



EMC TEST REPORT

Authorized under **Declaration of Conformity**

According to

- | | |
|-----------------------------------|--------------------------------------|
| EN 55032: 2012+AC: 2013 (Class B) | EN 55024 : 2010 |
| EN 61000-3-2 : 2014 | EN 50130-4: 2011 |
| EN 61000-3-3 : 2013 | IEC 61000-4-2 : 2008 |
| | IEC 61000-4-3 : 2006+A1:2007+A2:2010 |
| | IEC 61000-4-4 : 2012 |
| | IEC 61000-4-5 : 2014 |
| | IEC 61000-4-6 : 2013 |
| | IEC 61000-4-8 : 2009 |
| | IEC 61000-4-11 : 2004 |

- Applicant : Zhejiang Dahua Vision Technology Co., Ltd.
-
- Address : No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China
-
- Equipment : Outdoor Station
-
- Model No. : OEM-VTO1220B, OEM-VTO1220BW, DH-VTO1220B, DH-VTO1220BW, DHI-VTO1220B, VTO1220B, DHI-VTO1220BW, VTO1220BW
-

I HEREBY CERTIFY THAT :

The sample was received on Aug. 03, 2016 and the testing was carried out on Sep. 24, 2016 at CerpPASS Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.



EMC TEST REPORT

Issued by:

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The test record, data evaluation & Equipment Under Test configurations represented herein are true and accurate accounts of the measurements of the samples EMC characteristics under the conditions specified in this report.

The above equipment was tested by CerpPASS Technology Corp. for compliance with the requirements of technical standards specified above under the EMC Directive **2014/30/EU**. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties

Approved by:

Miro Chueh

EMC/RF B.U. Manager

Laboratory Accreditation:

CerpPASS Technology Corporation Test Laboratory

NVLAP LAB Code:	200954-0
TAF LAB Code:	1439

CerpPASS Technology(SuZhou) Co., Ltd.

NVLAP LAB Code:	200814-0
CNAS LAB Code:	L5515



Contents

1. Summary of Test Procedure and Test Results	6
2. Immunity Testing Performance Criteria Definition	7
3. Test Configuration of Equipment under Test	8
3.1. Feature of Equipment under Test.....	8
3.2. Test Manner	8
3.3. Description of Support Unit	9
3.4. General Information of Test.....	10
3.5. Measurement Uncertainty	11
4. Test of Conducted Emission	13
4.1. Test Limit	13
4.2. Test Procedures	16
4.3. Typical Test Setup	16
4.4. Measurement Equipment.....	17
4.5. Test Result and Data	18
4.6. Test Photographs of Power Port	26
4.7. Test Photographs of Telecommunication Port.....	27
5. Test of Radiated Emission	28
5.1. Test Limit	28
5.2. Test Procedures	31
5.3. Typical Test Setup	31
5.4. Measurement Equipment.....	32
5.5. Test Result and Data (30MHz ~ 1GHz).....	33
5.6. Test Result and Data (1GHz ~ 6GHz).....	37
5.7. Test Photographs (30MHz~1GHz)	41
5.8. Test Photographs (1GHz~6GHz)	42
6. Harmonics Test	43
6.1. Limits of Harmonics Current Measurement	43
6.2. Measurement equipment	44
6.3. Test Result and Data	45
6.4. Test Photographs	47
7. Voltage Fluctuations Test	48
7.1. Test Procedure	48
7.2. Measurement Equipment.....	48
7.3. Test Result and Data	49
7.4. Test Photographs	51
8. Electrostatic Discharge Immunity Test	52
8.1. Test Procedure	52
8.2. Test Setup for Tests Performed in Laboratory.....	53
8.3. Test Severity Levels	54
8.4. Measurement Equipment.....	54
8.5. Test Result and Data	55
8.6. Test Photographs	57
9. Radio Frequency electromagnetic field immunity test	61



- 9.1. Test Procedure 61
- 9.2. Test Severity Levels 61
- 9.3. TEST SETUP 62
- 9.4. Measurement Equipment..... 63
- 9.5. Test Result and Data..... 64
- 9.6. Test Photographs 66
- 10. Electrical Fast Transient/ Burst Immunity Test 67**
 - 10.1. Test Procedure 67
 - 10.2. Test Severity Levels 67
 - 10.3. TEST SETUP 68
 - 10.4. Measurement Equipment..... 69
 - 10.5. Test Result and Data..... 70
 - 10.6. Test Photographs 72
- 11. Surge Immunity Test..... 74**
 - 11.1. Test Procedure 74
 - 11.2. Test Severity Level 74
 - 11.3. TEST SETUP 75
 - 11.4. Measurement Equipment..... 75
 - 11.5. Test Result and Data..... 76
 - 11.6. Test Photographs 80
- 12. Conduction Disturbances induced by Radio-Frequency Fields 81**
 - 12.1. Test Procedure 81
 - 12.2. Test Severity Levels 81
 - 12.3. TEST SETUP 82
 - 12.4. Measurement Equipment..... 82
 - 12.5. Test Result and Data..... 83
 - 12.6. Test Photographs 85
- 13. Power Frequency Magnetic Field Immunity Test..... 86**
 - 13.1. Test Setup 86
 - 13.2. Test Severity Levels 86
 - 13.3. Measurement Equipment..... 86
 - 13.4. Test Result and Data..... 87
 - 13.5. Test Photographs 88
- 14. Voltage Dips and Voltage Interruptions Immunity Test Setup 89**
 - 14.1. Test Conditions..... 89
 - 14.2. TEST SETUP 89
 - 14.3. Measurement Equipment..... 89
 - 14.4. Test Result and Data..... 90
 - 14.5. Test Photographs 92
- 15. EUT Photographs 93**



1. Summary of Test Procedure and Test Results

EMISSION[EN 55032: 2012+AC: 2013]			
Standard	Item	Result	Remarks
EN 55032: 2012+AC: 2013	Conducted (Power Port)	PASS	Meet Class B Limit Minimum passing margin(AV) is -8.81 dB at 16.2300MHz
	Conducted (Telecom port)	PASS	Meets Class B Limit Minimum passing margin(AV) is -10.47 dB at 16.2300MHz
	Radiated	PASS	Meets Class B Limit Minimum passing margin(QP) is -3.59 dB at 144.4600MHz
EN 61000-3-2: 2014	Harmonic current emissions	PASS	Meet Class A Limit
EN61000-3-3: 2013	Voltage fluctuations & flicker	PASS	Meets the requirements

IMMUNITY[EN 55024:2010]			
Standard	Item	Result	Remarks
IEC 61000-4-2: 2008	ESD	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2006+A1:2007+A2:2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5: 2014	Surge	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6: 2013	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8: 2009	PFMF	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11: 2004	Voltage dips & voltage variations	PASS	Meets the requirements of Voltage Dips: 1) >95% reduction Performance Criterion A 2) 30% reduction Performance Criterion A Voltage Interruptions: 1) >95% reduction Performance Criterion C



IMMUNITY[EN 50130-4: 2011]			
Standard	Item	Result	Remarks
IEC 61000-4-2: 2008	ESD	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2006+A1:2007+A2:2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5: 2014	Surge	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6: 2013	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11: 2004	Voltage dips & voltage variations	PASS	Meets the requirements of Voltage Dips: 1) >95% reduction Performance Criterion A 2) 30% reduction Performance Criterion A Voltage Interruptions: 1) >95% reduction Performance Criterion C

2. Immunity Testing Performance Criteria Definition

- A. Normal performance within limits specified by the manufacture, requestor or purchaser;
- B. Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;
- C. Temporary loss of function or degradation of performance, the correction of which requires operation intervention;
- D. Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data.



3. Test Configuration of Equipment under Test

3.1. Feature of Equipment under Test

Product Name:	Outdoor Station	
Model Name:	DH-VTO1220B, OEM-VTO1220B, DH-VTO1220BW, OEM-VTO1220BW, DHI-VTO1220B, VTO1220B, DHI-VTO1220BW, VTO1220BW	
Model Discrepancy:	1) DH-VTO1220B was selected as the test models and its data have been recorded in this report. 2) These models are similar except for hardware, structure, software and label.	
Adapter	Model No.:	ADS-12B-1212012Gz
	INPUT:	100-240V~ 50/60Hz Max. 0.3A
	OUTPUT:	12V, 1.0A

3.2. Test Manner

- a. During testing, the interface cables and equipment positions were varied according to Europe Standard EN55032 Class B.
- b. Turn on the power of all equipment.
- c. The complete test system included Notebook PC-01, Notebook PC-02 and EUT for EMI&EMS test
- d. The test mode of CE/RE as follow:

Mode 1 Normal Operation(110V/60Hz)

Mode 2 Normal Operation(230V/50Hz)

The "Test Mode 1,2" was reported as final data.

The test mode of ISN as follow:

Mode 1 Normal Operation(LAN1 100Mbps) (110V/60Hz)

Mode 2 Normal Operation(LAN1 100Mbps) (230V/50Hz)

Mode 3 Normal Operation(LAN2 100Mbps) (110V/60Hz)

Mode 4 Normal Operation(LAN2 100Mbps) (230V/50Hz)

The "Test Mode 1,2,3,4" were reported as final data.

The test mode of H&F/EMS as follow:

Mode 1 Normal Operation

The "Test Mode 1" were reported as final data.



3.3. Description of Support Unit

No.	Device	Manufacturer	Model No.	Description
1	Notebook PC-01	SONY	PCG-71811P	Non-Shielded,1.5m (R33021)
2	Notebook PC-02	SONY	PCG-71811P	Non-Shielded,1.5m (R33021)

Use Cable:

No.	Cable	Quantity	Description
A	LAN Cable	1	Non-Shielded, >3.0m
B	LAN Cable	1	Non-Shielded, >3.0m



3.4. General Information of Test

<input type="checkbox"/>	Test Site	<p>CerpPASS Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582</p>
	FCC	TW1079, TW1061,390316, 228391, 641184
	IC	4934B-1, 4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-3428, R-4218 for Radiated emission test G-812, G-813 for radiated disturbance above 1GHz
<input checked="" type="checkbox"/>	Test Site	<p>CerpPASS Technology (Suzhou) Co.,Ltd Address: No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China Tel: +86-512-6917-5888 Fax: +86-512-6917-5666</p>
	FCC	331395
	IC	7290A-1, 7290A-2
	VCCI	T-1945 for Telecommunication Test C-2919 for Conducted emission test R-2670 for Radiated emission test G-227 for radiated disturbance above 1GHz
Frequency Range Investigated:		Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 6000MHz
Test Distance :		The test distance of radiated emission below 1GHz from antenna to EUT is 10 M. The test distance of radiated emission above 1GHz from antenna to EUT is 3 M.



3.5. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions(LINE)	9KHz-30MHz	+/- 0.7738 dB
Conducted emissions(NEUTRAL)	9KHz-30MHz	+/- 0.7886 dB
Conducted emissions(10Mbps)	150KHz-30MHz	+/- 1.3013dB
Conducted emissions(100Mbps)	150KHz-30MHz	+/- 1.3197 dB
Conducted emissions(1000Mbps)	150KHz-30MHz	+/- 1.2987 dB

Measurement	Polarity	Frequency	Uncertainty
Radiated emissions (below 1GHz)	H	30MHz ~ 200MHz	+/- 3.8909dB
		200MHz ~1000MHz	+/- 3.6555dB
	V	30MHz ~ 200MHz	+/- 3.8948dB
		200MHz ~1000MHz	+/- 3.6538dB
Radiated emissions (above 1GHz)	H	1000MHz ~18000MHz	+/- 3.8948 dB
		18000MHz ~40000MHz	+/-3.8844dB
	V	1000MHz ~18000MHz	+/- 3.8906dB
		18000MHz ~40000MHz	+/- 3.8744dB

Measurement	Uncertainty
ESD—Rise time tr	10%
ESD—Peak current Ip	6%
ESD—Current at 30 ns	6%
ESD—Current at 60 ns	6%
ESD- Charging voltage	1%
RS above 1GHz	±2.37dB
RS under 1GHz	±3.83dB
EFT—Rise time tr	4%
EFT—Peak current Ip	4%



EFT—Current	4%
Surge—Rise time tr	4%
Surge—Peak current Ip	4%
Surge—Current	4%
CS-CND	±0.80dB
CS-Clamp	±1.06dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22: 2008, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.



4. Test of Conducted Emission

4.1. Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in European Standard EN 55032.

Table A.8 – Requirements for conducted emissions from the AC mains power ports of Class A equipment

Applicable to				
1. AC mains power ports (3.1.1)				
Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class A limits dB(μ V)
A8.1	0,15 – 0,5	AMN	Quasi Peak / 9 kHz	79
	0,5 – 30			73
A8.2	0,15 – 0,5	AMN	Average / 9 kHz	66
	0,5 – 30			60

NOTE Apply A8.1 and A8.2 across the entire frequency range.

Table A.9 – Requirements for conducted emissions from the AC mains power ports of Class B equipment

Applicable to				
1. AC mains power ports (3.1.1)				
Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class B limits dB(μ V)
A9.1	0,15 – 0,5	AMN	Quasi Peak / 9 kHz	66 – 56
	0,5 – 5			56
	5 – 30			60
A9.2	0,15 – 0,5	AMN	Average / 9 kHz	56 – 46
	0,5 – 5			46
	5 – 30			50

NOTE Apply A9.1 and A9.2 across the entire frequency range.



Table A.10 – Requirements for asymmetric mode conducted emissions from Class A equipment

Applicable to					
1. wired network ports (3.1.30) 2. optical fibre ports (3.1.24) with metallic shield or tension members 3. antenna ports (3.1.3)					
Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class A voltage limits dB(μV)	Class A current limits dB(μA)
A10.1	0,15 – 0,5	AAN	Quasi Peak / 9 kHz	97 – 87	n/a
	0,5 – 30			87	
	0,15 – 0,5	AAN	Average / 9 kHz	84 – 74	
	0,5 – 30			74	
A10.2	0,15 – 0,5	CVP and current probe	Quasi Peak / 9 kHz	97 – 87	53 – 43
	0,5 – 30			87	43
	0,15 – 0,5	CVP and current probe	Average / 9 kHz	84 – 74	40 – 30
	0,5 – 30			74	30
A10.3	0,15 – 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	53 – 43
	0,5 – 30				43
	0,15 – 0,5	Current Probe	Average / 9 kHz		40 – 30
	0,5 – 30				30
NOTE 1 The choice of coupling device and measurement procedure is defined in Annex C. NOTE 2 AC mains power ports shall meet the limits given in Table A.8. NOTE 3 The test shall cover the entire frequency range. NOTE 4 The application of the voltage and/or current limits is dependent on the measurement procedure used. Refer to Table C.1 for applicability. NOTE 5 Testing is required at only one EUT supply voltage and frequency. NOTE 6 Applicable to ports listed above and intended to connect to cables longer than 3 m.					



Table A.11 – Requirements for asymmetric mode conducted emissions from Class B equipment

Applicable to					
1. wired network ports (3.1.30) 2. optical fibre ports (3.1.24) with metallic shield or tension members 3. broadcast receiver tuner ports (3.1.8) 4. antenna ports (3.1.3)					
Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
A11.1	0,15 – 0,5	AAN	Quasi Peak / 9 kHz	84 – 74	n/a
	0,5 – 30			74	
	0,15 – 0,5	AAN	Average / 9 kHz	74 – 64	
	0,5 – 30			64	
A11.2	0,15 – 0,5	CVP and current probe	Quasi Peak / 9 kHz	84 – 74	40 – 30
	0,5 – 30			74	30
	0,15 – 0,5	CVP and current probe	Average / 9 kHz	74 – 64	30 – 20
	0,5 – 30			64	20
A11.3	0,15 – 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	40 – 30
	0,5 – 30				30
	0,15 – 0,5	Current Probe	Average / 9 kHz		30 – 20
	0,5 – 30				20
<p>NOTE 1 The choice of coupling device and measurement procedure is defined in Annex C.</p> <p>NOTE 2 Screened ports including TV broadcast receiver tuner ports are tested with a common-mode impedance of 150 Ω. This is typically accomplished with the screen terminated by 150 Ω to earth.</p> <p>NOTE 3 AC mains power ports shall meet the limits given in Table A.9.</p> <p>NOTE 4 The test shall cover the entire frequency range.</p> <p>NOTE 5 The application of the voltage and/or current limits is dependent on the measurement procedure used. Refer to Table C.1 for applicability.</p> <p>NOTE 6 Testing is required at only one EUT supply voltage and frequency.</p> <p>NOTE 7 Applicable to ports listed above and intended to connect to cables longer than 3 m.</p>					



4.4. Measurement Equipment

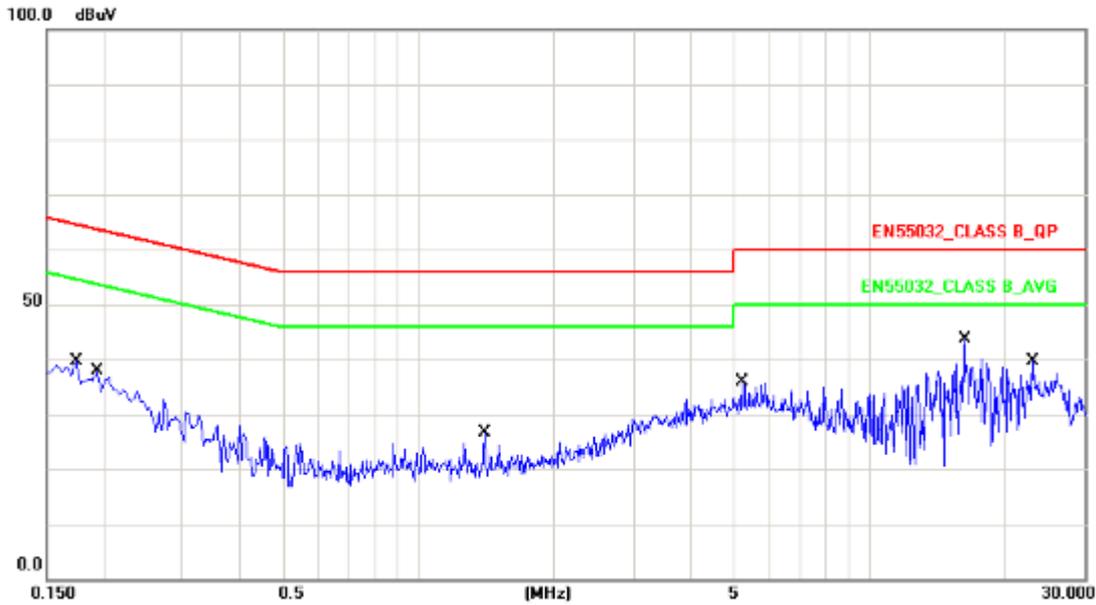
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100565	2016.07.07	2017.07.06
AMN	R&S	ESH2-Z5	100182	2016.08.31	2017.08.30
Two-Line V-Network	R&S	ENV216	100325	/	/
ISN	FCC	FCC-TLISN-T2-02	20379	2016.03.26	2017.03.25
ISN	FCC	FCC-TLISN-T4-02	20380	2016.06.24	2017.06.24
ISN	FCC	FCC-TLISN-T8-02	20381	2016.03.26	2017.03.25
ISN	TESEQ	ISN ST08	30175	2016.03.26	2017.03.25
Current Probe	R&S	EZ-17	100303	2016.03.26	2017.03.25
Passive Voltage Probe	R&S	ESH2-Z3	100026	2016.03.26	2017.03.25
Pulse Limiter	R&S	ESH3-Z2	100529	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2016.03.29	2017.03.28
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A



4.5. Test Result and Data

4.5.1 Conducted Emission for Power Port Test Data

Test Mode :	Mode 1: Normal Operation(110V/60Hz)		
AC Power :	AC 110V/60Hz	Phase :	LINE
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03

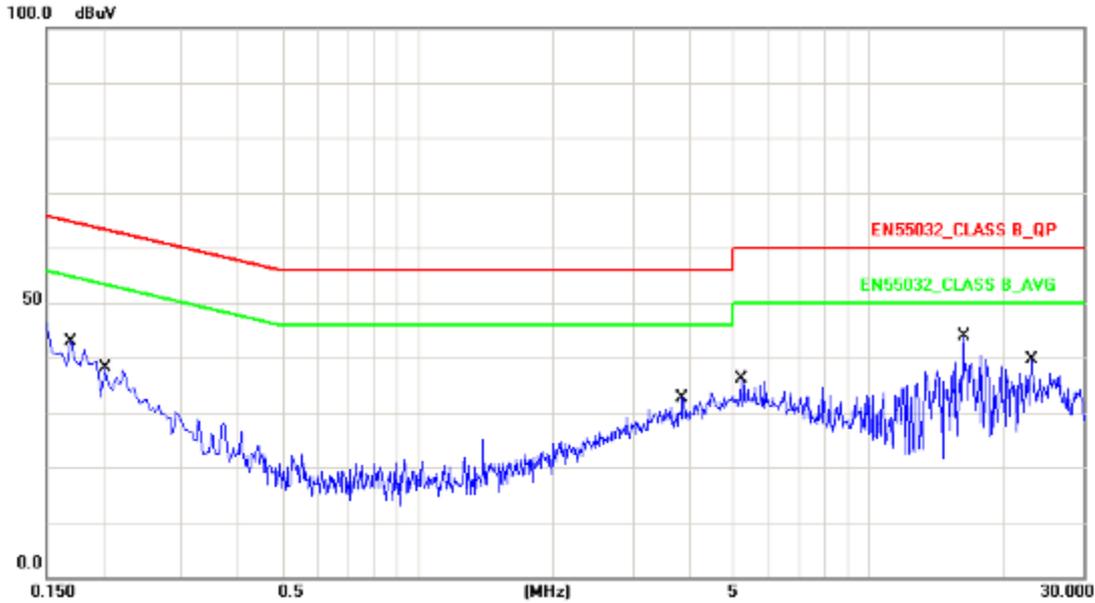


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1740	10.24	22.34	32.58	64.76	-32.18	QP
2	0.1740	10.24	3.96	14.20	54.76	-40.56	AVG
3	0.1940	10.25	21.87	32.12	63.86	-31.74	QP
4	0.1940	10.25	4.24	14.49	53.86	-39.37	AVG
5	1.4100	10.30	11.55	21.85	56.00	-34.15	QP
6	1.4100	10.30	9.68	19.98	46.00	-26.02	AVG
7	5.2380	10.29	22.76	33.05	60.00	-26.95	QP
8	5.2380	10.29	18.88	29.17	50.00	-20.83	AVG
9	16.2300	10.41	32.48	42.89	60.00	-17.11	QP
10	16.2300	10.41	30.66	41.07	50.00	-8.93	AVG
11	23.1299	10.49	27.86	38.35	60.00	-21.65	QP
12	23.1299	10.49	25.09	35.58	50.00	-14.42	AVG

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 1: Normal Operation(110V/60Hz)		
AC Power :	AC 110V/60Hz	Phase :	NEUTRAL
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03

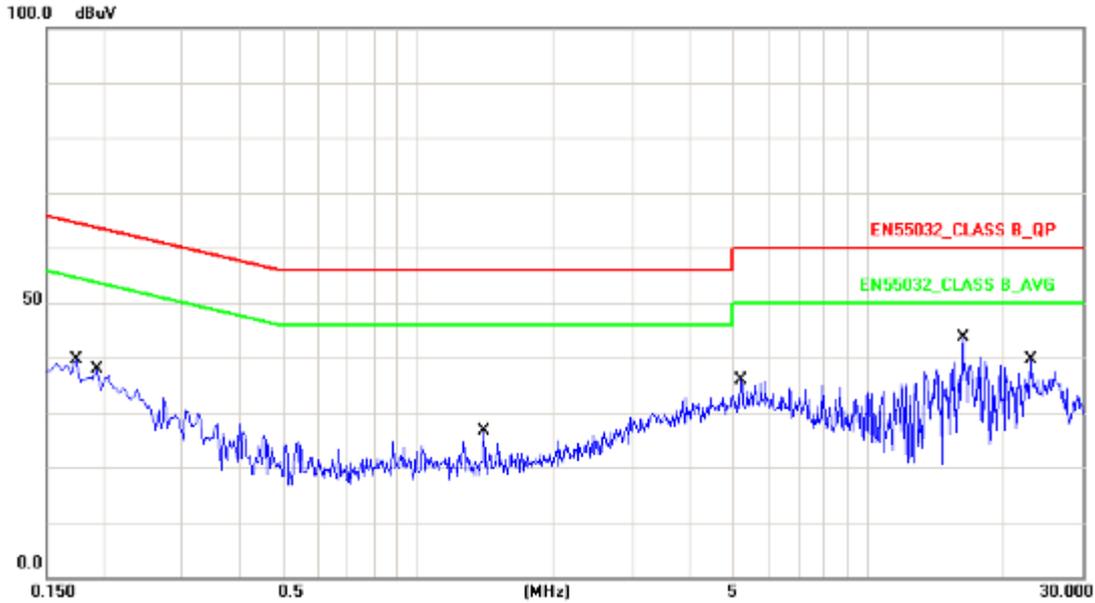


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	10.20	24.80	35.00	64.96	-29.96	QP
2	0.1700	10.20	5.33	15.53	54.96	-39.43	AVG
3	0.2020	10.21	19.82	30.03	63.52	-33.49	QP
4	0.2020	10.21	2.37	12.58	53.52	-40.94	AVG
5	3.8620	10.53	16.02	26.55	56.00	-29.45	QP
6	3.8620	10.53	9.50	20.03	46.00	-25.97	AVG
7	5.2380	10.55	22.34	32.89	60.00	-27.11	QP
8	5.2380	10.55	18.44	28.99	50.00	-21.01	AVG
9	16.2300	10.73	32.21	42.94	60.00	-17.06	QP
10	16.2300	10.73	30.46	41.19	50.00	-8.81	AVG
11	23.1299	10.83	28.19	39.02	60.00	-20.98	QP
12	23.1299	10.83	25.39	36.22	50.00	-13.78	AVG

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(230V/50Hz)		
AC Power :	AC 230V/50Hz	Phase :	LINE
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03

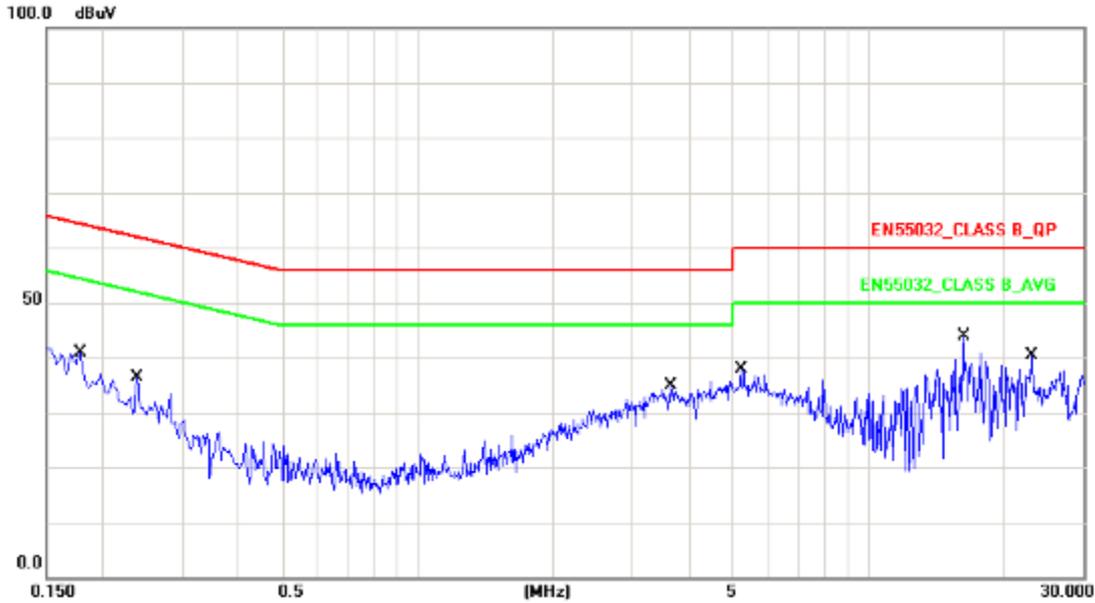


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1740	10.24	22.34	32.58	64.76	-32.18	QP
2	0.1740	10.24	3.96	14.20	54.76	-40.56	AVG
3	0.1940	10.25	21.87	32.12	63.86	-31.74	QP
4	0.1940	10.25	4.24	14.49	53.86	-39.37	AVG
5	1.4100	10.30	11.55	21.85	56.00	-34.15	QP
6	1.4100	10.30	9.68	19.98	46.00	-26.02	AVG
7	5.2380	10.29	22.76	33.05	60.00	-26.95	QP
8	5.2380	10.29	18.88	29.17	50.00	-20.83	AVG
9	16.2300	10.41	32.48	42.89	60.00	-17.11	QP
10	16.2300	10.41	30.66	41.07	50.00	-8.93	AVG
11	23.1299	10.49	27.86	38.35	60.00	-21.65	QP
12	23.1299	10.49	25.09	35.58	50.00	-14.42	AVG

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(230V/50Hz)		
AC Power :	AC 230V/50Hz	Phase :	NEUTRAL
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1780	10.20	22.77	32.97	64.57	-31.60	QP
2	0.1780	10.20	3.46	13.66	54.57	-40.91	AVG
3	0.2380	10.23	16.09	26.32	62.16	-35.84	QP
4	0.2380	10.23	0.00	10.23	52.16	-41.93	AVG
5	3.6500	10.53	17.71	28.24	56.00	-27.76	QP
6	3.6500	10.53	9.00	19.53	46.00	-26.47	AVG
7	5.2340	10.55	22.39	32.94	60.00	-27.06	QP
8	5.2340	10.55	17.55	28.10	50.00	-21.90	AVG
9	16.2300	10.73	32.21	42.94	60.00	-17.06	QP
10	16.2300	10.73	30.44	41.17	50.00	-8.83	AVG
11	23.1299	10.83	28.15	38.98	60.00	-21.02	QP
12	23.1299	10.83	25.37	36.20	50.00	-13.80	AVG

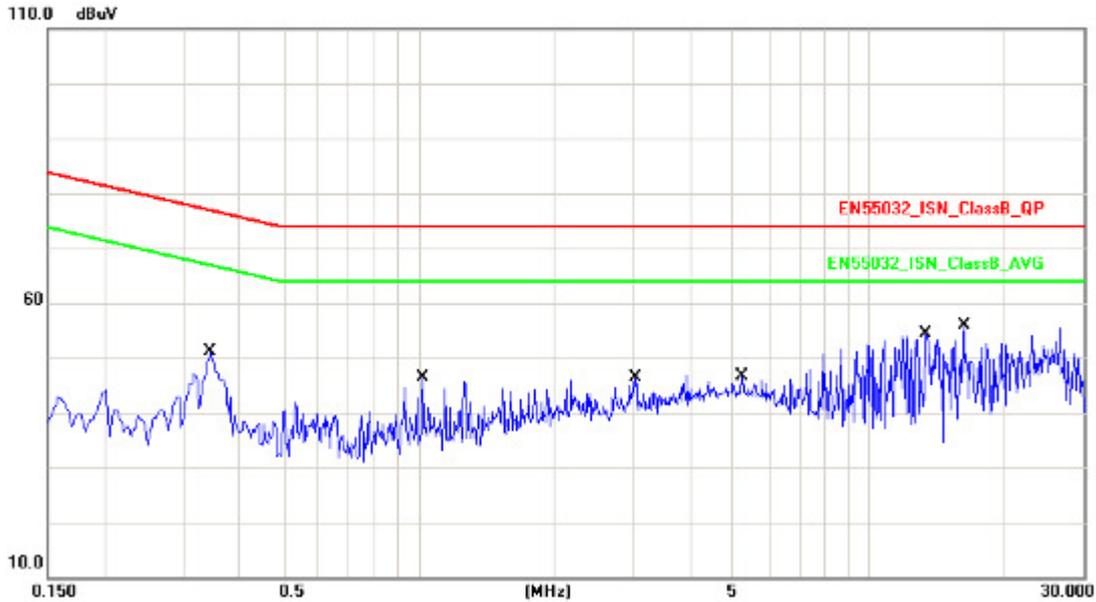
Note: Measurement Level = Reading Level + Correct Factor

Test engineer: *Sun Zhang*



4.5.2 Conducted Emission for Telecommunication Port Test Data

Test Mode :	Mode 1: Normal Operation(LAN1 100Mbps) (110V/60Hz)		
AC Power :	AC 110V/60Hz	Phase :	100Mbps
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03

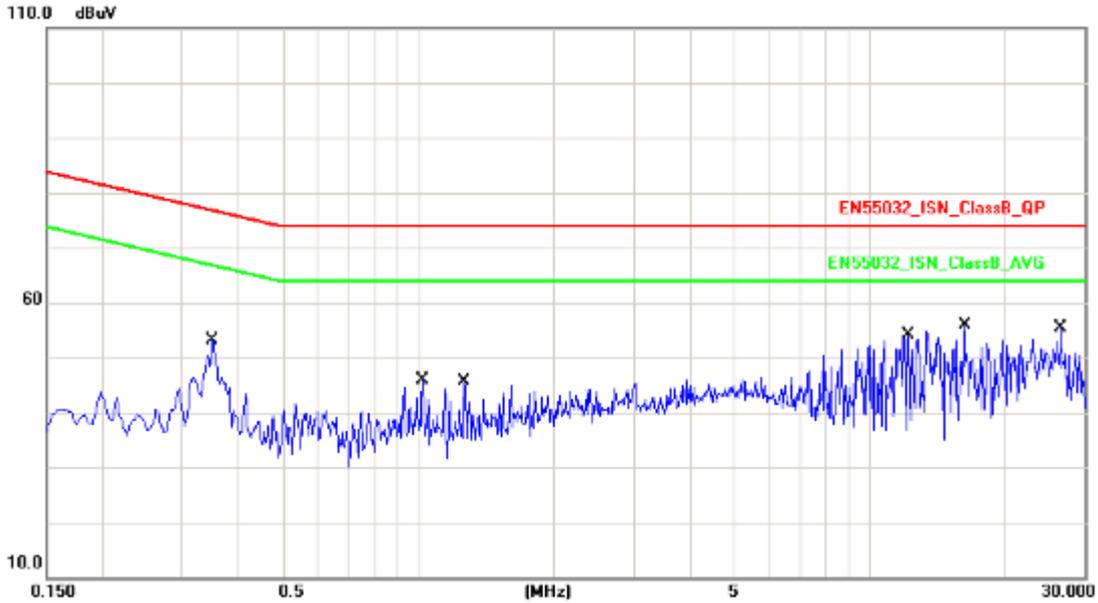


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3460	19.62	28.29	47.91	77.06	-29.15	QP
2	0.3460	19.62	18.67	38.29	67.06	-28.77	AVG
3	1.0220	19.30	24.77	44.07	74.00	-29.93	QP
4	1.0220	19.30	21.48	40.78	64.00	-23.22	AVG
5	3.0380	19.37	24.13	43.50	74.00	-30.50	QP
6	3.0380	19.37	20.48	39.85	64.00	-24.15	AVG
7	5.2340	19.67	21.88	41.55	74.00	-32.45	QP
8	5.2340	19.67	16.56	36.23	64.00	-27.77	AVG
9	13.3580	19.37	34.46	53.83	74.00	-20.17	QP
10	13.3580	19.37	31.97	51.34	64.00	-12.66	AVG
11	16.2300	19.33	35.81	55.14	74.00	-18.86	QP
12	16.2300	19.33	34.17	53.50	64.00	-10.50	AVG

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(LAN1 100Mbps) (230V/50Hz)		
AC Power :	AC 230V/50Hz	Phase :	100Mbps
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03

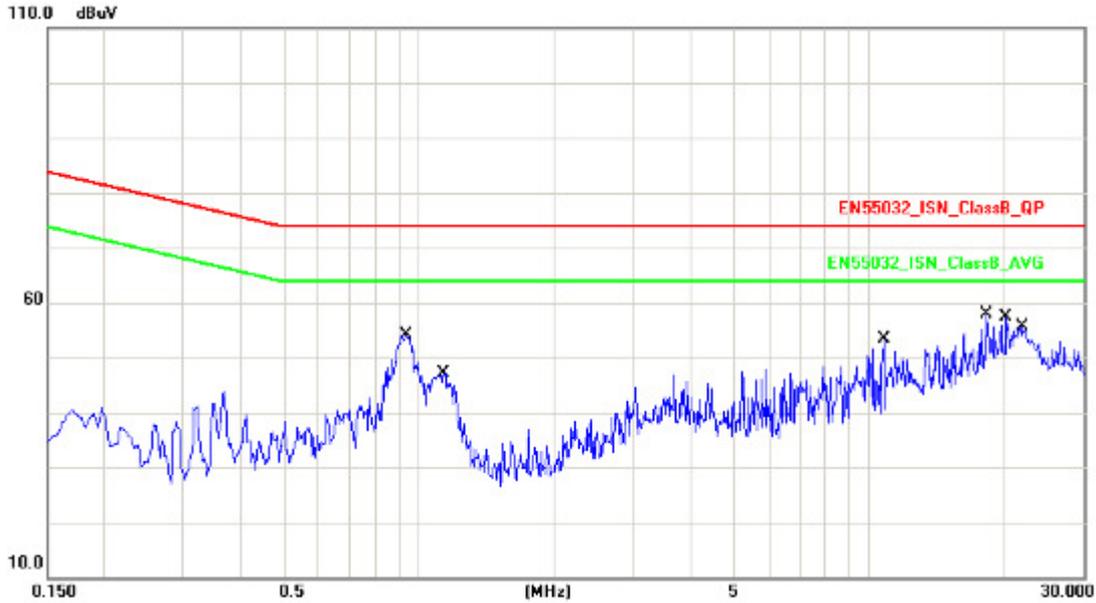


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3500	19.62	28.23	47.85	76.96	-29.11	QP
2	0.3500	19.62	20.29	39.91	66.96	-27.05	AVG
3	1.0220	19.30	24.91	44.21	74.00	-29.79	QP
4	1.0220	19.30	21.52	40.82	64.00	-23.18	AVG
5	1.2660	19.27	24.79	44.06	74.00	-29.94	QP
6	1.2660	19.27	21.58	40.85	64.00	-23.15	AVG
7	12.1980	19.47	33.67	53.14	74.00	-20.86	QP
8	12.1980	19.47	31.57	51.04	64.00	-12.96	AVG
9	16.2300	19.33	35.82	55.15	74.00	-18.85	QP
10	16.2300	19.33	34.20	53.53	64.00	-10.47	AVG
11	26.6100	19.79	33.83	53.62	74.00	-20.38	QP
12	26.6100	19.79	30.88	50.67	64.00	-13.33	AVG

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 3: Normal Operation(LAN2 100Mbps) (110V/60Hz)		
AC Power :	AC 110V/60Hz	Phase :	100Mbps
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03

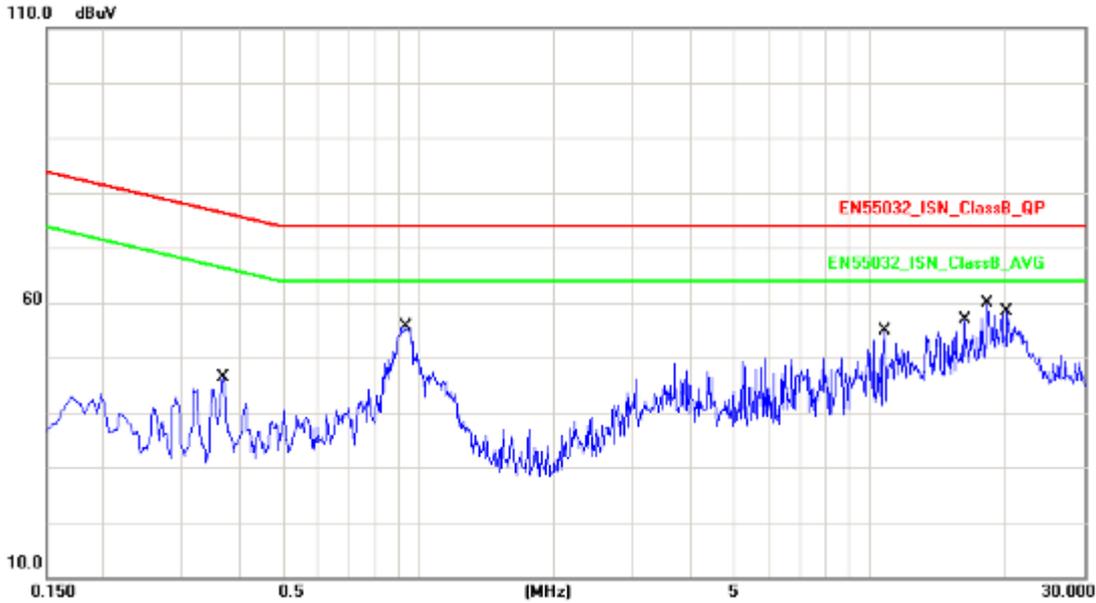


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.9460	19.34	29.34	48.68	74.00	-25.32	QP
2	0.9460	19.34	17.56	36.90	64.00	-27.10	AVG
3	1.1380	19.28	22.85	42.13	74.00	-31.87	QP
4	1.1380	19.28	12.79	32.07	64.00	-31.93	AVG
5	10.7940	19.58	35.61	55.19	74.00	-18.81	QP
6	10.7940	19.58	30.21	49.79	64.00	-14.21	AVG
7	18.2420	19.46	38.44	57.90	74.00	-16.10	QP
8	18.2420	19.46	32.46	51.92	64.00	-12.08	AVG
9	20.2580	19.59	35.78	55.37	74.00	-18.63	QP
10	20.2580	19.59	29.63	49.22	64.00	-14.78	AVG
11	21.9180	19.67	33.05	52.72	74.00	-21.28	QP
12	21.9180	19.67	25.18	44.85	64.00	-19.15	AVG

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 4: Normal Operation(LAN2 100Mbps) (230V/50Hz)		
AC Power :	AC 230V/50Hz	Phase :	100Mbps
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temperature :	26°C	Humidity :	54%
Pressure(mbar) :	1002	Date :	2016/08/03



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3699	19.61	22.37	41.98	76.50	-34.52	QP
2	0.3699	19.61	11.46	31.07	66.50	-35.43	AVG
3	0.9460	19.34	30.52	49.86	74.00	-24.14	QP
4	0.9460	19.34	17.62	36.96	64.00	-27.04	AVG
5	10.7940	19.58	32.59	52.17	74.00	-21.83	QP
6	10.7940	19.58	30.11	49.69	64.00	-14.31	AVG
7	16.2299	19.33	31.64	50.97	74.00	-23.03	QP
8	16.2299	19.33	25.13	44.46	64.00	-19.54	AVG
9	18.2420	19.46	39.47	58.93	74.00	-15.07	QP
10	18.2420	19.46	31.20	50.66	64.00	-13.34	AVG
11	20.2580	19.59	35.47	55.06	74.00	-18.94	QP
12	20.2580	19.59	29.34	48.93	64.00	-15.07	AVG

Note: Measurement Level = Reading Level + Correct Factor

Test engineer: Sun. Zhang

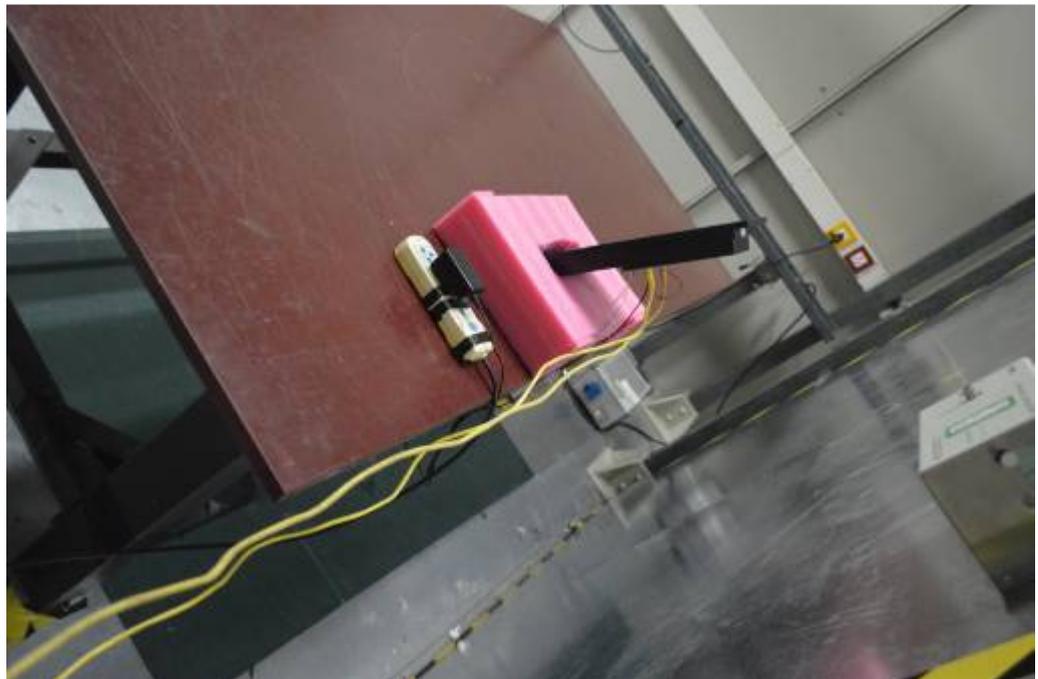


4.6. Test Photographs of Power Port

Front View



Rear View



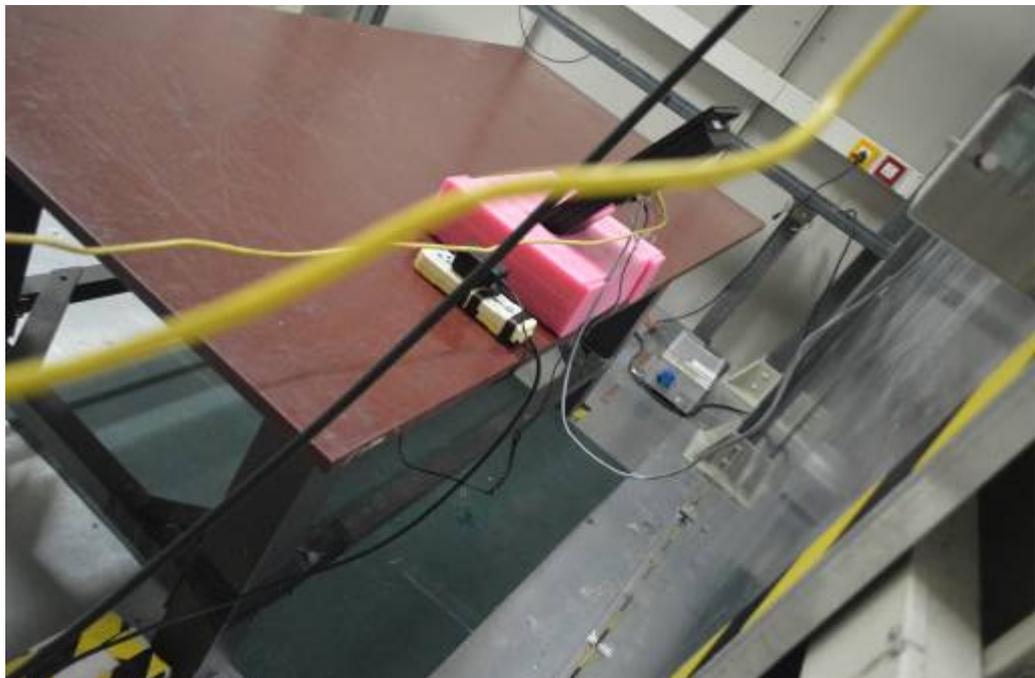


4.7. Test Photographs of Telecommunication Port

Front View



Rear View





5. Test of Radiated Emission

5.1. Test Limit

The EUT shall meet the limits of below Table when measured at the measuring distance R in accordance with the methods described in European Standard EN 55032. If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the highest reading shall be recorded, with the exception of any brief isolated high reading, which shall be ignored.

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

NOTE 2 F_x is defined in 3.1.19.

Where the F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Table A.2 – Requirements for radiated emissions at frequencies up to 1 GHz for Class A equipment

Table clause	Frequency range MHz	Measurement		Class A limits dB(μV/m)
		Distance m	Detector type/ bandwidth	OATS/SAC (see Table A.1)
A2.1	30 – 230	10	Quasi Peak / 120 kHz	40
	230 – 1 000			47
A2.2	30 – 230	3		50
	230 – 1 000			57

NOTE Apply only A2.1 or A2.2 across the entire frequency range.

Table A.3 – Requirements for radiated emissions at frequencies above 1 GHz for Class A equipment

Table clause	Frequency range MHz	Measurement		Class A limits dB(μV/m)
		Distance m	Detector type/ bandwidth	FSOATS (see Table A.1)
A3.1	1 000 – 3 000	3	Average / 1 MHz	56
	3 000 – 6 000			60
A3.2	1 000 – 3 000		Peak / 1 MHz	76
	3 000 – 6 000			80

NOTE Apply A3.1 and A3.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.



Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz for Class B equipment

Table clause	Frequency range MHz	Measurement		Class B limits dB(μV/m)	
		Distance m	Detector type/ bandwidth	OATS/SAC (see Table A.1)	
A4.1	30 – 230	10	Quasi Peak / 120 kHz	30	
	230 – 1 000			37	
A4.2	30 – 230	3		40	
	230 – 1 000			47	

NOTE Apply only table clause A4.1 or A4.2 across the entire frequency range.

Table A.5 – Requirements for radiated emissions at frequencies above 1 GHz for Class B equipment

Table clause	Frequency range MHz	Measurement		Class B limits dB(μV/m)	
		Distance m	Detector type/ bandwidth	FSOATS (see Table A.1)	
A5.1	1 000 – 3 000	3	Average/ 1 MHz	50	
	3 000 – 6 000			54	
A5.2	1 000 – 3 000		Peak/ 1 MHz	70	
	3 000 – 6 000			74	

NOTE Apply A5.1 and A5.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.

Table A.6 – Requirements for radiated emissions from FM receivers

Table clause	Frequency range MHz	Measurement		Class B limit dB(μV/m)		
		Distance m	Detector type/ bandwidth	Fundamental	Harmonics	
				OATS/SAC (see Table A.1)	OATS/SAC (see Table A.1)	
A6.1	30 – 230	10	Quasi peak/ 120 kHz	50	42	
	230 – 300				42	
	300 – 1 000				46	
A6.2	30 – 230	3		Quasi peak/ 120 kHz	60	52
	230 – 300					52
	300 – 1 000					56

NOTE 1 Apply only A.6.1 or A.6.2 across the entire frequency range.

NOTE 2 These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in Table A.4.



Table A.12 – Requirements for conducted differential voltage emissions from Class B equipment

Applicable to						
1. TV broadcast receiver tuner ports (3.1.8) with an accessible connector						
2. RF modulator output ports (3.1.27)						
3. FM broadcast receiver tuner ports (3.1.8) with an accessible connector						
Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz	46	46	46	See NOTE 1
	950 – 2 150		46	54	54	
A12.2	950 – 2 150	Quasi Peak/ 120 kHz	46	54	54	See NOTE 2
A12.3	30 – 300		For frequencies ≥1 GHz	46	54	50
	300 – 1 000	52				
A12.4	30 – 300	Peak/ 1 MHz	46	66	59	See NOTE 4
	300 – 1 000				52	
A12.5	30 – 950	Peak/ 1 MHz	46	76	46	See NOTE 5
	950 – 2 150			n/a	54	

NOTE 1 Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

NOTE 2 Tuner units (not the LNB) for satellite signal reception.

NOTE 3 Frequency modulation audio receivers and PC tuner cards.

NOTE 4 Frequency modulation car radios.

NOTE 5 Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

NOTE 6 Testing is required at only one EUT supply voltage and frequency.

NOTE 7 The term 'other' refers to all emissions other than the fundamental and the harmonics of the local oscillator.

NOTE 8 The test shall be performed with the device operating at each reception channel.

NOTE 9 The test shall cover the entire frequency range.

5.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3/10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

5.3. Typical Test Setup

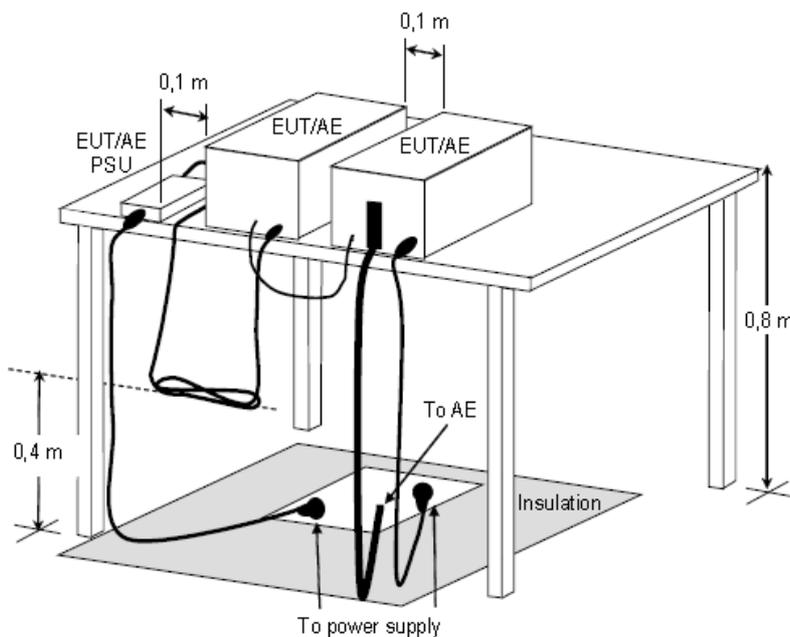


Figure D.8 – Example measurement arrangement for table-top EUT
(Radiated emission measurement)



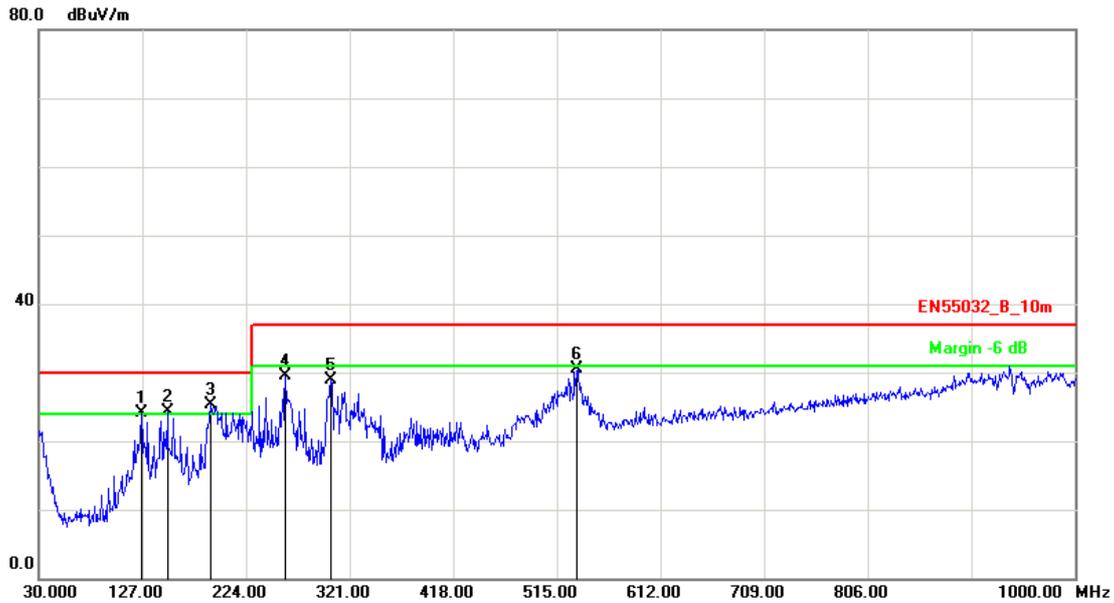
5.4. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMI Test Receiver	R&S	ESC17	100968	2016.03.26	2017.03.25
Preamplifier	Agilent	87405B	My39500554	2016.03.26	2017.03.25
Preamplifier	Agilent	8449B	3008A02342	2016.03.26	2017.03.25
Bilog Antenna	Sunol Science	JB1	A072414-1	2016.04.16	2017.04.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-618	2016.04.16	2017.04.15
Spectrum Analyzer	R&S	FSP40	100324	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-001	2016.03.29	2017.03.28
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A



5.5. Test Result and Data (30MHz ~ 1GHz)

Test Mode :	Mode 1: Normal Operation(110V/60Hz)		
AC Power :	AC 110V/60Hz	Ant. Polarization:	Horizontal
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16

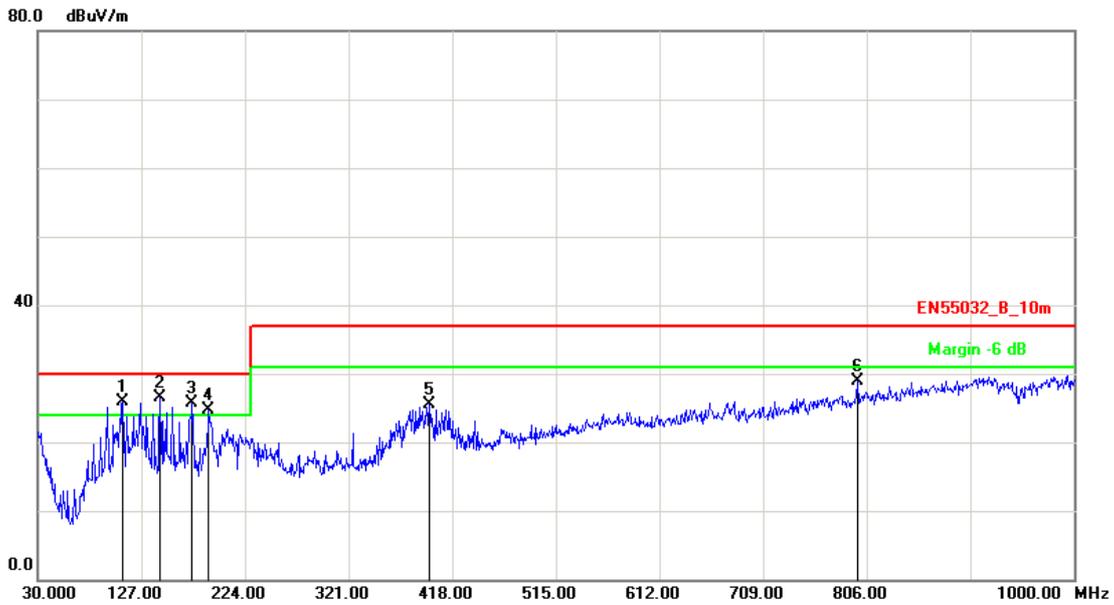


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	126.0300	-9.81	33.91	24.10	30.00	-5.90	QP	100	245
2	150.2800	-10.65	35.02	24.37	30.00	-5.63	QP	400	96
3	191.0200	-10.62	35.89	25.27	30.00	-4.73	QP	100	318
4	260.8600	-9.99	39.41	29.42	37.00	-7.58	QP	400	74
5	303.5400	-8.63	37.59	28.96	37.00	-8.04	QP	100	41
6	534.3999	-2.33	32.89	30.56	37.00	-6.44	QP	100	264

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 1: Normal Operation(110V/60Hz)		
AC Power :	AC 110V/60Hz	Ant. Polarization:	Vertical
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16

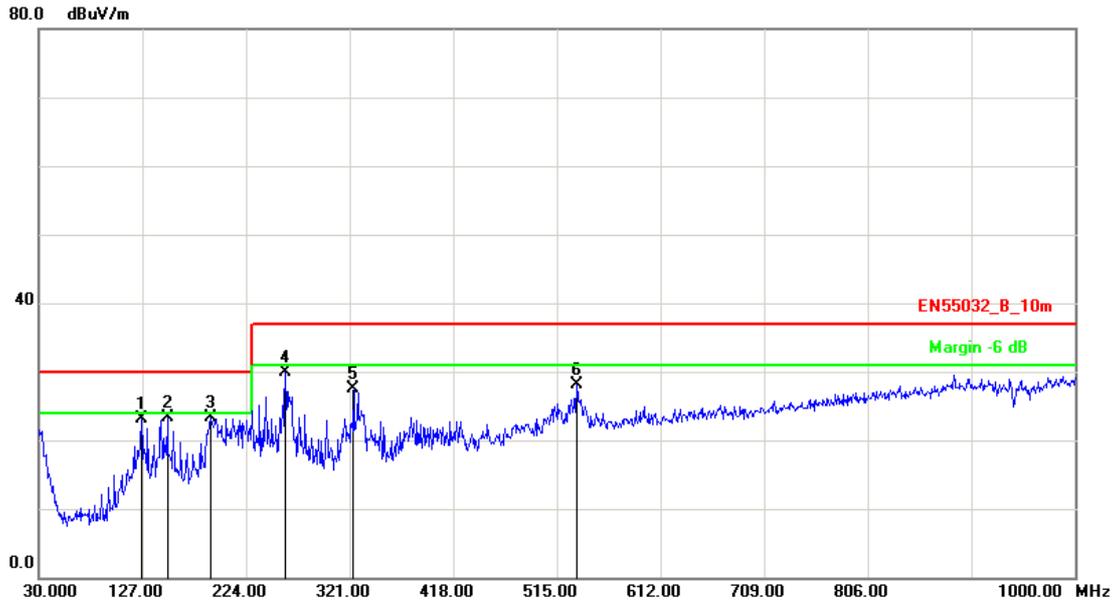


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	109.5400	-11.77	37.67	25.90	30.00	-4.10	QP	100	0
2	144.4600	-10.52	36.93	26.41	30.00	-3.59	QP	400	74
3	174.5300	-11.31	37.02	25.71	30.00	-4.29	QP	400	156
4	190.0500	-10.70	35.32	24.62	30.00	-5.38	QP	100	32
5	396.6600	-5.44	30.95	25.51	37.00	-11.49	QP	400	289
6	797.2699	2.03	26.78	28.81	37.00	-8.19	QP	400	127

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(230V/50Hz)		
AC Power :	AC 230V/50Hz	Ant. Polarization:	Horizontal
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16

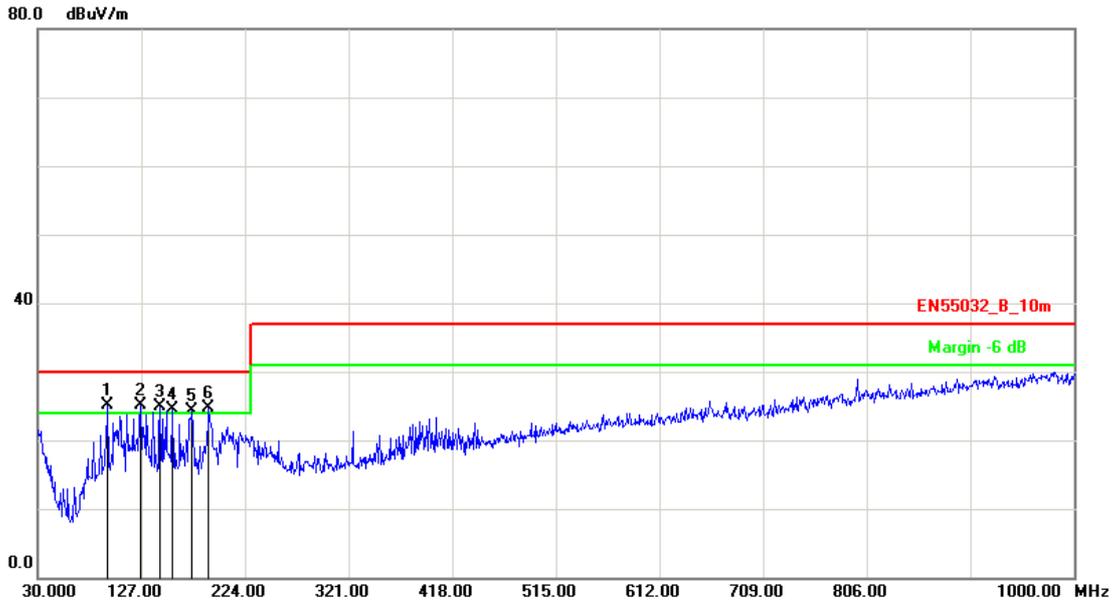


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	126.0300	-9.81	32.91	23.10	30.00	-6.90	QP	400	358
2	150.2800	-10.65	34.02	23.37	30.00	-6.63	QP	100	94
3	191.0200	-10.62	33.89	23.27	30.00	-6.73	QP	100	62
4	260.8600	-9.99	39.91	29.92	37.00	-7.08	QP	400	227
5	324.8799	-7.97	35.38	27.41	37.00	-9.59	QP	100	10
6	533.4298	-2.35	30.40	28.05	37.00	-8.95	QP	400	79

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(230V/50Hz)		
AC Power :	AC 230V/50Hz	Ant. Polarization:	Vertical
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	94.9899	-15.06	40.20	25.14	30.00	-4.86	QP	100	259
2	126.0300	-9.81	34.92	25.11	30.00	-4.89	QP	100	64
3	144.4600	-10.52	35.43	24.91	30.00	-5.09	QP	100	74
4	156.0999	-10.77	35.31	24.54	30.00	-5.46	QP	400	2
5	174.5300	-11.31	35.52	24.21	30.00	-5.79	QP	400	18
6	190.0500	-10.70	35.32	24.62	30.00	-5.38	QP	100	330

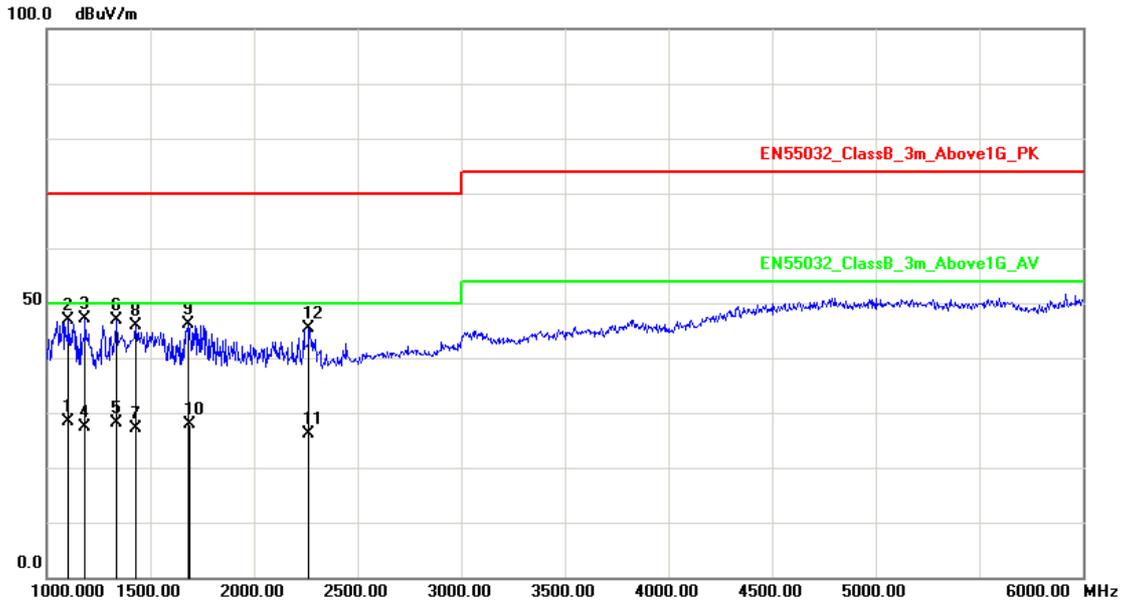
Note: Measurement Level = Reading Level + Correct Factor

Test engineer: Sun. Zhang



5.6. Test Result and Data (1GHz ~ 6GHz)

Test Mode :	Mode 1: Normal Operation(110V/60Hz)		
AC Power :	AC 110V/60Hz	Ant. Polarization:	Horizontal
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16

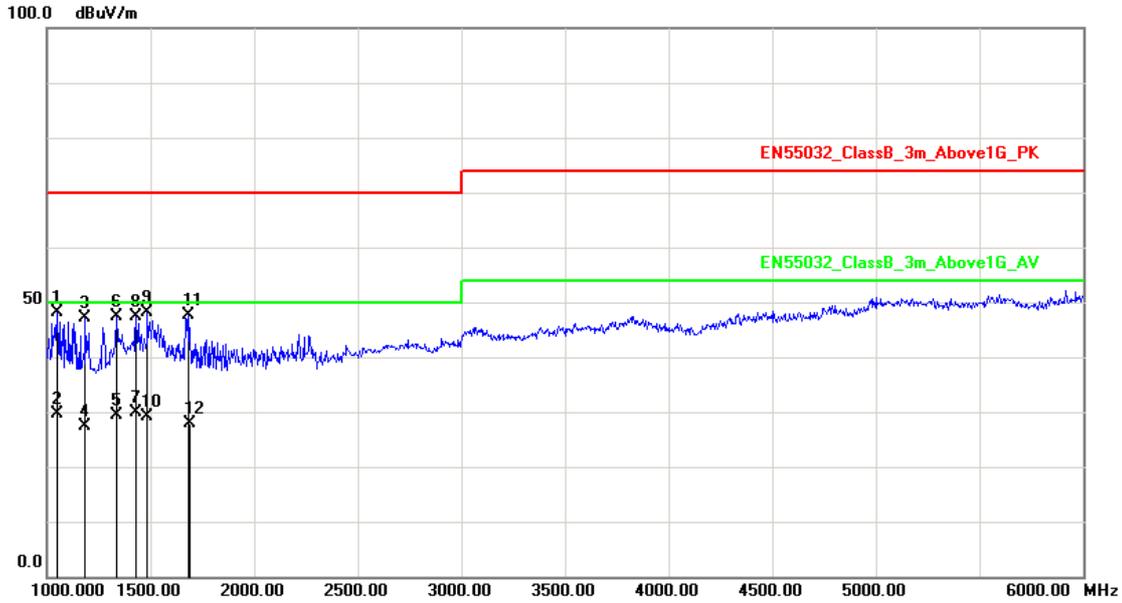


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	1104.000	-5.29	33.62	28.33	50.00	-21.67	AVG	100	9
2	1105.000	-5.28	52.17	46.89	70.00	-23.11	peak	100	9
3	1185.000	-4.74	51.85	47.11	70.00	-22.89	peak	100	332
4	1186.000	-4.74	32.15	27.41	50.00	-22.59	AVG	100	332
5	1334.000	-3.75	31.92	28.17	50.00	-21.83	AVG	100	163
6	1335.000	-3.74	50.52	46.78	70.00	-23.22	peak	100	163
7	1429.000	-3.11	30.26	27.15	50.00	-22.85	AVG	200	187
8	1430.000	-3.11	49.02	45.91	70.00	-24.09	peak	200	187
9	1685.000	-2.11	48.33	46.22	70.00	-23.78	peak	200	219
10	1687.000	-2.10	29.87	27.77	50.00	-22.23	AVG	200	219
11	2263.000	0.14	26.10	26.24	50.00	-23.76	AVG	100	58
12	2265.000	0.15	45.34	45.49	70.00	-24.51	peak	100	58

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 1: Normal Operation(110V/60Hz)		
AC Power :	AC 110V/60Hz	Ant. Polarization:	Vertical
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16

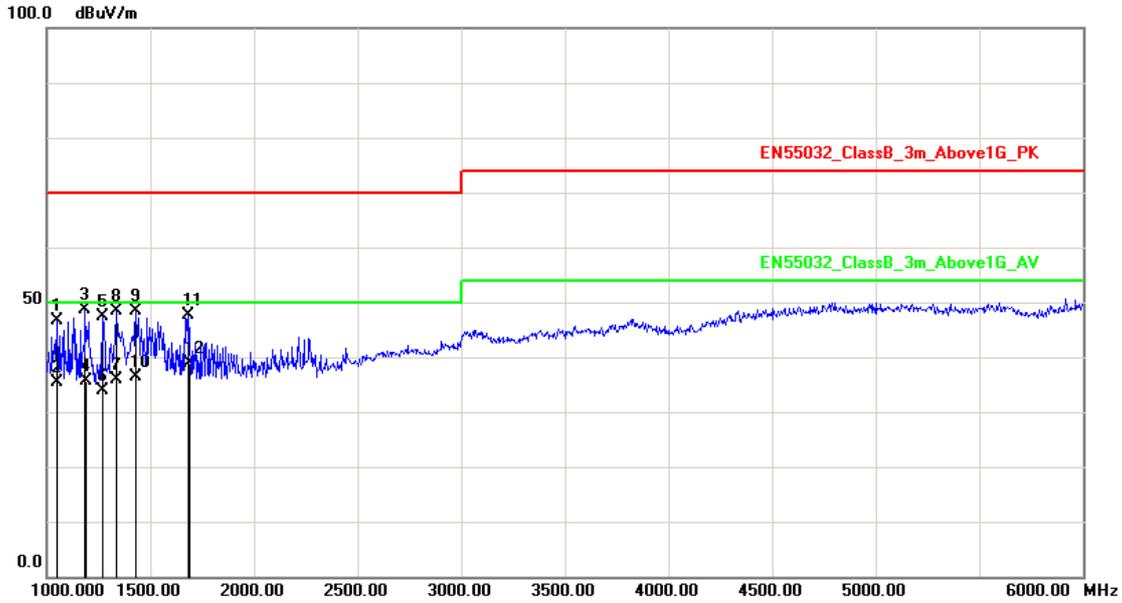


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	1050.000	-5.65	53.78	48.13	70.00	-21.87	peak	200	62
2	1051.000	-5.64	35.22	29.58	50.00	-20.42	AVG	200	62
3	1185.000	-4.74	51.85	47.11	70.00	-22.89	peak	100	359
4	1186.000	-4.74	32.16	27.42	50.00	-22.58	AVG	100	359
5	1334.000	-3.75	33.24	29.49	50.00	-20.51	AVG	100	359
6	1335.000	-3.74	51.02	47.28	70.00	-22.72	peak	100	359
7	1429.000	-3.11	32.89	29.78	50.00	-20.22	AVG	100	168
8	1430.000	-3.11	50.52	47.41	70.00	-22.59	peak	100	168
9	1485.000	-2.74	50.85	48.11	70.00	-21.89	peak	200	54
10	1486.000	-2.73	31.74	29.01	50.00	-20.99	AVG	200	54
11	1685.000	-2.11	49.83	47.72	70.00	-22.28	peak	200	0
12	1687.000	-2.10	29.88	27.78	50.00	-22.22	AVG	200	0

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(230V/50Hz)		
AC Power :	AC 230V/50Hz	Ant. Polarization:	Horizontal
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16

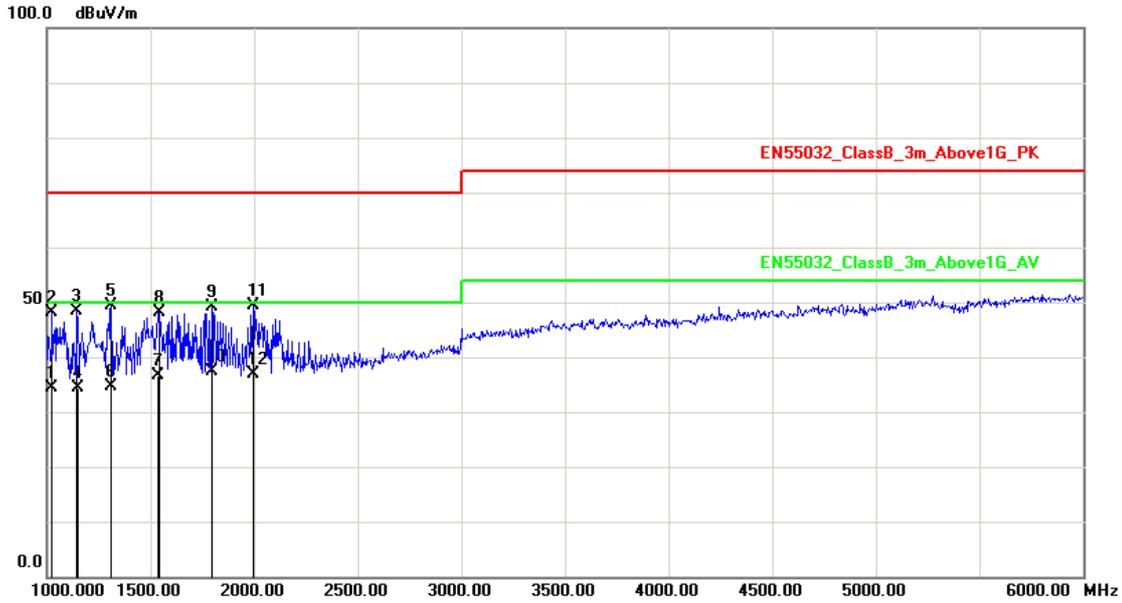


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	1050.000	-5.65	52.28	46.63	70.00	-23.37	peak	100	298
2	1051.360	-5.64	41.10	35.46	50.00	-14.54	AVG	100	314
3	1185.000	-4.74	53.35	48.61	70.00	-21.39	peak	100	226
4	1187.120	-4.73	40.26	35.53	50.00	-14.47	AVG	100	275
5	1270.000	-4.18	51.48	47.30	70.00	-22.70	peak	200	245
6	1271.590	-4.17	38.15	33.98	50.00	-16.02	AVG	200	260
7	1334.200	-3.75	39.67	35.92	50.00	-14.08	AVG	100	148
8	1335.000	-3.74	52.02	48.28	70.00	-21.72	peak	100	102
9	1430.000	-3.11	51.52	48.41	70.00	-21.59	peak	100	356
10	1430.690	-3.10	39.45	36.35	50.00	-13.65	AVG	100	347
11	1685.000	-2.11	49.83	47.72	70.00	-22.28	peak	200	21
12	1687.410	-2.10	41.02	38.92	50.00	-11.08	AVG	200	0

Note: Measurement Level = Reading Level + Correct Factor



Test Mode :	Mode 2: Normal Operation(230V/50Hz)		
AC Power :	AC 230V/50Hz	Ant. Polarization:	Vertical
Equipment :	Outdoor Station	Model No :	DH-VTO1220B
Temp :	25°C	Humidity :	52%
Pressure(mbar) :	1002	Date :	2016/08/16



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	1024.510	-5.82	40.10	34.28	50.00	-15.72	AVG	100	96
2	1025.000	-5.81	53.99	48.18	70.00	-21.82	peak	100	248
3	1145.000	-5.01	53.33	48.32	70.00	-21.68	peak	100	326
4	1147.320	-5.00	39.46	34.46	50.00	-15.54	AVG	100	345
5	1310.000	-3.91	53.29	49.38	70.00	-20.62	peak	100	56
6	1312.200	-3.89	38.52	34.63	50.00	-15.37	AVG	100	64
7	1538.900	-2.53	39.10	36.57	50.00	-13.43	AVG	200	140
8	1540.000	-2.52	50.66	48.14	70.00	-21.86	peak	200	127
9	1795.000	-1.79	51.01	49.22	70.00	-20.78	peak	100	298
10	1797.200	-1.78	39.20	37.42	50.00	-12.58	AVG	100	32
11	1995.000	-1.21	50.49	49.28	70.00	-20.72	peak	200	175
12	1996.250	-1.21	38.12	36.91	50.00	-13.09	AVG	200	41

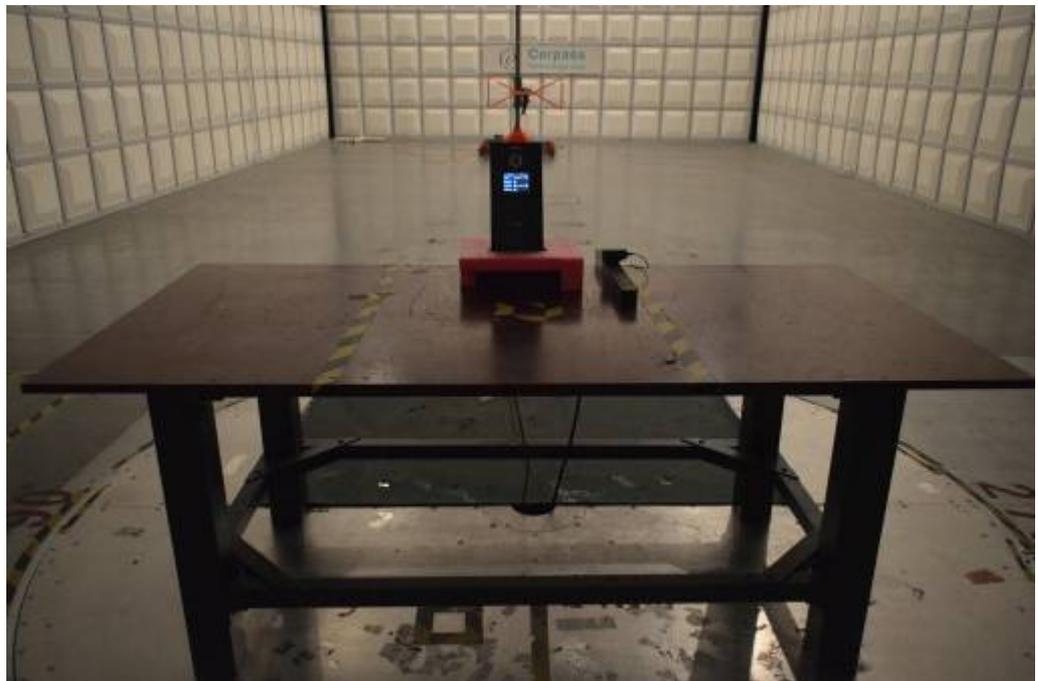
Note: Measurement Level = Reading Level + Correct Factor

Test engineer: *Sun. Zhang*

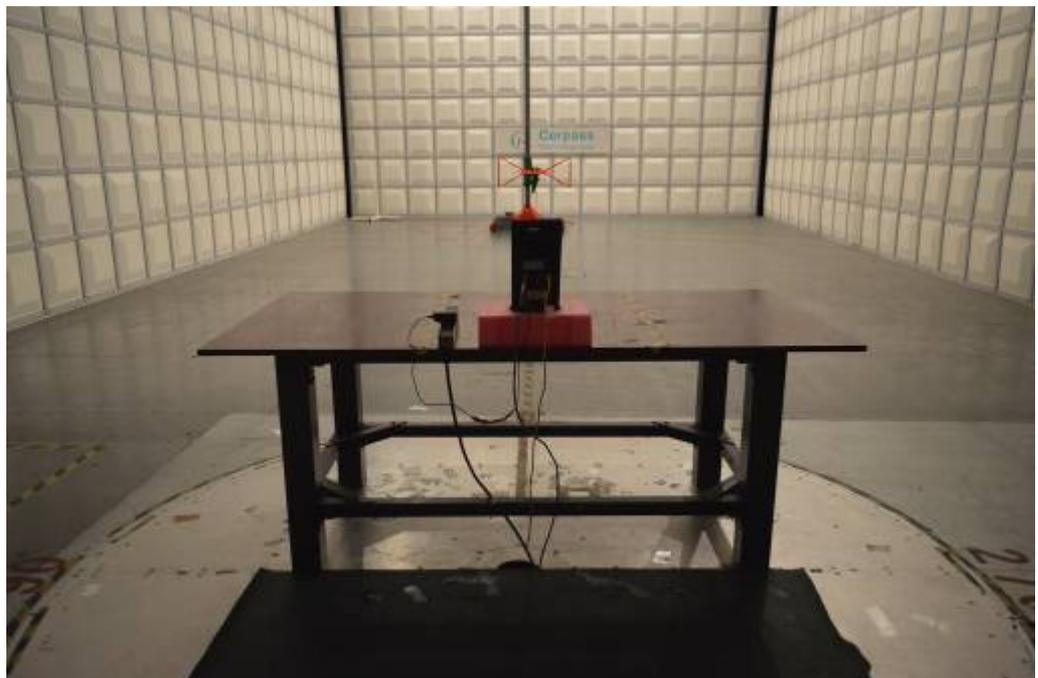


5.7. Test Photographs (30MHz~1GHz)

Front View



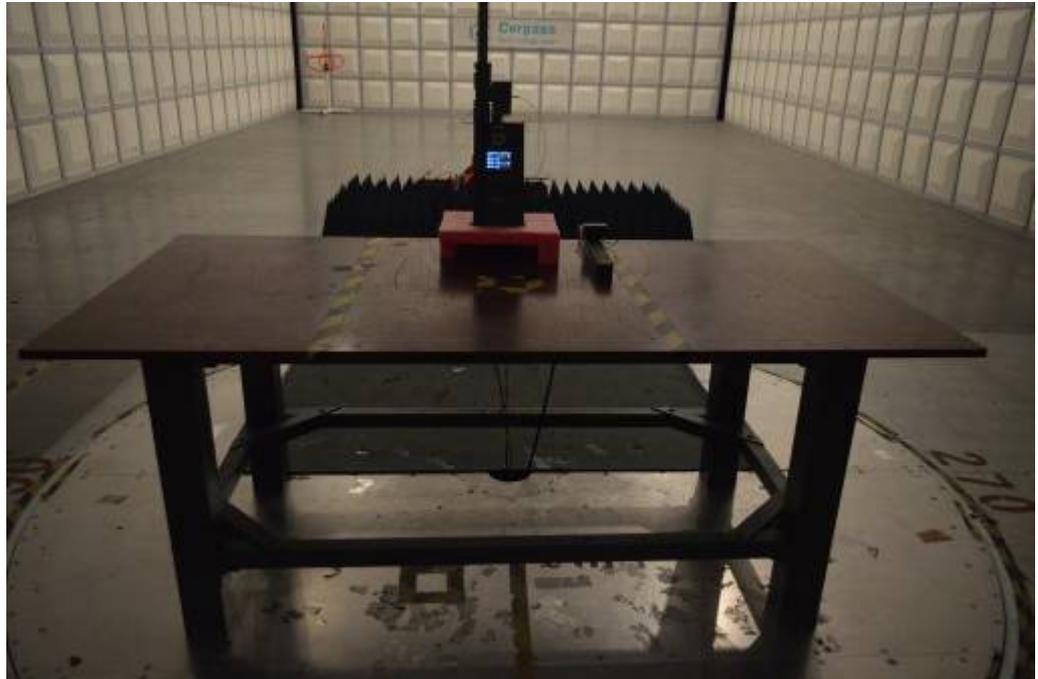
Rear View



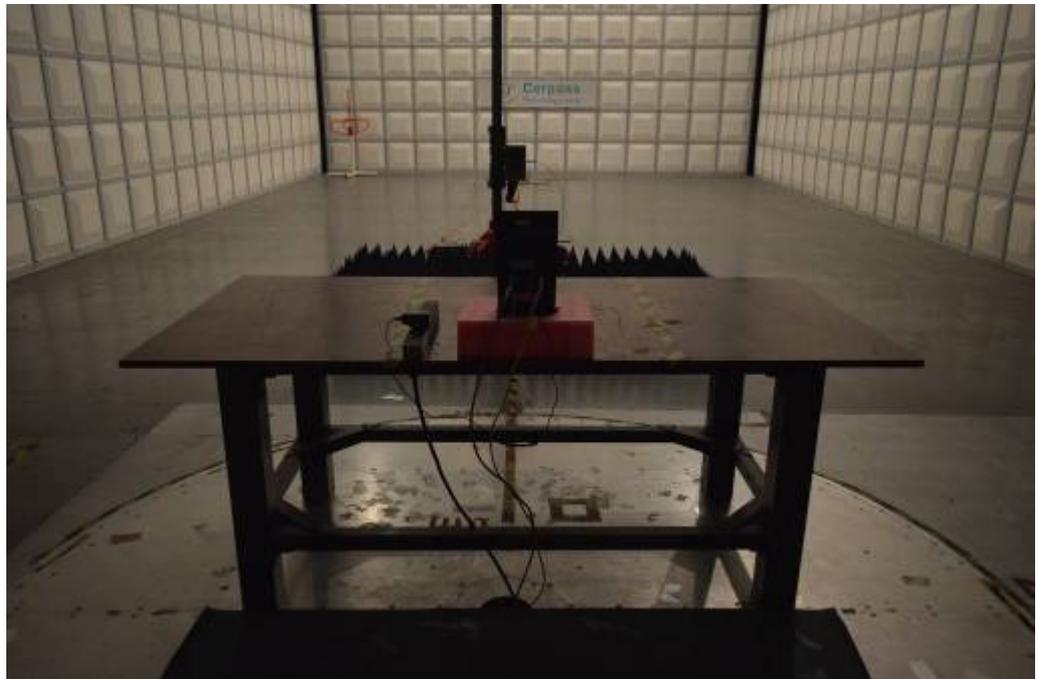


5.8. Test Photographs (1GHz~6GHz)

Front View



ear View





6. Harmonics Test

6.1. Limits of Harmonics Current Measurement

Limits for Class A equipment

Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	8 ≤ n ≤ 40	0.23x8/n
11	0.33		
13	0.21		
15 ≤ n ≤ 39	0.15x15/n		

(b) Limits for Class B equipment

For Class B equipment, the harmonics of the input current shall not exceed the values given in Table that is the limit of Class A multiplied by a factor of 1,5.

(c) Limits for Class C equipment

Harmonics Order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda^*$
5	10
7	7
9	5
11 < n < 39 (odd harmonics only)	3

* λ is the circuit power factor

(d) Limits for Class D equipment

Harmonics 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
11 < n < 39 (odd harmonics only)	3.85/n	See limit of Class A

NOTE: According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.



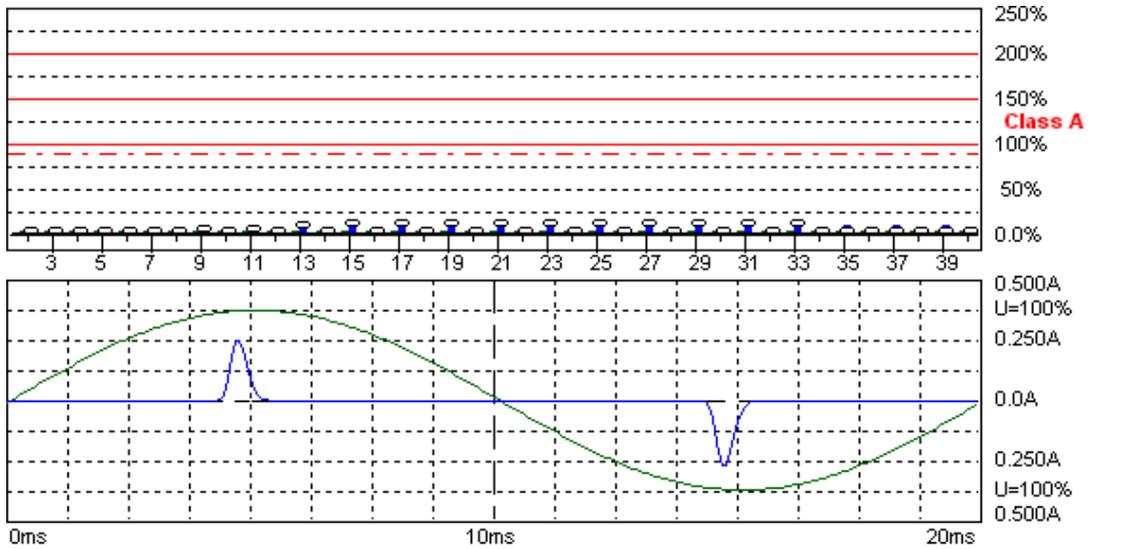
6.2. Measurement equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMC Emission Tester	EMCPARTNER	Harmonics-1000	159	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2016.03.29	2017.03.28
HARCS	EMC Partner AG	Ver 4.18	N/A	N/A	N/A



6.3. Test Result and Data

Basic Standard	:	EN 61000-3-2
Final Test Result	:	PASS
Test Mode	:	Mode 1
Equipment	:	Outdoor Station
Model No.	:	DH-VTO1220B
Temperature	:	25°C
Humidity	:	52%
Atmospheric Pressure	:	100 kPa
Test Date	:	Sep 24, 2016



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)

2016-9-24 11:07:18

Urms = 229.7 V P = 3.730 W THC = 0.045 A
 Irms = 0.045 A pf = 0.358

Range: 0.5 A
 V-nom: 230 V
 TestTime: 15 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Full Bar : Actual Values
 Empty Bar : Maximum Values
 Blue : Current , Green : Voltage , Red : Failed

Urms = 229.7V Freq = 50.000 Range: 0.5 A
 Irms = 0.045A Ipk = 0.286A cf = 6.290
 P = 3.730W S = 10.43VA pf = 0.358
 THDi = 94.1 % THDu = 0.20 % Class A
 Test - Time : 15min (100 %)
 Test completed, Result: PASSED



Order	Freq. [Hz]	Irms [A]	Irms%L [%]	I _{max} [A]	I _{max} %L [%]	Limit [A]
1	50	0.0163		0.0169		
2	100	0.0009	0.0876	0.0016	0.1441	1.0800
3	150	0.0150	0.6502	0.0157	0.6833	2.3000
4	200	0.0009	0.2200	0.0016	0.3690	0.4300
5	250	0.0146	1.2850	0.0155	1.3572	1.1400
6	300	0.0010	0.3255	0.0016	0.5290	0.3000
7	350	0.0145	1.8786	0.0151	1.9658	0.7700
8	400	0.0010	0.4246	0.0016	0.6900	0.2300
9	450	0.0141	3.5172	0.0146	3.6545	0.4000
10	500	0.0010	0.5307	0.0016	0.8625	0.1840
11	550	0.0135	4.0875	0.0140	4.2540	0.3300
12	600	0.0010	0.6369	0.0016	1.0349	0.1533
13	650	0.0129	6.1326	0.0133	6.3360	0.2100
14	700	0.0010	0.7430	0.0016	1.2074	0.1314
15	750	0.0122	8.1177	0.0125	8.3618	0.1500
16	800	0.0010	0.8757	0.0016	1.4065	0.1150
17	850	0.0114	8.6236	0.0117	8.8311	0.1324
18	900	0.0010	0.9852	0.0016	1.5823	0.1022
19	950	0.0106	8.9681	0.0108	9.1227	0.1184
20	1000	0.0010	1.1278	0.0016	1.7912	0.0920
21	1050	0.0098	9.1431	0.0099	9.2855	0.1071
22	1100	0.0010	1.2406	0.0017	2.0069	0.0836
23	1150	0.0090	9.1715	0.0090	9.2027	0.0978
24	1200	0.0010	1.3534	0.0017	2.2291	0.0767
25	1250	0.0081	9.0535	0.0081	9.0535	0.0900
26	1300	0.0010	1.4662	0.0017	2.4149	0.0708
27	1350	0.0074	8.8257	0.0074	8.8257	0.0833
28	1400	0.0010	1.5790	0.0017	2.5542	0.0657
29	1450	0.0066	8.5354	0.0066	8.5354	0.0776
30	1500	0.0010	1.6917	0.0017	2.7366	0.0613
31	1550	0.0059	8.1150	0.0059	8.1150	0.0726
32	1600	0.0010	1.7514	0.0016	2.8129	0.0575
33	1650	0.0052	7.6538	0.0052	7.6538	0.0682
34	1700	0.0010	1.8045	0.0016	2.8760	0.0541
35	1750	0.0046	7.1682	0.0046	7.2157	0.0643
36	1800	0.0009	1.7912	0.0015	2.9257	0.0511
37	1850	0.0041	6.6745	0.0041	6.7749	0.0608
38	1900	0.0009	1.8277	0.0014	2.8992	0.0484
39	1950	0.0036	6.1890	0.0037	6.4006	0.0577
40	2000	0.0008	1.7912	0.0013	2.8527	0.0460

EUT is PASSED if:

- all Average values of the Individual Harmonic Currents (I_{avg}) are below 100% of the Individual Limits.
- all Maximum values of the Individual Harmonic Currents (I_{max}) are below 150% of the Individual Limits.

Test engineer: Sun. Zhang



6.4. Test Photographs





7. Voltage Fluctuations Test

7.1. Test Procedure

The equipment shall be tested under the conditions of **Clause 5**.

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance.

The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of $\pm 8\%$ is achieved during the whole assessment procedure.

7.2. Measurement Equipment

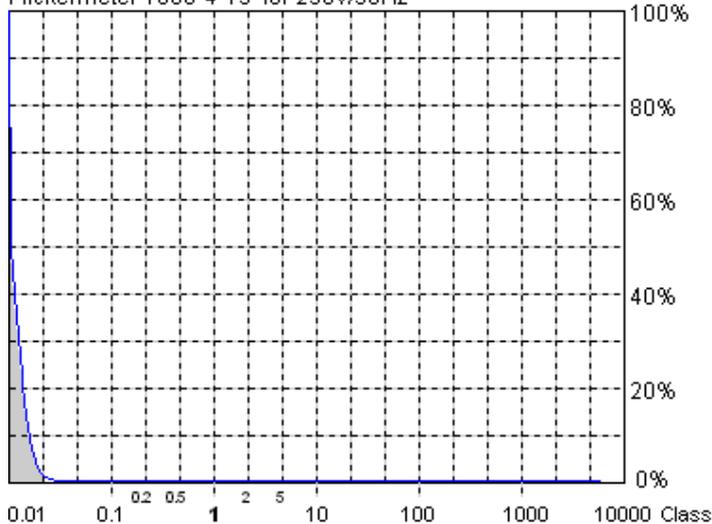
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMC Emission Tester	EMCPARTNER	Harmonics-1000	159	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2016.03.29	2017.03.28
HARCS	EMC Partner AG	Ver 4.18	N/A	N/A	N/A



7.3. Test Result and Data

Basic Standard	:	EN 61000-3-3
Final Test Result	:	PASS
Test Mode	:	Mode 1
Equipment	:	Outdoor Station
Model No.	:	DH-VTO1220B
Temperature	:	25°C
Humidity	:	52%
Atmospheric Pressure	:	100 kPa
Test Date	:	Sep 24, 2016

Flickermeter 1000-4-15 for 230V/50Hz



Actual Flicker (Fli): 0.01
Short-term Flicker (Pst): 0.09
 Limit (Pst): 1.00
Long-term Flicker (Plt): 0.09
 Limit (Plt): 0.65
Maximum Relative Volt. Change (dmax): 0.00%
 Limit (dmax): 4.00%
Relative Steady-state Voltage Change (dc): 0.10%
 Limit (dc): 3.30%
Maximum Interval exceeding 3.30% (dt): 0.00ms
 Limit (dt>Lim): 500ms

Flicker Emission - IEC 61000-3-3 , EN 61000-3-3 , (EN60555-3)

Urms = 229.9 V P = 3.730 W
 Irms = 0.046 A pf = 0.355

2016-9-24 11:20:57

Range: 0.5 A
 V-nom: 230 V
 TestTime: 10 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

- Full Bar : Actual Values
- Empty Bar : Maximum Values
- Circles : Average Values
- Blue : Current , Green : Voltage , Red : Failed



Urms = 229.9V Freq = 50.013 Range: 0.5 A
Irms = 0.046A Ipk = 0.293A cf = 6.422
P = 3.730W S = 10.50VA pf = 0.355

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : No LIN

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

Test engineer: Sun. Zhang



7.4. Test Photographs



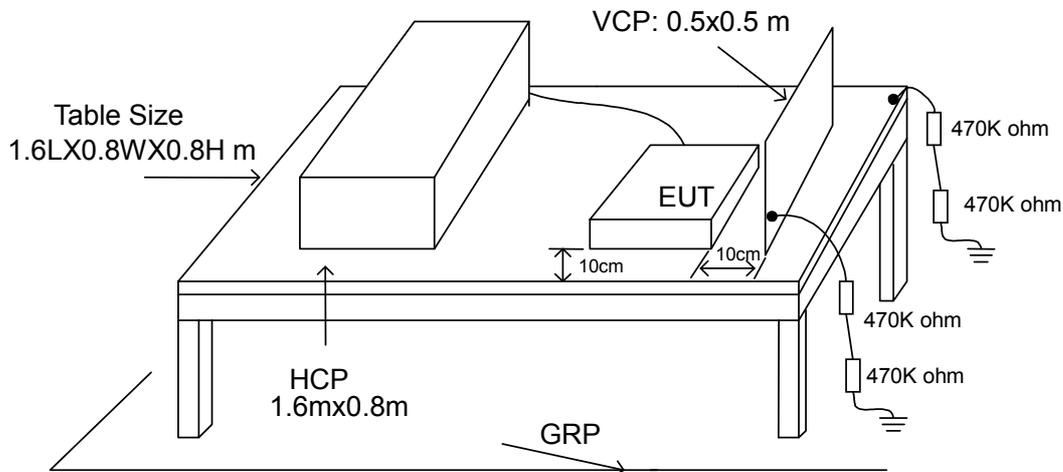


8. Electrostatic Discharge Immunity Test

8.1. Test Procedure

- a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
 - ambient temperature: 15°C to 35°C;
 - relative humidity : 30% to 60%;
 - atmospheric pressure : 86 KPa (860 mbar) to 106 KPa (1060 mbar).
- b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
- d. The test shall be performed with both air discharge and contact discharge. On reselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On reselected points at least 25 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
- e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
- f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :
 - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
 - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
 - The contact discharge test shall not be applied to such surfaces.
- h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT . After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

8.2. Test Setup for Tests Performed in Laboratory



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the following manner :

- a. Contact Discharge to the conductive surfaces and to coupling plane;
- b. Air Discharge at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the CerpPASS Technology Corp., we provided 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 2.5 m x 2.5 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1m minimum was provided between the EUT and the wall of the lab. and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resistor located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.



8.3. Test Severity Levels

Contact Discharge		Air Discharge	
Level	Test Voltage (KV) of Contact discharge	Level	Test Voltage (KV) of Air Discharge
1	±2	1	±2
2	±4	2	±4
3	±6	3	±8
4	±8	4	±15
X	Specified	X	Specified

Remark: "X" is an open level.

8.4. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
ESD Simulator	EM Test	dito	V0714102399	2016.04.21	2017.04.20
Tonometer	shanghaifengyun	DYM3	3251	2015.12.21	2016.12.20
Dehumidifier	ZEDO	ZD-220LB	CEP-TH-01	N/A	N/A
Humidifier	YADU	YZ-DS251C	CEP-TH-02	N/A	N/A
Temperature/ Humidity Meter	feiyang	N/A	102	2016.03.29	2017.03.28



8.5. Test Result and Data

Basic Standard : IEC 61000-4-2
 Product Standard : EN 50130-4: 2011
 Product Standard : EN 55024 : 2010
 Equipment : Outdoor Station
 Model No. : DH-VTO1220B
 Final Test Result : PASS
 Temperature : 24 °C
 Relative Humidity : 49 %
 Atmospheric Pressure : 101 kPa
 Test Date : Sep 23, 2016

Test Mode 1:

For EN 55024: 2010

Test Voltage: AC 230V/50Hz																
	Contact Discharge								Air Discharge							
	25 times / each								10 times / each							
Voltage	2 kV		4 kV		6 kV		8 kV		2 kV		4 kV		8 kV		10 kV	
Point\Polarity	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
HCP	A	A	A	A	---	---	---	---	---	---	---	---	---	---	---	---
VCP	A	A	A	A	---	---	---	---	---	---	---	---	---	---	---	---
1-19	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
20-31	A	A	A	A	---	---	---	---	---	---	---	---	---	---	---	---
32.33	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
34	A	A	A	A	---	---	---	---	---	---	---	---	---	---	---	---

For EN 50130-4: 2011

Test Voltage: AC 230V/50Hz																
	Contact Discharge								Air Discharge							
	25 times / each								10 times / each							
Voltage	2 kV		4 kV		6 kV		8 kV		2 kV		4 kV		8 kV		10 kV	
Point\Polarity	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
HCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
VCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
1-19	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
20-31	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
32.33	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
34	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---



Test Voltage: AC 195.5V/50Hz																
	Contact Discharge								Air Discharge							
	25 times / each								10 times / each							
Voltage	2 kV		4 kV		6 kV		8 kV		2 kV		4 kV		8 kV		10 kV	
Point\Polarity	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
HCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
VCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
1-19	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
20-31	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
32.33	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
34	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---

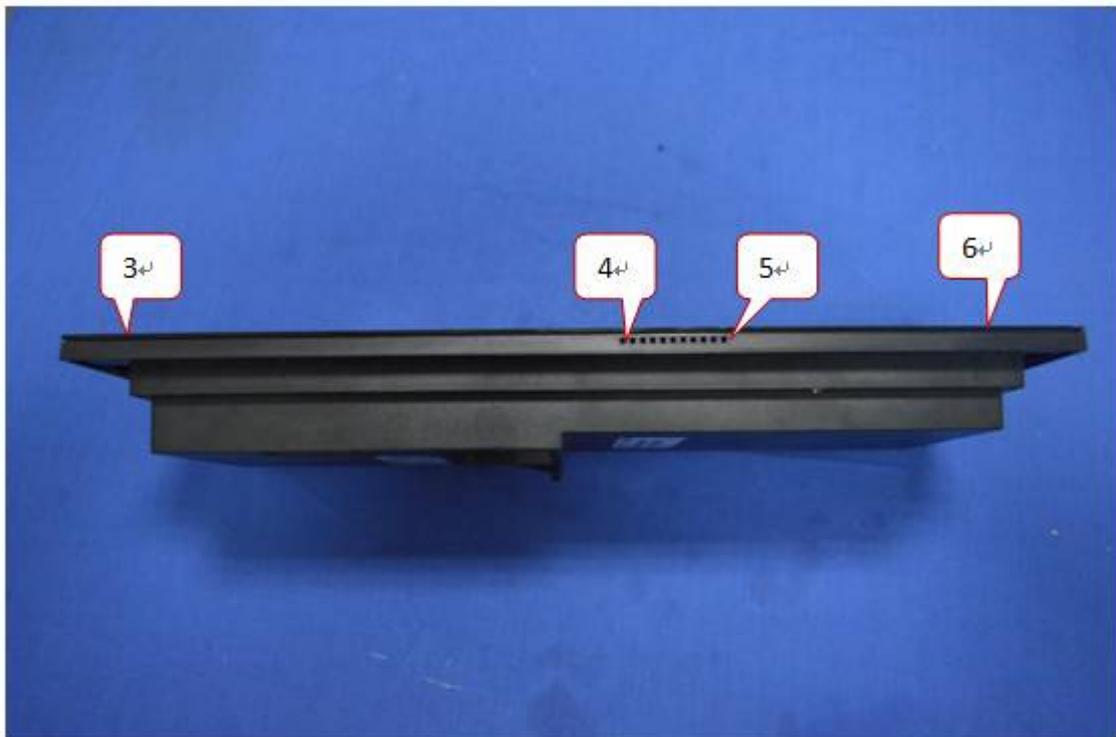
Test Voltage: AC 253V/50Hz																
	Contact Discharge								Air Discharge							
	25 times / each								10 times / each							
Voltage	2 kV		4 kV		6 kV		8 kV		2 kV		4 kV		8 kV		10 kV	
Point\Polarity	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
HCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
VCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
1-19	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
20-31	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
32.33	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---
34	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---

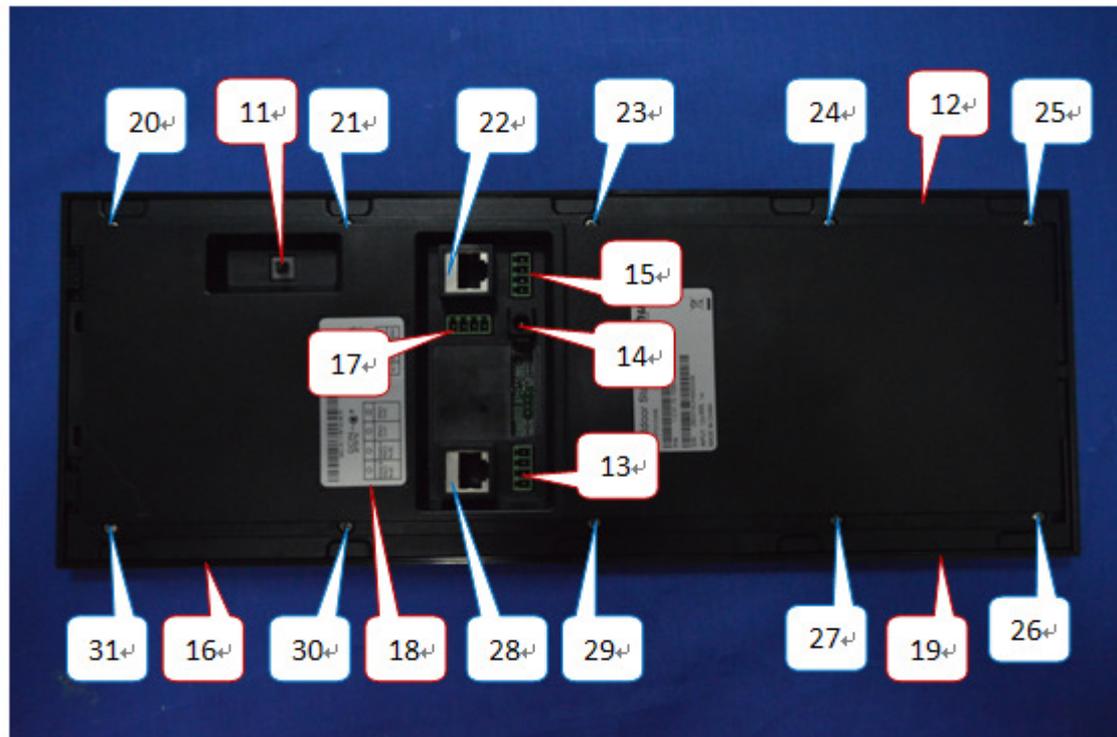
Test engineer: Sun. Zhang

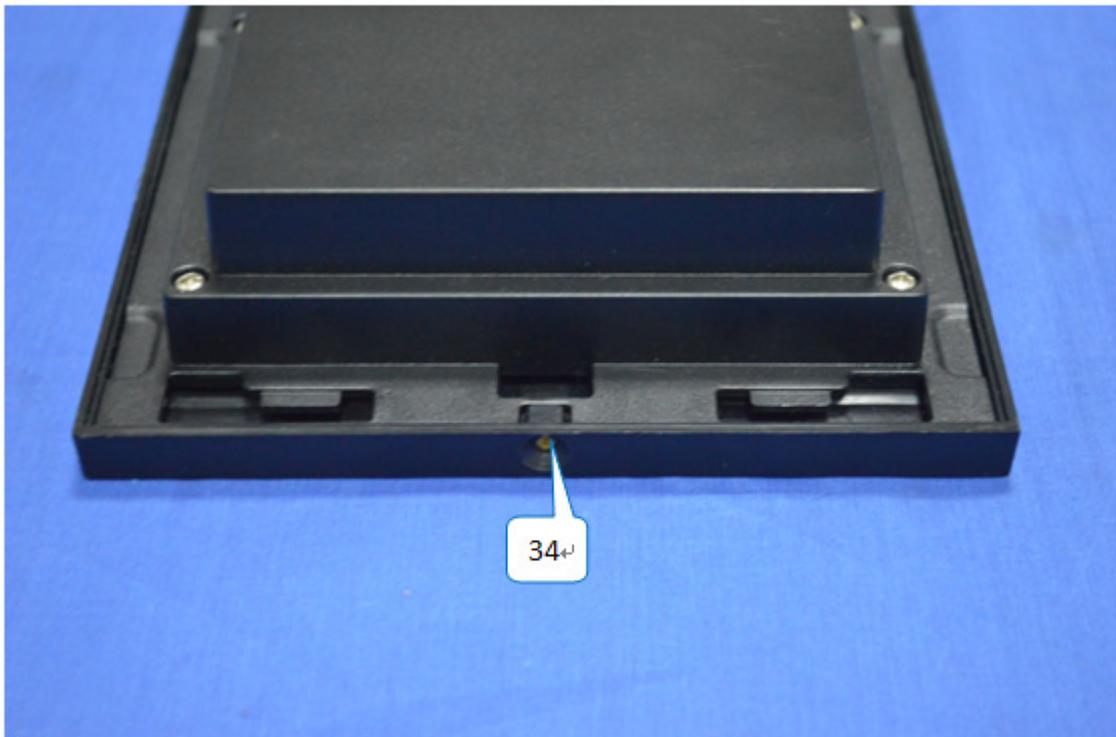
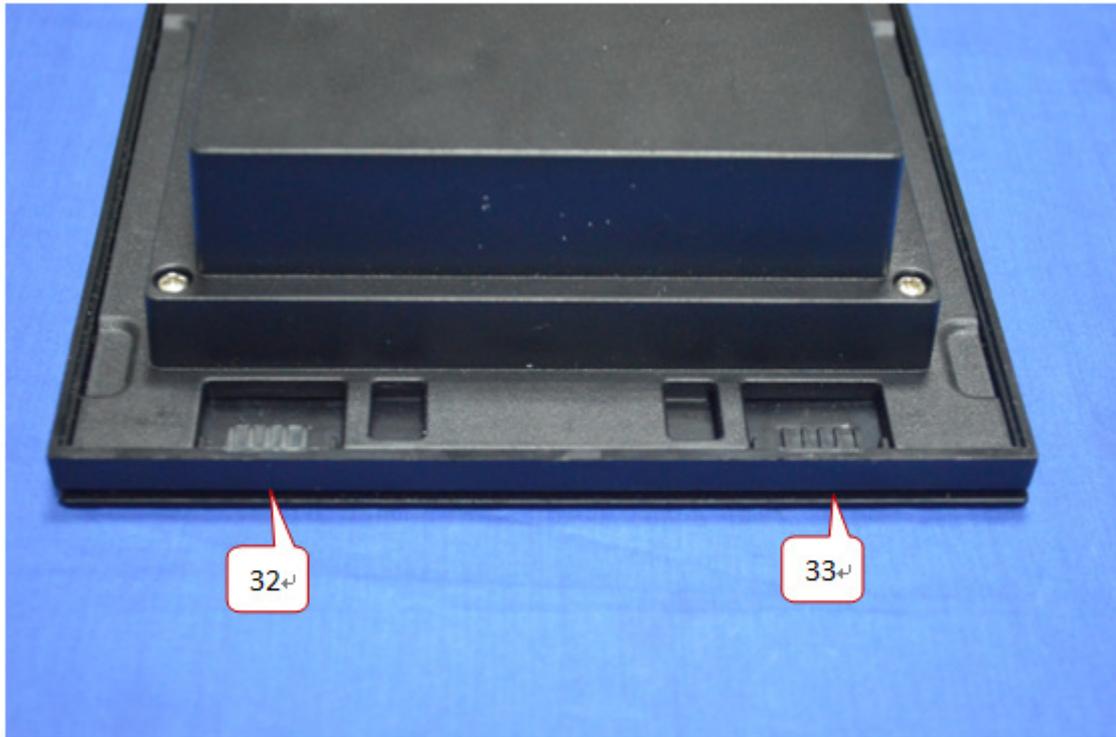


8.6. Test Photographs











9. Radio Frequency electromagnetic field immunity test

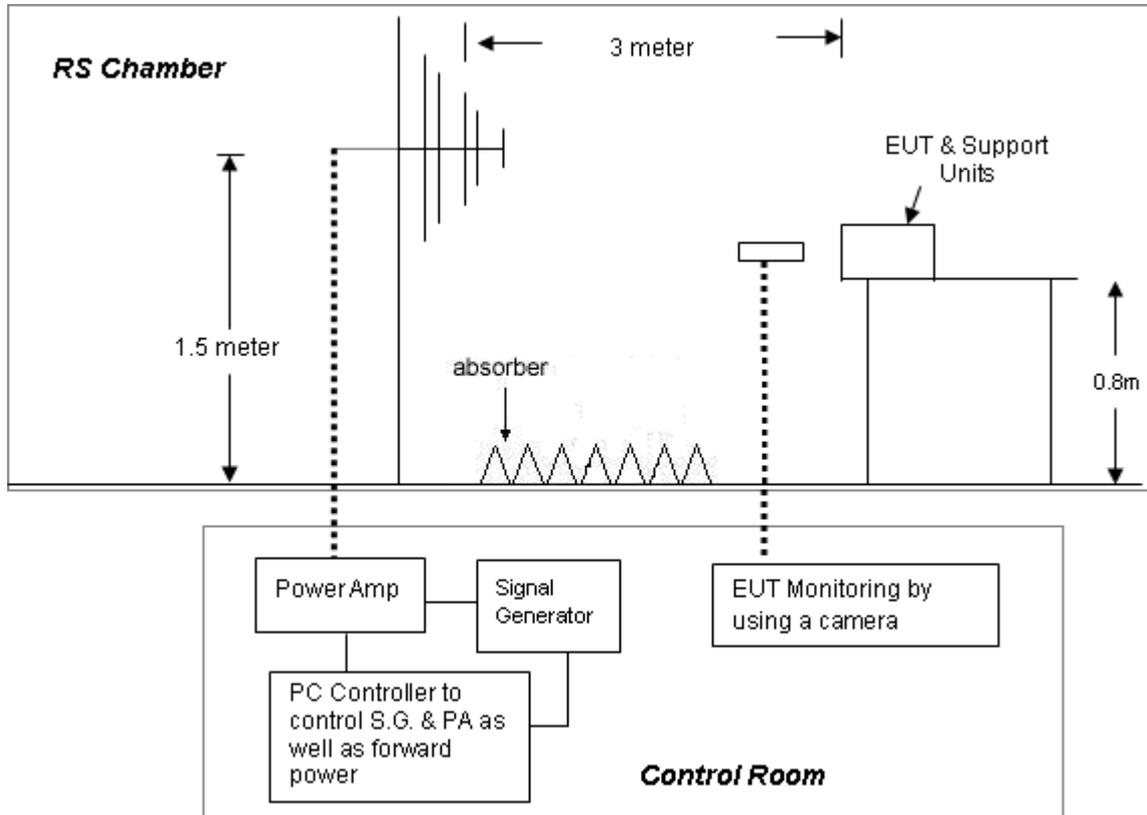
9.1. Test Procedure

- a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
- b. The antenna which is enabling the complete frequency range of 80-1000 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.
- c. The test is normally performed with the antenna facing the most sensitive side of the EUT. The polarization of the field generated by the bucolical antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. The circular polarization of the field from the log-spiral antenna makes a change of position of the antenna unnecessary.
- d. At each of the above conditions, the frequency range is swept 80-1000 MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of $1.5 \cdot 10^{-3}$ decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

9.2. Test Severity Levels

Frequency Band : 80-1000 MHz	
Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified
Remark: "X" is an open class.	

9.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.



9.4. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Signal Generator	R&S	SML03	103287	2016.03.26	2017.03.25
Power Sensor	R&S	NR P-Z91	100383	2016.03.26	2017.03.25
Power Sensor	R&S	NRP-Z91	100384	2016.03.26	2017.03.25
Power Meter	R&S	NRP	101206	2016.03.26	2017.03.25
Power Amplifier	BONN	BLWA0830-16 0/100/40D	076659	2016.03.26	2017.03.25
Istropic Electric Field Probe	EST.LINDGRE N	HI-6105	137445	2015.11.20	2016.11.19
EMS Antenna	R&S	HL046E	100028	N/A	N/A
Temperature/ Humidity Meter	feiyang	N/A	101	2016.03.29	2017.03.28
EMC-32	Rohde&Schwa rz	Ver 6.10.0	N/A	N/A	N/A



9.5. Test Result and Data

Basic Standard : IEC 61000-4-3
 Product Standard : EN 50130-4: 2011
 Product Standard : EN 55024 : 2010
 Equipment : Outdoor Station
 Model No. : DH-VTO1220B
 Final Test Result : PASS
 Temperature : 25 °C
 Relative Humidity : 52%
 Atmospheric Pressure : 101 kPa
 Test Date : Sep 23, 2016

Test Mode 1:

For EN 55024: 2010

Test Voltage: AC 230V/50Hz

Modulation : AM 80% , 1KHz sine wave , Dwell time: 3.0 S				
Frequency Step Size : 1 % of preceding frequency value				
Frequency (MHz)	Antenna Polarization	face	Field strength (V/m)	Result
80~1000	Horizontal &Vertical	Front	3 V/m	A
80~1000	Horizontal &Vertical	Rear	3 V/m	A
80~1000	Horizontal &Vertical	Left	3 V/m	A
80~1000	Horizontal &Vertical	Right	3 V/m	A

For EN 50130-4: 2011

Test Voltage: AC 230V/50Hz

Modulation : AM 80% , 1KHz sine wave , Dwell time: 3.0S				
Frequency Step Size : 1 % of preceding frequency value				
Frequency (MHz)	Antenna Polarization	face	Field strength (V/m)	Result
80~2700	Horizontal &Vertical	Front	10 V/m	A
80~2700	Horizontal &Vertical	Rear	10 V/m	A
80~2700	Horizontal &Vertical	Left	10 V/m	A
80~2700	Horizontal &Vertical	Right	10 V/m	A



Test Voltage: AC 195.5V/50Hz

Modulation : AM 80% , 1KHz sine wave , Dwell time: 3.0 S				
Frequency Step Size : 1 % of preceding frequency value				
Frequency (MHz)	Antenna Polarization	face	Field strength (V/m)	Result
80~2700	Horizontal &Vertical	Front	10 V/m	A
80~2700	Horizontal &Vertical	Rear	10 V/m	A
80~2700	Horizontal &Vertical	Left	10 V/m	A
80~2700	Horizontal &Vertical	Right	10 V/m	A

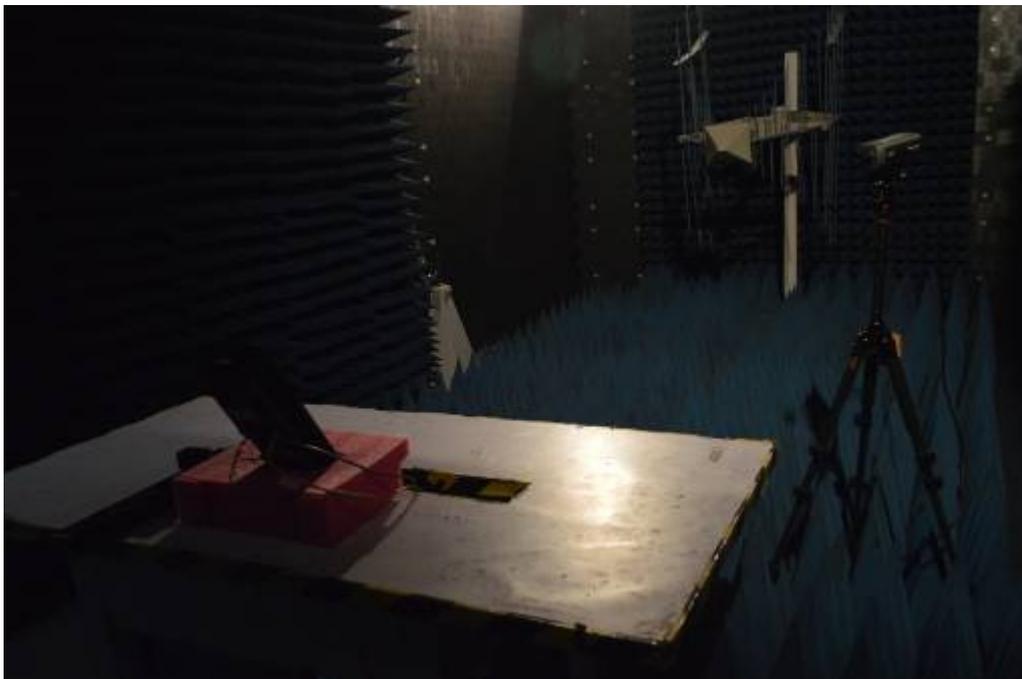
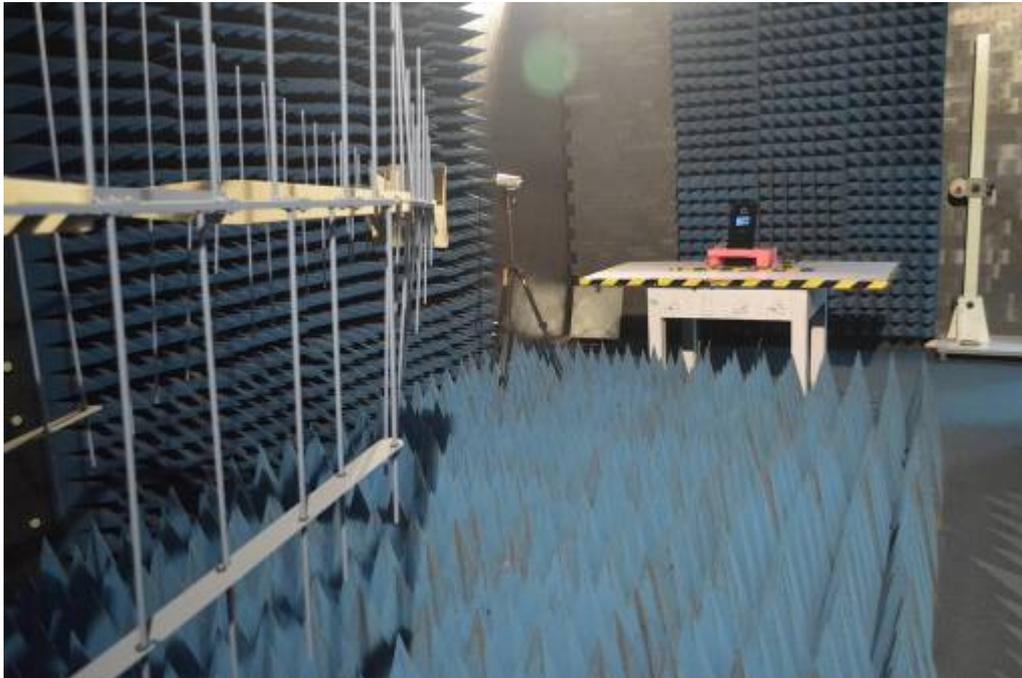
Test Voltage: AC 253V/50Hz

Modulation : AM 80% , 1KHz sine wave , Dwell time: 3.0 S				
Frequency Step Size : 1 % of preceding frequency value				
Frequency (MHz)	Antenna Polarization	face	Field strength (V/m)	Result
80~2700	Horizontal &Vertical	Front	10 V/m	A
80~2700	Horizontal &Vertical	Rear	10 V/m	A
80~2700	Horizontal &Vertical	Left	10 V/m	A
80~2700	Horizontal &Vertical	Right	10 V/m	A

Test engineer: Sun Zhang



9.6. Test Photographs





10. Electrical Fast Transient/ Burst Immunity Test

10.1. Test Procedure

- a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
 - ambient temperature: 15°C to 35°C;
 - relative humidity : 45% to 75%;
 - Atmospheric pressure: 86 Kpa (860 mbar) to 106 Kpa (1060 mbar).
- b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.
- c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.
- d. Test on Power Line:
 - The EFT/B-generator was located on the GRP.
For floor standing equipment 1,0 m
For table top equipment 0,5 m
 - The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.
- e. Test on Communication Lines
 - The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP.
 - The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.
- f. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
 - Normal performance within the specification limits.
 - Temporary degradation or loss of function or performance which is self-recoverable.
 - Temporary degradation or loss of function or performance which requires operator intervention or system reset.
 - Degradation or loss of function which is not recoverable due to damage of equipment (components).

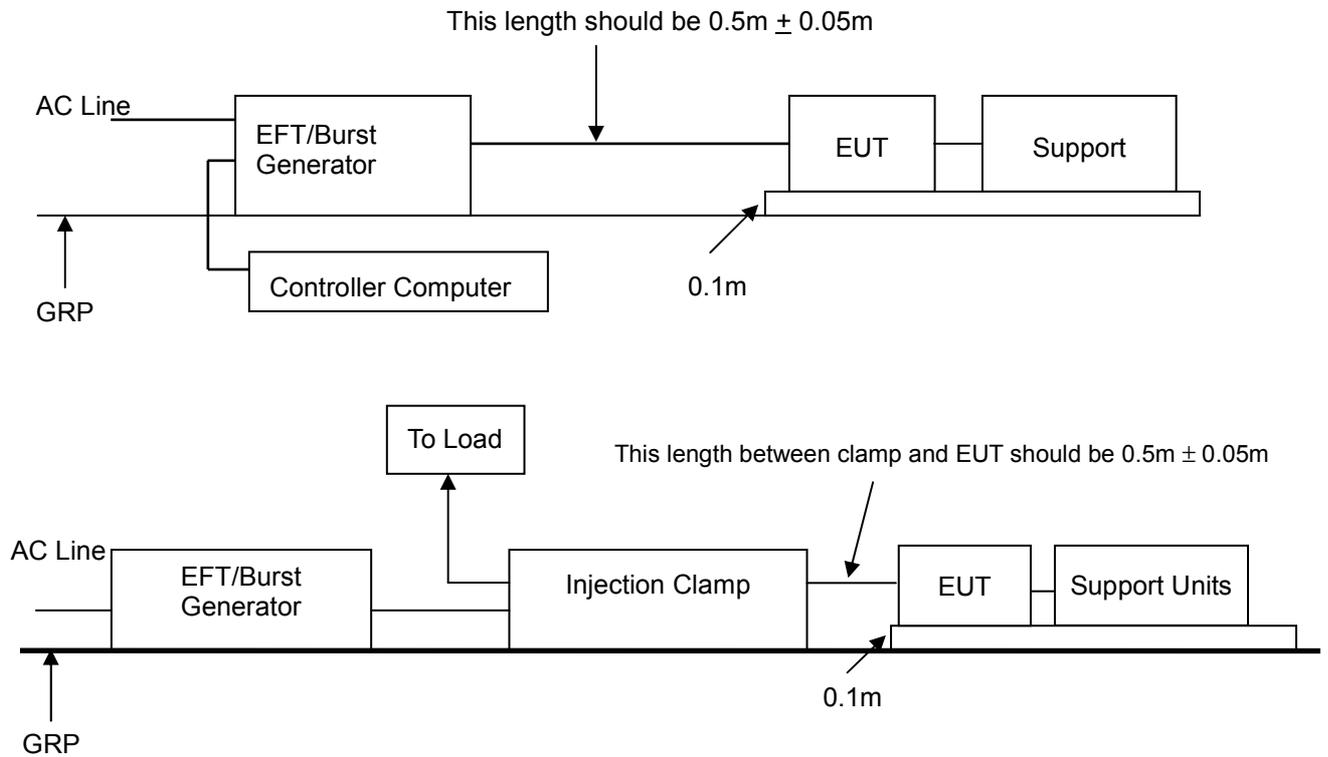
10.2. Test Severity Levels

The following test severity levels are recommended for the fast transient/burst test :

Open circuit output test voltage $\pm 10\%$		
Level	On Power Supply	On I/O signal, data and control line
1	0.5 KV	0.25 KV
2	1.0 KV	0.50 KV
3	2.0 KV	1.00 KV
4	4.0 KV	2.00 KV
X	Specified	Specified

Remark : “ X ” is an open level. The level is subject to negotiation between the user and manufacturer or is specified by the manufacturer.

10.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.1m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.



10.4. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
TRANSIENT	EMCPARTNER	TRA2000IN6	901	2016.03.26	2017.03.25
CDN	EMCPARTNER	CDN2000-06-32	121	2016.03.26	2017.03.25
Coupling clamp	EMCPARTNER	CN-EFT1000	547	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-005	2016.03.29	2017.03.28



10.5. Test Result and Data

Basic Standard : IEC 61000-4-4
 Product Standard : EN 50130-4: 2011
 Product Standard : EN 55024 : 2010
 Equipment : Outdoor Station
 Model No. : DH-VTO1220B
 Final Test Result : PASS
 Temperature : 25°C
 Relative Humidity : 49%
 Atmospheric Pressure : 101 kPa
 Test Date : Sep 23, 2016

Test Mode 1:
 For EN 55024: 2010

Pulse : 5/50 ns		Repetition Rate: 5 kHz			
Burst : 15m/300ms		Test time : 1 min/each condition			
Voltage/ Mode/ Polarity/ Result/ Phase		<u>0.5 kV</u>		<u>1.0 kV</u>	
		+	-	+	-
Power Line	L	---	---	A	A
	N	---	---	A	A
	L-N	---	---	A	A
Signal Line	RJ45	A	A	---	---



For EN 50130-4: 2011

Test Voltage: AC 230V/50Hz

Pulse : 5/50 ns		Repetition Rate: 5/100 kHz			
Burst : 15m/300ms		Test time : 1 min/each condition			
Voltage/ Mode/ Polarity/ Result/ Phase		1 kV		2.0 kV	
		+	-	+	-
Power Line	L	---	---	A	A
	N	---	---	A	A
	L-N	---	---	A	A
Signal Line	RJ45	A	A	---	---

Test Voltage: AC 195.5V/50Hz

Pulse : 5/50 ns		Repetition Rate: 5/100 kHz			
Burst : 15m/300ms		Test time : 1 min/each condition			
Voltage/ Mode/ Polarity/ Result/ Phase		1 kV		2.0 kV	
		+	-	+	-
Power Line	L	---	---	A	A
	N	---	---	A	A
	L-N	---	---	A	A
Signal Line	RJ45	A	A	---	---

Test Voltage: AC 253V/50Hz

Pulse : 5/50 ns		Repetition Rate: 5/100 kHz			
Burst : 15m/300ms		Test time : 1 min/each condition			
Voltage/ Mode/ Polarity/ Result/ Phase		1 kV		2.0 kV	
		+	-	+	-
Power Line	L	---	---	A	A
	N	---	---	A	A
	L-N	---	---	A	A
Signal Line	RJ45	A	A	---	---

Test engineer: Sun. Zhang



10.6. Test Photographs

Main





LAN





11. Surge Immunity Test

11.1. Test Procedure

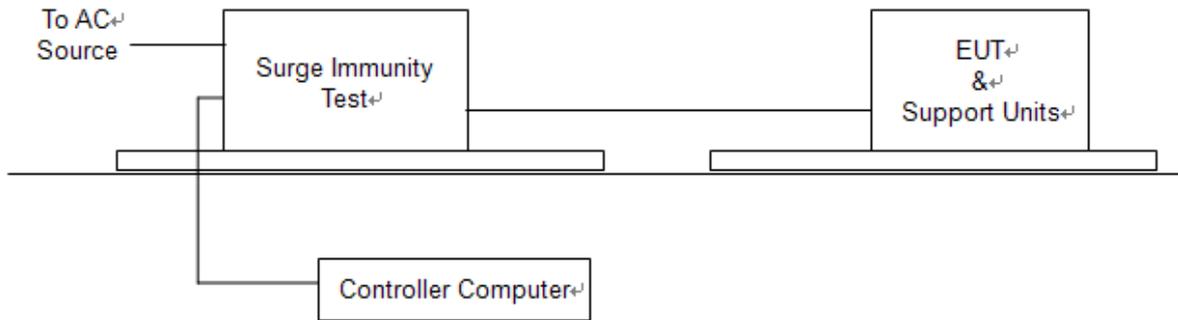
- a. Climatic conditions
The climatic conditions shall comply with the following requirements :
 - ambient temperature : 15 °C to 35 °C
 - relative humidity : 10 % to 75 %
 - atmospheric pressure : 86 kPa to 106 kPa (860 mbar to 1060 mbar)
- b. Electromagnetic conditions
the electromagnetic environment of the laboratory shall not influence the test results.
- c. The test shall be performed according the test plan that shall specify the test set-up with
 - generator and other equipment utilized;
 - test level (voltage/current);
 - generator source impedance;
 - internal or external generator trigger;
 - number of tests : at least five positive and five negative at the selected points;
 - repetition rate : maximum 1/min.
 - inputs and outputs to be tested;
 - representative operating conditions of the EUT;
 - sequence of application of the surge to the circuit;
 - phase angle in the case of AC. power supply;
 - actual installation conditions, for example :
 - AC : neutral earthed,
 - DC : (+) or (-) earthed to simulated the actual earthing conditions.
- d. If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the AC. voltage wave (positive and negative).
- e. The surges have to be applied line to line and line(s) and earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.
- f. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan.
- g. All lower levels including the selected test level shall be satisfied. For testing the secondary protection, the output voltage of the generator shall be increased up to the worst-case voltage breakdown level (let-through level) of the primary protection.
- h. If the actual operating signal sources are not available, that may be simulated. Under no circumstances may the test level exceed the product specification. The test shall be carried out according to a test plan.
- i. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied. For acceptance test previously unstressed equipment shall be used to the protection devices shall be replaced.

11.2. Test Severity Level

Level	Open-circuit test voltage, $\pm 10\%$, KV
1	0.5
2	1.0
3	2.0
4	4.0
X	Specified
NOTE: "X" is an open class. This level can be specified in the product specification.	



11.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

11.4. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
TRANSIENT	TESEQ	NSG 3060	1830	2016.02.04	2017.02.03
CDN	TESEQ	CDN 3061	1575	2016.02.04	2017.02.03
CDN	TESEQ	CNV508T5	P 1546167499	2016.02.17	2017.02.16
CDN	TESEQ	CDN HSS-2	41020	2016.02.24	2017.02.23
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-005	2016.03.29	2017.03.28



11.5. Test Result and Data

Basic Standard : IEC 61000-4-5
 Product Standard : EN 50130-4: 2011
 Product Standard : EN 55024 : 2010
 Equipment : Outdoor Station
 Model No. : DH-VTO1220B
 Final Test Result : PASS
 Temperature : 25°C
 Relative Humidity : 50%
 Atmospheric Pressure : 101 kPa
 Test Date : Sep 23, 2016

Test Mode 1:
 For EN 55024: 2010

Power Port

Test Voltage: AC 230V/50Hz						
Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 20 time/each condition						
/Phase Voltage / Mode / Polarity / Result			0°	90°	180°	270°
<u>0.5/1.0 kV</u>	L-N	+	A	A	A	A
		-	A	A	A	A

Signal Port

Waveform :10/700µs Repetition rate : 60 sec Time : 5 time/each condition					
Voltage		<u>0.5 kV</u>		<u>1 kV</u>	
Mode / Polarity / Result		+	-	+	-
RJ45		A	A	A	A



For EN 50130-4: 2011

Power Port

Test Voltage: AC 230V/50Hz						
Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 20 time/each condition						
/Phase Voltage / Mode / Polarity / Result			0°	90°	180°	270°
<u>0.5/1.0 kV</u>	L-N	+	A	A	A	A
		-	A	A	A	A

Signal Port

Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 5 time/each condition					
Voltage		<u>0.5 kV</u>		<u>1 kV</u>	
Mode / Polarity / Result		+	-	+	-
RJ45		A	A	A	A

Waveform : 10/700µs Repetition rate : 60 sec Time : 5 time/each condition					
Voltage		<u>0.5 kV</u>		<u>1 kV</u>	
Mode / Polarity / Result		+	-	+	-
RJ45		A	A	A	A

Power Port

Test Voltage: AC 195.5V/50Hz						
Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 20 time/each condition						
/Phase Voltage / Mode / Polarity / Result			0°	90°	180°	270°
<u>0.5/1.0 kV</u>	L-N	+	A	A	A	A
		-	A	A	A	A



Signal Port

Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 5 time/each condition					
Voltage		<u>0.5 kV</u>		<u>1 kV</u>	
Mode / Polarity / Result		+	-	+	-
RJ45		A	A	A	A

Waveform : 10/700µs Repetition rate : 60 sec Time : 5 time/each condition					
Voltage		<u>0.5 kV</u>		<u>1 kV</u>	
Mode / Polarity / Result		+	-	+	-
RJ45		A	A	A	A

Power Port

Test Voltage: AC 253V/50Hz						
Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 20 time/each condition						
/Phase Voltage / Mode / Polarity / Result			0°	90°	180°	270°
<u>0.5/1.0 kV</u>	L-N	+	A	A	A	A
		-	A	A	A	A

Signal Port

Waveform : 1.2/50µs(8/20µs) Repetition rate : 60 sec Time : 5 time/each condition					
Voltage		<u>0.5 kV</u>		<u>1 kV</u>	
Mode / Polarity / Result		+	-	+	-
RJ45		A	A	A	A

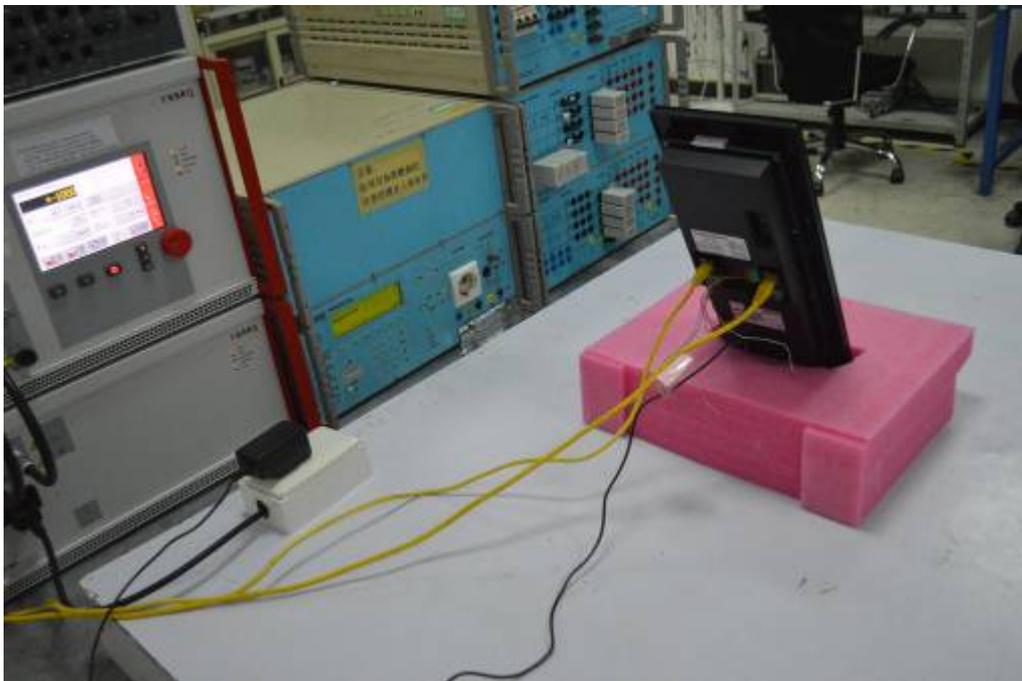


Waveform : 10/700μs Repetition rate : 60 sec Time : 5 time/each condition				
Voltage	0.5 kV		1 kV	
Mode / Polarity / Result	+	-	+	-
RJ45	A	A	A	A

Test engineer: Sun. Zhang



11.6. Test Photographs





12. Conduction Disturbances induced by Radio-Frequency Fields

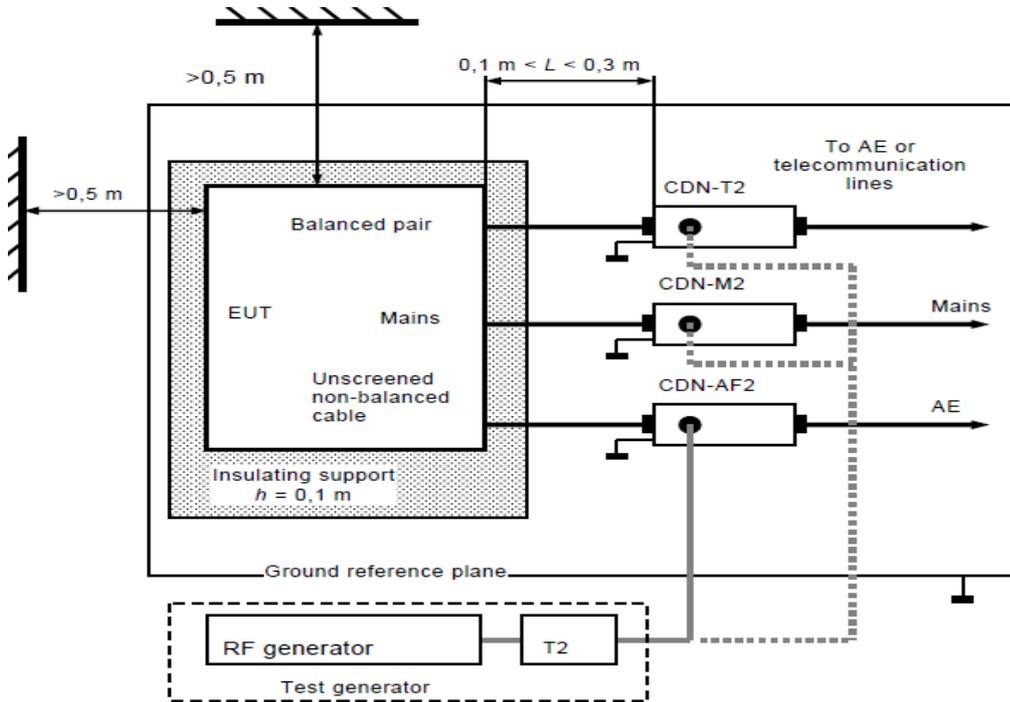
12.1. Test Procedure

- a. The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.
- b. This test method test can be performed without using a sell shielded enclosure. This is because the disturbance levels applied and the geometry of the setups are not likely to radiated a high amount of energy, especially at the lower frequencies. If under certain circumstances the radiated energy is too high, a shielded enclosure has to be used.
- c. 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 ohm load resistor.
- d. The frequency range is swept from 150 KHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1KHz sign wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
- e. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency (ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
- f. An alternative test procedure may be adopted, wherein the frequency range is swept incrementally, with a step size not exceeding 4% of the start ad thereafter 4% of the preceding frequency value. The test level should be at least twice the value of the specified test level.
- g. In cases of dispute, the test procedure using a step size not exceeding 1% of the start and thereafter 1% of preceding frequency value shall take precedence.
- h. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.
- i. The use of special exercising programs is recommended.
- j. Testing shall be performed according to a Test Plan, which shall be included in the test report.
- k. It may be necessary to carry out some investigatory testing in order to establish some aspects of the test plan.

12.2. Test Severity Levels

Level	Voltage Level (e.m.f.)
1	1 V
2	3 V
3	10 V
x	Specified
NOTE - x is an open class. This level can be specified in the product specification.	

12.3.TEST SETUP



- Note:**
1. The EUT is setup 0.1m above Ground Reference Plane
 2. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.
 3. For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

12.4.Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Conducted immunity test system	FRANKONIA	CIT-10/75	102D1294	2016.03.26	2017.03.25
EM Injection clamp	FCC	F-203I-23MM	536	2016.03.26	2017.03.25
CDN	FRANKONIA	CDN-T2	A3010029	2016.03.26	2017.03.25
CDN	FRANKONIA	CDN-T4	A3015017	2016.03.26	2017.03.25
CDN	FRANKONIA	CDN-T8	A3022010	2016.03.26	2017.03.25
CDN	FRANKONIA	CDN-M2	A3002037	2016.03.26	2017.03.25
CDN	FRANKONIA	CDN-M2+M3	A3011102	2016.03.26	2017.03.25
CDN	FCC	CDN-M5/32	A3013024	2016.03.26	2017.03.25
6 dB Attenuator	FRANKONIA	N/A	N/A	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-005	2016.03.29	2017.03.28
EN61000-4-6	Hubert GmbH	Ver 2.21	N/A	N/A	N/A



12.5.Test Result and Data

Basic Standard : IEC 61000-4-6
 Product Standard : EN 50130-4: 2011
 Product Standard : EN 55024 : 2010
 Equipment : Outdoor Station
 Model No. : DH-VTO1220B
 Final Test Result : PASS
 Temperature : 25°C
 Relative Humidity : 49%
 Atmospheric Pressure : 101 kPa
 Test Date : Sep 23, 2016

Test Mode 1:

For EN 55024: 2010

Test Voltage: AC 230V/50Hz

Frequency : 0.15~80MHz, Modulation : AM 80%,1KHz sine wave, Dwell time: 3.0s Frequency Step Size : 1 % of preceding frequency value			
Frequency	Test mode	Voltage(V)	Result
0.15 ~ 80MHz	Power(M2)	3	A
0.15 ~ 80MHz	RJ45	3	A

For EN 50130-4: 2011

Test Voltage: AC 230V/50Hz

Frequency : 0.15~100MHz, Modulation : AM 80%,1KHz sine wave, Dwell time: 3.0s Frequency Step Size : 1 % of preceding frequency value			
Frequency	Test mode	Voltage(V)	Result
0.15 ~ 100MHz	Power(M2)	10	A
0.15 ~ 100MHz	RJ45	10	A



Test Voltage: AC 195.5V/50Hz			
Frequency : 0.15~100MHz, Modulation : AM 80%,1KHz sine wave, Dwell time: 3.0s			
Frequency Step Size : 1 % of preceding frequency value			
Frequency	Test mode	Voltage(V)	Result
0.15 ~ 100MHz	Power(M2)	10	A
0.15 ~ 100MHz	RJ45	10	A

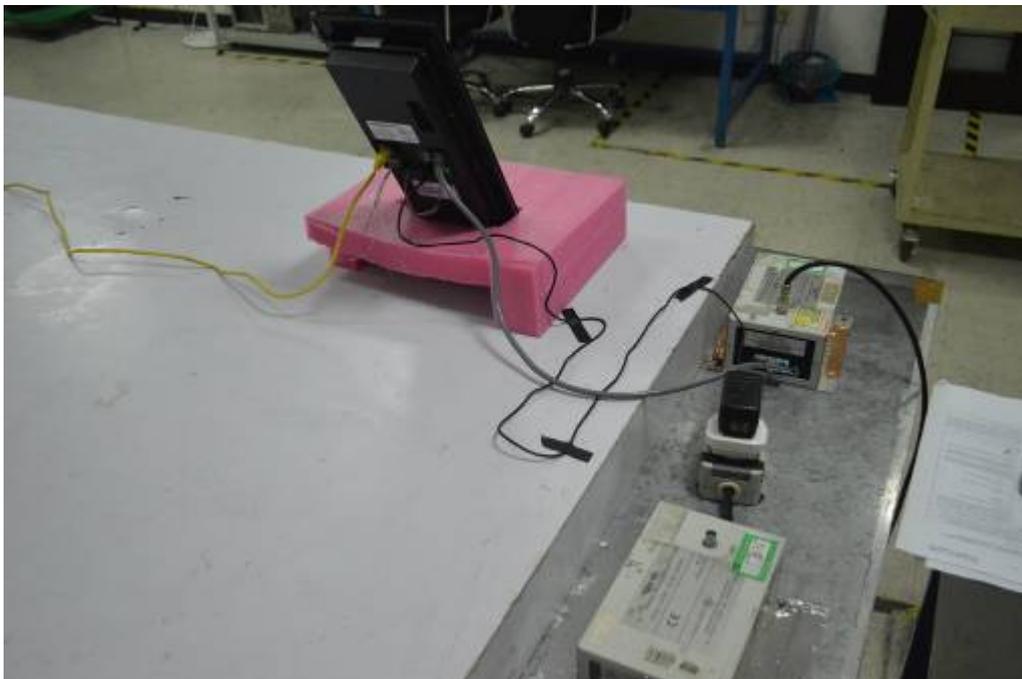
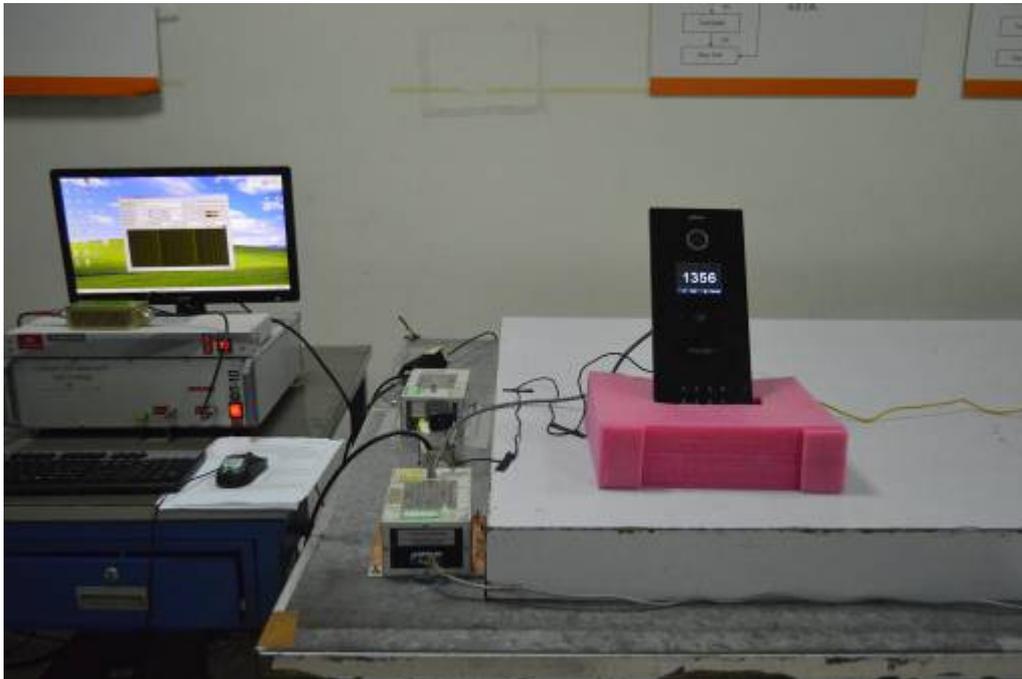
Test Voltage: AC 253V/50Hz

Frequency : 0.15~100MHz, Modulation : AM 80%,1KHz sine wave, Dwell time: 3.0s			
Frequency Step Size : 1 % of preceding frequency value			
Frequency	Test mode	Voltage(V)	Result
0.15 ~ 100MHz	Power(M2)	10	A
0.15 ~ 100MHz	RJ45	10	A

Test engineer: Sun. Zhang

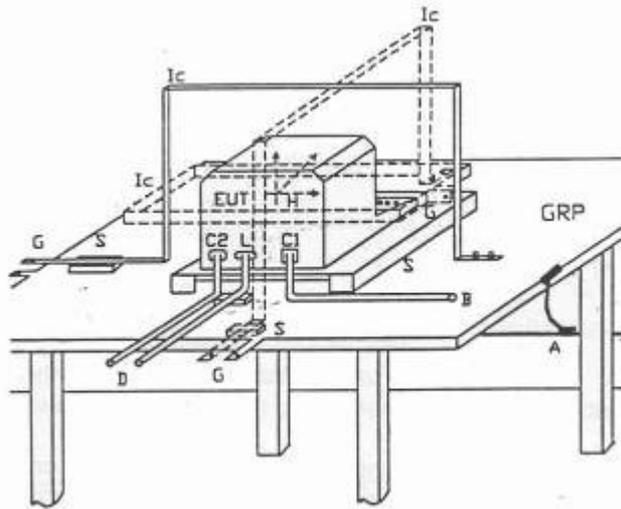


12.6. Test Photographs



13. Power Frequency Magnetic Field Immunity Test

13.1. Test Setup



- GPR : Ground plane
- A : Safety earth
- S : Insulating support
- EUT : Equipment under test
- Lc : Induction coil
- E : Earth terminal
- C1 : Power supply circuit
- C2 : Signal circuit
- L : Communication line
- B : To power supply source
- D : To signal source, simulator
- G : To the test generator

13.2. Test Severity Levels

Level	Magnetic field strength (A/m)
1	1
2	3
3	10
4	30
5	100
X ¹⁾	special

NOTE 1 "X" is an open level. This level can be given in the product specification.

13.3. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
TRANSIENT	EMCPARTNER	TRA2000IN6	901	2016.03.26	2017.03.25
H-Filed-Loop	EMCPARTNER	MF1000-1	144	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-005	2016.03.29	2017.03.28



13.4. Test Result and Data

Basic Standard : IEC 61000-4-8
Product Standard : EN 55024 : 2010
Equipment : Outdoor Station
Model No. : DH-VTO1220B
Final Test Result : PASS
Temperature : 25°C
Relative Humidity : 50%
Atmospheric Pressure : 101 kPa
Test Date : Sep 23, 2016

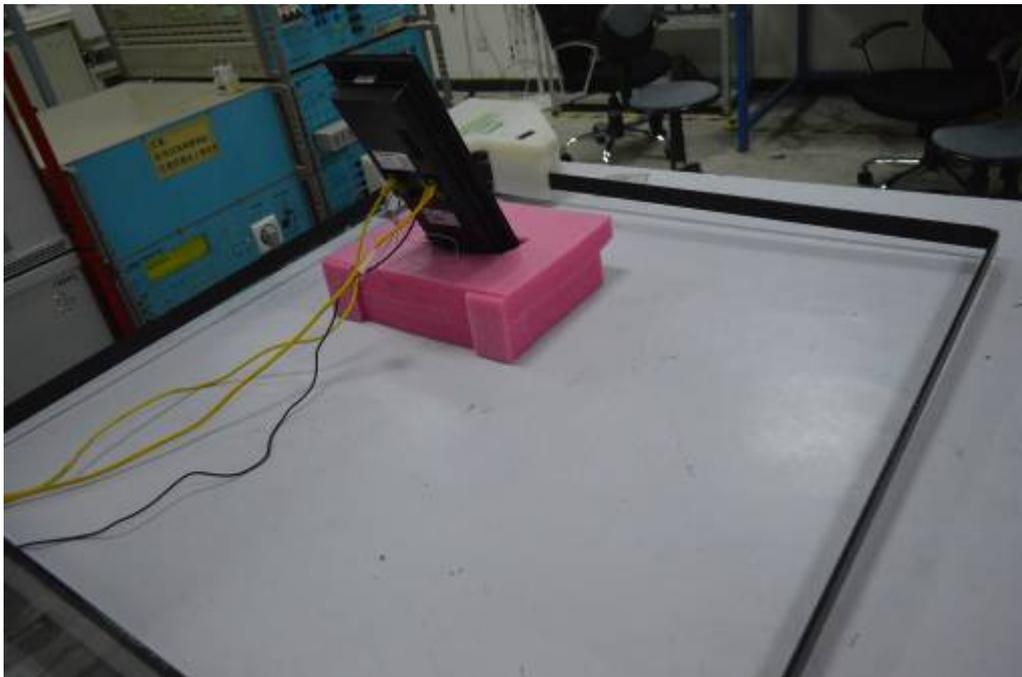
Test Mode 1:

Power Frequency Magnetic Field : <u>50</u> Hz, <u>1</u> A/m		
Coil Orientation	Testing duration	Results
X-axis	1.0 Min	A
Y-axis	1.0 Min	A
Z-axis	1.0 Min	A
Power Frequency Magnetic Field : <u>60</u> Hz, <u>1</u> A/m		
Coil Orientation	Testing duration	Results
X-axis	1.0 Min	A
Y-axis	1.0 Min	A
Z-axis	1.0 Min	A

Test engineer: Sun. Zhang



13.5. Test Photographs



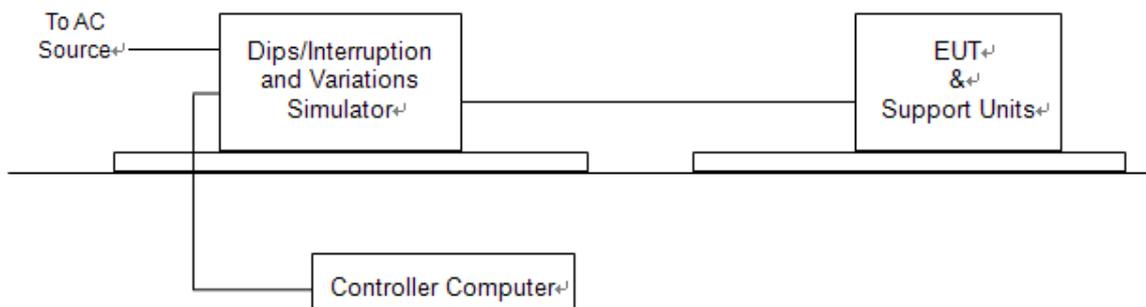
14. Voltage Dips and Voltage Interruptions Immunity Test Setup

14.1. Test Conditions

1. Source voltage and frequency : AC 100/230/240V / 50Hz, Single phase.
2. Test of interval : 10 sec.
3. Level and duration : Sequence of 3 dips/interrupts.
4. Voltage rise (and fall) time : 1 ~ 5 μ s.
5. Test severity :

Voltage dips and Interrupt reduction (%)	Test Duration (period)
>95%	250
30%	25
>95%	0.5

14.2. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

14.3. Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
TRANSIENT	EMCPARTNER	TRA2000IN6	901	2016.03.26	2017.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-005	2016.03.29	2017.03.28



14.4. Test Result and Data

Basic Standard : IEC 61000-4-11
 Product Standard : EN 55024 : 2010
 Equipment : Outdoor Station
 Model No. : DH-VTO1220B
 Final Test Result : PASS
 Temperature : 25°C
 Relative Humidity : 50%
 Atmospheric Pressure : 101 kPa
 Test Date : Sep 23, 2016

Test Mode 1:
 For EN 55024: 2010

Voltage(UT): AC 100V/50 Hz Interval(s) : 10s Times : 3										
Test mod	Test level UT %	Durations (period / ms)	Phase / Result							
			0	45	90	135	180	225	270	315
Voltage interruptions	>95%	250	C	C	C	C	C	C	C	C
Voltage dips	30%	25	B	B	B	B	B	B	B	B
	>95%	0.5	B	B	B	B	B	B	B	B

Voltage(UT): AC 230V/240 V/50 Hz Interval(s) : 10s Times : 3										
Test mod	Test level UT %	Durations (period / ms)	Phase / Result							
			0	45	90	135	180	225	270	315
Voltage interruptions	>95%	250	C	C	C	C	C	C	C	C
Voltage dips	30%	25	A	A	A	A	A	A	A	A
	>95%	0.5	A	A	A	A	A	A	A	A



For EN 50130-4: 2011

Test Voltage: AC 230V/50Hz Interval(s) : 10s Times : 3										
Test mod	Test level UT %	Durations (period / ms)	Phase / Result							
			0	45	90	135	180	225	270	315
Voltage interruptions	100%	250	A	A	A	A	A	A	A	A
Voltage dips	20%	250	A	A	A	A	A	A	A	A
	30%	25	A	A	A	A	A	A	A	A
	60%	10	A	A	A	A	A	A	A	A

100% and 20% is permitted to UPS to meet the requirements of Result A.

Test Voltage: AC 195.5V/50Hz Interval(s) : 10s Times : 3										
Test mod	Test level UT %	Durations (period / ms)	Phase / Result							
			0	45	90	135	180	225	270	315
Voltage interruptions	100%	250	A	A	A	A	A	A	A	A
Voltage dips	20%	250	A	A	A	A	A	A	A	A
	30%	25	A	A	A	A	A	A	A	A
	60%	10	A	A	A	A	A	A	A	A

100% and 20% is permitted to UPS to meet the requirements of Result A.

Test Voltage: AC 253V/50Hz Interval(s) : 10s Times : 3										
Test mod	Test level UT %	Durations (period / ms)	Phase / Result							
			0	45	90	135	180	225	270	315
Voltage interruptions	100%	250	A	A	A	A	A	A	A	A
Voltage dips	20%	250	A	A	A	A	A	A	A	A
	30%	25	A	A	A	A	A	A	A	A
	60%	10	A	A	A	A	A	A	A	A

100% and 20% is permitted to UPS to meet the requirements of Result A.

Test engineer: Sun. Zhang



14.5. Test Photographs





15. EUT Photographs

1) EUT Photo



2) EUT Photo





3) EUT Photo



4) EUT Photo

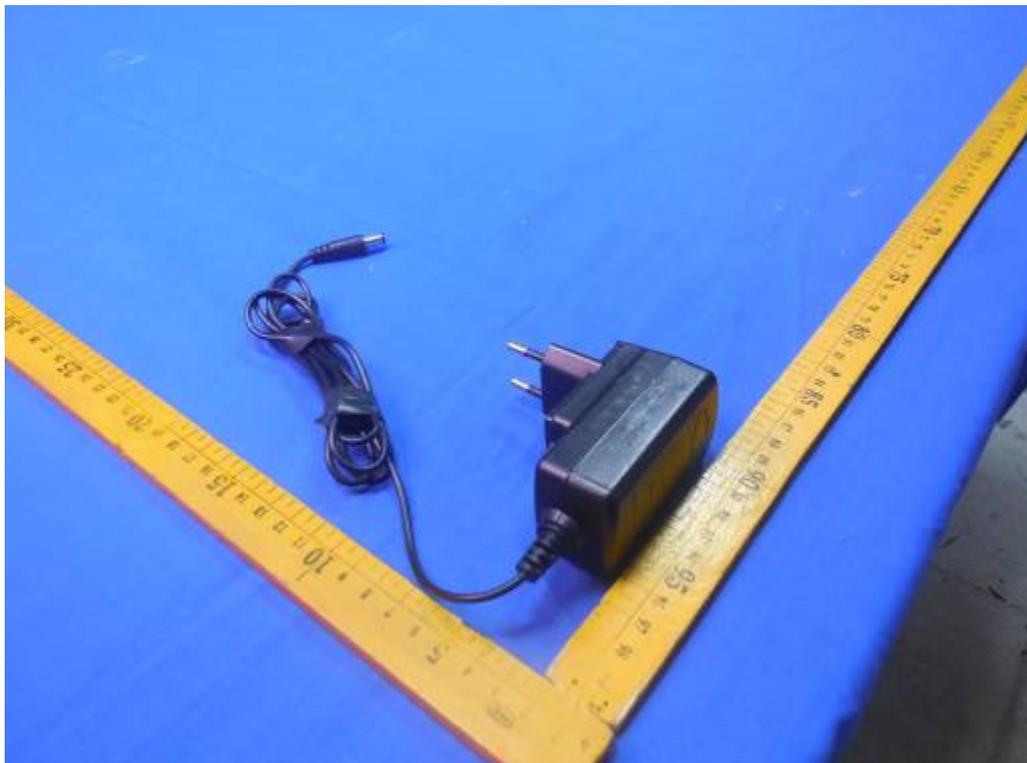




5) EUT Photo

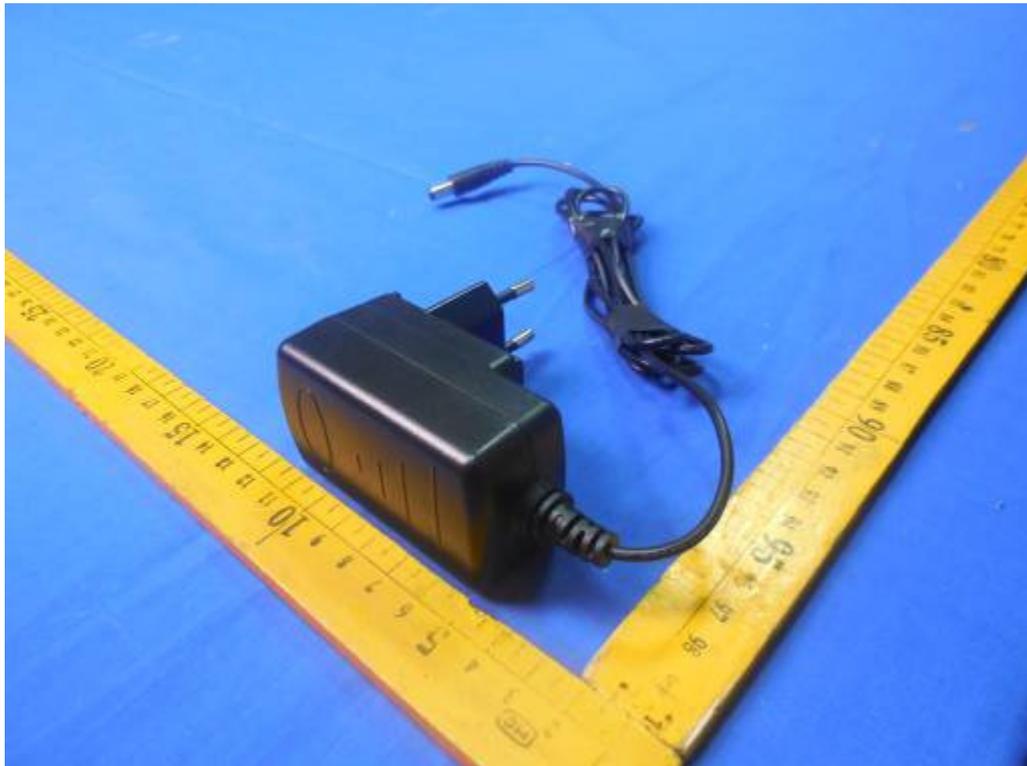


6) EUT Photo





7) EUT Photo



8) EUT Photo

