



Declaration of Conformity



Type of equipment: NETWORK CAMERA
Brand Name /Trade Mark: SAMSUNG
Type designation /model: SNB-9000P
Applicant: SAMSUNG TECHWIN CO., LTD.

In accordance with the following Directives:

2004/108/EC The Electromagnetic Compatibility Directive
Including amendments by the CE Marking Directive 93/68/EEC

2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)

The following harmonized European standards or technical specifications have been applied:

EN 55022:2010	Limits and methods of measurement of radio disturbance characteristics of information technology equipment
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 50130-4:2011	Product family standard: Immunity requirements for components of fire, intruder and social alarm systems
EN 61000-3-3:2008	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
EN 61000-4-2:2009	Electrostatic discharge immunity test
EN 61000-4-3:2006+A2:2010	Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4:2012	Electrical fast transient/burst immunity test
EN 61000-4-5:2006	Surge immunity test
EN 61000-4-6:2009	Immunity to conducted disturbances, induced by radio-frequency fields

The CE Marking on the products and/or their packaging signifies that SAMSUNG TECHWIN CO., LTD. holds the reference technical file available to the European Union authorities.

Place and date of issue: 84, Jeongdong-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea / April 22, 2015

Authorized Signatory: Name : Jei Soon, Kang
Title : Principal Research Engineer

Signature :

CE Conformance EMC Test Report

Test Report No. : KES-E1-15T0121
Date of Issue : 04. 21. 2015
Description of Product : NETWORK CAMERA
Model No. : SNB-9000P
Variant Model : -
Applicant : Samsung Techwin Co., Ltd.
Address : 84, Jeongdong-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
Manufacturer : ZHEJIANG DAHUA VISION TECHNOLOGY CO LTD
Address : 1199 Bin An Rd Changhe St Binjiang District Hangzhou Zhejiang 310053 CHINA
Applicable Regulation : **EMC Directive 2004/108/EC**
EN 55022:2010
EN 50130-4:2011
EN 61000-3-3:2008

Date of Receipt : 03. 17. 2015
Test Date : 04. 06. 2015 ~ 04. 14. 2015

Tested by:Hyo Jin, Kim
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Test report No.:
KES-E1-15T0121
Page (2) of (104)

Revision history

Revision	Date of issue	Test report No.	Description
-	04. 21. 2015	KES-E1-15T0121	Initial

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The test results in the report only apply to the tested sample.

TABLE OF CONTENTS

1	General Information	4
2	Product Labelling Requirements	12
3	Applicable Regulations	13
4	Test standards and results	16
5	Test Performed	17
5.1	Conducted Emission Measurements	17
5.2	Radiated Emission Measurements	30
5.3	Harmonics / Voltage Fluctuations Measurements	47
5.4	Electrostatic Discharge Immunity	49
5.5	Radio-frequency electromagnetic field Amplitude modulated Immunity	52
5.6	Fast Transients Immunity	56
5.7	Surge Immunity	61
5.8	Radio-frequency continuous conducted Immunity	64
5.9	Voltage Dips and Interruptions Immunity	67
6	Test Setup Photographs	69
6.1	Conducted Emission	69
6.2	Radiated Emission	73
6.3	Harmonics / Voltage Fluctuations Measurements	79
6.4	Electrostatic Discharge Immunity	80
6.5	Radio frequency electromagnetic field immunity	86
6.6	Fast Transients Immunity	88
6.7	Surge Immunity	91
6.8	Radio-frequency continuous conducted Immunity	93
6.9	Voltage Dips and Interruptions Immunity	96
7	External Photographs	97
8	Internal Photographs	99
	Appendix A -Schematics/Block Diagram	103
	Appendix B - User's Manual	104

1. General Information

1.1 Introduction

The EMC Test Report for CE Declaration of Conformity is prepared on behalf of named applicant in accordance with the EMC Directive(2004/108/EC) of the European Economic Community. The test results reported in this document relate only to the item that was tested.

All radiated emission, conducted emission measurements required by the EMC Directive were performed manually at KES Co., Ltd. (here in after called KES), 473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, 469-803 KOREA.

The radiated emission measurements performed on 10 meter, Open Area Test Site, test range maintained by KES. Complete ANSI63.4;2009 description and site attenuation measurement data records are maintained at the test facility and have been placed on file with the Federal Communications Commission.

All immunity measurements required by the EMC Directive were performed manually at KES Co., Ltd. (here in after called KES), 473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, 469-803 KOREA.

The immunity measurements were performed in a shielded enclosure and/or anechoic chamber also located at the same facility.

The KES EMC test facilities in Yeoju-si are designated testing laboratory according to ISO/IEC 17025 by Radio Research Agency(RRA), Korea Communication Commission.

1.2 Product Description for Equipment Under Test (E.U.T)

Samsung Techwin Co., Ltd., NETWORK CAMERA, Model No: SNB-9000P or the "E.U.T" as referred to in this report is base model.

Main Specifications of EUT are:

Video	
Imaging Device	1/2.3"12MProgressivescanCMOS
Total Pixels	12M(4168×3026)
Effective Pixels	4072(H)×3046(V)
Scanning System	Progressive
Min. Illumination	Color:0.56Lux/(50IRE,1/30sec,F1.2);0.28Lux/(30IRE,1/30sec,F1.2) B/W:0.06Lux/(50IRE,1/30sec,F1.2);0.03Lux/(30IRE,1/30sec,F1.2)
S / N Ratio	50dB ↑
Video Out	CVBS:1.0Vp-p/75Ωcomposite,720x480(N),720x576(P),forinstallation -DIPconnectortype
Lens	
Focus Control	SimpleFocus/Manual - Remote control via network ,Button control (Manual, Simple Focus, Day&Night)
Lens Type	Manual / DC Auto Iris
Mount Type	C/CS Mount
Operational	
Camera Title	Off/On(Displayedupto45characters)
Day & Night	Auto (ICR) / Color / B/W / External / Schedule
Backlight Compensation	Off / BLC / HLC
WDR	-
Contrast Enhancement	SSDR(SamsungSuperDynamicRange) (Off / On)
Digital Noise Reduction	SSNRIII+(3DNoiseFilter) (Off / On)
Digital Image Stabilization	-
Defog	Auto/Manual/Off
Motion Detection	Off / On (4ea 4 Points Polygonal zones)
Privacy Masking	Off / On (32 Zones of Rectangular)
Gain Control	Off/Low/Middle/High
White Balance	ATW / AWC / Manual / Indoor / Outdoor / Mercury
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1 ~ 1/12,000sec)
Digital Zoom	8x zoom
D-PTZ	O
D-Tracking	-
Hand Over	-
Flip / Mirror	Off/On
Intelligent Video Analytics	Tampering,VirtualLine,Enter/Exit,Appear/Disappear, AudioDetection,FaceDetectionwithMetadata(toNVR/SSMRecordingServer)
Alarm I/O	Input2ea/Output1ea
Audio In	Selectable (Mic IN/Line IN), Max output level: 1 Vrms
Audio out	Line out (3.5mm mono mini jack)
Serial Interface	RS-485(10EA) -Samsung-T/E,Pelco-D/P,Panasonic,vicon,Honewell,AD,GE,Bosch
Alarm Triggers	Motion detection, Tampering, Audio Detection, Face Detecton, Video Analytics, Alarm Input,

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Test report No.:
KES-E1-15T0121
Page (6) of (104)

	Network Disconnection
Alarm events	FileuploadviaFTPandE-Mail NotificationviaE-Mail,TCPandHTTP localstorage(SD/SDHC/SDXC)orNASrecordingatNetworkdisconnected&Event(AlarmTriggers) Externaloutput
Network	
Ethernet	RJ-45(10/100/1000BASE-T)
Video Compression Format	H.264 (MPEG-4 Part 10/AVC), Motion JPEG
Resolution	4000x3000 / 4096x2160 / 3840x2160 / 2592x1944 / 2048x1536 / 1920x1080 / 1600x1200 / 1280x1024 / 1280x960 / 1280x720 / 1024x768 / 800x600 / 720x576 / 720x480 / 704x576 / 640x480 / 640x360 / 320x240
Max. Framerate	H.264:3840x2160~320x240-30fps/4096x2160-25fps/4000x3000-20fps MJPEG:800x600~320x240-30fps/1024x768~1920x1080-20fps/2048x1536~2592x1944-15fps/3840x2160~4000x3000-5fps
Smart Codec	Yes (Area Based Method)
Video Quality Adjustment	H.264:TargetBitrateLevelControl MJPEG:QualityLevelControl
Bitrate Control Method	H.264:CBRorVBR, MotionJPEG:VBR
Streaming Capability	Multiple Streaming (Up to 3 Profiles per each resolution mode)
Audio Compression Format	G.711u-law/G.726Selectable G.726(ADPCM)8KHz,G.7118KHz G.726:16Kbps,24Kbps,32Kbps,40Kbps AAC(16KHz/48KHz)
Audio Communication	Bi-directional
IP	IPv4, IPv6
Protocol	TCP/IP,UDP/IP,RTP(UDP),RTP(TCP),RTCP,RTSP,NTP,HTTP,HTTPS,SSL,DHCP,PPPoE,FTP,SMTP,ICMP,IGMP,SNMPv1/v2c/v3(MIB-2),ARP,DNS,DDNS,QoS,PIM-SM,UPnP,Bonjour
Security	HTTPS(SSL)LoginAuthentication DigestLoginAuthentication IPAddressFiltering UseraccessLog 802.1xAuthentication
Streaming Method	Unicast / Multicast
Max. User Access	15 users at Unicast Mode
Memory Slot	microSD/SDHC/SDXC(128GB) -motionImagesrecordedintheSDX/SDHC/SDmemorycardcanbedownloaded.
Application Programming Interface	ONVIFProfileS&G SUNAPI(HTTPAPI)v2.0 SVNP2.0
Webpage Language	English,French,German,Spanish,Italian,Chinese,Korean,Russian,Japanese,Swedish,Danish,Portuguese,Turkish,Polish,Czech,Rumanian,Serbian,Dutch,Croatian,Hungarian,Greek,Norwegian,Finnish(23Languages)
Web Viewer	SupportedOS:WindowsVISTA/7/8,MACOSX10.7orhigher SupportedBrowser:MicrosoftInternetExplorer(Ver.8~11)orhigher, MozillaFirefox(Ver.9~19)orhigher, GoogleChrome(Ver.15~25)orhigher, AppleSafari(Ver.6.0.2(MacOSX10.8,10.7Only),5.1.7)orhigher *MacOSXOnly
Central Management Software	SmartViewer, SSM
Environmental	
Operating	-10°C~+55°C(+14°F~+131°F)/Lessthan90%RH

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Test report No.:
KES-E1-15T0121
Page (7) of (104)

Temperature / Humidity	
Storage Temperature / Humidity	-30°C~+60°C, Less than 95% RH
Electrical	
Input Voltage / Current	AC24V±10%, DC12V±10%,PoE(IEEE802.3af,Class3)
Power Consumption	Max.12.5W(AC24V,50~60Hz) Max.10.5W(DC12V) Max.12.0W(PoE,Class3)
Mechanical	
Color / Material	FRONT (BLACK) , BODY (IVORY) / FRONT(Aluminium), BODY(Aluminium)
Dimension (WxHxD)	W78.3 x H67.3 x D134.6
Weight	497g

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**1.3 Equipment Under Test**

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK CAMERA	SNB-9000P	-	ZHEJIANG DAHUA VISION TECHNOLOGY CO LTD	EUT

1.4 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adapter	FSD-804PS(V3)	-	PLANET Technology Corp.	-
Notebook	LG15N54	410NZET022292	LG Electronics Inc.,	-
AC/DC Adapter	ADP-90WH B	84ZW19F1557	DELTA ELECTRONICS(JIANGSU) LTD.	-
PTZ Controller	SPC-1010	-	SAMSUNG TECHWIN CO., LTD	-
Headset	RHS-2000	-	ROYCHE	-
Monitor	SMT-2232	C95V67VF900015 Y	Weihai Daewoo Electronics Co., Ltd.	-
Micro SD	-	-	Sandisk	-



1.5 External I/O Cabling

- AC, DC Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA	Audio In	Headset	Audio Out	1.8	Unshielded
	Audio Out	Headset	Audio In	1.8	Unshielded
	BNC	Monitor	BNC	5.0	Shielded
	RJ-45	Notebook	RJ-45	3.0	Unshielded
	RS-485	PTZ Controller	RS-485	3.0	Unshielded

- POE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA	Audio In	Headset	Audio Out	1.8	Unshielded
	Audio Out	Headset	Audio In	1.8	Unshielded
	BNC	Monitor	BNC	5.0	Shielded
	RJ-45	POE Adapter	RJ-45	3.0	Unshielded
	RS-485	PTZ Controller	RS-485	3.0	Unshielded
POE Adapter	RJ-45	Notebook	RJ-45	1.0	Unshielded

1.6 Special Accessories

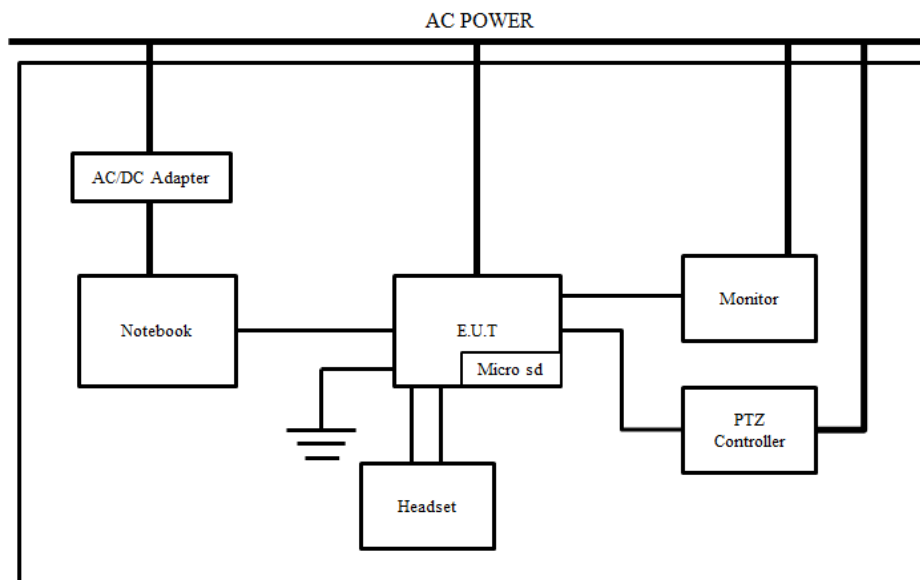
As shown in section 1.8, all interface cables used for compliance testing are shielded as normally supplied or by use respective component manufacturers.

1.7 E.U.T Modifications

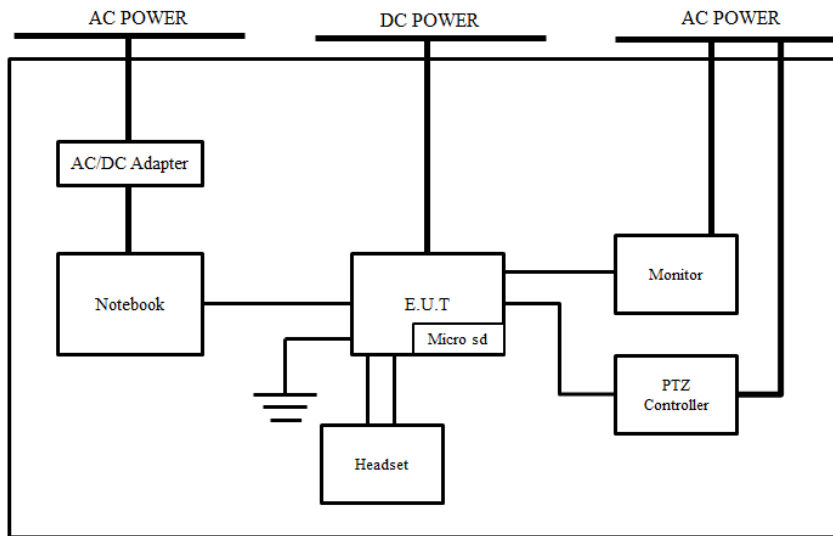
No modifications were made to the E.U.T in order to achieve and maintain compliance to the standards described in this report.

1.8 Configuration of Test System

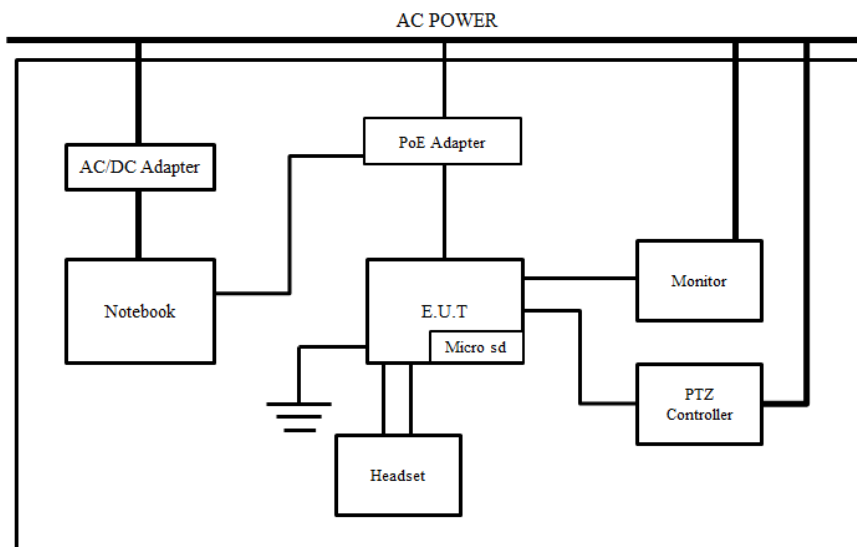
- AC Mode



- DC Mode



- POE Mode



1.9 Operating condition :

※ Test Operating Mode

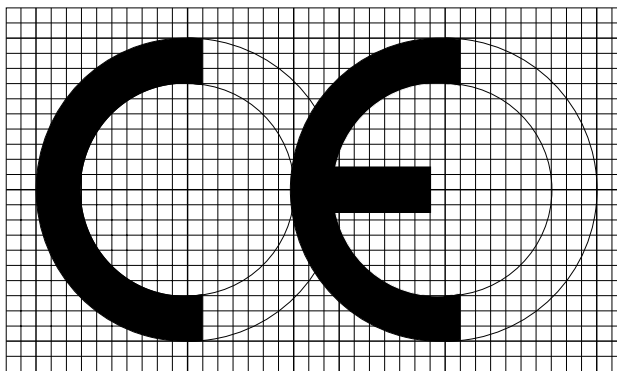
- Ping test
- Web view monitoring
- operated monitoring

2. Product Labelling Requirements

2.1 CE Mark

The CE Conformity Marking must consist of the initials "CE" in the stylized font and proportional to the dimensional requirements shown in following figure. Regardless of its size, the symbol must retain the specified proportionality.

The Various components of the CE Marking must have substantially the same vertical dimensions, and shall not be less than 5mm in height.



Radius of Outer Circle 100 units
 Radius of Inner Circle 70 units
 Stroke Width 30 units
 Length of Bar 85 units
 Axis to Axis 170 units
 Minimum Height 5.0 mm

2.2 Statements and User Information

Equipment classification, Class (A)

Directives in which conformance is claimed Applicable EN standards

Transitional provisions Class A equipment shall also include the following statement:

Warning:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

3. Applicable Regulations

3.1 Emission

EN 55022:2010/CISPR22 are the applicable regulations that apply to Information Technology Equipment. The intention of these standards, is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe method of measurement and to standardize operation conditions and interpretation of the results.

EN 55022:2010/CISPR22 defines Information Technology Equipment (ITE) as follows:

Any equipment which has a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control, of data and of telecommunication message and which may be equipped with one or more terminal ports typically operated for information transfer.

Any equipment with a rated supply voltage not exceeding 600 V (ac)

3.2 Immunity

EN 50130-4:2011 Alarm systems-Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.

If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing that is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such

Flickering of indicators occurs at a field strength of 3 V/m.

For components of CCTV systems, where the picture is allowed at 10 V/m, providing.

- (a) there is no permanent damage or change to EUT
(e.g. no corruption of memory or changes to programmable setting etc.)
- (b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and
- (c) there is no observable deterioration of the picture at 1 V/m.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the application of discharge is permissible, providing

That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,

and no such flickering of indicators occurs at $U = 130 \text{ dB}\mu\text{V}$.

For component of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at $U = 140 \text{ dB}\mu\text{V}$, providing:

- (a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
- (b) at $U = 130 \text{ dB}\mu\text{V}$, any deterioration of the picture is so minor that the system could still be used; and
- (c) there is no observable deterioration of the picture at $U = 120 \text{ dB}\mu\text{V}$.

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.

Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

4. Test standards and results

STANDARDS		LIMIT	RESULTS
EN 55022	Conducted Emission on AC mains Port	Refer to EN 55022	PASS
	Conducted Emission on Telecommunication Port	Refer to EN 55022	PASS
	Radiated Emission	Refer to EN 55022	PASS
EN 61000-3-2	Harmonic Current Emission on AC Mains Input Port	Refer to EN 61000-3-2	N/A(1)
EN 61000-3-3	Voltage Fluctuations and Flicker on AC Mains Input Port	Refer to EN 61000-3-3	PASS
EN 50130-4	Electrostatic Discharge Immunity	Refer to EN 61000-4-2	PASS
	Radio-frequency electromagnetic field Amplitude modulated Immunity	Refer to EN 61000-4-3	PASS
	Fast Transients Immunity	Refer to EN 61000-4-4	PASS
	Surges Immunity	Refer to EN 61000-4-5	PASS
	Radio-frequency common mode Immunity	Refer to EN 61000-4-6	PASS
	Voltage Dips, Voltage Interruptions Immunity	Refer to EN 61000-4-11	N/A(1)
	Voltage Variations Immunity	Refer to EN 50130-4	N/A(1)

※ Note.

(1) This device is operate by 24 V (ac), 12 V (dc) and PoE power, test is not applicable

5. Test Performed

5.1 Conducted Emission Measurements

5.1.1 Test Description

The power line conducted emission measurements were performed in a shielded enclosure. The E.U.T was placed on a wooden table, 80 centimeters height above the floor. Power was fed to the E.U.T through a 50 ohm/ 50 micro henry Line Impedance Stabilization Network (LISN). The ground plane that was electrically bonded to the shield room ground system and all power lines entering the shield room were filtered.

5.1.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI Receiver/Signal Analyzer	Narda S.T.S / PMM	PMM 9010F	020WW31006	04. 01. 2016
LISN	R&S	ENV216	101137	02. 10. 2016
LISN	EMCO	3810/2	2228	-
8-Wire ISN CAT3	Schwarzbeck Mess	CAT3 8158	8158-0019	04. 02. 2016
8-Wire ISN CAT5	Schwarzbeck Mess	NTFM 8158	8158-0030	04. 02. 2016
8-Wire ISN CAT6	Schwarzbeck Mess	NTFM 8158	8158-0029	08. 15. 2015
Electro wave Shieldroom	SEMITEC	-	-	-

5.1.3 Test Environments

Ambient Temperatures	Relative Humidity
see the data	see the data

5.1.4 Test Limits

- AC Main

Frequency (MHz)	EN 55022			
	Class B (dB μ V)		Class A (dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	66.0 to 56.0	56.0 to 46.0	79.0	66.0
0.50 to 5.00	56.0	46.0	73.0	60.0
5.00 to 30.00	60.0	50.0	73.0	60.0

- Telecommunication

Frequency (MHz)	EN 55022(Voltage)			
	Class B (dB μ V)		Class A (dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	84.0 to 74.0	74.0 to 64.0	97.0 to 87.0	84.0 to 74.0
0.50 to 30.00	74.0	64.0	87.0	74.0

Frequency (MHz)	EN 55022(Current)			
	Class B (dB μ A)		Class A (dB μ A)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	40.0 to 30.0	30.0 to 20.0	53.0 to 43.0	40.0 to 30.0
0.50 to 30.00	30.0	20.0	43.0	30.0

5.1.5 Test Procedure

The conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with the E.U.T exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the HOT side and NEUTRAL side, herein referred to as H and N, respectively.

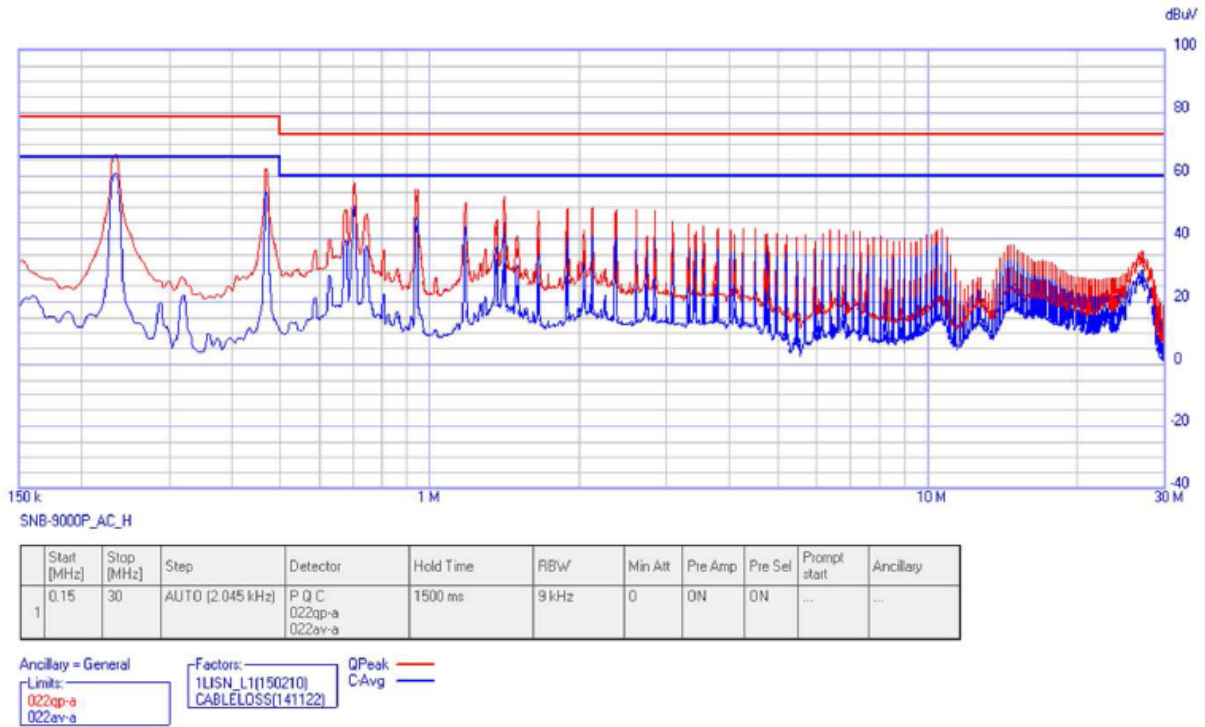
5.1.6 Test Results

According to the data in section 5.1.7, the E.U.T complied with the EN 55022/CISPR22 standards.

5.1.7 Test Data

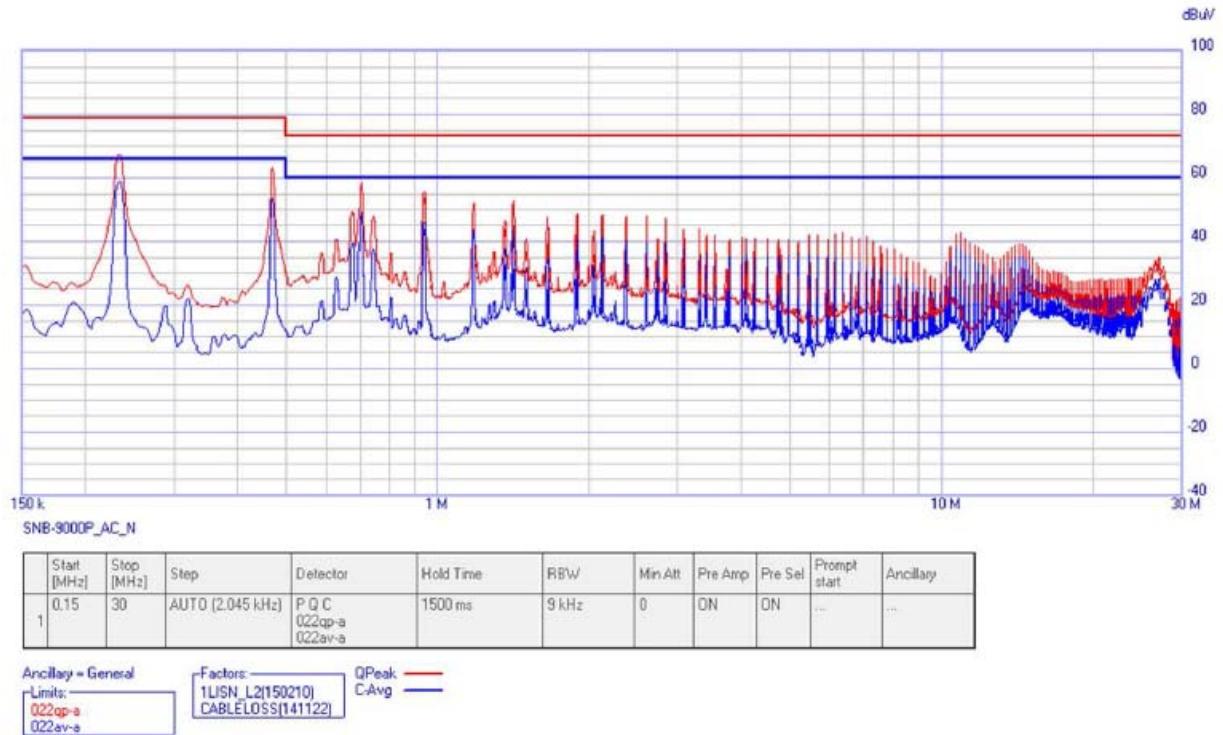
- AC Mode

Temperature: 19.2 °C Humidity: 48.4 R.H. Test Date: 04. 06. 2015 Tested by: Hyo Jin, Kim
Polarization: HOT



Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (LISN) [dB]	Factor (Cable Loss) [dB]
0.152	33.190	79.000	-45.810	20.220	66.000	-45.780	9.650	0.020
0.154	32.000	79.000	-47.000	21.360	66.000	-44.640	9.650	0.020
0.234	66.740	79.000	-12.260	60.740	66.000	-5.260	9.650	0.030
0.469	62.590	79.000	-16.410	54.840	66.000	-11.160	9.650	0.030
0.706	57.460	73.000	-15.540	50.290	60.000	-9.710	9.650	0.040
0.941	55.710	73.000	-17.290	46.600	60.000	-13.400	9.650	0.040
1.177	51.780	73.000	-21.220	43.950	60.000	-16.050	9.650	0.050
1.416	53.720	73.000	-19.280	45.120	60.000	-14.880	9.660	0.050

Polarization: NEUTRAL



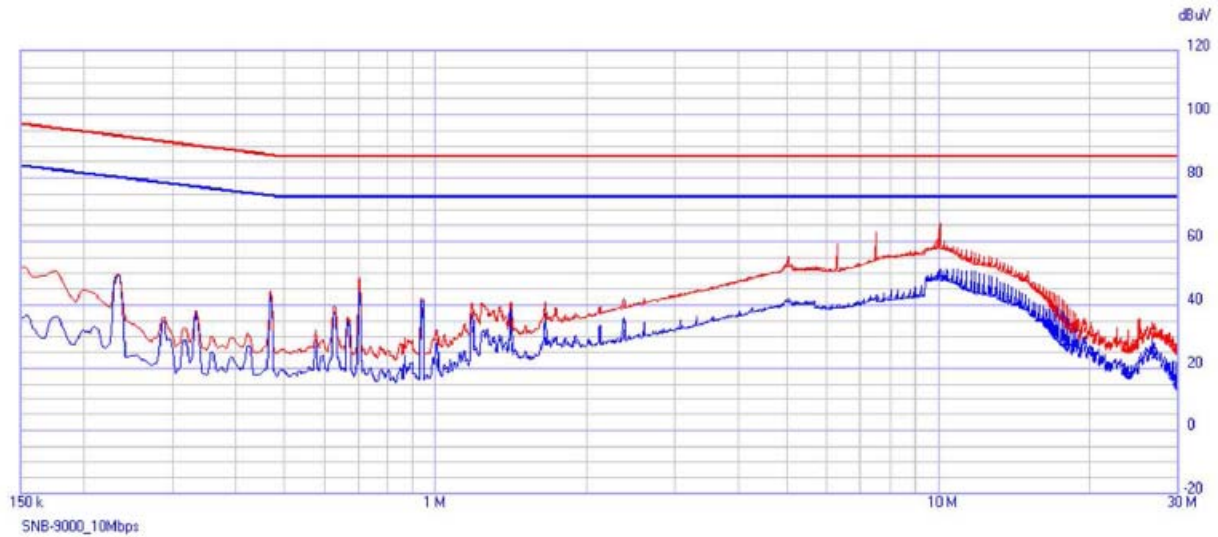
Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (LISN) [dB]	Factor (Cable Loss) [dB]
0.152	32.210	79.000	-46.790	18.300	66.000	-47.700	9.650	0.020
0.154	31.240	79.000	-47.760	18.040	66.000	-47.960	9.650	0.020
0.234	67.310	79.000	-11.690	58.730	66.000	-7.270	9.650	0.030
0.469	63.200	79.000	-15.800	53.650	66.000	-12.350	9.650	0.030
0.706	58.400	73.000	-14.600	49.010	60.000	-10.990	9.650	0.040
0.941	55.600	73.000	-17.400	46.060	60.000	-13.940	9.650	0.040
1.177	52.190	73.000	-20.810	43.430	60.000	-16.570	9.650	0.050
1.416	52.630	73.000	-20.370	44.620	60.000	-15.380	9.660	0.050

- Telecommunication

- AC Mode

Temperature: 19.2 °C Humidity: 48.4 % R.H. Test Date: 04. 06. 2015 Tested by: Hyo Jin, Kim

[10 Mbps]



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Alt	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P.Q.C KN22_CE_TEL_ KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	...	...

Ancillary = General

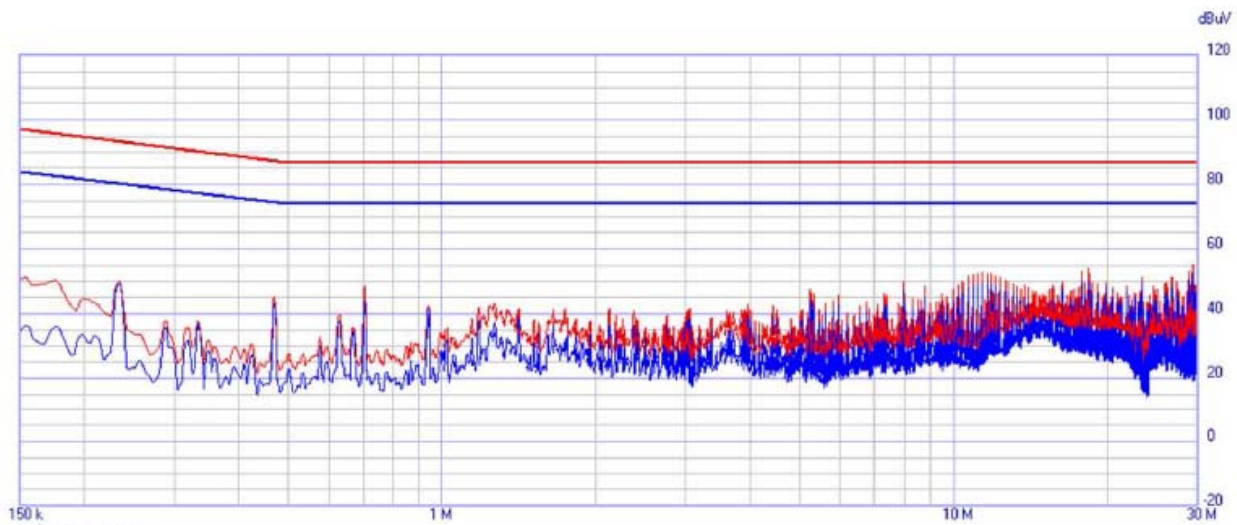
Limits:
KN22_CE_TEL_A_OP
KN22_CE_TEL_A_AV

Factors:
R_ISN 10 Mbps(150402)_ISN ONLY
CABLELOSS(141122)

Q-Peak —
C-Avg —

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.152	51.960	96.890	-44.930	36.530	83.890	-47.360	10.290	0.020
0.154	51.380	96.780	-45.400	36.790	83.780	-46.990	10.280	0.020
0.234	49.760	93.310	-43.550	49.030	80.310	-31.280	10.190	0.030
0.469	44.470	87.530	-43.060	42.620	74.530	-31.910	10.060	0.030
5.019	55.110	87.000	-31.890	41.170	74.000	-32.830	9.830	0.180
6.269	59.260	87.000	-27.740	39.800	74.000	-34.200	9.830	0.210
7.508	62.990	87.000	-24.010	43.030	74.000	-30.970	9.830	0.250
10.046	65.610	87.000	-21.390	50.990	74.000	-23.010	9.830	0.280

[100 Mbps]



SNB-9000_100Mbps

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL_ KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	...	...

Ancillary = General

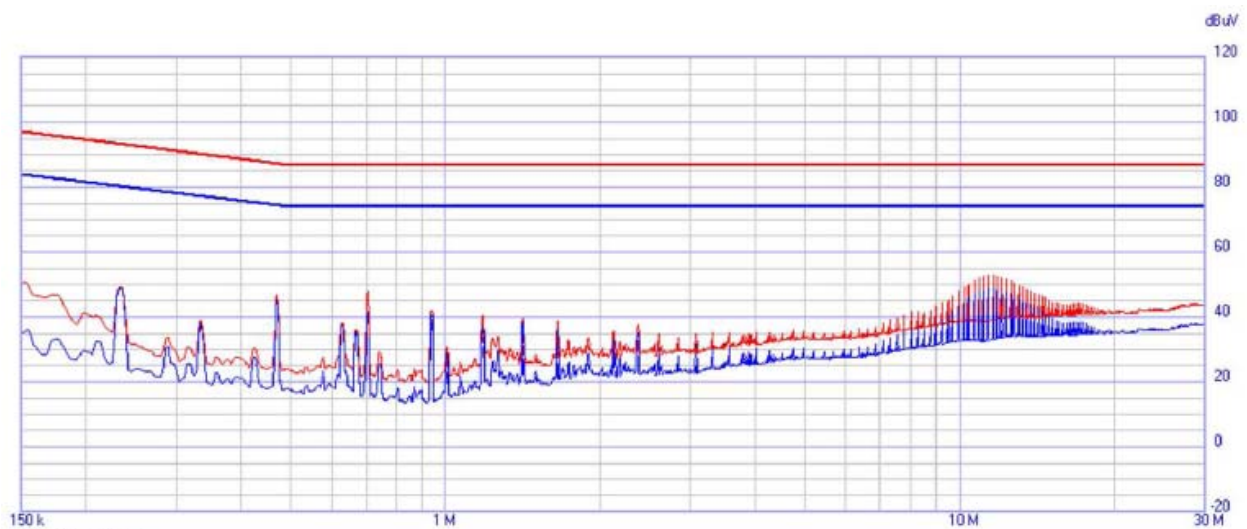
Limits:
KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:
R_ISN 100 Mbps(150402)_ISN ONLY
CABLELOSS(141122)

QPeak —
C-Avg —

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.152	51.290	96.890	-45.600	35.870	83.890	-48.020	9.790	0.020
0.154	51.050	96.780	-45.730	36.480	83.780	-47.300	9.780	0.020
0.234	49.840	93.310	-43.470	49.020	80.310	-31.290	9.690	0.030
0.469	45.120	87.530	-42.410	43.260	74.530	-31.270	9.560	0.030
17.708	53.360	87.000	-33.640	49.890	74.000	-24.110	9.340	0.240
18.281	53.940	87.000	-33.060	50.350	74.000	-23.650	9.340	0.230
28.833	53.380	87.000	-33.620	50.630	74.000	-23.370	9.360	0.410
29.293	55.150	87.000	-31.850	52.630	74.000	-21.370	9.360	0.440

[1000 Mbps]



SNB-9000_1000Mbps

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min.Alt	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL_ KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	...	...

Ancillary = General

Limits:
KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:
R_ISN 1000 Mbps(140815)_ISN ONLY
CABLELOSS(141122)

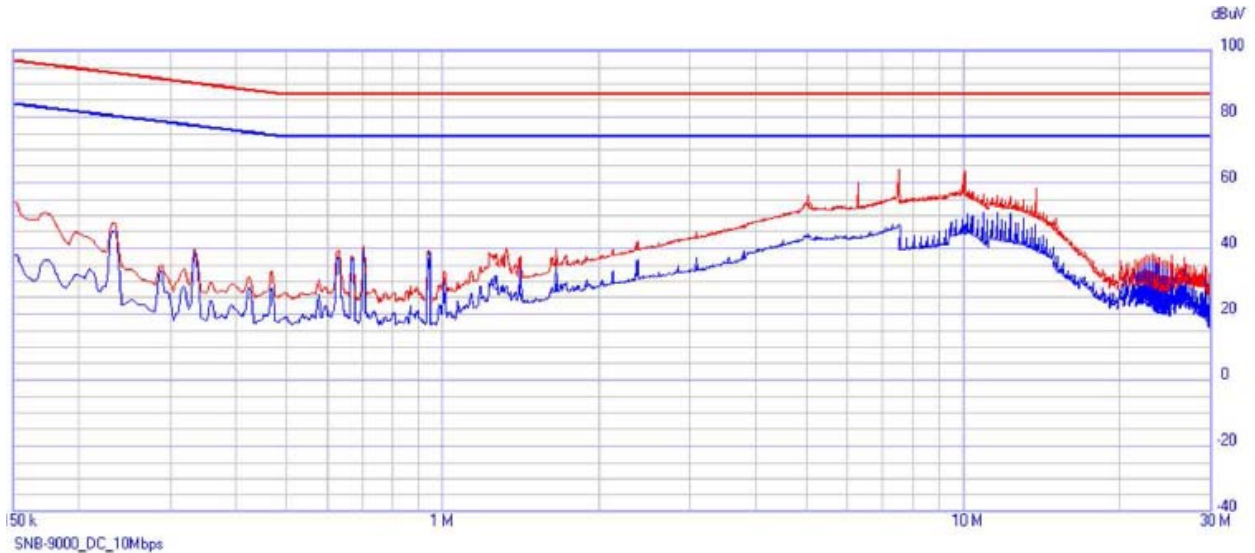
QPeak: —
CAvg: —

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.152	50.800	96.890	-46.090	35.690	83.890	-48.200	9.550	0.020
0.154	50.150	96.780	-46.630	35.840	83.780	-47.940	9.550	0.020
0.234	49.320	93.310	-43.990	48.920	80.310	-31.390	9.480	0.030
0.469	46.630	87.530	-40.900	45.030	74.530	-29.500	9.380	0.030
11.109	52.320	87.000	-34.680	47.090	74.000	-26.910	9.300	0.320
11.348	52.770	87.000	-34.230	48.630	74.000	-25.370	9.300	0.320
11.592	52.730	87.000	-34.270	48.970	74.000	-25.030	9.300	0.310
11.839	52.500	87.000	-34.500	47.070	74.000	-26.930	9.300	0.310

- DC Mode

Temperature: 19.2 °C Humidity: 48.4 % R.H. Test Date: 04. 06. 2015 Tested by: Hyo Jin, Kim

[10 Mbps]



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL_ KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	---	---

Ancillary = General

Limits:

KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:

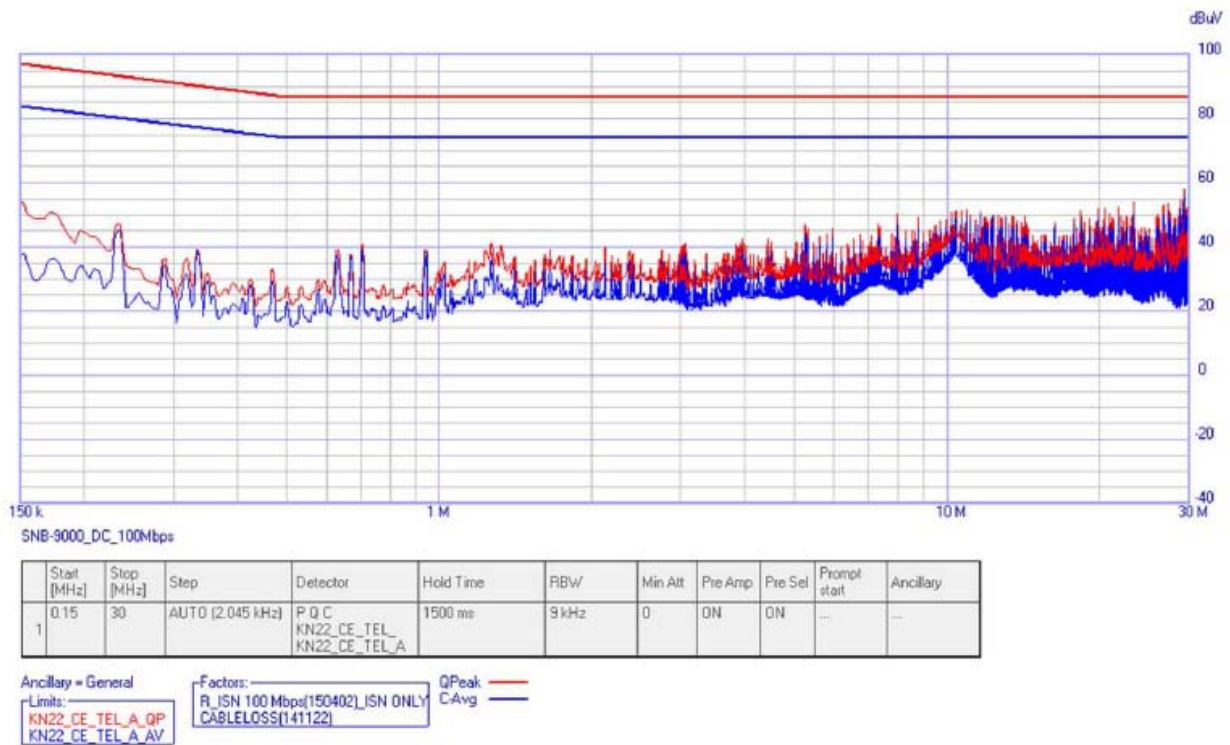
R_ISN 10 Mbps(150402)_ISN ONLY
CABLELOSS(141122)

QPeak

CAvg

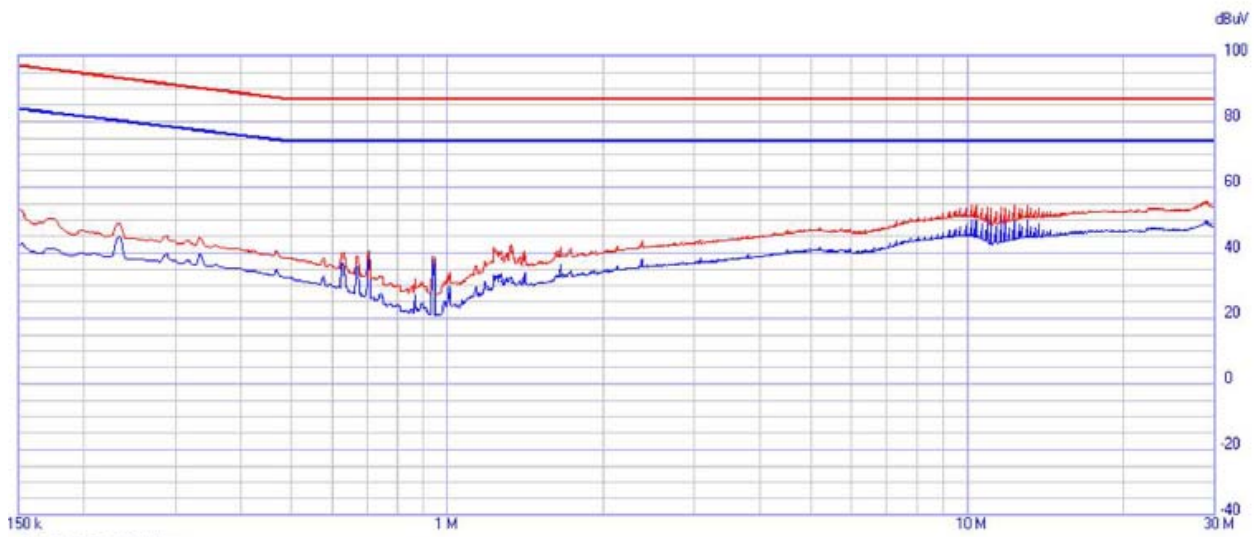
Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.150	54.490	97.000	-42.510	38.030	84.000	-45.970	10.290	0.020
0.172	50.750	95.840	-45.090	36.330	82.840	-46.510	10.260	0.030
0.234	47.580	93.310	-45.730	45.340	80.310	-34.970	10.190	0.030
6.269	60.130	87.000	-26.870	43.430	74.000	-30.570	9.830	0.210
7.508	63.810	87.000	-23.190	47.080	74.000	-26.920	9.830	0.250
10.046	63.620	87.000	-23.380	47.080	74.000	-26.920	9.830	0.280
13.807	58.470	87.000	-28.530	41.350	74.000	-32.650	9.850	0.290

[100 Mbps]



Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.150	54.220	97.000	-42.780	37.770	84.000	-46.230	9.790	0.020
0.172	50.620	95.840	-45.220	36.300	82.840	-46.540	9.760	0.030
0.234	47.250	93.310	-46.060	45.110	80.310	-35.200	9.690	0.030
23.203	54.030	87.000	-32.970	50.380	74.000	-23.620	9.350	0.240
27.199	53.600	87.000	-33.400	50.640	74.000	-23.360	9.350	0.380
28.833	54.670	87.000	-32.330	52.130	74.000	-21.870	9.360	0.410
29.293	57.800	87.000	-29.200	55.400	74.000	-18.600	9.360	0.440

[1000 Mbps]



SNB-9000_DC_1000Mbps

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL_... KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	...	...

Ancillary = General

Limits:
KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:
R_ISN 1000 Mbps(140815)_ISN ONLY
CABLELOSS(141122)

QPeak —
CAvg —

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.150	53.250	97.000	-43.750	42.280	84.000	-41.720	9.550	0.020
0.154	50.540	96.780	-46.240	41.670	83.780	-42.110	9.550	0.020
7.547	49.560	87.000	-37.440	43.580	74.000	-30.420	9.270	0.250
10.373	54.490	87.000	-32.510	50.060	74.000	-23.940	9.290	0.290
10.426	54.490	87.000	-32.510	50.060	74.000	-23.940	9.290	0.300
12.287	54.220	87.000	-32.780	50.110	74.000	-23.890	9.300	0.310
28.680	55.650	87.000	-31.350	49.390	74.000	-24.610	9.050	0.410



KES Co., Ltd.

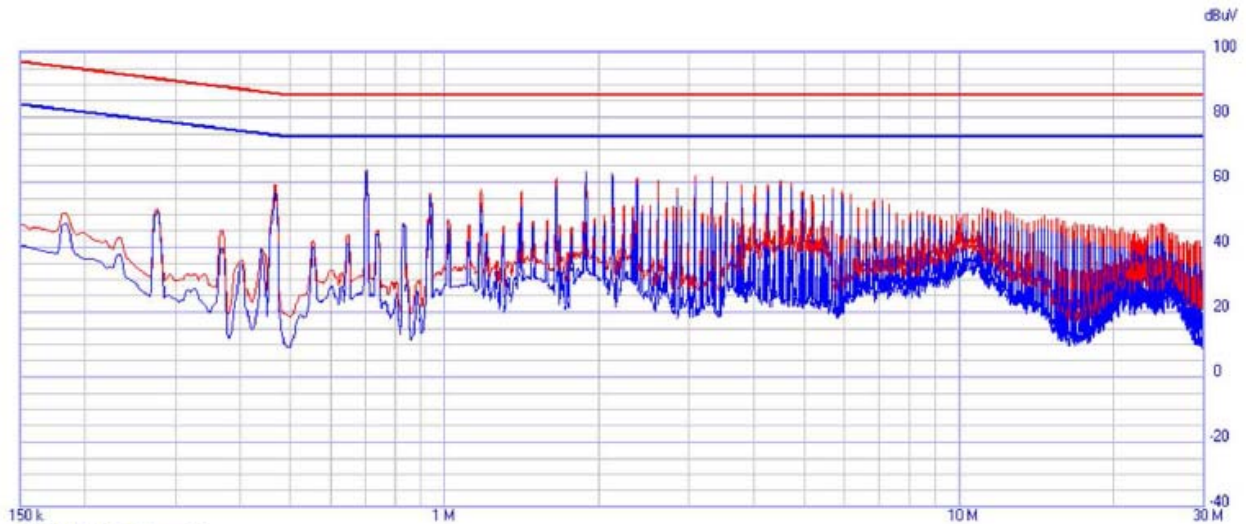
C-3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 431-716, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-E1-15T0121
Page (27) of (104)

- POE Mode

Temperature: 19.2 °C Humidity: 48.4 % R.H. Test Date: 04. 06. 2015 Tested by: Hyo Jin, Kim

[10 Mbps]



SNB-9000_PoE_10Mbps_002

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	...	...

Ancillary = General

Limits:

KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:

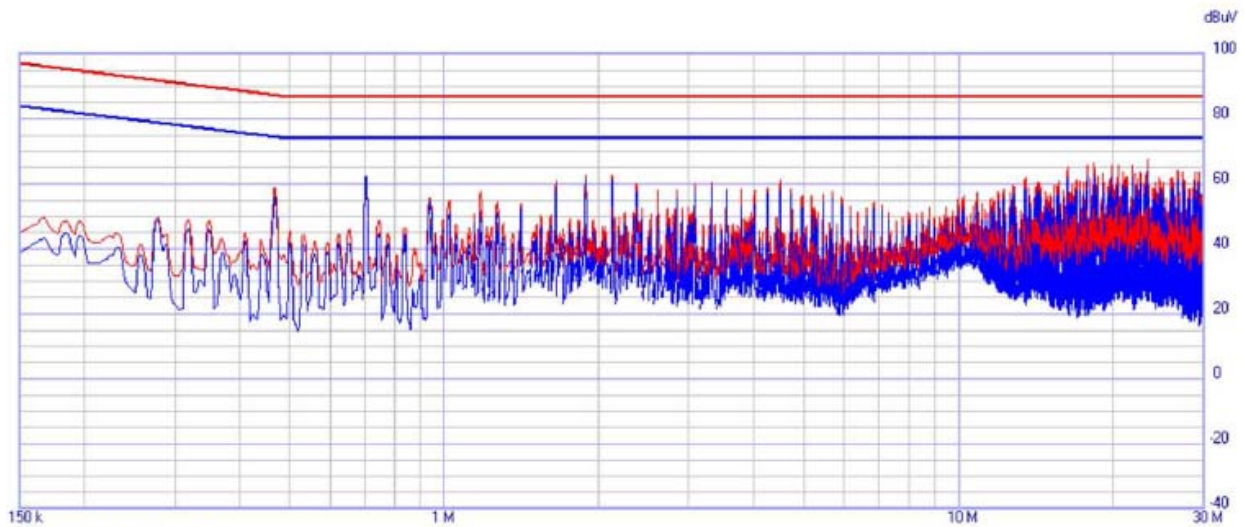
R_ISN 10 Mbps(150402)_ISN ONLY
CABLELOSS(141122)

Q-Peak: —
C-Avg: —

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.183	50.340	95.360	-45.020	47.240	82.360	-35.120	10.240	0.030
0.277	51.460	91.910	-40.450	50.630	78.910	-28.280	10.160	0.030
0.467	59.270	87.570	-28.300	56.780	74.570	-17.790	10.060	0.030
0.469	59.270	87.530	-28.260	56.780	74.530	-17.750	10.060	0.030
0.704	63.510	87.000	-23.490	63.060	74.000	-10.940	9.990	0.040
1.884	63.360	87.000	-23.640	62.150	74.000	-11.850	9.880	0.070
2.117	62.810	87.000	-24.190	62.230	74.000	-11.770	9.870	0.070
3.066	62.050	87.000	-24.950	58.960	74.000	-15.040	9.850	0.110

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The test results in the report only apply to the tested sample.

[100 Mbps]



SNB-3000_PoE_100Mbps_000

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL_	1500 ms	9 kHz	0	ON	ON	---	---

Ancillary = General

Limits:
KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:

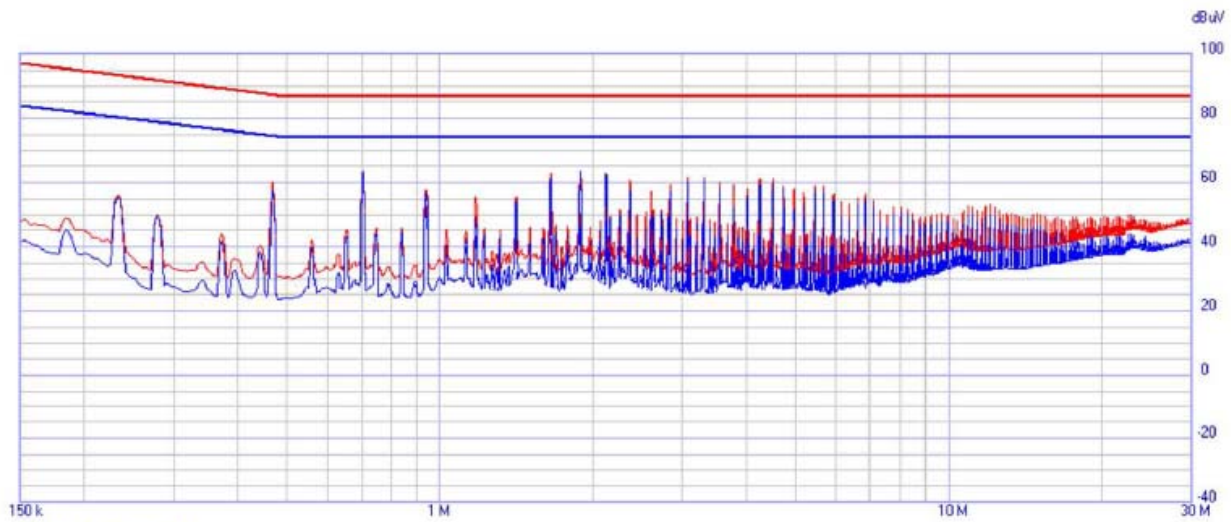
R_ISN 100 Mbps(150402)_ISN ONLY
CABLELOSS(141122)

QPeak

CAvg

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.166	49.470	96.140	-46.670	43.080	83.140	-40.060	9.770	0.030
0.279	49.530	91.850	-42.320	48.720	78.850	-30.130	9.660	0.030
0.318	48.830	90.770	-41.940	46.060	77.770	-31.710	9.630	0.030
0.467	58.780	87.570	-28.790	55.800	74.570	-18.770	9.560	0.030
18.281	66.410	87.000	-20.590	63.220	74.000	-10.780	9.340	0.230
19.792	65.790	87.000	-21.210	62.290	74.000	-11.710	9.340	0.210
21.774	65.640	87.000	-21.360	62.320	74.000	-11.680	9.340	0.210
23.203	67.610	87.000	-19.390	63.970	74.000	-10.030	9.350	0.240

[1000 Mbps]



SNB-9000_PoE_1000Mbps

Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C KN22_CE_TEL_ KN22_CE_TEL_A	1500 ms	9 kHz	0	ON	ON	...

Ancillary = General

Limits:
KN22_CE_TEL_A_QP
KN22_CE_TEL_A_AV

Factors:
R_ISN 1000 Mbps(140815)_ISN ONLY
CABLELOSS(141122)

QPeak —
CAvg —

Frequency [MHz]	Q-Peak [dBμV]	Limit [dBμV]	Margin [dB]	C-Avg [dBμV]	Limit [dBμV]	Margin [dB]	Factor (ISN) [dB]	Factor (Cable Loss) [dB]
0.185	48.850	95.270	-46.420	45.080	82.270	-37.190	9.520	0.030
0.234	55.970	93.310	-37.340	55.350	80.310	-24.960	9.480	0.030
0.279	49.960	91.850	-41.890	49.420	78.850	-29.430	9.450	0.030
0.467	60.150	87.570	-27.420	57.420	74.570	-17.150	9.380	0.030
0.704	63.460	87.000	-23.540	63.210	74.000	-10.790	9.320	0.040
1.651	62.860	87.000	-24.140	61.280	74.000	-12.720	9.170	0.060
1.884	63.650	87.000	-23.350	63.240	74.000	-10.760	9.160	0.070
2.117	62.720	87.000	-24.280	62.430	74.000	-11.570	9.150	0.070

5.2 Radiated Emission Measurements

5.2.1 Test Description

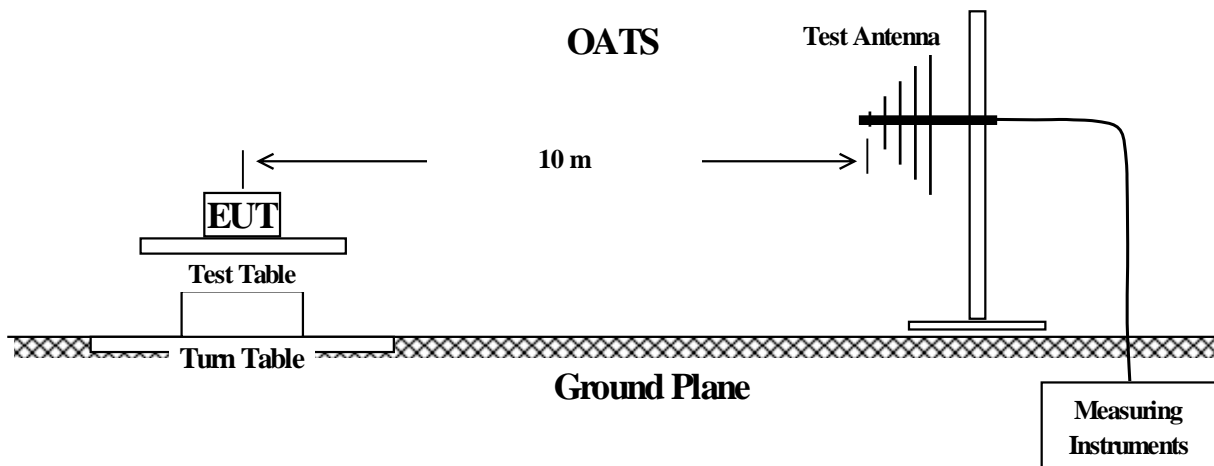
The radiated emissions measurements were performed on the ten-meter open-field test site and 3 m full chamber. The E.U.T was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

The frequency spectrum from 30 MHz to 1 000 MHz and 1 000 MHz to 6 000 MHz was scanned and maximum emission levels at each frequency recorded.

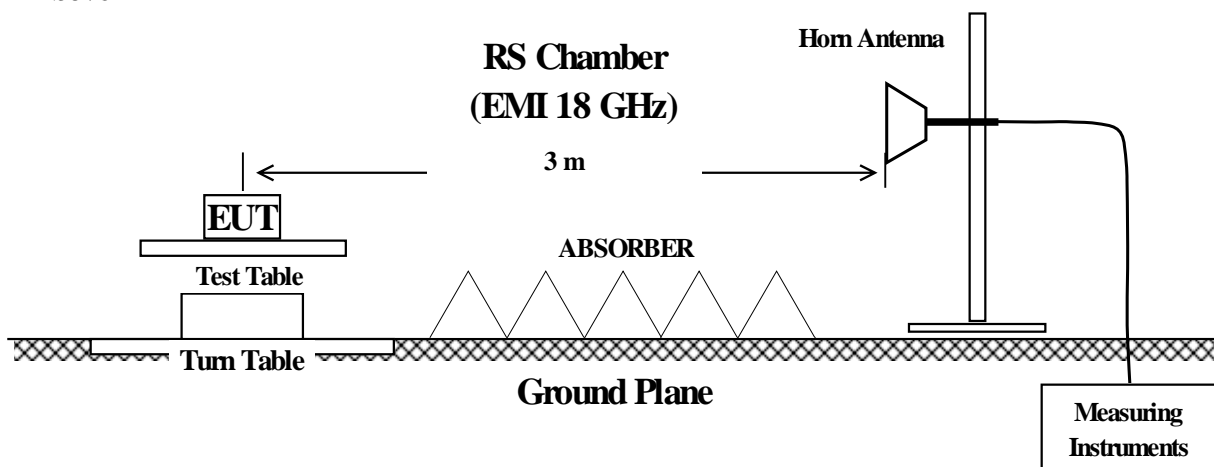
The system was rotated 360°, and the antenna was varied in the height between 1.0 and 4.0 meters in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

- above 1 GHz : Antenna height is fixed to 1.0 m

* Below 1 GHz



* Above 1 GHz



5.2.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
EMI TEST Receiver	R & S	ESVS10	826008/014	04. 04. 2015
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-385	05. 09. 2015
OATS	KES	-	-	-
Antenna Mast	DAEIL EMC	-	-	-
Turn Table	DAEIL EMC	-	-	-
EMI TEST Receiver	R & S	ESR7	101190	08. 13. 2015
PREAMPLIFIER	8449B	H.P	3008A00538	07. 23. 2015
Double Ridged Horn Antenna	A-H-SYSTEM,INC	SAS-571	414	02. 09. 2017
RS Chamber (EMI 18GHz)	SEMITEC	-	-	-
Antenna Mast	AUDIX	-	-	-
Turn Table	AUDIX	-	-	-

5.2.3 Test Environments

Ambient Temperatures	Relative Humidity
see the data	see the data

5.2.4 Test Limits

Frequency (MHz)	EN 55022	
	Class B @ 10 m (dB μ V/m)	Class A @ 10 m (dB μ V/m)
30 to 230	30.0	40.0
230 to 1 000	37.0	47.0

Frequency (MHz)	EN 55022			
	Class B @ 3 m (dB μ V/m)		Class A @ 3 m (dB μ V/m)	
	PK	AV	PK	AV
1 000 to 3 000	70	50	76	56
3 000 to 6 000	74	54	80	60

5.2.5 Test Procedure

Before final measurements of radiated emission were made on the OATS, the E.U.T was scanned in semi-anechoic chamber in order to determine its emission spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the E.U.T's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

The radiated emission test was performed with E.U.T exercise program loaded, and the emissions were scanned between 30 MHz to 6 000 MHz using the spectrum analyzer. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz(1 MHz), and the analyzer was operated in the CISPR quasi-peak(Peak) detection mode.

Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

5.2.6 Field Strength Calculation

F.S = Field Strength

M.R = Meter Reading

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

* Below 1 GHz : $F.S(dB\mu V/m) = M.R(dB\mu V) + [A.F(dB/m) + C.L(dB)]$

* Above 1 GHz : $F.S(dB\mu V/m) = M.R(dB\mu V) + [A.F(dB/m) + C.L(dB)] - A.G(35 dB)$

* Measurement in the presence of high ambient signals

In general, the ambient signals should not exceed the limit. Radiated emanations from the EUT at the point of measurement may, however, be impossible to measure at some frequencies due to ambient noise fields generated by local broadcast services, other manmade devices, and natural sources.

a) Perform measurements at close-in distances and determine the limit L2 corresponding to the close-in distance d2 by applying the following relation:

$$L2 = L1 (d1/d2)$$

where L1 is the specified limit in microvolts per metre ($\mu V/m$) at the distance d1.
Determine the possible environmental and compliance test conditions stipulated in Clause 8 using L2 as the new limit for distance d2.

b) In the frequency bands where the ambient noise values of Clause 8 are exceeded (measured values higher than 6 dB below the limit), the disturbance values of the EUT may be interpolated from the adjacent disturbance values. The interpolated value shall lie on the curve describing a continuous function of the disturbance values adjacent to the ambient noise.

5.2.7 Test Results

According to the data in section 5.2.8, the E.U.T complied with the EN 55022/CISPR22 standards.

5.2.8 Test Data

* Below 1 GHz

- AC Mode

Temperature: 14.0 °C Humidity: 47.0 % R.H. Test Date: 04.07. 2015 Tested by: Hyo Jin, Kim

Frequency (MHz)	Amplitude (dB μ V/m)	Antenna		Correction Factor		Corrected Amplitude (dB μ V/m)	Applicable Limit (dB μ V/m)	Margin (dB)
		Polar. (H/V)	Height (m)	Ant. (dB)	Cable (dB)			
185.035	11.800	V	1.000	11.250	3.280	26.330	40.000	13.670
189.992	10.100	H	4.000	10.800	3.330	24.230	40.000	15.770
250.000	12.600	V	3.530	11.750	3.870	28.220	47.000	18.780
766.742	10.300	V	2.380	21.960	7.750	40.010	47.000	6.990
767.931	12.400	H	2.230	21.980	7.760	42.140	47.000	4.860
801.610	10.700	V	2.030	22.540	7.980	41.220	47.000	5.780

- DC Mode

Temperature: 14.0 °C Humidity: 49.0 % R.H. Test Date: 04.07. 2015 Tested by: Hyo Jin, Kim

Frequency (MHz)	Amplitude (dB μ V/m)	Antenna		Correction Factor		Corrected Amplitude (dB μ V/m)	Applicable Limit (dB μ V/m)	Margin (dB)
		Polar. (H/V)	Height (m)	Ant. (dB)	Cable (dB)			
59.652	10.500	V	1.000	13.150	1.790	25.440	40.000	14.560
190.010	12.400	H	4.000	10.790	3.340	26.530	40.000	13.470
190.173	15.900	V	1.000	10.780	3.340	30.020	40.000	9.980
375.031	11.300	H	2.870	15.040	4.950	31.290	47.000	15.710
767.991	12.200	H	2.250	21.990	7.760	41.950	47.000	5.050
801.867	11.900	V	2.330	22.540	7.980	42.420	47.000	4.580

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Test report No.:
KES-E1-15T0121
Page (34) of (104)

- POE Mode

Temperature: 14.0 °C Humidity: 49.0 % R.H. Test Date: 04.07. 2015 Tested by: Hyo Jin, Kim

Frequency (MHz)	Amplitude (dB μ V/m)	Antenna		Correction Factor		Corrected Amplitude (dB μ V/m)	Applicable Limit (dB μ V/m)	Margin (dB)
		Polar. (H/V)	Height (m)	Ant. (dB)	Cable (dB)			
66.270	14.800	V	1.000	12.190	1.910	28.900	40.000	11.100
249.993	12.900	H	3.020	11.750	3.870	28.520	47.000	18.480
400.012	14.300	H	2.880	15.580	5.140	35.020	47.000	11.980
525.013	12.900	V	2.570	18.220	6.070	37.190	47.000	9.810
625.021	12.300	V	2.310	19.920	6.750	38.970	47.000	8.030
805.987	10.600	V	1.930	22.570	8.000	41.170	47.000	5.830

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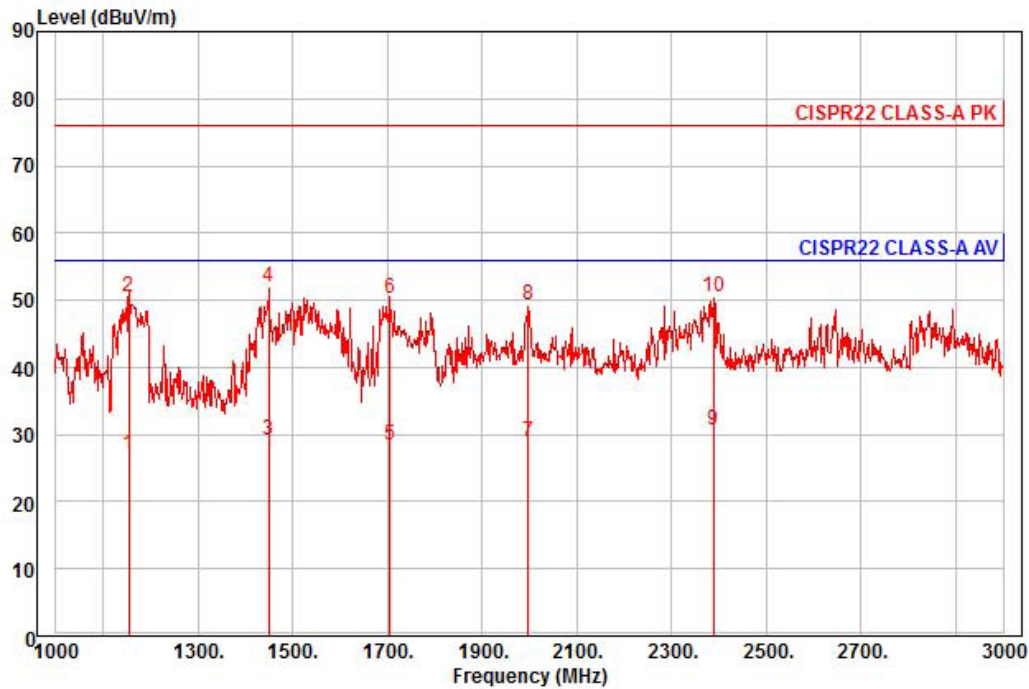
C-3701, 40, Simin-daero 365beon-gil,
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Test report No.:
KES-E1-15T0121
Page (35) of (104)

* Above 1 GHz

- AC Mode

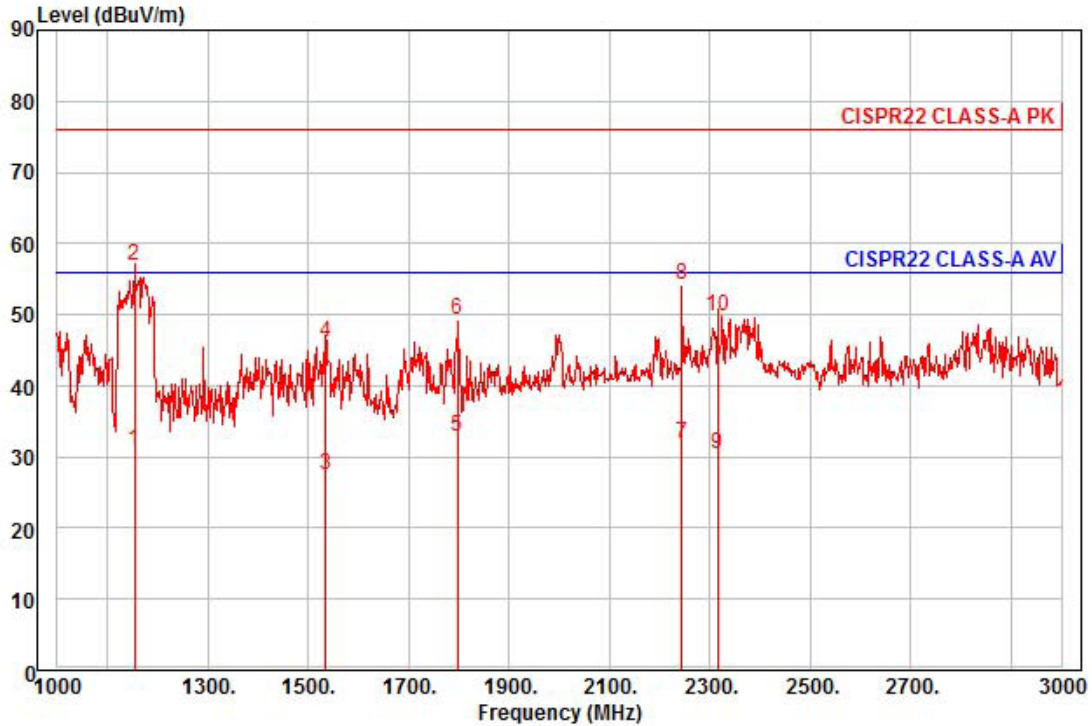
Temperature: 20.1 °C Humidity: 43.2 % R.H. Test Date: 04.08. 2015 Tested by: Hyo Jin, Kim



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : AC
Memo : 1 - 3 Ghz

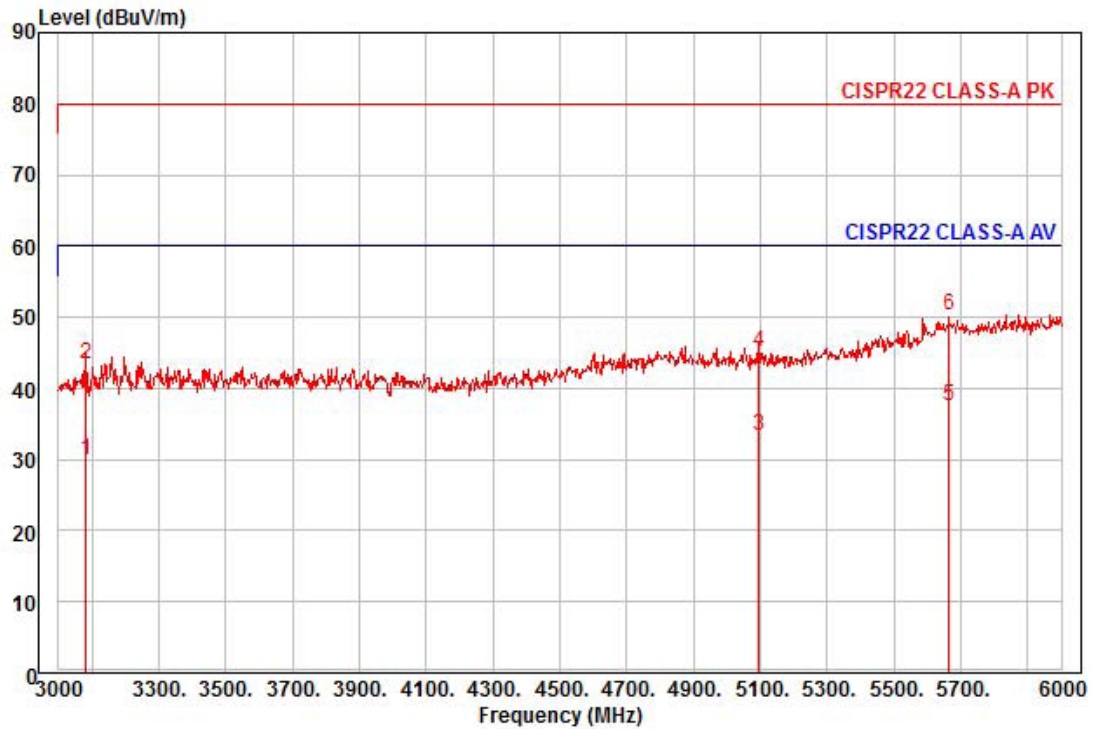
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1154.00	32.95	24.22	5.81	35.94	339	56.00	-28.96	horizontal	Average
2	1154.00	56.41	24.22	5.81	35.94	339	76.00	-25.50	horizontal	Peak
3	1450.00	33.13	24.91	6.53	35.45	53	56.00	-26.88	horizontal	Average
4 pp	1450.00	56.04	24.91	6.53	35.45	53	76.00	-23.97	horizontal	Peak
5	1706.00	30.02	26.32	7.15	35.02	10	56.00	-27.53	horizontal	Average
6	1706.00	51.86	26.32	7.15	35.02	10	76.00	-25.69	horizontal	Peak
7	1998.00	27.41	28.14	7.86	34.53	219	56.00	-27.12	horizontal	Average
8	1998.00	47.74	28.14	7.86	34.53	219	76.00	-26.79	horizontal	Peak
9 av	2388.00	26.91	29.29	8.67	34.26	7	56.00	-25.39	horizontal	Average
10	2388.00	46.89	29.29	8.67	34.26	7	76.00	-25.41	horizontal	Peak

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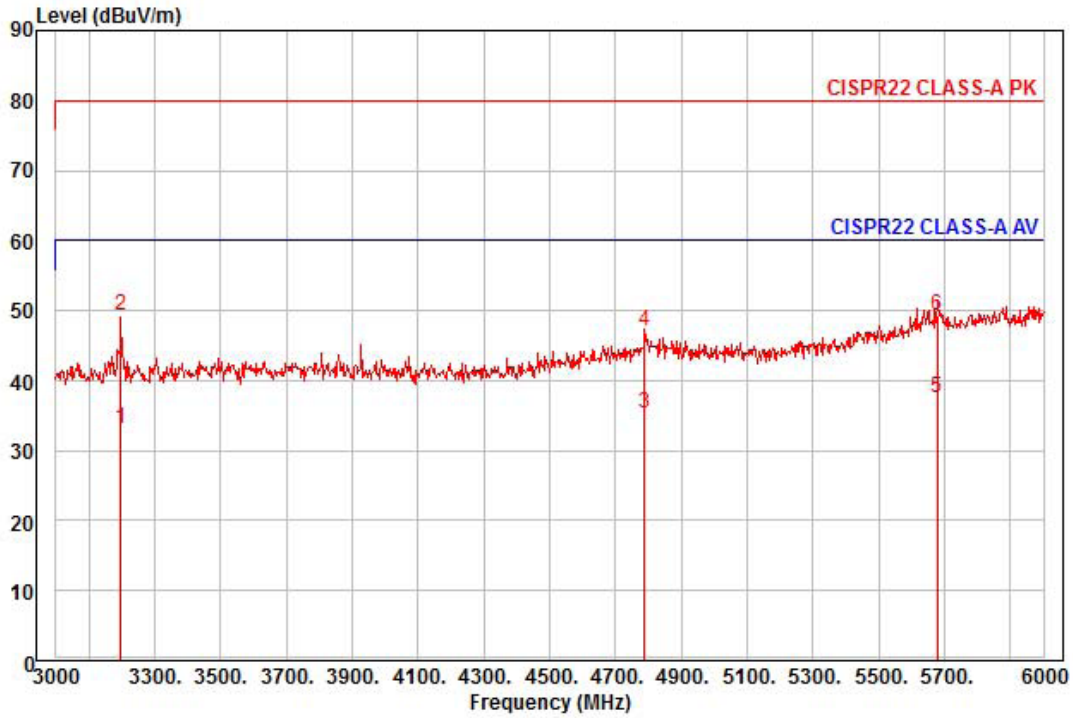
Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : AC
Memo : 1 - 3 Ghz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1154.00	36.86	24.22	5.81	35.94	18	56.00	-25.05	vertical	Average
2 pp	1154.00	62.79	24.22	5.81	35.94	18	76.00	-19.12	vertical	Peak
3	1534.00	30.81	25.24	6.73	35.31	343	56.00	-28.53	vertical	Average
4	1534.00	49.52	25.24	6.73	35.31	343	76.00	-29.82	vertical	Peak
5 av	1798.00	33.53	26.89	7.37	34.87	216	56.00	-23.08	vertical	Average
6	1798.00	50.01	26.89	7.37	34.87	216	76.00	-26.60	vertical	Peak
7	2244.00	28.96	28.87	8.37	34.36	319	56.00	-24.16	vertical	Average
8	2244.00	51.42	28.87	8.37	34.36	319	76.00	-21.70	vertical	Peak
9	2316.00	27.16	29.08	8.52	34.31	34	56.00	-25.55	vertical	Average
10	2316.00	46.42	29.08	8.52	34.31	34	76.00	-26.29	vertical	Peak



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : AC
Memo : 3 - 6 Ghz

	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3081.00	23.20	30.50	10.09	33.93	58	60.00	-30.14	horizontal Average
2	3081.00	36.76	30.50	10.09	33.93	58	80.00	-36.58	horizontal Peak
3	5097.00	19.05	33.86	13.60	33.22	180	60.00	-26.71	horizontal Average
4	5097.00	30.96	33.86	13.60	33.22	180	80.00	-34.80	horizontal Peak
5 pp	5664.00	20.61	34.13	16.14	33.30	268	60.00	-22.42	horizontal Average
6 pk	5664.00	33.36	34.13	16.14	33.30	268	80.00	-29.67	horizontal Peak



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : AC
Memo : 3 - 6 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3198.00	26.34	30.63	10.27	34.06	209	60.00	-26.82	vertical	Average
2	3198.00	42.43	30.63	10.27	34.06	209	80.00	-30.73	vertical	Peak
3	4788.00	22.86	33.13	12.82	33.58	273	60.00	-24.77	vertical	Average
4	4788.00	34.69	33.13	12.82	33.58	273	80.00	-32.94	vertical	Peak
5 pp	5679.00	20.53	34.18	16.21	33.31	155	60.00	-22.39	vertical	Average
6 pk	5679.00	32.22	34.18	16.21	33.31	155	80.00	-30.70	vertical	Peak



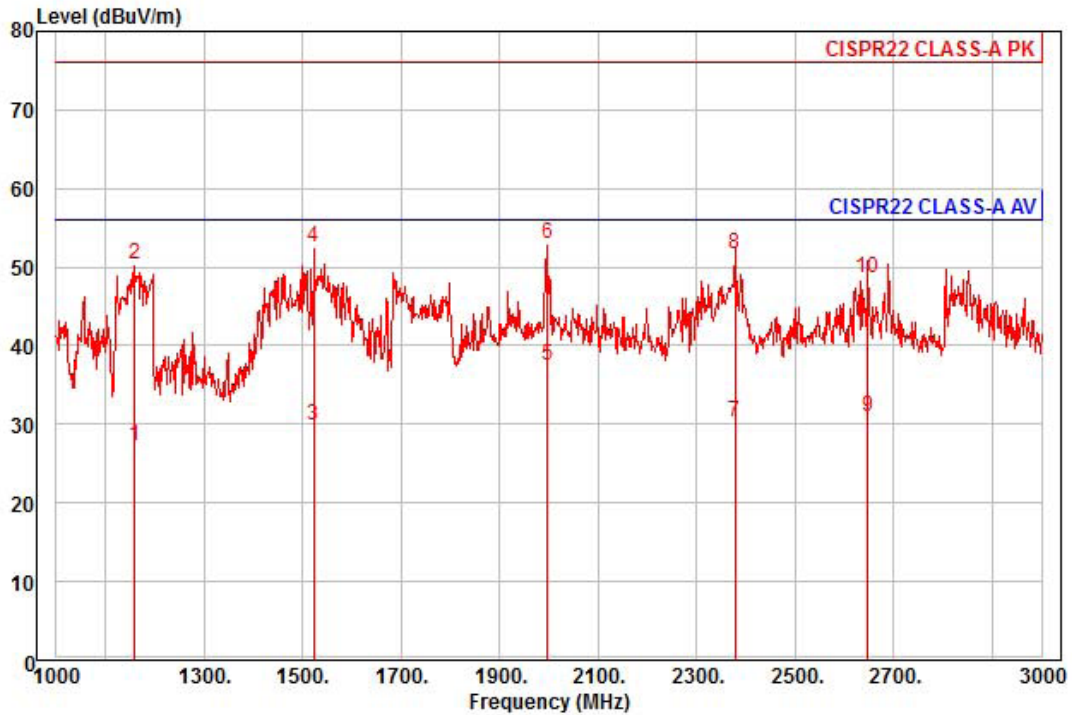
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Test report No.:
KES-E1-15T0121
Page (39) of (104)

- DC Mode

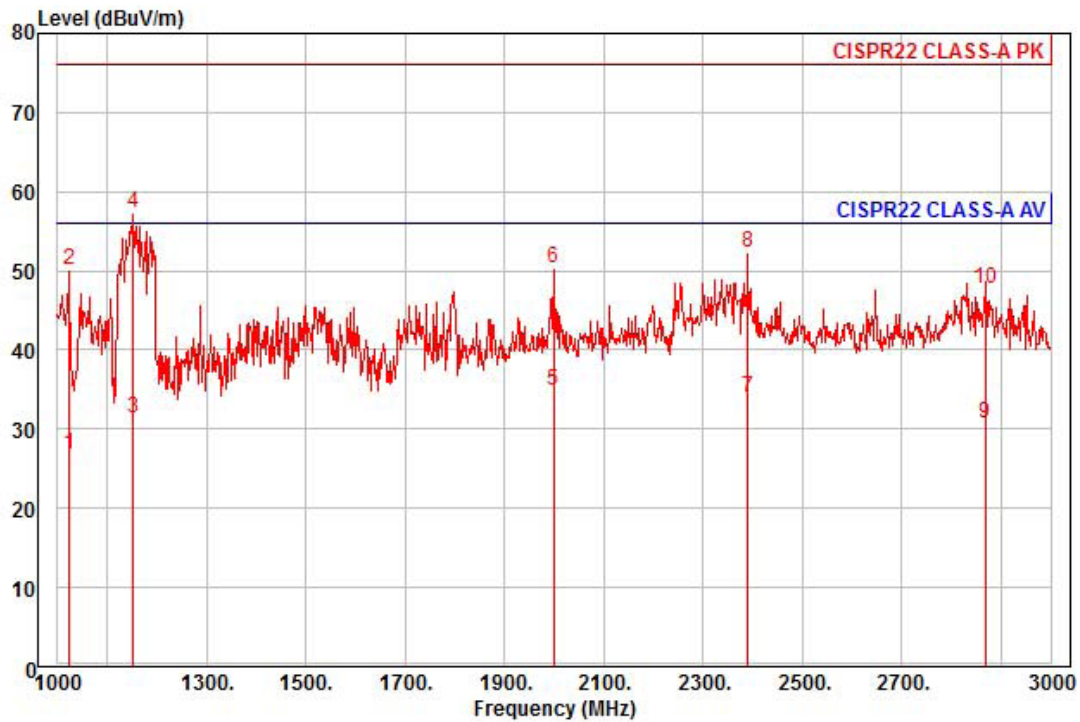
Temperature: 20.1 °C Humidity: 43.2 % R.H. Test Date: 04.08. 2015 Tested by: Hyo Jin, Kim



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : DC
Memo : 1 - 3 Ghz

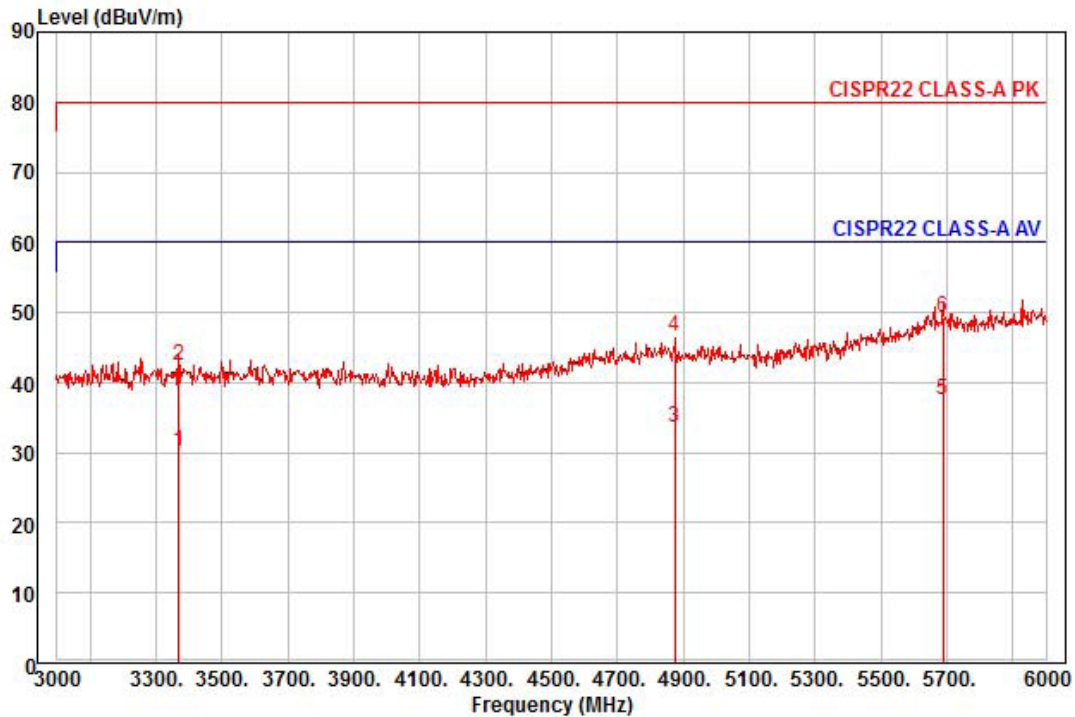
		Read	Ant	Cable	Preamp	TPos	Limit	Over		
	Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1160.00	33.22	24.23	5.83	35.93	17	56.00	-28.65	horizontal	Average
2	1160.00	56.23	24.23	5.83	35.93	17	76.00	-25.64	horizontal	Peak
3	1522.00	33.41	25.17	6.70	35.33	0	56.00	-26.05	horizontal	Average
4	1522.00	56.06	25.17	6.70	35.33	0	76.00	-23.40	horizontal	Peak
5 pp	1998.00	36.01	28.14	7.86	34.53	218	56.00	-18.52	horizontal	Average
6 pk	1998.00	51.42	28.14	7.86	34.53	218	76.00	-23.11	horizontal	Peak
7	2378.00	26.73	29.26	8.65	34.27	37	56.00	-25.63	horizontal	Average
8	2378.00	48.08	29.26	8.65	34.27	37	76.00	-24.28	horizontal	Peak
9	2648.00	25.93	29.85	9.22	34.08	61	56.00	-25.08	horizontal	Average
10	2648.00	43.71	29.85	9.22	34.08	61	76.00	-27.30	horizontal	Peak

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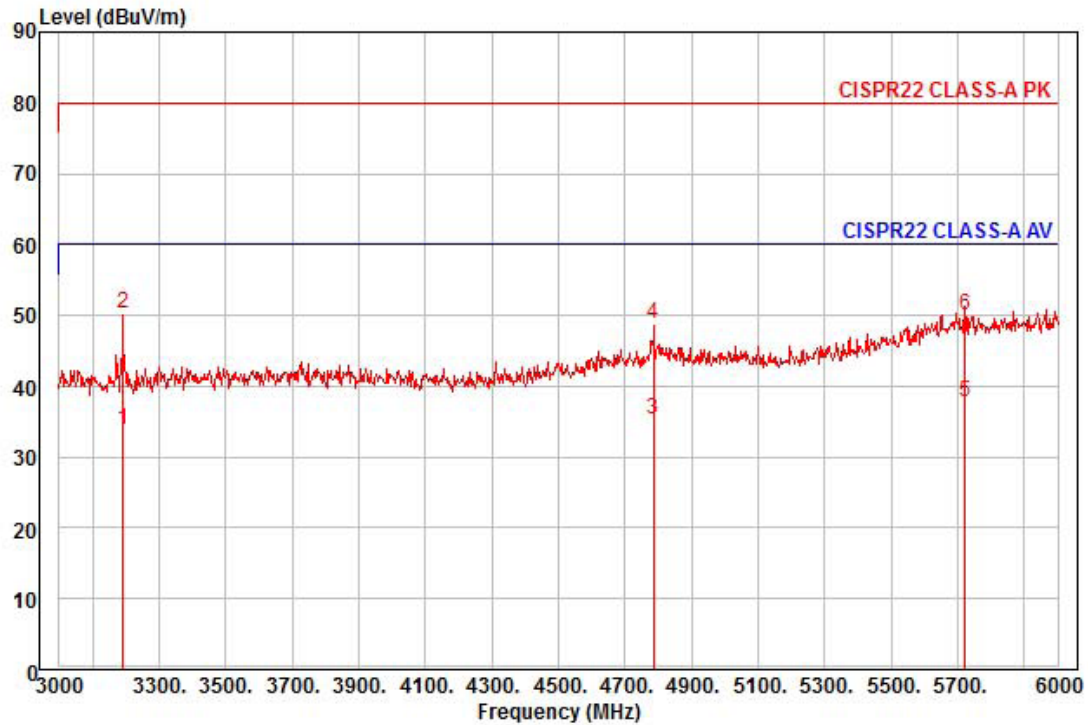
Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : DC
Memo : 1 - 3 Ghz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1024.00	33.45	23.92	5.50	36.16	358	56.00	-29.29	vertical	Average
2	1024.00	56.89	23.92	5.50	36.16	358	76.00	-25.85	vertical	Peak
3	1152.00	37.32	24.22	5.81	35.95	9	56.00	-24.60	vertical	Average
4 pp	1152.00	63.29	24.22	5.81	35.95	9	76.00	-18.63	vertical	Peak
5 av	2000.00	33.50	28.15	7.86	34.53	4	56.00	-21.02	vertical	Average
6	2000.00	48.96	28.15	7.86	34.53	4	76.00	-25.56	vertical	Peak
7	2390.00	30.23	29.30	8.68	34.26	314	56.00	-22.05	vertical	Average
8	2390.00	48.59	29.30	8.68	34.26	314	76.00	-23.69	vertical	Peak
9	2868.00	24.81	30.19	9.68	33.93	47	56.00	-25.25	vertical	Average
10	2868.00	41.84	30.19	9.68	33.93	47	76.00	-28.22	vertical	Peak



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : DC
Memo : 3 - 6 Ghz

	Read	Ant	Cable	Preamp	TPos	Limit	Over		
Freq	Level	Factor	Loss	Factor		Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3369.00	22.98	30.84	10.54	34.26	70	60.00	-29.90	horizontal Average
2	3369.00	35.23	30.84	10.54	34.26	70	80.00	-37.65	horizontal Peak
3	4875.00	20.66	33.45	12.96	33.43	195	60.00	-26.36	horizontal Average
4	4875.00	33.53	33.45	12.96	33.43	195	80.00	-33.49	horizontal Peak
5 pp	5688.00	20.46	34.20	16.25	33.31	33	60.00	-22.40	horizontal Average
6 pk	5688.00	32.16	34.20	16.25	33.31	33	80.00	-30.70	horizontal Peak



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : DC
Memo : 3 - 6 Ghz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3192.00	26.95	30.63	10.26	34.06	227	60.00	-26.22	vertical	Average
2 pk	3192.00	43.45	30.63	10.26	34.06	227	80.00	-29.72	vertical	Peak
3	4785.00	22.96	33.12	12.82	33.59	281	60.00	-24.69	vertical	Average
4	4785.00	36.50	33.12	12.82	33.59	281	80.00	-31.15	vertical	Peak
5 pp	5721.00	20.31	34.30	16.39	33.31	268	60.00	-22.31	vertical	Average
6	5721.00	32.73	34.30	16.39	33.31	268	80.00	-29.89	vertical	Peak



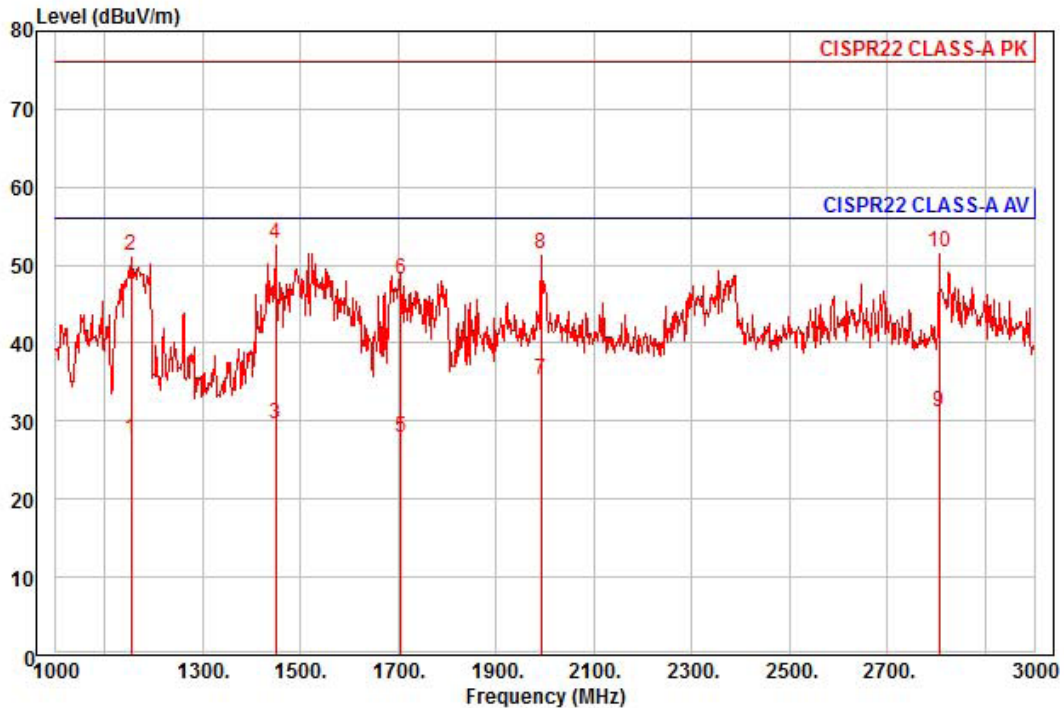
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Test report No.:
KES-E1-15T0121
Page (43) of (104)

- POE Mode

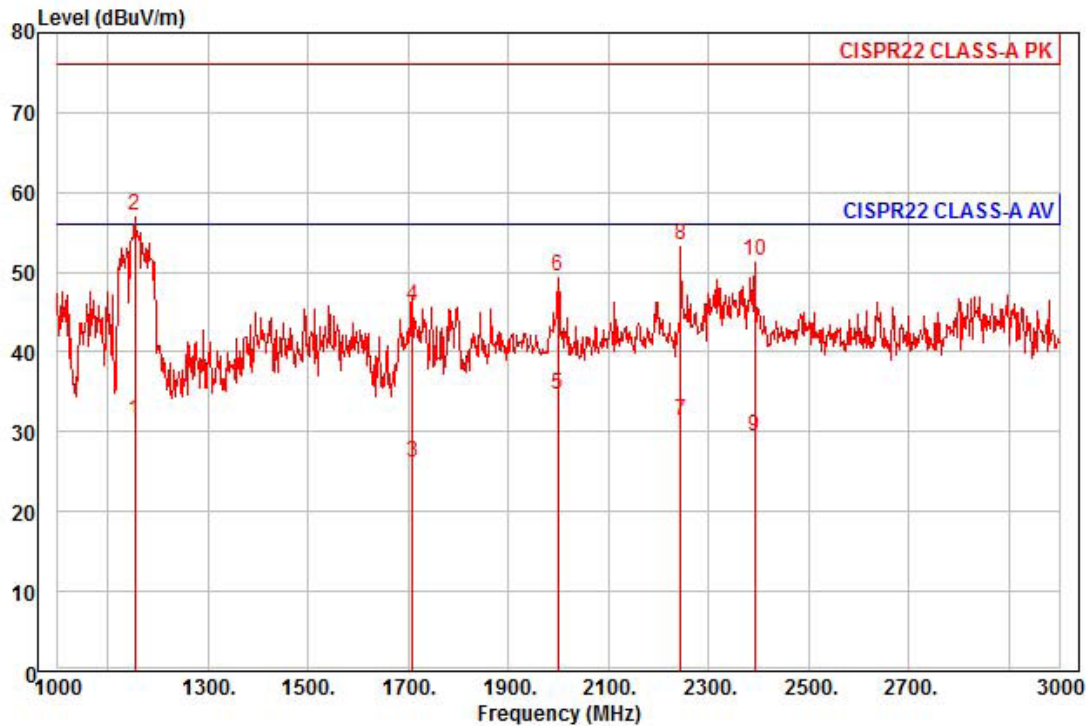
Temperature: 20.1 °C Humidity: 43.2 % R.H. Test Date: 04.08. 2015 Tested by: Hyo Jin, Kim



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : PoE
Memo : 1 - 3 Ghz

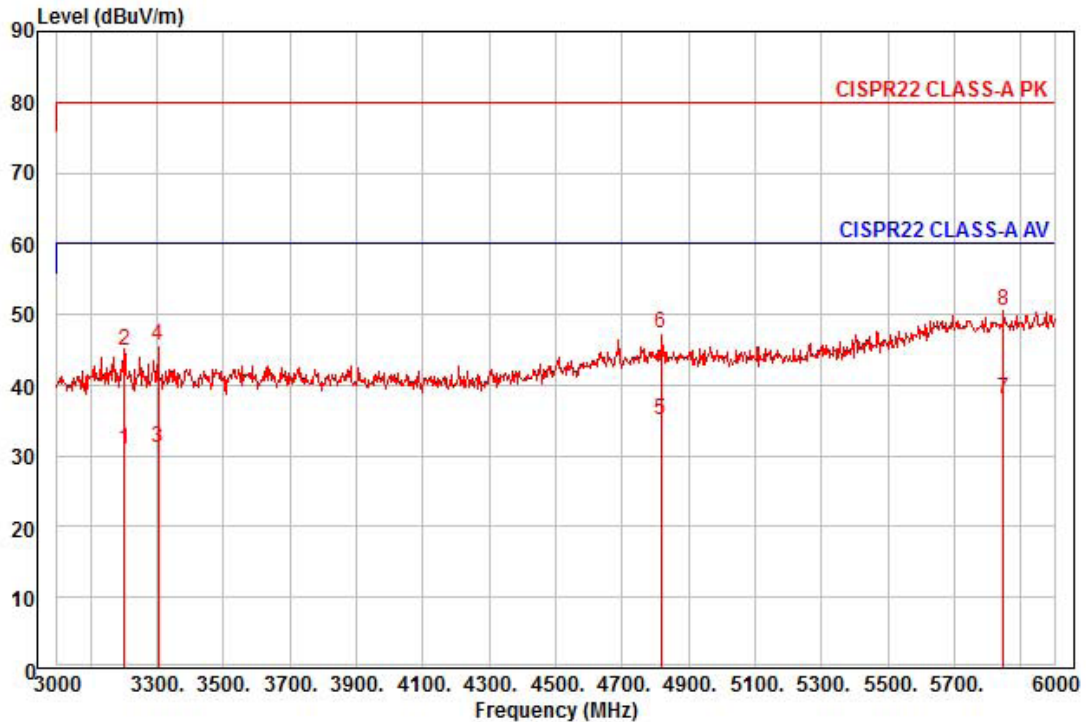
	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1154.00	33.63	24.22	5.81	35.94	48	56.00	-28.28	horizontal	Average
2	1154.00	57.07	24.22	5.81	35.94	48	76.00	-24.84	horizontal	Peak
3	1450.00	33.71	24.91	6.53	35.45	4	56.00	-26.30	horizontal	Average
4 pk	1450.00	56.80	24.91	6.53	35.45	4	76.00	-23.21	horizontal	Peak
5	1706.00	29.45	26.32	7.15	35.02	37	56.00	-28.10	horizontal	Average
6	1706.00	49.75	26.32	7.15	35.02	37	76.00	-27.80	horizontal	Peak
7 pp	1992.00	33.86	28.10	7.84	34.54	179	56.00	-20.74	horizontal	Average
8	1992.00	50.06	28.10	7.84	34.54	179	76.00	-24.54	horizontal	Peak
9	2806.00	25.42	30.10	9.55	33.97	25	56.00	-24.90	horizontal	Average
10	2806.00	45.91	30.10	9.55	33.97	25	76.00	-24.41	horizontal	Peak

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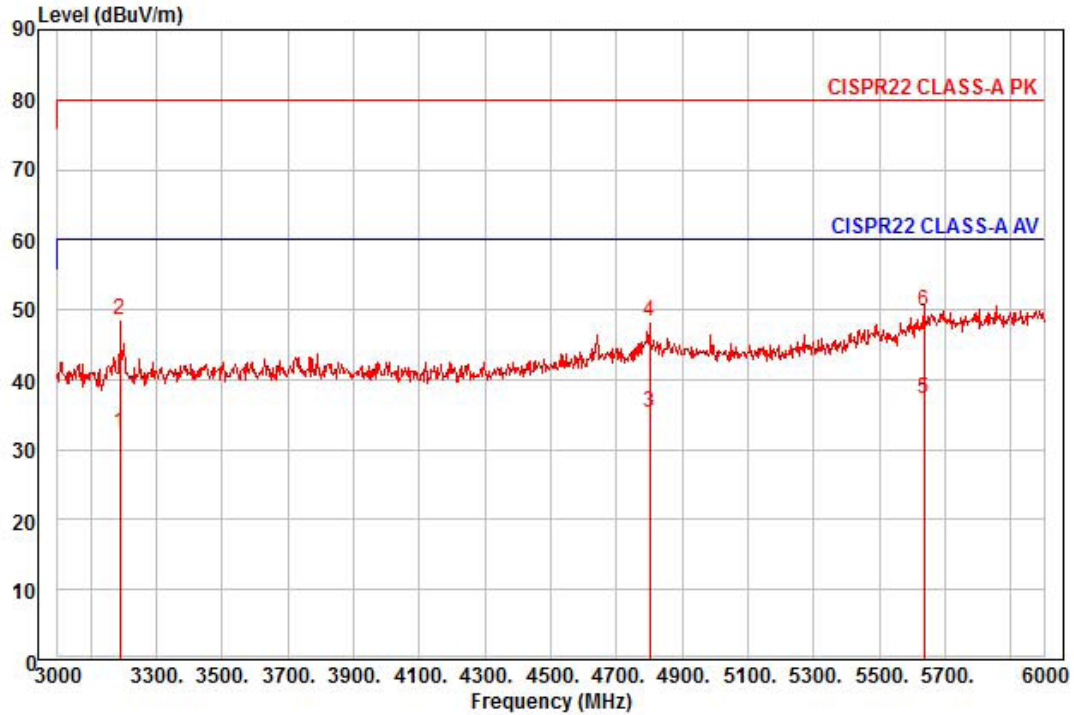
Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : PoE
Memo : 1 - 3 Ghz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1154.00	37.26	24.22	5.81	35.94	10	56.00	-24.65	vertical	Average
2 pp	1154.00	63.10	24.22	5.81	35.94	10	76.00	-18.81	vertical	Peak
3	1708.00	27.59	26.33	7.15	35.02	50	56.00	-29.95	vertical	Average
4	1708.00	47.21	26.33	7.15	35.02	50	76.00	-30.33	vertical	Peak
5 av	2000.00	33.20	28.15	7.86	34.53	349	56.00	-21.32	vertical	Average
6	2000.00	47.93	28.15	7.86	34.53	349	76.00	-26.59	vertical	Peak
7	2244.00	28.61	28.87	8.37	34.36	318	56.00	-24.51	vertical	Average
8	2244.00	50.46	28.87	8.37	34.36	318	76.00	-22.66	vertical	Peak
9	2392.00	25.71	29.30	8.68	34.26	50	56.00	-26.57	vertical	Average
10	2392.00	47.73	29.30	8.68	34.26	50	76.00	-24.55	vertical	Peak



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : PoE
Memo : 3 - 6 Ghz

	Freq	Read Level	Ant Factor	Cable Loss	Preampl Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3201.00	24.02	30.64	10.27	34.07	71	60.00	-29.14	horizontal	Average
2	3201.00	37.99	30.64	10.27	34.07	71	80.00	-35.17	horizontal	Peak
3	3303.00	24.13	30.76	10.43	34.18	60	60.00	-28.86	horizontal	Average
4	3303.00	38.57	30.76	10.43	34.18	60	80.00	-34.42	horizontal	Peak
5	4818.00	22.46	33.24	12.87	33.53	357	60.00	-24.96	horizontal	Average
6	4818.00	34.81	33.24	12.87	33.53	357	80.00	-32.61	horizontal	Peak
7 pp	5847.00	19.75	34.67	16.96	33.33	283	60.00	-21.95	horizontal	Average
8 pk	5847.00	32.30	34.67	16.96	33.33	283	80.00	-29.40	horizontal	Peak



Site : chamber
Condition: CISPR22 CLASS-A PK 3m HORN-414(15.02.09) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : SNB-9000P
Mode : PoE
Memo : 3 - 6 Ghz

	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3189.00	25.58	30.62	10.25	34.05	269	60.00	-27.60	vertical	Average
2	3189.00	41.71	30.62	10.25	34.05	269	80.00	-31.47	vertical	Peak
3	4800.00	22.88	33.17	12.84	33.56	196	60.00	-24.67	vertical	Average
4	4800.00	35.75	33.17	12.84	33.56	196	80.00	-31.80	vertical	Peak
5 pp	5637.00	20.59	34.05	16.02	33.30	55	60.00	-22.64	vertical	Average
6 pk	5637.00	33.09	34.05	16.02	33.30	55	80.00	-30.14	vertical	Peak

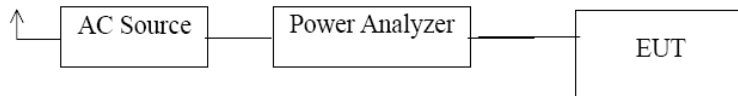
5.3 Harmonics / Voltage Fluctuations Measurements

5.3.1 Test Description

Harmonics of the fundamental current were measured up to 2 kHz using a universal power analyzer. The measurements were carried out under steady conditions and using averaging.

Before making measurements the class of the E.U.T has been evaluated, it is necessary for the E.U.T to decide which class the E.U.T fulfills into; A, B, C or D

AC Mains



5.3.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
AC Source	EM test	ACS 500 N	V1024106760	08. 13. 2015
Digital Power Analyzer	EM test	DPA 500 N	V1024106759	08. 13. 2015

5.3.3 Test Environments

Ambient Temperatures : -

Relative Humidity : -

5.3.4 Test Procedures

The E.U.T was installed and placed on a non-conductive table and was connected to the AC power source, 230 V (ac), 50 Hz via the measuring equipment with its attached AC power cord. All other equipment or peripherals included in the test, and having a separate power supply, are connected to the outlet, supplying 230 V (ac), 50 Hz. A typical configuration is defined in the specification ANSI 63.4 or CISPR22. This ensures the repeatability of the test.

The E.U.T is set in operation and was monitored for measurements with the software, supplied by test equipment manufacturer. An EMC test program provided by client was used to exercise the E.U.T.

5.3.5 Test Results

According to the data in section 5.3.7 the EUT complied with the EN61000-3-3:2008 standards, and detailed test results are found in the following test data.

5.3.6 Test Data - Harmonic

Harmonic test is not applicable.

5.3.7 Test Data - Voltage Fluctuations

Temperature: 19.2 °C Humidity: 48.4 % R.H. Test Date: 04. 06. 2015 Tested by: Hyo Jin, Kim

Maximum Flicker results

	E.U.T values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.283	4.00	PASS
dt [s]	0.000	0.50	PASS

5.4 Electrostatic Discharge Immunity

5.4.1 Test Description

The E.U.T and all local support equipment were placed on non-metallic support 0.8 m above a reference ground plane (RGP) and was put into operation according to the specified operating mode.

5.4.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
ESD SIMULATOR	Noise Ken	ESS-2000	ESS05X4620	06.30.2015

5.4.3 Test Environment

Ambient Temperatures :	15 °C ~ 35 °C
Relative Humidity :	25 % R.H. ~ 75 % R.H.
Atmospheric Pressure :	86.0 kPa ~ 106.0 kPa

5.4.4 Test Levels

Discharge Impedance :	330 Ω \pm 10 % / 150 pF \pm 10 %
Type of Discharge :	Direct - Air Discharge (\pm 2 kV & \pm 4 kV & \pm 8 kV), Contact Discharge (\pm 6 kV) Indirect - HCP Discharge (\pm 2 kV & \pm 4 kV & \pm 6 kV) VCP Discharge (\pm 2 kV & \pm 4 kV & \pm 6 kV)
Polarity of Output Voltage :	Positive and Negative
Discharge Repetition Rate :	1/sec
Number of Discharges :	more than 10 times
Performance Criteria :	B

5.4.5 Test Procedure

Test programs and software were chosen so as to exercise all normal modes of operation of the E.U.T. The use of special exercising software is encouraged, but permitted only where it can be shown that the E.U.T is being comprehensively exercised.

The test was conducted in the following order: Air Discharge, Direct Contact Discharge, Indirect Contact Horizontal Coupling Plane (HCP) Discharge, and Indirect Contact Vertical Coupling Plane (VCP) Discharge. The electrostatic discharge test levels were set and discharges for the different test modes were set appropriately. The electrostatic discharge is applied to the conductive surface of the E.U.T, and along all seams and control surfaces on the E.U.T. When a discharge occurs and an error is caused, the type of error, discharge level and location is recorded.

5.4.6 Test Results

According to the data in section 5.4.7, the E.U.T complied with the EN 61000-4-2 standards, and detailed test results are found in the following test data.

5.4.7 Test Data

Temperature: 19.7 °C Humidity: 39.2 % R.H. Test Date: 04. 09. 2015 Tested by: Hyo Jin, Kim

- AC Mode

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Test level	Results	
1	HCP Contact	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-
2	VCP Contact	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Test level	Results	
1	Enclosure	Air Discharge	$\pm (2,4,8) \text{ kV}$	Complied	-
2	IRIS Port	Air Discharge	$\pm (2,4,8) \text{ kV}$	Complied	-
3	Port	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-

- DC Mode

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Test level	Results	
1	HCP Contact	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-
2	VCP Contact	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Test level	Results	
1	Enclosure	Air Discharge	$\pm (2,4,8) \text{ kV}$	Complied	-
2	IRIS Port	Air Discharge	$\pm (2,4,8) \text{ kV}$	Complied	-
3	Port	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-

- PoE Mode

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Test level	Results	
1	HCP Contact	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-
2	VCP Contact	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-

Direct Discharge

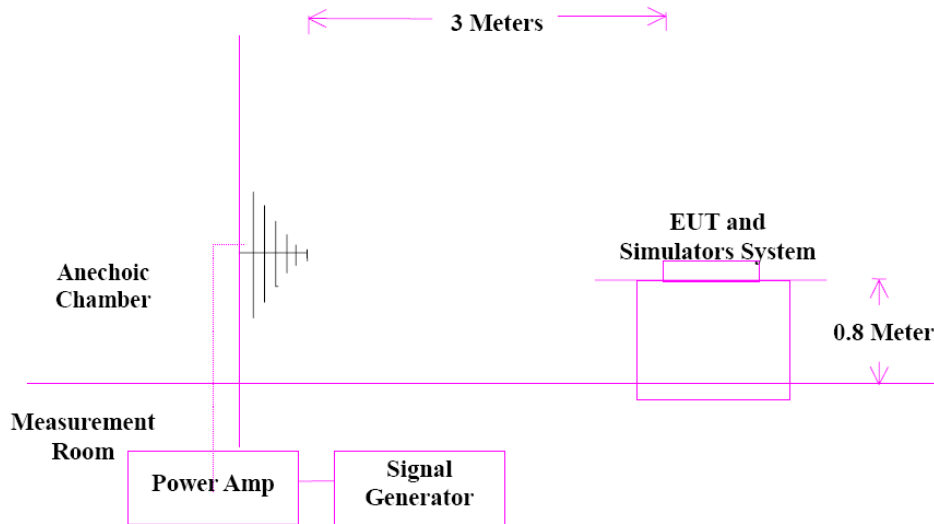
No.	Test Point	Discharge Method	Performance		Remarks
			Test level	Results	
1	Enclosure	Air Discharge	$\pm (2,4,8) \text{ kV}$	Complied	-
2	IRIS Port	Air Discharge	$\pm (2,4,8) \text{ kV}$	Complied	-
3	Port	Contact Discharge	$\pm (2,4,6) \text{ kV}$	Complied	-

☐ 10 times Indirect discharge test for each polarity.

5.5 Radio-frequency electromagnetic field Amplitude modulated Immunity

5.5.1 Test Description

The E.U.T and all local support equipment were placed on a non-metallic support 0.8 m above a reference ground plane (RGP) and was put into operation according to the specified operating mode.



5.5.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Average Power Sensor	Agilent	E9301A	MY41498011	08.13.2015
Average Power Sensor	Agilent	E9301A	-	08.13.2015
Signal Generator	HP	ESG-3000A	US37040210	08.13.2015
Power Meter	Agilent	E4419B	MY45101506	08.13.2015
Power Amplifier	Infinitech	ITA0300-200	-	08.13.2015
Power Amplifier	Infinitech	ITA0750-200	-	08.13.2015
Power Amplifier	Infinitech	ITA1500-100	-	08.13.2015
Power Amplifier	Infinitech	ITA2500-100	-	08.13.2015
Stacked Log.-Per.Antenna	Schwarzbeck	STLP 9128 D	9128D038	-
RS Chamber(EMI 18GHz)	SEMITEC	-	-	-

5.5.3 Test Environments

Ambient Temperatures :	15 °C ~ 35 °C
Relative Humidity :	25 % R.H. ~ 75 % R.H.
Atmospheric Pressure :	86.0 kPa ~ 106.0 kPa

5.5.4 Test Levels

Frequency Range :	80 MHz to 2 700 MHz
Field Strength :	10 V/m(3 V/m, 1 V/m)
Modulation :	80 % Amplitude Modulation (1 kHz) Pulse Modulation (1 Hz (0.5 s ON: 0.5 s OFF))
Distance of ANT-E.U.T :	3 meters
Antenna Polarity :	Horizontal and Vertical
Frequency Step :	1 %
Performance Criteria :	A

5.5.5 Test Procedures

The E.U.T is set into operation and was monitored for variations in performance. The test signal start frequency (80 MHz) and stop frequency (2 700 MHz) were set, including the field strength at 10 V/m(3 V/m, 1 V/m), 80 % modulated through immunity test software. The software maintains the necessary field strength through the frequency range, with the transmitting antenna horizontally polarized. If an error is detected, the field is reduced until the error is not repeatable, the field is then manually increased until the error begins to occur. This threshold level, the frequency and the error created are noted before continuing. The test is then repeated with vertical polarization, using the same test configuration for all four sides.

5.5.6 Test Results

According to the data in section 5.5.7, the E.U.T complied with the EN 61000-4-3 standards, and detailed test results are found in the following test data.



5.5.7 Test Data

- AC Mode

Temperature: 22.5 °C Humidity: 37.3 % R.H. Test Date: 04. 10. 2015 Tested by: Hyo Jin, Kim

No.	Test Point	Performance Results		Remarks
		Horizontal	Vertical	
1	Front	Complied	Complied	-
2	Rear	Complied	Complied	-
3	Right Side	Complied	Complied	-
4	Left Side	Complied	Complied	-

- DC Mode

Temperature: 22.5 °C Humidity: 37.3 % R.H. Test Date: 04. 10. 2015 Tested by: Hyo Jin, Kim

No.	Test Point	Performance Results		Remarks
		Horizontal	Vertical	
1	Front	Complied	Complied	-
2	Rear	Complied	Complied	-
3	Right Side	Complied	Complied	-
4	Left Side	Complied	Complied	-

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Test report No.:
KES-E1-15T0121
Page (55) of (104)

- PoE Mode

Temperature: 22.5 °C Humidity: 37.3 % R.H. Test Date: 04. 10. 2015 Tested by: Hyo Jin, Kim

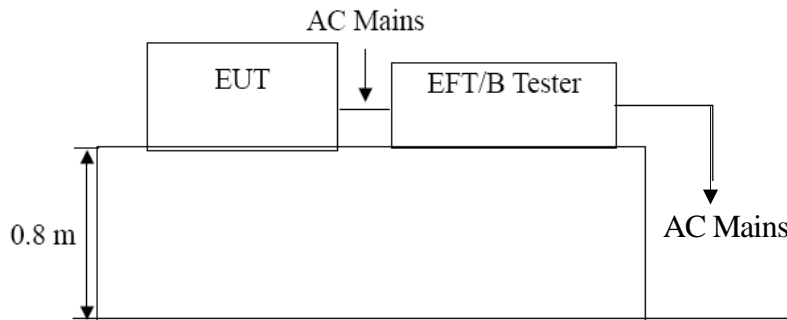
No.	Test Point	Performance Results		Remarks
		Horizontal	Vertical	
1	Front	Complied	Complied	-
2	Rear	Complied	Complied	-
3	Right Side	Complied	Complied	-
4	Left Side	Complied	Complied	-

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5.6 Fast Transient Immunity

5.6.1 Test Description

The E.U.T and all local support equipment were placed a non-metallic support 0.8 m above a reference ground plane (RGP) and was put into operation according to the specified operating mode. If the E.U.T has a non-detachable supply cable more than 1 m long, the excess length of this cable was gathered into a flat coil with a 0.4 m diameter and situated at a distance of 0.1 m above the RGP.



5.6.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Ultra Compact Simulator	EM TEST	UCS 500 N5	V0936105120	08. 13. 2015
Capacitive Coupling Clamp	EM TEST	HFK	070925	08. 14. 2015
MotorVariac	EM TEST	MV2616	V0936105123	08. 13. 2015

5.6.3 Test Environments

Ambient Temperatures :	15 °C ~ 35 °C
Relative Humidity :	25 % R.H. ~ 75 % R.H.
Atmospheric Pressure :	86.0 kPa ~ 106.0 kPa

5.6.4 Test Levels

Open Circuit Output Test Voltage :	■ Power Supply AC; ± 2 kV ■ Power Supply DC; ± 1 kV ■ I/O Signal, Data and Control ports; ± 1 kV
Repetition Frequency of the Impulses :	100 kHz
Polarity :	Positive and Negative
Rise Time of One Pulse :	5 ns ± 30 %
Impulse Duration :	50 ns ± 30 %
Burst Duration :	15 ms ± 20 %
Burst Period :	300 ms ± 20 %
Performance Criteria :	B

5.6.5 Test Procedure

The E.U.T was connected to the test equipment, and monitored for performance. The test level was set and the test signal was applied for 200 seconds. A test signal of ± 1 kV, and ± 2 kV was Coupled to Line and Ground, Neutral and Ground, Line plus Neutral and Ground, and Protective Earth and Ground. When an error occurs, the test level is reduced until the error recovers and then increased until the threshold level is reached. This threshold and the error conditions were noted. This procedure was then repeated for the other coupling modes.

5.6.6 Test Results

According to the data in section 5.6.7, the E.U.T complied with the EN61000-4-4 standards, and detailed test results are found in the following test data.



5.6.7 Test Data

-AC Mode

Temperature: 21.0 °C Humidity: 34.2 % R.H. Test Date: 04. 11. 2015 Tested by: Hyo Jin, Kim

On AC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
1	L1	± 2 kV	Complied	Complied	-
2	L2	± 2 kV	Complied	Complied	-
3	L1-L2	± 2 kV	Complied	Complied	-

On DC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
1	RS-485	± 1 kV	Complied	Complied	-
2	LAN (RJ-45)	± 1 kV	Complied	Complied	-
3	BNC	± 1 kV	Complied	Complied	-



-DC Mode

Temperature: 21.0 °C Humidity: 34.2 % R.H. Test Date: 04. 11. 2015 Tested by: Hyo Jin, Kim

On AC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-

On DC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
1	L1	± 1 kV	Complied	Complied	-
2	L2	± 1 kV	Complied	Complied	-
3	L1-L2	± 1 kV	Complied	Complied	-

On I/O Signal, Data and Control ports

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
1	RS-485	± 1 kV	Complied	Complied	-
2	LAN (RJ-45)	± 1 kV	Complied	Complied	-
3	BNC	± 1 kV	Complied	Complied	-



-PoE Mode

Temperature: 21.0 °C Humidity: 34.2 % R.H. Test Date: 04. 11. 2015 Tested by: Hyo Jin, Kim

On AC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-

On DC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-
-	-	± 1 kV	-	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Test Level	Performance Results		Remarks
			+Burst	-Burst	
1	RS-485	± 1 kV	Complied	Complied	-
2	LAN (RJ-45)	± 1 kV	Complied	Complied	-
3	LAN(PoE)	± 1 kV	Complied	Complied	-

5.7 Surge Immunity

5.7.1 Test Description

The E.U.T and all local support equipment was placed on a non-metallic support 0.8 m above a reference ground plane (RGP) and was put into operation according to the specified operating mode.

5.7.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Ultra Compact Simulator	EM TEST	UCS 500 N5	V0936105120	08. 14. 2015
MotorVariac	EM TEST	MV2616	V0936105123	08. 13. 2015
CDN	EM TEST	CNV 504N	V0936105121	-

5.7.3 Test Environments

Ambient Temperatures :	15 °C ~ 35 °C
Relative Humidity :	25 % R.H. ~ 75 % R.H.
Atmospheric Pressure :	86.0 kPa ~ 106.0 kPa

5.7.4 Test Levels

Open Circuit Test Voltage :	<input checked="" type="checkbox"/> AC Power; $\pm 0,5$ kV & ± 1 kV line-to-line, <input type="checkbox"/> AC Power; $\pm 0,5$ kV & ± 1 kV & ± 2 kV line-to-ground <input type="checkbox"/> DC Power; $\pm 0,5$ kV & ± 1 kV line-to-ground <input checked="" type="checkbox"/> Data and Control Line; $\pm 0,5$ kV & ± 1 kV line-to-ground
Open Circuit Voltage Waveform :	1.2/50 microsecond
Short Circuit Current Waveform :	8/20 microsecond
Number of Tests :	5 positive and 5 negative
Repetition Rate :	1/min
Performance Criteria :	B

5.7.5 Test Procedure

The surges have to be applied line to line and line(s) and ground. In case of testing line to ground the test voltage has to be applied successively between each of the lines and ground, if there is no other specification. All lower levels including the selected test level must be satisfied. For testing the secondary protection the output voltage of the generator must be increased up to the worst case voltage break down level of the primary protection.

5.7.6 Test Results

According to the data in section 5.7.7, the E.U.T complied with the EN61000-4-5 standards, and detailed test results are found in the following test data.

5.7.7 Test Data

-AC Mode

Temperature: 19.1 °C Humidity: 34.5 % R.H. Test Date: 04. 13. 2015 Tested by: Hyo Jin, Kim

On DC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Surge	-Surge	
1	L1-L2	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-

On I/O Signal, Data and Control ports

No.	Test Point	Test Level	Performance Results		Remarks
			+Surge	-Surge	
1	RS-485	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-
2	LAN (RJ-45)	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-
3	BNC	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-

-DC Mode

Temperature: 19.1 °C Humidity: 34.5 % R.H. Test Date: 04. 13. 2015 Tested by: Hyo Jin, Kim

On DC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Surge	-Surge	
1	-	$\pm (0,5 \& 1) \text{ kV}$	-	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Test Level	Performance Results		Remarks
			+Surge	-Surge	
1	RS-485	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-
2	LAN (RJ-45)	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-
3	BNC	$\pm (0,5 \& 1) \text{ kV}$	Complied	Complied	-

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Test report No.:
KES-E1-15T0121
Page (63) of (104)

-PoE Mode

Temperature: 19.1 °C Humidity: 34.5 % R.H. Test Date: 04. 13. 2015 Tested by: Hyo Jin, Kim

On DC Power Supply

No.	Test Point	Test Level	Performance Results		Remarks
			+Surge	-Surge	
1	-	$\pm (0,5 \text{ \& } 1) \text{ kV}$	-	-	-

On I/O Signal, Data and Control ports

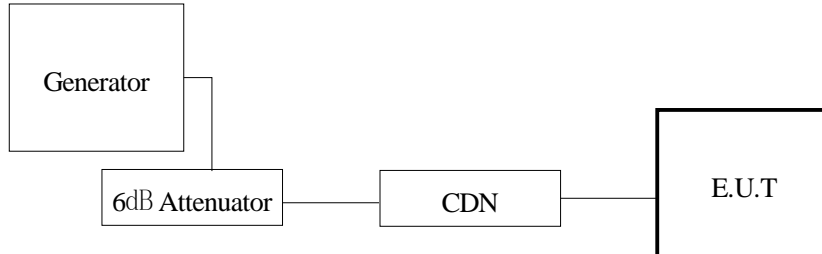
No.	Test Point	Test Level	Performance Results		Remarks
			+Surge	-Surge	
1	RS-485	$\pm (0,5 \text{ \& } 1) \text{ kV}$	Complied	Complied	-
2	LAN (RJ-45)	$\pm (0,5 \text{ \& } 1) \text{ kV}$	Complied	Complied	-
3	LAN(PoE)	$\pm (0,5 \text{ \& } 1) \text{ kV}$	Complied	Complied	-

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5.8 Radio-frequency continuous conducted Immunity

5.8.1 Test Descriptions

The E.U.T and all local support equipment were placed on a non-metallic support 0.1 m above a reference ground plane (RGP) and was put into operation according to the specified operating mode.



5.8.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Continuous Wave Simulator	EM TEST	CWS 500N1	V0936105119	08. 14. 2015
6dB Attenuator	EM TEST	ATT6	1208-34	08. 13. 2015
CDN	EM TEST	CDN-M2/M3N	0909-06	08. 13. 2015
EM Injection Clamp	EM TEST	EM 101	36152	05. 14. 2015

5.8.3 Test Environments

Ambient Temperatures :	15 °C ~ 35 °C
Relative Humidity :	25 % R.H. ~ 75 % R.H.
Atmospheric Pressure :	86.0 kPa ~ 106.0 kPa

5.8.4 Test Levels

Frequency Range :	150 kHz to 100 MHz
Voltage Level :	10 V(3 V, 1 V)
Modulation :	80 % Amplitude Modulation (1 kHz) Pulse Modulation (1 Hz (0.5 s ON: 0.5 s OFF))
Frequency Step :	1 %
Performance Criteria :	A

5.8.5 Test Procedure

The test was 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 Ω load resistor. The frequency range is swept from 150 kHz to 100 MHz, using the signal levels established during the setting process, and with the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF-signal level or to switch coupling device as necessary.

5.8.6 Test Results

According to the data in section 5.8.7, the E.U.T complied with the EN61000-4-6 standards, and detailed test results are found in the following test data.

5.8.7 Test Data

- AC Mode

Temperature: 18.6 °C Humidity: 43.2 % R.H. Test Date: 04. 14. 2015 Tested by: Hyo Jin, Kim

On AC Power Supply

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	24 V (dc)	CDN	Complied	CDN-M2

On DC Power Supply

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	-	CDN	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	RS-485	EM Clamp	Complied	-
2	LAN (RJ-45)	EM Clamp	Complied	-
3	BNC	EM Clamp	Complied	-

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Test report No.:
KES-E1-15T0121
Page (66) of (104)

- DC Mode

Temperature: 18.6 °C Humidity: 43.2 % R.H. Test Date: 04. 14. 2015 Tested by: Hyo Jin, Kim

On AC Power Supply

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	-	CDN	-	-

On DC Power Supply

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	12 V (dc)	CDN	Complied	CDN-M2

On I/O Signal, Data and Control ports

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	RS-485	EM Clamp	Complied	-
2	LAN (RJ-45)	EM Clamp	Complied	-
3	BNC	EM Clamp	Complied	-

- PoE Mode

Temperature: 18.6 °C Humidity: 43.2 % R.H. Test Date: 04. 14. 2015 Tested by: Hyo Jin, Kim

On AC Power Supply

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	-	CDN	-	-

On DC Power Supply

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	-	CDN	-	-

On I/O Signal, Data and Control ports

No.	Test Point	Performance		Remarks
		Coupling method	Results	
1	RS-485	EM Clamp	Complied	-
2	LAN (RJ-45)	EM Clamp	Complied	-
3	LAN(PoE)	EM Clamp	Complied	-

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5.9 Voltage Dips and Voltage Interruptions Immunity Measurements

5.9.1 Test Descriptions

The E.U.T and all local support equipment was placed on a non-metallic support 0.8 m above a reference ground plane (RGP) and was put into operation according to the specified operating mode.

5.9.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Ultra Compact Simulator	EM TEST	UCS 500 N5	V0936105120	08.13.2015
MotorVariac	EM TEST	MV2616	V0936105123	08.13.2015

5.9.3 Test Environments

Ambient Temperatures :	15 °C ~ 35 °C
Relative Humidity :	25 % R.H. ~ 75 % R.H.
Atmospheric Pressure :	86.0 kPa ~ 106.0 kPa

5.9.4 Test Levels

Overshoot/Undershoot of Actual Voltage :	Less than ± 5 % of the change in voltage
Voltage Rise and Fall Time :	Between 1 and 5 microseconds
Test Voltage / Test Frequency :	230 V (ac) / 50 Hz
Frequency Deviation of Test Voltage :	Less than ± 2 % of rated frequency
Number of Tests :	3 times
Test Intervals :	10 sec
Performance Criteria :	B for Voltage Dips C for Voltage Short Interruptions A for Voltage Variation

5.9.5 Test Procedure

For each test any degradation of performance were recorded. The monitoring equipment should be capable of displaying the status of the operational mode of the E.U.T during and after the tests. After each group of tests a full functional check were performed.



5.9.6 Test Results

N/A : This device operate by 24 V (dc), 12 V (dc) and PoE power. Test is not applicable.

5.9.7 Test Data

Temperature: °C Humidity: % R.H. Test Date: Tested by:

Voltage Dips(AC Power Supply)

No.	Depth	Duration	Results	Remarks
1	20 %	250T	-	-
2	30 %	25T	-	-
3	60 %	10T	-	-
4	100 %	250T	-	-

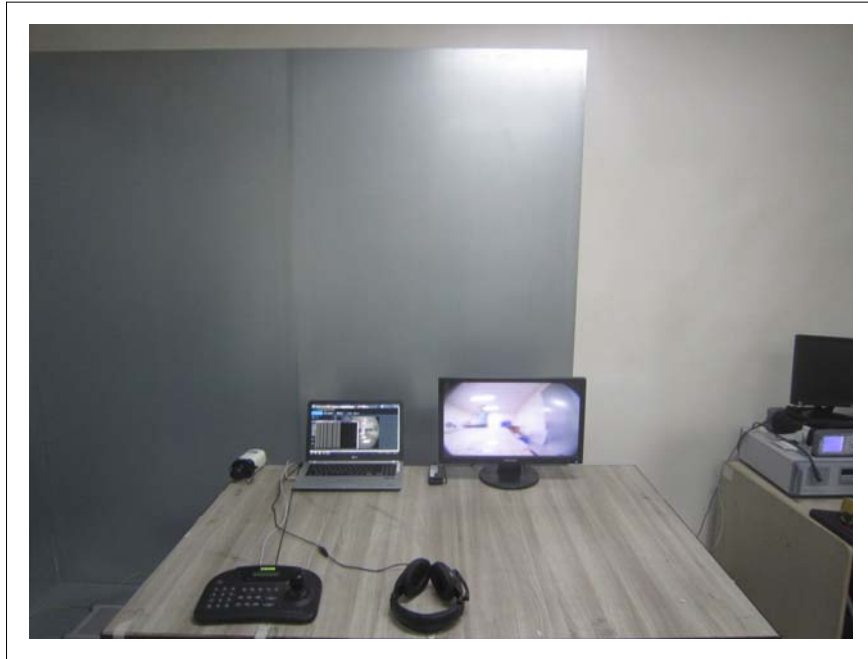
Voltage variations(AC Power Supply)

No.	Test Level		Results	Remarks
1	Unom + 10 %	253 V (ac)	-	-
2	Unom - 15 %	195.5 V (ac)	-	-

6. Test Setup Photographs

6.1 Conducted Emission

- AC Mode



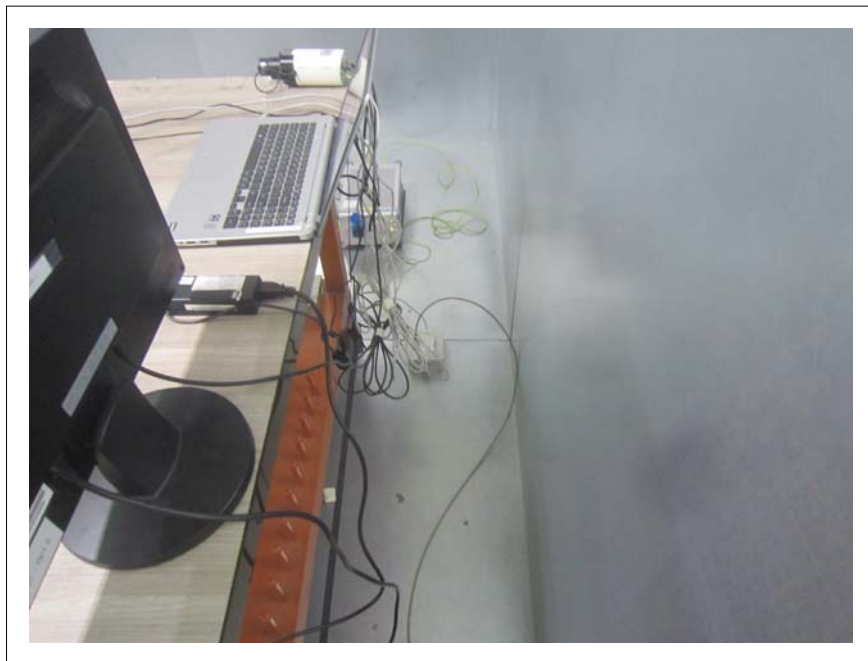
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The test results in the report only apply to the tested sample.

- Telecommunication Emission

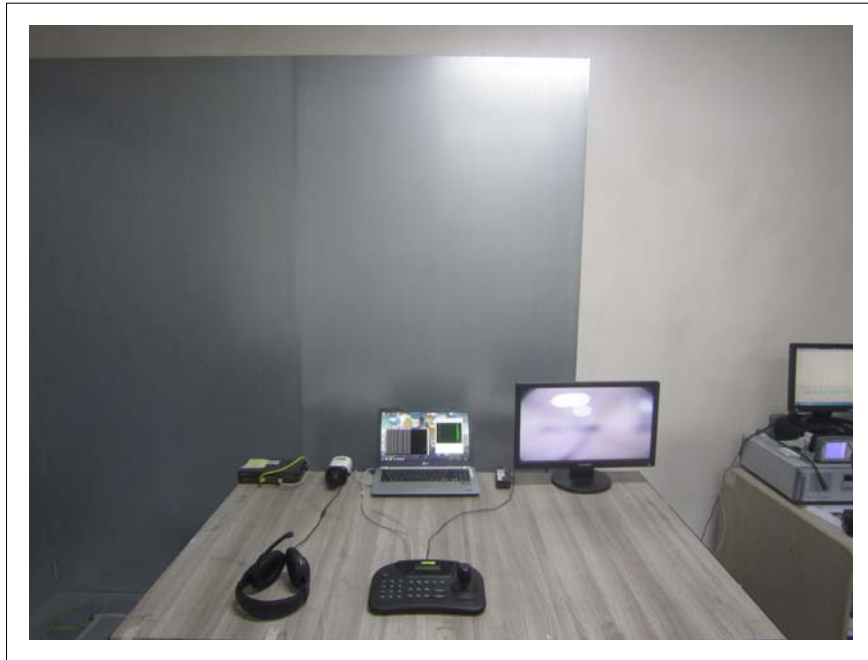
-AC Mode



-DC Mode



-POE Mode



6.2 Radiated Emission

* Below 1 GHz

-AC Mode



-DC Mode



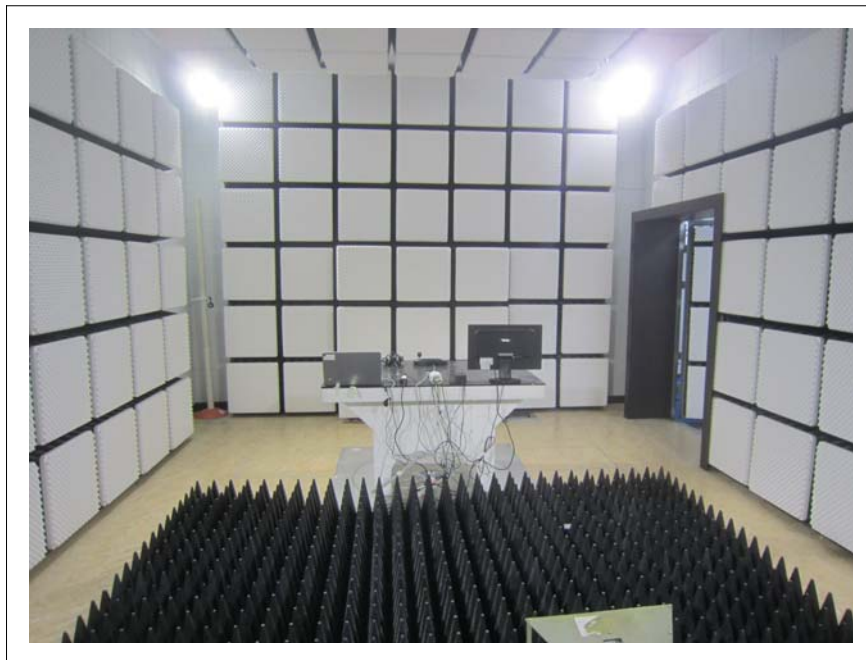
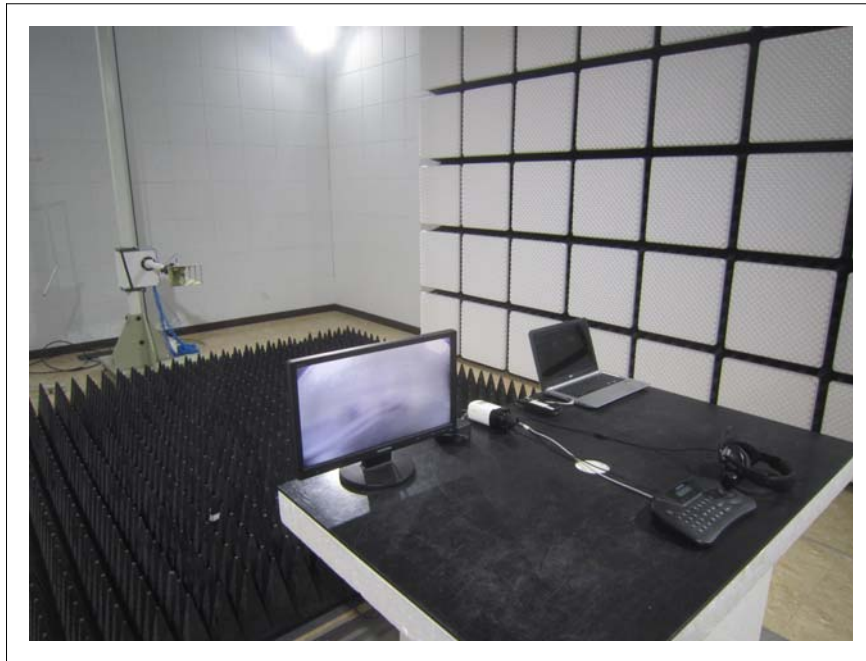
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-POE Mode



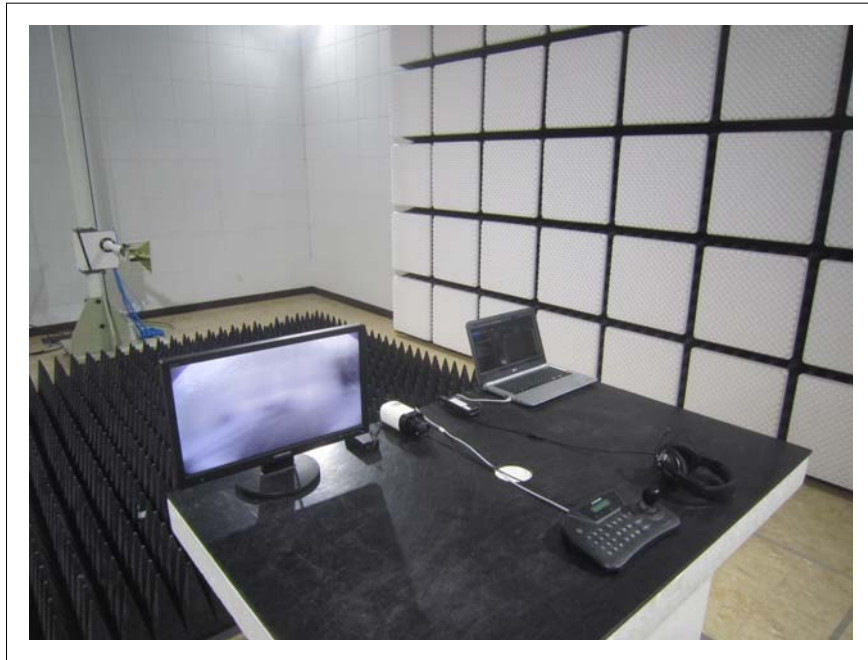
* Above 1 GHz

-AC Mode



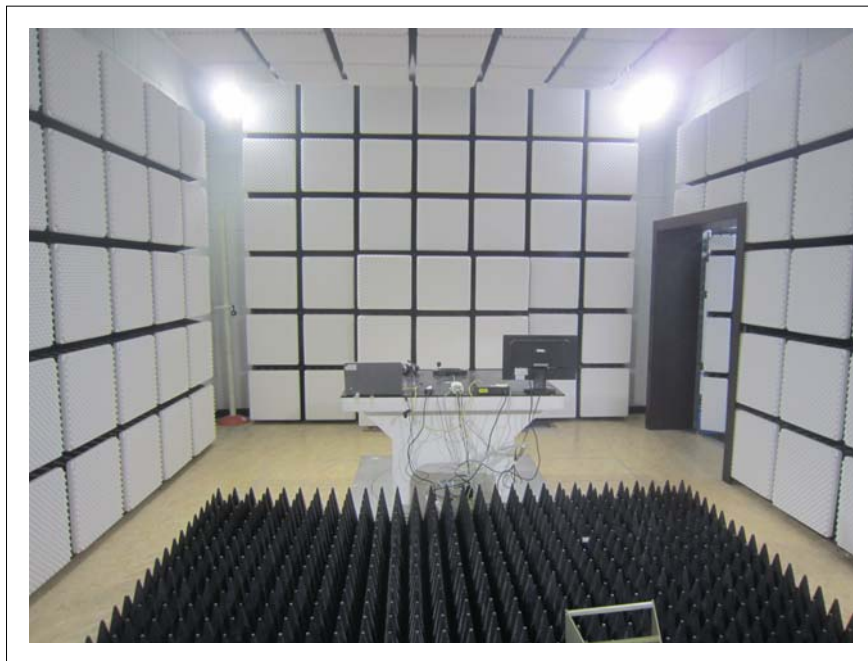
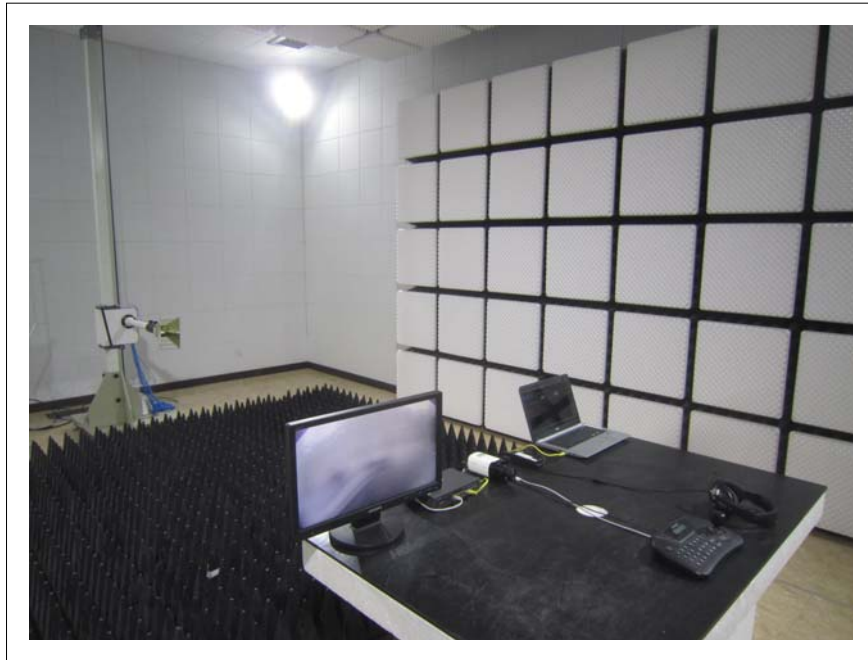
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-DC Mode



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-POE Mode



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6.3 Harmonics / Voltage Fluctuations



6.4 Electrostatic Discharge Immunity

- AC Mode



- DC Mode



- PoE Mode



- AC Mode

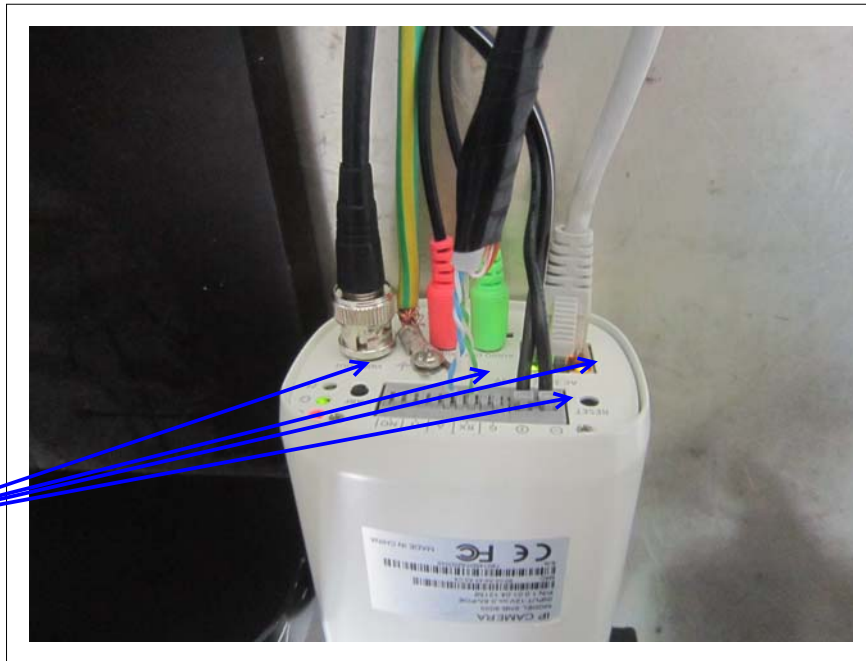


1. Air
Discharge



2. Air
Discharge

3. Contact
Discharge



- DC Mode



1. Air
Discharge



2. Air
Discharge

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3. Contact
Discharge



- PoE Mode



1. Air
Discharge



2. Air
Discharge

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3. Contact
Discharge

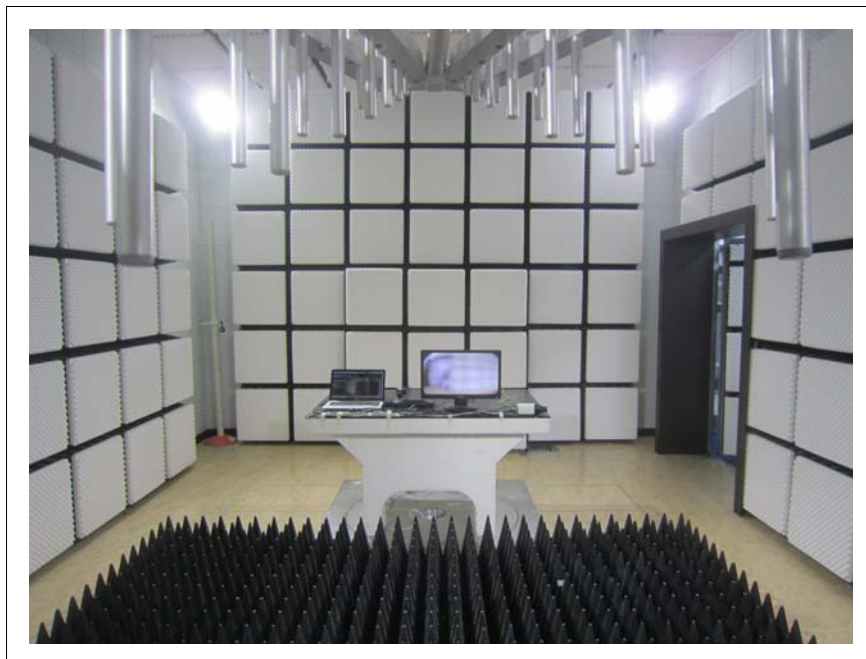


6.5 Radio frequency electromagnetic field immunity

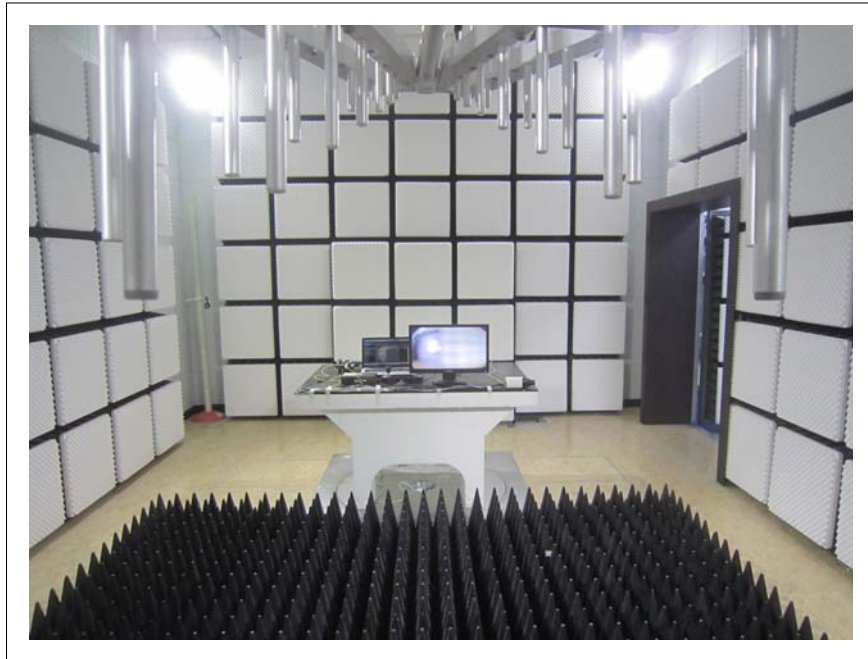
- AC Mode



- DC Mode



- PoE Mode



6.6 Fast Transient Immunity

-AC Mode



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-DC Mode



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-PoE Mode



6.7 Surge Immunity

- AC Mode



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- DC Mode



- PoE Mode



6.8 Radio-frequency continuous conducted Immunity

- AC Mode



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- DC Mode



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- PoE Mode



6.9 Voltage Dips and Voltage Interruptions Immunity

N/A

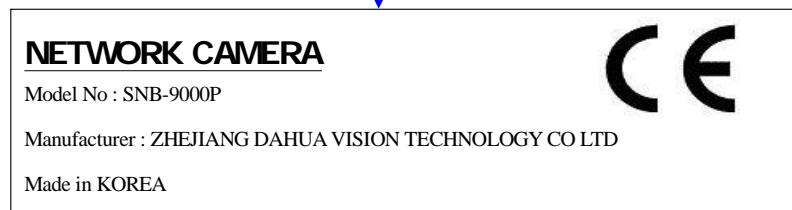
7. External Photographs



[FRONT VIEW]

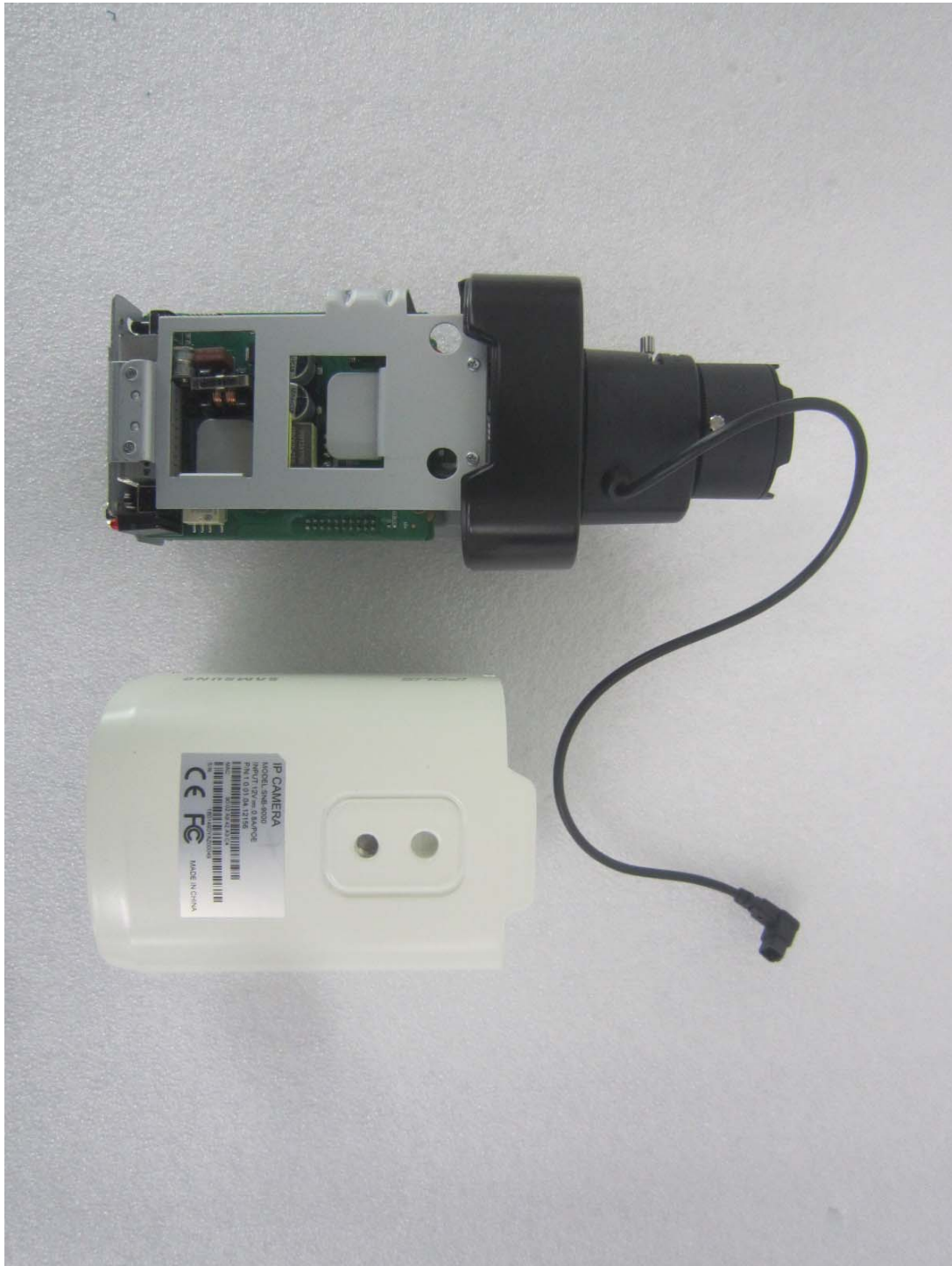


[REAR VIEW]



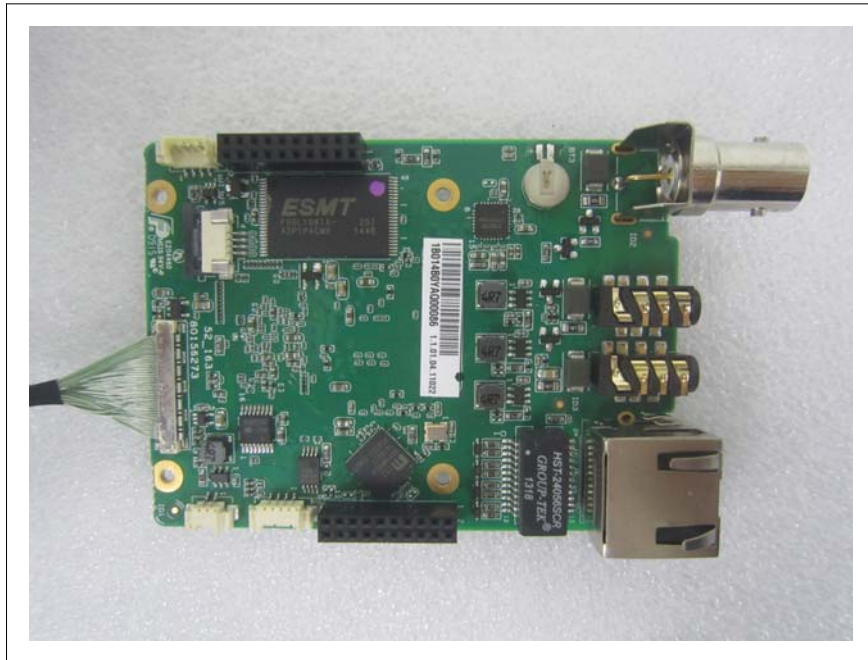
[LABEL VIEW]

8. Internal Photographs

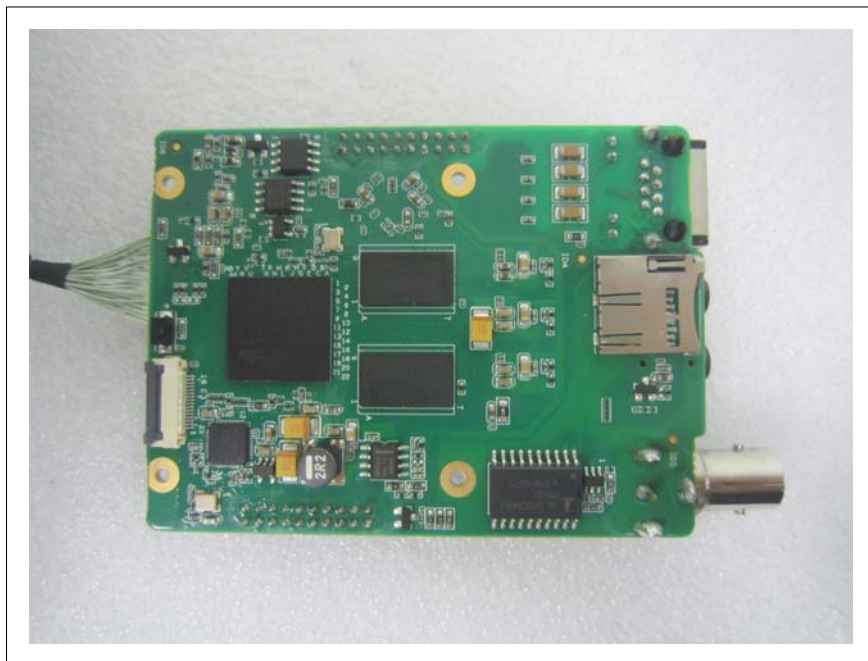


[INTERNAL VIEW]

○ Main Board

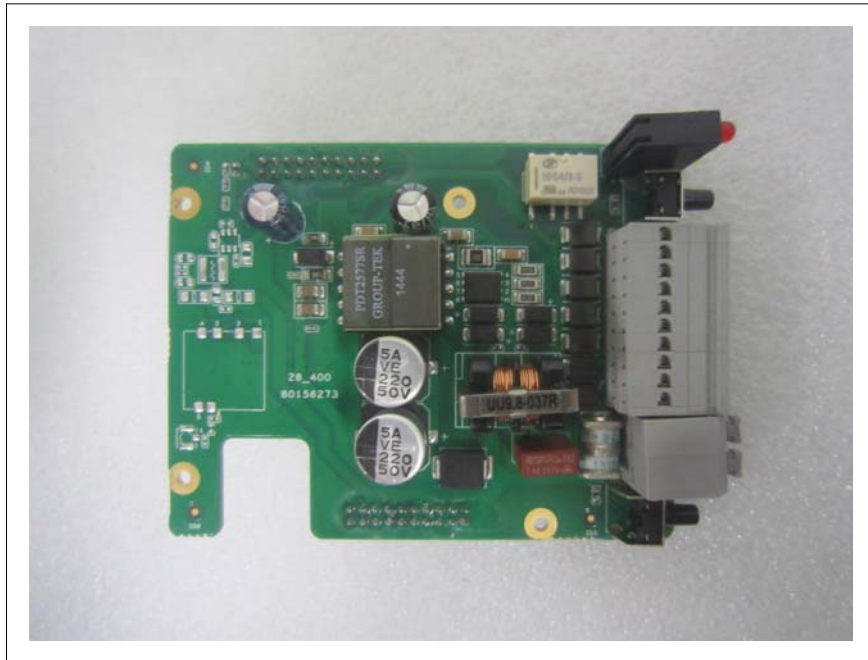


[TOP VIEW]



[BOTTOM VIEW]

○ Sub Board



[TOP VIEW]



[BOTTOM VIEW]

○ Lens Board



[TOP VIEW]



[BOTTOM VIEW]



Appendix A - Schematics/Block Diagram

Please see attached document(s).



Appendix B - User's Manual

Please see attached document(s).