

EMC TEST REPORT For CE

Test Report No. : KES-E1-17T0749-R2

Date of Issue : Aug. 12, 2019

Product name : THERMAL CAMERA

Model/Type No. : TNO-4050T

Variant Model : TNO-4040T, TNO-4030T

Applicant : Hanwha Techwin Co., Ltd.

Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA

Manufacturer : 1. HANWHA TECHWIN(TIANJIN) CO., LTD
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
3. D-TECH CO.,LTD.

Manufacturer Address : 1. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
2. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
3. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do,
Korea (Suwon Industrial Complex)

Date of Receipt : Oct. 26, 2017

Test date : Nov. 05, 2017 ~ Nov. 08, 2017

Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by



Dae Hyun, Kim
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.

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 15, 2017	KES-E1-17T0749	Issued
Jun. 26, 2018	KES-E1-17T0749-R1	Re-issue due to manufacturer change
Aug. 12, 2019	KES-E1-17T0749-R2	Re-issue due to Applicant Address change

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1.0 General Product Description

Main Specifications of E.U.T are:

Video	
Imaging Device	Uncooled Micro volometer
Pixel size	17μm
Effective Pixels	640x480(Scale up 800x600)
Sensitivity	NETD < 50mK
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation USB : Micro USB type B, 1280x720, for installation
Lens	
Focal Length (Zoom Ratio)	35mm fixed
Max. Aperture Ratio	1.0
Angular Field of View	H: 17°
Min. Object Distance	TBD
Focus Control	Fixed
Lens Type	TBD
Mount Type	Board-in type
Operational	
Camera Title	Off / On - WWW : English/Numeric/Special Characters - China : English/Numeric/Special/Chinese Characters - Common : Multi-line (Max 5), Color (Grey/Green/Red/Blue/Black/White), Transparency, Auto Scale by Resolution
Digital Image Stabilization	Off / On(with Gyro)
Motion Detection	Off/ On(8ea, 8point Polygonal zones), Handover
Privacy Masking	Off / On (32ea, polygonal zones) - Color : Grey/Green/Red/Blue/Black/White - Mosaic
Gain Control	Off / Low / Middle / High
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2 ~ 1/12,000sec)
Pan/Tilt	Pelco D/P, Samsung T/E, Honeywell, Bosch, Panasonic, Sungin, AD, Vicon, GE
Flip / Mirror	Flip : On/Off Mirror : On/Off Hallway view : 90°/270°
Video & Audio Analytics	Tampering, Loitering, Directional Detection, Virtual Line, Fence detection, Enter/Exit, Appear / Disappear, Audio Detection, Motion Detection, Sound Classification, Shock detection, drastic temperature swings
Alarm I/O	Input 2ea / Output 2ea
Alarm Triggers	Alarm Input, Motion Detection, Video & Audio Analytics, Network Disconnect
Alarm events	File upload via FTP, E-Mail Notification via E-Mail local storage(SD/SDHC/SDXC) or NAS recording at Event Triggers External output
Audio In	Selectable (Mic IN/Line IN), Supply voltage: 2.5VDC(4mA), Input impedance: approx. 2K Ohm
Audio out	Line out, Max output level: 1 Vrms
Pixel count	support
Digital zoom	-
Remote control	-
Network	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression Format	H.265/H.264 (MPEG-4 Part 10/AVC) : Main/Baseline/High , Motion JPEG
Resolution	800x600, 640x480, 640x360, 320x240
Max. Framerate	H.265/H.264 : Max. 30fps at all resolutions Motion JPEG : Max. 30fps
Smart Codec	Manual Mode (area-based : 5EA)
WiseStream II	Support
Video Quality Adjustment	H.264/H.265 : Target Bitrate Level Control MJPEG : Target Bitrate Level Control
Bitrate Control Method	H.264/H.265 : CBR or VBR MJPEG : VBR
Streaming Capability	Multiple Streaming (Up to 10 Profiles) G.711 u-law / G.726 Selectable G.726 (ADPCM) 8KHz, G.711 8KHz G.726 : 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC : 48Kbps at 8/16/32/48KHz
Audio Compression Format	Bi-directional (2-Way)
Audio Communication	Bi-directional (2-Way)
IP	IPv4, IPv6
Protocol	TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, PPPoE, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, PIM-SM, UPnP, Bonjour
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access Log 802.1X Authentication (EAP-TLS, EAP-LEAP)
Streaming Method	Unicast / Multicast
Max. User Access	20 users at Unicast Mode
Edge Storage	SD/SDHC/SDXC (up to 256 GB) - Motion Images recorded in the SD/SDHC/SDXC memory card can be downloaded. NAS(Network Attached Storage) Local PC for Instant Recording
Application Programming Interface	ONVIF Profile S/G SUNAPI(HTTP API) Open Platform
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	TBD
Central Management Software	SmartViewer, SSM
Environmental	
Operating Temperature / Humidity	-40°C ~ +60°C (-40°F ~ +131°F) / Less than 90% RH
Storage Temperature / Humidity	-50°C ~ +60°C (-58°F ~ +140°F) / Less than 90% RH
Ingress Protection	IP66, NEMA 4X
Vandal Resistance	IK10
Electrical	
Input Voltage / Current	24VAC ± 10%, 12VDC ± 10%, PoE(IEEE802.3af)
Power Consumption	TBD
Mechanical	
Color / Material	TBD
Dimension (WxHxD)	TBD
Weight	TBD
기타	Palette 7mode

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

1.2 Variant Model Differences

Lens size difference

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
THERMAL CAMERA	TNO-4050T	-	HANWHA TECHWIN (TIANJIN) CO., LTD	E.U.T

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adapter	ANY4805C-LT1	10H300002	ANY ELECTRONICS CO., LTD	-
Notebook	ProBook4430s	-	HP	-
Notebook Adapter	SeriesPPP0009H	-	CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD,	-
Speaker	BR10000A CUVE	-	BEIJING EDIFIER HI-TECH GROUP.	-
Alarm Jig	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Phone	A1429	-	Apple	-
Micro SD Card	-	-	Sandisk	-

1.6 External I/O Cabling

■ AC 24 V, DC 12 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (E.U.T)	RJ-45(LAN)	Notebook	RJ-45(LAN)	3.0	U
	Audio In (2 Pin)	Phone	3.5 mm	1.6	U
	Audio Out (2 Pin)	Speaker	3.5 mm	1.5	U
	Alarm (2 Pin)	Alarm Jig	Alarm	3.0	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL CAMERA (E.U.T)	RJ-45(PoE)	PoE Adapter	RJ-45(PoE)	3.0	U
PoE Adapter	RJ-45(LAN)	Notebook	RJ-45(LAN)	1.6	U
THERMAL CAMERA (E.U.T)	Audio In (2 Pin)	Phone	3.5 mm	1.6	U
	Audio Out (2 Pin)	Speaker	3.5 mm	1.5	U
	Alarm (2 Pin)	Alarm Jig	Alarm	3.0	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-

* Unshielded=U, Shielded=S

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1.7 E.U.T Operating Mode(s)

Test mode	operating
AC 24 V	E.U.T Monitoring, Ping test
DC 12 V	
PoE	

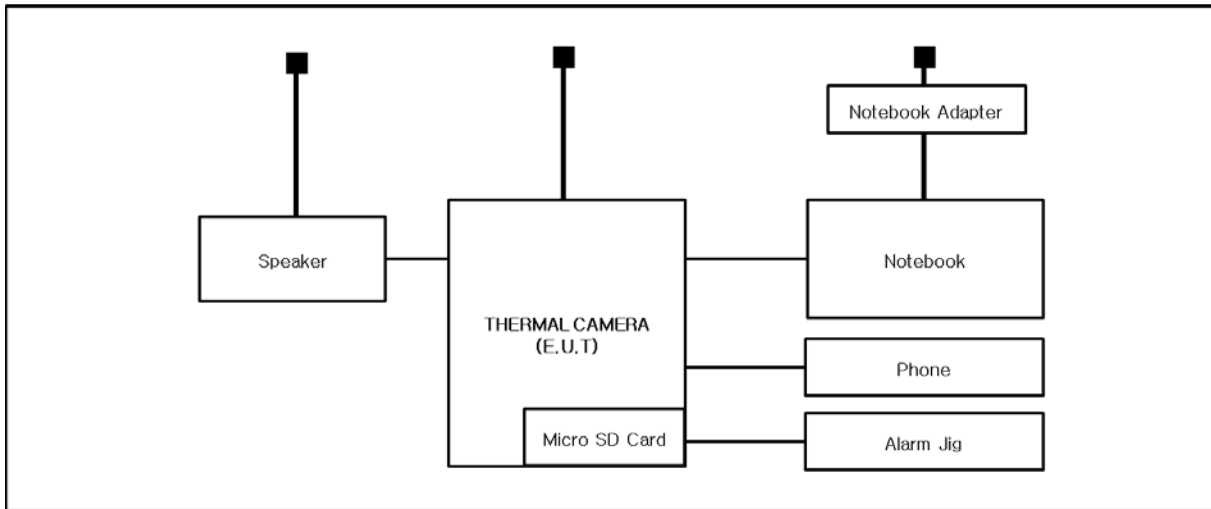
E.U.T Test operating S/W		
Name	Version	Manufacture Company
WebViewer	-	Hanwha Techwin Co., Ltd.

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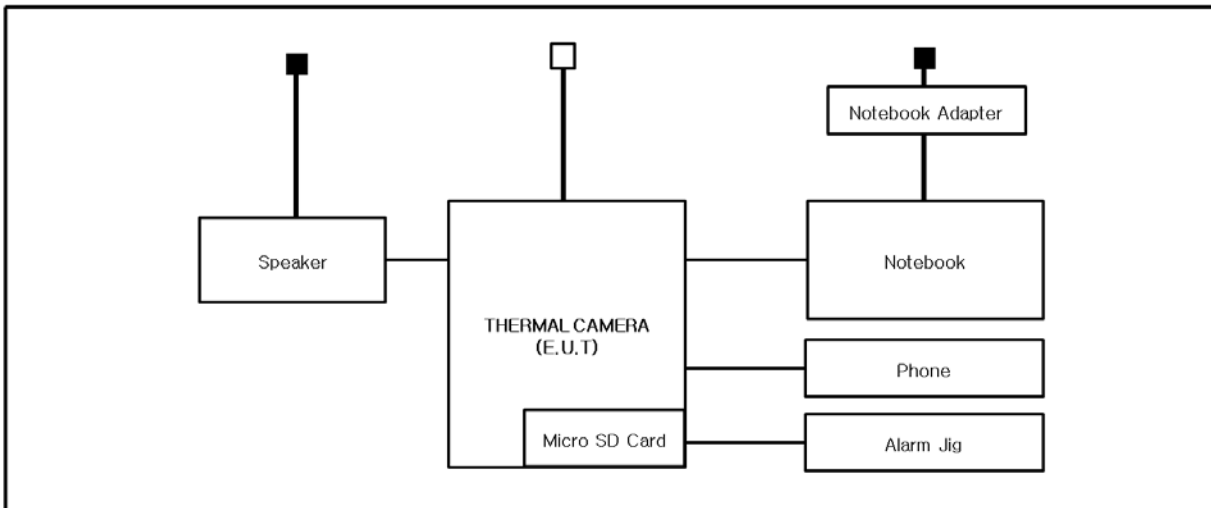
1.8 Configuration

■ AC Main
 □ DC Main

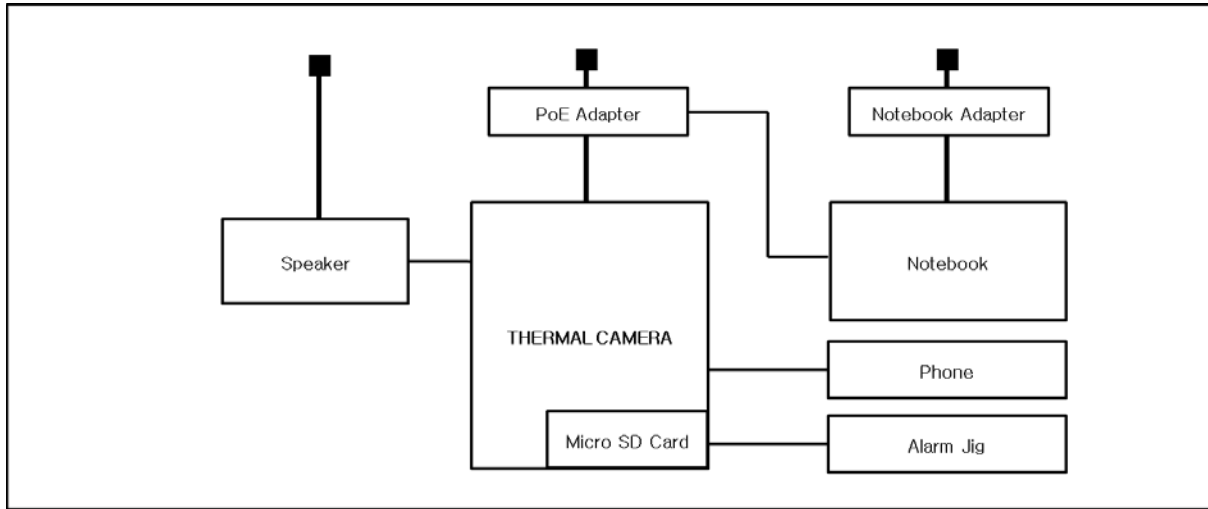
■ AC 24 V Mode



■ DC 12 V Mode



■ PoE Mode



1.9 Remarks when standards applied

N/A

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, Yeoju-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area 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, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-20056, C-20036, T-20040, G-20057
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0003

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2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ EMC – Directive 2014/30/EU

☐ EN 61000-6-3: 2011

☐ EN 61000-6-1: 2007

☐ EN 61000-6-4: 2007 +A1: 2011

☐ EN 61000-6-2: 2005

☐ EN 55011: 2007 +A1: 2010

☐ Group 1
☐ Class A

☐ Group 2
☐ Class B

☐ EN 55014-1: 2006 +A2: 2011

☐ EN 55014-2: 1997 +A2: 2008

☐ EN 55015: 2013

☐ EN 61547: 2009

☒ EN 55032: 2012/AC: 2013

☒ Class A

☐ Class B

☐ EN 55024: 2010 +A1: 2015

☒ EN 50130-4: 2011

☐ EN 61000-3-2: 2014

☐ EN 61000-3-3: 2013

☐ EN 61326-1: 2013



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-
- | | | |
|--|----------------------------------|----------------------------------|
| <input type="checkbox"/> VCCI V-3 / 2015.04 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> 47 CFR Part 15, Subpart B | | |
| <input type="checkbox"/> CISPR 22: 2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2009 | | |
| <input type="checkbox"/> IC Regulation ICES-003 : 2016 | | |
| <input type="checkbox"/> CAN/CSA CISPR 22-10 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014 | | |
|
<input type="checkbox"/> RE- Directive 2014/53/EU | | |
|
<input type="checkbox"/> EN 301 489-1 V1.9.2 | | |
| <input type="checkbox"/> Equipment for fixed use | | |
| <input type="checkbox"/> Equipment for vehicular use | | |
| <input type="checkbox"/> Equipment for portable use | | |
|
<input type="checkbox"/> EN 301 489-3 V1.6.1 | | |
|
<input type="checkbox"/> EN 301 489-17 V2.2.1 | | |
|
<input type="checkbox"/> EN 60945: 2002 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Nov. 06, 2017

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	01, 11, 2018
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 13, 2017

Test Conditions

Temperature: 20,2 °C

Relative Humidity: 42,0 %

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.

2.2 Conducted Emissions at Telecommunication Ports

Test Date

Nov. 06, 2017

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101781	04, 27, 2018
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	01, 11, 2018
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 13, 2017
<input checked="" type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 11, 2018
<input type="checkbox"/>	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	01, 11, 2018
<input type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 12, 2018
<input type="checkbox"/>	CDN	CDNS502A	TESEQ	40431	01, 11, 2018

Test Conditions

Temperature: 20,2 °C

Relative Humidity: 42,0 %

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.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Nov. 05, 2017

Test Location

☐ OPEN AREA TEST SITE #2

☒ SAC #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 18, 2018
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	12, 13, 2017
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11, 28, 2018

Test Conditions

Temperature: 20,2 °C

Relative Humidity: 41,3 %

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

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Nov. 05, 2017

Test Location

SEMI ANECHOIC CHAMBER #2

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	e3	AUDIX	8.083b	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100552	04, 19, 2018
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01729	05, 31, 2018
<input type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 24, 2018
<input checked="" type="checkbox"/>	LOG-PERIODIC ANTENNA	STLP 9149	SCHWARZBECK	9149-255	05, 17, 2018

Test Conditions

Temperature: 19,3 °C

Relative Humidity: 52,1 %

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

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
<input type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 09, 2018
<input type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

℃

Relative Humidity:

%

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

- Not applicable because it is AC 24 V.

3.0 Criteria for compliance

Criteria for compliance was based on the following guidelines:

EN 50130-4: 2011 +A1: 2014 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

Nov. 06, 2017

Test Location

EMS-ESD: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS05X4620	02, 24, 2018
<input checked="" type="checkbox"/>	HCP	-	Noise Ken	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: 19,6 °C

Relative Humidity: 51,0 %

Atmospheric Pressure: 100,0 kPa

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Test SpecificationsDischarge Factor: $\geq 1 \text{ s}$

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

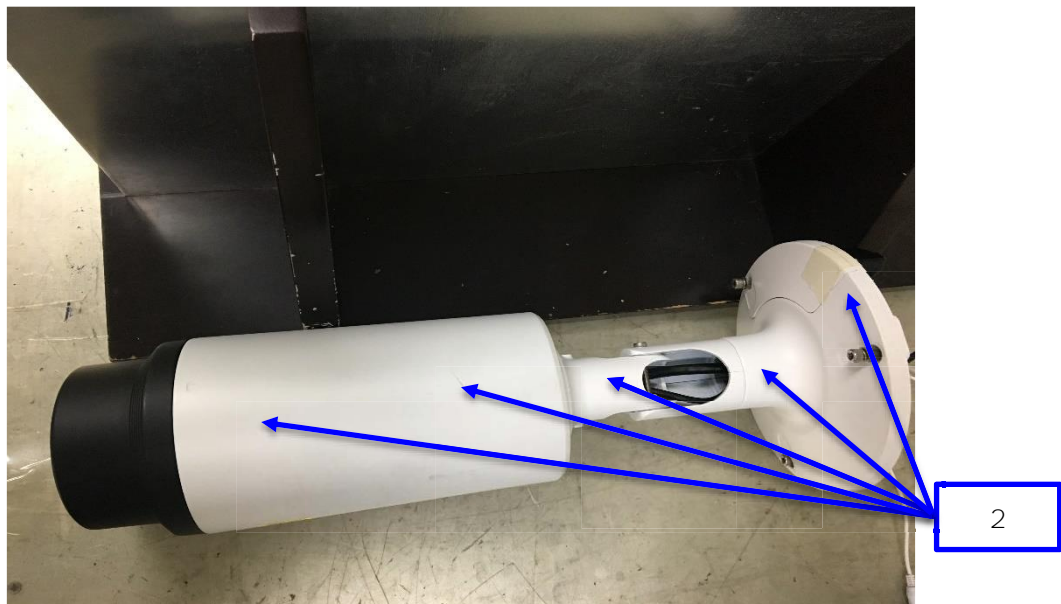
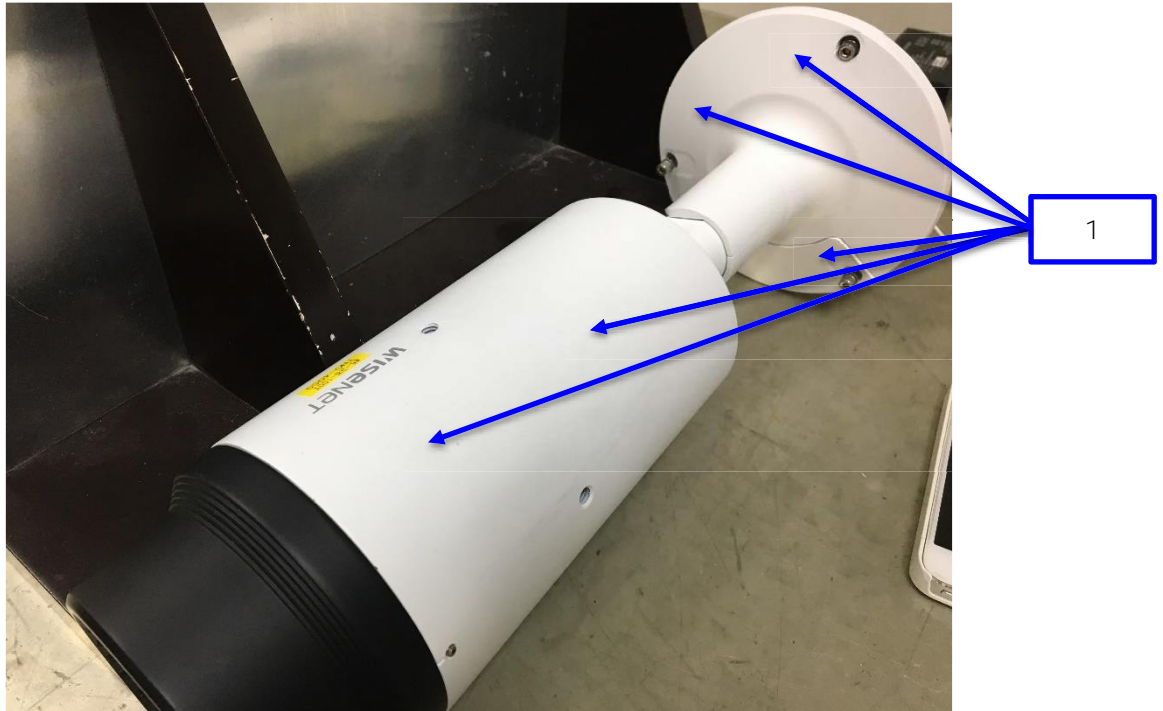
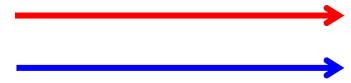
Discharge Voltage:	Contact	Air	HCP	VCP
	<input type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 2 kV	<input type="checkbox"/> 2 kV	<input type="checkbox"/> 2 kV
	<input type="checkbox"/> 4 kV	<input checked="" type="checkbox"/> 4 kV	<input type="checkbox"/> 4 kV	<input type="checkbox"/> 4 kV
	<input checked="" type="checkbox"/> 6 kV	<input type="checkbox"/> 6 kV	<input checked="" type="checkbox"/> 6 kV	<input checked="" type="checkbox"/> 6 kV
	<input type="checkbox"/> 8 kV	<input checked="" type="checkbox"/> 8 kV	<input type="checkbox"/> 8 kV	<input type="checkbox"/> 8 kV
	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV

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

Required Performance Criteria: ☒ Complied

Location of Discharge:

Air
Contact



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Test Data**■ AC 24 V 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 1	Contact Discharge	Complied	-
2	Enclosure 2	Contact Discharge	Complied	-

■ DC 12 V 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 1	Contact Discharge	Complied	-
2	Enclosure 2	Contact Discharge	Complied	-

■ PoE 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 1	Contact Discharge	Complied	-
2	Enclosure 2	Contact Discharge	Complied	-

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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.

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3.2 Radiated Electric Field Immunity

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

Test Date
Nov. 08, 2017

Test Location
EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 07, 2018
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 07, 2018
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 07, 2018
<input checked="" type="checkbox"/>	POWER METER	NRP2	R & S	103475	08, 07, 2018
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 07, 2018
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 07, 2018
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 07, 2018
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions

Temperature: 19,8 °C
Relative Humidity: 44,2 %
Atmospheric Pressure: 100,1 kPa

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Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 mField Strength: ☐ 1 V/m ☐ 3 V/m
☒ 10 V/mFrequency Range: ☐ 80 MHz to 1 GHz ☐ 1,4 GHz to 2,7 GHz
☒ 80 MHz to 2,7 GHzModulation: ☒ AM, 80 %, 1 kHz sine wave
☒ PM, 1 Hz (0,5 s ON : 0,5 s OFF)Frequency step: ☒ 1 % stepDwell Time: ☐ 1 s ☒ 3 s# of Sides Radiated: ☒ 4Required Performance Criteria: ☒ Complied

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Test Data

■ AC 24 V Mode

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

■ DC 12 V Mode

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

■ PoE 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

Remarks

PASS Required Performance Criteria.



3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4: 2012

Test Date

Nov. 07, 2017

Test Location

EMS-EFT: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	070925	06, 26, 2018

Test Conditions

Temperature: 19,8 °C
Relative Humidity: 53,1 %
Atmospheric Pressure: 99,9 kPa

Test Specifications

Pulse Amplitude & Polarity:
(AC Power Lines) ☐ ± 1.0 kV ☒ ± 2.0 kV
☐ ± 4.0 kV

Pulse Amplitude & Polarity:
(Other supply / Signal Lines) ☐ ± 0.5 kV ☒ ± 1.0 kV
☐ ± 2.0 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 24 V Mode

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

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

☐ 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(LAN)	Complied	Complied
Alam	Complied	Complied

■ DC 12 V Mode

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

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

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

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

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Observations	
	(+) Burst (kV)	(-) Burst (kV)
RJ-45(LAN)	Complied	Complied
Alam	Complied	Complied

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■ PoE Mode

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

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

☐ 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
Alam	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.



3.4 Surge Transients

Reference Standard

EN 61000-4-5: 2014

Test Date

Nov. 07, 2017

Test Location

EMS-Surge: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	10, 16, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018
<input type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1551168979	04, 26, 2018
<input checked="" type="checkbox"/>	CDN	CNV 508T5	EM TEST	P1549168422	04, 26, 2018

Test Conditions

Temperature: 19,8 °C

Relative Humidity: 53,1 %

Atmospheric Pressure: 99,9 kPa



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

Test Data

■ AC 24 V Mode

☒ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45 (LAN)	Complied	Complied

■ DC 12 V Mode

☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45 (LAN)	Complied	Complied

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■ PoE Mode☐ Line to Earth – Common Mode

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

Signal Lines

☒ Line to Earth – Common Mode

Mode of Application	Observations	
	(+) Surge (kV)	(-) Surge (kV)
RJ-45(PoE)	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.

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3.5 Conducted Disturbance

Reference Standard
EN 61000-4-6: 2014

Test Date
Nov. 08, 2017

Test Location
EMS-CS: Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.7	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1	EM TEST	V0936105119	08, 07, 2018
<input checked="" type="checkbox"/>	ATTENUATOR	ATT6	EM TEST	1208-34	08, 07, 2018
<input checked="" type="checkbox"/>	CDN	CDN-M2/M3N	EM TEST	0909-06	08, 07, 2018
<input checked="" type="checkbox"/>	CDN	CDN T8RJ45	EM TEST	0909-09	08, 07, 2018
<input checked="" type="checkbox"/>	EM INJECTION CLAMP	EM 101	Liithi	35943	02, 03, 2018

Test Conditions
Temperature: 19,4 °C
Relative Humidity: 53,0 %
Atmospheric Pressure: 100,1 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 24 V 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
-	CDN	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45(LAN)	CDN T800	Complied
Alam	Clamp	Complied

■ DC 12 V 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
L - N	CDN	Complied

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45(LAN)	CDN T800	Complied
Alam	Clamp	Complied

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■ PoE 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
-	CDN	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Observations
RJ-45(PoE)	CDN T800	Complied
Alam	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**Remarks**PASS Required Performance Criteria.

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3.6 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11: 2004

Test Date

Nov. 07, 2017

Test Location

EMS-Voltage dip: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	AMETEK CTS	7.1.2	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500 N5	EM TEST	V0936105120	06, 26, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	V0936105123	06, 26, 2018

Test Conditions

Temperature: 19,8 °C

Relative Humidity: 53,1 %

Atmospheric Pressure: 99,9 kPa

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Test Specifications & Observations/Remarks

(Test Voltage : AC 24 V)

<u>Test Level</u>	<u>Duration [in period/ms (50 Hz)]</u>	<u>Results</u>
<input checked="" type="checkbox"/> 20 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>
<input checked="" type="checkbox"/> 30 % dip	<input checked="" type="checkbox"/> 25 / 500	<u>Complied</u>
<input checked="" type="checkbox"/> 60 % dip	<input checked="" type="checkbox"/> 10 / 200	<u>Complied</u>
<input checked="" type="checkbox"/> 100 % dip	<input checked="" type="checkbox"/> 250 / 5 000	<u>Complied</u>

- Voltage variations

<input checked="" type="checkbox"/> Unom + 10 %	<input checked="" type="checkbox"/> 253.0 V (ac)	<u>Complied</u>
<input checked="" type="checkbox"/> Unom - 15 %	<input checked="" type="checkbox"/> 195.5 V (ac)	<u>Complied</u>

Observations:

Complied – No degradation of function

Test Results

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

Remarks

PASS Required Performance Criteria.

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APPENDIX A – TEST DATA

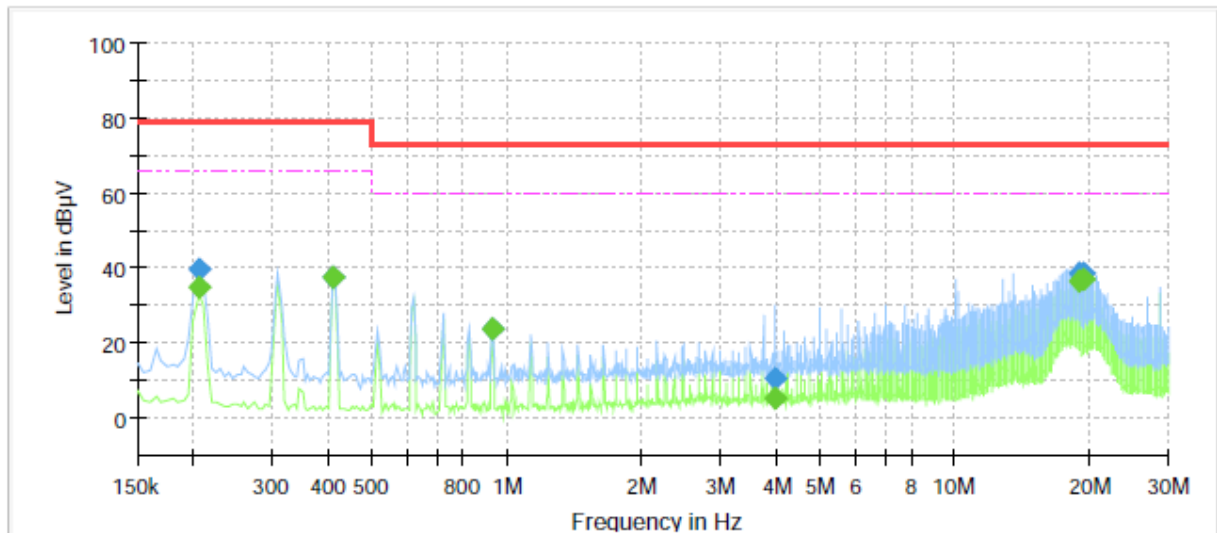
Conducted Emissions at Mains Power Ports

■ AC 24 V Mode
[HOT]

Common Information

Test Description:
Model No.:
Mode
Operator Name:

Conducted Emission
TNO-4050TP
AC 24 V
KES



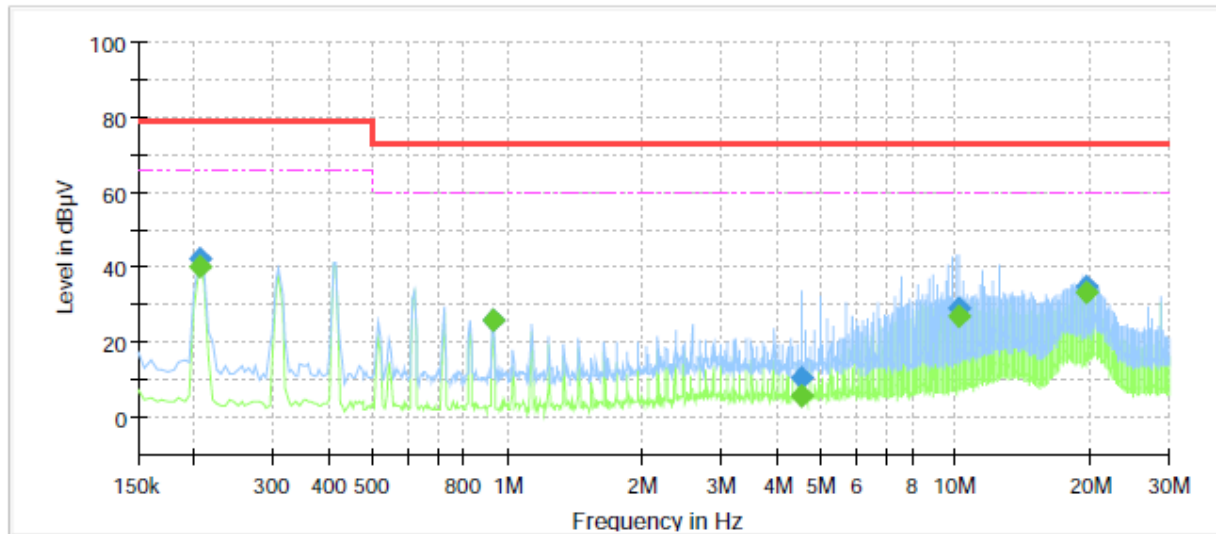
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	34.72	66.00	31.28	1000.0	9.000	L1	19.5
0.205000	39.89	---	79.00	39.11	1000.0	9.000	L1	19.5
0.410000	---	37.77	66.00	28.23	1000.0	9.000	L1	19.7
0.410000	37.81	---	79.00	41.19	1000.0	9.000	L1	19.7
0.925000	---	23.70	60.00	36.30	1000.0	9.000	L1	20.1
0.925000	23.68	---	73.00	49.32	1000.0	9.000	L1	20.1
3.960000	---	5.55	60.00	54.45	1000.0	9.000	L1	20.0
3.960000	10.41	---	73.00	62.59	1000.0	9.000	L1	20.0
18.960000	---	36.64	60.00	23.36	1000.0	9.000	L1	20.3
18.960000	38.41	---	73.00	34.59	1000.0	9.000	L1	20.3
19.475000	---	36.98	60.00	23.02	1000.0	9.000	L1	20.3
19.475000	38.45	---	73.00	34.55	1000.0	9.000	L1	20.3

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4050TP
Mode	AC 24 V
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.205000	---	40.08	66.00	25.92	1000.0	9.000	N	19.5
0.205000	42.25	---	79.00	36.75	1000.0	9.000	N	19.5
0.925000	---	25.74	60.00	34.26	1000.0	9.000	N	20.0
0.925000	25.70	---	73.00	47.30	1000.0	9.000	N	20.0
4.545000	---	5.63	60.00	54.37	1000.0	9.000	N	19.9
4.545000	10.38	---	73.00	62.62	1000.0	9.000	N	19.9
10.205000	---	26.97	60.00	33.03	1000.0	9.000	N	20.1
10.205000	29.31	---	73.00	43.69	1000.0	9.000	N	20.1
19.580000	---	33.29	60.00	26.71	1000.0	9.000	N	20.4
19.580000	34.75	---	73.00	38.25	1000.0	9.000	N	20.4

◆ 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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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Conducted Emissions at Telecommunication Ports

■ AC 24 V Mode

[10 Mbps]

Common Information

Test Description:

Telecommunication Emission

Model No.:

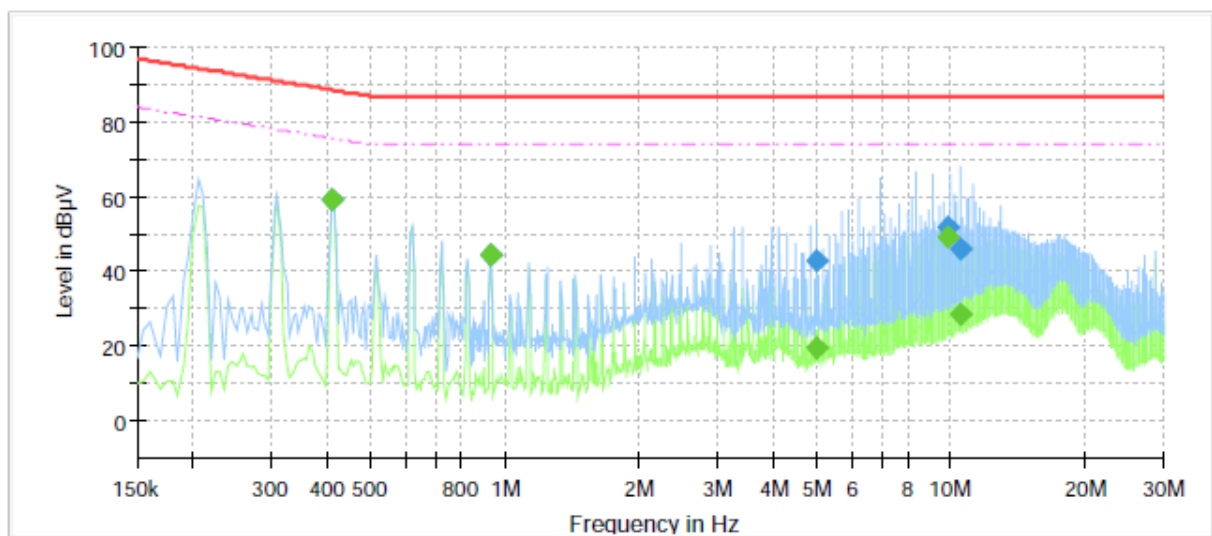
TNO-4050TP

Mode

AC 24 V_10 Mbps

Operator Name:

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.410000	---	59.26	75.65	16.39	1000.0	9.000	Single Line	19.6
0.410000	59.36	---	88.65	29.29	1000.0	9.000	Single Line	19.6
0.925000	---	44.51	74.00	29.49	1000.0	9.000	Single Line	19.9
0.925000	44.52	---	87.00	42.48	1000.0	9.000	Single Line	19.9
4.995000	---	19.67	74.00	54.33	1000.0	9.000	Single Line	19.5
4.995000	42.77	---	87.00	44.23	1000.0	9.000	Single Line	19.5
9.890000	---	49.28	74.00	24.72	1000.0	9.000	Single Line	19.8
9.890000	51.84	---	87.00	35.16	1000.0	9.000	Single Line	19.8
10.500000	---	28.59	74.00	45.41	1000.0	9.000	Single Line	19.8
10.500000	46.12	---	87.00	40.88	1000.0	9.000	Single Line	19.8

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Test report No.:

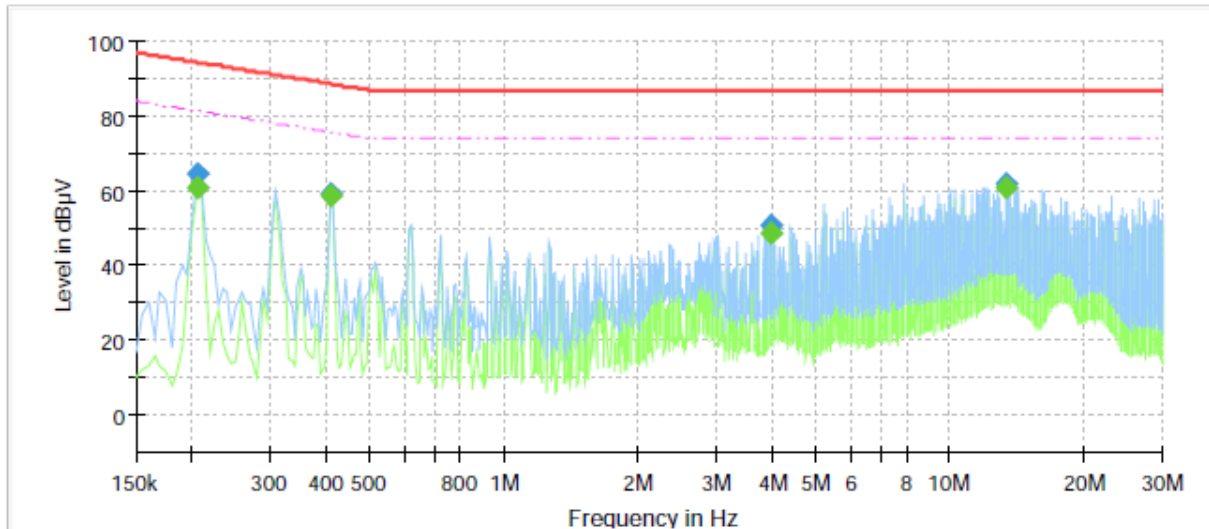
KES-E1-17T0749-R2

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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4050TP
Mode: AC 24 V_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)
0.205000	---	60.69	81.41	20.72	1000.0	9.000	Single Line	20.0
0.205000	64.81	---	94.41	29.60	1000.0	9.000	Single Line	20.0
0.410000	---	58.89	75.65	16.76	1000.0	9.000	Single Line	19.9
0.410000	59.18	---	88.65	29.47	1000.0	9.000	Single Line	19.9
3.955000	---	48.62	74.00	25.38	1000.0	9.000	Single Line	20.0
3.955000	50.94	---	87.00	36.06	1000.0	9.000	Single Line	20.0
13.420000	---	60.73	74.00	13.27	1000.0	9.000	Single Line	20.2
13.420000	61.86	---	87.00	25.14	1000.0	9.000	Single Line	20.2

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Test report No.:

KES-E1-17T0749-R2

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■ DC 12 V Mode
[10 Mbps]

Common Information

Test Description:

Model No.:

Mode

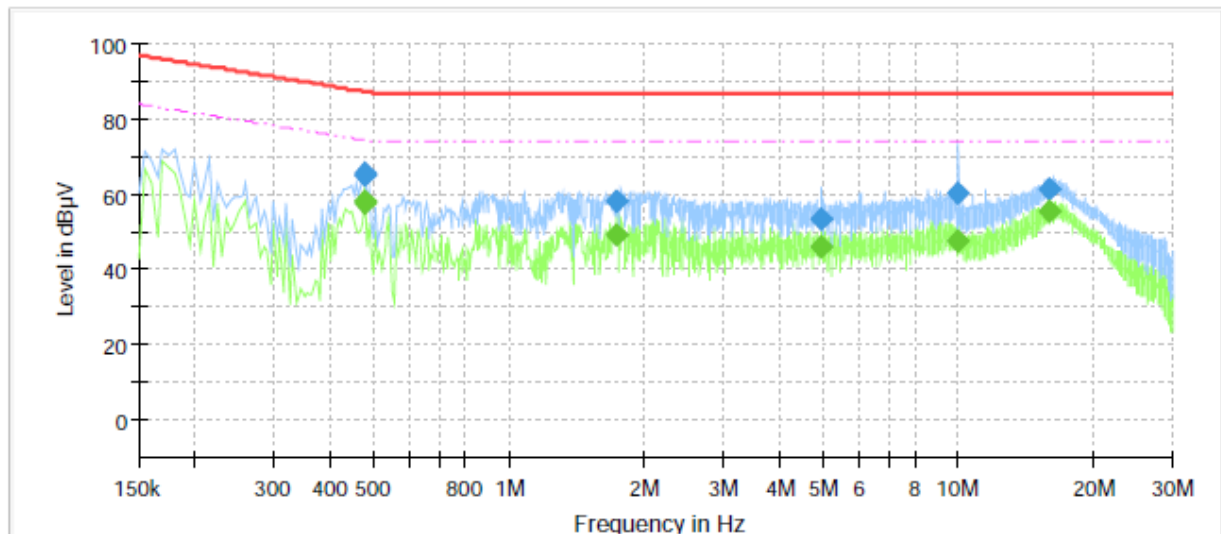
Operator Name:

Telecommunication Emission

TNO-4050TP

DC 12 V_10 Mbps

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.475000	---	58.33	74.43	16.10	1000.0	9.000	Single Line	19.7
0.475000	65.83	---	87.43	21.60	1000.0	9.000	Single Line	19.7
0.480000	---	57.58	74.34	16.76	1000.0	9.000	Single Line	19.7
0.480000	64.97	---	87.34	22.37	1000.0	9.000	Single Line	19.7
1.735000	---	49.07	74.00	24.93	1000.0	9.000	Single Line	20.0
1.735000	58.43	---	87.00	28.57	1000.0	9.000	Single Line	20.0
4.960000	---	46.10	74.00	27.90	1000.0	9.000	Single Line	19.5
4.960000	53.72	---	87.00	33.28	1000.0	9.000	Single Line	19.5
10.005000	---	47.84	74.00	26.16	1000.0	9.000	Single Line	19.8
10.005000	60.37	---	87.00	26.63	1000.0	9.000	Single Line	19.8
15.855000	---	55.75	74.00	18.25	1000.0	9.000	Single Line	19.9
15.855000	61.14	---	87.00	25.86	1000.0	9.000	Single Line	19.9

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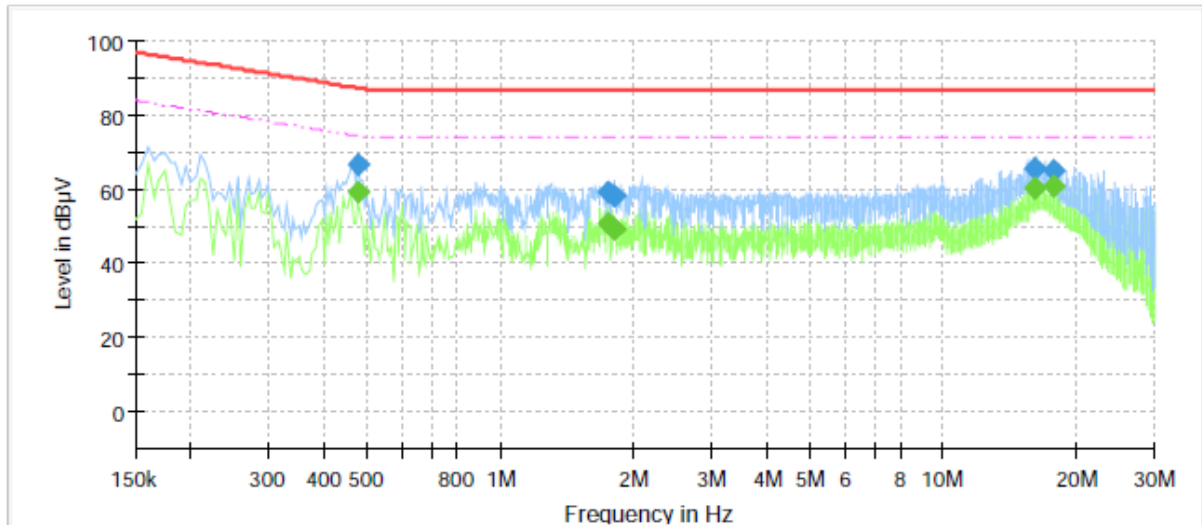
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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4050TP
Mode: DC 12 V_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)
0.475000	---	59.22	74.43	15.21	1000.0	9.000	Single Line	20.0
0.475000	66.61	---	87.43	20.82	1000.0	9.000	Single Line	20.0
1.745000	---	50.76	74.00	23.24	1000.0	9.000	Single Line	20.3
1.745000	59.09	---	87.00	27.91	1000.0	9.000	Single Line	20.3
1.805000	---	49.30	74.00	24.70	1000.0	9.000	Single Line	20.3
1.805000	58.23	---	87.00	28.77	1000.0	9.000	Single Line	20.3
16.165000	---	60.45	74.00	13.55	1000.0	9.000	Single Line	20.2
16.165000	65.51	---	87.00	21.49	1000.0	9.000	Single Line	20.2
17.695000	---	61.02	74.00	12.98	1000.0	9.000	Single Line	20.3
17.695000	65.28	---	87.00	21.72	1000.0	9.000	Single Line	20.3



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Test report No.:

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■ PoE Mode
[10 Mbps]

Common Information

Test Description:

Model No.:

Mode

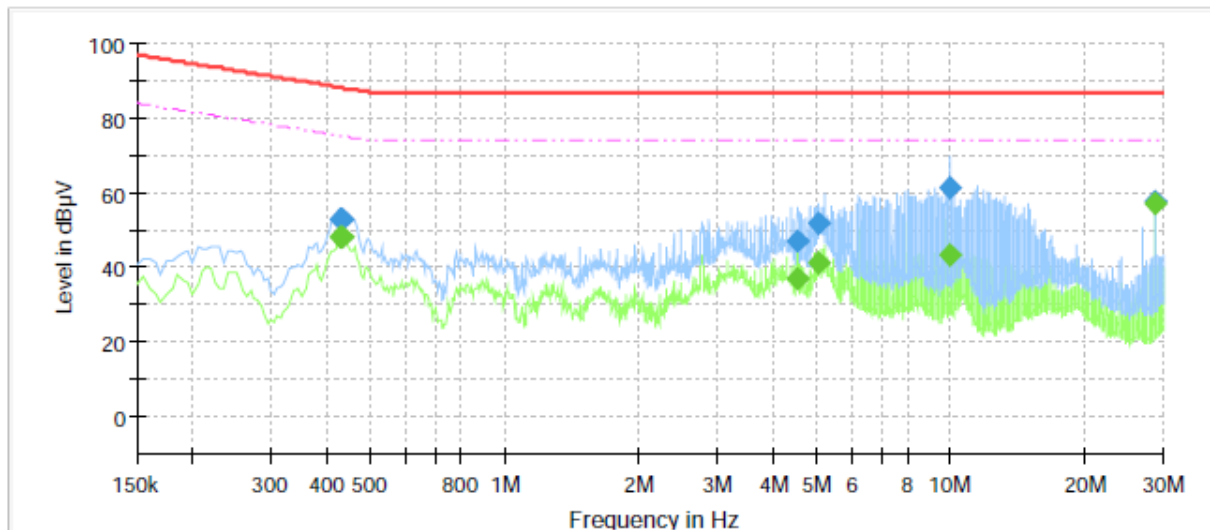
Operator Name:

Telecommunication Emission

TNO-4050TP

PoE_10 Mbps

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.430000	---	48.28	75.25	26.97	1000.0	9.000	Single Line	19.6
0.430000	53.14	---	88.25	35.11	1000.0	9.000	Single Line	19.6
0.435000	---	48.26	75.16	26.90	1000.0	9.000	Single Line	19.6
0.435000	53.06	---	88.16	35.10	1000.0	9.000	Single Line	19.6
4.515000	---	37.33	74.00	36.67	1000.0	9.000	Single Line	19.6
4.515000	47.11	---	87.00	39.89	1000.0	9.000	Single Line	19.6
5.045000	---	41.18	74.00	32.82	1000.0	9.000	Single Line	19.5
5.045000	51.90	---	87.00	35.10	1000.0	9.000	Single Line	19.5
9.995000	---	43.67	74.00	30.33	1000.0	9.000	Single Line	19.8
9.995000	61.44	---	87.00	25.56	1000.0	9.000	Single Line	19.8
28.640000	---	57.38	74.00	16.62	1000.0	9.000	Single Line	20.7
28.640000	57.84	---	87.00	29.16	1000.0	9.000	Single Line	20.7

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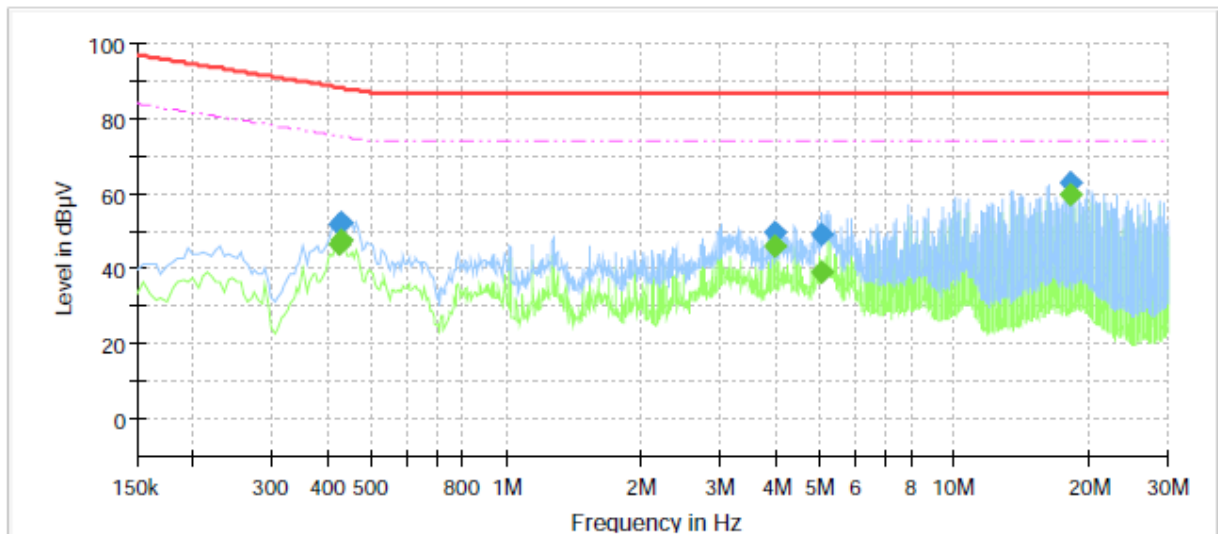
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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4050TP
Mode: PoE_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)
0.425000	---	46.76	75.35	28.59	1000.0	9.000	Single Line	19.9
0.425000	52.01	---	88.35	36.34	1000.0	9.000	Single Line	19.9
0.430000	---	47.58	75.25	27.67	1000.0	9.000	Single Line	19.9
0.430000	52.28	---	88.25	35.97	1000.0	9.000	Single Line	19.9
3.955000	---	46.14	74.00	27.86	1000.0	9.000	Single Line	20.0
3.955000	50.02	---	87.00	36.98	1000.0	9.000	Single Line	20.0
5.040000	---	39.25	74.00	34.75	1000.0	9.000	Single Line	19.8
5.040000	49.00	---	87.00	38.00	1000.0	9.000	Single Line	19.8
18.245000	---	59.68	74.00	14.32	1000.0	9.000	Single Line	20.3
18.245000	63.09	---	87.00	23.91	1000.0	9.000	Single Line	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 (ISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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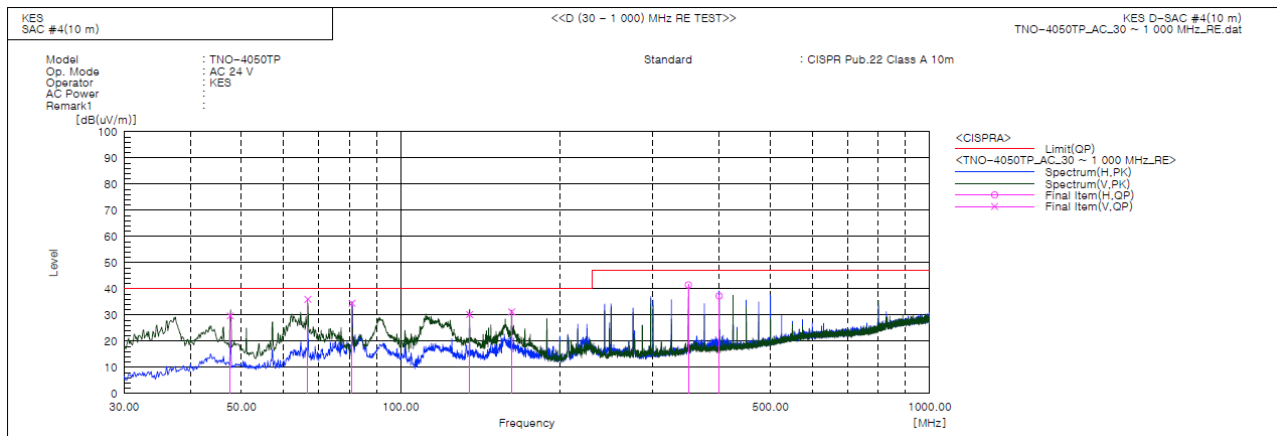
Test report No.:

KES-E1-17T0749-R2

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Radiated Electric Field Emissions(Below 1 GHz)

AC 24 V 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	47.640	V	57.5	-27.8	29.7	40.0	10.3	115.0	108.0	
2	66.739	V	66.8	-30.8	36.0	40.0	4.0	318.0	122.0	
3	80.925	V	68.1	-33.6	34.5	40.0	5.5	228.0	158.0	
4	135.003	V	62.0	-31.8	30.2	40.0	9.8	138.0	237.0	
5	162.163	V	61.9	-30.7	31.2	40.0	8.8	197.0	353.0	
6	349.958	H	63.5	-22.0	41.5	47.0	5.5	200.0	255.0	
7	400.016	H	57.5	-20.2	37.3	47.0	9.7	200.0	129.0	

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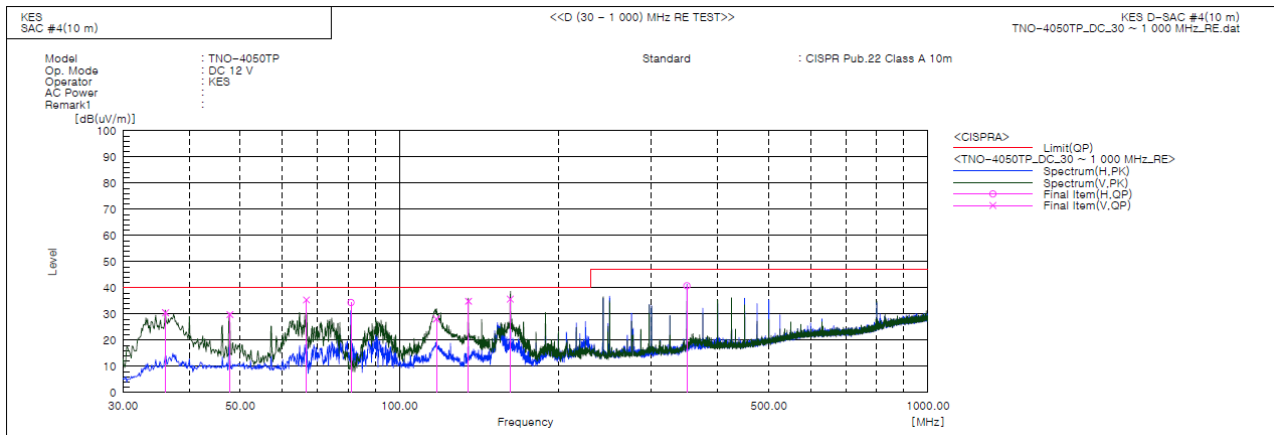
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Test report No.:

KES-E1-17T0749-R2

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DC 12 V Mode



Final Result

No.	Frequency	(P)	Reading	c.f	Result	Limit	Margin	Height	Angle	Remark
	[MHz]		QP [dB(uV)]	[dB(1/m)]	QP [dB(uV/m)]	QP [dB(uV/m)]	QP [dB]	[cm]	[deg]	
1	36.116	V	61.4	-30.9	30.5	40.0	9.5	129.0	11.0	
2	47.803	V	57.6	-27.8	29.8	40.0	10.2	150.0	20.0	
3	66.694	V	66.2	-30.8	35.4	40.0	4.6	246.0	84.0	
4	81.014	H	68.0	-33.6	34.4	40.0	5.6	375.0	225.0	
5	117.504	V	58.6	-30.5	28.1	40.0	11.9	131.0	169.0	
6	135.127	V	66.7	-31.8	34.9	40.0	5.1	138.0	323.0	
7	162.116	V	66.4	-30.7	35.7	40.0	4.3	259.0	336.0	
8	349.926	H	62.8	-22.0	40.8	47.0	6.2	283.0	233.0	

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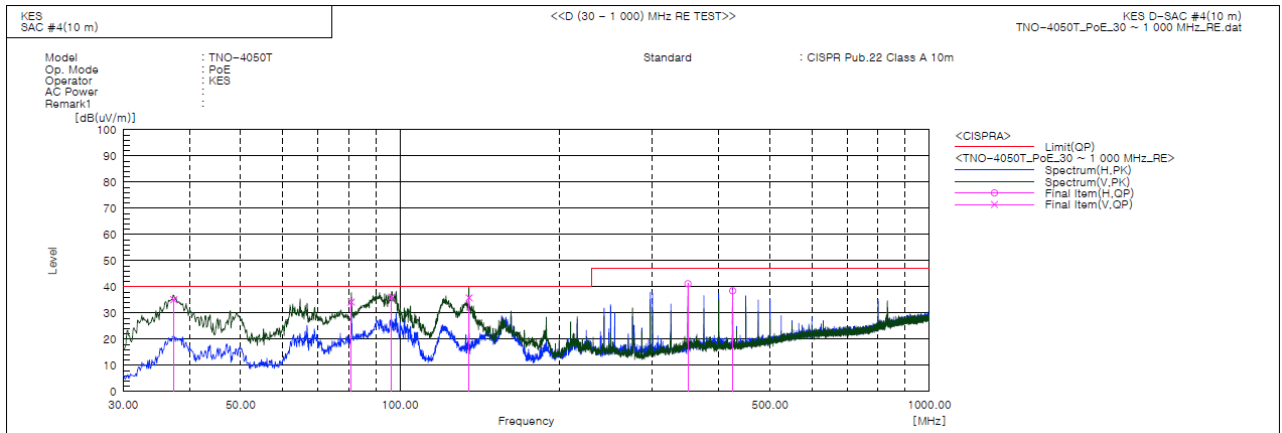
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PoE Mode



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	37.386	V	65.5	-30.4	35.1	40.0	4.9	127.0	328.0	
2	80.925	V	67.8	-33.6	34.2	40.0	5.8	175.0	251.0	
3	96.445	V	64.8	-28.6	36.2	40.0	3.8	131.0	195.0	
4	135.118	V	67.6	-31.8	35.8	40.0	4.2	181.0	314.0	
5	349.956	H	63.2	-22.0	41.2	47.0	5.8	365.0	273.0	
6	425.069	H	58.1	-19.6	38.5	47.0	8.5	200.0	67.0	

◆ Calculation

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

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

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

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

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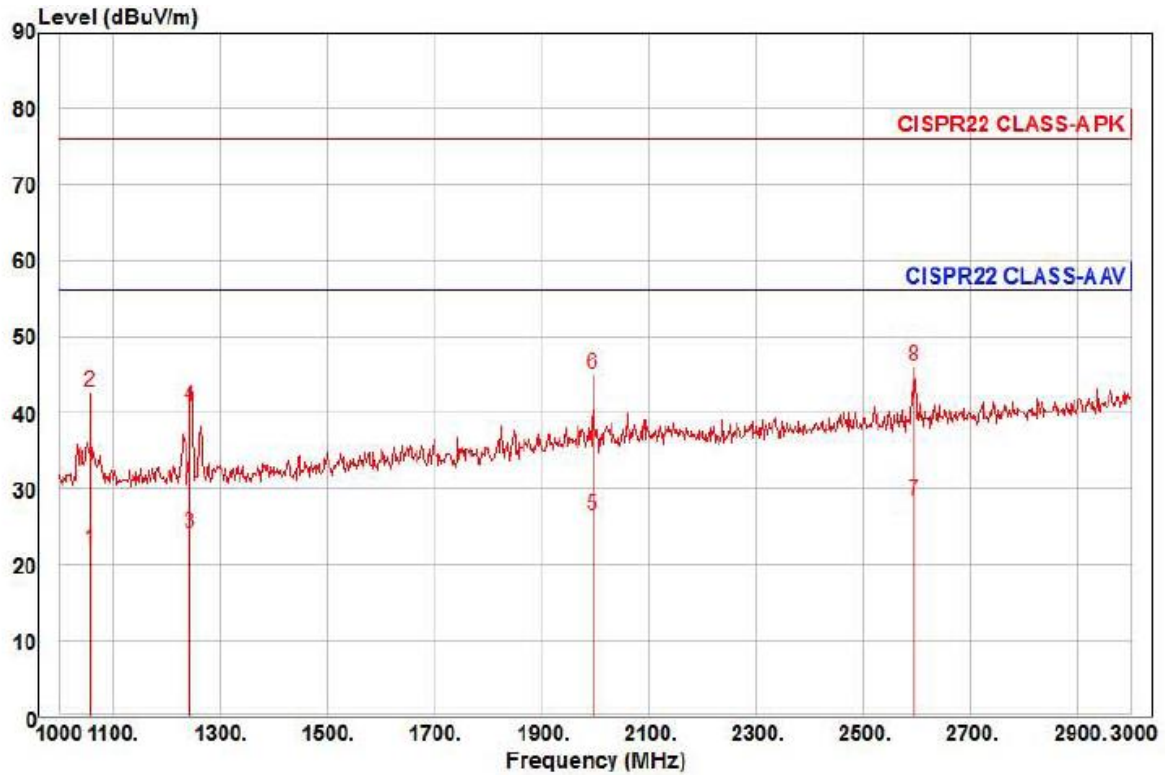
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Test report No.:
KES-E1-17T0749-R2
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Radiated Electric Field Emissions(Above 1 GHz)

■ AC 24 V Mode



Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : AC 24 V
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	1058.00	28.55	22.68	6.82	36.10	307	56.00	-34.05	horizontal	Average
2	1058.00	49.43	22.68	6.82	36.10	307	76.00	-33.17	horizontal	Peak
3	1244.00	29.29	23.24	7.42	35.79	140	56.00	-31.84	horizontal	Average
4	1244.00	45.87	23.24	7.42	35.79	140	76.00	-35.26	horizontal	Peak
5	1996.00	25.38	25.99	9.64	34.54	63	56.00	-29.53	horizontal	Average
6	1996.00	43.93	25.99	9.64	34.54	63	76.00	-30.98	horizontal	Peak
7 pp	2596.00	23.54	27.95	11.05	34.12	63	56.00	-27.58	horizontal	Average
8 pk	2596.00	41.17	27.95	11.05	34.12	63	76.00	-29.95	horizontal	Peak

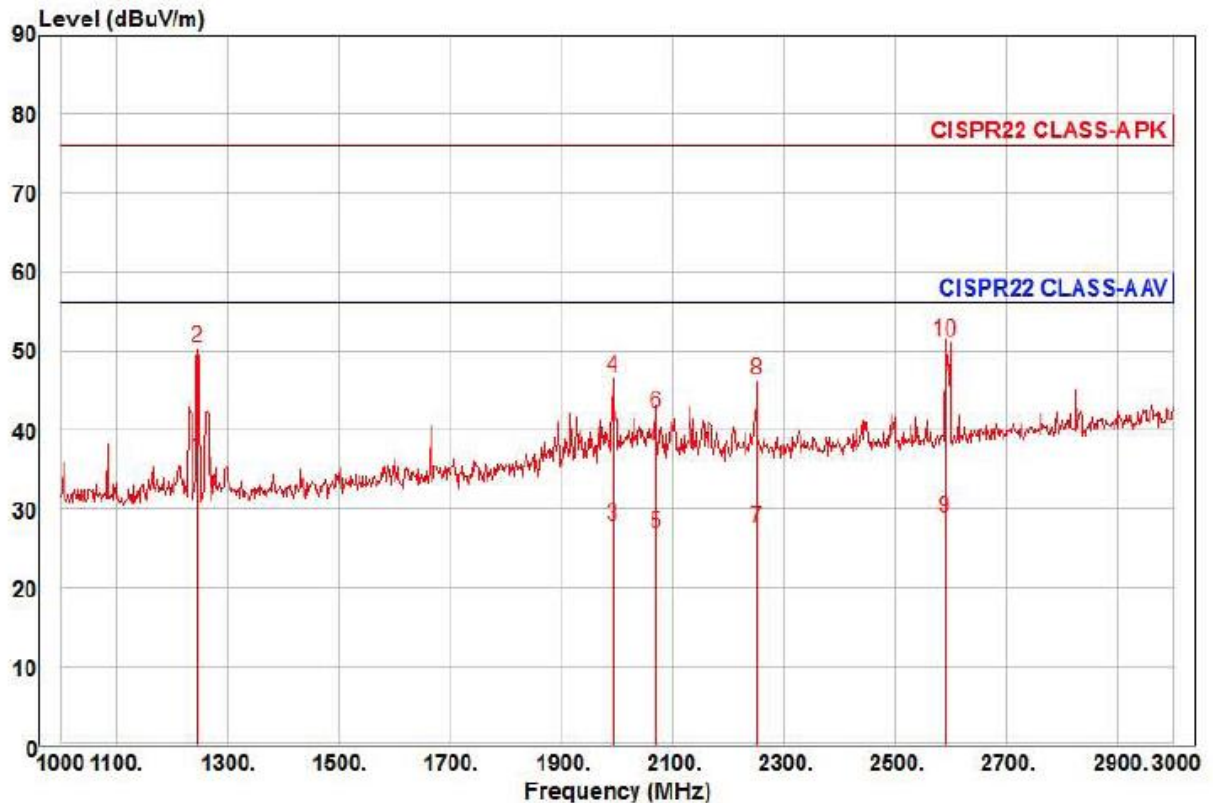
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Test report No.:
KES-E1-17T0749-R2
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : AC 24 V
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 pp	1246.00	41.49	23.25	7.43	35.79	185	56.00	-19.62	vertical	Average
2	1246.00	55.46	23.25	7.43	35.79	185	76.00	-25.65	vertical	Peak
3	1992.00	26.77	25.98	9.62	34.54	337	56.00	-28.17	vertical	Average
4	1992.00	45.63	25.98	9.62	34.54	337	76.00	-29.31	vertical	Peak
5	2070.00	25.35	26.22	9.81	34.48	211	56.00	-29.10	vertical	Average
6	2070.00	40.70	26.22	9.81	34.48	211	76.00	-33.75	vertical	Peak
7	2250.00	24.82	26.77	10.24	34.36	161	56.00	-28.53	vertical	Average
8	2250.00	43.65	26.77	10.24	34.36	161	76.00	-29.70	vertical	Peak
9	2590.00	23.97	27.93	11.04	34.12	211	56.00	-27.18	vertical	Average
10 pk	2590.00	46.27	27.93	11.04	34.12	211	76.00	-24.88	vertical	Peak

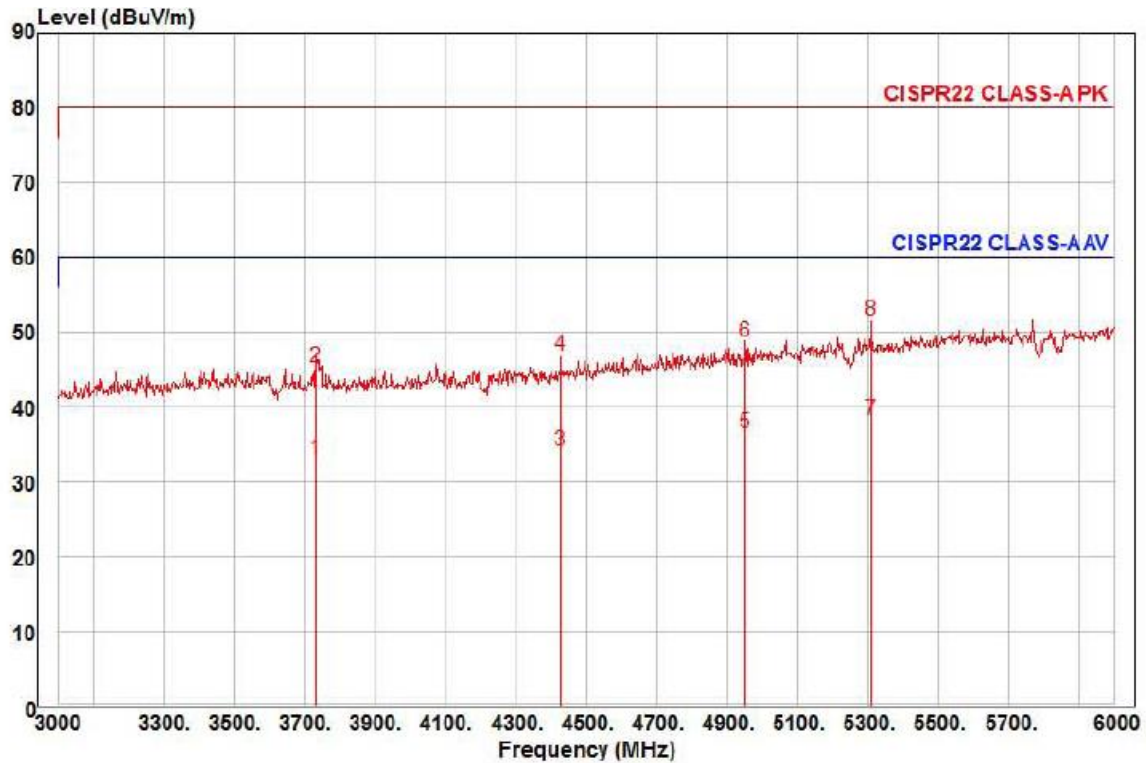
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Test report No.:
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : AC 24 V
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	3732.00	22.32	31.78	13.51	34.67	153	60.00	-27.06	horizontal	Average
2	3732.00	34.69	31.78	13.51	34.67	153	80.00	-34.69	horizontal	Peak
3	4428.00	21.13	32.38	14.85	34.22	310	60.00	-25.86	horizontal	Average
4	4428.00	33.90	32.38	14.85	34.22	310	80.00	-33.09	horizontal	Peak
5	4953.00	20.84	33.31	15.70	33.29	313	60.00	-23.44	horizontal	Average
6	4953.00	32.97	33.31	15.70	33.29	313	80.00	-31.31	horizontal	Peak
7 pp	5310.00	20.61	34.63	16.28	33.25	69	60.00	-21.73	horizontal	Average
8 pk	5310.00	33.83	34.63	16.28	33.25	69	80.00	-28.51	horizontal	Peak

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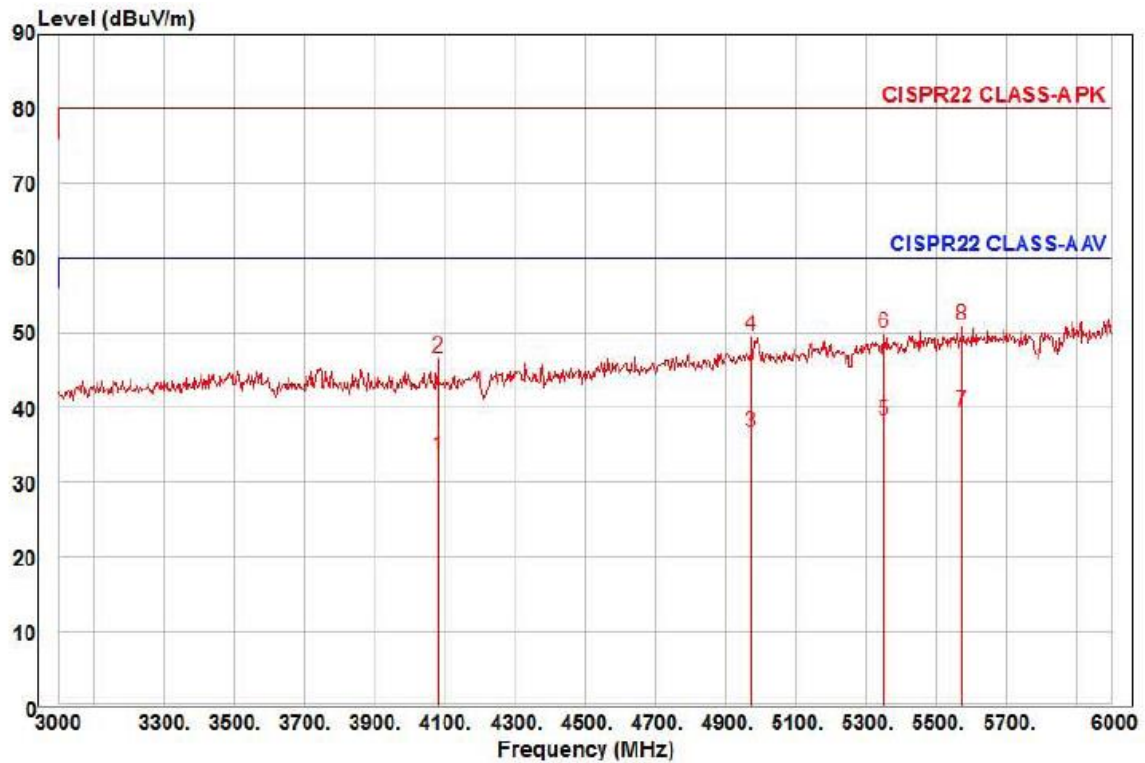
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Test report No.:

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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : AC 24 V
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	4080.00	21.62	32.48	14.20	34.83	234	60.00	-26.53	vertical	Average
2	4080.00	34.87	32.48	14.20	34.83	234	80.00	-33.28	vertical	Peak
3	4971.00	20.86	33.35	15.73	33.26	261	60.00	-23.32	vertical	Average
4	4971.00	33.82	33.35	15.73	33.26	261	80.00	-30.36	vertical	Peak
5	5352.00	20.39	34.79	16.36	33.26	153	60.00	-21.72	vertical	Average
6	5352.00	32.06	34.79	16.36	33.26	153	80.00	-30.05	vertical	Peak
7 pp	5574.00	20.51	35.48	16.73	33.29	311	60.00	-20.57	vertical	Average
8 pk	5574.00	31.97	35.48	16.73	33.29	311	80.00	-29.11	vertical	Peak

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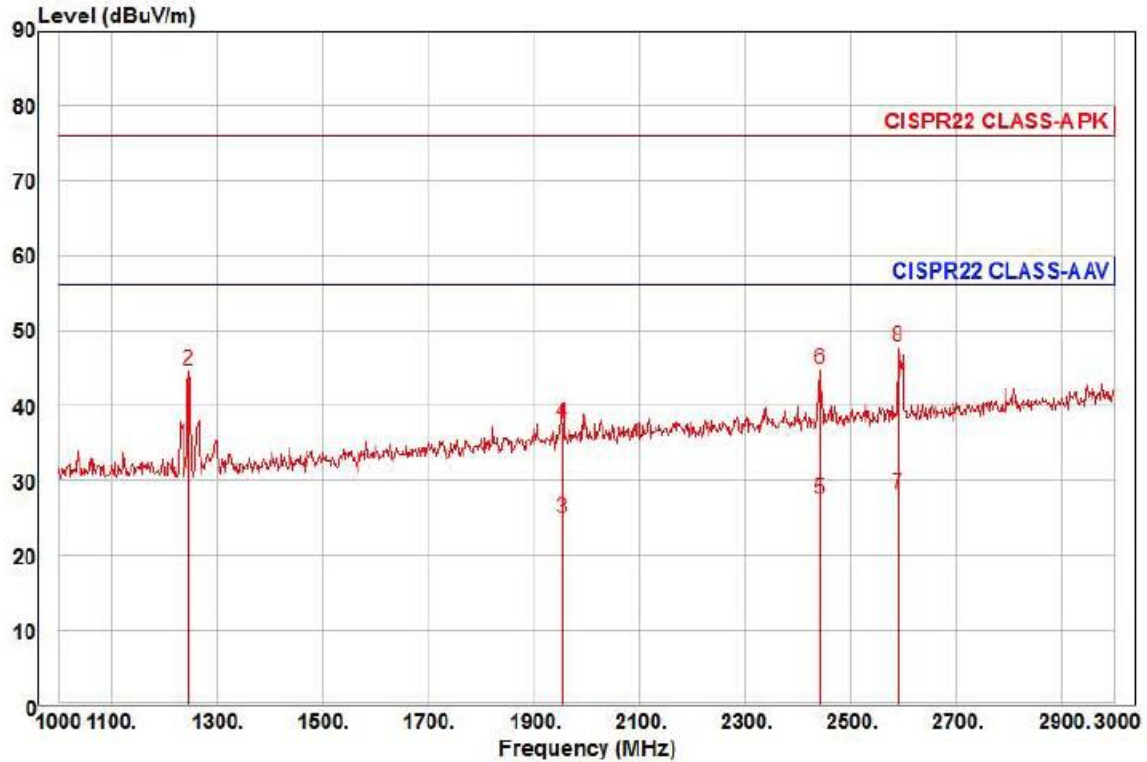


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Test report No.:
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DC 12 V Mode



Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : DC 12 V
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 pp	1246.00	35.99	23.25	7.43	35.79	226	56.00	-25.12	horizontal	Average
2	1246.00	49.90	23.25	7.43	35.79	226	76.00	-31.21	horizontal	Peak
3	1954.00	24.14	25.83	9.52	34.61	182	56.00	-31.12	horizontal	Average
4	1954.00	36.92	25.83	9.52	34.61	182	76.00	-38.34	horizontal	Peak
5	2442.00	23.59	27.35	10.69	34.23	170	56.00	-28.60	horizontal	Average
6	2442.00	41.12	27.35	10.69	34.23	170	76.00	-31.07	horizontal	Peak
7	2590.00	23.44	27.93	11.04	34.12	220	56.00	-27.71	horizontal	Average
8 pk	2590.00	42.93	27.93	11.04	34.12	220	76.00	-28.22	horizontal	Peak

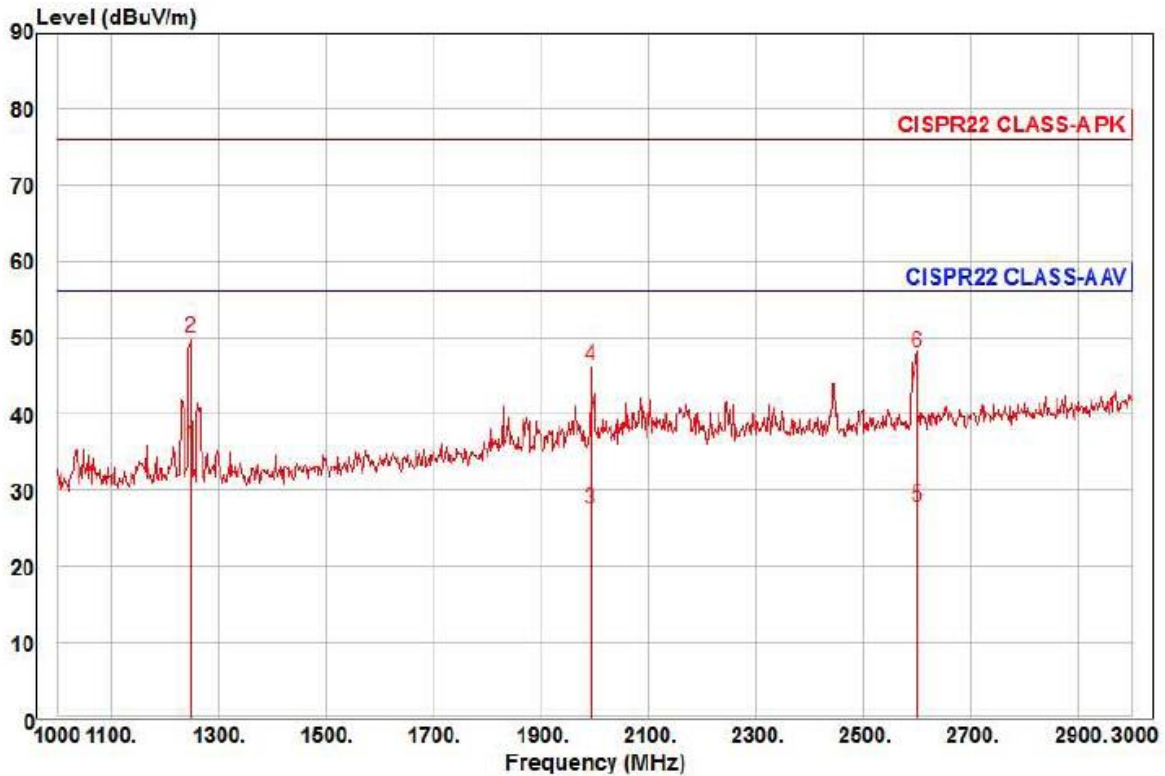
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : DC 12 V
Memo : 1 ~ 3 GHz

		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	pp	1248.00	40.94	23.25	7.44	35.79	171	56.00	-20.16	vertical	Average
2	pk	1248.00	55.18	23.25	7.44	35.79	171	76.00	-25.92	vertical	Peak
3		1992.00	26.49	25.98	9.62	34.54	345	56.00	-28.45	vertical	Average
4		1992.00	45.19	25.98	9.62	34.54	345	76.00	-29.75	vertical	Peak
5		2600.00	23.02	27.97	11.06	34.12	59	56.00	-28.07	vertical	Average
6		2600.00	43.15	27.97	11.06	34.12	59	76.00	-27.94	vertical	Peak

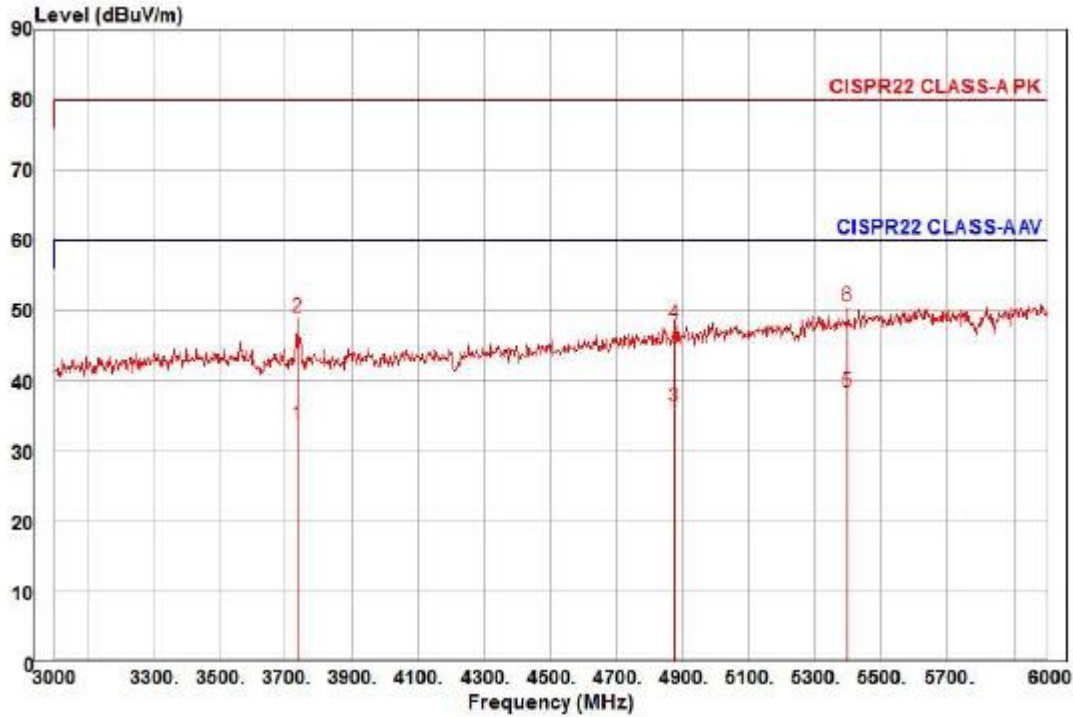
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : DC 12 V
Memo : 3 ~ 6 GHz

		Read Freq	Ant Level	Ant Factor	Cable Loss	Preamp Factor	TPos deg	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1		3735.00	23.09	31.78	13.52	34.67	112	60.00	-26.28	horizontal	Average
2		3735.00	38.38	31.78	13.52	34.67	112	80.00	-30.99	horizontal	Peak
3		4878.00	20.85	33.15	15.61	33.42	9	60.00	-23.81	horizontal	Average
4		4878.00	32.68	33.15	15.61	33.42	9	80.00	-31.98	horizontal	Peak
5	pp	5400.00	20.31	34.98	16.45	33.27	214	60.00	-21.53	horizontal	Average
6	pk	5400.00	32.34	34.98	16.45	33.27	214	80.00	-29.50	horizontal	Peak

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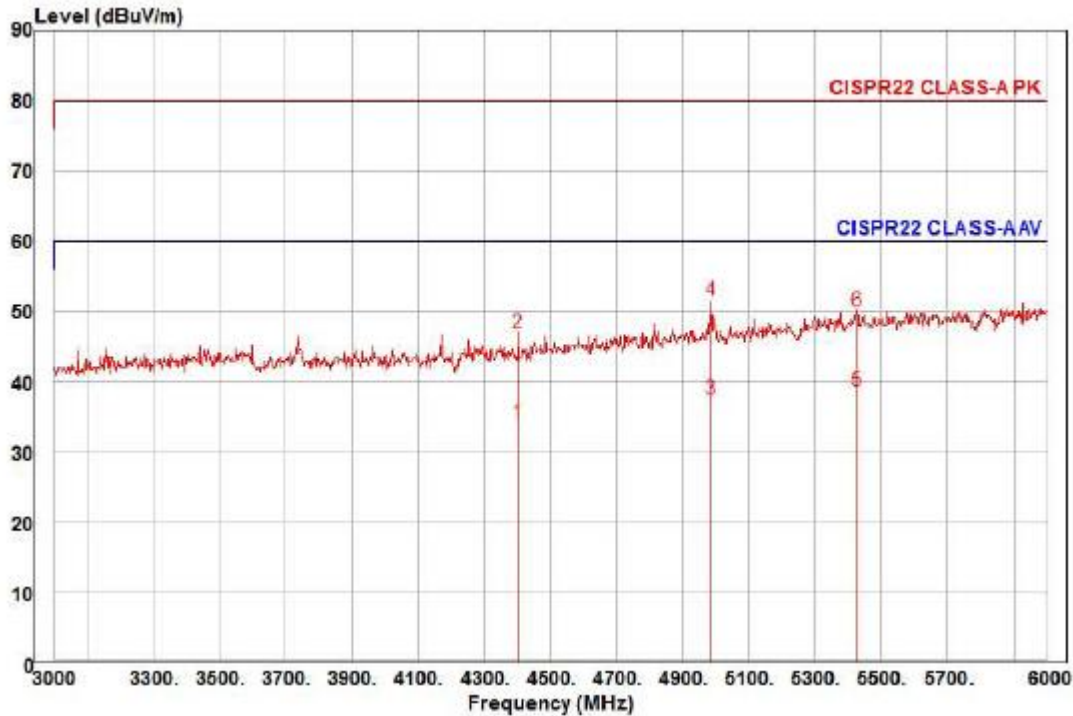
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : DC 12 V
Memo : 3 ~ 6 GHz

	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	4404.00	21.09	32.39	14.81	34.26	199	60.00	-25.97	vertical	Average
2	4404.00	33.91	32.39	14.81	34.26	199	80.00	-33.15	vertical	Peak
3	4989.00	21.49	33.39	15.75	33.23	257	60.00	-22.60	vertical	Average
4 pk	4989.00	35.67	33.39	15.75	33.23	257	80.00	-28.42	vertical	Peak
5 pp	5430.00	20.35	35.10	16.50	33.27	4	60.00	-21.32	vertical	Average
6	5430.00	31.65	35.10	16.50	33.27	4	80.00	-30.02	vertical	Peak

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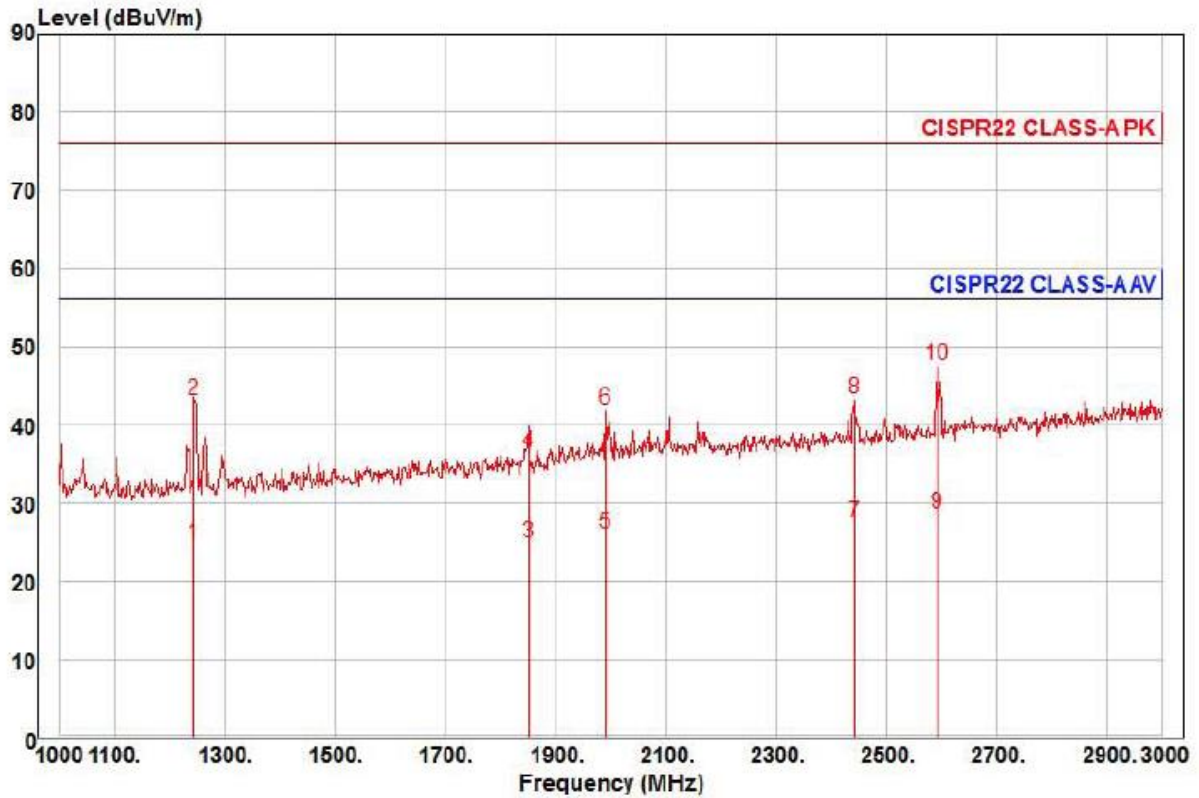


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Test report No.:
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PoE Mode



Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
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	1244.00	29.93	23.24	7.42	35.79	228	56.00	-31.20	horizontal	Average
2	1244.00	48.28	23.24	7.42	35.79	228	76.00	-32.85	horizontal	Peak
3	1850.00	25.02	25.41	9.23	34.78	195	56.00	-31.12	horizontal	Average
4	1850.00	36.57	25.41	9.23	34.78	195	76.00	-39.57	horizontal	Peak
5	1990.00	25.00	25.97	9.62	34.55	308	56.00	-29.96	horizontal	Average
6	1990.00	40.90	25.97	9.62	34.55	308	76.00	-34.06	horizontal	Peak
7	2442.00	23.65	27.35	10.69	34.23	44	56.00	-28.54	horizontal	Average
8	2442.00	39.52	27.35	10.69	34.23	44	76.00	-32.67	horizontal	Peak
9 pp	2592.00	23.87	27.94	11.04	34.12	216	56.00	-27.27	horizontal	Average
10 pk	2592.00	42.84	27.94	11.04	34.12	216	76.00	-28.30	horizontal	Peak

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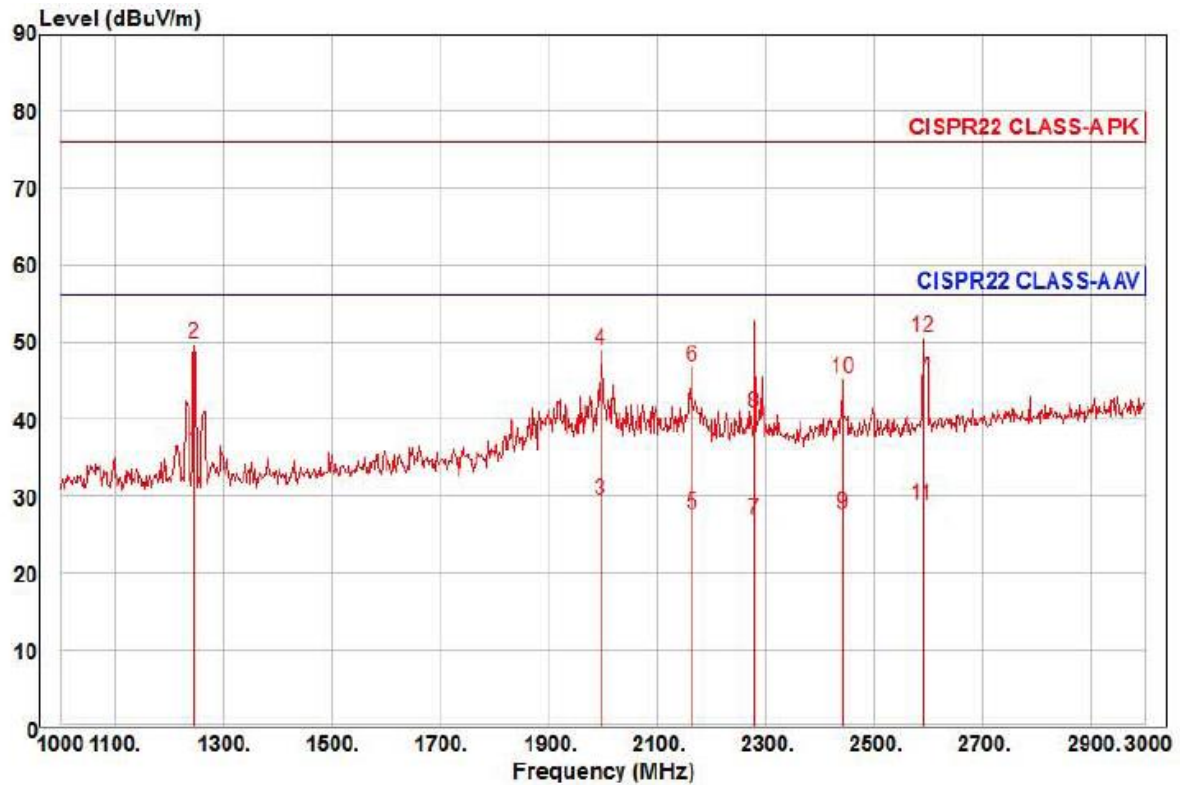
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : PoE
Memo : 1 ~ 3 GHz

	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 pp	1246.00	40.98	23.25	7.43	35.79	174	56.00	-20.13	vertical Average
2	1246.00	54.95	23.25	7.43	35.79	174	76.00	-26.16	vertical Peak
3	1996.00	28.26	25.99	9.64	34.54	25	56.00	-26.65	vertical Average
4	1996.00	47.91	25.99	9.64	34.54	25	76.00	-27.00	vertical Peak
5	2164.00	25.52	26.51	10.04	34.42	75	56.00	-28.35	vertical Average
6	2164.00	44.66	26.51	10.04	34.42	75	76.00	-29.21	vertical Peak
7	2280.00	23.98	26.86	10.31	34.34	246	56.00	-29.19	vertical Average
8	2280.00	37.92	26.86	10.31	34.34	246	76.00	-35.25	vertical Peak
9	2442.00	23.78	27.35	10.69	34.23	171	56.00	-28.41	vertical Average
10	2442.00	41.42	27.35	10.69	34.23	171	76.00	-30.77	vertical Peak
11	2590.00	23.95	27.93	11.04	34.12	43	56.00	-27.20	vertical Average
12 pk	2590.00	45.65	27.93	11.04	34.12	43	76.00	-25.50	vertical Peak

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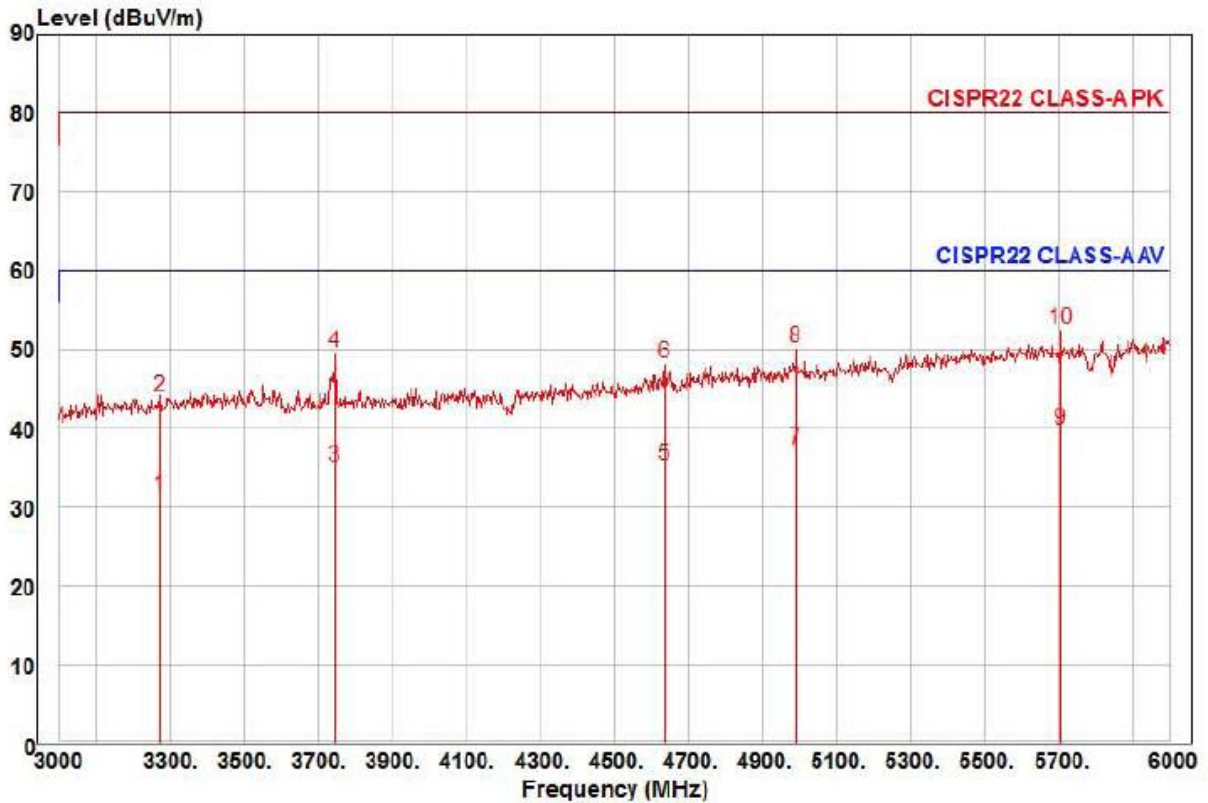
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : PoE
Memo : 3 ~ 6 GHz

	Read Freq	Ant Level	Cable Factor	Preamp Loss	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	deg	dBuV/m	dB		
1	3273.00	22.28	30.51	12.79	34.15	147	60.00	-28.57	horizontal Average
2	3273.00	34.87	30.51	12.79	34.15	147	80.00	-35.98	horizontal Peak
3	3744.00	24.41	31.81	13.54	34.68	109	60.00	-24.92	horizontal Average
4	3744.00	39.02	31.81	13.54	34.68	109	80.00	-30.31	horizontal Peak
5	4635.00	21.37	32.64	15.19	33.85	147	60.00	-24.65	horizontal Average
6	4635.00	34.35	32.64	15.19	33.85	147	80.00	-31.67	horizontal Peak
7	4989.00	21.28	33.39	15.75	33.23	129	60.00	-22.81	horizontal Average
8	4989.00	34.22	33.39	15.75	33.23	129	80.00	-29.87	horizontal Peak
9 pp	5706.00	20.44	35.68	16.91	33.31	198	60.00	-20.28	horizontal Average
10 pk	5706.00	33.20	35.68	16.91	33.31	198	80.00	-27.52	horizontal Peak

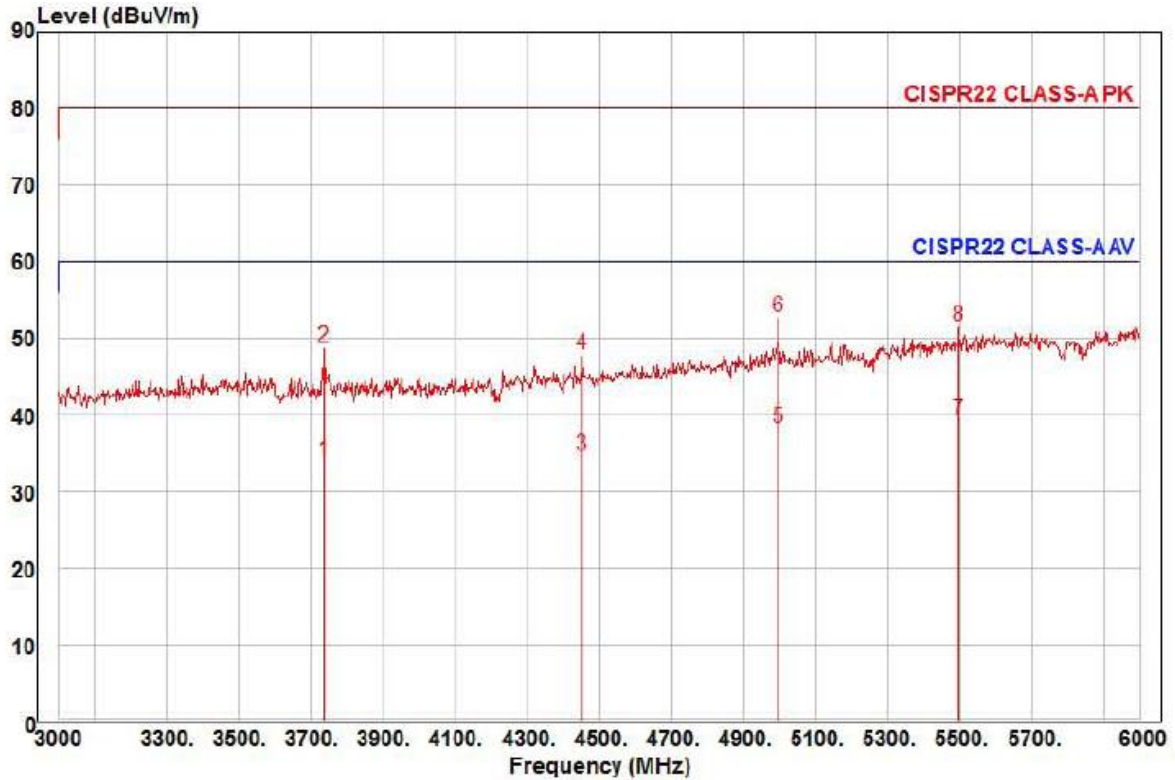
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Test report No.:
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4050TP
Mode : PoE
Memo : 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	3735.00	23.28	31.78	13.52	34.67	36	60.00	-26.09	vertical	Average
2	3735.00	38.26	31.78	13.52	34.67	36	80.00	-31.11	vertical	Peak
3	4452.00	21.65	32.37	14.89	34.17	304	60.00	-25.26	vertical	Average
4	4452.00	34.69	32.37	14.89	34.17	304	80.00	-32.22	vertical	Peak
5	4998.00	22.35	33.41	15.76	33.21	260	60.00	-21.69	vertical	Average
6 pk	4998.00	36.83	33.41	15.76	33.21	260	80.00	-27.21	vertical	Peak
7 pp	5499.00	20.46	35.37	16.61	33.28	318	60.00	-20.84	vertical	Average
8	5499.00	32.97	35.37	16.61	33.28	318	80.00	-28.33	vertical	Peak

◆ Calculation - SAC #3

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

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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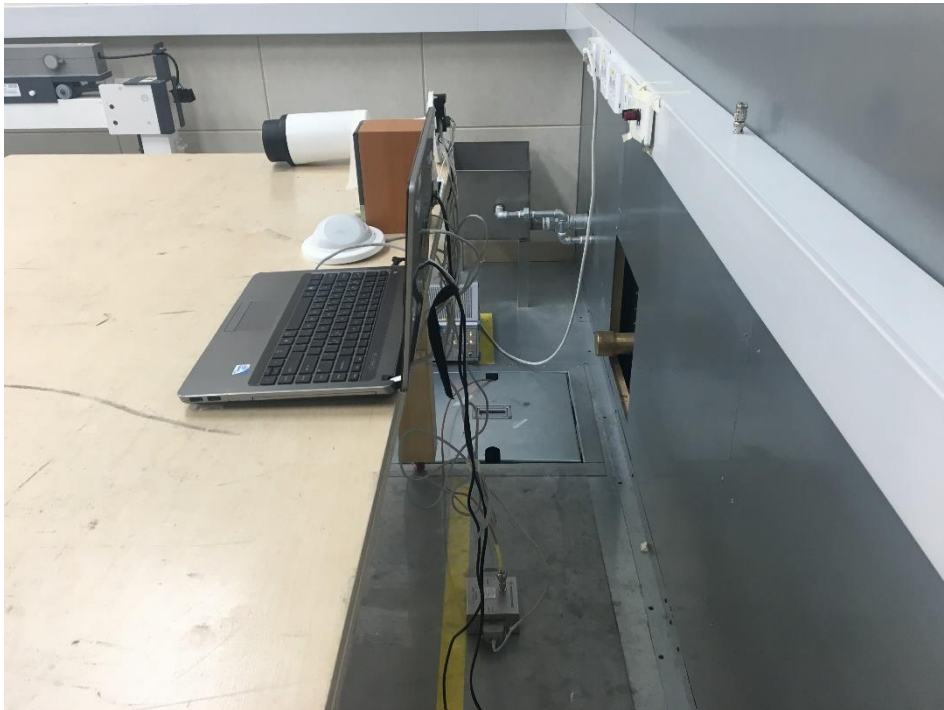
Test Setup Photos and Configuration

Conducted Voltage Emissions



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Conducted Telecommunication Emissions



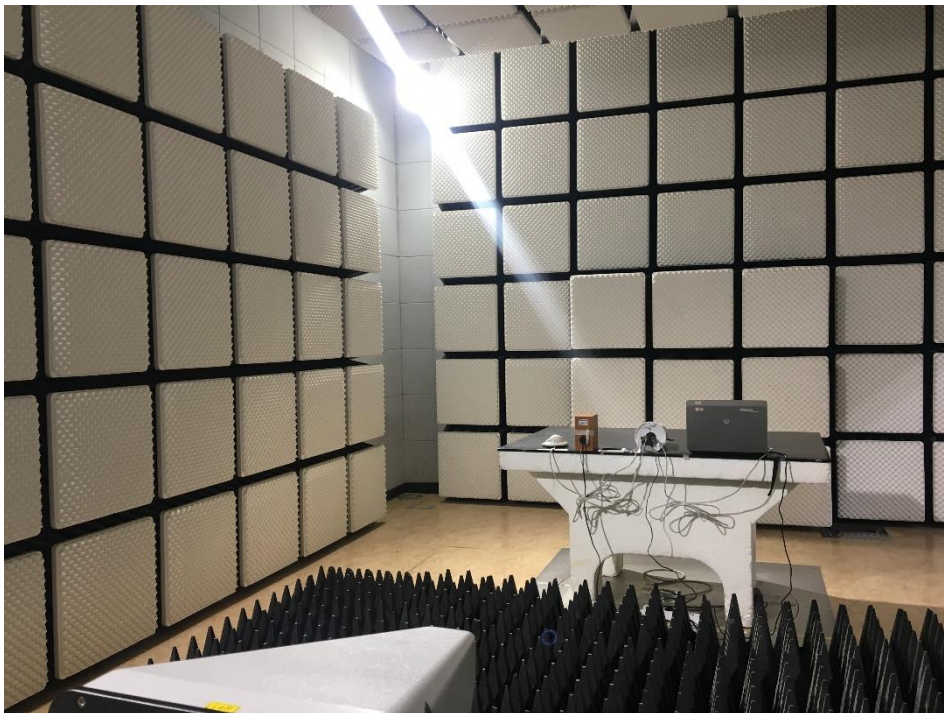
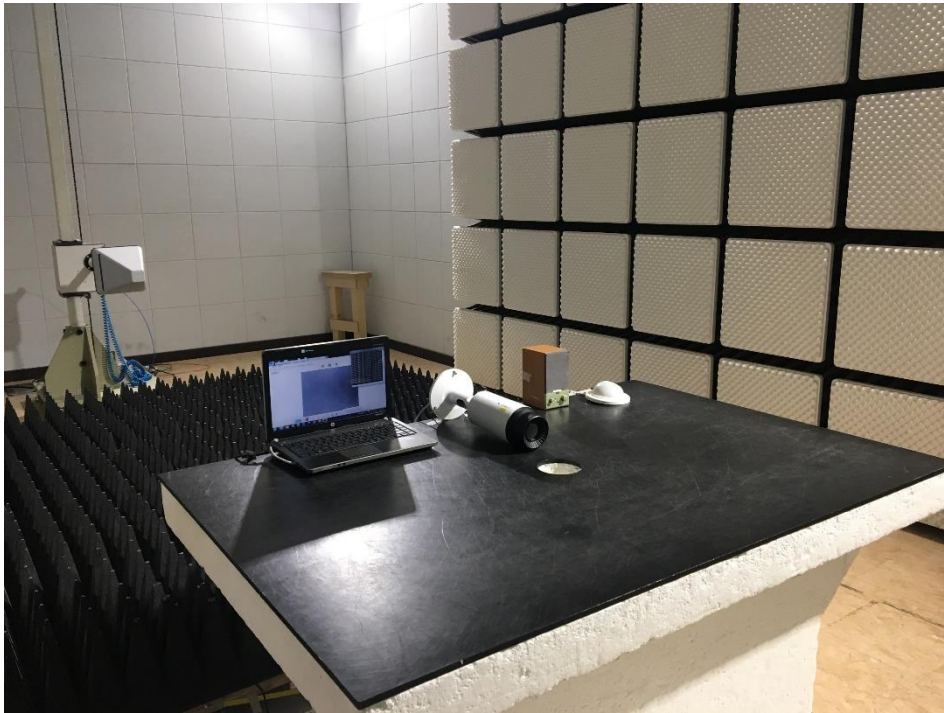
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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www.kes.co.kr

Test report No.:
KES-E1-17T0749-R2
Page (69) of (83)

Harmonic Current Emissions and Voltage Fluctuations and Flicker

N/A

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Electrostatic Discharge

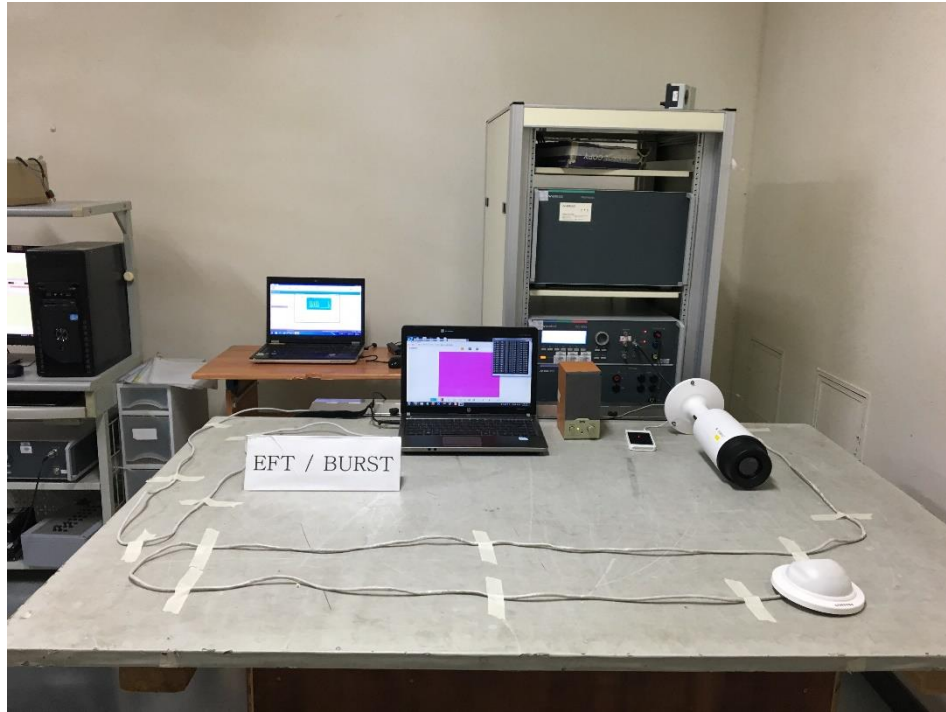


Radiated Electric Field Immunity

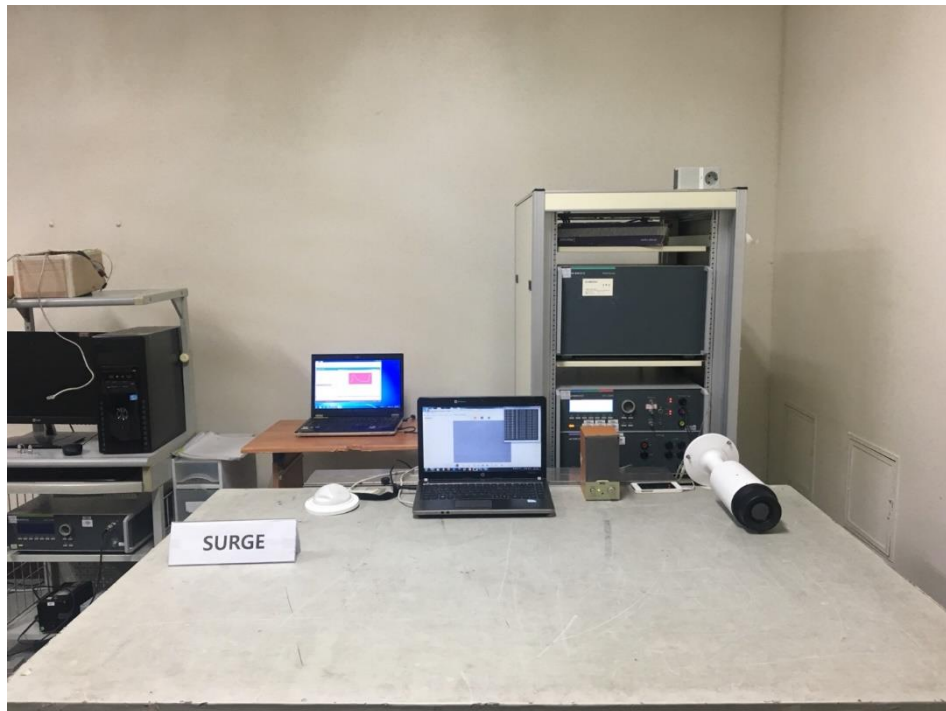


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Electrical Fast Transients/Bursts



Surge Transients



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Conducted Disturbance



Voltage Dips and Short Interruptions



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)



EUT Internal View – Board 1

(Top)



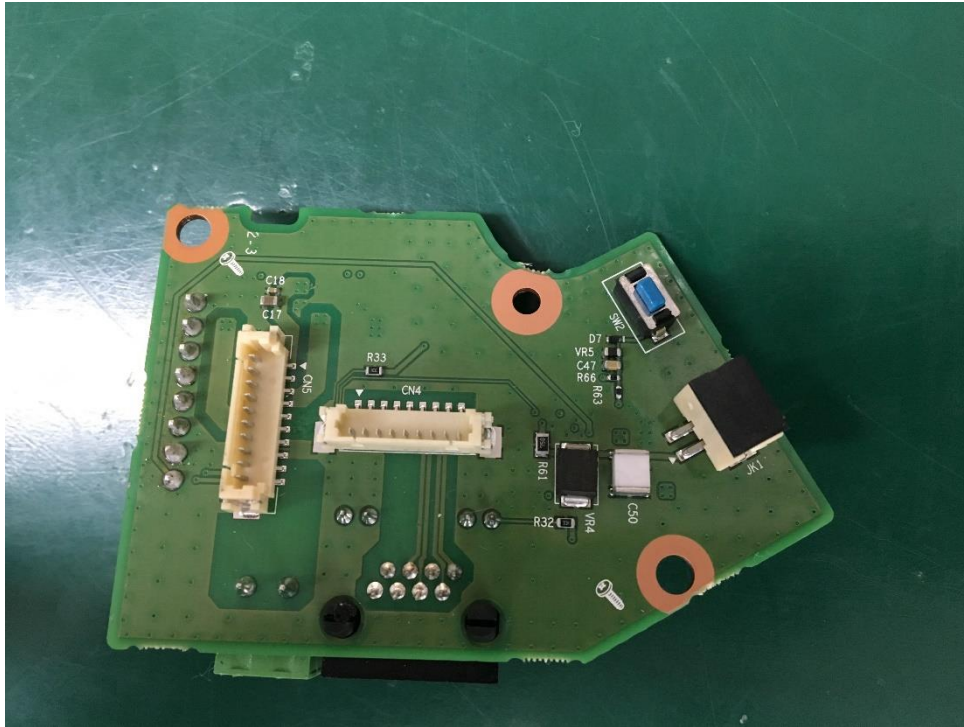
(Bottom)



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EUT Internal View – Board 2

(Top)



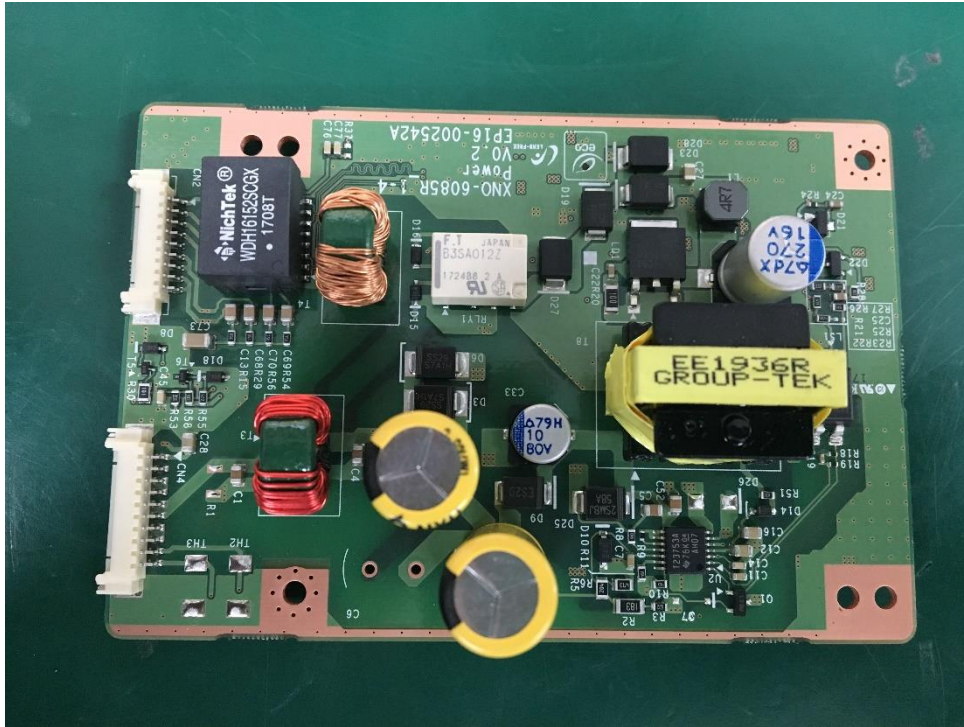
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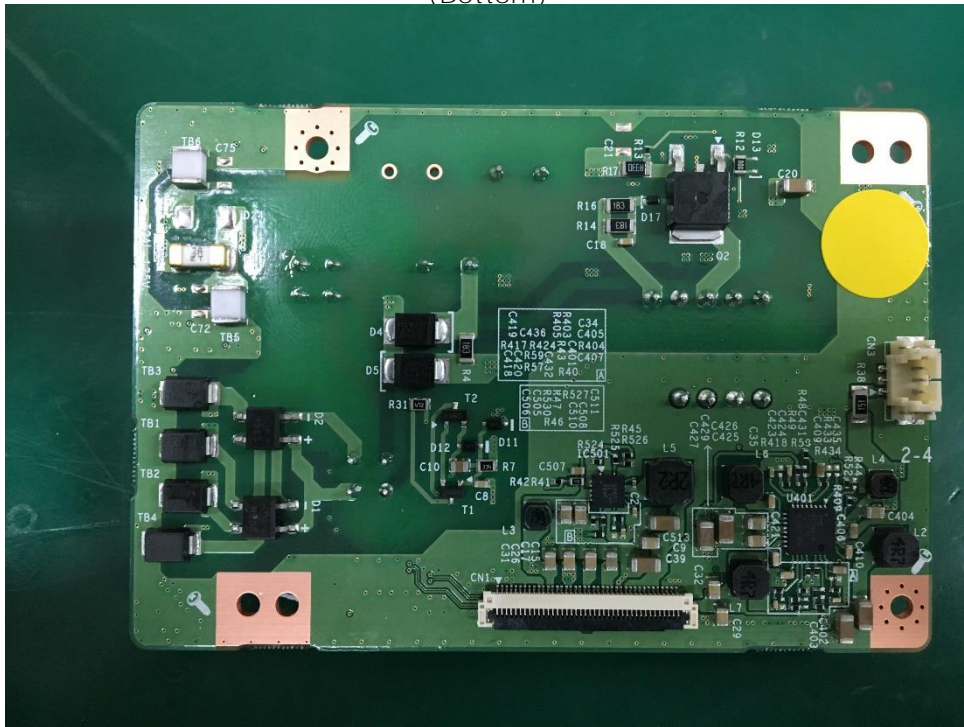
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EUT Internal View – Board 3

(Top)



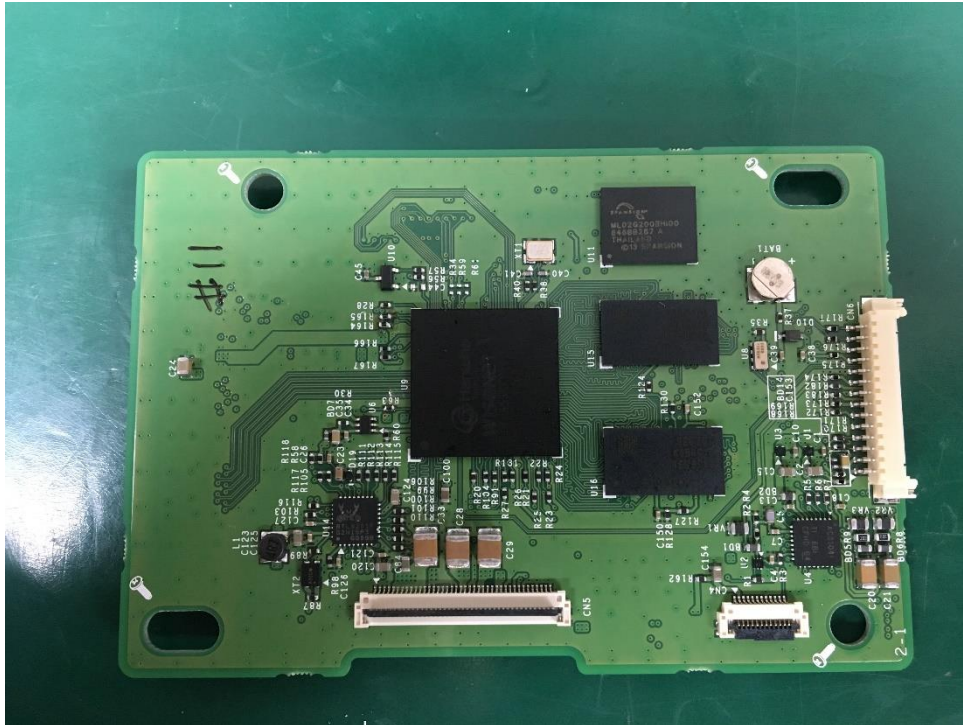
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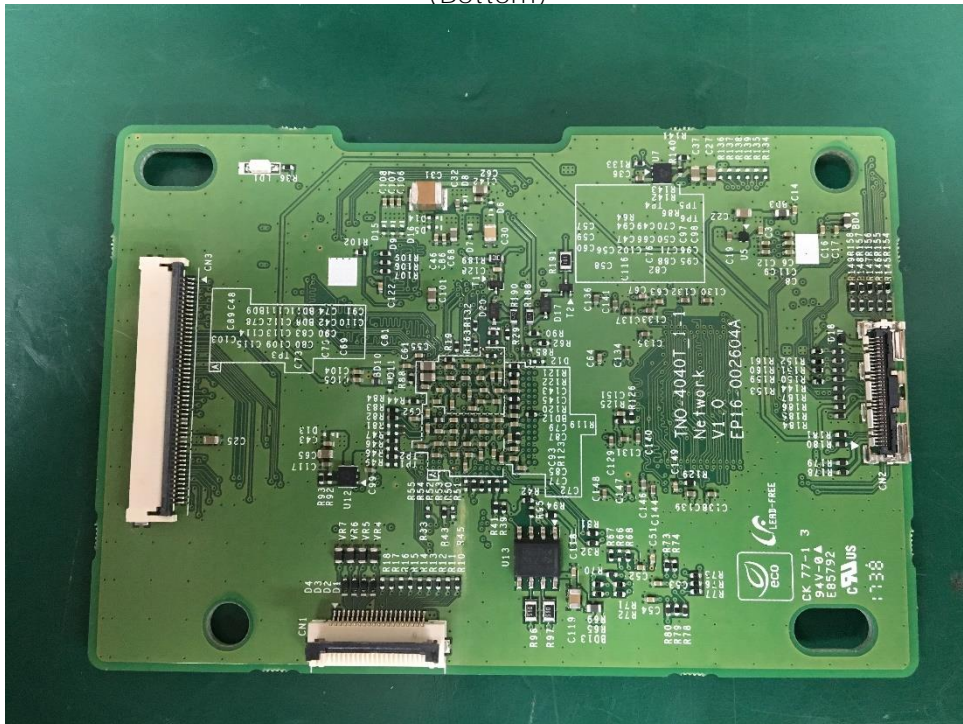
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EUT Internal View – Board 4

(Top)



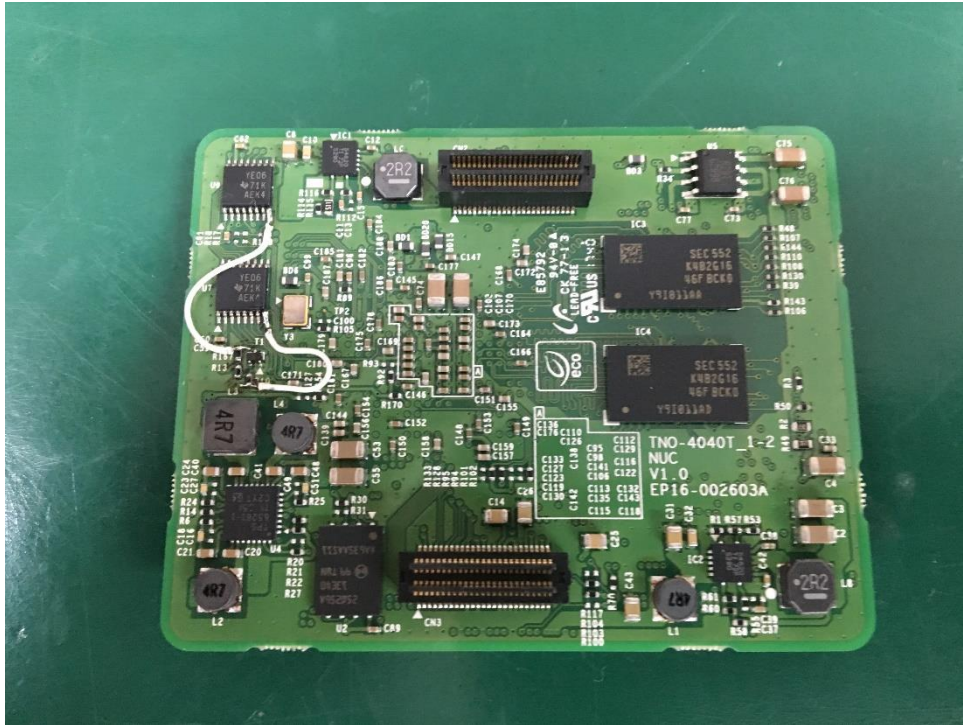
(Bottom)



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EUT Internal View – Board 5

(Top)



(Bottom)



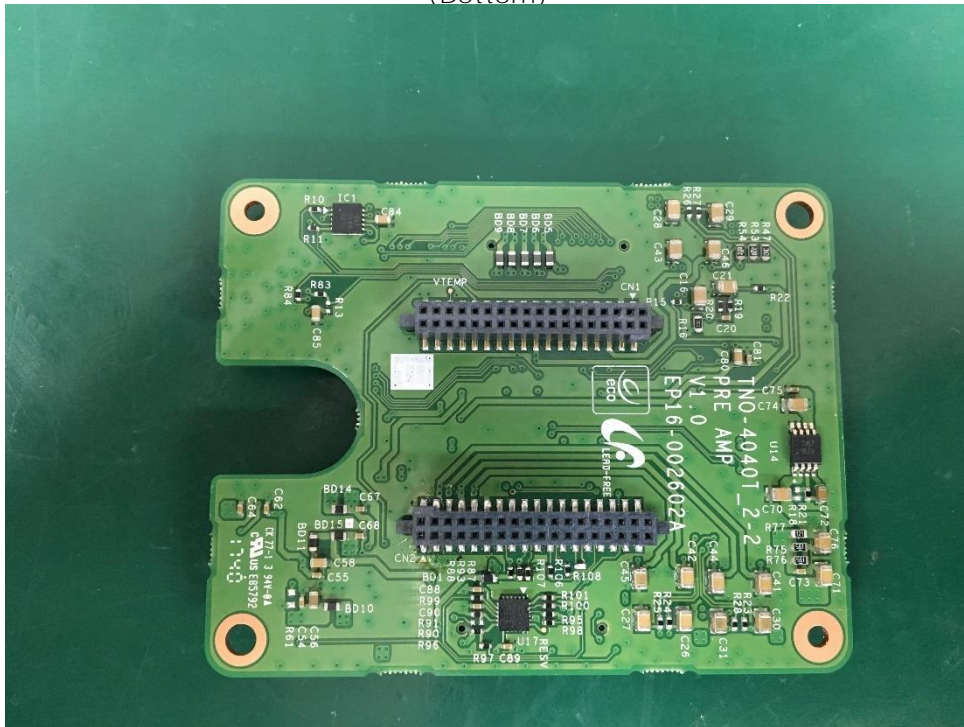
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EUT Internal View – Board 6

(Top)



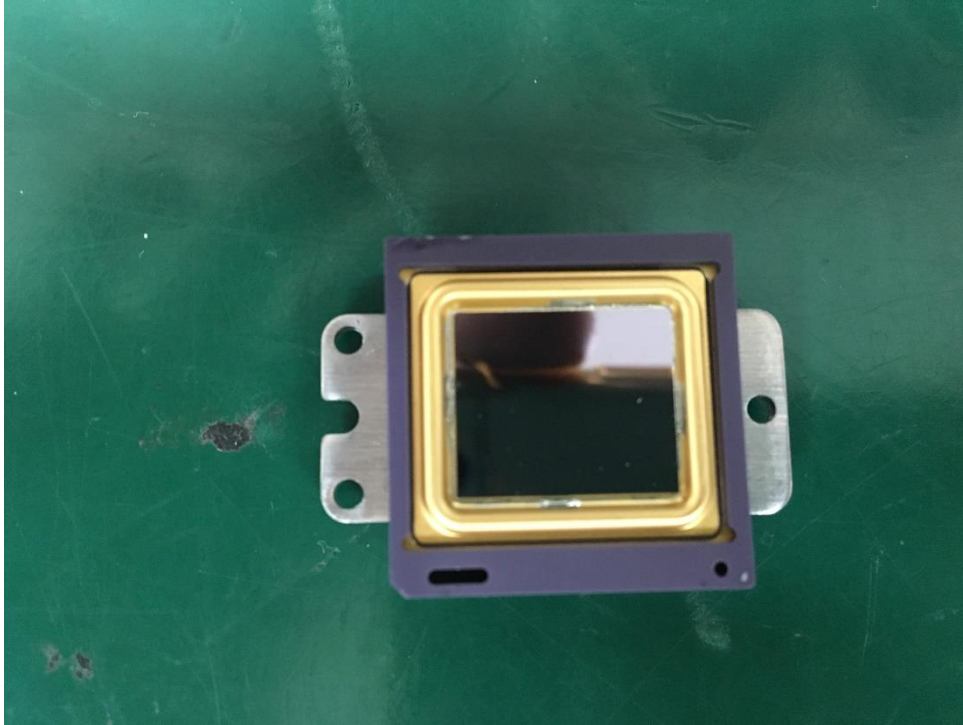
(Bottom)



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EUT Internal View – Lens 1

(Top)



(Bottom)



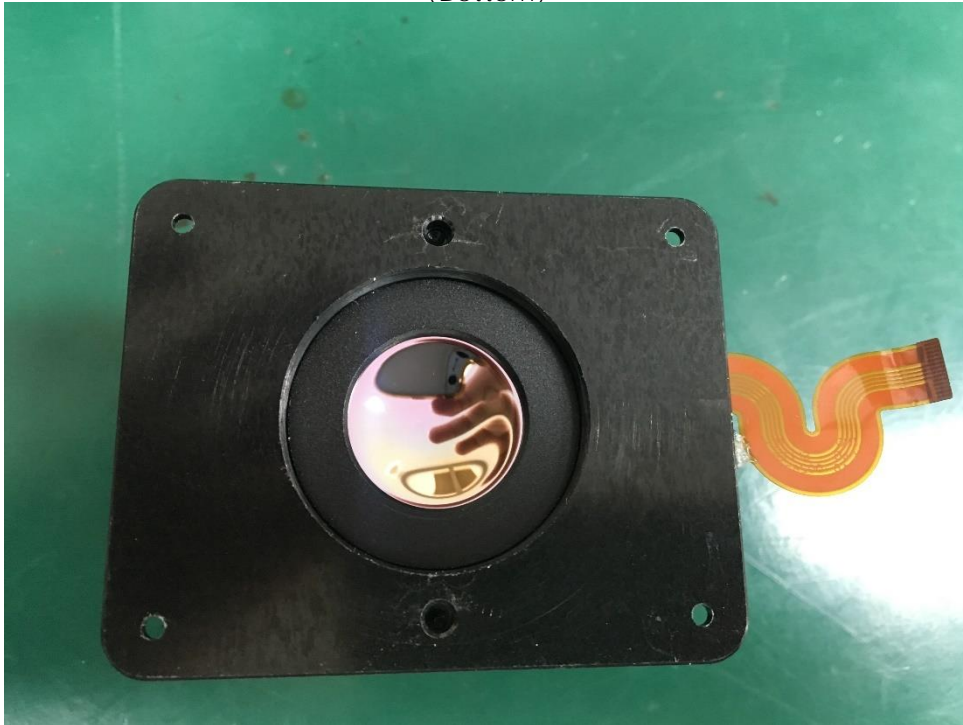
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EUT Internal View – Lens 2

(Top)

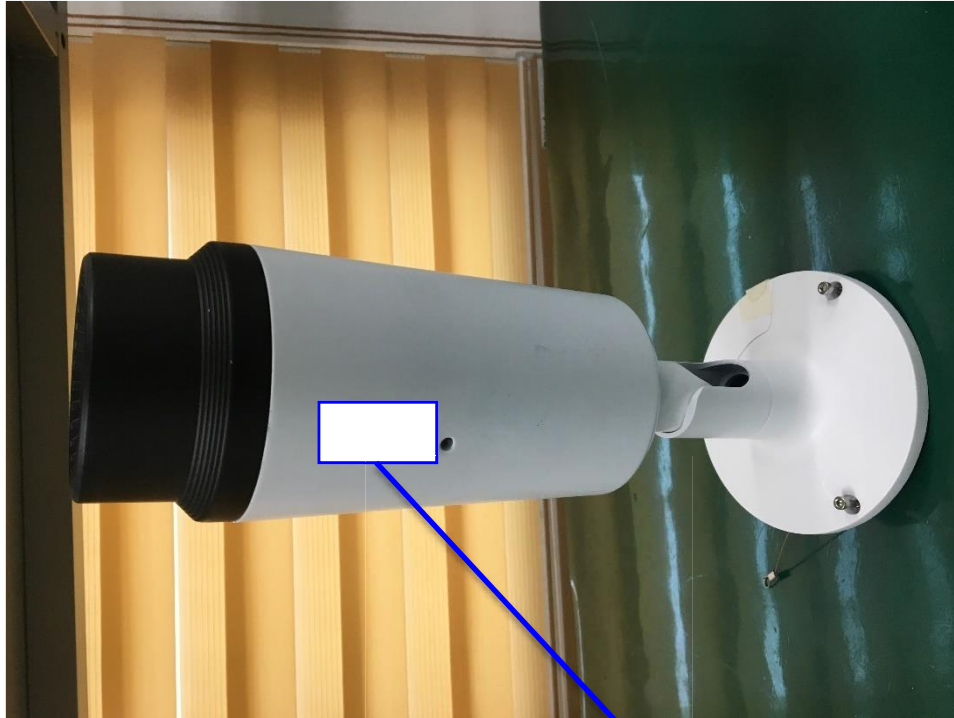


(Bottom)



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