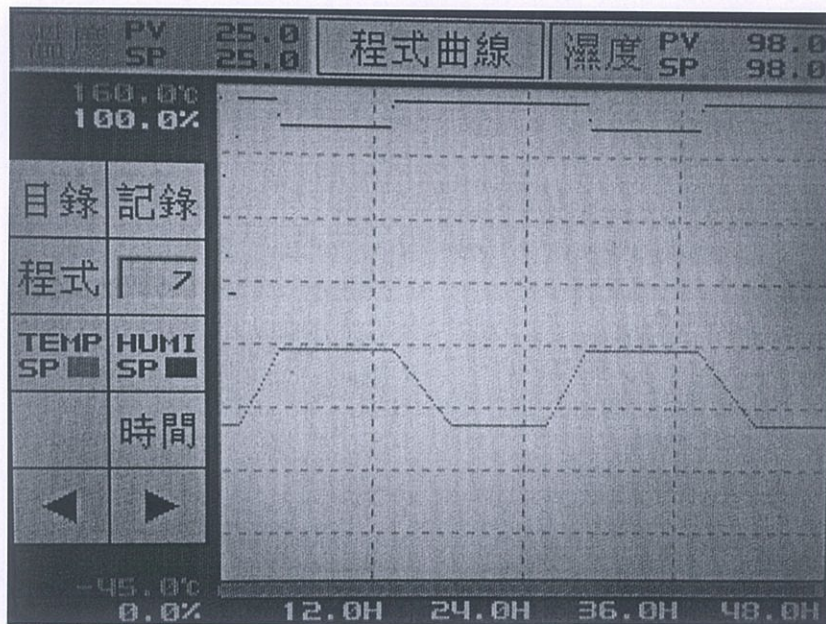


Figure 8: The actual running state of the Environment Test Chamber.

Afterdamp heat cyclic test, the sample of the camera was no deformation, breakage, damage.

4.2.8 Random Vibration Test (Function test)

Test Requirement:

The sample is placed on the vibration test system according to requirement of client in X, Y and Z direction (the mounting see the Figure 9).

The sample with voltage supplied is switched on duration the test.

Do vibration test as following method referring to Table 2:

At the end of test, the sample shall be checked the performanceparameter according to 2.2/2.3 Tests require.

Table 2-1: vibration test conditions

Test conditions	Frequency (Hz)	PSD (g2/Hz)	Slope(dB/oct)
	5	0.00006	/
	20	0.00006	/
	150	/	-6
vibration direction	X direction (see the Figure 9-1)		
Test time	10min		

Table 2-2: vibration test conditions

Test conditions	Frequency (Hz)	PSD (g2/Hz)	Slope(dB/oct)
	5	0.000144	/
	20	0.000144	/
	150	/	-6
vibration direction	Y direction (see the Figure 9-2)		
Test time	10min		

Table 2-3: vibration test conditions

Test conditions	Frequency (Hz)	PSD (g2/Hz)	Slope(dB/oct)
	5	0.000298	/
	20	0.000298	/
	150	/	-6
vibration direction	Z direction (see the Figure 9-3)		
Test time	10min		

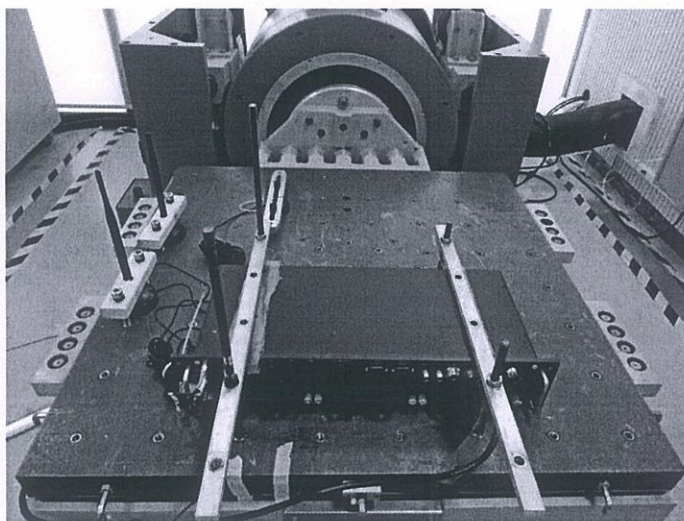


Figure 9-1: The mounting of the sample on the vibration platform in X axis.

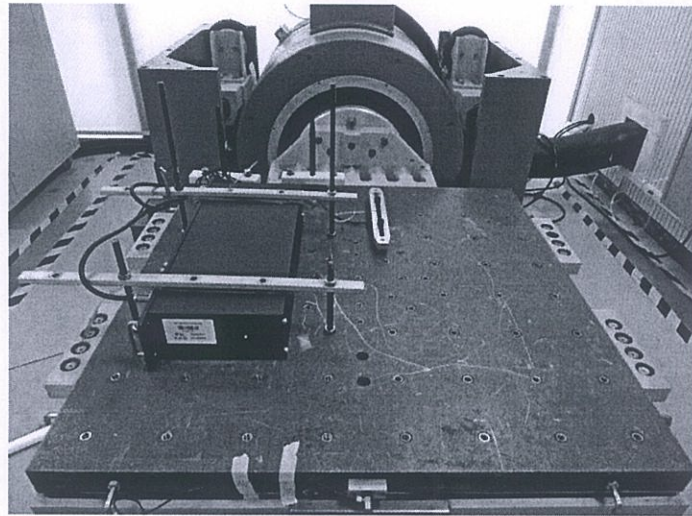


Figure 9-2: The mounting of the sample on the vibration platform in Y axis.

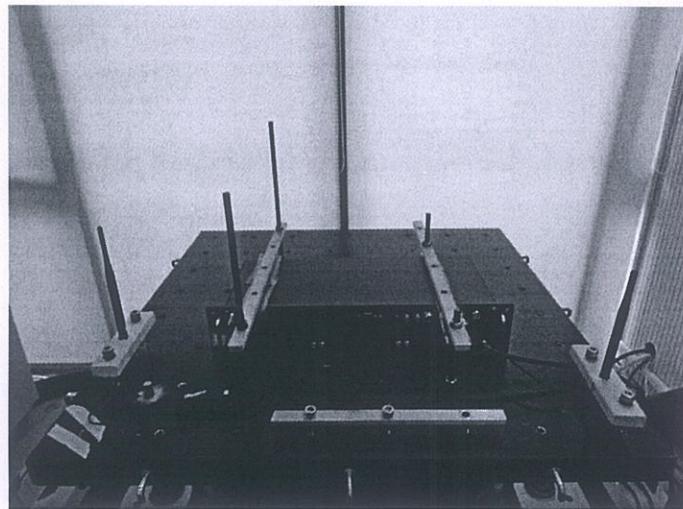


Figure 9-3: The mounting of the sample on the vibration platform in Z axis.

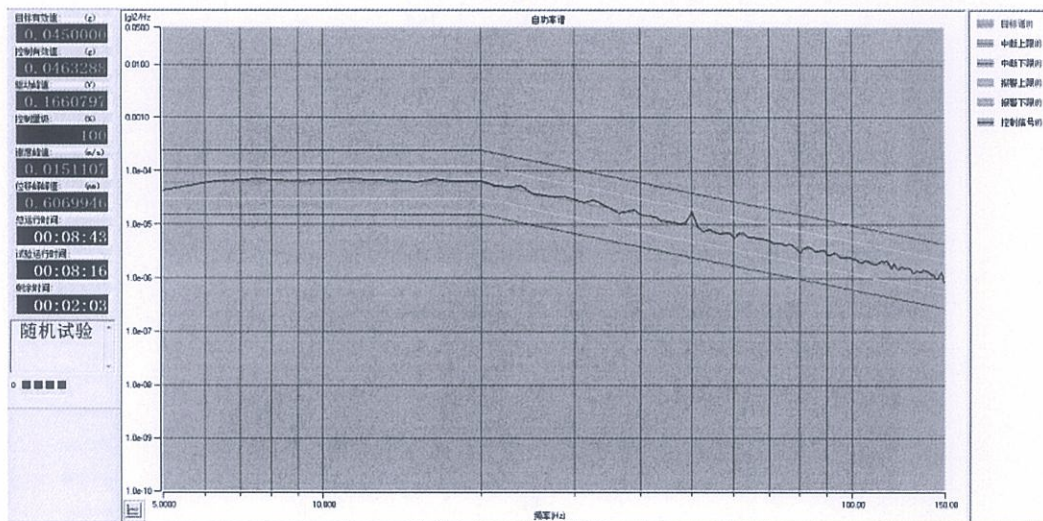


Figure 10-1: The vibration control spectrum in X axis.

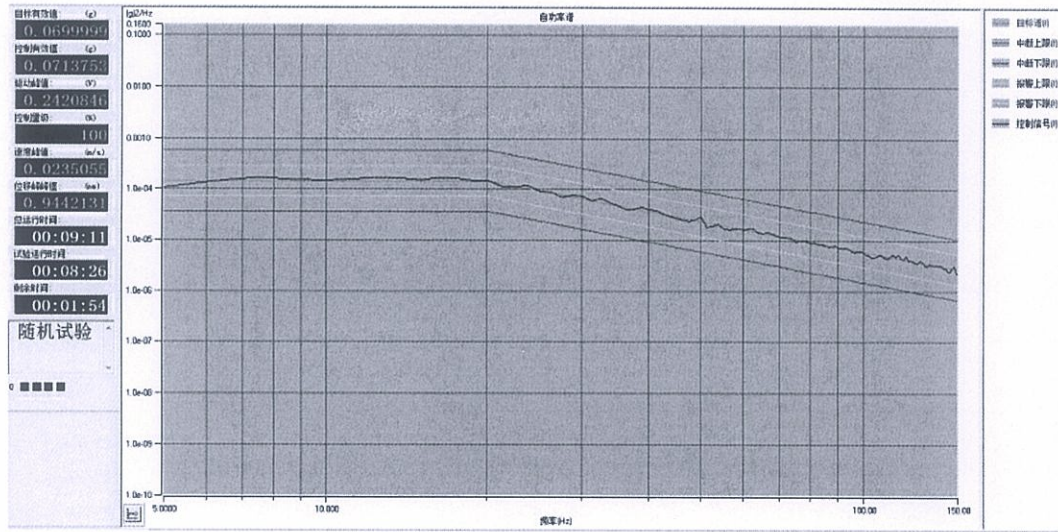


Figure 10-2: The vibration control spectrum in Y axis.

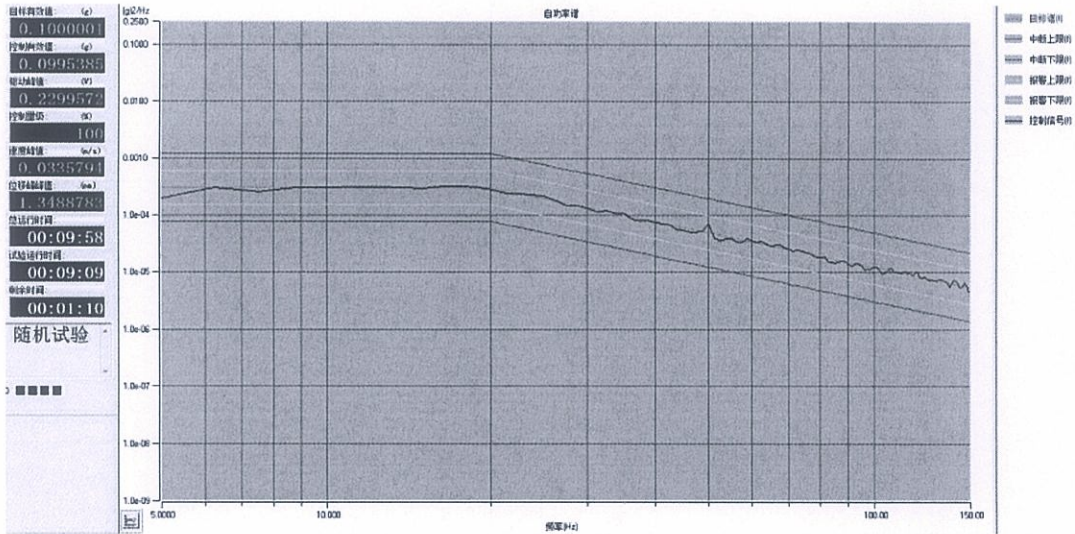


Figure 10-3: The vibration control spectrum in Z axis.

After random vibration test (Function test), the sample of the Orbital Automotive NVR was no deformation, breakage, damage.

4.2.9 Random Vibration Test (Long life test)

Test Requirement:

The sample is placed on the vibration test system according to requirement of client in X, Y and Z direction (the mounting see the Figure 9).

Do vibration test as following method referring to Table 3:

At the end of test, the sample shall be checked the performanceparameter according to 2.2/2.3 Tests require.

Table 3-1: vibration test conditions

Test conditions	Frequency (Hz)	PSD (g ² /Hz)	Slope(dB/oct)
	5	0.00366	/
	20	0.00366	/
	150	/	-6
vibration direction	X direction (see the Figure 9-1)		
Test time	5hours		

Table 3-2: vibration test conditions

Test conditions	Frequency (Hz)	PSD (g ² /Hz)	Slope(dB/oct)
	5	0.00901	/
	20	0.00901	/
	150	/	-6
vibration direction	Y direction (see the Figure 9-2)		
Test time	5hours		

Table 3-3: vibration test conditions

Test conditions	Frequency (Hz)	PSD (g ² /Hz)	Slope(dB/oct)
	5	0.01857	/
	20	0.01857	/
	150	/	-6
vibration direction	Z direction (see the Figure 9-3)		
Test time	5hours		

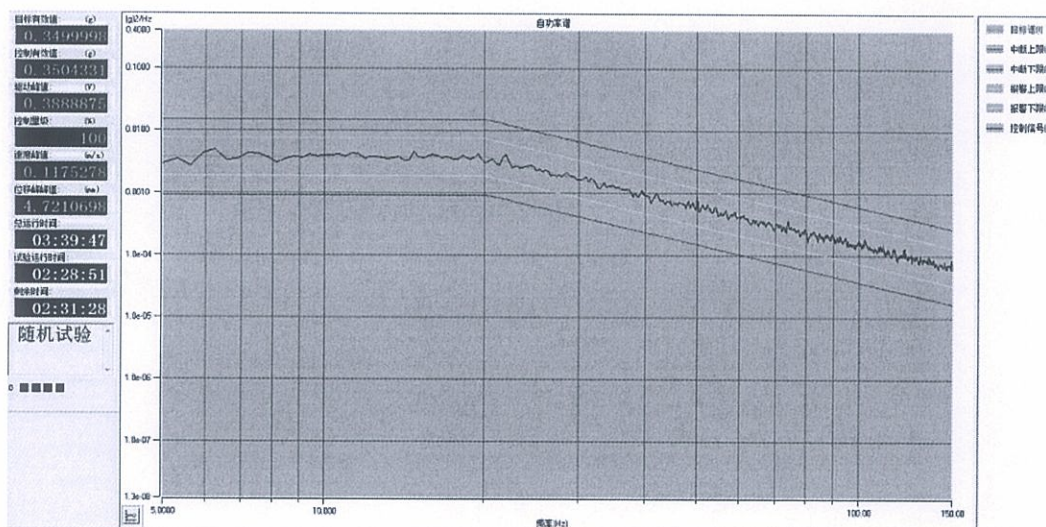


Figure 11-1: The vibration control spectrum in X axis.

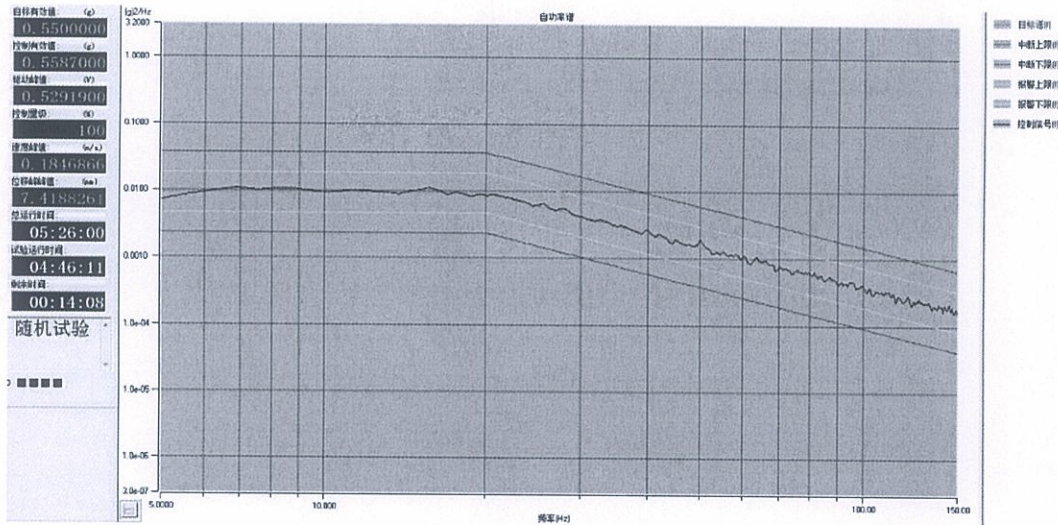


Figure 11-2: The vibration control spectrum in Y axis.

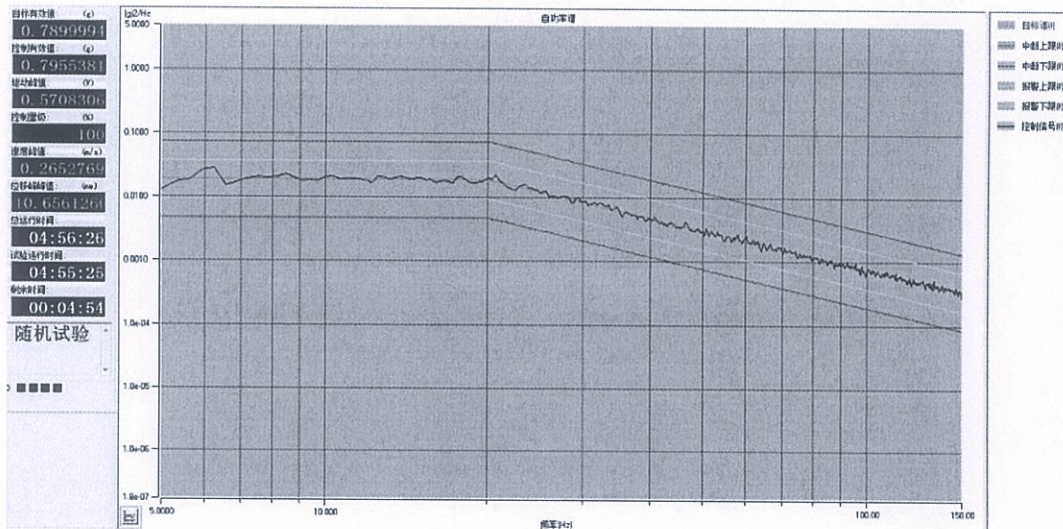


Figure 11-3: The vibration control spectrum in Z axis.

After random vibration test (Function test), the sample of the Orbital Automotive NVR was no deformation, breakage, damage.

4.2.10 Mechanical Shock Test

Test Requirement:

The sample is placed on the vibration test system according to requirement of client in X, Y and Z direction (the mounting see the Figure 9).

Do vibration test as following method referring to Table 4:

At the end of test, the sample shall be checked the performance parameter according to 2.2/2.3 Tests require.

Table 4-1: Mechanical Shock test conditions

Test conditions	Pulse shape	Acceleration amplitude(g)	Shock duration (ms)
		Half sine wave	3
Shock axis	±X direction (see the Figure 9-1)		
Shock times	3times / axis, total 6 times		

Table 4-2: Mechanical Shock test conditions

Test conditions	Pulse shape	Acceleration amplitude(g)	Shock duration (ms)
		Half sine wave	5
Shock axis	±Y direction (see the Figure 9-2)		
Shock times	3times / axis, total 6 times		

Table 4-3: Mechanical Shock test conditions

Test conditions	Pulse shape	Acceleration amplitude(g)	Shock duration (ms)
		Half sine wave	3
Shock axis	±Z direction (see the Figure 9-3)		
Shock times	3times / axis, total 6 times		

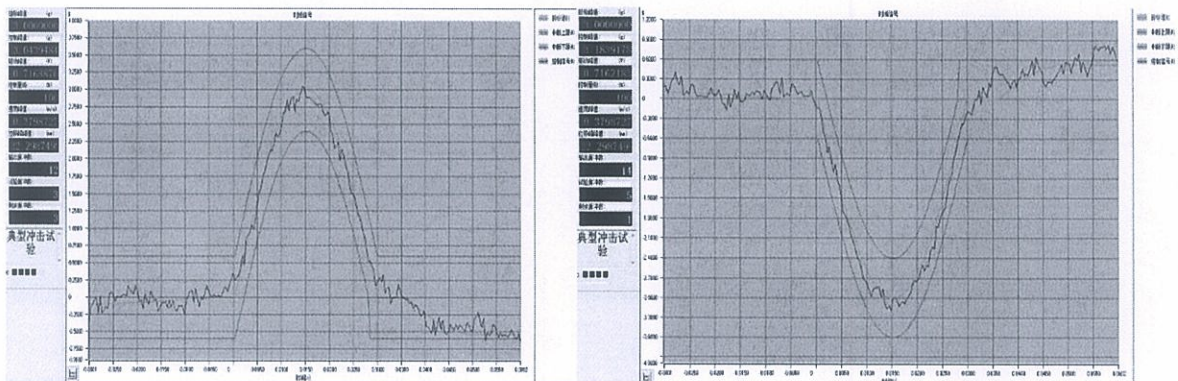


Figure 12-1: The control spectrum of Mechanical Shock Test (±3g 30ms).

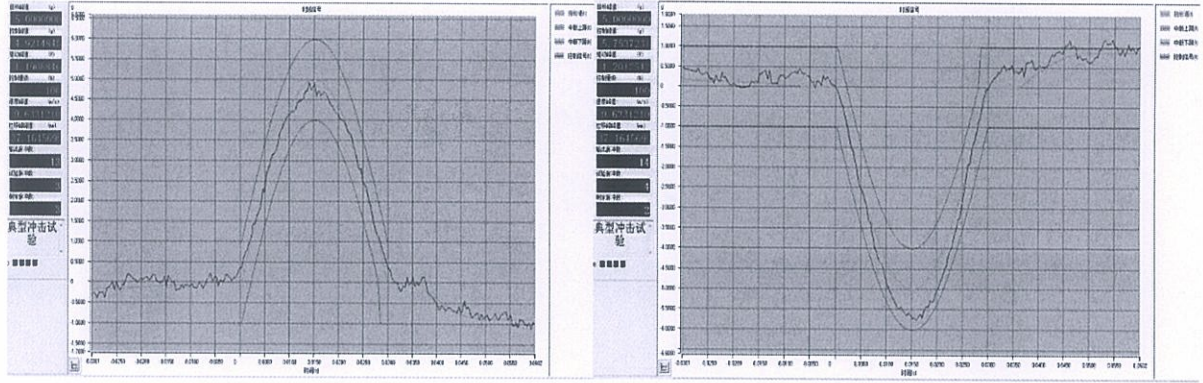


Figure 12-2: The control spectrum of Mechanical Shock Test ($\pm 5g$ 30ms).

After mechanical shock test, the sample of the Orbital Automotive NVR was no deformation, breakage, damage.

END OF THE TEST REPORT