

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (1) of (73)

EMC TEST REPORT For CE

Test Report No. : KES-EM-20T0599-R1
Date of Issue : Feb. 24, 2023
Product name : NETWORK CAMERA
Model/Type No. : QNO-8081R/KME
Variant Model : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED
2. D-TECH CO.,LTD.
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
Date of Receipt : Aug. 25, 2020
Test date : Aug. 26, 2020 ~ Sep. 03, 2020
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jun Soo, Jung
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0599-R1
Page (2) of (73)

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Sep. 14, 2020	KES-EM-20T0599	Issued
Feb. 24, 2023	KES-EM-20T0599-R1	Change the Applicant and manufacturer at the request of the customer, UKCA, Regulations Update

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd. This document may be altered or revised by KES Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KES Co., Ltd. will constitute fraud and shall nullify the document.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



TABLE OF CONTENTS

1.0	General Product Description	4
1.1	Test Voltage & Frequency	8
1.2	Variant Model Differences.....	8
1.3	Device Modifications	8
1.4	Equipment Under Test.....	8
1.5	Support Equipments	8
1.6	External I/O Cabling	9
1.7	EUT Operating Mode(s)	9
1.8	Configuration.....	10
1.9	Remarks when standards applied	11
1.10	Calibration Details of Equipment Used for Measurement	11
1.11	Test Facility	11
1.12	Laboratory Accreditations and Listings	11
2.0	Test Regulations.....	12
2.1	Conducted Emissions at Mains Power Ports	13
2.2	Conducted Emissions at Telecommunication Ports	14
2.3	Radiated Electric Field Emissions(Below 1 GHz)	15
2.4	Radiated Electric Field Emissions(Above 1 GHz)	16
2.5	Harmonic Current Emissions	17
2.6	Voltage Fluctuations and Flicker	18
3.0	Criteria for compliance.....	19
3.1	Electrostatic Discharge.....	21
3.2	Radiated Electric Field Immunity	25
3.3	Electrical Fast Transients/Bursts	28
3.4	Surge Transients	31
3.5	Conducted Disturbance	35
3.6	Voltage Dips and Short Interruptions	38
APPENDIX A – TEST DATA.....		40
Conducted Emissions at Mains Power Ports.....		40
Conducted Emissions at Telecommunication Ports		42
Radiated Electric Field Emissions(Below 1 GHz)		44
Radiated Electric Field Emissions(Above 1 GHz).....		46
Harmonic Current Emissions and Voltage Fluctuations and Flicker		48
Test Setup Photos and Configuration		51
Conducted Emissions at Mains Power Ports.....		51
Conducted Emissions at Telecommunication Ports		52
Radiated Electric Field Emissions(Below 1 GHz)		54
Radiated Electric Field Emissions(Above 1 GHz).....		56
Harmonic Current Emissions and Voltage Fluctuations and Flicker		58
Electrostatic Discharge		59
Radiated Electric Field Immunity		60
Electrical Fast Transients/Bursts		61
Surge Transients.....		62
Conducted Disturbance.....		63
Voltage Dips and Short Interruptions.....		64
EUT External Photographs		65
EUT Internal Photographs		66



1.0 General Product Description

Main Specifications of EUT are:

	QNO-8081R
Video	
Imaging Device	1/2.8" CMOS
Resolution	2592x1944, 1920x1080, 1280x960, 1280x720, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
Max. Framerate	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 15fps/12fps(60Hz/50Hz)
NETD	None
Pixel Size	None
Min. Illumination	Color: 0.15Lux(F1.6, 1/30sec) BW: 0Lux(IR LED on)
Video Out	CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation
Video Transmission Distance	None
Lens	
Focal Length (Zoom Ratio)	2.7~12mm(4.4x) Motorized varifocal
Max. Aperture Ratio	F1.6(Wide)~F2.9(Tele)
Angular Field of View	H: 100.3°(Wide)~31.2°(Tele) / V: 72.3°(Wide)~23.5°(Tele) / D: 133.1°(Wide)~38.8°(Tele)
Min. Object Distance	None
Focus Control	Simple focus
Lens Type	DC auto iris (IR corrected)
Mount Type	None
Optional Lens	None
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
Pan Range	None
Pan Speed	None
Tilt Range	None
Tilt Speed	None

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (5) of (73)

Rotate Range	None
Sequence	None
Preset Accuracy	None
Operational	
Camera Title	Displayed up to 85 characters
Direction Indicator	None
Day & Night	Auto(ICR)
Backlight Compensation	BLC, WDR, SSDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNR
Digital Image Stabilization	None
Defog	None
Motion Detection	4ea, polygonal zones
Privacy Masking	6ea, rectangular zones
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/5~1/12,000sec)
Digital PTZ	None
Video Rotation	Flip, Mirror, Hallway view(90°/270°)
Analytics	Defocus detection, Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line
Business Intelligence	None
Serial Interface	None
Alarm I/O	Input 1ea / Output 1ea
Alarm Triggers	Analytics, Network disconnect, Alarm input
Alarm Events	File upload via FTP and e-mail Notification via e-mail SD/SDHC/SDXC or NAS recording at event triggers Alarm output
Audio In	None
Audio Out	None
IR Viewable Length	30m(98.42ft)
IR Illuminator (Optional)	None

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (6) of (73)

Water Removal	None
Auto Tracking	None
Coaxial Protocol	None
Color Palettes	None
Radiometry	
Temperature detect range	None
Temperature accuracy	None
Temperature detection	None
Additional	None
Network	
Ethernet	RJ-45(10/100BASE-T)
Video Compression	H.265/H.264: Main/High, MJPEG
Audio Compression	None
Smart Codec	WiseStreamII
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Quality level control
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(6 users) / Multicast Multiple streaming(Up to 3 profiles)
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP)
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API) Wisenet open platform
General	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (7) of (73)

Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch
Web Viewer	None
Edge Storage	Micro SD/SDHC/SDXC 1slot 128GB
Memory	512MB RAM, 256MB Flash
Environmental & Electrical	
Operating Temperature / Humidity	-30°C ~ +55°C (-30°C ~ +60°C Intermittent) / Less than 95% RH (Non-condensing) * Start up should be done at above -20°C
Storage Temperature / Humidity	-30°C ~ +60°C / Less than 90% RH
Certification	IP66, IK10
Input Voltage	DC 12V, PoE(IEEE802.3af, Class3)
Power Consumption	DC 12V : Max 8.50W, typical 6.30W PoE: Max 9.50W, typical 7.30W
Mechanical	
Color / Material	Dark grey / Aluminum
RAL Code	RAL7022
Product dimensions / weight	Ø91x322.9mm(Ø35.8x127.1"), 1210g
Conduit hole	None
Hanging mount(Dome)	None
Skin cover(Dome)	None
Weather cap(Dome)	None
Power module	None
Backbox	SBO-126B
DORI (EN62676-4 standard)	
Detect (25PPM/ 8PPF)	Wide: 43.3m(141.96ft) / Tele: 185.7m(609.15ft)
Observe (63PPM/ 19PPF)	Wide: 17.3m(56.78ft) / Tele: 74.3m(243.66ft)
Recognize (125PPM/ 38PPF)	Wide: 8.7m(28.39ft) / Tele: 37.1m(121.83ft)
Identify (250PPM/ 76PPF)	Wide: 4.3m(14.20ft) / Tele: 18.6m(60.92ft)

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage ☒ 230 Vac ☐ 100 Vac ☐ 24 Vac ☐ 12 Vdc ☒ PoE
Frequency ☒ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
NETWORK CAMERA	QNO-8081R/KME	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adapter	GS728TPP	-	NETGEAR	-
AC/DC Adapter	SW60-12005000-w	-	SHENZHEN TOP-ASIA ELECTRONICS CO.,LTD	-
Notebook	HSN-Q07C	5CD8367KND	HP	-
Notebook Adapter	HSTNN-CA40	WFTKU0ERLB4QCH	HP	-
Micro SD Card	-	-	Kingston	16 GB
Alarm in	-	-	-	-
Alarm out	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-

1.6 External I/O Cabling

■ AC/DC Adapter MODE

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45	Notebook	RJ-45	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
	3Pin	Alarm in	3Pin	3.4	U
	3Pin	Alarm out	3Pin	3.5	U

* Unshielded=U, Shielded=S

■ PoE Adapter MODE

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45 (PoE)	PoE Adapter	RJ-45 (PoE)	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
	3Pin	Alarm in	3Pin	3.4	U
	3Pin	Alarm out	3Pin	3.5	U
Notebook	RJ-45 (LAN)	PoE Adapter	RJ-45 (LAN)	3.0	U

* Unshielded=U, Shielded=S

1.7 EUT Operating Mode(s)

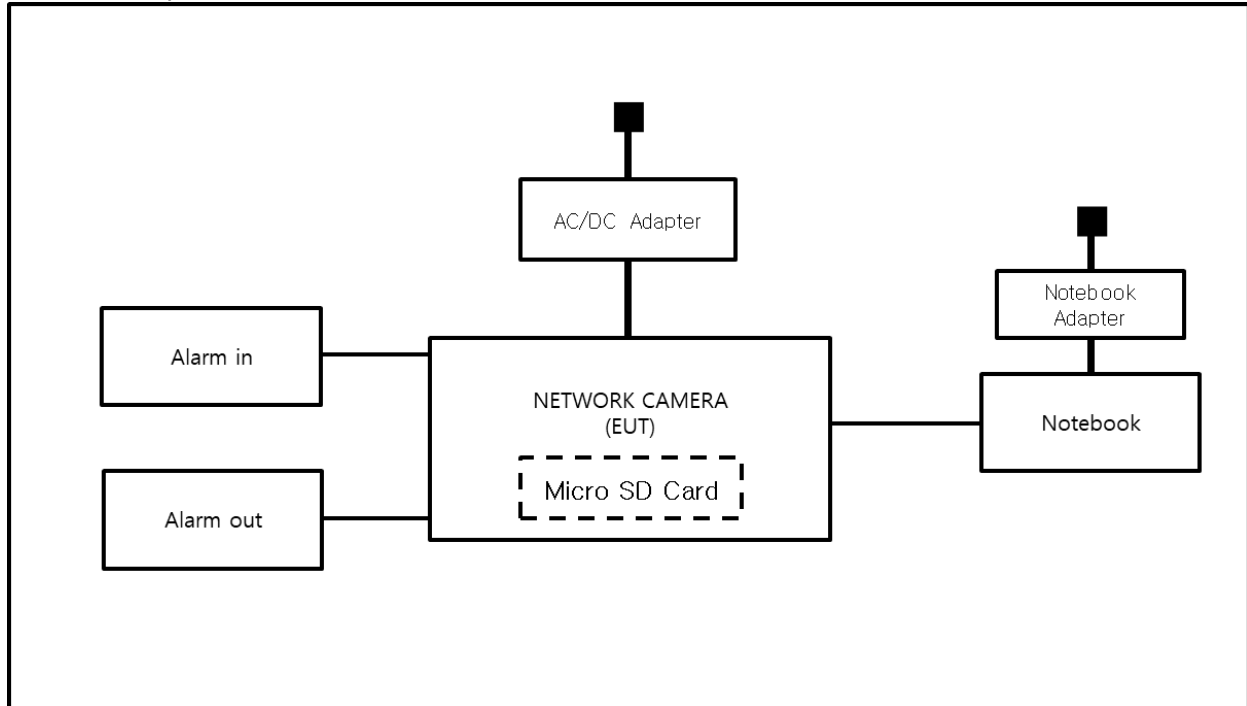
Test Mode	operating
OP	EUT Monitoring, Ping test

EUT Test operating S/W		
Name	Version	Manufacture Company
WebView	-	Hanwha Vision Co., Ltd

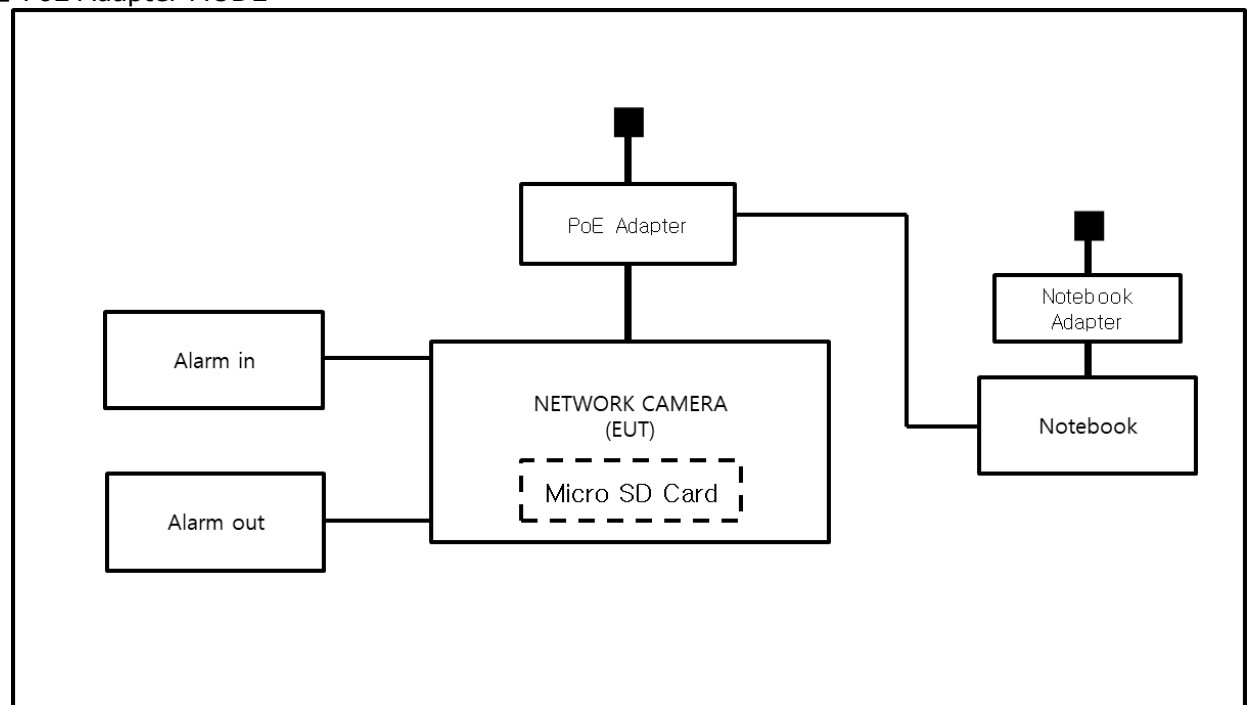
1.8 Configuration

■ AC Main
 □ DC Main

■ AC/DC Adapter MODE



■ PoE Adapter MODE



1.9 Remarks when standards applied

PoE port is considered to be a wired network port, so test items related to power are excluded.

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298
JAPAN	VCCI	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site)	 C-20136, T-20137, R-20181, G-20176
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0004



2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **EMC – Directive 2014/30/EU**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ **EMC – Regulations 2016**

☒ EN 55032:2015/A11:2020

☒ Class A

☐ Class B

☒ EN 50130-4:2011

☒ EN 61000-3-2:2014

☒ EN 61000-3-3:2013

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (13) of (73)

2.1 Conducted Emissions at Mains Power Ports

Test Date

Aug. 26, 2020

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	01, 20, 2021
☒	LISN	ENV216	R & S	101787	01, 02, 2021
☒	LISN	ESH2-Z5	R & S	100450	01, 02, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	01, 02, 2021

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 52,0 % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

- See Appendix A for test data.
- PoE port is considered to be a wired network port, so test items related to power are excluded.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



2.2 Conducted Emissions at Telecommunication Ports

Test Date

Aug. 26, 2020

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	01, 20, 2021
☒	LISN	ENV216	R & S	101787	01, 02, 2021
☒	LISN	ESH2-Z5	R & S	100450	01, 02, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	01, 02, 2021
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 07, 2021
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 07, 2021
☐	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	03, 10, 2021
☐	CDN	CDNS502A	TESEQ	40431	01, 02, 2021

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 52,0 % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (15) of (73)

2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Aug. 26, 2020

Test Location☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10m)**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	04, 01, 2021
☒	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2020
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2021

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 52,1 % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Aug. 27, 2020

Test Location

SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	08, 05, 2021
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 20, 2021
☐	ATTENUATOR	8491A	HP	35496	03, 10, 2021
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2021

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 50,4 % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Aug. 27, 2020

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2021
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 52,0 % R.H.

Classification of Equipment for Harmonic Current Emissions

- ☒ Class A
☐ Class B
☐ Class C(Below 25 W)
☐ Class C(Above 25 W)
☐ Class D

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

- See Appendix A for test data.
- PoE port is considered to be a wired network port, so test items related to power are excluded.



2.6 Voltage Fluctuations and Flicker

Test Date

Aug. 27, 2020

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	net.control	EM TEST	2.1.4	-
☒	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2021
☒	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 22,9 °C
Relative Humidity: 52,0 % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

- See Appendix A for test data.
- PoE port is considered to be a wired network port, so test items related to power are excluded.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:
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 oeuvres 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 in 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.



3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Aug. 27, 2020

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	01, 28, 2021
☒	HCP	-	KES	-	-
☒	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 23,6 °C
Relative Humidity: 52,5 % R.H.
Atmospheric Pressure: 99,8 kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

Kind of Discharge: Air, Contact (direct and indirect)

Polarity: Positive and Negative

Number of Discharge: 10 at all locations for Air discharge
10 at all locations for Contact discharge

Discharge Voltage:	Contact	Air	HCP	VCP
	☐ 2 kV	☒ 2 kV	☐ 2 kV	☐ 2 kV
	☐ 4 kV	☒ 4 kV	☐ 4 kV	☐ 4 kV
	☒ 6 kV	☐ 6 kV	☒ 6 kV	☒ 6 kV
	☐ 8 kV	☒ 8 kV	☐ 8 kV	☐ 8 kV
	☐ 15 kV	☐ 15 kV	☐ 15 kV	☐ 15 kV

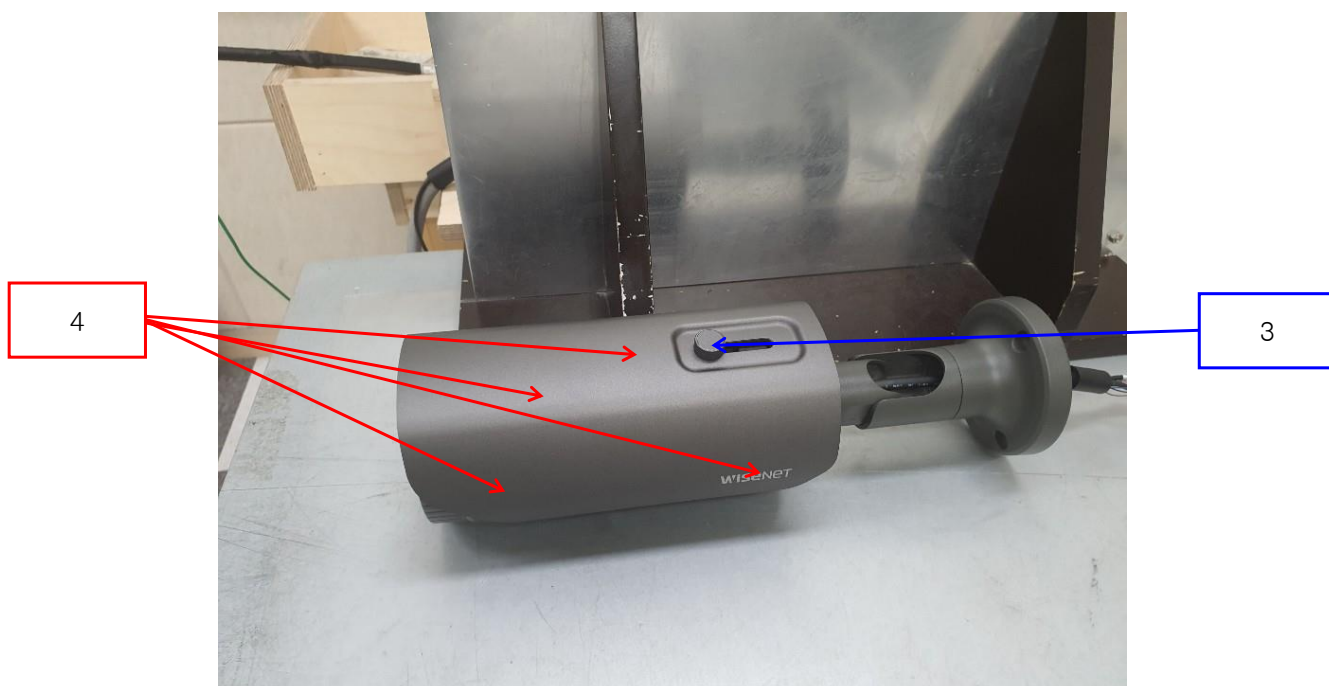
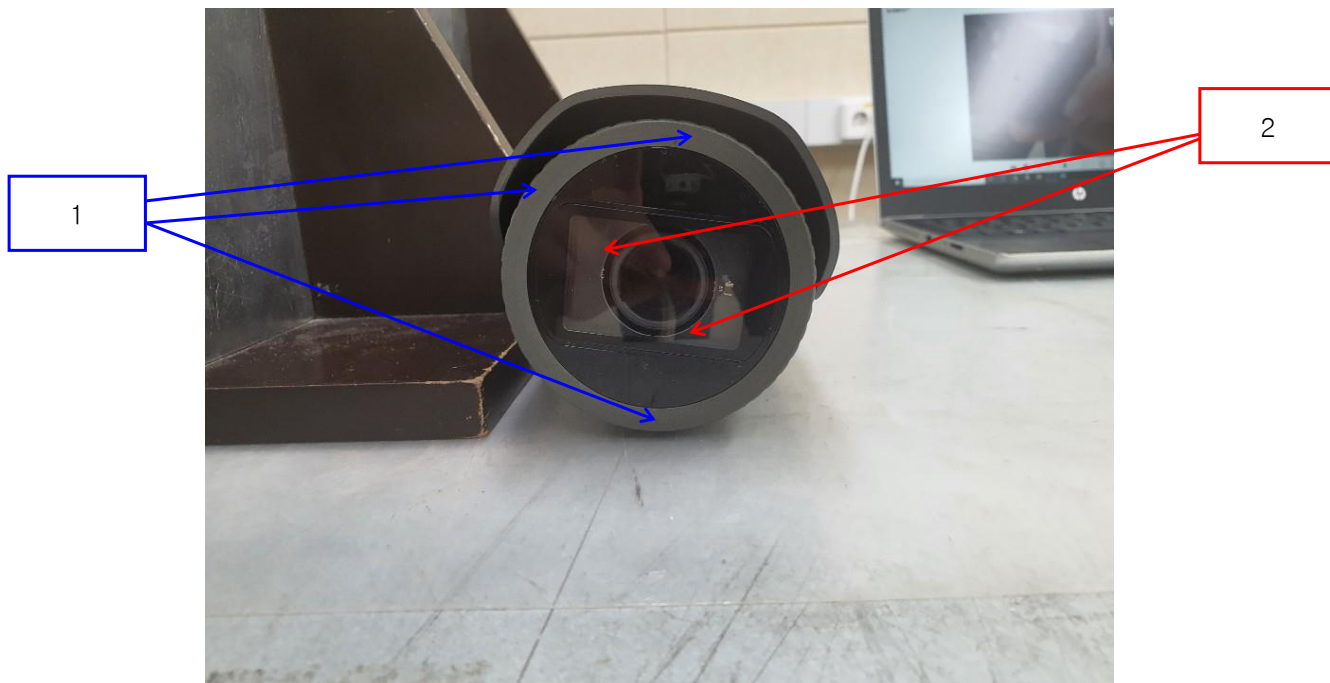
Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

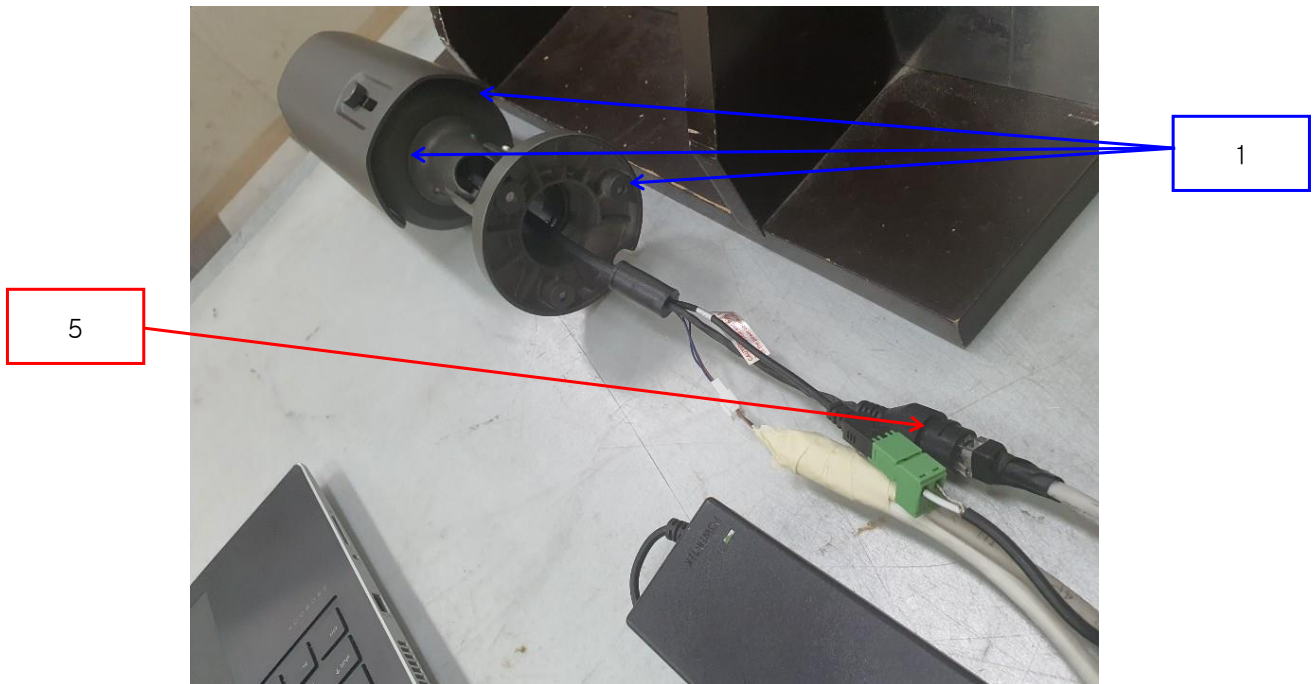
Required Performance Criteria: ☒ Complied

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Location of Discharge:

Air
Contact





**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0599-R1
Page (24) of (73)

Test Data**■ AC/DC Adapter MODE****Indirect Discharge**

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure	Contact Discharge	Complied	-
2	Lens	Air Discharge	Complied	-
3	Screw	Contact Discharge	Complied	-
4	Cover	Air Discharge	Complied	-
5	Around the port	Air Discharge	Complied	-

■ PoE Adapter MODE**Indirect Discharge**

No.	Test Point	Discharge Method	Observations	Remarks
1	HCP Contact	Contact Discharge	Complied	-
2	VCP Contact	Contact Discharge	Complied	-

Direct Discharge

No.	Test Point	Discharge Method	Observations	Remarks
1	Enclosure	Contact Discharge	Complied	-
2	Lens	Air Discharge	Complied	-
3	Screw	Contact Discharge	Complied	-
4	Cover	Air Discharge	Complied	-
5	Around the port	Air Discharge	Complied	-

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

3.2 Radiated Electric Field Immunity

Reference Standard

EN 61000-4-3:2006 +A2:2010

Test Date

Sep. 03, 2020

Test LocationEMS-RS: ☐ SEMI ANECHOIC CHAMBER #2☒ SEMI ANECHOIC CHAMBER #4**Test Equipment**

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	EMC32	R & S	9.12.00	-
☒	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 05, 2021
☒	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
☒	POWER METER	E4419B	Agilent	GB40203000	04, 20, 2021
☒	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 20, 2021
☒	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 20, 2021
☒	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 D	SCHWARZBECK	9128D038	-
☒	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	-

Test Conditions

Temperature: 23,1 °C
Relative Humidity: 52,9 % R.H.
Atmospheric Pressure: 99,6 kPa



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (26) of (73)

Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☐ 3 V/m
☒ 10 V/m

Frequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz
☒ 80 MHz to 2,7 GHz

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ Complied

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (27) of (73)

Test Data**■ AC/DC Adapter MODE**

Side Exposed	Observations	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

■ PoE Adapter MODE

Side Exposed	Observations	
	Horizontal	Vertical
Front	Complied	Complied
Right	Complied	Complied
Back	Complied	Complied
Left	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

RemarksPASS Required Performance Criteria

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Aug. 28, 2020

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2020
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020
☒	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 27, 2020

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 51,8 % R.H.
Atmospheric Pressure: 99,4 kPa

Test Specifications

Pulse Amplitude & Polarity: (AC Power Lines)	☐ ± 1.0 kV ☐ ± 4.0 kV	☒ ± 2.0 kV
Pulse Amplitude & Polarity: (Other supply / Signal Lines)	☐ ± 0.5 kV ☐ ± 2.0 kV	☒ ± 1.0 kV
Burst Period:	☒ 300 ms	☐ 2 s
Repetition Rate:	☐ 5 kHz	☒ 100 kHz
Duration of Test Voltage:	☒ ≥ 1 min	
Required Performance Criteria:	☒ Complied	

Test Data

■ AC/DC Adapter MODE

☒ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	Complied	Complied
N	Complied	Complied
PE	-	-
L – N	Complied	Complied
L – PE	-	-
N – PE	-	-
L – N – PE	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45	Complied	Complied
Alarm in	Complied	Complied
Alarm out	Complied	Complied

■ PoE Adapter MODE

☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
L	-	-
N	-	-
PE	-	-
L – N	-	-
L – PE	-	-
N – PE	-	-
L – N – PE	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
-	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45 (PoE)	Complied	Complied
Alarm in	Complied	Complied
Alarm out	Complied	Complied

Note: “Blank” = Not performed

Observations:

Complied – No degradation of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

PASS Required Performance Criteria

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (31) of (73)

3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Aug. 28, 2020

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2020
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020
☒	CDN	CNV 508N1	EM TEST	P1610176296	11, 27, 2020

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 51,8 % R.H.
Atmospheric Pressure: 99,4 kPa

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (32) of (73)

Test Specifications

AC Power Lines

Source Impedance: 12 ohm for common Mode and 2 ohm for differential Mode

Surge Amplitude :

Common Mode

☐ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

☒ 0°, 90°, 180°, 270° (input a.c. power port)

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

Other supply / Signal Lines

Source Impedance:

42 ohm for common Mode

Surge Amplitude:

Common Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 Surges

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ Complied

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (33) of (73)

Test Data☒ AC/DC Adapter MODE☒ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N	Complied	Complied

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – PE	-	-
N – PE	-	-

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45	CDN	Complied	Complied
	LINE	Complied	Complied

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (34) of (73)

■ PoE Adapter MODE☐ Line to Line – Differential Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – N	-	-

☐ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
L – PE	-	-
N – PE	-	-

Signal Lines☒ Line to Earth – Common Mode

Mode of Application	Coupling Method	Observations	
		(+) Surge (kV)	(-) Surge (kV)
RJ-45 (PoE)	CDN	Complied	Complied
	LINE	Complied	Complied

Note: "Blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria
☐ NOT APPLICABLE

RemarksPASS Required Performance Criteria

3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Sep. 01, 2020

Test Location

EMS-CS: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	icd.control	EM TEST	5.3.7	-
☒	CONTINUOUS WAVE SIMULATOR	CWS 500N1	EM TEST	V0936105119	08, 05, 2021
☒	ATTENUATOR	ATT6	EM TEST	1208-34	08, 05, 2021
☒	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 05, 2021
☒	CDN	CDN T8RJ45	EM TEST	0909-09	08, 05, 2021
☒	EM INJECTION CLAMP	EM 101	Liithi	35943	08, 06, 2021

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 53,8 % R.H.
Atmospheric Pressure: 99,4 kPa

Test Specifications

Frequency range: ☒ 150 kHz to 100 MHz ☐ 150 kHz to 80 MHz

Voltage Level: ☐ 1 Vrms ☐ 3 Vrms
☒ 10 Vrms

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☐ 1 s ☒ 3 s

Required Performance Criteria: ☒ Complied

Test Data

■ AC/DC Adapter MODE

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
L - N	CDN	Complied

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45	CDN	Complied
Alarm in	Clamp	Complied
Alarm out	Clamp	Complied

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (37) of (73)

■ PoE Adapter MODE☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Observations
-	-	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45 (PoE)	CDN	Complied
Alarm in	Clamp	Complied
Alarm out	Clamp	Complied

Notes: CDN = Coupling Decoupling Network
"blank" = Not performed

Observations:

Complied – No degradation of function

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

RemarksPASS Required Performance Criteria

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (38) of (73)

3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Aug. 28, 2020

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMS Test S/W	iec.control	EM TEST	5.4.7	-
☒	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2020
☒	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2020

Test Conditions

Temperature: 23,3 °C
Relative Humidity: 51,8 % R.H.
Atmospheric Pressure: 99,4 kPa

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0599-R1
Page (39) of (73)

Test Specifications & Observations/Remarks

■ AC/DC Adapter MODE

- Voltage Dips and Short Interruptions

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
☒ 20 % dip	☒ 250 / 5 000	<u>Complied</u>
☒ 30 % dip	☒ 25 / 500	<u>Complied</u>
☒ 60 % dip	☒ 10 / 200	<u>Complied</u>
☒ 100 % dip	☒ 250 / 5 000	<u>Degradation</u>

- Voltage variations

☒ Unom + 10 %	☒ 253.0 V (ac)	<u>Complied</u>
☒ Unom - 15 %	☒ 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

Degradation - See "Remarks "

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria
☐ NOT APPLICABLE

Remarks

- PoE port is considered to be a wired network port, so test items related to power are excluded.

- During the test(100%, 250cycle), EUT was turned off but after the test, it was recovered by no operator's intervention.

APPENDIX A – TEST DATA

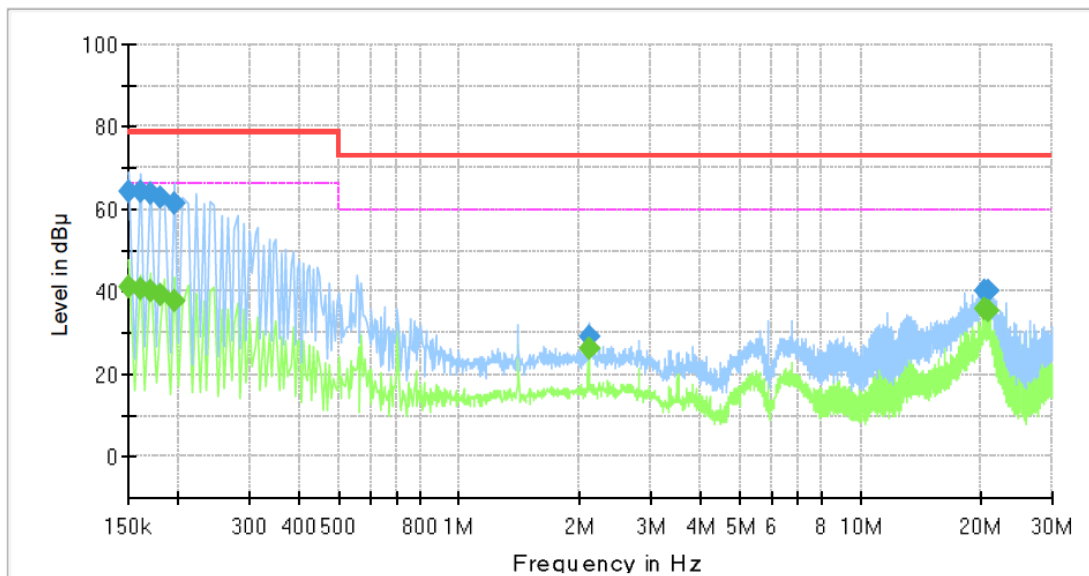
Conducted Emissions at Mains Power Ports

■ AC/DC Adapter MODE

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	QNO-8081R/KME
Phase:	L1
Mode:	DC
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	64.50	---	79.00	14.50	1000.0	9.000	L1	19.5
0.150000	---	41.04	66.00	24.96	1000.0	9.000	L1	19.5
0.160000	---	40.60	66.00	25.40	1000.0	9.000	L1	19.5
0.160000	64.39	---	79.00	14.61	1000.0	9.000	L1	19.5
0.170000	63.76	---	79.00	15.24	1000.0	9.000	L1	19.5
0.170000	---	40.09	66.00	25.91	1000.0	9.000	L1	19.5
0.180000	---	39.25	66.00	26.75	1000.0	9.000	L1	19.5
0.180000	62.82	---	79.00	16.18	1000.0	9.000	L1	19.5
0.195000	---	37.85	66.00	28.15	1000.0	9.000	L1	19.5
0.195000	61.49	---	79.00	17.51	1000.0	9.000	L1	19.5
2.100000	28.84	---	73.00	44.16	1000.0	9.000	L1	20.2
2.100000	---	26.37	60.00	33.63	1000.0	9.000	L1	20.2
20.260000	40.14	---	73.00	32.86	1000.0	9.000	L1	20.2
20.260000	---	35.65	60.00	24.35	1000.0	9.000	L1	20.2
20.810000	---	35.15	60.00	24.85	1000.0	9.000	L1	20.2
20.810000	40.03	---	73.00	32.97	1000.0	9.000	L1	20.2

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

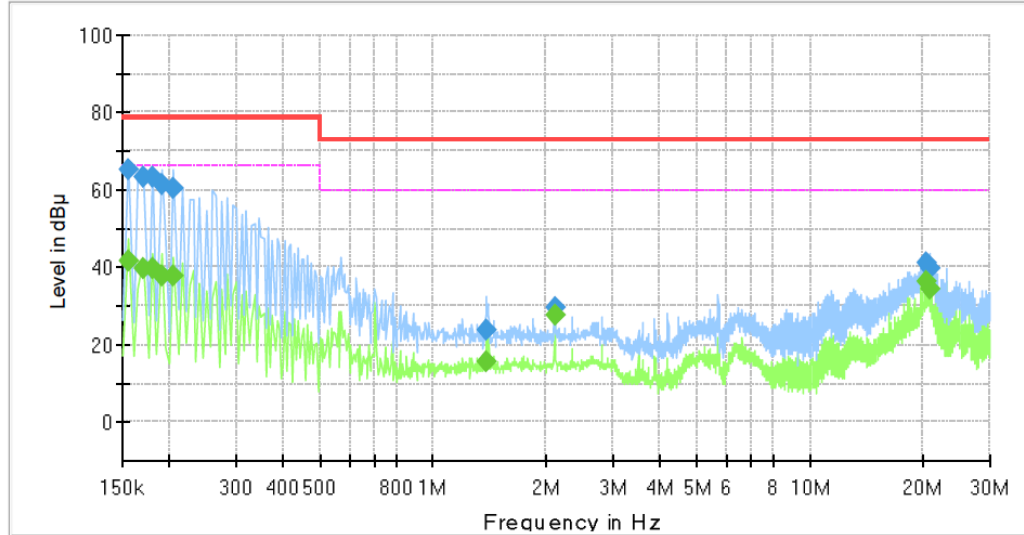
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	QNO-8081R/KME
Phase:	N
Mode:	DC
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	65.19	---	79.00	13.81	1000.0	9.000	N	19.4
0.155000	---	41.81	66.00	24.19	1000.0	9.000	N	19.4
0.170000	---	39.48	66.00	26.52	1000.0	9.000	N	19.5
0.170000	63.33	---	79.00	15.67	1000.0	9.000	N	19.5
0.180000	---	39.91	66.00	26.09	1000.0	9.000	N	19.5
0.180000	63.11	---	79.00	15.89	1000.0	9.000	N	19.5
0.190000	61.23	---	79.00	17.77	1000.0	9.000	N	19.5
0.190000	---	37.86	66.00	28.14	1000.0	9.000	N	19.5
0.205000	60.62	---	79.00	18.38	1000.0	9.000	N	19.5
0.205000	---	37.68	66.00	28.32	1000.0	9.000	N	19.5
1.385000	23.88	---	73.00	49.12	1000.0	9.000	N	20.2
1.385000	---	15.65	60.00	44.35	1000.0	9.000	N	20.2
2.105000	29.68	---	73.00	43.32	1000.0	9.000	N	20.2
2.105000	---	27.49	60.00	32.51	1000.0	9.000	N	20.2
20.260000	---	36.32	60.00	23.68	1000.0	9.000	N	20.3
20.260000	41.05	---	73.00	31.95	1000.0	9.000	N	20.3
20.870000	---	34.53	60.00	25.47	1000.0	9.000	N	20.3
20.870000	39.82	---	73.00	33.18	1000.0	9.000	N	20.3

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

Conducted Emissions at Telecommunication Ports

■ AC/DC Adapter MODE

[100 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

QNO-8081R/KME

Mode :

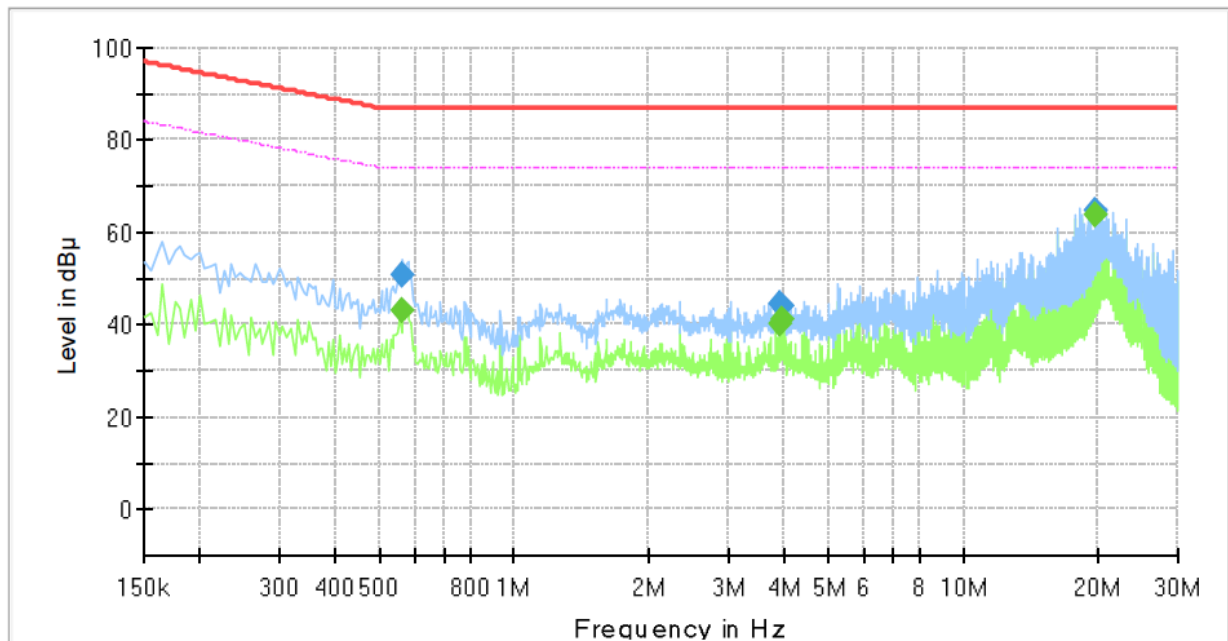
DC

Speed :

100 Mbps

Operator Name:

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.565000	---	42.85	74.00	31.15	1000.0	9.000	Single Line	19.8
0.565000	50.87	---	87.00	36.13	1000.0	9.000	Single Line	19.8
3.890000	---	40.40	74.00	33.60	1000.0	9.000	Single Line	19.6
3.890000	44.64	---	87.00	42.36	1000.0	9.000	Single Line	19.6
3.955000	---	41.09	74.00	32.91	1000.0	9.000	Single Line	19.6
3.955000	44.17	---	87.00	42.83	1000.0	9.000	Single Line	19.6
19.710000	---	63.92	74.00	10.08	1000.0	9.000	Single Line	20.1
19.710000	64.98	---	87.00	22.02	1000.0	9.000	Single Line	20.1

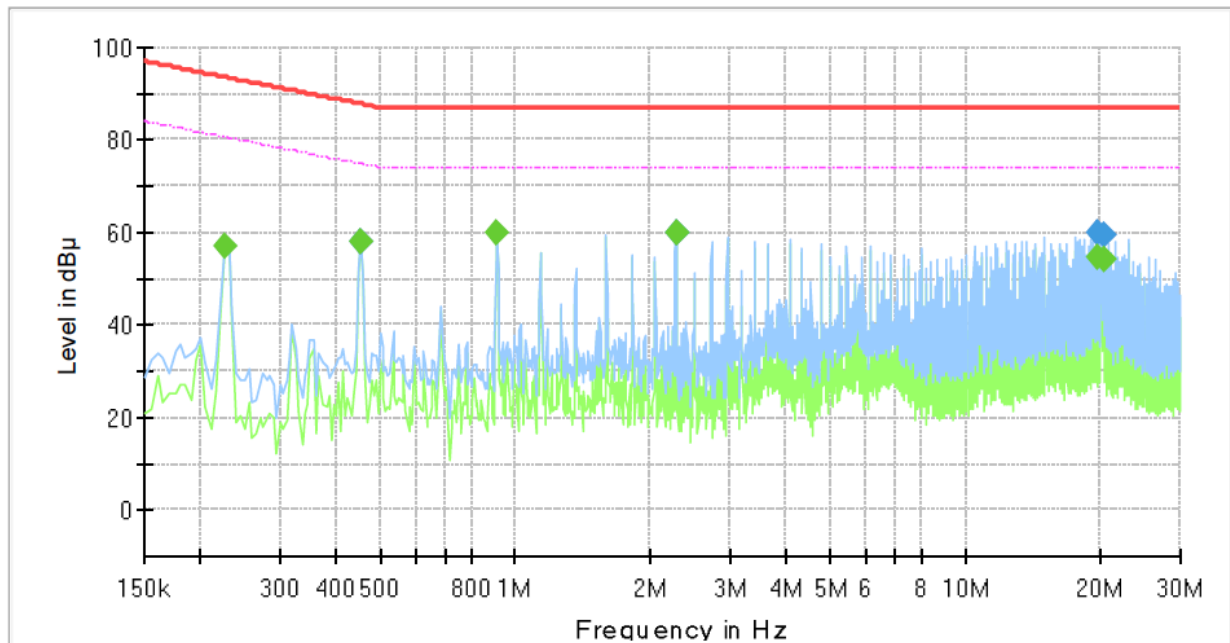
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr

■ PoE Adapter MODE
[100 Mbps]
Common Information

Test Description:	Telecommunication Emission
Model No.:	QNO-8081R/KME
Mode :	PoE
Speed :	100 Mbps
Operator Name:	KES


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.225000	---	57.07	80.63	23.56	1000.0	9.000	Single Line	19.7
0.455000	58.10	---	87.78	29.68	1000.0	9.000	Single Line	19.7
0.455000	---	58.10	74.78	16.68	1000.0	9.000	Single Line	19.7
0.910000	---	59.93	74.00	14.07	1000.0	9.000	Single Line	20.0
2.275000	---	59.80	74.00	14.20	1000.0	9.000	Single Line	20.0
2.275000	60.08	---	87.00	26.92	1000.0	9.000	Single Line	20.0
19.710000	59.98	---	87.00	27.02	1000.0	9.000	Single Line	20.1
19.710000	---	54.49	74.00	19.51	1000.0	9.000	Single Line	20.1
20.260000	---	54.20	74.00	19.80	1000.0	9.000	Single Line	20.1
20.260000	59.37	---	87.00	27.63	1000.0	9.000	Single Line	20.1

◆ Calculation

$$\text{QuasiPeak [dBuV]} / \text{CAverage [dBuV]} = \text{Reading Value [dBuV]} + \text{Corr. [dB]}$$

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

The authenticity of the test report, contact kes@kes.co.kr



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

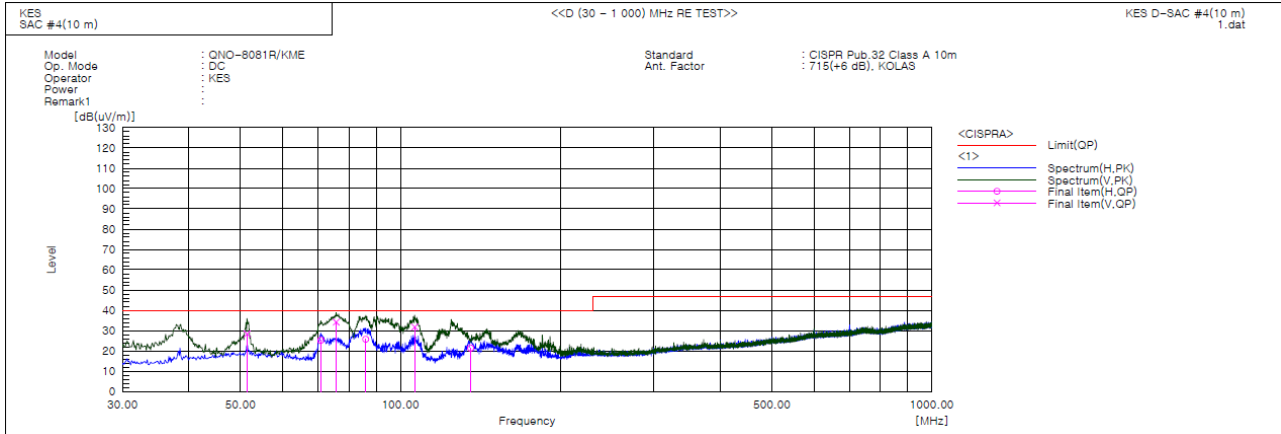
Report No.:

KES-EM-20T0599-R1

Page (44) of (73)

Radiated Electric Field Emissions(Below 1 GHz)

■ AC/DC Adapter MODE



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]	Remark
1	51.461	V	49.8	-21.4	28.4	40.0	11.6	107.0	300.0	
2	70.861	H	50.6	-25.4	25.2	40.0	14.8	275.0	219.0	
3	75.711	V	61.2	-27.0	34.2	40.0	5.8	103.0	342.0	
4	86.018	H	51.7	-26.0	25.7	40.0	14.3	394.0	143.0	
5	106.388	V	54.4	-22.6	31.8	40.0	8.2	111.0	281.0	
6	135.609	H	47.5	-26.1	21.4	40.0	18.6	389.0	14.0	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



KES Co., Ltd.

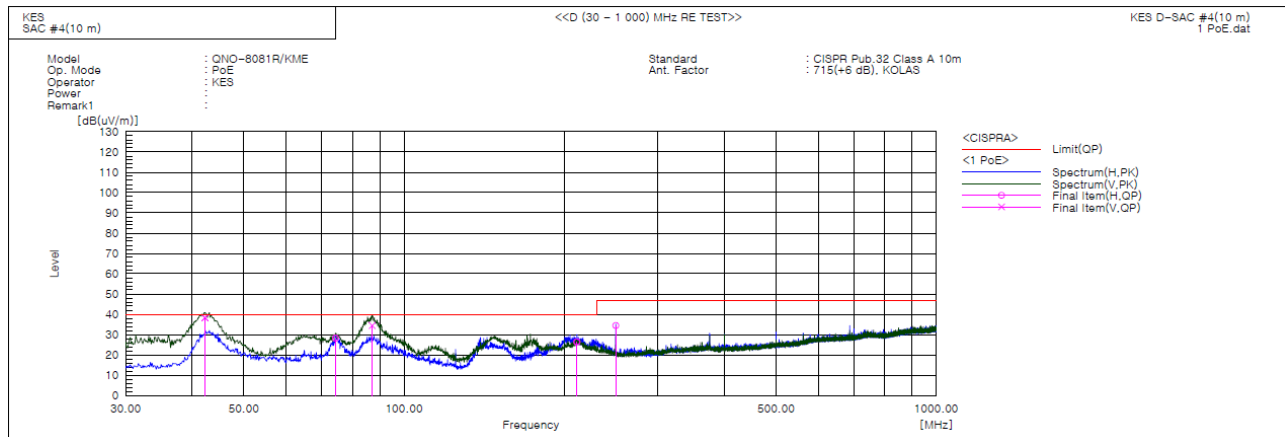
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (45) of (73)

■ PoE Adapter MODE



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]	Remark
1	42.246	V	60.5	-22.2	38.3	40.0	1.7	102.0	70.0	
2	74.378	H	54.8	-26.6	28.2	40.0	11.8	395.0	213.0	
3	87.109	V	60.1	-25.6	34.5	40.0	5.5	155.0	120.0	
4	211.148	H	47.5	-21.1	26.4	40.0	13.6	389.0	301.0	
5	249.948	H	54.5	-20.0	34.5	47.0	12.5	398.0	267.0	

◆ Calculation – SEMI ANECHOIC CHAMBER #4(10 m)

Result(QP) [dB(μ V/m)] = (Reading(QP)[dB(μ V)] + c.f[dB(1/m)]

Margin(QP)[dB] = Limit[dB(μ V/m)] - Result(QP) [dB(μ V/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



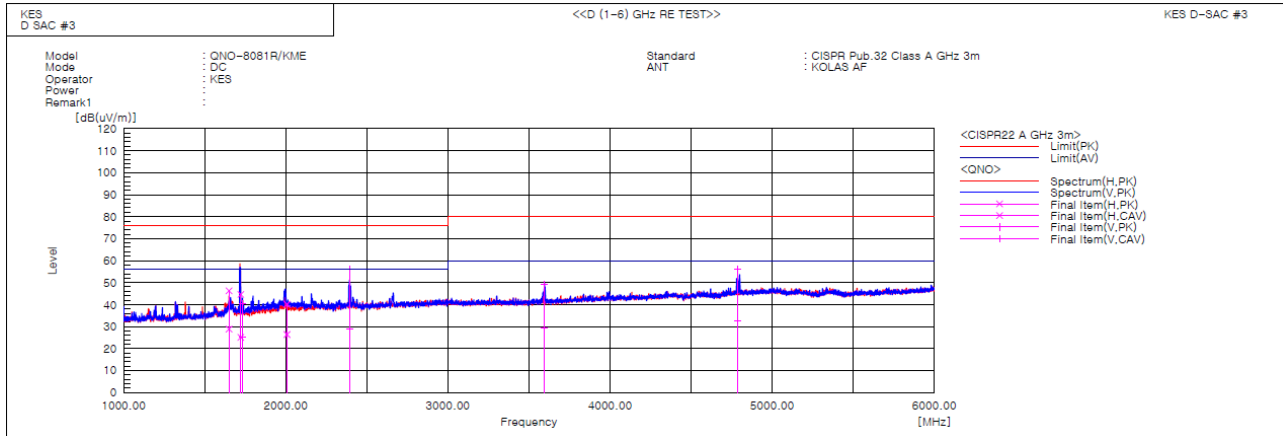
KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:
KES-EM-20T0599-R1
Page (46) of (73)

Radiated Electric Field Emissions(Above 1 GHz)

■ AC/DC Adapter MODE



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1649.780	H	51.5	34.1	-5.3	46.2	28.8	76.0	56.0	29.8	27.2	100.0	340.9	
2	1734.257	V	44.9	29.4	-4.4	40.5	25.0	76.0	56.0	35.5	31.0	100.0	354.9	
3	1721.519	H	49.1	29.6	-4.5	44.6	25.1	76.0	56.0	31.4	30.9	100.0	328.3	
4	2007.217	H	42.4	28.6	-2.2	40.2	26.4	76.0	56.0	35.8	29.6	100.0	333.8	
5	2396.779	V	56.8	29.6	-0.7	56.1	28.9	76.0	56.0	19.9	27.1	100.0	156.9	
6	3594.360	V	46.7	26.9	2.6	49.3	29.5	80.0	60.0	30.7	30.5	100.0	147.9	
7	4787.362	V	48.7	25.2	7.4	56.1	32.6	80.0	60.0	23.9	27.4	100.0	6.6	

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



KES Co., Ltd.

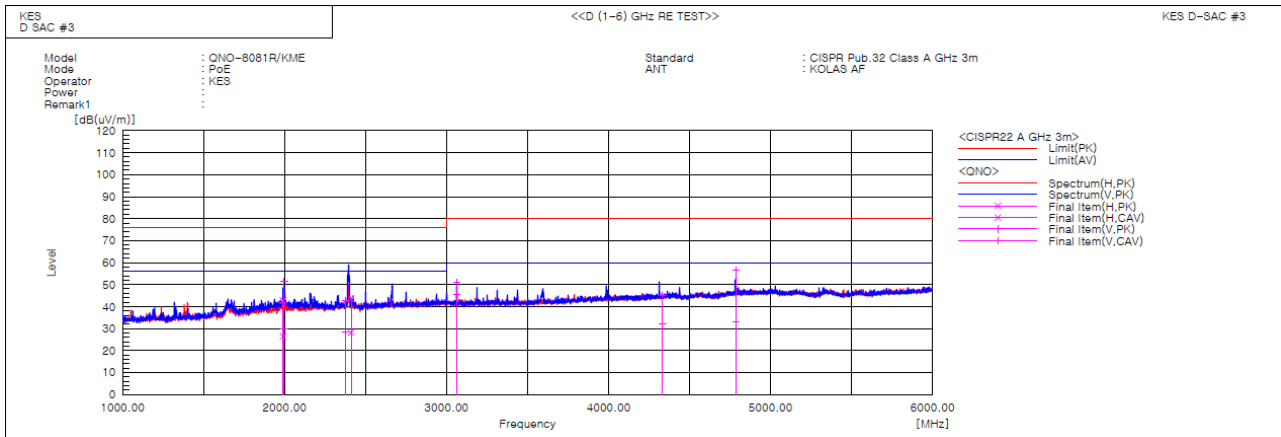
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (47) of (73)

■ PoE Adapter MODE



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1989.480	H	45.0	28.8	-2.3	42.7	26.5	76.0	56.0	33.3	29.5	101.0	159.4	
2	1997.730	V	54.0	32.2	-2.3	51.7	29.9	76.0	56.0	24.3	26.1	101.0	247.9	
3	2376.364	V	43.4	29.2	-0.7	42.7	28.5	76.0	56.0	33.3	27.5	101.0	178.8	
4	2409.887	H	44.2	28.8	-0.6	43.6	28.2	76.0	56.0	32.4	27.8	101.0	351.6	
5	3062.360	V	49.2	43.9	1.6	50.8	45.5	80.0	60.0	29.2	14.5	101.0	212.1	
6	4333.136	V	39.4	26.2	5.7	45.1	31.9	80.0	60.0	34.9	28.1	101.0	201.9	
7	4785.170	V	49.3	25.8	7.4	56.7	33.2	80.0	60.0	23.3	26.8	101.0	10.8	

◆ Calculation

Result(PK/CAV) [dB(μ V/m)] = (Reading(PK/CAV)[dB(μ V)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB(μ V/m)] - Result(PK/CAV) [dB(μ V/m)]

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr



Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ AC/DC Adapter MODE

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.027			
2	0.002	0.146	1.080	n/a
3	0.019	0.819	2.300	PASS
4	0.002	0.446	0.430	n/a
5	0.019	1.651	1.140	PASS
6	0.001	0.456	0.300	n/a
7	0.019	2.425	0.770	PASS
8	0.001	0.545	0.230	n/a
9	0.018	4.391	0.400	PASS
10	0.001	0.748	0.184	n/a
11	0.017	5.048	0.330	PASS
12	0.001	0.782	0.153	n/a
13	0.016	7.505	0.210	PASS
14	0.001	0.835	0.131	n/a
15	0.015	9.765	0.150	PASS
16	0.001	0.830	0.115	n/a
17	0.014	10.336	0.132	PASS
18	0.001	0.849	0.102	n/a
19	0.012	10.513	0.118	PASS
20	0.001	0.922	0.092	n/a
21	0.011	6.916	0.161	PASS
22	0.001	0.840	0.084	n/a
23	0.010	6.867	0.147	PASS
24	0.001	0.956	0.077	n/a
25	0.009	6.498	0.135	PASS
26	0.001	0.901	0.071	n/a
27	0.008	6.026	0.125	PASS
28	0.001	0.951	0.066	n/a
29	0.006	5.506	0.116	PASS
30	0.001	0.999	0.061	n/a
31	0.005	4.739	0.109	PASS
32	0.001	1.034	0.058	n/a
33	0.004	4.064	0.102	n/a
34	0.001	1.221	0.054	n/a
35	0.003	3.210	0.096	n/a
36	0.001	1.203	0.051	n/a
37	0.002	2.383	0.091	n/a
38	0.001	1.271	0.048	n/a
39	0.002	1.777	0.087	n/a
40	0.001	1.372	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.



Test Data - Harmonics (continued)

Maximum harmonic current results				
Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.027			
2	0.002	0.152	1.620	n/a
3	0.020	0.579	3.450	PASS
4	0.003	0.400	0.645	n/a
5	0.019	1.110	1.710	PASS
6	0.002	0.541	0.450	n/a
7	0.019	1.651	1.155	PASS
8	0.002	0.551	0.345	n/a
9	0.018	2.967	0.600	PASS
10	0.002	0.604	0.276	n/a
11	0.017	3.426	0.495	PASS
12	0.001	0.626	0.230	n/a
13	0.016	5.099	0.315	PASS
14	0.001	0.677	0.197	n/a
15	0.015	6.670	0.225	PASS
16	0.001	0.656	0.173	n/a
17	0.014	6.968	0.199	PASS
18	0.001	0.682	0.153	n/a
19	0.013	7.112	0.178	PASS
20	0.001	0.734	0.138	n/a
21	0.011	6.989	0.161	PASS
22	0.001	0.651	0.125	n/a
23	0.010	6.961	0.147	PASS
24	0.001	0.715	0.115	n/a
25	0.009	6.613	0.135	PASS
26	0.001	0.685	0.106	n/a
27	0.008	6.175	0.125	PASS
28	0.001	0.713	0.099	n/a
29	0.007	5.665	0.116	PASS
30	0.001	0.765	0.092	n/a
31	0.005	4.895	0.109	PASS
32	0.001	0.787	0.086	n/a
33	0.004	4.201	0.102	n/a
34	0.001	0.919	0.081	n/a
35	0.003	3.298	0.096	n/a
36	0.001	0.898	0.077	n/a
37	0.002	2.508	0.091	n/a
38	0.001	0.937	0.073	n/a
39	0.002	1.960	0.087	n/a
40	0.001	1.040	0.069	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

**KES Co., Ltd.**

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-EM-20T0599-R1

Page (50) of (73)

Test Data - Voltage Fluctuations

Maximum Flicker results

■ AC/DC Adapter MODE

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ AC/DC Adapter MODE



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Conducted Emissions at Telecommunication Ports

■ AC/DC Adapter MODE

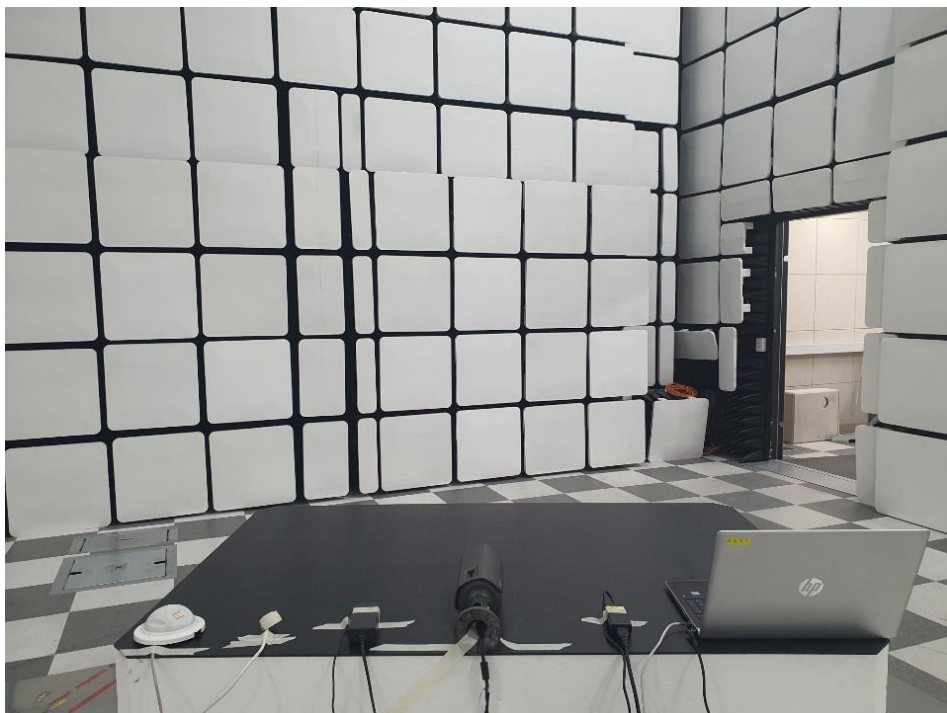


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

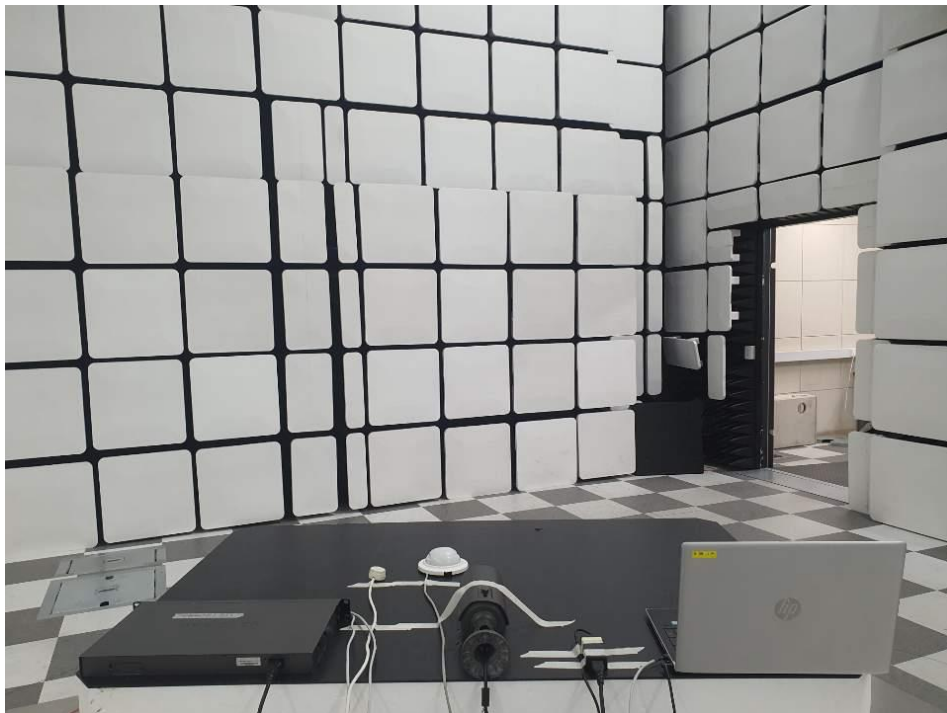
■ PoE Adapter MODE

Radiated Electric Field Emissions(Below 1 GHz)

■ AC/DC Adapter MODE



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

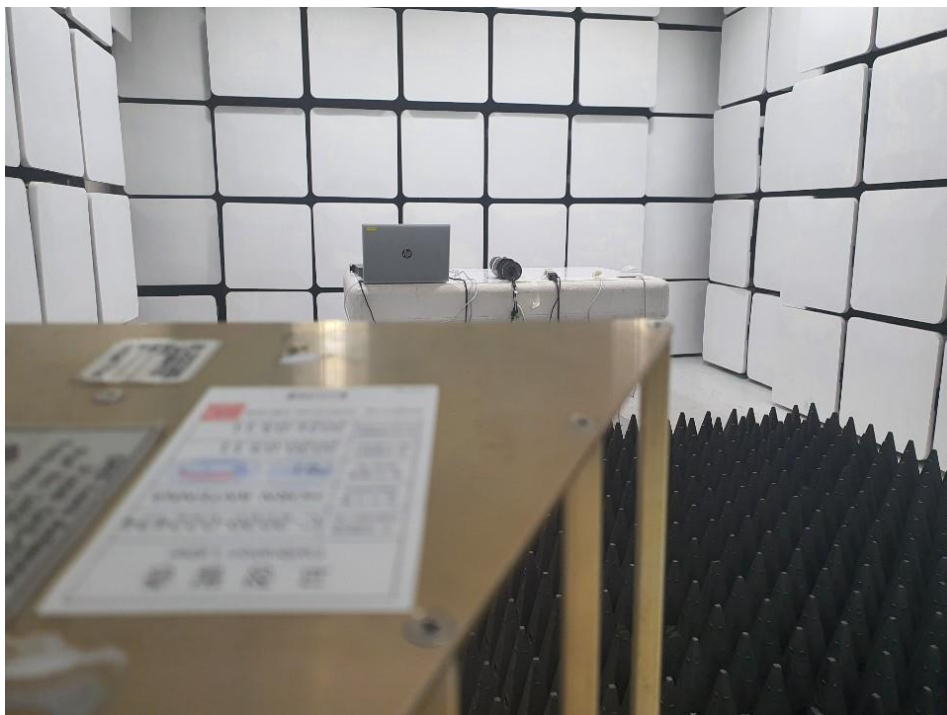
■ PoE Adapter MODE

Radiated Electric Field Emissions(Above 1 GHz)

■ AC/DC Adapter MODE



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

■ PoE Adapter MODE

Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ AC/DC Adapter MODE



Electrostatic Discharge

■ AC/DC Adapter MODE



■ PoE Adapter MODE



Radiated Electric Field Immunity

■ AC/DC Adapter MODE



■ PoE Adapter MODE



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Electrical Fast Transients/Bursts

■ AC/DC Adapter MODE



■ PoE Adapter MODE



Surge Transients

■ AC/DC Adapter MODE



■ PoE Adapter MODE



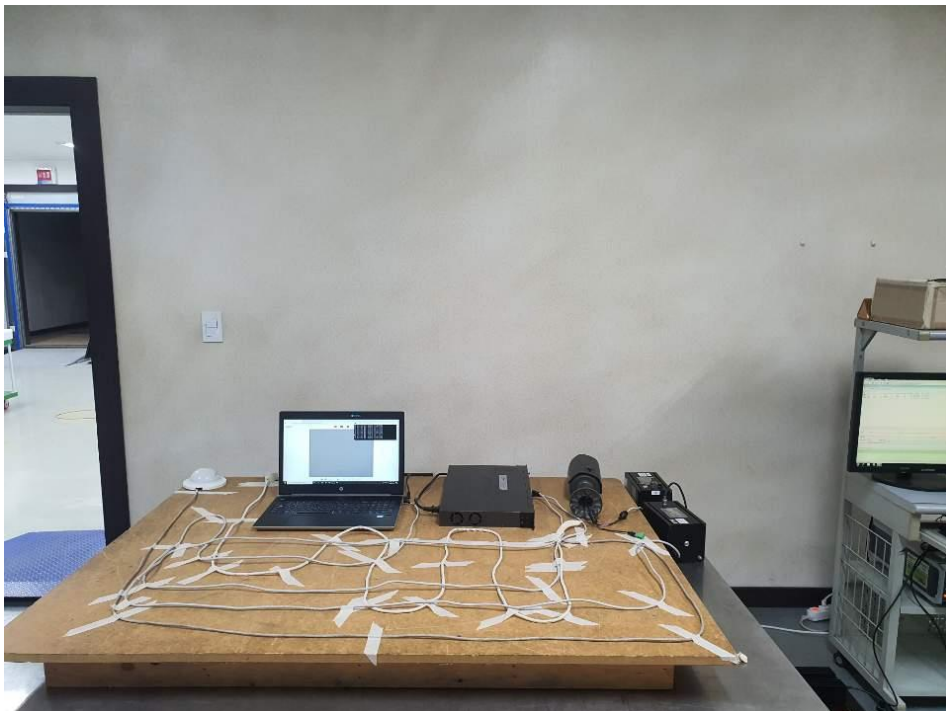
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Conducted Disturbance

■ AC/DC Adapter MODE



■ PoE Adapter MODE



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Voltage Dips and Short Interruptions

■ AC/DC Adapter MODE



EUT External Photographs

(Top)



(Bottom)



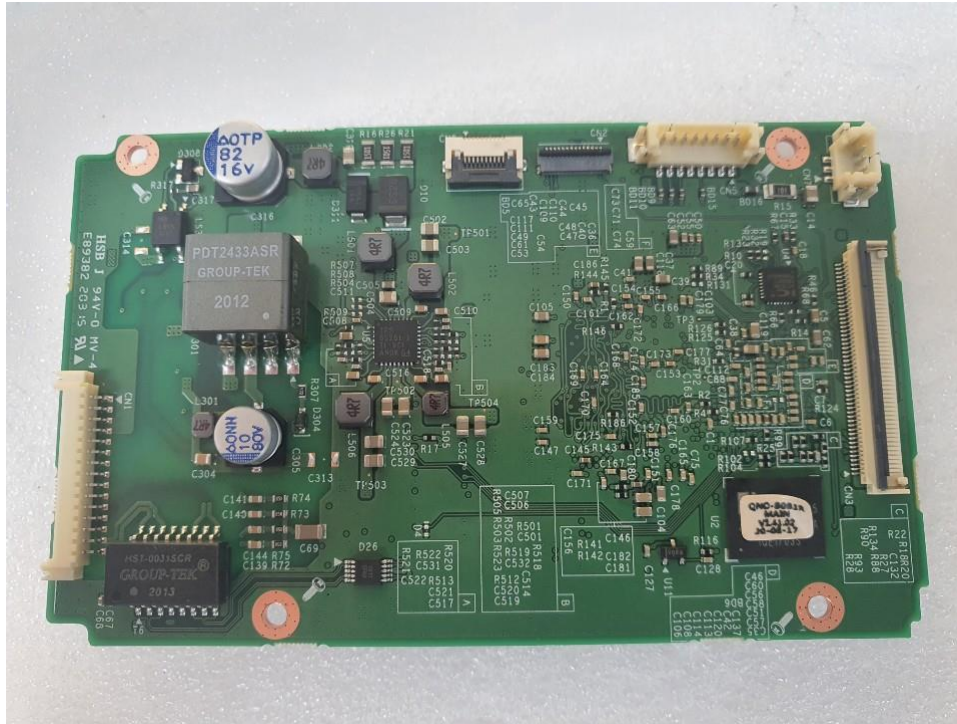
EUT Internal Photographs

(Internal View)

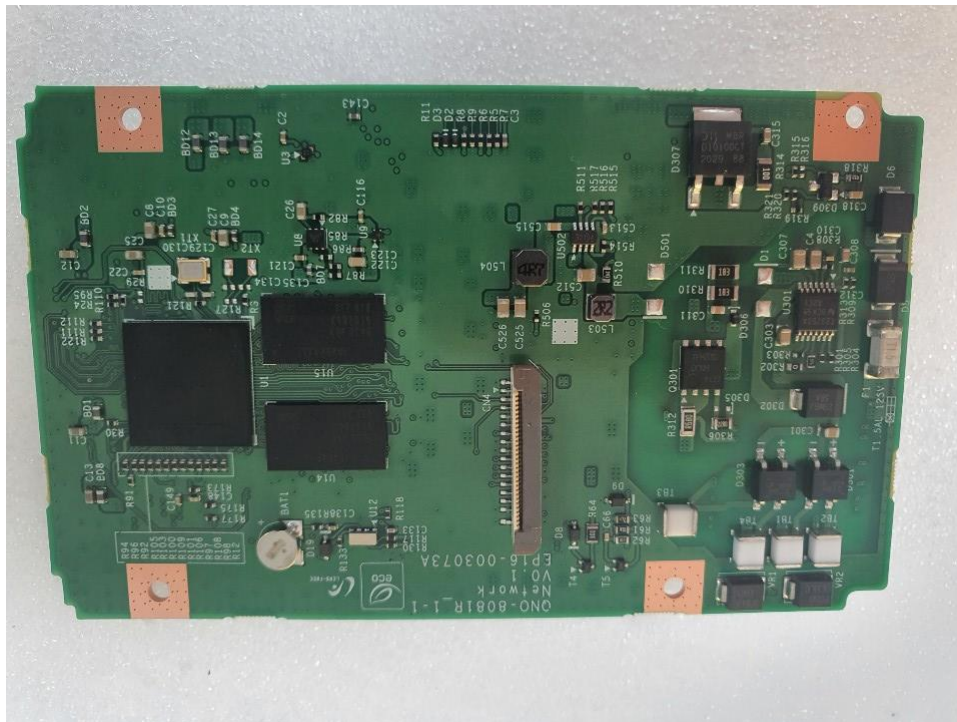


EUT Internal View – Main Board

(Top)



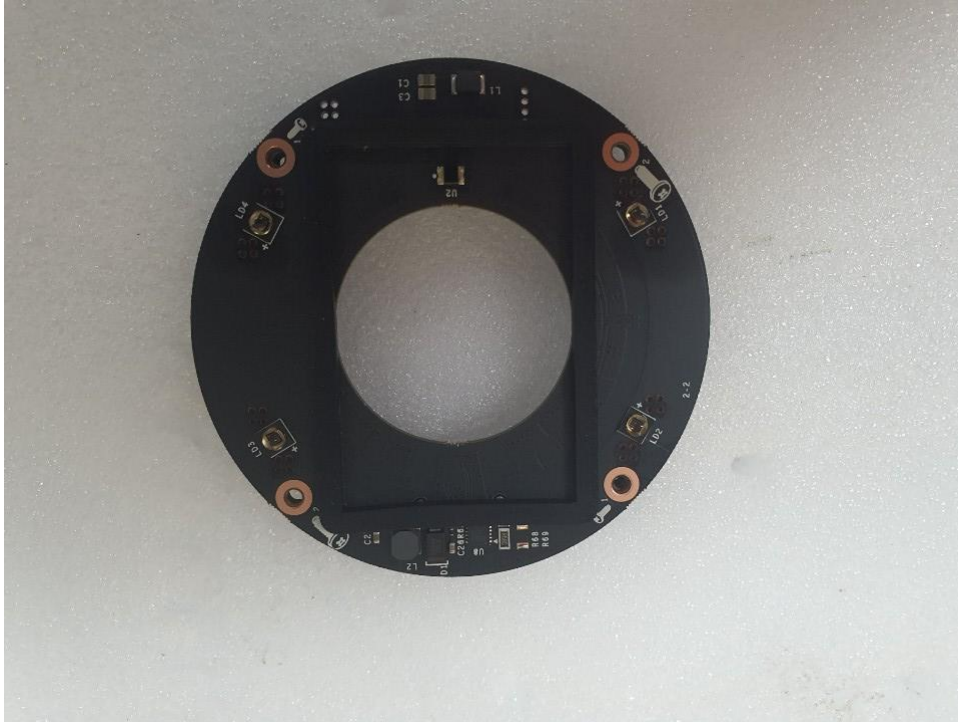
(Bottom)



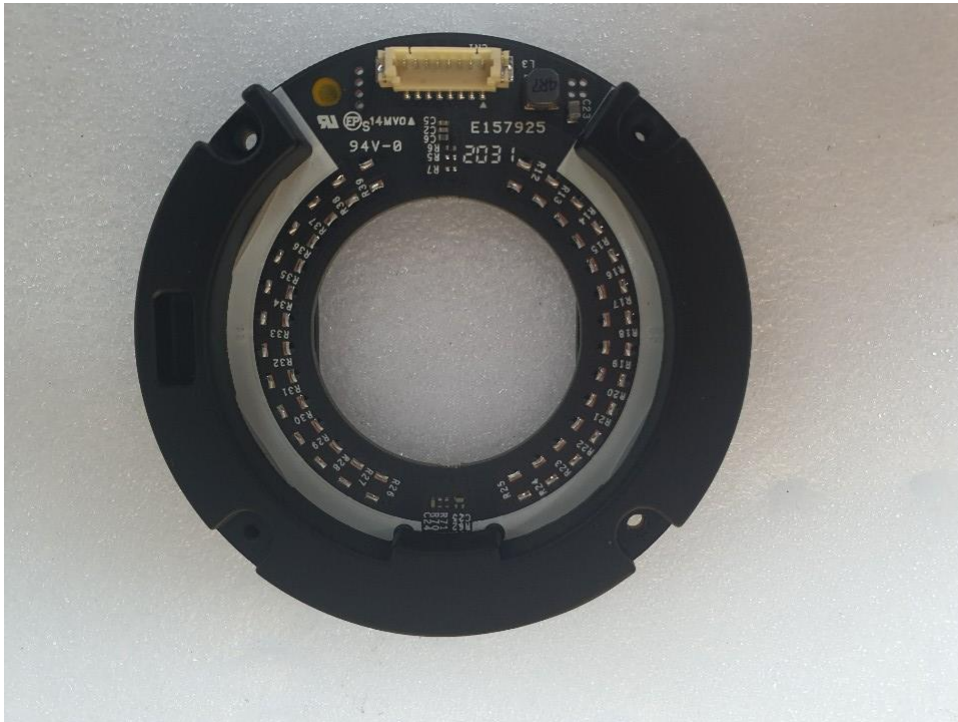
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – SUB Board 1

(Top)



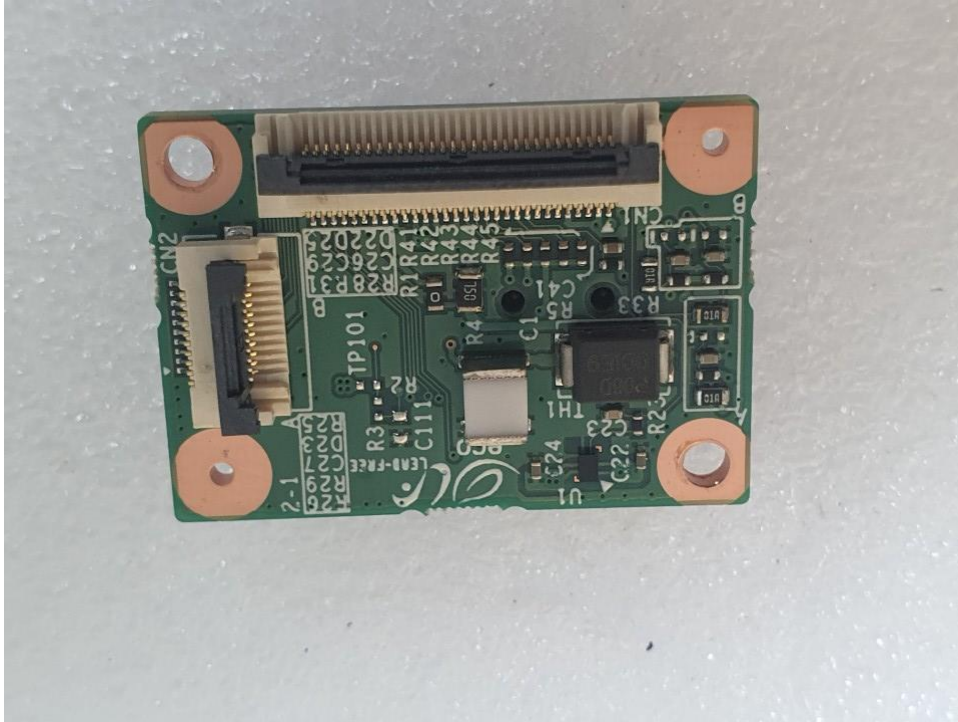
(Bottom)



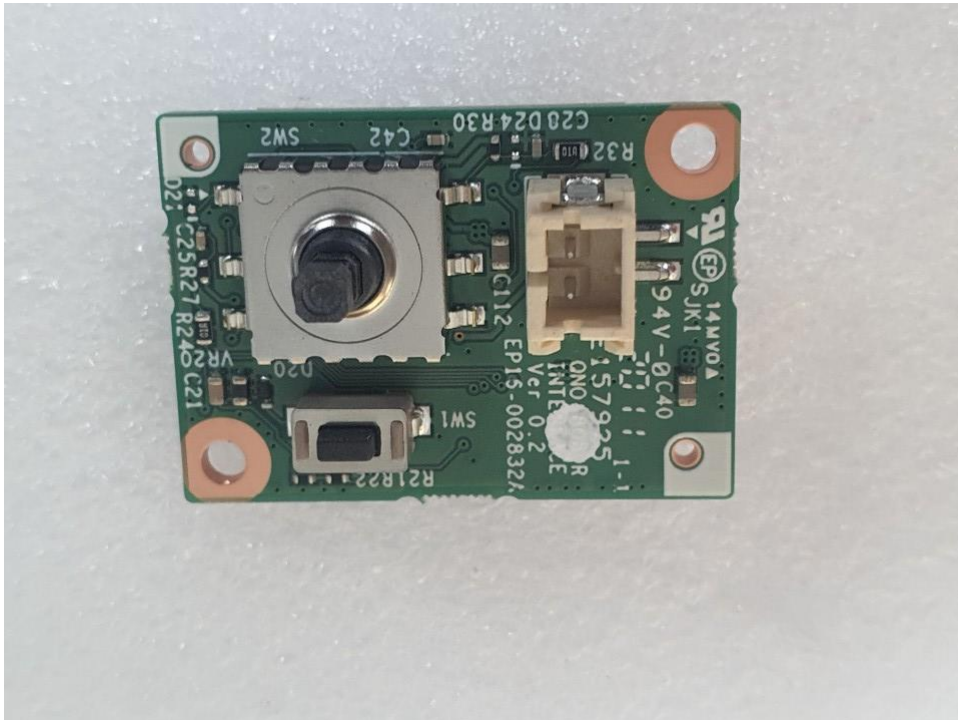
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – SUB Board 2

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – SUB Board 3

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – SUB Board 4

(Top)



(Bottom)



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

Label and Location



NETWORK CAMERA

Model No : QNO-8081R/KME

Manufacturer : HANWHA VISION VIETNAM COMPANY LIMITED

Made in Vietnam

