EU Declaration of Conformity

EU Declaration of Conformity

According to

EMC Directive 2004/108/EC

For the following

Product : Gigabit PoE Switch

Model Name : DH-2212PF

Manufactured at : IDIS CO., LTD.

Address : 8-10, TECHNO 3-RO,
YUSEONG-GU, DAEJEON, KOREA

We hereby declare, Electromagnetic Compatibility Directives (2004/108/EC) are fulfilled, as laid out in the guideline set down by the member states of the EEC Commission. This declaration is valid for all samples that are part of this declaration, which are manufactured according to the production charts appendix.

The standards relevant for the evaluation of EMC requirements are as follows:

Test Standards : ETSI EN 300 386 V 1.6.1 (2012-04)
(Other than Telecommunication Centers(OTC))
EN 61000-3-2:2014
EN 61000-3-3:2013

Date of issue: June 09, 2015

IDIS CO., LTD.

8-10, TECHNO 3-RO,
YUSEONG-GU, DAEJEON, KOREA

(Name and signature of authorized person)

EMC TEST REPORT

Test report No	:	**EMC-CE-E5670**
Type of Equipment	:	**Gigabit PoE Switch**
Model Name	:	**DH-2212PF**
Applicant	:	**IDIS CO., LTD.** **8-10, TECHNO 3-RO,** **YUSEONG-GU, DAEJEON, KOREA**
Manufacturer	:	**IDIS CO., LTD.** **8-10, TECHNO 3-RO,** **YUSEONG-GU, DAEJEON, KOREA**
Test standards	:	**ETSI EN 300 386 V 1.6.1 (2012-04)** **(Other than Telecommunication Centers (OTC))** **EN 61000-3-2:2014** **EN 61000-3-3:2013**
Testing Laboratory	:	**EMC Compliance Ltd.**
Test result	:	**Complied**

This product complies with the requirements of the EMC Directive 2004/108/ EC.
The results in this report apply only to the sample tested.
This test report shall not be reproduced, except in full, without the written approval of EMC compliance Laboratory.

Date of receipt: 2015. 05. 20

Date of testing: 2015. 05. 26 ~ 06. 05

Issued date: 2015. 06. 09

Tested by: LEE, JUN-HEE

Approved by: BAEK, JEONG-SOO

Contents

1. Applicant information

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Contact name:	**Jang Jung Doo**

Manufacturer:	IDIS CO., LTD.
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2. Laboratory information

Address

EMC compliance Ltd.
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Telephone Number: 82 70 5008 1021
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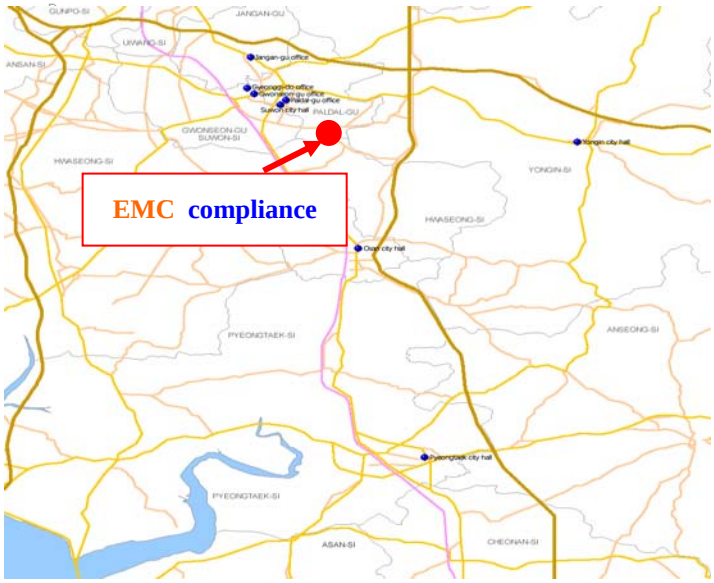
FCC Site Designation No: KR0040, FCC Site Registration No: 687132
VCCI Registration No. : R-3327, G-198, C-3706, T-1849
Industry Canada Registration No. : 8035A
KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation environment

		Temperature	Humidity	Pressure
Chamber(10 m)	:	23.5 °C	46.3 % R.H.	-
Shielded room(CE)	:	26.3 ~ 26.4 °C	42.2 ~ 42.8 % R.H.	-
Shielded room(ESD)	:	22.5 °C	40.7 % R.H.	100.4 kPa

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber
Harmonics current	EMI Test area(6F)
Voltage fluctuations and flickers	EMI Test area(6F)
Electrostatic discharge	Shielded Room
Radiated RF immunity	6F Fully anechoic chamber (3 m)
Electric Fast Transient/BURST	Shielded Room
Surge	Shielded Room
Conducted RF immunity	Shielded Room
Magnetic field immunity	Shielded Room
Voltage dip/interruption	Shielded Room

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability.
Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted emission measurement (C.L: Approx 95 %, k = 2)		
Shielded Room (CE#1)	9 ㎑ ~ 150 ㎑: ± 3.75 dB	
	150 ㎑ ~ 30 ㎒: ± 3.36 dB	
Shielded Room (CE#2)	9 ㎑ ~ 150 ㎑: ± 3.79 dB	
	150 ㎑ ~ 30 ㎒: ± 3.42 dB	
Radiated Emission measurement (C.L: Approx 95 %, k = 2)		
10 m Chamber (4F)	30 ㎒ ~ 300 ㎒	3 m: + 5.20 dB, - 5.31 dB
		10 m: + 5.19 dB, - 5.30 dB
	300 ㎒ ~ 1 000 ㎒	3 m: + 6.56 dB, - 6.65 dB
		10 m: + 6.45 dB, - 6.64 dB
	1 ㎓ ~ 6 ㎓	3 m: + 6.70 dB, - 6.81 dB
10 m Chamber (2F)	30 ㎒ ~ 300 ㎒	3 m: + 5.21 dB, - 5.32 dB
		10 m: + 5.20 dB, - 5.31 dB
	300 ㎒ ~ 1 000 ㎒	3 m: + 5.82 dB, - 5.91 dB
		10 m: + 5.69 dB, - 5.91 dB
	1 ㎓ ~ 6 ㎓	3 m: + 6.28 dB, - 6.30 dB
Radio Frequency Electromagnetic Fields (C.L: Approx 95 %, k = 2)		
± 1.82 dB		
Disturbance power Electromagnetic Fields (C.L: Approx 95 %, k = 2)		
Disturbance power (5F)	30 ㎒ ~ 300 ㎒	± 3.30 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program	
Conducted Emission	EP5CE_V 5.4.0(TOYO)	
Radiated Emission	EP5RE_V 4.6.0(TOYO)	
Harmonics current, Voltage fluctuations and flickers	CTS 4_V 4.6.2 (AMETEK)	
Radiated RF immunity	3F	EMC32_V 9.01.0 (ROHDE & SCHWARZ)
	6F	EMC32_V 8.53.0 (ROHDE & SCHWARZ)
Electric Fast Transient/BURST, Surge, Magnetic field immunity, Voltage dip/interruption	6F(#1)	ISMIEC_V 4.08(EM TEST)
	6F(#2)	ISMIEC_V 4.07(EM TEST)
	3F(#3)	IEC_V 5.2.9(EM TEST)
Conducted RF immunity	6F(#1)	ICD_V 3.53.01(EM TEST)
	6F(#2)	WIN2070_V 3.00(SCHAFFNER)
	3F(#3)	ICD_V 5.3.4(EM TEST)

4. Description of E.U.T.

4.1 General information

Model		DH-2212PF
CPU		Embedded MIPS
System Memory		256MB SDRAM, 32M Flash
Switching Capacity		24Gbps
Copper Service Port		8 RJ-45 Connectors (10/100/1000BASE-T)
Copper Uplink Port		2 RJ-45 Connectors (10/100/1000BASE-T)
Optical Uplink Port		2 SFP Connectors (1000BASE-X)
Rated Input		AC100-240V, 50/60Hz
Power Consumption		Max. 160W
PSE Power		Max. 140W
PoE-supported Standards		IEEE 802.3af-2003 and IEEE 802.3at-2009
PoE-supported Network Camera Connection		Up to 8 IEEE 802.3af cameras or 4 IEEE 802.3at cameras
Environmental Conditions	Operating Temperature	0°C - 40°C (32°F - 104°F)
	Operating Humidity	10 ~ 90%
	Storage Temperature	30°C - 60°C (-22°F - 140°F)
Dimensions (W1 x H x D)		280mm x 44mm x 180mm (11.02" x 1.73" x 7.09")
Weight (Main Unit)		1.55Kg (3.42 lbs.)
Weight (Packaging)		2.45Kg (5.40 lbs.)
Electrical Approvals		FCC, UL, CE, CB, KC
IEEE Standards		IEEE 802.3 10BASE-T [1], IEEE 802.3u 100BASE-TX [2], IEEE 802.3ab 1000BASE-T, IEEE 802.3z 1000BASE-SX, IEEE 802.3ad Link Aggregation, IEEE 802.3x Flow Control Support, IEEE 802.1p Priority Support, IEEE 802.1D (Bridging) 1993, IEEE 802.1w Rapid Spanning Tree
Internet Standards		RFC 3635 Ethernet-like MIB, RFC2863 Interface Group MIB , RFC 2819 RMON, RFC 1493 Bridge MIB, RFC 2674 Bridge MIB extension

4.2 Product description

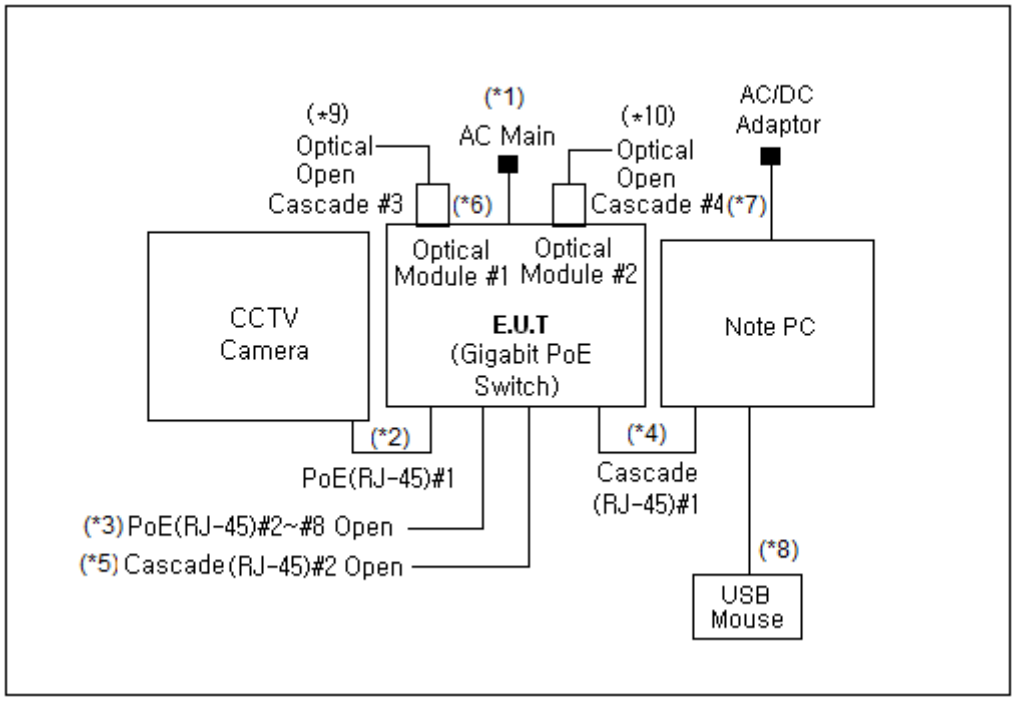
Type of product	Gigabit PoE Switch
Model name (Basic)	DH-2212PF
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	-
Testing Voltage	230 V, 50 Hz
Input range	AC 100 ~ 240 V, 50/60 Hz
Internal clock frequency	2.5 GHz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	C1410	473680121639	FUJITSU
USB Mouse	1088	8165906051194	Microsoft
CCTV Camera	VDR-9001	-	IDIS CO., LTD.
Smart bits	SMB-600	-	Spirent
Optical Module #1	APS31123CDL20	SG31250800132	RoHS
Optical Module #2	APS31123CDL20	SG31250800133	RoHS

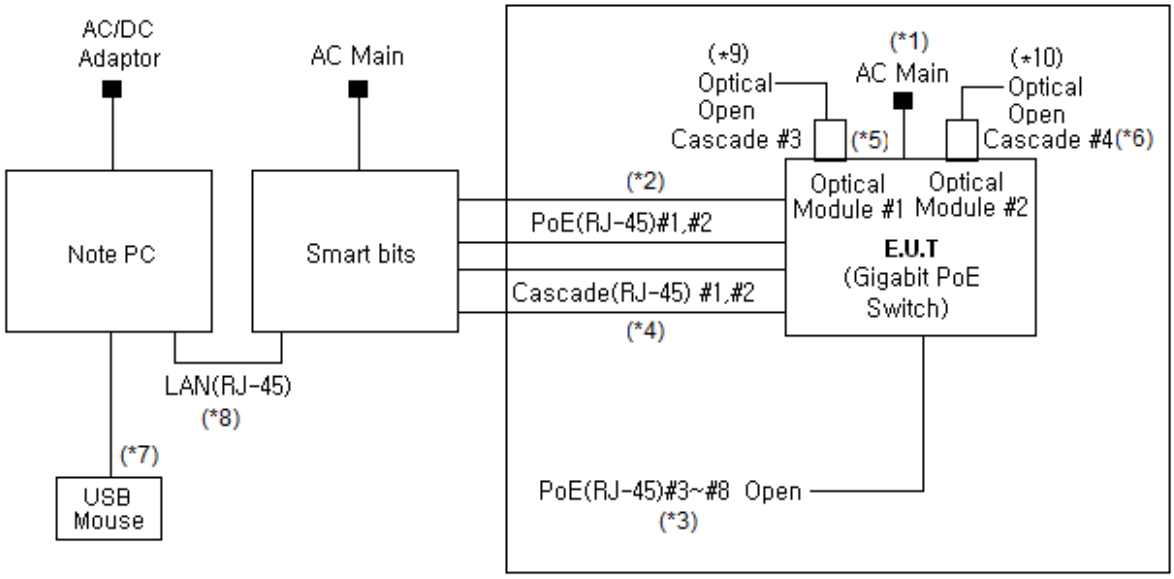
4.4 Test configuration

* EMI



Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT** (Gigabit PoE Switch)	Power	AC Main	Power	2.0	Non-Shield
2		PoE(RJ-45)#1	CCTV Camera	PoE(RJ-45)#1	3.0	Non-Shield
3		PoE(RJ-45)#2~#8	Open	-	3.0	Non-Shield
4		Cascade(RJ-45)#1	Note PC	Cascade(RJ-45)#1	3.0	Non-Shield
5		Cascade(RJ-45)#2	Open	-	3.0	Non-Shield
6		Cascade#3	Optical Module#1	Cascade#3	Direct	-
7		Cascade#4	Optical Module#2	Cascade#4	Direct	-
8	Note PC	USB	USB Mouse	USB	1.8	Shield
9	Optical Module#1	Optical	Open	-	2.5	Non-Shield
10	Optical Module#2	Optical	Open	-	2.5	Non-Shield

* EMS



Note	Start		End		Cable	
*	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT** (Gigabit PoE Switch)	Power	AC Main	Power	2.0	Non-Shield
2		PoE(RJ-45)#1,#2	Smart bits	PoE(RJ-45)#1,#2	5.0	Non-Shield
3		PoE(RJ-45)#3~#8	Open	-	3.0	Non-Shield
4		Cascade (RJ-45) #1,#2	Smart bits	Cascade (RJ-45) #1,#2	5.0	Non-Shield
5		Cascade#3	Optical Module#1	Cascade#3	Direct	-
6		Cascade#4	Optical Module#2	Cascade#4	Direct	-
7	Note PC	USB	USB Mouse	USB	1.8	Shield
8		LAN(RJ-45)	Smart bits	LAN(RJ-45)	1.0	Non-Shield
9	Optical Module#1	Optical	Open	-	2.5	Non-Shield
10	Optical Module#2	Optical	Open	-	2.5	Non-Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
EMI	Camera Web View Test.
	Ping test.
EMS	During the test, by running smart bits program, the EUT was monitored for packet data rate check.

5. Summary of test results

5.1 Standards & results

The following standards have been applied:

ETSI EN 300 386 V 1.6.1 (2012-04)

Electromagnetic compatibility and Radio spectrum Matters (ERM);

Telecommunication network equipment; Electromagnetic Compatibility (EMC) requirements

Test items Result

Basic Standard	Description	Test Result
ETSI EN 300 386 V 1.6.1 (2012)	Electromagnetic compatibility and Radio spectrum Matters (ERM);Telecommunication network equipment; Electromagnetic Compatibility (EMC) requirements	☒Pass ☐Fail
ETSI EN 300 386 clause 6.4	Radiated emission For radiated emission in the frequency range 30 MHz to 1 000 MHz the test method specified in the EN 55022 [4] shall apply. For radiated emission in the frequency range 1 000 MHz to 6 000 MHz the test method and the conditional testing Procedure specified in the EN 55022 [4] shall apply.	☒Pass ☐Fail
ETSI EN 300 386 clause 6.1	Conducted emissions The limits defined in the EN 55022 [4] shall apply.	☒Pass ☐Fail
ETSI EN 300 386 clause 6.3	For conducted emissions on telecommunications ports in the frequency range 0,15 MHz to 30 MHz, the test method specified in EN 55022 [4] shall apply.	☒Pass ☐Fail
ETSI EN 300 386 clause 6.1	Current harmonics For current harmonics emission the test methods of either EN 61000-3-2 [5] or EN 61000-3-12 [8] shall apply.	☒Pass ☐Fail
ETSI EN 300 386 clause 6.1	Voltage fluctuations (Flickers) For voltage fluctuations (Flickers) the test methods of either EN 61000-3-3 [6] or EN 61000-3-11 [7] shall apply.	☒Pass ☐Fail
ETSI EN 300 386 clause 7.2.2.1.1	Electrostatic discharge	☒Pass ☐Fail
ETSI EN 300 386 clause 7.2.2.1.2	Radio frequency electromagnetic field amplitude modulated.	☒Pass ☐Fail
ETSI EN 300 386 clause 7.2.2.4.1 / clause 7.2.2.2.1 / clause 7.2.2.3.1	Fast transients. / Telecommunications port for indoor signal lines	☒Pass ☐Fail
ETSI EN 300 386 clause 7.2.2.4.2 / clause 7.2.2.2.2 / clause 7.2.2.3.2	Surges	☒Pass ☐Fail
ETSI EN 300 386 clause 7.2.2.4.3 / clause 7.2.2.2.3/ clause 7.2.2.3.3	Radio frequency, conducted continuous. / Telecommunications port for indoor signal lines	☒Pass ☐Fail
ETSI EN 300 386 clause 7.2.2.4.4	Voltage dips and short interruptions	☒Pass ☐Fail

5.2 Performance criteria

ETSI EN 300 386 V 1.6.1 (2012-04)

For the switching equipment the following main signal ports are recognized:

▪ Analogue ports (e.g. analogue subscribers' lines, analogue interfaces to transmission equipment);

▪ Digital ports (e.g. digital subscribers' lines (ISDN), digital connections to transmission equipment).

The interfaces shall operate as described in the following clauses.

* Digital port performance criteria

Performance criterion A (continuous phenomena)

During the sweep:

▪ The established connections shall be maintained throughout testing and the transfer of information shall be within the limits of the manufacturer's specification;

▪ Loss of frame alignment or loss of synchronization is not allowed during each individual exposure (if applicable).

For selected frequencies (see clause 11.2.2):

▪ It shall be possible to establish a connection between two ports;

▪ It shall be possible to clear a connection in a controlled manner.

Performance criterion B (transient phenomena)

The established connections shall be maintained throughout testing except in the case of surge immunity testing at 1 kV where disconnection is allowed on the port being tested:

▪ It shall be possible to establish a connection between two ports after the end of the transient disturbances;

▪ It shall be possible to clear a connection in a controlled manner after the end of the transient disturbances.

Performance criterion C (interruptions)

The general performance criterion C applies.

* Analogue port performance criteria

Performance criterion A (continuous phenomena)

During the sweep:

▪ the established connections shall be maintained throughout testing;

▪ the noise level at a two wire analogue interface shall be less than -40 dBm at 600 Ω (ignoring the nominal impedance of the port for practical reasons) if not otherwise stated by the manufacturer.

The measurement shall be done selectively with a bandwidth ≤ 100 Hz at 1 kHz;

▪ Dialing tones shall be available (if applicable).

For selected frequencies (see clause 11.2.2):

▪ it shall be possible to establish a connection between two ports;

▪ it shall be possible to clear a connection in a controlled manner.

Performance criterion B (transient phenomena)

Established connections shall be maintained throughout testing except in the case of surge immunity testing at 1 kV where disconnection is allowed on the port being tested:

▪ it shall be possible to establish a connection between two ports after the end of the transient disturbances;

▪ it shall be possible to clear a connection in a controlled manner after the end of the transient disturbances.

Performance criterion C (interruptions)

The general performance criterion C applies.

6. Test results

6.1 Conducted Emission

Test specification	ETSI EN 300 386 clause 6, Class A		
Testing voltage	230 V, 50 Hz		
Test facility	Shielded room (CE#1)		
Date	2015. 06. 02		
Temperature (°C)	26.3 ~ 26.4 °C	Humidity (% R.H.)	42.2 ~ 42.8 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emission measurement

☒ AC main

Frequency [㎒]	Class A (dB(㎶))		Class B (dB(㎶))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 *	56 ~ 46*
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

*The limit decreases linearly with the logarithm of frequency.

☒ Telecommunication

Frequency [㎒]	Class A Voltage Limits (dB(㎶))		Current Limits (dB(㎂))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	87	74	43	30
Frequency [㎒]	Class B Limits (dB(㎶))		Current Limits (dB(㎂))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	74	64	30	20

* The limits decrease linearly with the logarithm of the frequency in the range 0.15 ㎒ to 0.5 ㎒

* The current and voltage disturbance limits are derived for use with an impedance stabilization Network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 $\log_{10}$ 150/I = 44 dB).

6.1.2 Measurement procedure

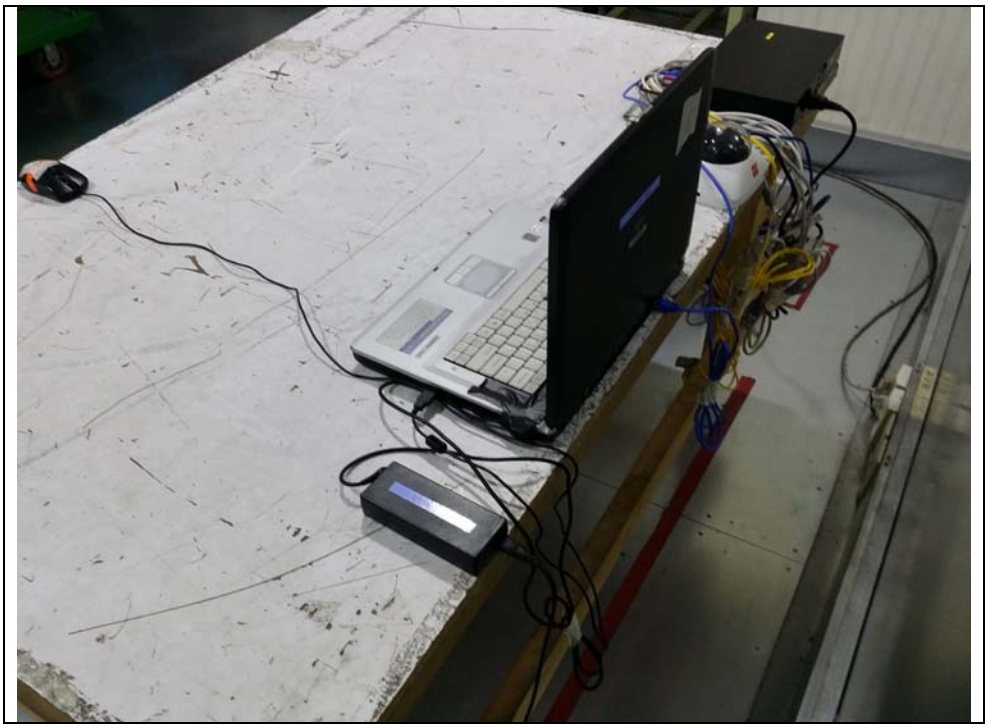
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement.
Both lines of power cord, hot and neutral, were measured.

6.1.3 Used equipments

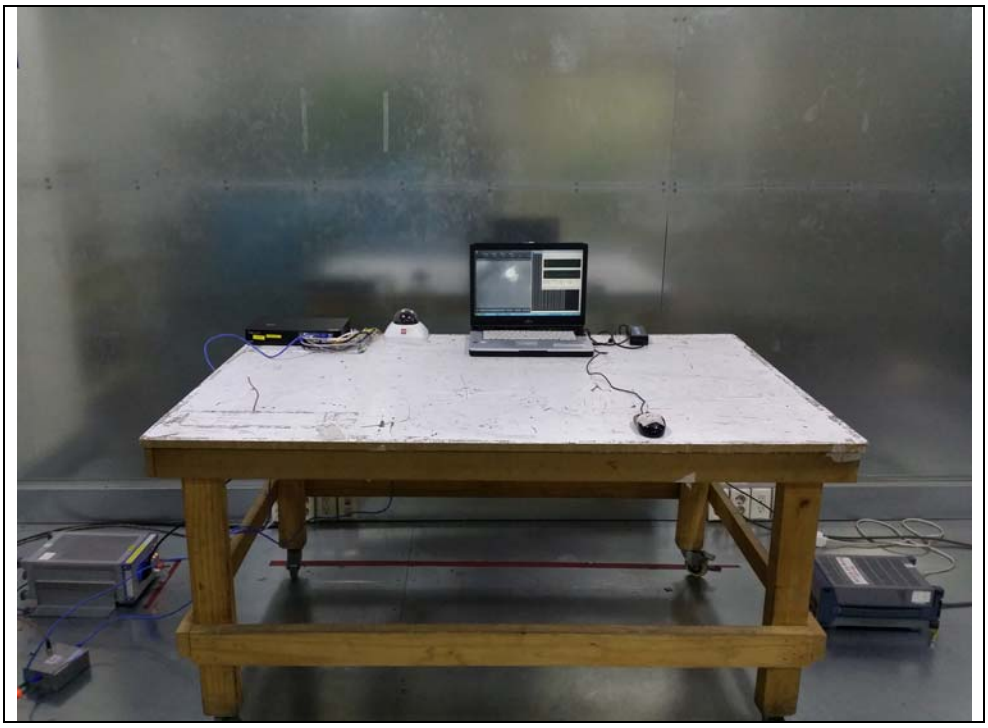
Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESCI	101408	R&S	2016.03.02	☐
Test Receiver	ESCI	100001	R&S	2015.07.14	☒
Test Receiver	ESCI	100710	R&S	2015.10.13	☐
TWO-LINE V-NETWORK	ENV216	101358	R&S	2015.10.02	☒
TWO-LINE V-NETWORK	ESH3-Z5	100267	R&S	2015.06.24	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0071	SCHWARZBECK	2016.03.29	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2016.03.04	☐

6.1.4 Photographs of test setup

* AC Main

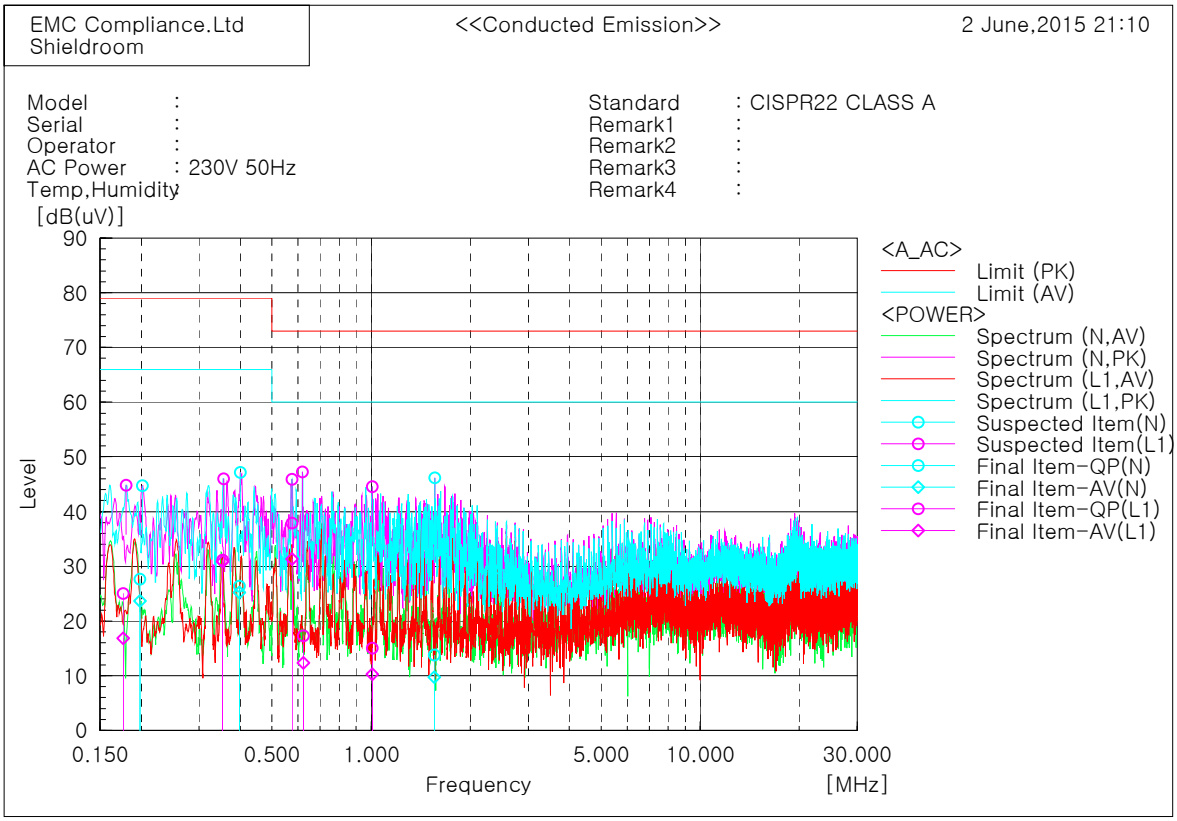


* Telecommunication



6.1.5 Conducted emission measurement result

* AC Main (DH-2212PF)



Final Result

--- N Phase ---

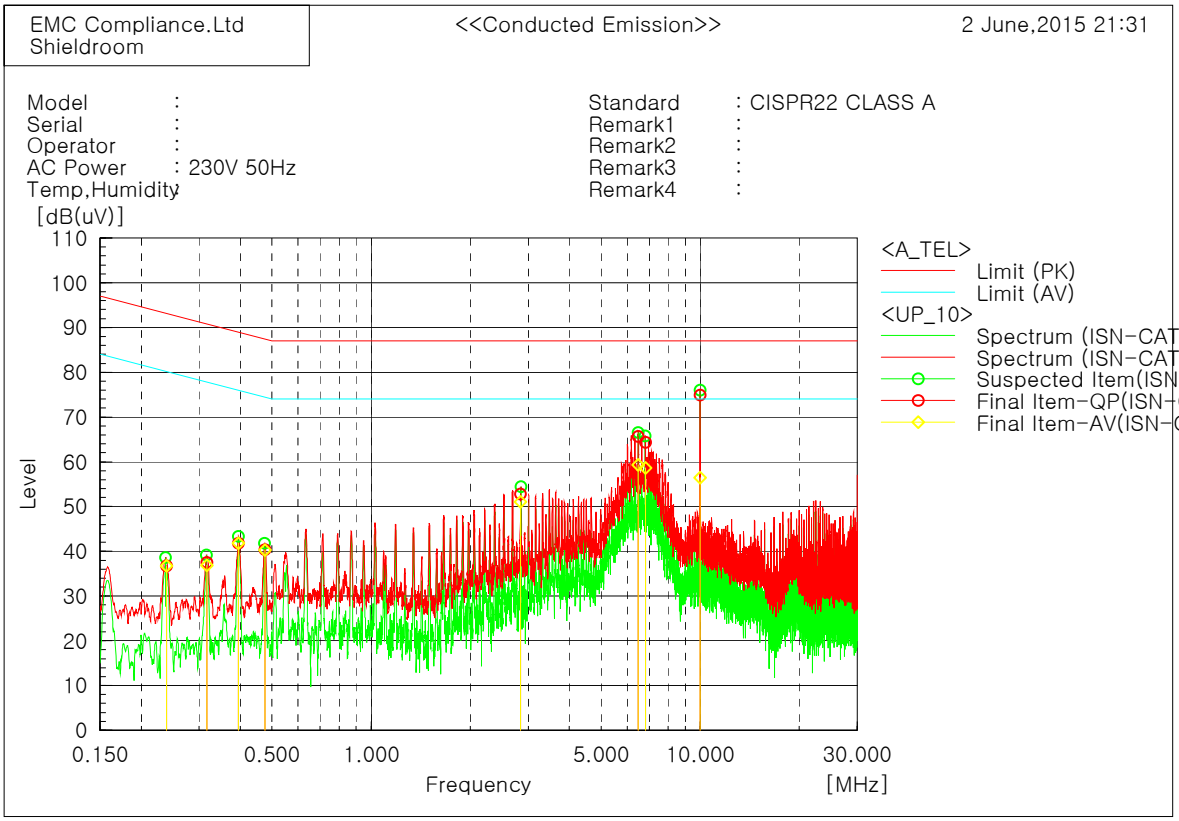
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.19832	18.0	14.1	9.6	27.6	23.7	79.0	66.0	51.4	42.3	
2	0.39809	16.7	15.6	9.6	26.3	25.2	79.0	66.0	52.7	40.8	
3	1.55751	4.3	0.2	9.5	13.8	9.7	73.0	60.0	59.2	50.3	

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.17663	15.5	7.3	9.5	25.0	16.8	79.0	66.0	54.0	49.2	
2	0.35426	21.7	21.4	9.5	31.2	30.9	79.0	66.0	47.8	35.1	
3	0.5739	28.4	21.8	9.5	37.9	31.3	73.0	60.0	35.1	28.7	
4	0.62228	7.7	2.8	9.5	17.2	12.3	73.0	60.0	55.8	47.7	
5	1.00758	5.7	0.9	9.4	15.1	10.3	73.0	60.0	57.9	49.7	

* Telecommunication port

LCL 65 dB (Cascade(RJ-45) Port (LCL 65 dB)_10 Mbps) (DH-2212PF)_UP Link

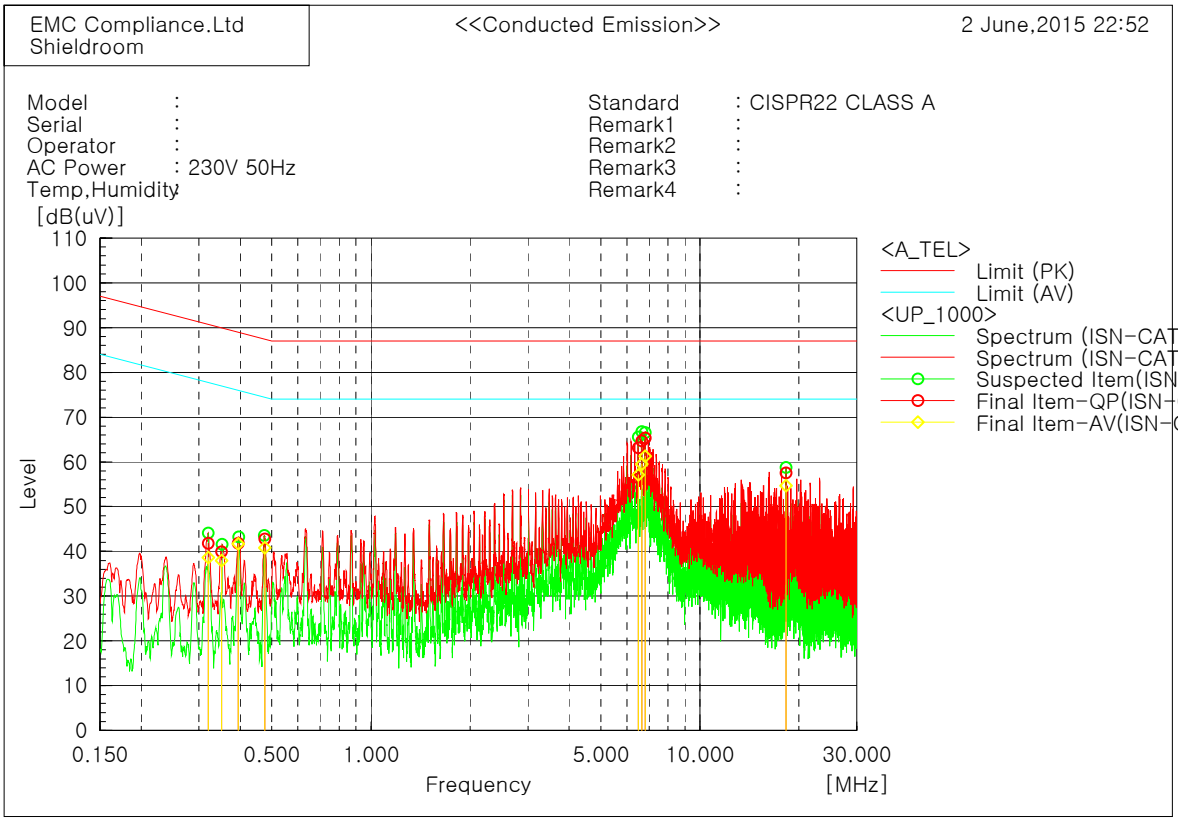


Final Result

--- ISN-CAT5 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.23848	27.3	27.3	9.4	36.7	36.7	93.1	80.1	56.4	43.4	
2	0.31693	28.2	27.5	9.3	37.5	36.8	90.8	77.8	53.3	41.0	
3	0.39493	32.6	32.6	9.2	41.8	41.8	89.0	76.0	47.2	34.2	
4	0.47499	31.1	31.1	9.2	40.3	40.3	87.4	74.4	47.1	34.1	
5	2.84646	43.6	41.8	9.2	52.8	51.0	87.0	74.0	34.2	23.0	
6	6.4822	56.6	50.2	9.1	65.7	59.3	87.0	74.0	21.3	14.7	
7	6.81179	55.2	49.5	9.1	64.3	58.6	87.0	74.0	22.7	15.4	
8	10.00027	65.5	47.0	9.4	74.9	56.4	87.0	74.0	12.1	17.6	

LCL 65 dB (Cascade(RJ-45) Port (LCL 65 dB)_1000 Mbps) (DH-2212PF)_UP Link

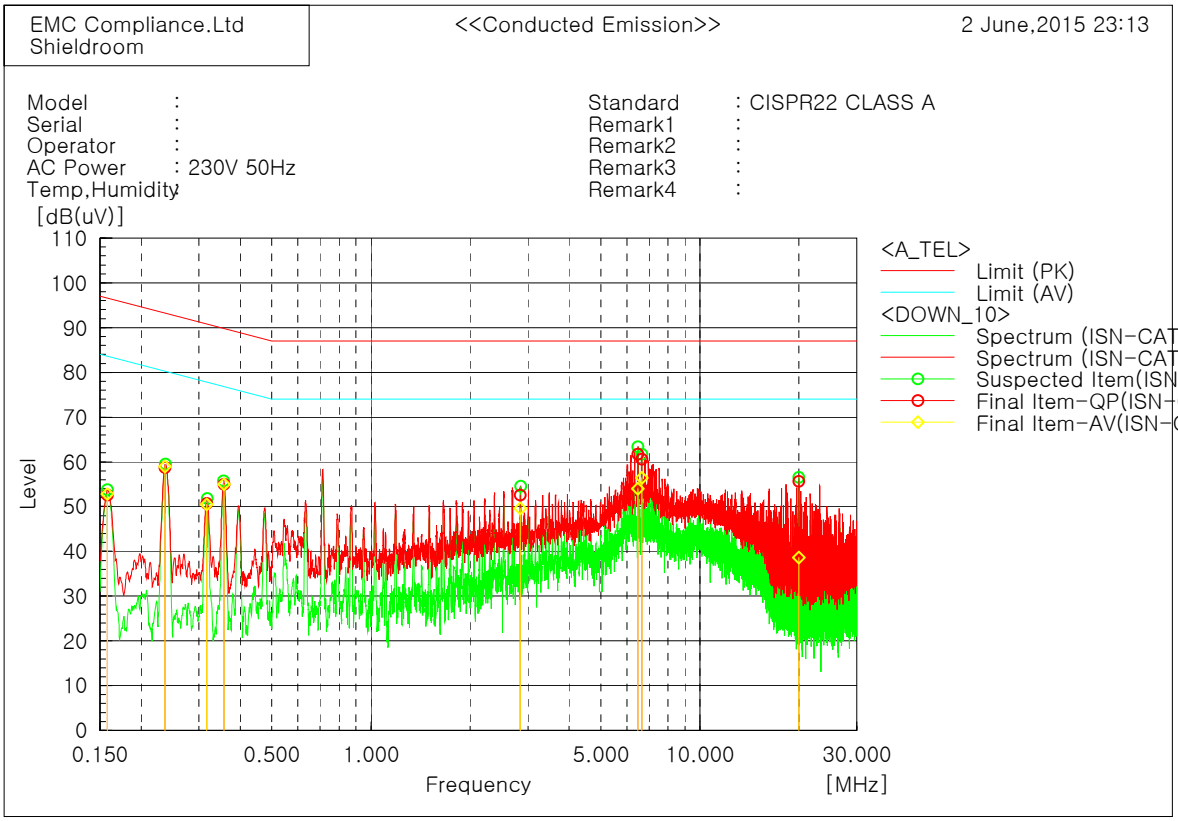


Final Result

--- ISN-CAT5 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.31965	32.5	29.3	9.3	41.8	38.6	90.7	77.7	48.9	39.1	
2	0.35158	30.7	28.8	9.2	39.9	38.0	89.9	76.9	50.0	38.9	
3	0.39495	32.6	32.5	9.2	41.8	41.7	89.0	76.0	47.2	34.3	
4	0.47484	33.6	31.6	9.2	42.8	40.8	87.4	74.4	44.6	33.6	
5	6.50081	54.0	48.0	9.1	63.1	57.1	87.0	74.0	23.9	16.9	
6	6.65405	55.6	50.4	9.1	64.7	59.5	87.0	74.0	22.3	14.5	
7	6.81416	56.2	52.2	9.1	65.3	61.3	87.0	74.0	21.7	12.7	
8	18.24309	48.1	45.1	9.5	57.6	54.6	87.0	74.0	29.4	19.4	

LCL 65 dB (PoE(RJ-45) Port (LCL 65 dB)_10 Mbps) (DH-2212PF)_Down Link

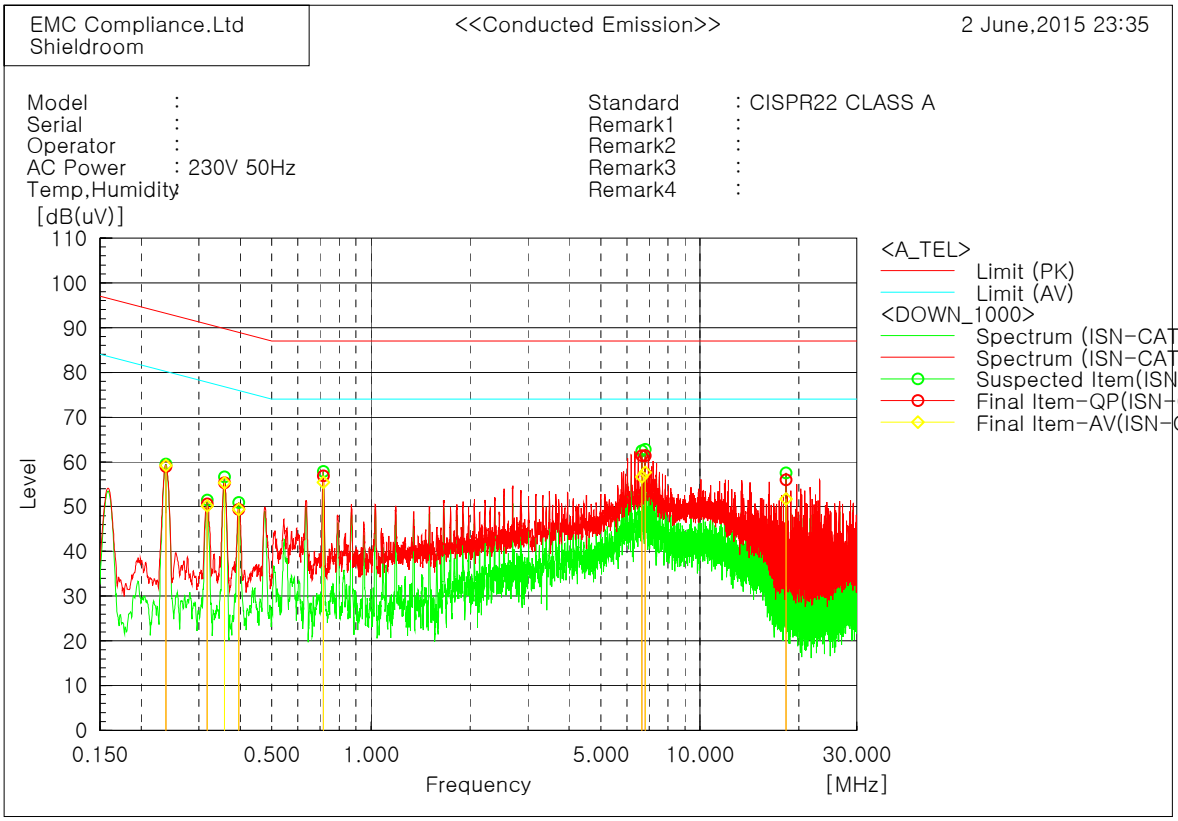


Final Result

--- ISN-CAT5 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.15803	43.1	43.3	9.5	52.6	52.8	96.6	83.6	44.0	30.8	
2	0.23662	49.4	49.5	9.4	58.8	58.9	93.2	80.2	34.4	21.3	
3	0.31651	41.4	41.2	9.3	50.7	50.5	90.8	77.8	40.1	27.3	
4	0.35691	45.8	45.8	9.2	55.0	55.0	89.8	76.8	34.8	21.8	
5	2.8464	43.3	40.4	9.2	52.5	49.6	87.0	74.0	34.5	24.4	
6	6.48155	52.6	44.9	9.1	61.7	54.0	87.0	74.0	25.3	20.0	
7	6.64635	51.5	47.3	9.1	60.6	56.4	87.0	74.0	26.4	17.6	
8	19.99976	46.1	29.1	9.5	55.6	38.6	87.0	74.0	31.4	35.4	

LCL 65 dB (PoE(RJ-45) Port (LCL 65 dB)_1000 Mbps) (DH-2212PF)_Down Link



Final Result

--- ISN-CAT5 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.23801	49.5	49.8	9.4	58.9	59.2	93.2	80.2	34.3	21.0	
2	0.31776	41.3	40.9	9.3	50.6	50.2	90.8	77.8	40.2	27.6	
3	0.35841	46.1	46.1	9.2	55.3	55.3	89.8	76.8	34.5	21.5	
4	0.39675	40.2	40.2	9.2	49.4	49.4	88.9	75.9	39.5	26.5	
5	0.71572	47.7	46.2	9.2	56.9	55.4	87.0	74.0	30.1	18.6	
6	6.66282	52.2	47.6	9.1	61.3	56.7	87.0	74.0	25.7	17.3	
7	6.81422	52.3	48.5	9.1	61.4	57.6	87.0	74.0	25.6	16.4	
8	18.24362	46.4	42.2	9.5	55.9	51.7	87.0	74.0	31.1	22.3	

6.2 Radiated Emission

Test specification	ETSI EN 300 386 clause 6, Class A		
Testing voltage	230 V, 50 Hz		
Test facility	10 m Chamber (2F)		
Test distance	10 m, 3 m		
Date	2015. 05. 26		
Temperature (°C)	23.5 °C	Humidity (% R.H.)	46.3 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

Frequency [MHz]	Class A (dB(μV/m)) @ 10 m	Class B (dB(μV/m)) @ 10 m
30 ~ 230	40	30
230 ~ 1 000	47	37

☒ Limits above 1 GHz

Frequency [GHz]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB(μV/m))	Peak limit (dB(μV/m))	Average limit (dB(μV/m))	Peak limit (dB(μV/m))
1 ~ 3	56	76	50	70
3 ~ 6	60	80	54	74
Note - The lower limit applies at the transition frequency.				

6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.
Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2016.01.20	☒
Test Receiver	ESR	101078	R&S	2016.02.16	☐
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2016.08.28	☒
Amplifier	310N	284608	SONOMA INSTR UMENT	2016.04.13	☒
3 dB Attenuator	8491B	22981	HP	2016.02.27	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Preamplifier	8449B	3008A02343	AGILENT	2015.10.13	☒
Horn ANT	3115	00155772	ETS	2016.02.05	☒

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L +3 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

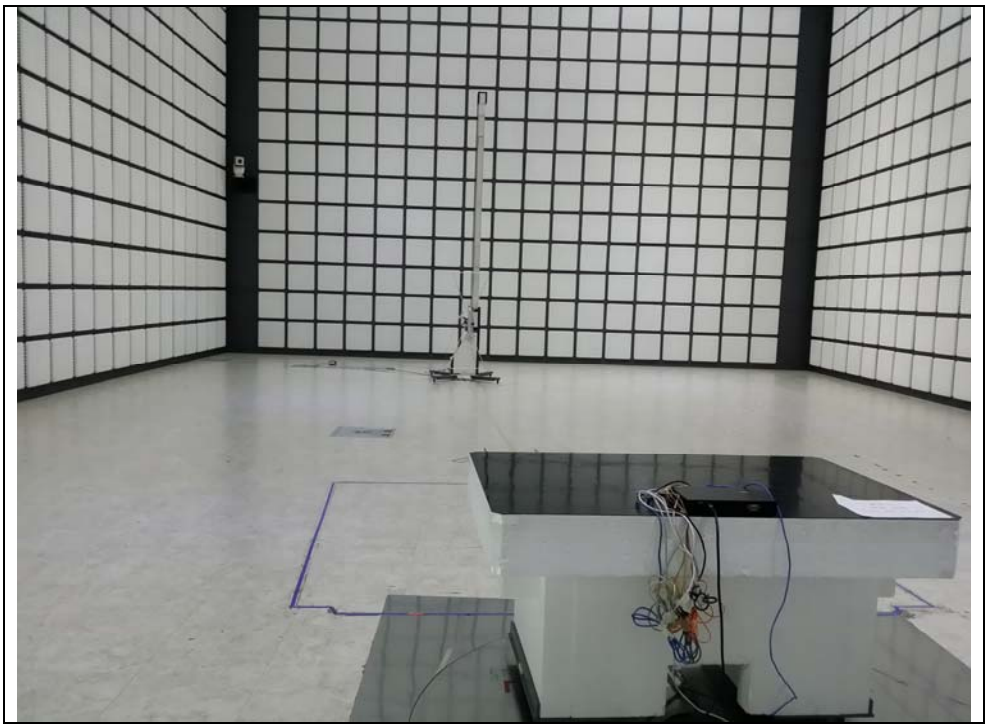
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

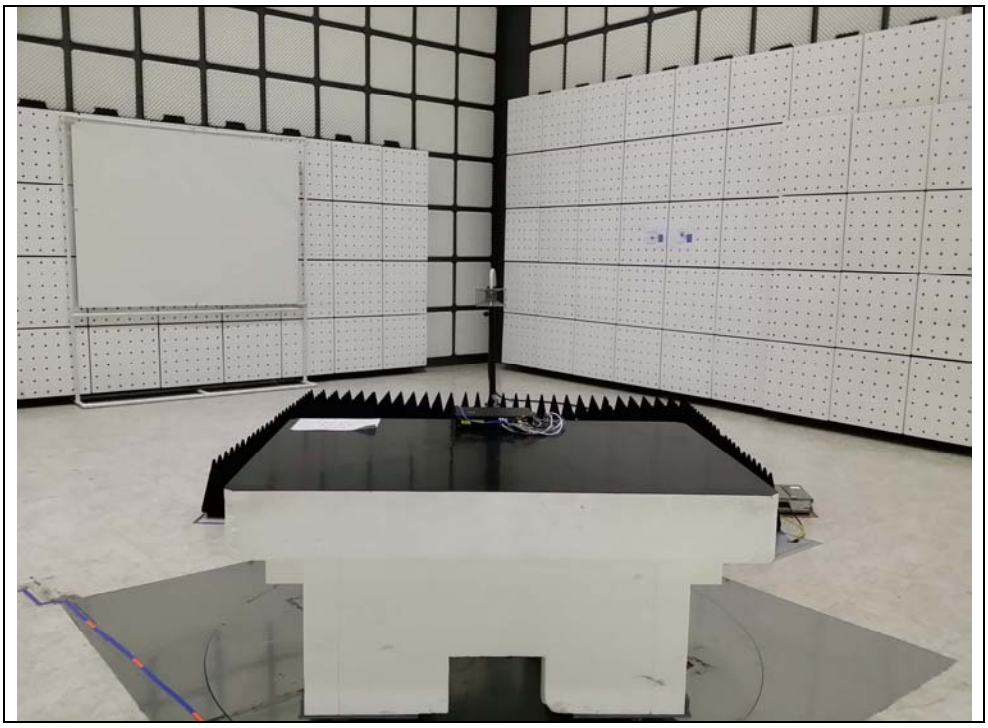
30 + 12 + 5 + 3 – 35 = 15 dB(μV/m)

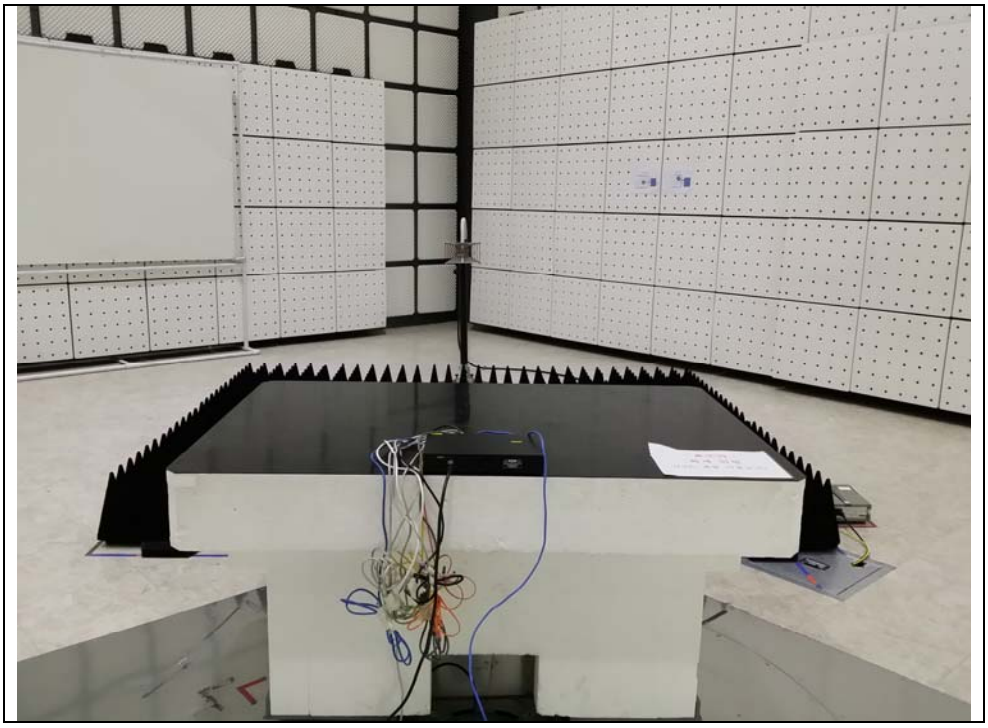
6.2.5 Photographs of test setup

* 30 ㎒ ~ 1 ㎓



* 1 ㎓ ~ 6 ㎓

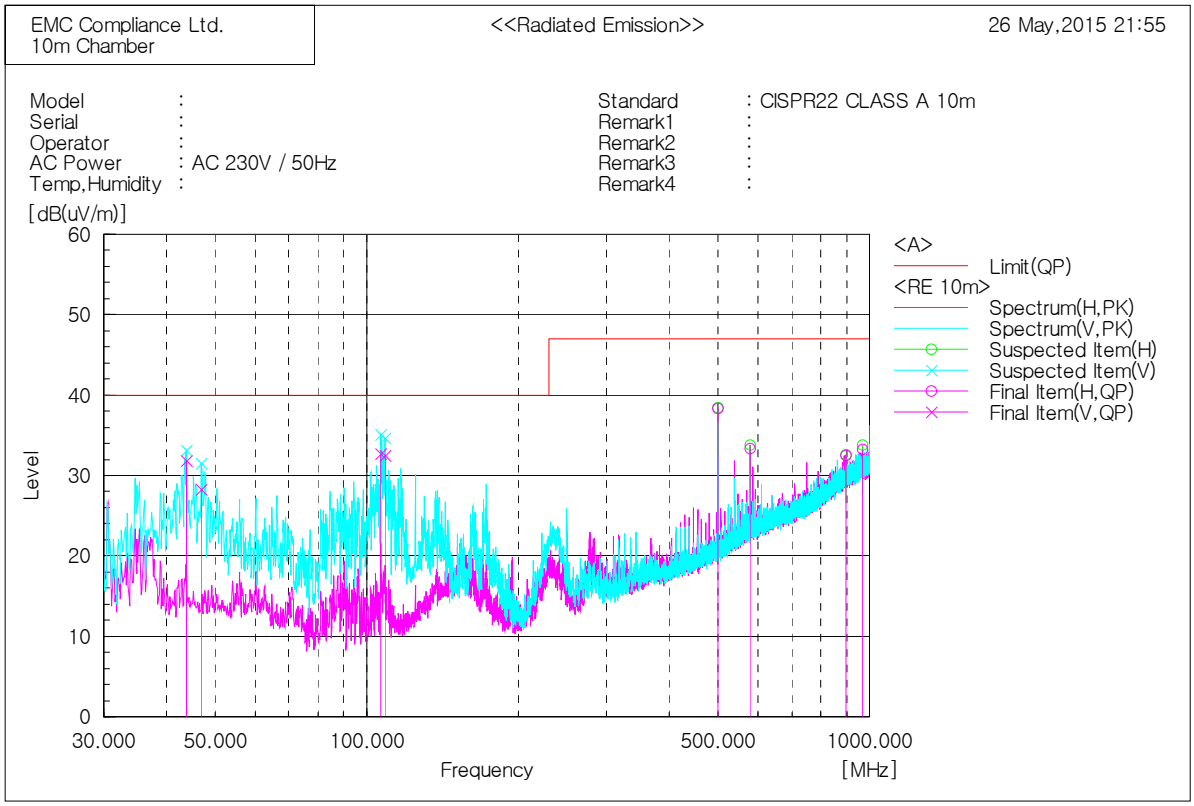




6.2.6 Radiated emission measurement result

*** Graph and Data**

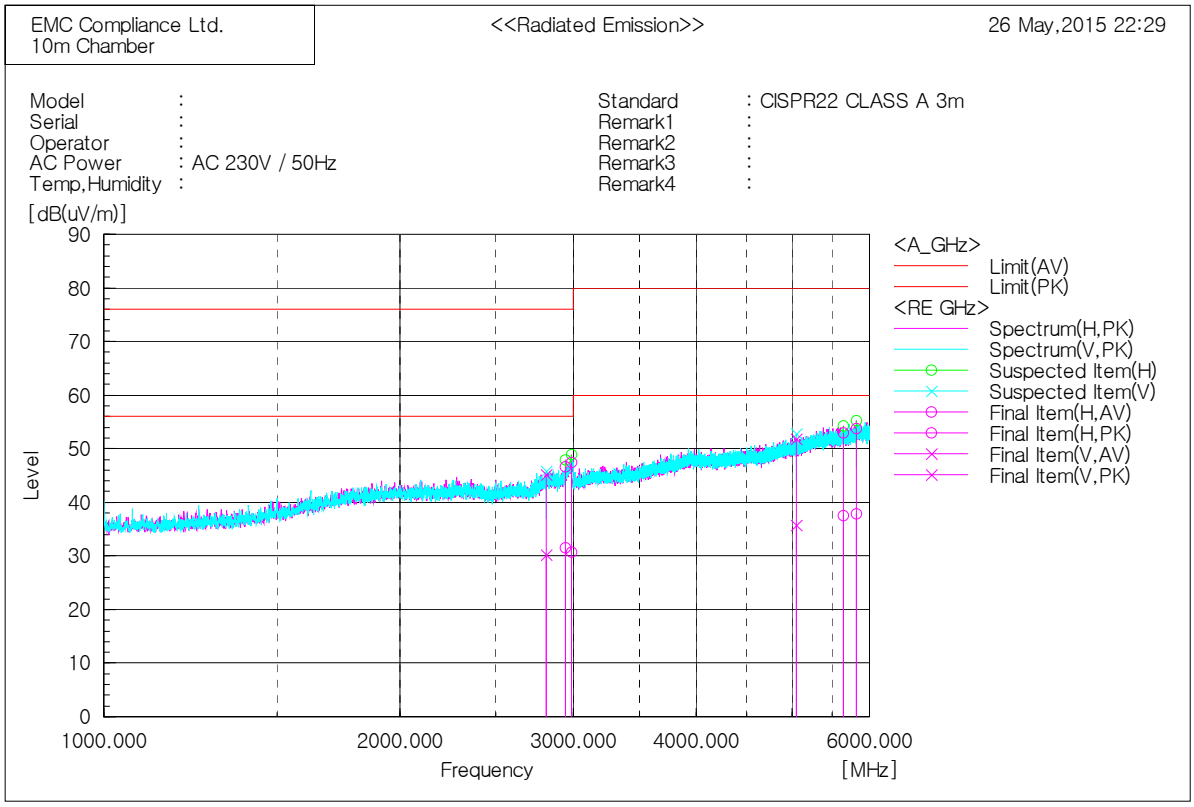
* 30 ㎒ ~ 1 ㎓ (DA-EC2104R)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	43.823	V	44.7	-12.9	31.8	40.0	8.2	100.0	311.7
2	46.975	V	41.1	-12.8	28.3	40.0	11.7	100.0	178.8
3	106.630	V	48.5	-15.8	32.7	40.0	7.3	100.0	322.3
4	108.813	V	48.0	-15.5	32.5	40.0	7.5	100.0	218.1
5	499.965	H	42.0	-3.7	38.3	47.0	8.7	200.0	79.2
6	578.171	H	34.7	-1.3	33.4	47.0	13.6	200.0	103.5
7	899.241	H	27.7	4.8	32.5	47.0	14.5	301.0	169.6
8	969.566	H	27.0	6.2	33.2	47.0	13.8	301.0	15.6

* 1 ㎓ ~ 6 ㎓ (DA-EC2104R)



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	2819.375	V	27.1	42.0	3.1	30.2	45.1	56.0	76.0	25.8	30.9	100.0	254.3
2	2948.125	H	27.7	42.8	3.8	31.5	46.6	56.0	76.0	24.5	29.4	100.0	138.6
3	2988.750	H	26.6	43.4	4.1	30.7	47.5	56.0	76.0	25.3	28.5	100.0	289.8
4	5053.750	V	23.3	39.4	12.5	35.8	51.9	60.0	80.0	24.2	28.1	100.0	313.3
5	5647.500	H	22.9	38.3	14.7	37.6	53.0	60.0	80.0	22.4	27.0	100.0	10.3
6	5816.250	H	22.6	38.4	15.3	37.9	53.7	60.0	80.0	22.1	26.3	100.0	4.6

6.3 Harmonics

Test specification	EN 61000-3-2:2014				
Testing voltage	230 V, 50 Hz				
Test facility	EMI Test area(6F)				
Date	2015. 06. 05				
Temperature(°C)	26.5 °C	Humidity (% R.H.)	36.8 % R.H.	Pressure (kPa)	100.0 kPa
Remarks	Pass				

6.3.1 Measurement procedure

The equipment is supplied in series with shunt(s) Rm or current transformer(s) from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the equipment. Measurements shall be made under normal load, or conditions for adequate heat discharge, and under normal operating conditions. User's operation controls or automatic programmers shall be set to produce the maximum harmonic component, for each successive harmonic component in turn. For the purpose of harmonic current limitation, equipment is classified as follows :

Class A : Equipment not specified in one of the three other Classes shall be considered as Class A equipment.

- Balanced three-phase equipment;
- Household appliances excluding equipment identified as Class D;
- Tools excluding portable tools;
- Dimmers for incandescent lamps;
- Audio equipment.

Class B : Portable tools; Arc welding equipment which is not professional equipment.

Class C : Lighting equipment.

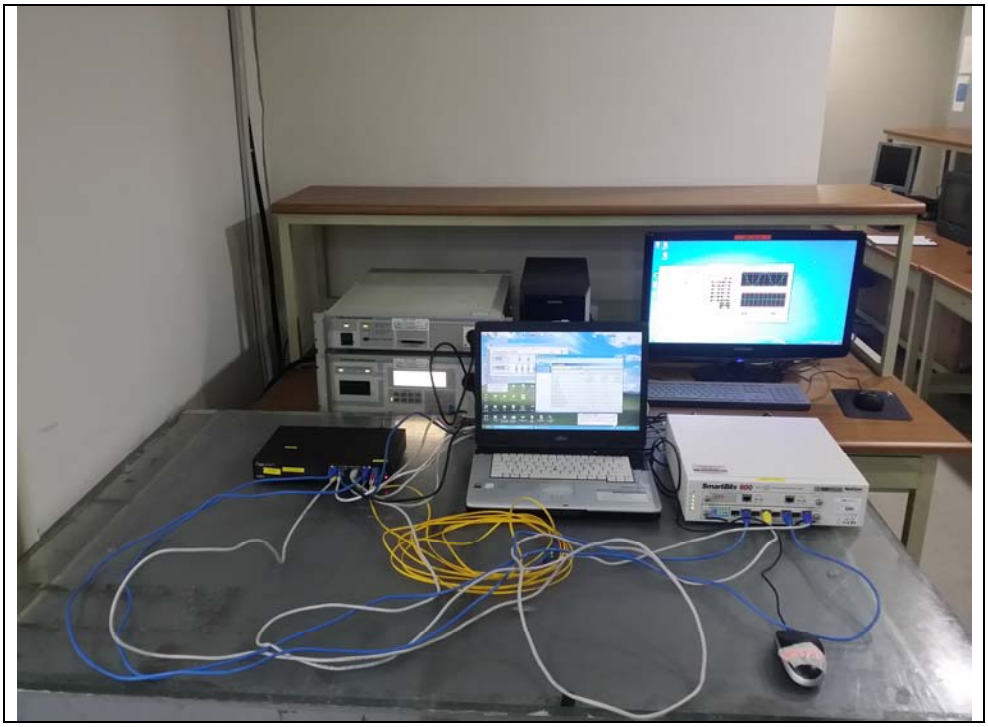
Class D : Equipment having a specified power according to 6.2.2 less than or equal to 600 w, of the following types:

- Personal computers and personal computer monitors;
- Television receivers.

6.3.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS -400-413	54894	C.I.	2017.03.16	☒

6.3.3 Photographs of test setup



6.3.4 Measurement result

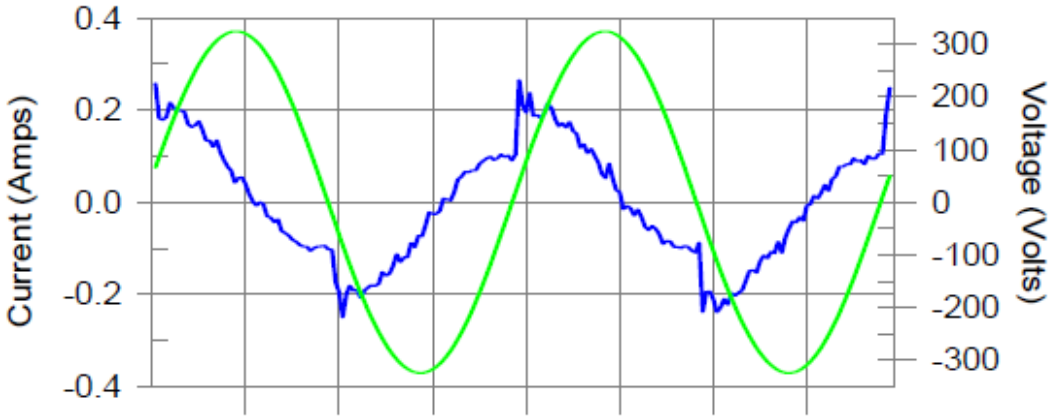
Harmonics – Class-A per Ed. 4.0 (2014)(Run time) incl. inter-harmonics

EUT: DH-2212PF
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 05/06/2015 Start time: 19:23:38
Test duration (min): 2.5 Data file name: H-000273.cts_data
Comment: Comments
Customer: IDIS CO., LTD.

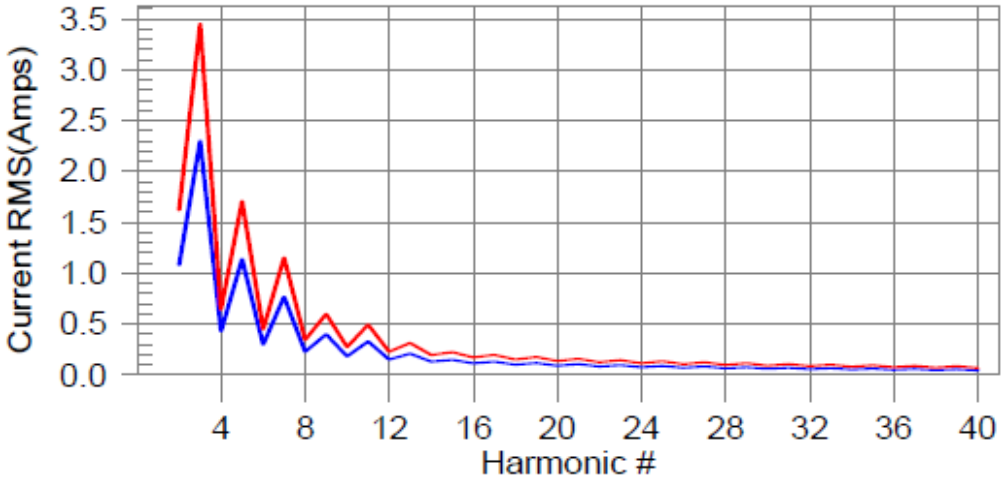
Tested by: Test Operator
Test Margin: 100
End time: 19:26:30

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #9 with 1.5% of the limit.

Current Test Result Summary (Run time)

EUT: DH-2212PF
Tested by: Test Operator
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test Margin: 100
Test date: 05/06/2015
Start time: 19:23:38
End time: 19:26:30
Test duration (min): 2.5
Data file name: H-000273.cts_data
Comment: Comments
Customer: IDIS CO., LTD.

Test Result: Pass
Source qualification: Normal
THC(A): 0.025
I-THD(%): 19.8
POHC(A): 0.000
POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.49	Frequency(Hz):	50.00
I_Peak (Amps):	0.298	I_RMS (Amps):	0.128
I_Fund (Amps):	0.125	Crest Factor:	2.345
Power (Watts):	13.1	Power Factor:	0.449

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.016	2.300	0.7	0.016	3.450	0.5	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.011	1.140	0.9	0.011	1.710	0.6	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.008	0.770	1.0	0.008	1.155	0.7	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.006	0.400	1.5	0.006	0.600	1.0	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.005	0.330	N/A	0.005	0.495	N/A	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.004	0.210	N/A	0.004	0.315	N/A	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.004	0.150	N/A	0.004	0.225	N/A	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.003	0.132	N/A	0.003	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.003	0.118	N/A	0.003	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.003	0.107	N/A	0.003	0.161	N/A	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.003	0.098	N/A	0.003	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.002	0.090	N/A	0.003	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.002	0.083	N/A	0.002	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.002	0.078	N/A	0.002	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.002	0.073	N/A	0.002	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.002	0.068	N/A	0.002	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.002	0.064	N/A	0.002	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.002	0.061	N/A	0.002	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.001	0.046	N/A	0.001	0.069	N/A	Pass

Voltage Source Verification Data (Run time)

EUT: DH-2212PF
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 05/06/2015 Start time: 19:23:38
Test duration (min): 2.5 Data file name: H-000273.cts_data
Comment: Comments
Customer: IDIS CO., LTD.

Tested by: Test Operator
Test Margin: 100
End time: 19:26:30

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.49	Frequency(Hz):	50.00
I_Peak (Amps):	0.298	I_RMS (Amps):	0.128
I_Fund (Amps):	0.125	Crest Factor:	2.345
Power (Watts):	13.1	Power Factor:	0.449

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.113	0.459	24.54	OK
3	0.520	2.065	25.18	OK
4	0.024	0.459	5.31	OK
5	0.024	0.918	2.63	OK
6	0.025	0.459	5.47	OK
7	0.024	0.688	3.42	OK
8	0.020	0.459	4.25	OK
9	0.017	0.459	3.71	OK
10	0.009	0.459	1.88	OK
11	0.028	0.229	12.03	OK
12	0.016	0.229	7.16	OK
13	0.020	0.229	8.81	OK
14	0.008	0.229	3.41	OK
15	0.014	0.229	6.26	OK
16	0.011	0.229	4.86	OK
17	0.009	0.229	3.91	OK
18	0.013	0.229	5.62	OK
19	0.008	0.229	3.56	OK
20	0.004	0.229	1.81	OK
21	0.007	0.229	3.18	OK
22	0.008	0.229	3.35	OK
23	0.006	0.229	2.42	OK
24	0.008	0.229	3.59	OK
25	0.012	0.229	5.31	OK
26	0.008	0.229	3.66	OK
27	0.007	0.229	3.15	OK
28	0.008	0.229	3.64	OK
29	0.015	0.229	6.47	OK
30	0.009	0.229	4.06	OK
31	0.010	0.229	4.34	OK
32	0.004	0.229	1.86	OK
33	0.012	0.229	5.29	OK
34	0.008	0.229	3.55	OK
35	0.011	0.229	4.72	OK
36	0.006	0.229	2.47	OK
37	0.009	0.229	3.88	OK
38	0.003	0.229	1.40	OK
39	0.006	0.229	2.59	OK
40	0.009	0.229	3.80	OK

6.4 Flicker

Test specification	EN 61000-3-3:2013				
Testing voltage	230 V, 50 Hz				
Test facility	EMI Test area(6F)				
Date	2015. 06. 05				
Temperature(°C)	26.5 °C	Humidity (% R.H.)	36.8 % R.H.	Pressure (kPa)	100.0 kPa
Remarks	Pass				

6.4.1 Measurement procedure

EUT was connected to the power analyzer system.

Measurement was performed to obtain the desired flicker parameters.

The measuring time depends on which parameters are to be measured.

P_{lt} = 2 h

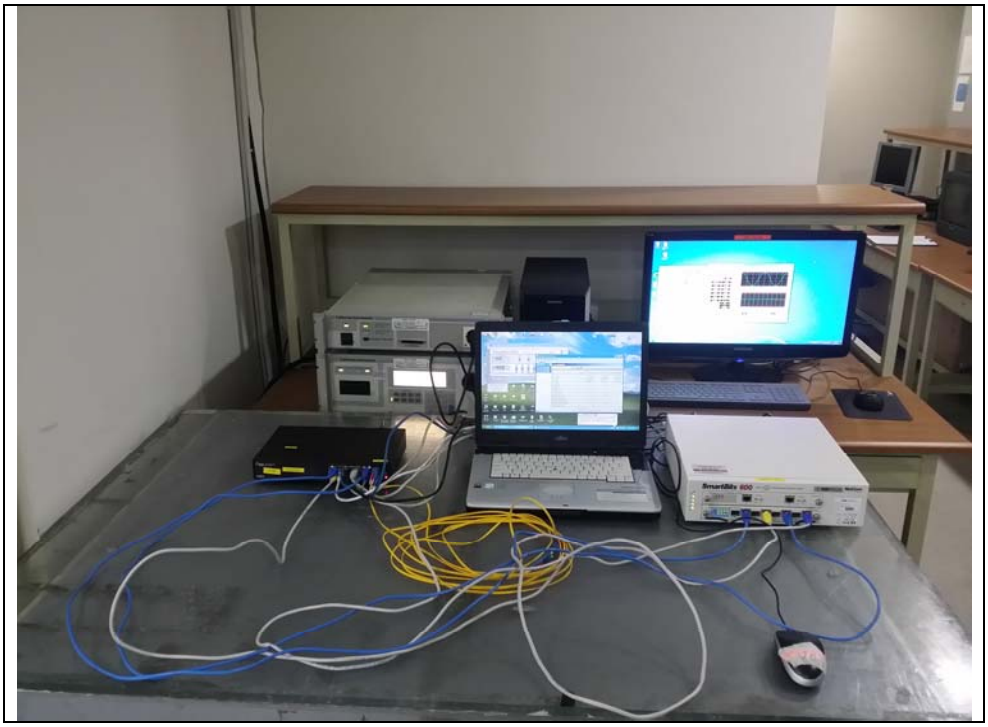
P_{st} = 10 min

Controls and automatic programs shall be set to produce the most unfavorable sequence of voltage changes, using only those combinations of controls and programs are mentioned by the manufacturer in the instruction manual.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter	5001x-CTS -400-413	54894	C.I.	2017.03.16	☒

6.4.3 Photographs of test setup



6.4.4 Measurement result

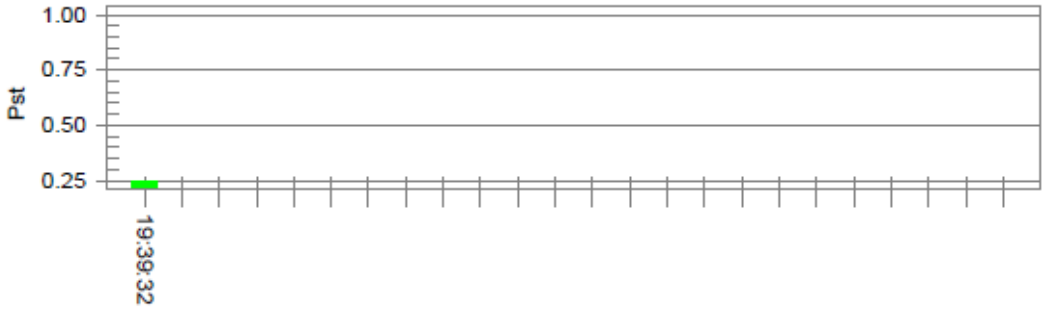
Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: DH-2212PF
Test category: All parameters (European limits)
Test date: 05/06/2015
Test duration (min): 10
Comment: Comment
Customer: IDIS CO., LTD.

Tested by: Test Operator
Test Margin: 100
Start time: 19:29:02
End time: 19:39:33
Data file name: F-000274.cts_data

Test Result: Pass
Status: Test Completed

Pst_t and limit line
European Limits



Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.47			
Highest dt (%):	0.00	Test limit (%):	N/A	N/A
T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.02	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.250	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.109	Test limit:	0.650	Pass

6.5 Electrostatic Discharge

Test specification	ETSI EN 300 386 clause 7.2.2.1.1, Criteria : B				
Test level	☒ Contact: ± 6 kV ☒ Air: ± 2 kV, ± 4 kV, ± 8 kV ☒ HCP: ± 2 kV, ± 4 kV, ± 6 kV ☒ VCP: ± 2 kV, ± 4 kV, ± 6 kV				
Discharge impedance	330 Ω / 150 pF				
Number of discharge (Each polarity)	☒ Contact: 10 ☒ Air: 10 ☒ HCP / VCP: 10				
Interval between discharges	1 s				
Testing Voltage	230 V, 50 Hz				
Test facility	Shielded room(3F)				
Date	2015. 06. 04				
Temperature(°C)	22.5 °C	Humidity (% R.H.)	40.7 % R.H.	Pressure (kPa)	100.4 kPa
Remarks	Pass - A: There was no change of operation status during above testing.				

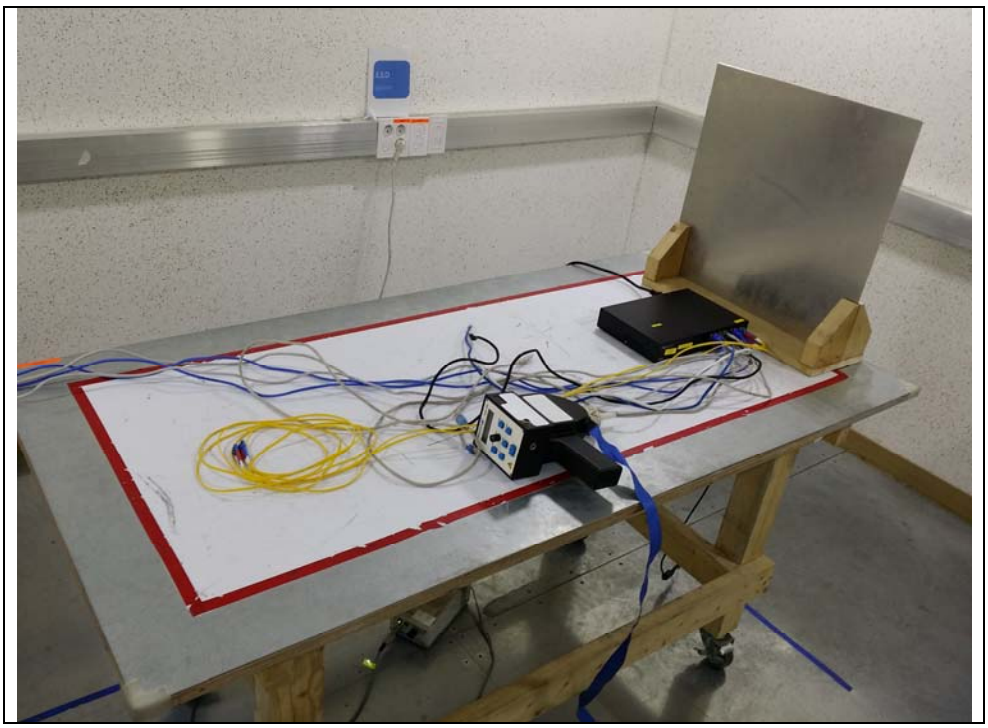
6.5.1 Measurement procedure

A ground reference plane was located on the floor, and connected to earth via a low Impedance connection. The return cable of the ESD generator was connected to the reference plane.
In case of floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating Support. In case of table top equipment, EUT was placed on a wooden table 0.8 m above the reference grounded floor. A horizontal coupling plane (HCP) was placed on the table, and Connected to the reference plane via a 470 kΩ resistor located in each end (0.5 mm insulating support between EUT and HCP). In both cases a vertical coupling plane(VCP) OF 0.5 X 0.5 m was located 0.1 m from the EUT's sides. The VCP was connected to the reference plane in the same matter as the HCP.

6.5.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. Date	Used
ESD Tester	PESD-1600	H011 309	HAEFELY	2015.06.30	☒
ESD Tester	NSG 437	182	TESEQ	2016.04.23	☐
HCP	-	-	-	-	☒
VCP	-	-	-	-	☒

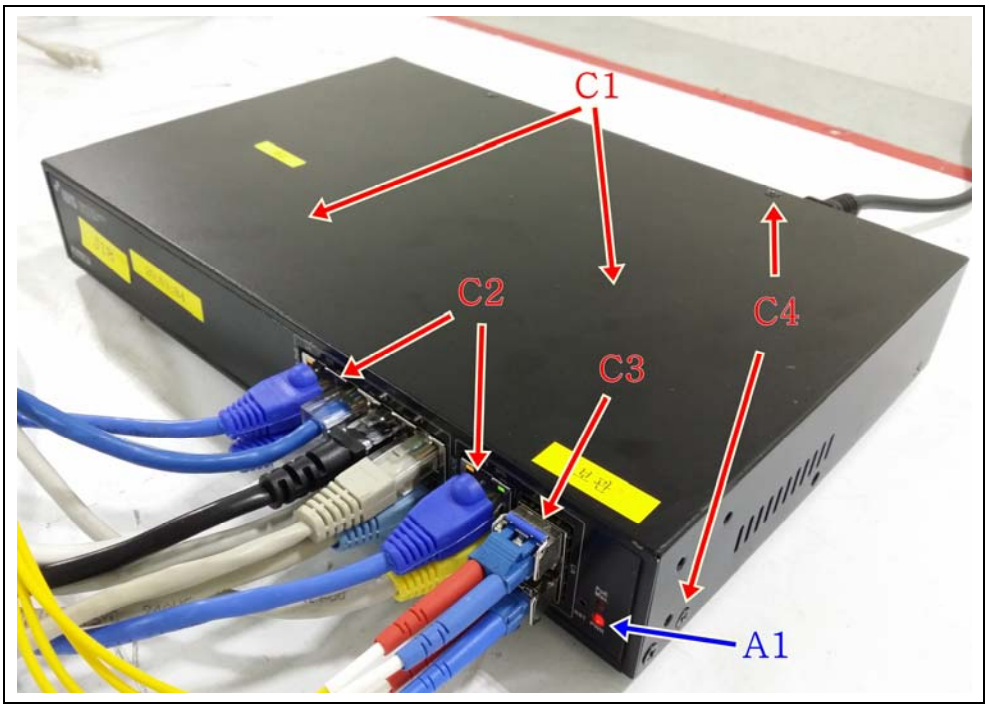
6.5.3 Photographs of test setup

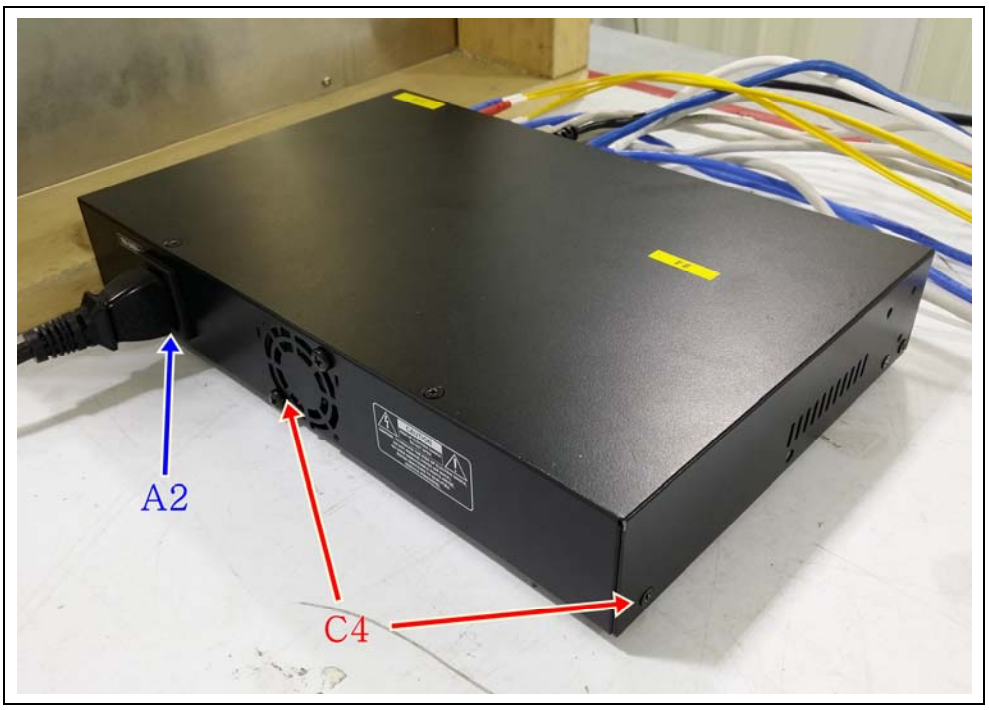


6.5.4 Measurement result

Electrostatic Discharge (Test Point)

Air discharge →
Contact discharge →





HCP/VCP discharge

Location(EUT)	Applied level (±)	Result
HCP (All 4 sides)	± 2 kV, ± 4 kV, ± 6 kV	A
VCP (All 4 sides)	± 2 kV, ± 4 kV, ± 6 kV	A

Contact discharge

Location(EUT)		Applied level (±)	Result
C1	Enclosure(Case)	± 6 kV	A
C2	RJ-45 Port	± 6 kV	A (* Note)See
C3	Optical Port	± 6 kV	A
C4	Screw	± 6 kV	A
C3	LAN(RJ-45) Port	± 6 kV	A

Air discharge

Location(EUT)		Applied level (±)	Result
A1	LED	± 2 kV, ± 4 kV, ± 8 kV	A
A2	Power Port	± 2 kV, ± 4 kV, ± 8 kV	A

* Loss Chart (* Note: During the test, some packet was lost but link was alive. (C2: RJ-45 Port))

DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
5625050616	5625050324	5625040264	5625040148	292	116	PASS

6.6 Radio Frequency Electromagnetic Fields

Test specification	ETSI EN 300 386 clause 7.2.2.1.2, Criteria : A				
Tested frequency	80 ㎒ ~ 800 ㎒, 800 ㎒ ~ 960 ㎒, 960 ㎒ ~ 1 ㎓, 1.4 ㎓ ~ 2 ㎓, 2 ㎓ ~ 2.7 ㎓				
Test level & Modulation	80 ㎒ ~ 800 ㎒: 3 ㎷/m, 80 % Amplitude Modulation (1 ㎑) 800 ㎒ ~ 960 ㎒: 10 ㎷/m, 80 % Amplitude Modulation (1 ㎑) 960 ㎒ ~ 1 ㎓: 3 ㎷/m, 80 % Amplitude Modulation (1 ㎑) 1.4 ㎓ ~ 2 ㎓: 10 ㎷/m, 80 % Amplitude Modulation (1 ㎑) 2 ㎓ ~ 2.7 ㎓: 3 ㎷/m, 80 % Amplitude Modulation (1 ㎑)				
Frequency Step	log 1 % step				
Dwell time	3 s				
Distance	3 ㎜ from EUT to tip of antenna				
Testing Voltage	230 ㎷, 50 ㎐				
Test facility	6F Fully anechoic chamber (3 ㎜)				
Date	2015. 06. 05				
Temperature(°C)	26.6 °C	Humidity (% R.H.)	27.1 % R.H.	Pressure (㎪)	100.0 ㎪
Remarks	Pass - A: There was no change of operation status during above testing.				

6.6.1 Measurement procedure

The test was performed at 3 ㎜ full anechoic chamber.

For floor standing equipment, the EUT was standing on the floor.

For tabletop equipment, the EUT was located on a wooden table 0.8 ㎜ above the floor.

The EUT was tested all sides, horizontal and vertical polarization.

6.6.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	2015.09.23	☒
Power sensor	PH2000	303224	AR	2015.09.23	☒
Power sensor	PH2000	311217	AR	2015.09.23	☒
Directional coupler	DC6180	303976	AR	2015.09.23	☒
Directional coupler	DC7144M1	320279	AR	2015.09.23	☒
Signal generator	E4421B	GB40052295	AGILENT	2015.09.23	☒
Broadband Amplifier	BBA100	100996-1	R&S	-	☒
Amplifier	60S1G3M2	320444	AR	-	☒
Log Periodic Dipole Antenna	LPDA-0803	-	ETS	-	☒
Antenna master	-	-	ETS	-	☒

6.6.3 Photographs of test setup

6.6.4 Measurement result

Location(EUT)	Antenna polarization	Result
Front side	Horizontal	A
	Vertical	A
Rear side	Horizontal	A
	Vertical	A
Left side	Horizontal	A
	Vertical	A
Right side	Horizontal	A
	Vertical	A

* Loss Chart

	DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
30-1000M(3V/m)	47248116160	47248116032	47265252736	47265252480	128	256	PASS
800-960M(10V/m)	147645064512	147645064320	147662207360	147662207104	192	256	PASS
1.4-2G(10V/m)	253455072576	253455072384	253472218688	253472218432	192	256	PASS
2-2.7G(3V/m)	347846033024	347846032896	347828889536	347828889344	128	192	PASS

6.7 Electric Fast Transient/BURST

Test specification	ETSI EN 300 386 clause 7.2.2.4.1/ 7.2.2.2.1 / 7.2.2.3.1, Criteria : B				
Coupling	☒ AC main ☐ Signal: Clamp ☒ Telecommunication: Clamp				
Test level	☒ AC main: ± 1 kV Peak ☐ Signal: ± 0.5 kV Peak ☒ Telecommunication: ± 0.5 kV Peak				
Repetition frequency	5 kHz, Tr/Th = 5 / 50 ns				
Coupling time (Minimum)	60 s				
Testing Voltage	230 V, 50 Hz				
Test facility	Shielded room (3F)				
Date	2015. 06. 04				
Temperature(°C)	22.4 °C	Humidity (% R.H.)	40.4 % R.H.	Pressure (kPa)	100.4 kPa
Remarks	Pass - A: There was no change of operation status during above testing.				

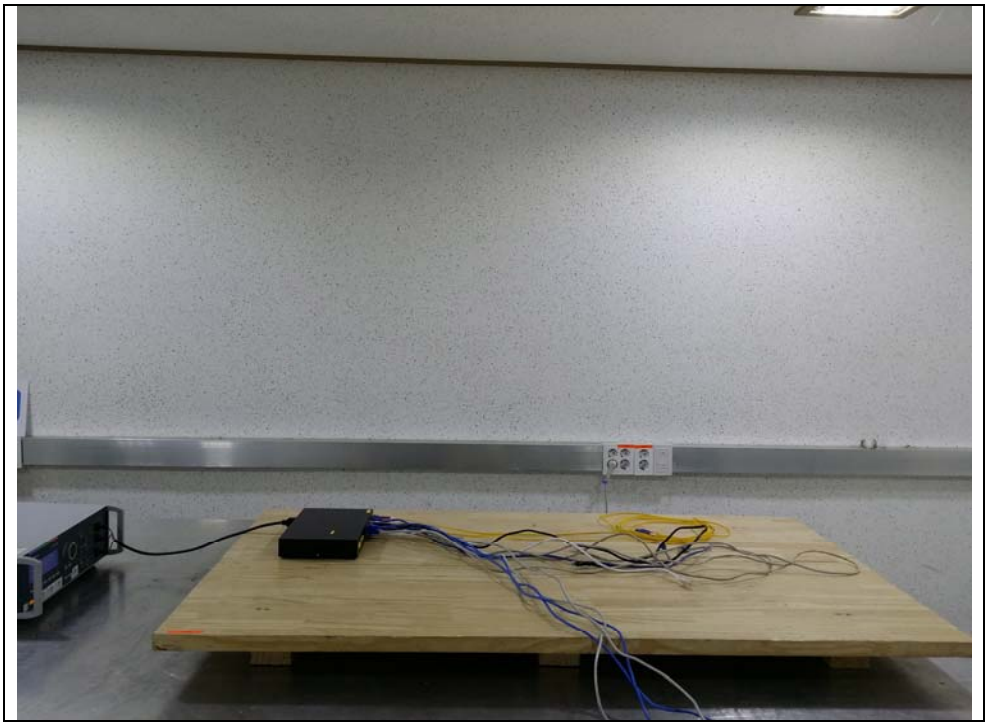
6.7.1 Measurement procedure

A ground reference plane was located on the floor.
EFT generator was connected to reference ground plane via low impedance connection.
For floor standing equipment, EUT was placed on a 0.1 m wooden table.
For tabletop equipment, EUT was placed on a 0.1 m above the ground reference plane.
Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane. When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, Shall be 0.5 m.

6.7.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS500N	V1238113636	EM TEST	2016.02.04	☒
Capacitive coupling clamp	HFK	P1411132494	EM TEST	2016.04.21	☒

6.7.3 Photographs of test setup



6.7.4 Measurement result

* AC main

Coupling point	(+)	(-)	Result
L+N+PE	+ 1 kV	- 1 kV	A

* Signal

Coupling point	(+)	(-)	Result
-	-	-	-

* Telecommunication

Coupling point	(+)	(-)	Result
Cascade(RJ-45)	+ 0.5 kV	- 0.5 kV	A
PoE(RJ-45)	+ 0.5 kV	- 0.5 kV	A

* Loss Chart

	DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
BURST POWER	36041357248	36041356447	36024201024	36024202394	801	-1370	PASS
BURST UPLINK	46648828736	46648824122	46620255936	46620255006	4614	930	PASS
BURST Downlink	125337026880	126097981852	126823915584	127579115292	-760954972	-755199708	PASS

6.8 Surge

Test specification	ETSI EN 300 386 clause 7.2.2.4.2 / 7.2.2.2.2 / 7.2.2.3.2, Criteria : B				
Coupling	☒ AC main: Direct ☒ Telecommunication:: Direct, CDN				
Test level	☒ AC main: ☒Differential mode: ± 0.5 kV, ± 1 kV ☒Common mode: ± 0.5 kV, ± 1 kV, ± 2 kV ☒ Telecommunication: ± 0.5 kV, ± 1 kV				
Coupling Impedance	☒ Differential mode: 18 ㎌ ☒ Common mode: 10 Ω + 9 ㎌ ☒ 40 Ω + 0.5 ㎌ ☒ Direct				
Surge pulse shape	Tr/Th = 1.2 / 50 ㎲(AC main/ Telecommunication_Cascade) Tr/Th = 10 / 700 ㎲ (Telecommunication_PoE)				
Angles	0 °, 90 °, 180 °, 270 °				
Number of surge	5				
Coupling time	1 min				
Testing Voltage	230 V, 50 Hz				
Test facility	Shielded room (3F)				
Date	2015. 06. 04				
Temperature(°C)	22.4 °C	Humidity (% R.H.)	40.4 % R.H.	Pressure (kPa)	100.4 kPa
Remarks	Pass - A: There was no change of operation status during above testing.				

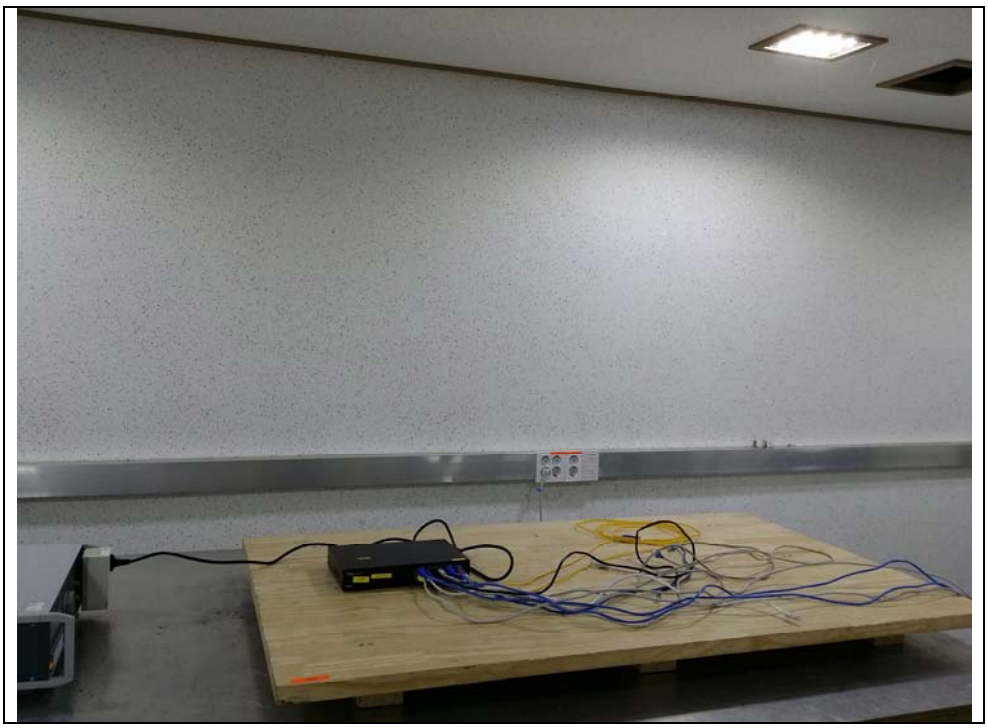
6.8.1 Measurement procedure

A ground reference plane was located on the floor. SURGE generator was connected to reference ground plane via low impedance connection. For floor standing equipment & table top equipment, EUT was placed on a wooden table.

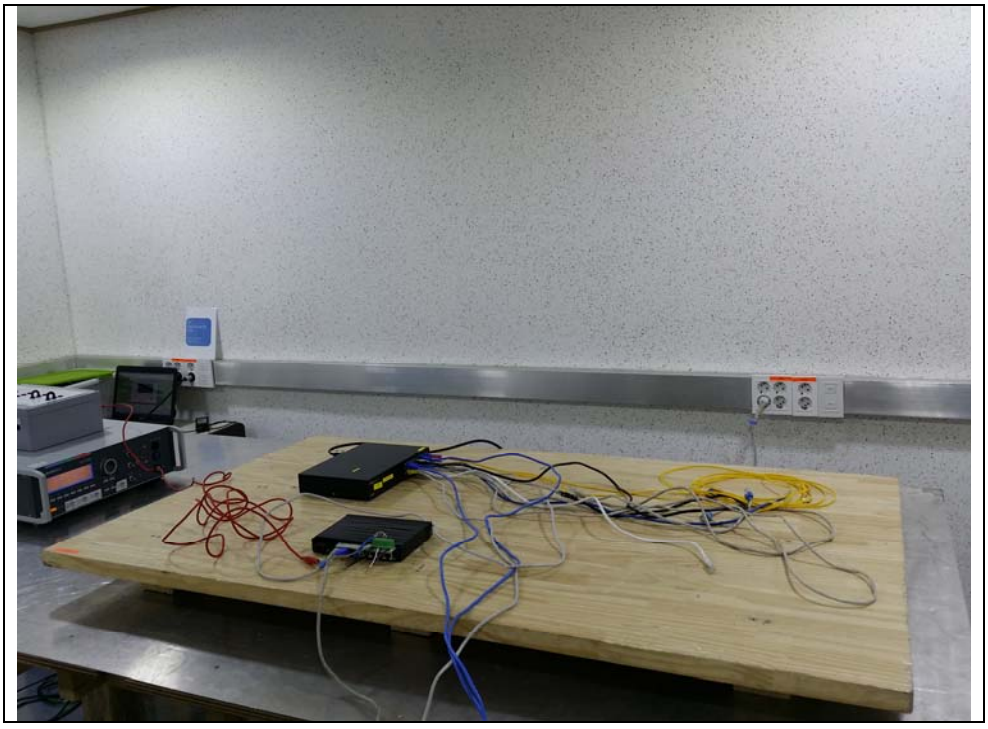
6.8.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS500N	V1238113636	EM TEST	2016.02.04	☒
CDN	CNV 504 N1	P1407131800	EM TEST	2016.04.21	☒
Surge generator	TSS500M	0402-01	EM TEST	2015.10.20	☒

6.8.3 Photographs of test setup



(Indoor)



(Outdoor)

6.8.4 Measurement result

* AC main

Coupling point	(+)	(-)	Result
L+N	+ 0.5 kV, + 1 kV	- 0.5 kV, - 1 kV	A
L+PE	+ 0.5 kV, + 1 kV, + 2 kV	- 0.5 kV, - 1 kV, - 2 kV	A
N+PE	+ 0.5 kV, + 1 kV, + 2 kV	- 0.5 kV, - 1 kV, - 2 kV	A

* Telecommunication

Coupling point	(+)	(-)	Result
Cascade(RJ-45)	+ 0.5 kV	+ 0.5 kV	A
PoE(RJ-45)	+ 1 kV	+ 1 kV	A

* Loss Chart

	DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
SURGE POWER	200274682304	201293098012	202291785792	203294017756	-1018415708	-1002231964	PASS
SURGE UPLINK	354835139520	355853561194	356817936640	357820174442	-1018421674	-1002237802	PASS
SURGE Downlink	462439731200	463458153368	464422550656	465424789016	-1018422168	-1002238360	PASS

6.9 Conducted Immunity

Test specification	ETSI EN 300 386 clause 7.2.2.4.3/7.2.2.2.3/7.2.2.3.3, Criteria : A				
Tested frequency	0.15 ㎒ ~ 80 ㎒				
Test level & Modulation	3 Ⅴ, 80 % Amplitude Modulation (1 ㎑)				
Frequency Step	log 1 % step				
Dwell time	3 s				
Coupling method	☒ AC main: CDN(M3) ☐ Signal: Clamp ☒ Telecommunication: CDN(T8-RJ-45)				
Testing Voltage	230 Ⅴ, 50 ㎐				
Test facility	Shielded room (3F)				
Date	2015. 06. 03				
Temperature(°C)	23.7 °C	Humidity (% R.H.)	48.8 % R.H.	Pressure (㎪)	100.4 ㎪
Remarks	Pass - A: There was no change of operation status during above testing.				

6.9.1 Measurement procedure

A ground reference plane was located on the floor.

The test was performed on a ground reference plane on a 0.1 m wooden table. This test were Performed using CDN for mains, clamp for signal and injection probe. The frequency range was swept from 0.15 ㎒ to 80 ㎒. This frequency range was Modulated with 1 ㎑ sine wave at 80 %.

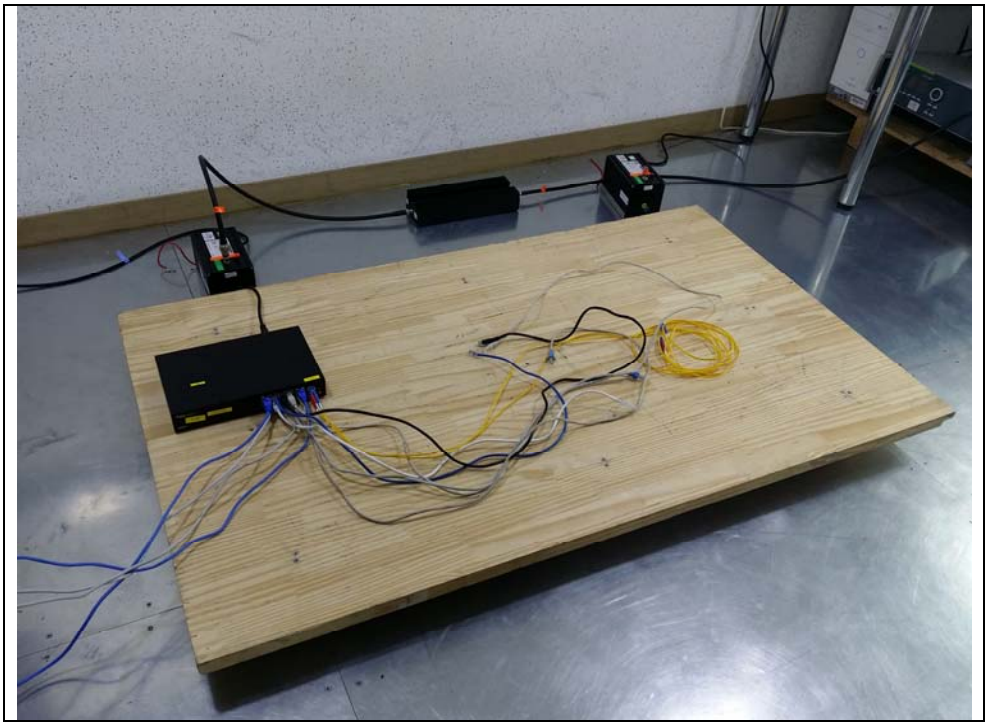
The signal generators provided the modulated frequency at a 1 % step size.

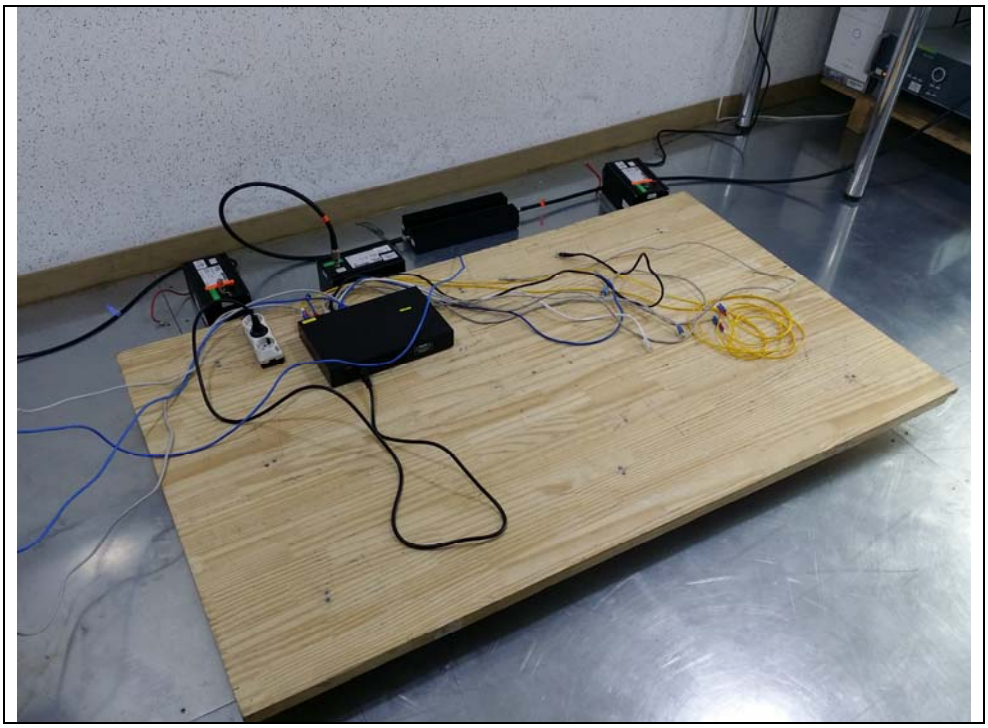
The power and all network cable, I/O cables longer than 3 m length were tested.

6.9.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Continuous Wave Simulator	CWS500N1.4	P1409132195	EM TEST	2016.05.12	☒
CDN	CDN M2/M3	P1402128648	EM TEST	2016.05.14	☒
CDN	CDN M2/M3	P1402128649	EM TEST	2016.05.14	☐
Attenuator	ATT6/80	P1402129094	EM TEST	2016.05.12	☒
Electromagnetic Injection Clamp	EM101	36197	Liithi	2016.05.13	☐
CDN	CDN S1-75	P1404129801	EM TEST	2016.05.14	☐
CDN	CDN-T8-RJ45	P1404129872	EM TEST	2016.05.14	☒

6.9.3 Photographs of test setup





6.9.4 Measurement result

* AC main

Coupling point	Coupling method	Result
Power	CDN(M3)	A

* Signal

Coupling point	Coupling method	Result
-	-	-

* Telecommunication

Coupling point	Coupling method	Result
Cascade(RJ-45)	CDN(T8-RJ-45)	A
PoE(RJ-45)	CDN(T8-RJ-45)	A

* Loss Chart

	DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
CS POWER	68231874757	68231874174	67231523487	67231523120	583	367	PASS
CS UPLINK	79544113847	79544113292	78544048436	78544048041	555	395	PASS
CS Downlink	95184429845	95184429286	94184416673	94184416272	559	401	PASS

6.10 Dips and Interruptions

Test specification	ETSI EN 300 386 clause 7.2.2.4.4, Criteria : B or C				
Number of dips	3 T				
Duration	10 s				
Phase	Zero crossing (0 °), 180 °				
Testing Voltage	100 V, 50/60 Hz / 240 V, 50/60 Hz				
Test facility	Shielded room (3F)				
Date	2015. 06. 04				
Temperature(°C)	22.4 °C	Humidity (% R.H.)	40.4 % R.H.	Pressure (kPa)	100.4 kPa
Remarks	Pass				

6.10.1 Measurement procedure

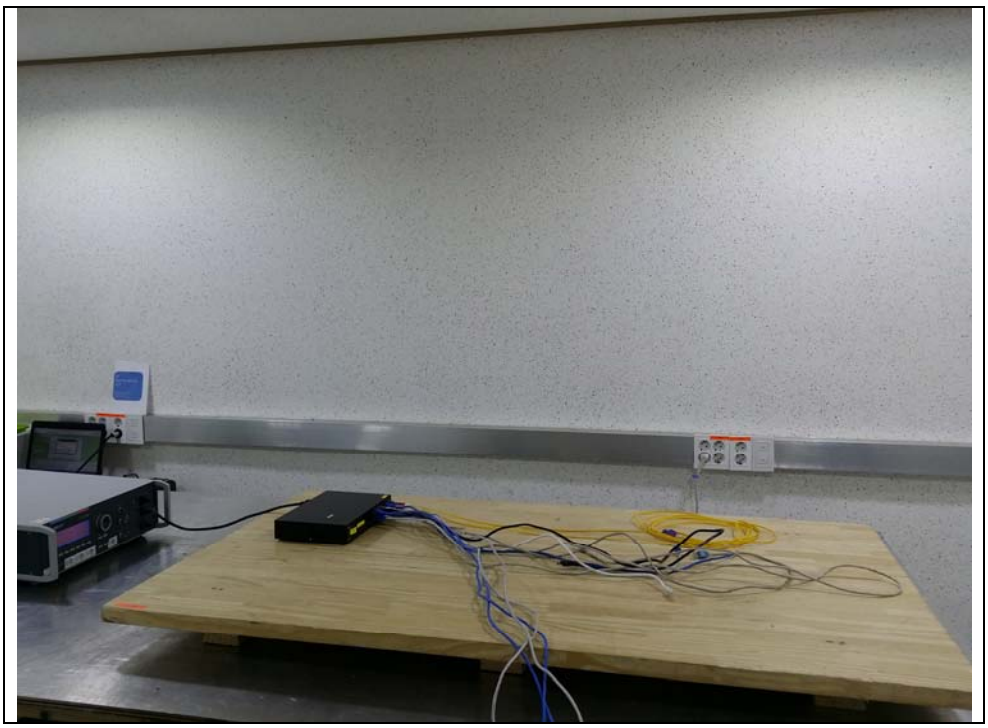
The dips/interruption test is only applicable to AC mains.

The dips/interruptions were applied at zero crossing.

6.10.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS500N	V1238113636	EM TEST	2016.02.04	☒

6.10.3 Photographs of test setup



6.10.4 Measurement result

* 100 V, 50/60 Hz

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Angle (°)	Count number	Result
0 %	100 %	0.5 Period	0 / 180	3T	A
0 %	100 %	1 Period	0	3T	A
70 %	30 %	25/30 Period	0	3T	A
0 %	100 %	250/300 Period	0	3T	B (*Note)See

Comment:

- A: There was no change of operation status during above testing.
  (0.5 Period, 1 Period, 25/30 Period)
- B: The power of EUT is off during the interruption test.
  After the test, EUT is getting back to normal operation. (250/300 Period)

* Loss Chart

	DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
DIP	545019058752	546037481414	54704758736	55706997192	-1018422662	-1002238456	PASS
INT	615192080960	616210503558	617163459136	618165697926	-1018422598	-1002238790	PASS

***** 240 V, 50/60 Hz

Test Level (%UT)	Dip/Int. (%UT)	Duration /Period	Angle (°)	Count number	Result (Criterion)
0 %	100 %	0.5 Period	0 / 180	3T	A
0 %	100 %	1 Period	0	3T	A
70 %	30 %	25 Period	0	3T	A
0 %	100 %	250 Period	0	3T	B (*Note)See

Comment:

- A: There was no change of operation status during above testing.
  (0.5 Period, 1 Period, 25/30 Period)
- B: The power of EUT is off during the interruption test.
  After the test, EUT is getting back to normal operation. (250/300 Period)

* Loss Chart

	DOWN LINK TX	DOWN LINK RX	UP LINK TX	UP LINK RX	DOWN LOSS	UP LOSS	RESULT
DIP	568230214715	569248637346	56323244812	57325483341	-1018422631	-1002238529	PASS
INT	599164308121	600182730738	59714562034	60716800665	-1018422617	-1002238631	PASS

7. E.U.T. photographs

Front View

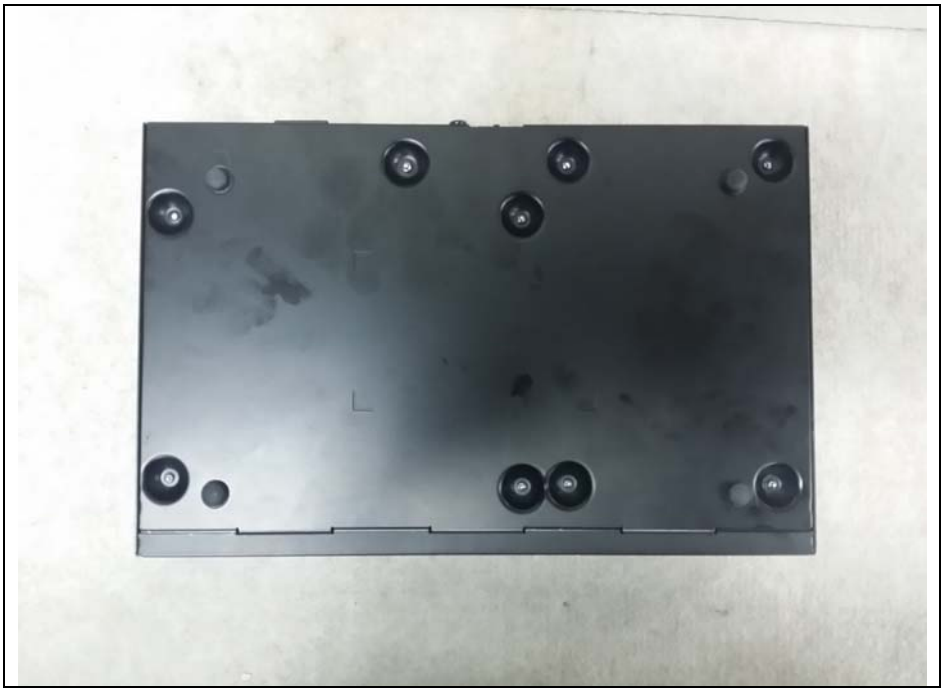
Rear View

Left View

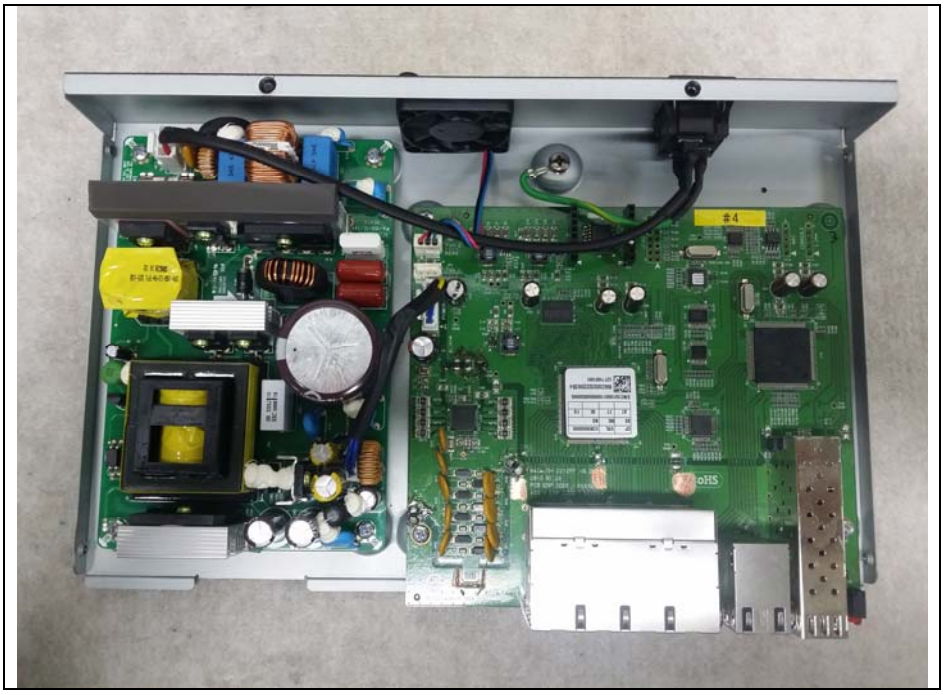
Right View

Top View

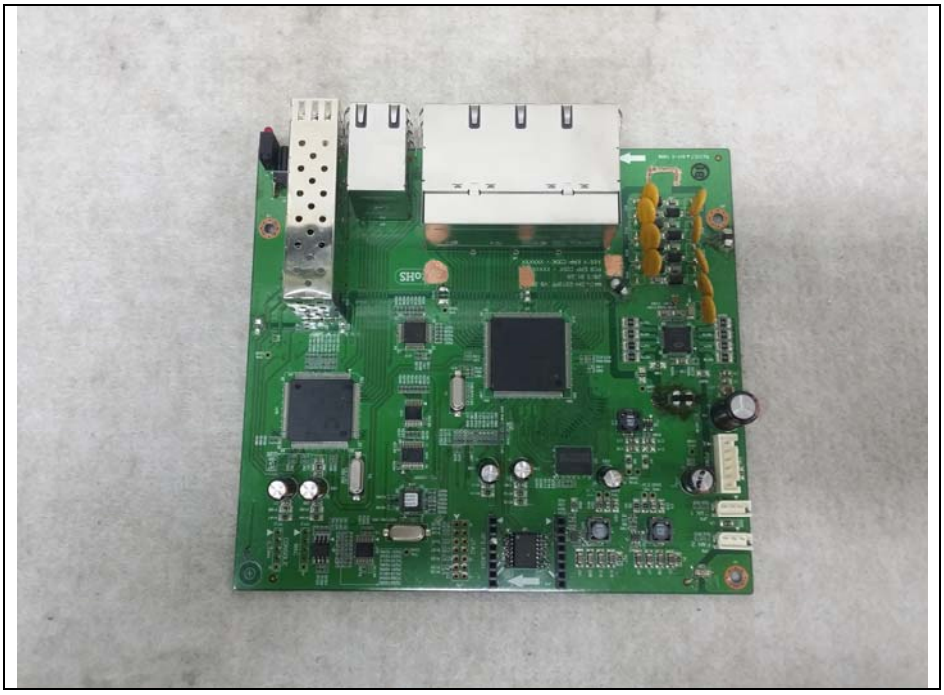
Bottom View

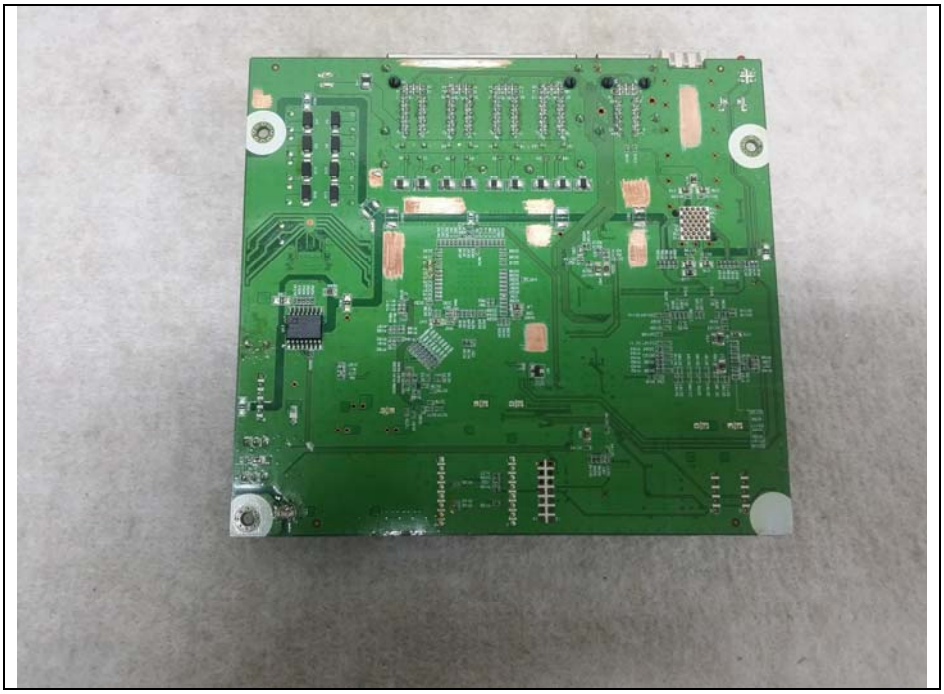


Inside



Main Board





Power Board