EMC TEST REPORT

Equipment	:	IP Camera
Model No.	:	GV-XBL470X-XX (X=0-9, A-Z, or Blank)
Trade Name	:	GeoVision
Applicant	:	GeoVision Inc.
Address	:	9F, No. 246, Sec.1, Neihu Rd., Neihu District, Taipei 114, Taiwan
Standard	:	EN 55032, EN 55035 EN 61000-3-2, EN 61000-3-3

HEREBY CERTIFY THAT :

The sample was received on : Jun. 11, 2019

The testing was carried out on : Jul. 13, 2019

The test result refers exclusively to the test presented test model / sample.

Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Kero Kuo / EMC/RF Manager

Testing Laboratory
1439

Contents

History of this test report

Report No.	Issue Date	Description	Version
TEEU1906015-558	Aug. 19, 2019	Original	A

Summary of Test Results

1. Applicable Standards

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 2014/30/EU.**
The energy emitted by this equipment was passed both Radiated and Conducted Emissions Class **A** limits.

Test Item	Normative References	Test Result
Conducted Emission	EN 55032:2015+AC:2016	N/A
Telecom Port Conducted Emissions	EN 55032:2015+AC:2016	PASS
Radiated Emission	EN 55032:2015+AC:2016	PASS
Harmonics	EN 61000-3-2:2014	N/A
Voltage Fluctuations	EN 61000-3-3:2013	N/A
EN 55035:2017		
Electrostatic Discharge Immunity Test (ESD)	IEC 61000-4-2:2008	PASS
Radio Frequency Electromagnetic Field Immunity Test (RS)	IEC 61000-4-3:2006+A1:2007+A2:2010	PASS
Electrical Fast Transient/ Burst Immunity Test (EFT)	IEC 61000-4-4:2012	PASS
Surge Immunity Test	IEC 61000-4-5:2014/AMD1:2017	PASS
Conduction Disturbances induced by Radio-Frequency Fields	IEC 61000-4-6:2013	PASS
Power Frequency Magnetic Field Immunity Test	IEC 61000-4-8:2009	PASS
Voltage Dips and Voltage Interruptions Immunity Test	IEC 61000-4-11:2004/AMD1:2017	N/A

Note*: Pass criterion is defined by the applicant. The test report is to follow the applicant specification.
The principle of judgment is made according to the laboratory's test report and measurement uncertainty standard procedures.

2. Immunity Testing Performance Criteria Definition

Criteria **A** : Normal performance within limits specified by the manufacture, requestor or purchaser.

Criteria **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.

Criteria **C** : Temporary loss of function or degradation of performance, the correction of which requires operation intervention.

Criteria **D** : Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data.

3. General Description

3.1. Product Details

Please refer to user manual.

3.2. Accessories

N/A

4. Test Configuration of Equipment under Test

4.1. Test Software

a. An executive program, “Web Page” was executed to capture image.
b. An executive program, “Ping.exe” was executed to capture image via the EUT to the remote workstation through LAN.
c. An executive program, “TFGEN.exe” was executed to transmit and receive data to the remote workstation through LAN. During the disturbances at telecommunication port test, the condition of LAN utilization in excess of 10%.

4.2. Test Manner

a. During testing, the interface cables and equipment positions were varied according to Europe Standard EN 55032.
b. The test modes of EMC test as follow:

Conducted Emission for telecommunication ports	
Test Mode 1	Live View + Link LAN (100Mbps), Power from PoE
Test Mode 2	Live View + Link LAN (100Mbps), Power from Adapter
caused “Test Mode 1” generated the worst case, it was reported as the final data.	
Radiation Emission	
Test Mode 1	Live View + Link LAN (100Mbps), Power from PoE
Test Mode 2	Live View + Link LAN (100Mbps), Power from Adapter
caused “Test Mode 1” generated the worst case, it was reported as the final data.	
Immunity Test (ESD, RS, EFT, SURGE, CS, PFMF test)	
Test Mode 1	Live View + Link LAN (100Mbps), Power from Adapter
Test Mode 2	Live View + Link LAN (100Mbps), Power from PoE

c. The maximum operating frequency is above 108MHz, the test frequency range is from 30MHz to 6GHz.

4.3. Description of Support Unit

EMI				
No	**Device**	**Manufacturer**	**Model No.**	**Description**
For Local				
1	Adapter	DVE	DSA-12PFT	N/A
For Remote workstation				
1	Notebook	DELL	Latitude E5440	Power Cable, Unshielding 1.8m
2	PoE	CERIO	POE-S53VG	Power Cable, Unshielding 1.8m RJ45 Cable, Unshielding 1.8m
Use Cable				
1	RJ45	N/A	N/A	Unshielding 15m
2	RJ45	N/A	N/A	Unshielding, 1.8m

EMS				
No	**Device**	**Manufacturer**	**Model No.**	**Description**
For Remote workstation				
1	Notebook	DELL	VOSTRO 3700	Power Cable, Unshielding 1.8m
2	PoE	Ubiquiti	UBI-POE-45-5G	Power Cable, Unshielding 1.8m
3	Adapter	DVE	DSA-12PFT	N/A
Use Cable				
1	RJ45	N/A	N/A	Unshielding 15m
2	RJ45	N/A	N/A	Unshielding 1.8m

4.4. General Information of Test

Test Site	**Cerpass 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
	☒ Conducted emission test (CON01-NK) ☐ Conducted emission test (CON02-NK) ☒ Radiated emission test (10M01-NK) ☐ Radiated emission test (3M01-NK) ☐ Radiated emission test (3M02-NK) ☒ Radiated disturbance above 1GHz (10M01-NK) ☐ Radiated disturbance above 1GHz (3M01-NK) ☐ Radiated disturbance above 1GHz (3M02-NK)
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.

5. Test of Conducted Emission

5.1. 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.

Requirements for conducted emissions from the AC mains power ports of Class A equipment

Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class A limits dB(μV)
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.				

Requirements for conducted emissions from the AC mains power ports of Class B equipment

Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class B limits dB(μV)
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 - 30			46
	5 - 30			50
NOTE Apply A9.1 and A9.2 across the entire frequency range.				

Requirements for asymmetric mode conducted emissions from Class A equipment

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	
A10.3	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.

Requirements for asymmetric mode conducted emissions from Class B equipment

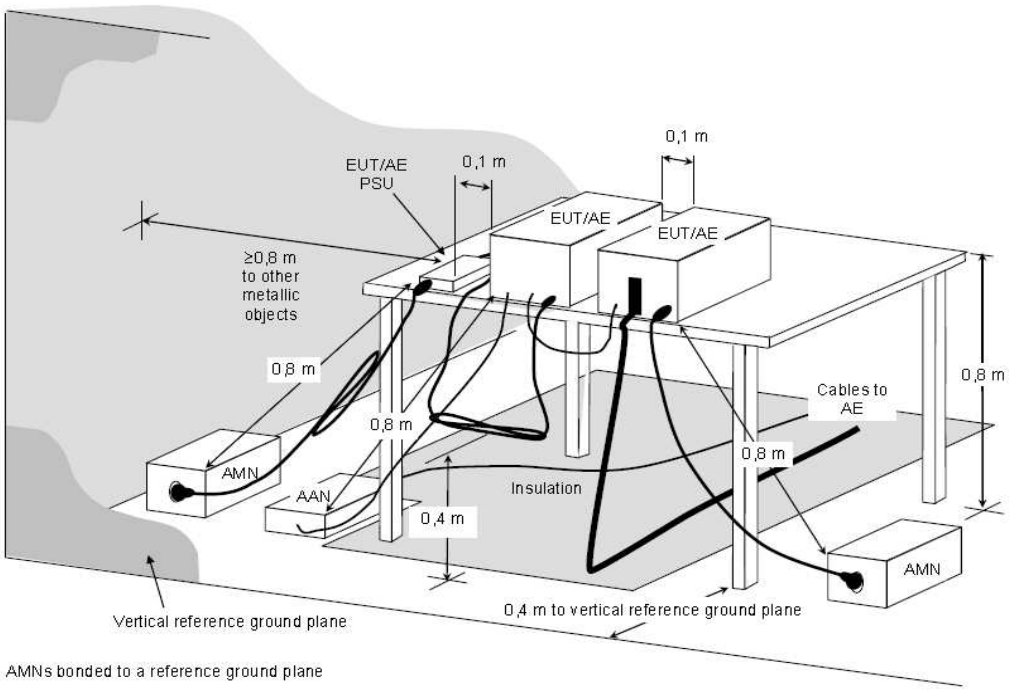
Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
A11.1	0.15 – 0.5	AAN	Quasi Peak / 9 kHz	84 – 74	n/a
	0.5 - 30			74	
	0.15 – 0.5	AAN	Average / 9 kHz	74 – 64	
	0.5 - 30			64	
A11.3	0.15 – 0.5	Current 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

NOTE 1 The choice of coupling device and measurement procedure is defined in Annex C.
NOTE 2 Screened ports including TV broadcast receiver tuner ports are tested with a common-mode impedance of 150Ω. This is typically accomplished with the screen terminated by 150Ω to earth.
NOTE 3 AC mains power ports shall meet the limits given in Table A.9.
NOTE 4 The test shall cover the entire frequency range.
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.
NOTE 6 Testing is required at only EUT supply voltage and frequency.
NOTE 7 Applicable to ports listed above and intended to connect to cables longer than 3 m.

5.2. Test Procedures

a. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The CISPR states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.3. Typical Test Setup



NOTE The 0,8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be ≥0,8 m.

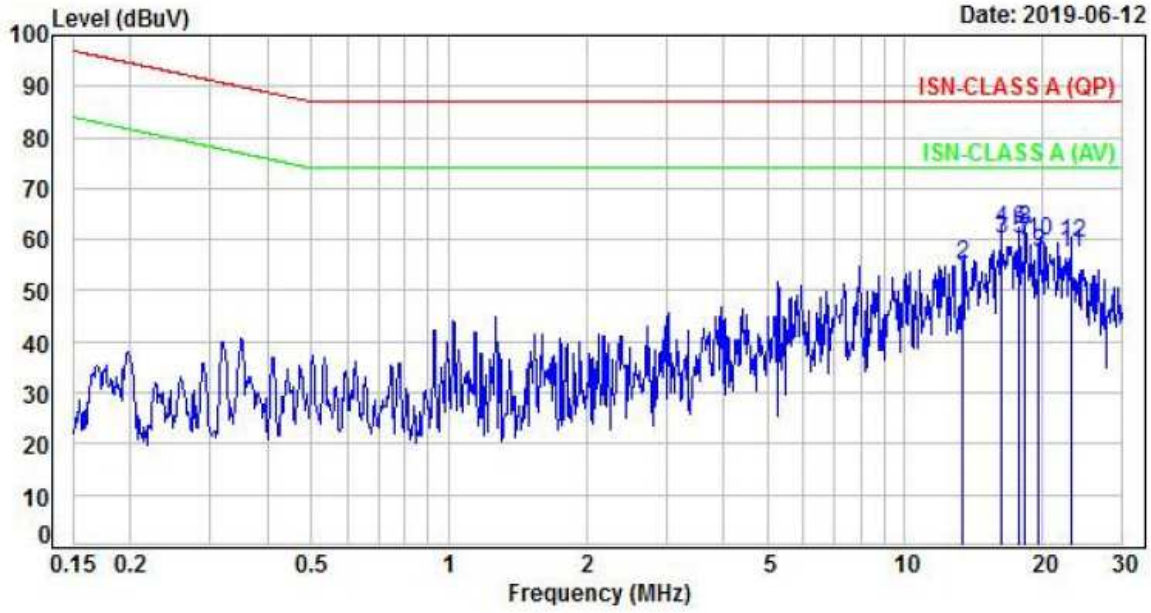
5.4. Test Result and Data of Power Port

The EUT is powered from PoE & DC Source, this test item is not applicable.

5.5. Test Result and Data of Telecommunication Port

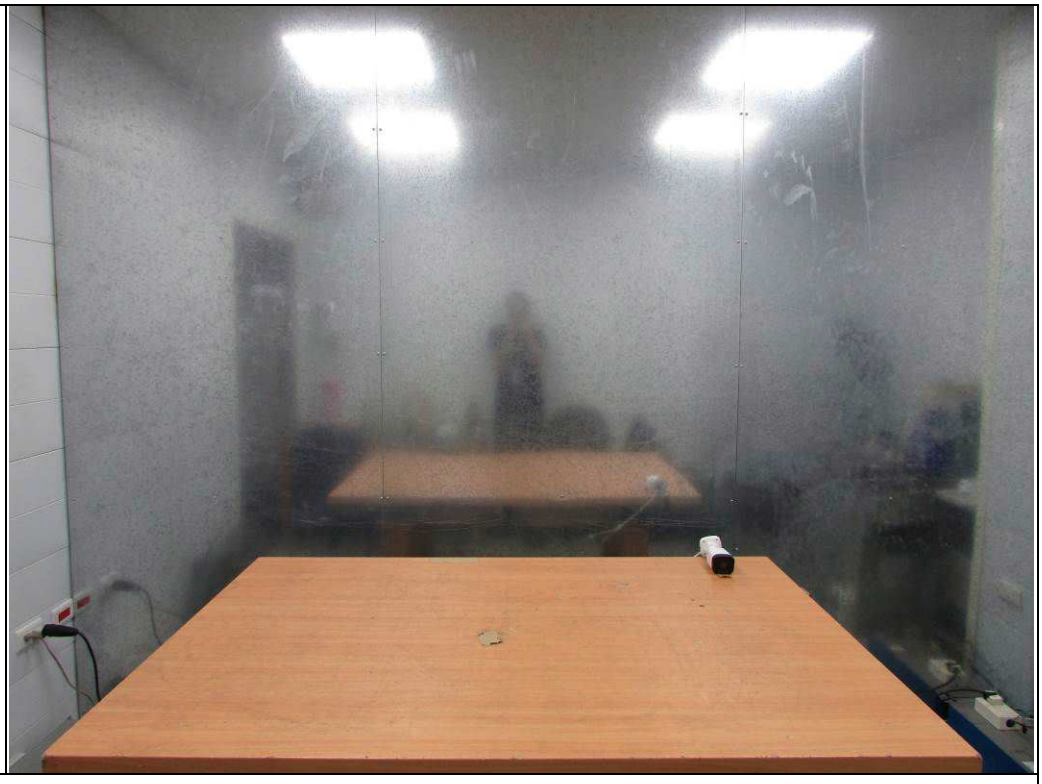
Test Mode	Mode 1	Traffic Rate	100Mbps
Test Frequency	0.15 MHz ~ 30 MHz	Test Voltage	From PoE
Test Date	Jun. 12, 2019	Test Engineer	Freeman
Temperature	20 °C	Relative Humidity	40%

Note : Level = Reading + Factor
Margin = Level – Limit
Factor= (LISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	13.42	19.61	32.96	52.57	74.00	-21.43	Average	P
2	13.42	19.61	35.61	55.22	87.00	-31.78	QP	P
3	16.23	19.68	40.27	59.95	74.00	-14.05	Average	P
4	16.23	19.68	42.41	62.09	87.00	-24.91	QP	P
5	17.75	19.71	40.21	59.92	74.00	-14.08	Average	P
6	17.75	19.71	42.33	62.04	87.00	-24.96	QP	P
7	18.24	19.71	40.15	59.86	74.00	-14.14	Average	P
8	18.24	19.71	42.33	62.04	87.00	-24.96	QP	P
9	19.71	19.75	37.74	57.49	74.00	-16.51	Average	P
10	19.71	19.75	39.79	59.54	87.00	-27.46	QP	P
11	23.13	19.88	37.72	57.60	74.00	-16.40	Average	P
12	23.13	19.88	39.51	59.39	87.00	-27.61	QP	P

5.6. Test Photographs of Telecommunication Port

Front View	
Rear View	

6. Test of Radiated Emission

6.1. 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.

Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
Fx ≤ 108 MHz	1 GHz
108 MHz < F_x ≤ 500 MHz	2 GHz
500 MHz < F_x ≤ 1 GHz	5 GHz
F_x > 1 GHz	5 x 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.

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.				

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 1000 MHz to the highest required frequency of measurement derived from Table 1.				

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.				

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 1000 MHz to the highest required frequency of measurement derived from Table 1.				

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 OATS/SAC (see Table A.1)	Harmonics 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		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.					

Requirements for conducted differential voltage emissions from Class B equipment

Table clause	Frequency Range MHz	Detector type / bandwidth	Class B limits dB(μV)75Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 - 950	For frequencies ≤1 GHz Quasi Peak / 120 kHz	46	46	46	See NOTE 1
	950 – 2 150		46	54	54	
A12.2	950 – 2 150		46	54	54	See NOTE 2
A12.3	30 – 300		46	54	50	See NOTE 3
	300 – 1 000				52	
A12.4	30 - 300	For frequencies ≥ 1 GHz Peak / 1 MHz	46	66	59	See NOTE 4
	300 – 1 000				52	
A12.5	30 - 950		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 EUT2 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.

6.2. 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 6 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 6 dB margin will be repeated one by one using the quasi-peak method and reported.

6.3. Typical Test Setup

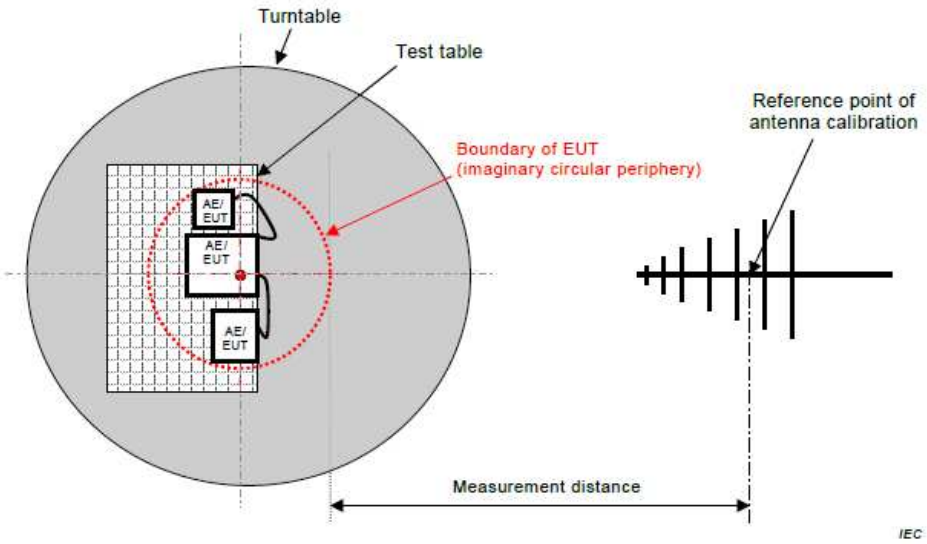
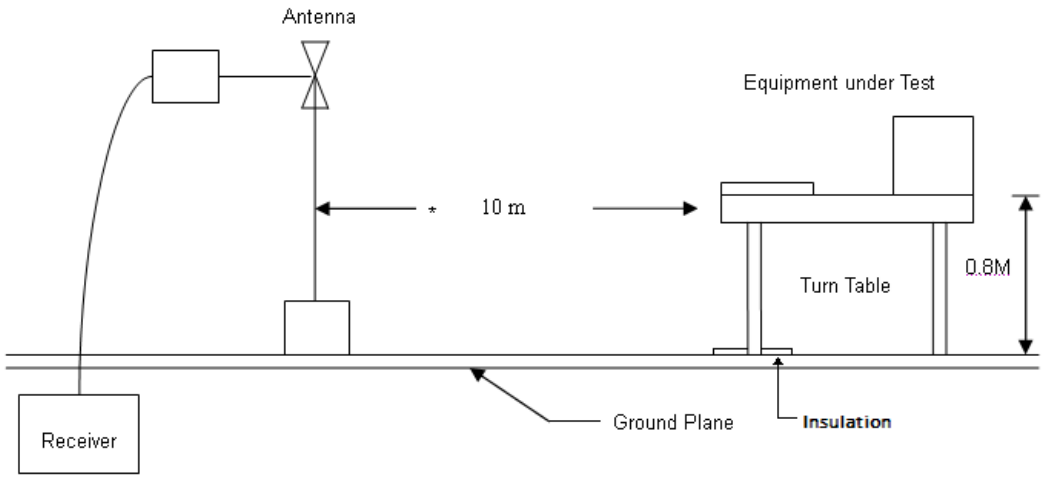
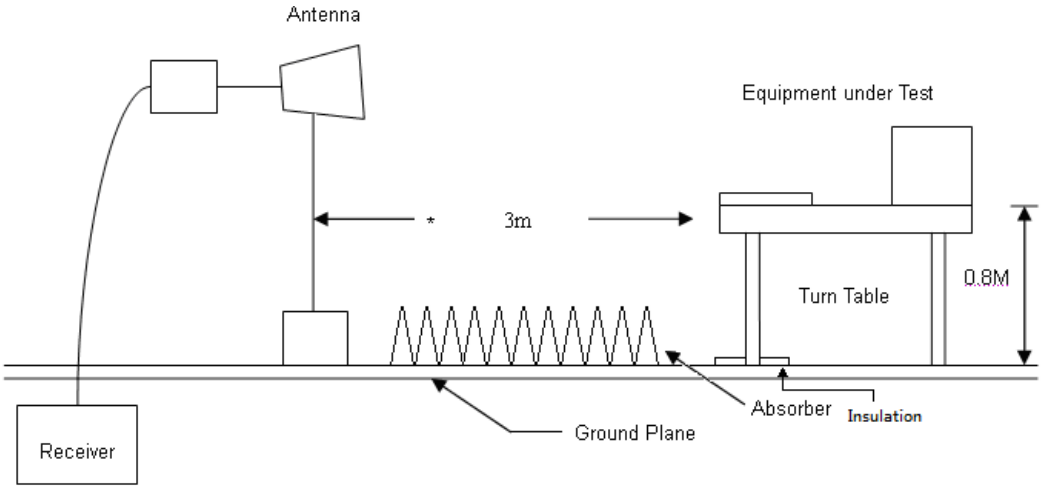


Figure C.1 – Measurement distance

Below 1GHz Test Setup



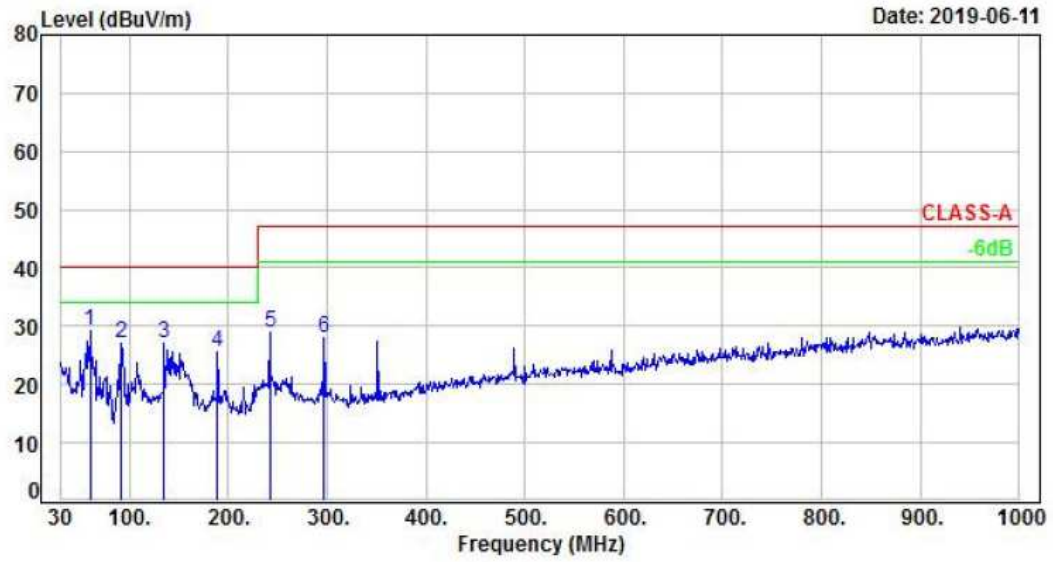
Above 1GHz Test Setup



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

Test Mode	Mode 1	Pol/Phase	VERTICAL
Test Frequency	30MHz ~ 1GHz	Test Voltage	From PoE
Test Date	Jun. 11, 2019	Test Engineer	Ming
Temperature	20 °C	Relative Humidity	40 %

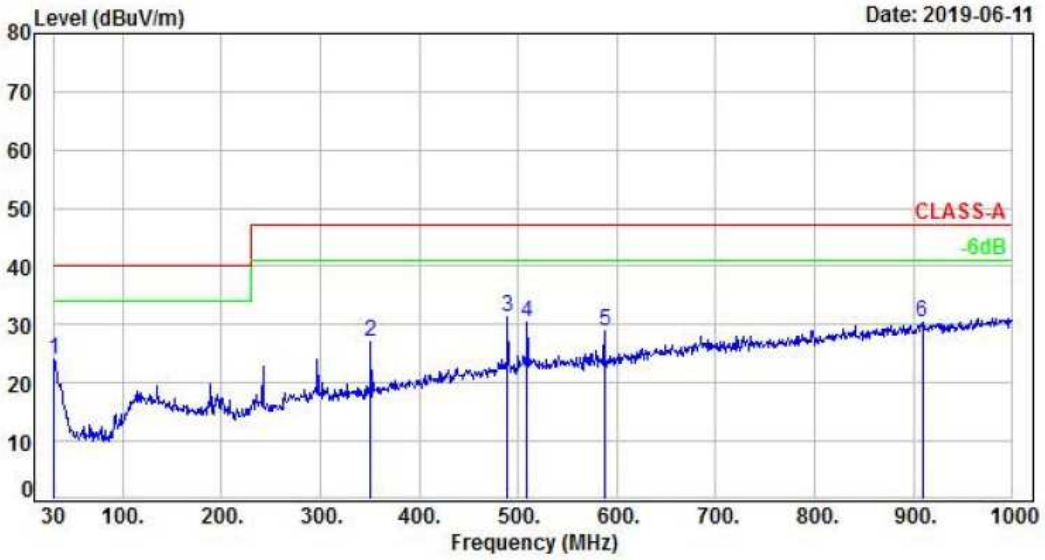
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	60.07	-15.84	45.09	29.25	40.00	-10.75	Peak	100	346	P
2	92.08	-15.48	42.70	27.22	40.00	-12.78	Peak	400	25	P
3	134.76	-9.44	36.43	26.99	40.00	-13.01	Peak	100	332	P
4	189.08	-11.61	37.31	25.70	40.00	-14.30	Peak	100	289	P
5	242.43	-11.02	39.87	28.85	47.00	-18.15	Peak	100	326	P
6	296.75	-8.95	36.90	27.95	47.00	-19.05	Peak	100	332	P

Test Mode	Mode 1	Pol/Phase	HORIZONTAL
Test Frequency	30MHz ~ 1GHz	Test Voltage	From PoE
Test Date	Jun. 11, 2019	Test Engineer	Ming
Temperature	20 °C	Relative Humidity	40 %

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor

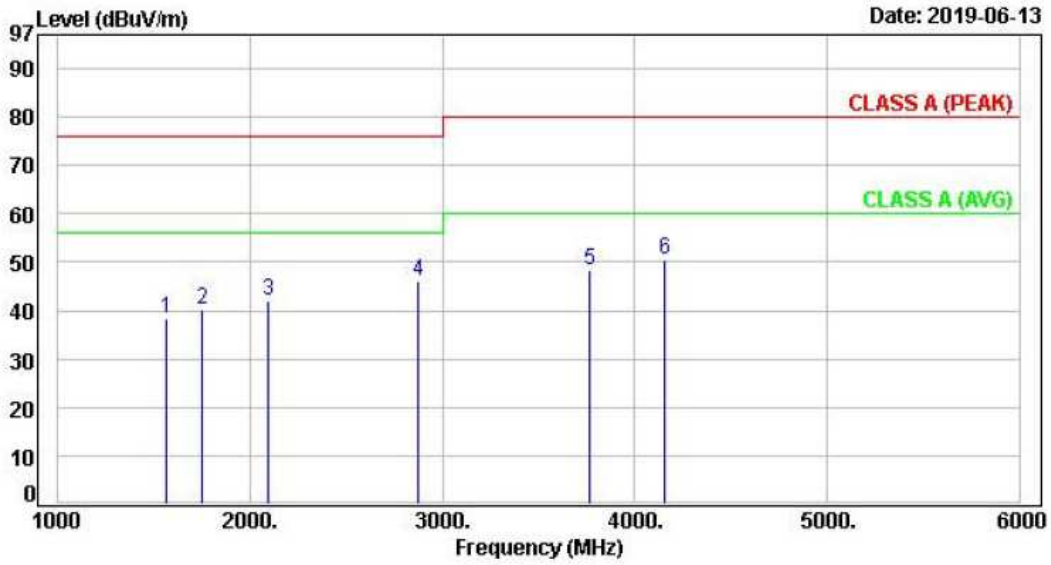


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	30.00	-2.48	26.45	23.97	40.00	-16.03	Peak	100	330	P
2	351.07	-6.90	33.98	27.08	47.00	-19.92	Peak	400	255	P
3	489.78	-2.83	34.14	31.31	47.00	-15.69	Peak	100	250	P
4	509.18	-2.45	32.92	30.47	47.00	-16.53	Peak	100	240	P
5	587.75	-1.32	30.22	28.90	47.00	-18.10	Peak	100	68	P
6	908.82	4.61	25.83	30.44	47.00	-16.56	Peak	100	167	P

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

Test Mode	Mode 1	Pol/Phase	VERTICAL
Test Frequency	1 GHz ~ 6 GHz	Test Voltage	From PoE
Test Date	Jun. 13, 2019	Test Engineer	Ming
Temperature	20 °C	Relative Humidity	40 %

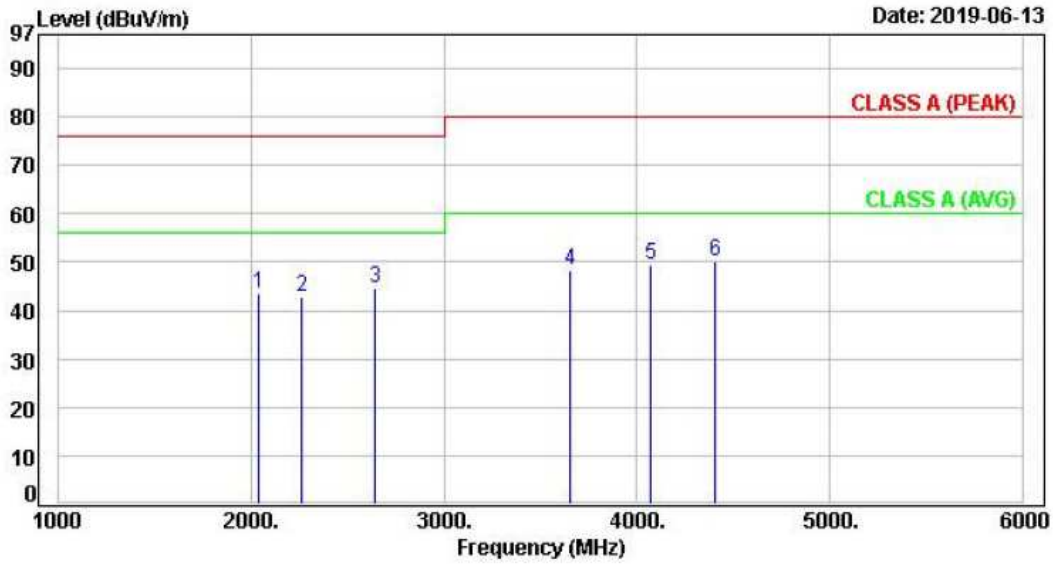
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	1570.00	-5.60	43.94	38.34	76.00	-37.66	Peak	400	0	P
2	1750.00	-4.25	44.43	40.18	76.00	-35.82	Peak	400	0	P
3	2100.00	-1.98	43.85	41.87	76.00	-34.13	Peak	400	0	P
4	2875.00	1.38	44.58	45.96	76.00	-30.04	Peak	400	0	P
5	3760.00	4.98	43.26	48.24	80.00	-31.76	Peak	400	0	P
6	4155.00	6.30	44.06	50.36	80.00	-29.64	Peak	400	0	P

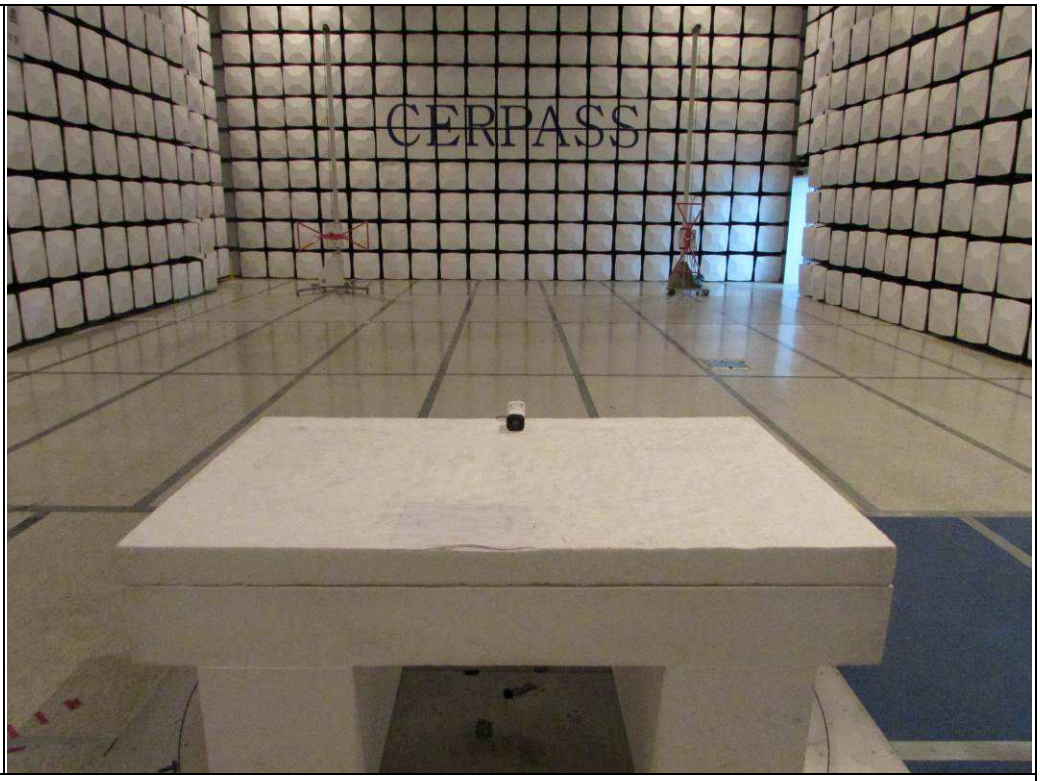
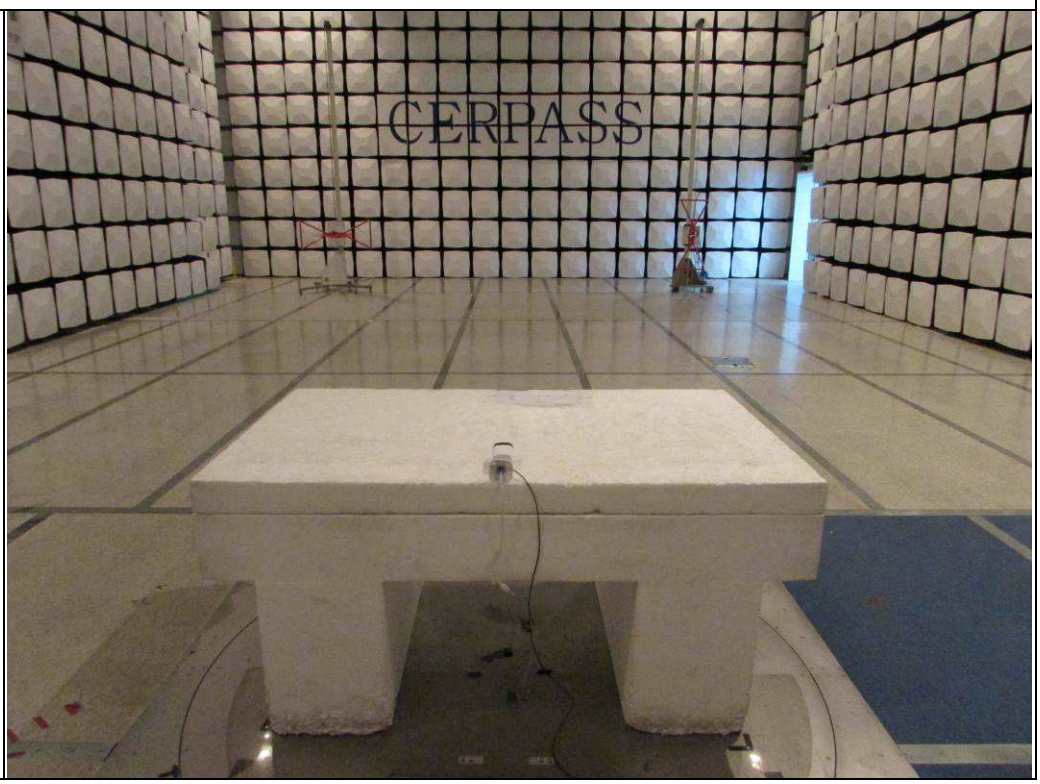
Test Mode	Mode 1	Pol/Phase	HORIZONTAL
Test Frequency	1 GHz ~ 6 GHz	Test Voltage	From PoE
Test Date	Jun. 13, 2019	Test Engineer	Ming
Temperature	20 °C	Relative Humidity	40 %

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor

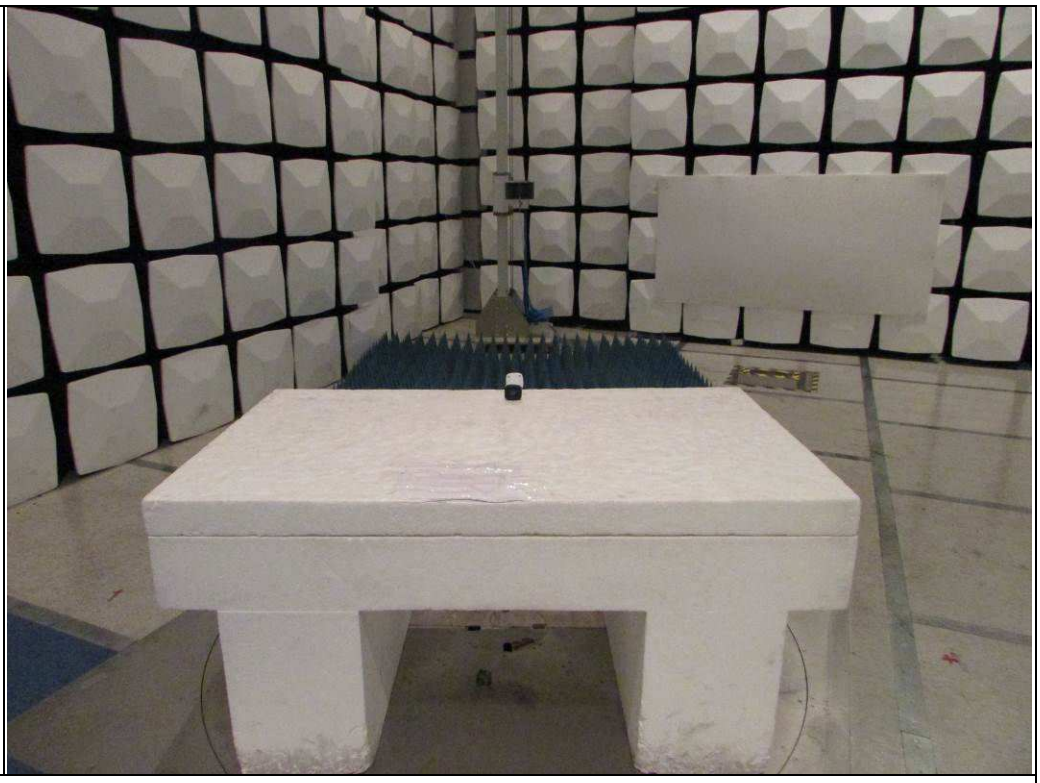


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2040.00	-2.21	45.85	43.64	76.00	-32.36	Peak	100	0	P
2	2260.00	-1.35	44.25	42.90	76.00	-33.10	Peak	100	0	P
3	2640.00	0.26	44.47	44.73	76.00	-31.27	Peak	100	0	P
4	3655.00	4.48	43.93	48.41	80.00	-31.59	Peak	100	0	P
5	4070.00	6.20	43.32	49.52	80.00	-30.48	Peak	100	0	P
6	4400.00	6.58	43.71	50.29	80.00	-29.71	Peak	100	0	P

6.6. Test Photographs (30MHz ~ 1GHz)

Front View	
Rear View	

6.7. Test Photographs (1GHz ~ 6GHz)

Front View	
Rear View	

7. Harmonics Test

7.1. Limits of Harmonics Current Measurement

Limits for Class A equipment	
Harmonics Order	Max. Permissible Harmonics current
n	A
Odd Harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15×15/n
Even Harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23×8/n

Limits for Class D equipment		
Harmonics Order	Max. Permissible Harmonics current per	Max. Permissible Harmonics current
n	Watt mA/W	A
Odd Harmonics only		
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15<=n<=39	3.85/n	0.15 x15/n

NOTE:

1. Class A and Class D are classified according to item section 5 of EN 61000-3-2:2014.
2. According to section 7 of EN 61000-3-2:2014, the above limits for all equipment except for lighting equipment are for all applications having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.2. Test Requirement

The repeatability of the average value for the individual harmonic currents over the entire test observation period shall be better than ±5 % of the applicable limit, when the following conditions are met:
– the same equipment under test (EUT) (not another of the same type, however similar);
– identical test conditions;
– the same test system;
– identical climatic conditions, if relevant.
Note:
This repeatability requirement serves the purpose of defining the necessary observation period, see 6.2.4.
It is not intended to serve as a pass/fail criterion for the assessment of compliance with the requirements of this standard.

7.3. Test Result and Data

The limits are not specified for equipment with rated power of 75W or less.
The EUT meets the above condition, so it conforms to EN 61000-3-2.

8. Voltage Fluctuations Test

8.1. 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 ±8% is achieved during the whole assessment procedure.

8.2. Test Result and Data

The EUT is powered from PoE & DC Source, this test item is not applicable.

9. Electrostatic Discharge Immunity Test

9.1. Test Procedure

a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
- ambient temperature: 15℃ to 35℃;
- 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 10 single discharges (in the most sensitive polarity) shall be applied on contact discharge.

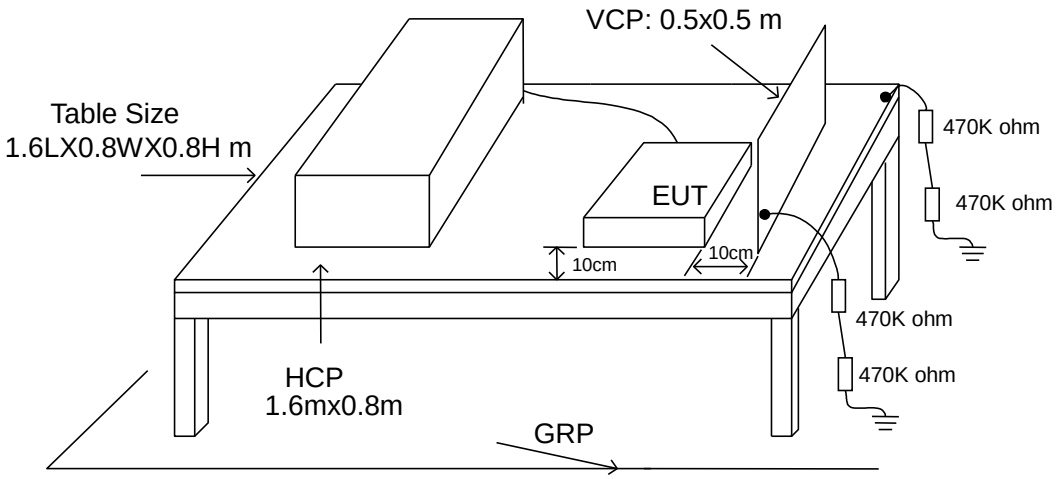
e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

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.

9.2. 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 follow 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 Cerpass 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 resister 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.

9.3. 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.			

9.4. Test Result and Data

Test Mode	Mode 1	**Final Test Result**	Pass
Test Date	Jun. 13, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	43 %
Atmospheric Pressure	1010 hPa		

Pass Performance Criteria	A
Required Performance Criteria	B
Basic Standard	IEC 61000-4-2
Product Standard	EN 55035
Test Voltage	±2 / ±4 / ±8 KV for air discharge, ±2 / ±4 KV for contact discharge

		Contact Discharge							
		10 times / each							
Voltage		**2 KV**		**4 KV**		**6 KV**		**8 KV**	
No\ Point\Polarity		+	—	+	—	+	—	+	—
---	HCP Front	A	A	A	A	---	---	---	---
---	HCP Right	A	A	A	A	---	---	---	---
---	HCP Left	A	A	A	A	---	---	---	---
---	HCP Rear	A	A	A	A	---	---	---	---
---	VCP Front	A	A	A	A	---	---	---	---
---	VCP Right	A	A	A	A	---	---	---	---
---	VCP Left	A	A	A	A	---	---	---	---
---	VCP Rear	A	A	A	A	---	---	---	---
4~9	Case	A	A	A	A	---	---	---	---
10	Screw	A	A	A	A	---	---	---	---

		Air Discharge							
		10 times / each							
Voltage		**2 KV**		**4 KV**		**8 KV**		**15 KV**	
No\ Point\Polarity		+	—	+	—	+	—	+	—
1	DC In	A	A	A	A	A	A	---	---
2	RJ45	A	A	A	A	A	A	---	---
3	Case	A	A	A	A	A	A	---	---
11	Reset	A	A	A	A	A	A	---	---
12~13	CCD	A	A	A	A	A	A	---	---
14	Case	A	A	A	A	A	A	---	---
15~18	Screw	A	A	A	A	A	A	---	---

Note: “A” means the EUT function is normal working during the test.

Test Mode	Mode 2	**Final Test Result**	Pass
Test Date	Jun. 13, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	43 %
Atmospheric Pressure	1010 hPa		

Pass Performance Criteria	A
Required Performance Criteria	B
Basic Standard	IEC 61000-4-2
Product Standard	EN 55035
Test Voltage	±2 / ±4 / ±8 KV for air discharge, ±2 / ±4 KV for contact discharge

		Contact Discharge							
		10 times / each							
Voltage		**2 KV**		**4 KV**		**6 KV**		**8 KV**	
No\ Point\Polarity		+	—	+	—	+	—	+	—
---	HCP Front	A	A	A	A	---	---	---	---
---	HCP Right	A	A	A	A	---	---	---	---
---	HCP Left	A	A	A	A	---	---	---	---
---	HCP Rear	A	A	A	A	---	---	---	---
---	VCP Front	A	A	A	A	---	---	---	---
---	VCP Right	A	A	A	A	---	---	---	---
---	VCP Left	A	A	A	A	---	---	---	---
---	VCP Rear	A	A	A	A	---	---	---	---
4~9	Case	A	A	A	A	---	---	---	---
10	Screw	A	A	A	A	---	---	---	---

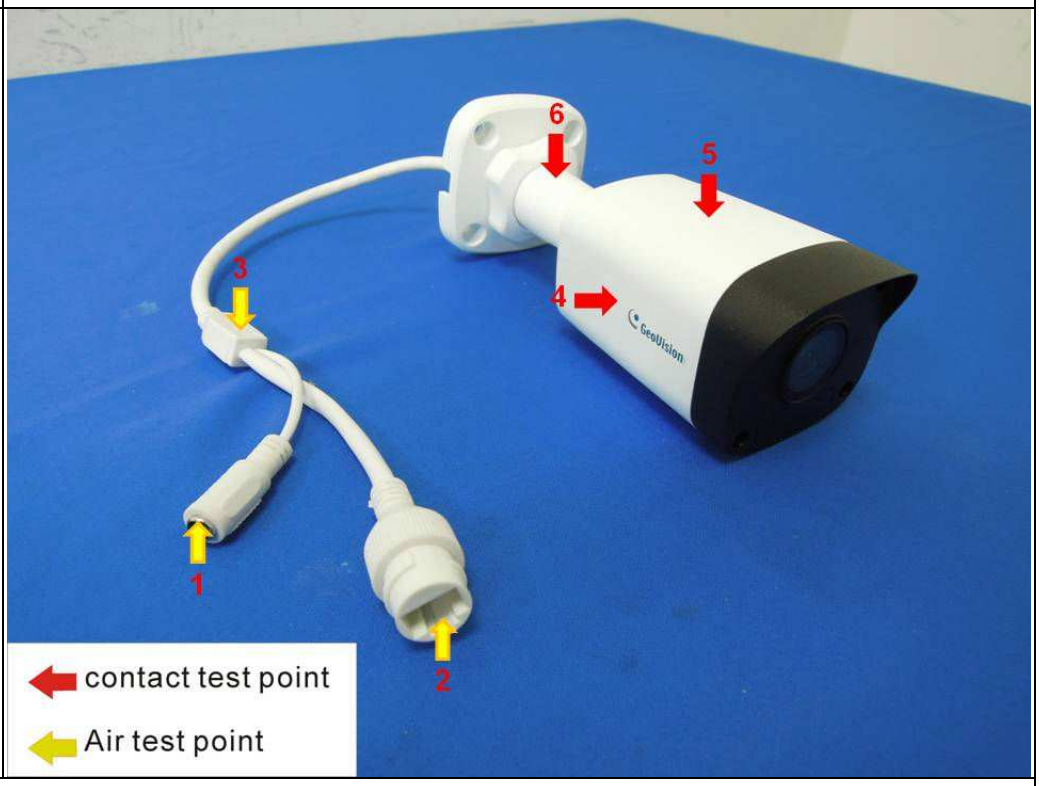
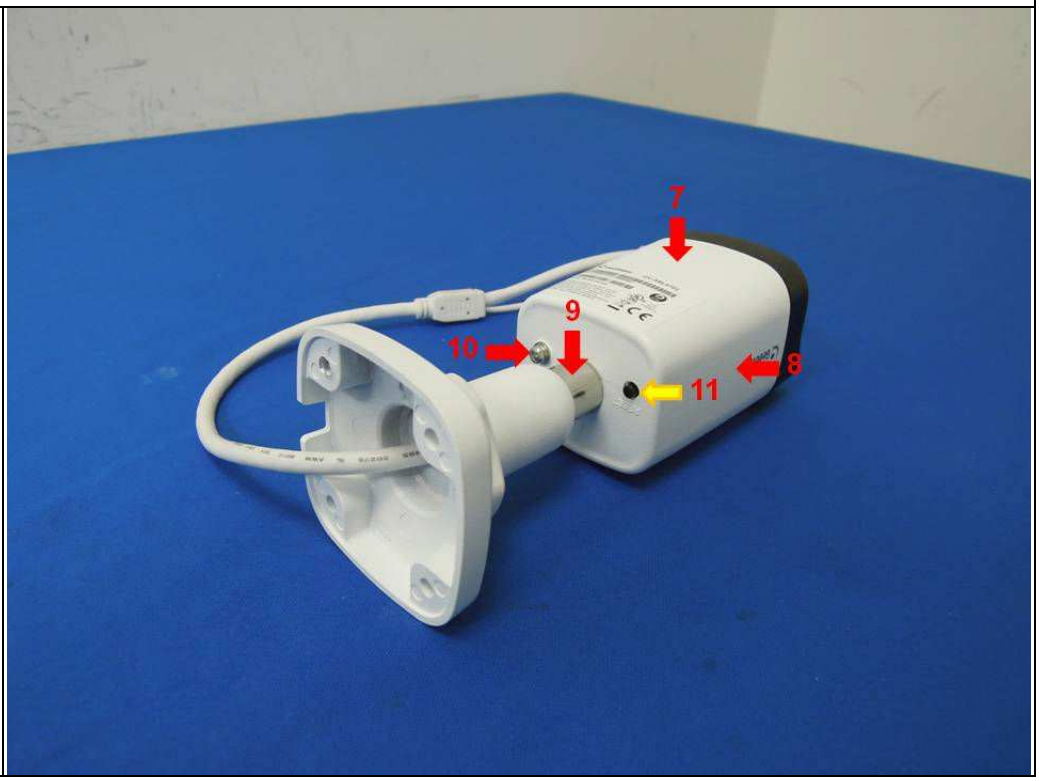
		Air Discharge							
		10 times / each							
Voltage		**2 KV**		**4 KV**		**8 KV**		**15 KV**	
No\ Point\Polarity		+	—	+	—	+	—	+	—
1	DC In	N/A	N/A	N/A	N/A	N/A	N/A	---	---
2	RJ45	A	A	A	A	A	A	---	---
3	Case	A	A	A	A	A	A	---	---
11	Reset	A	A	A	A	A	A	---	---
12~13	CCD	A	A	A	A	A	A	---	---
14	Case	A	A	A	A	A	A	---	---
15~18	Screw	A	A	A	A	A	A	---	---

Note: “A” means the EUT function is normal working during the test.

9.5. Test Photographs

Test Mode	Mode 1
Front View	
Test Mode	Mode 2
Front View	

9.6. Test Points

Test Mode	Mode 1 & Mode 2
Top View	
I/O View	

Test Mode	Mode 1 & Mode 2
I/O View	

10. Radio Frequency Electromagnetic Field Immunity Test

10.1.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 80-6000 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 80-6000 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*10-3 decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

10.2.Test Severity Levels

Frequency Band : 80-6000 MHz	
Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified
Remark: “X” is an open class.	

10.3.Test Result and Data

Test Mode	Mode 1 & Mode 2	Final Test Result	Pass
Test Date	Jun. 12, 2019	Test Engineer	Saga
Temperature	24 °C	Relative Humidity	57 %
Atmospheric Pressure	1008 hPa		

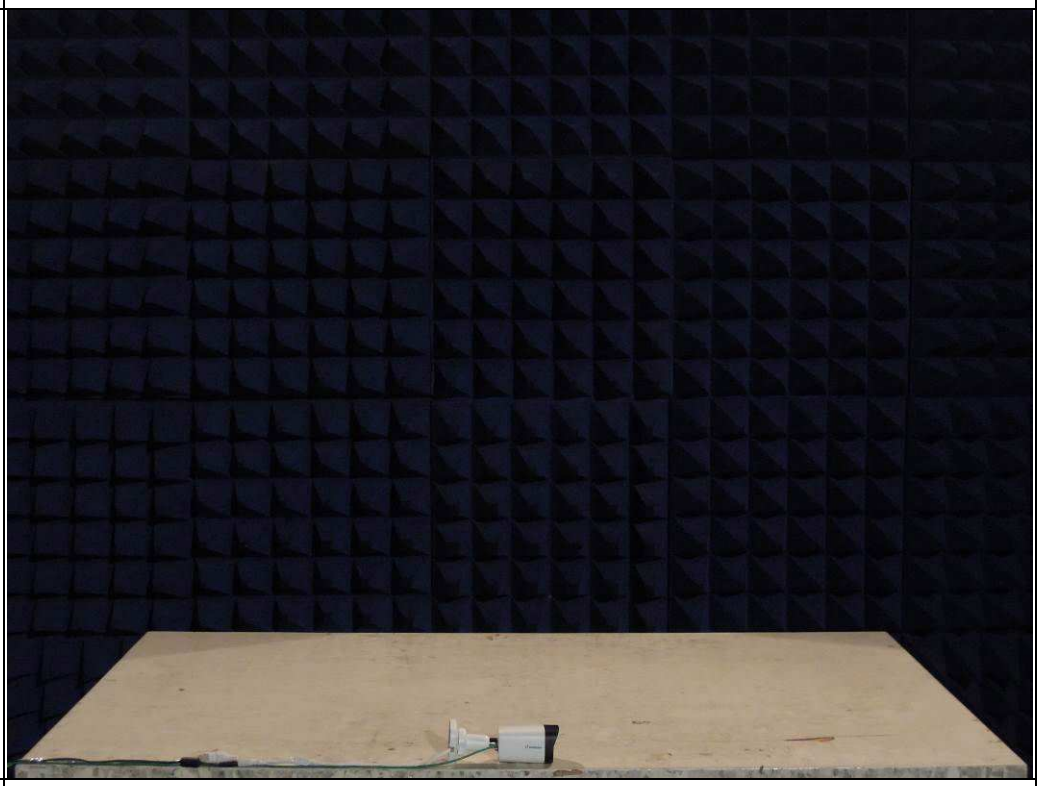
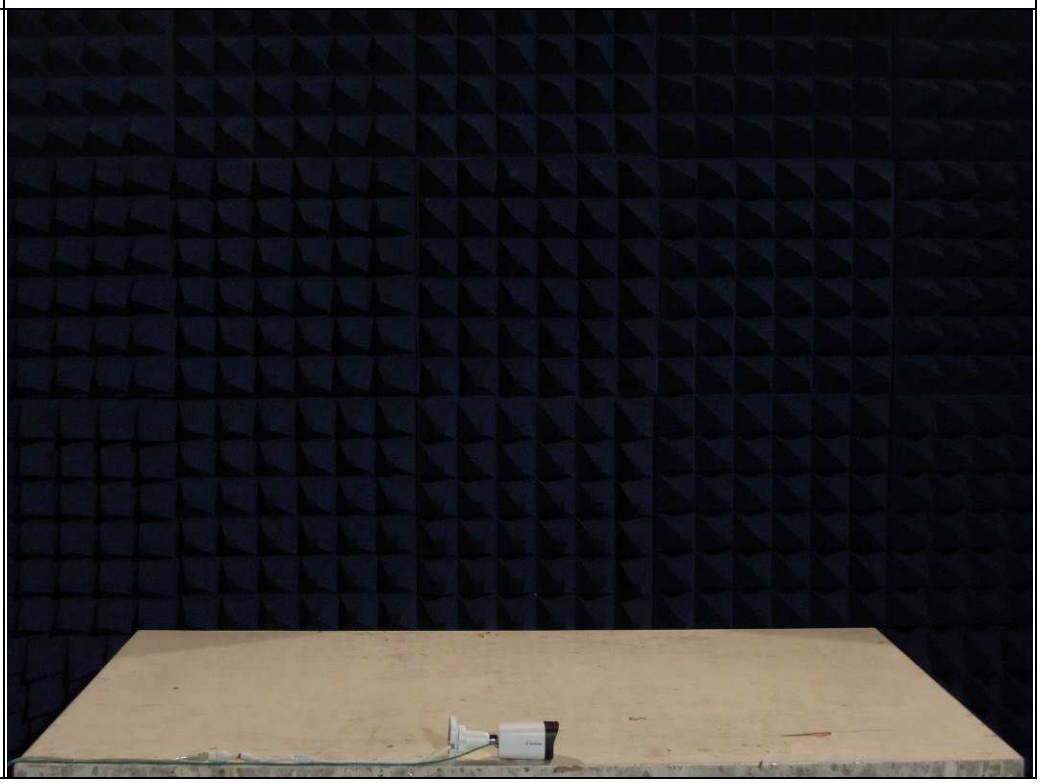
Pass Performance Criteria	A
Required Performance Criteria	A
Basic Standard	IEC 61000-4-3
Product Standard	EN 55035
Frequency Range	80~1000MHz,1800MHz, 2600MHz, 3500MHz, 5000MHz
Modulation	AM 80%, 1KHz sine wave
Dwell Time	3 S
Frequency Step Size	1 %

Frequency (MHz)	Antenna Polarization	Face	Field Strength (V/m)	Result
80~1000	Vertical	Front	3	A
80~1000	Vertical	Rear	3	A
80~1000	Vertical	Left	3	A
80~1000	Vertical	Right	3	A
80~1000	Horizontal	Front	3	A
80~1000	Horizontal	Rear	3	A
80~1000	Horizontal	Left	3	A
80~1000	Horizontal	Right	3	A

Frequency (MHz)	Antenna Polarization	Face	Field Strength (V/m)	Result
1800, 2600, 3500, 5000	Vertical	Front	3	A
1800, 2600, 3500, 5000	Vertical	Rear	3	A
1800, 2600, 3500, 5000	Vertical	Left	3	A
1800, 2600, 3500, 5000	Vertical	Right	3	A
1800, 2600, 3500, 5000	Horizontal	Front	3	A
1800, 2600, 3500, 5000	Horizontal	Rear	3	A
1800, 2600, 3500, 5000	Horizontal	Left	3	A
1800, 2600, 3500, 5000	Horizontal	Right	3	A

Note: “A” means the EUT function is normal working during the test.

10.4.Test Photographs

Test Mode	Mode 1
Front View	
Test Mode	Mode 2
Front View	

11. Electrical Fast Transient/ Burst Immunity Test

11.1. 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℃ to 35℃;
- 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).

11.2. Test Severity Levels

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

Open circuit output test voltage 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.

11.3. Test Result and Data

Test Mode	Mode 1	**Final Test Result**	Pass
Test Date	Jun. 13, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	57 %
Atmospheric Pressure	1010 hPa		

Pass performance criteria	A
Required performance criteria	B
Basic Standard	IEC 61000-4-4
Product Standard	EN 55035
Test Voltage	On Power Port -- ±0.5 KV On Telecommunication Port -- ±0.5 KV
Pulse	5/50 ns
Burst	15ms/300ms
Repetition Rate	5 kHz
Test time	1 min/each condition

For input power port				
Phase	**0.5 kV**		**1.0 kV**	
	+	—	+	—
L	A	A	---	---
N	A	A	---	---
L-N	A	A	---	---
PE	---	---	---	---
L-PE	---	---	---	---
N-PE	---	---	---	---
L-N-PE	---	---	---	---

For Telecommunication port				
Test port	**0.5 kV**		**1.0 kV**	
	+	—	**+**	—
RJ45 LAN	A	A	---	---

Note: “A” means the EUT function is normal working during the test.

Test Mode	Mode 2	Final Test Result	Pass
Test Date	Jun. 12, 2019	Test Engineer	Saga
Temperature	24 °C	Relative Humidity	57 %
Atmospheric Pressure	1008 hPa		

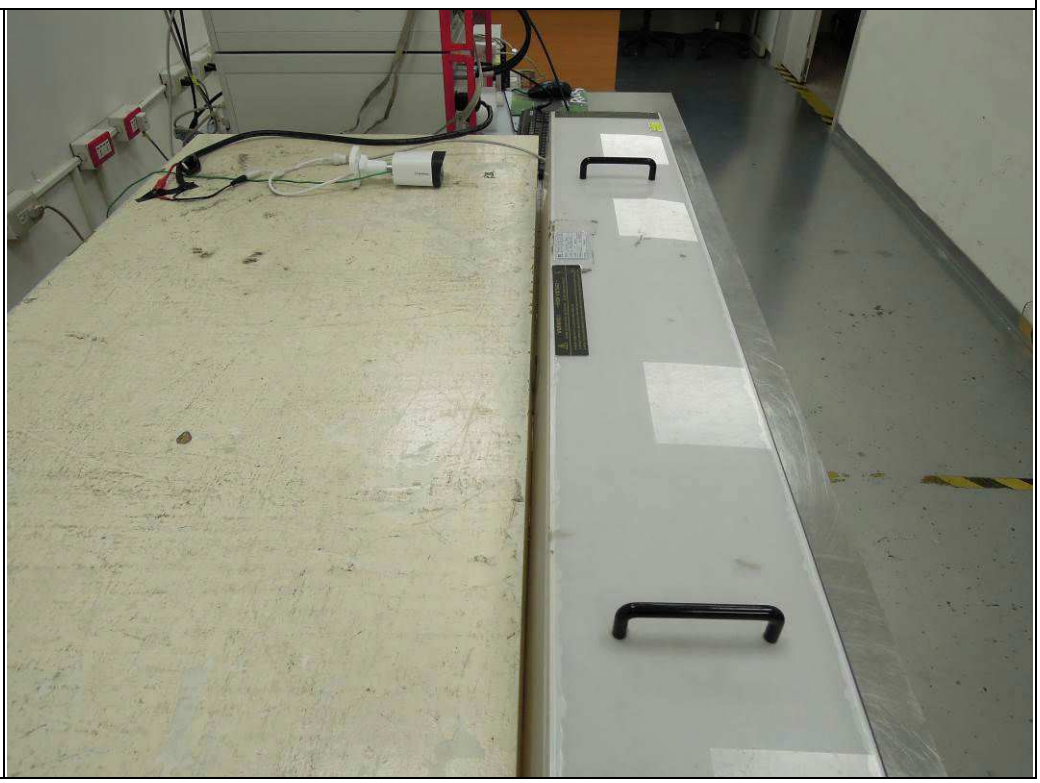
Pass Performance Criteria	A
Required Performance Criteria	B
Basic Standard	IEC 61000-4-4
Product Standard	EN 55035
Test Voltage	On Telecommunication Port -- ±0.5 KV
Pulse	5/50 ns
Burst	15ms/300ms
Repetition Rate	5 kHz
Test time	1 min/each condition

For input power port				
Phase	0.5 kV		1.0 kV	
	+	—	+	—
L	---	---	---	---
N	---	---	---	---
L-N	---	---	---	---
PE	---	---	---	---
L-PE	---	---	---	---
N-PE	---	---	---	---
L-N-PE	---	---	---	---

For Telecommunication port				
Test port	0.5 kV		1.0 kV	
	+	—	+	—
RJ45 LAN	A	A	---	---

Note: “A” means the EUT function is normal working during the test.

11.4. Test Photographs

Test Mode	Mode 1
Front View	
Clamp View	

Test Mode	Mode 2
Clamp View	

12. Surge Immunity Test

12.1. Test Procedure

a. Climatic conditions
The climatic conditions shall comply with the following requirements :
- ambient temperature : 15 ℃ to 35 ℃
- 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.

12.2. Test Severity Level

Level	Open-circuit test voltage (kV)	
	Line-to-line	Line-to-ground [b]
1	---	0.5
2	0.5	1.0
3	1.0	2.0
4	2.0	4.0
X [a]	Special	Special

[a] “X” and be any level, above, below or in between the others. The level shall be specified in the dedicated equipment specification.
[b] For symmetrical interconnection lines the test can be applied to multiple lines simultaneously with respect to ground, i.e. “lines to ground”.

12.3. Test Result and Data

Test Mode	Mode 1	**Final Test Result**	Pass
Test Date	Jun. 13, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	57 %
Atmospheric Pressure	1010 hPa		

Pass performance criteria	C for Telecommunication Port
Required performance criteria	B for Power Port; C for Telecommunication Port
Basic Standard	IEC 61000-4-5
Product Standard	EN 55035
Test Voltage	On Telecommunication Port – ± 1.0 kV
Waveform	On Telecommunication Port – 10/700
Repetition rate	60 sec
Test time	5 time/each condition

For input power port						
Voltage	**Phase**	**Polarity**	**0°**	**90°**	**180°**	**270°**
0.5 kV, 1.0kV	L-N	+	---	---	---	---
		—	---	---	---	---
0.5 kV, 1.0kV, 2.0kV	L-PE	+	---	---	---	---
		—	---	---	---	---
0.5 kV, 1.0kV, 2.0kV	N-PE	+	---	---	---	---
		—	---	---	---	---

For Telecommunication Port				
Voltage	**Test Port**	**Phase**	**Polarity**	**Result**
1.0kV	RJ45	L-PE	+	C
			—	C

Note: “C” means the power of EUT is off during the test, and it can be recover by manual resetting.

Remark: RJ45 Where normal functioning cannot be achieved because of the impact of the CDN on the EUT.

Test Mode	Mode 2	**Final Test Result**	Pass
Test Date	Jun. 12, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	57 %
Atmospheric Pressure	1008 hPa		

Pass performance criteria	C for Telecommunication Port
Required performance criteria	B for Power Port; C for Telecommunication Port
Basic Standard	IEC 61000-4-5
Product Standard	EN 55035
Test Voltage	On Telecommunication Port – ± 1.0 kV
Waveform	On Telecommunication Port – 10/700
Repetition rate	60 sec
Test time	5 time/each condition

For input power port						
Voltage	**Phase**	**Polarity**	**0°**	**90°**	**180°**	**270°**
0.5 kV, 1.0kV	L-N	+	---	---	---	---
		—	---	---	---	---
0.5 kV, 1.0kV, 2.0kV	L-PE	+	---	---	---	---
		—	---	---	---	---
0.5 kV, 1.0kV, 2.0kV	N-PE	+	---	---	---	---
		—	---	---	---	---

For Telecommunication Port				
Voltage	**Test Port**	**Phase**	**Polarity**	**Result**
1.0kV	RJ45	L-PE	+	C
			—	C

Note: “C” means the power of EUT is off during the test, and it can be recover by manual resetting.
Remark: RJ45 Where normal functioning cannot be achieved because of the impact of the CDN on the EUT.

12.4. Test Photographs

Test Mode	Mode 1
Front View	
Test Mode	Mode 2
Front View	

13. Conduction Disturbances Induced by Radio-Frequency Fields

13.1. 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 x 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.

13.2.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.	

13.3. Test Result and Data

Test Mode	Mode 1	**Final Test Result**	PASS
Test Date	Jun. 12, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	57 %
Atmospheric Pressure	1008 hPa		

Pass performance criteria	A
Required performance criteria	A
Basic Standard	IEC 61000-4-6
Product Standard	EN 55035
Frequency Range	0.15~10MHz, 10~30MHz, 30~80MHz
Modulation	AM 80%, 1KHz sine wave
Dwell time	3 S
Frequency Step Size	1 %
Coupling mode	CDN-M016M2 for DC power ports CDN-T8 for Telecommunication Ports

For input power port			
Frequency(MHz)	**Test Mode**	**Voltage(V)**	**Result**
0.15 ~ 10	Power(M2)	3	A
10 ~ 30	Power(M2)	3 ~ 1	A
30 ~ 80	Power(M2)	1	A

For Telecommunication Ports			
Frequency(MHz)	**Test Mode**	**Voltage(V)**	**Result**
0.15 ~ 10	RJ45 LAN	3	A
10 ~ 30	RJ45 LAN	3 ~ 1	A
30 ~ 80	RJ45 LAN	1	A

Note: “A” Means the EUT function is normal working during the test.

Test Mode	Mode 2	**Final Test Result**	PASS
Test Date	Jun. 12, 2019	**Test Engineer**	Saga
Temperature	24 °C	**Relative Humidity**	57 %
Atmospheric Pressure	1008 hPa		

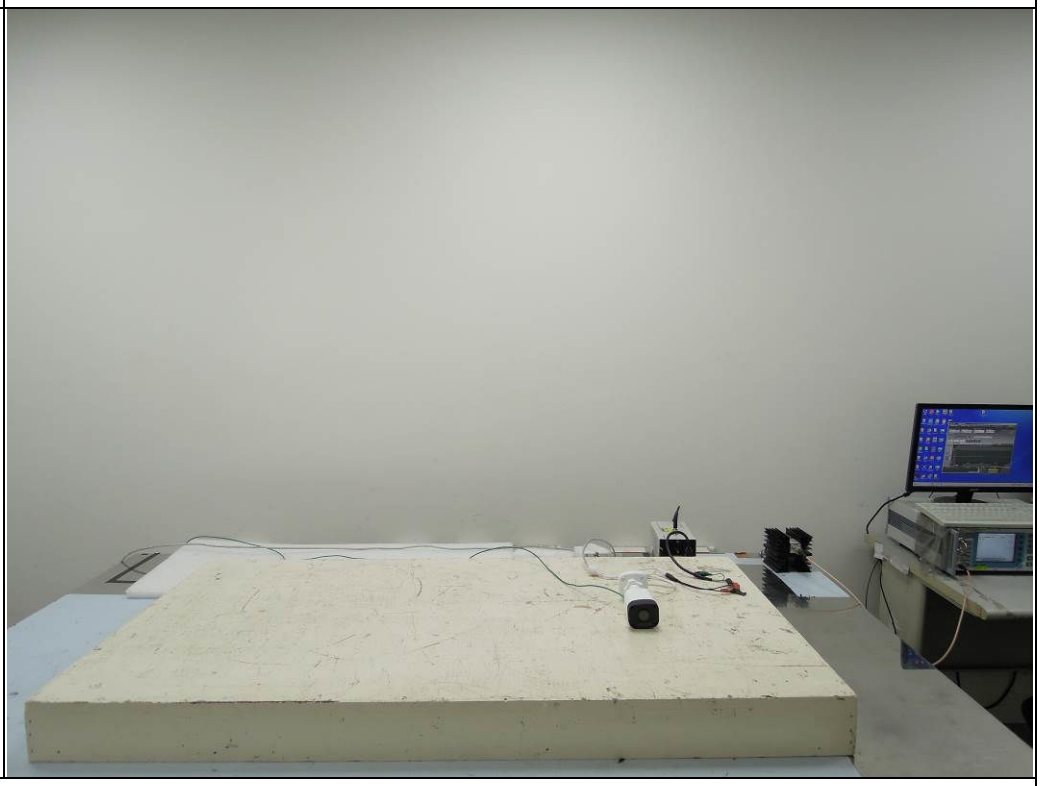
Pass performance criteria	A
Required performance criteria	A
Basic Standard	IEC 61000-4-6
Product Standard	EN 55035
Frequency Range	0.15~10MHz, 10~30MHz, 30~80MHz
Modulation	AM 80%, 1KHz sine wave
Dwell time	3 S
Frequency Step Size	1 %
Coupling mode	CDN-T8 for Telecommunication Ports

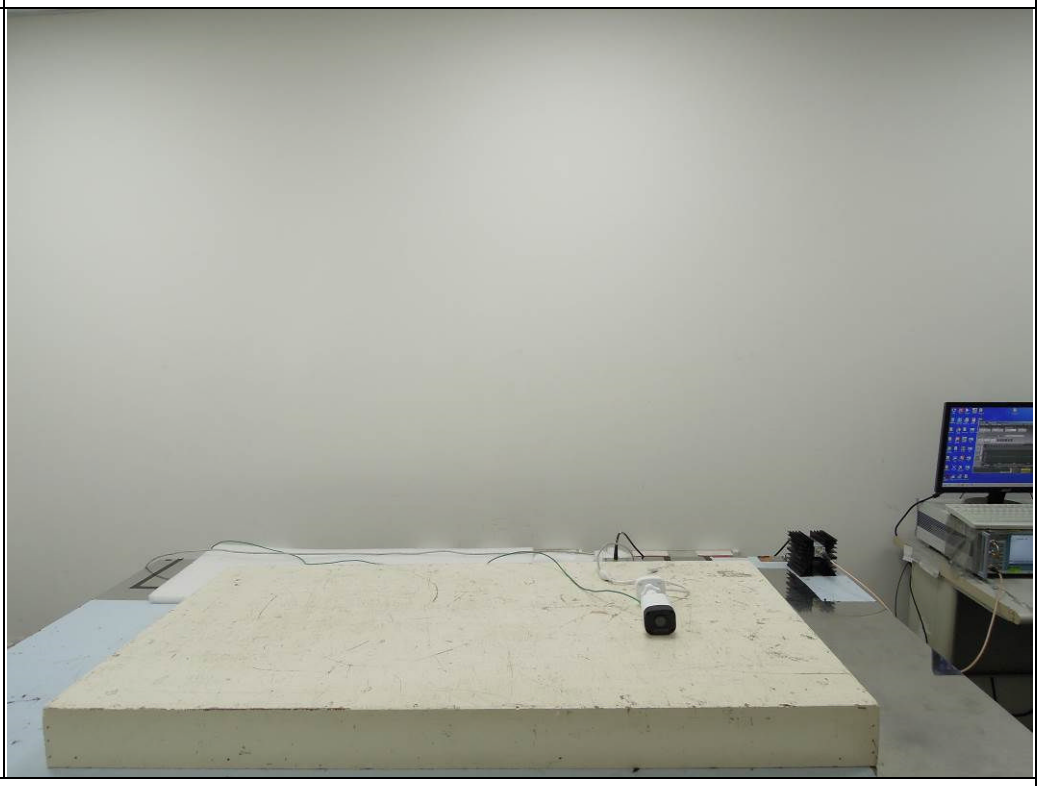
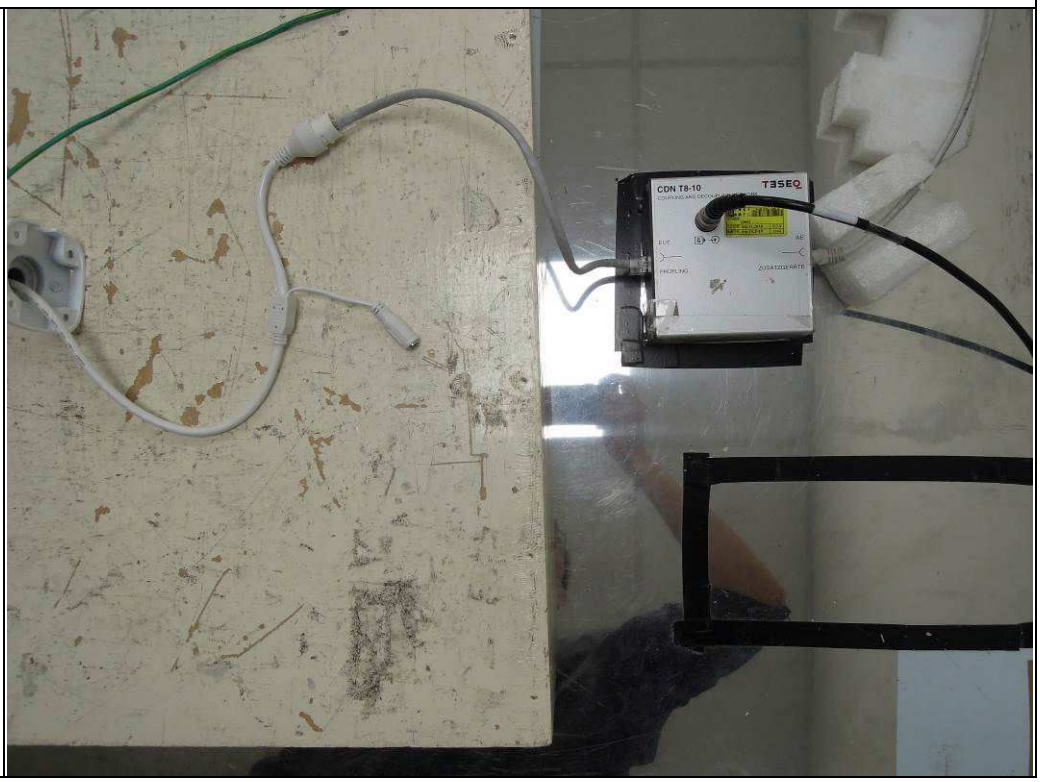
For input power port			
Frequency(MHz)	**Test Mode**	**Voltage(V)**	**Result**
0.15 ~ 10	--	--	--
10 ~ 30	--	--	--
30 ~ 80	--	--	--

For Telecommunication Ports			
Frequency(MHz)	**Test Mode**	**Voltage(V)**	**Result**
0.15 ~ 10	RJ45 LAN	3	A
10 ~ 30	RJ45 LAN	3 ~ 1	A
30 ~ 80	RJ45 LAN	1	A

Note: “A” Means the EUT function is normal working during the test.

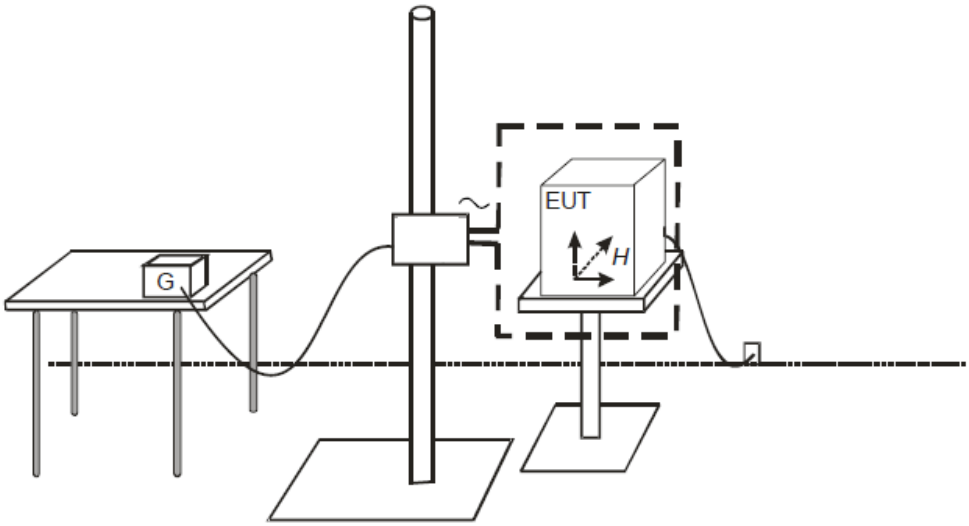
13.4.Test Photographs

Test Mode	Mode 1
Front View	
CDN T8 View	

Test Mode	Mode 2
Front View	
CDN T8 View	

14. Power Frequency Magnetic Field Immunity Test

14.1. Test Setup



14.2. 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.	

14.3. Test Result and Data

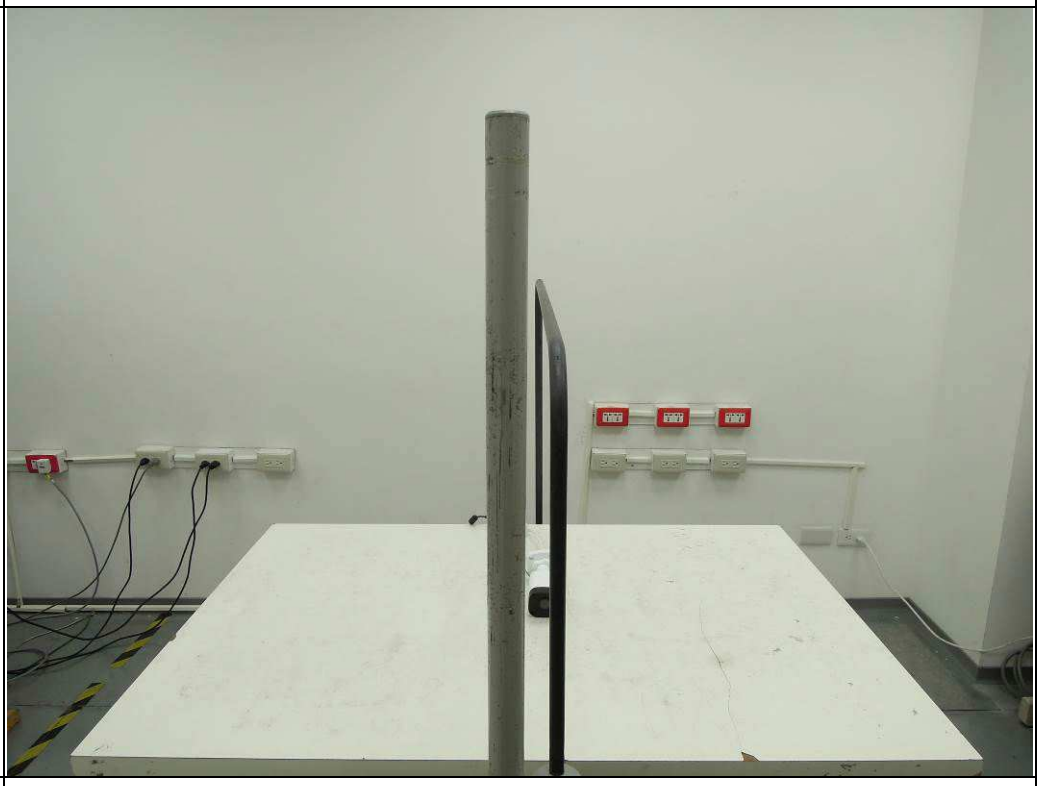
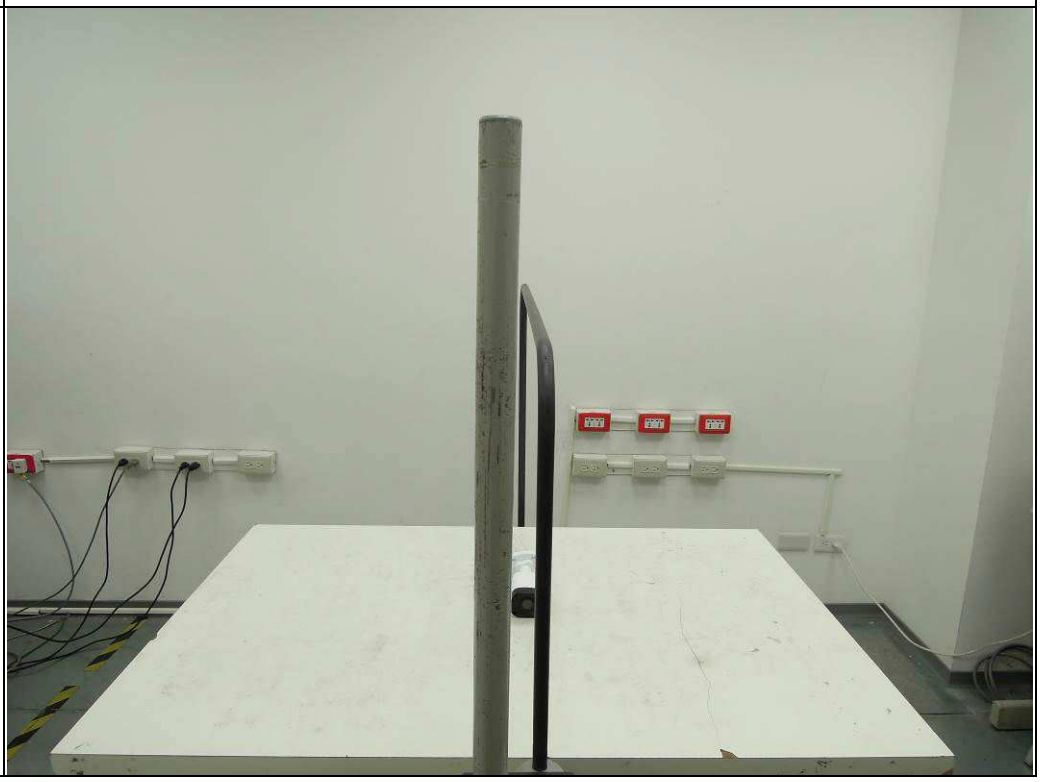
Test Mode	Mode 1 & Mode 2	Final Test Result	Pass
Test Date	Jun. 12, 2019	Test Engineer	Saga
Temperature	24 °C	Relative Humidity	57 %
Atmospheric Pressure	1008 hPa		

Pass Performance Criteria	A
Required Performance Criteria	B
Basic Standard	IEC 61000-4-8
Product Standard	EN 55035
Power Frequency Magnetic Field	50 or 60Hz, 1 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

Note: “A” Mean the EUT function is normal working during the test.

14.4. Test Photographs

Test Mode	Mode 1
Front View	
Test Mode	Mode 2
Front View	

15. Voltage Dips and Voltage Interruptions Immunity Test Setup

15.1. 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 μs.
5. Test severity:

Voltage Dips and Interrupt Reduction (%)	Test Duration (period)	Required Performance criteria
>95%	250	C
30%	25	C
>95%	0.5	B

Voltage Dips and Interrupt Reduction (%)	Test Duration (period)	Required Performance criteria
>95%	300	C
30%	30	C
>95%	0.5	B

15.2. Test Result and Data

The EUT is powered from PoE & DC Source, this test item is not applicable.

16. Measurement Uncertainty

Measurement Item	Measurement Frequency	Polarization	Uncertainty
Conducted Emission	9 kHz ~ 30 MHz	LINE / NEUTRAL	±3.25 dB
Conducted Emission (Telecommunication Port)	9 kHz ~ 30 MHz	N/A	±4.1 dB
Radiated Emission	30 MHz ~ 1,000 MHz	Vertical / Horizontal	±3.93 dB
	1,000 MHz ~ 6,000 MHz	Vertical / Horizontal	±3.82 dB
	6,000 MHz ~ 18,000 MHz	Vertical / Horizontal	±4.62 dB

The measurement uncertainty will be considered, when test result margin to the limit.

17. List of Measuring Equipment

Conducted Emission (Test date: 2019/06/12)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI	100443	2019/03/29	2020/03/28
LISN	Schwarzbeck	NSLK 8127	8127-516	2018/09/11	2019/09/10
ISN	TESEQ	ISN T800	24315	2019/03/28	2020/03/27
Pulse Limiter	R&S	ESH3-Z2	101934	2019/03/12	2020/03/11
Cable-6m (9k~300M)	NA	EMC5D-BM-BM-6	130606	2019/03/14	2020/03/13
Software	AUDIX	E3	Version: 8.2014-6-4	N/A	N/A

Radiated Emission below 1GHz (Test date: 2019/06/11)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Bilog Antenna(H)	Sunol	JB1	A020514-1	2019/03/26	2020/03/25
Bilog Antenna(V)	Sunol	JB1	A020514-2	2019/04/23	2020/04/22
EMI Receiver(V)	R&S	ESCI	101402	2019/03/14	2020/03/13
EMI Receiver(H)	R&S	ESCI 7	100963	2019/03/29	2020/03/28
Preamplifier(V)	EM Electronics corp.	EM330	60610	2019/03/11	2020/03/10
Preamplifier(H)	EM Electronics corp.	EM330	60611	2019/03/11	2020/03/10
Cable-16m (30M-1G)(H)	HUBER SUHNER	RG-214	01110M	2019/06/20	2020/06/19
Cable-4m (30M-1G)(H)	HUBER SUHNER	RG-214	02951M	2019/06/21	2020/06/20
Cable-1m (30M-1G)(H)	HUBER SUHNER	RG-214	01098M	2019/06/21	2020/06/20
Cable-10m (30M-1G)(V)	HUBER SUHNER	RG-214	01126M	2019/06/21	2020/06/20
Cable-4m (30M-1G)(V)	HUBER SUHNER	RG-214	02953M	2019/06/21	2020/06/20
Cable-1m (30M-1G)(V)	HUBER SUHNER	RG-214	01099M	2019/06/21	2020/06/20
Software	AUDIX	E3	Version: 8.2014-6-4	N/A	N/A

Radiated Emission above 1GHz (Test date: 2019/06/13)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Horn Antenna	EMCO	3115	31601	2018/09/26	2019/09/25
Spectrum Analyzer	R&S	FSP 40	100219	2018/07/03	2019/07/02
Preamplifier	Agilent	8449B	3008A01954	2019/03/11	2020/03/10
Cable-0.5m (30M-40G)	HUBER SUHNER	SUCOFLEX 102	36270/2	2019/03/14	2020/03/13
Cable-3m (1G-26.5G)	HUBER SUHNER	SUCOFLEX 102	28417/2	2019/03/13	2020/03/12
Software	AUDIX	E3	Version: 8.2014-6-4	N/A	N/A

ESD (Test date: 2019/06/13)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
ESD Simulator	AMETEK	DITO	P1404129910	2019/04/08	2020/04/07

RS (Test date: 2019/06/12)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Signal Generator	KEYSIGHT	N5171B	MY53051326	2018/09/05	2019/09/04
Power Meter	Boonton	4231A-01	115902	N/A	N/A
Power Sensor	Boonton	51075A	36586	2019/06/18	2020/06/17
Antenna (80-1000MHz)	AR	ALT80M1G	348540	N/A	N/A
Amplifier (80-1000MHz)	METEK	80RF 1000-300	1077169	N/A	N/A
Log.-Per.Antenna (1-6GHz)	Schwarzbeck	STLP 9149	9149-483	N/A	N/A
Amplifier(1-6GHz)	MILMEGA	AS0860B-50-50	1079233	N/A	N/A

EFT (Test date: 2019/06/12 & 2019/06/13)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMC Test System	Teseq	NSG3060	1385	2018/12/22	2019/12/21
Capacitor Clamp	KeyTek	CCL-4/S	309215	2018/12/19	2019/12/18

SURGE (Test date: 2019/06/12 & 2019/06/13)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMC Test System	Teseq	NSG3060	1385	2018/12/22	2019/12/21
CDN	Teseq GmbH	CDN 508T5	P1540164840	2018/12/18	2019/12/17

CS (Test date: 2019/06/12)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
CDN (M2+M3)	Schaffner	CDN M016	25111	2018/09/11	2019/09/10
CS Test system	Teseq GmbH	NSG 4070B-35	41159	2018/09/05	2019/09/04
CDN	Teseq GmbH	CDN T8-10	42001	2018/09/11	2019/09/10

PFMF (Test date: 2019/06/12)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Magnetic Field Generator	KeyTek	F-1000-4-8-G-125A F-1000-4-8/9/10-L-1M	03019 03016	2018/09/05	2019/09/04