

EMC TEST REPORT For VCCI

Test Report No. : KES-E1-17T0730
Date of Issue : Nov. 10, 2017
Product name : THERMAL CAMERA
Model/Type No. : TNO-4051TN
Variant Model : TNO-4041TN
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : No.11 Weiliu Rd, Micro-Electronic Industrial
Park, TEDA, Tianjin, 300385, People's Republic of China
Manufacturer : Hanwha Techwin Co., Ltd.
Manufacturer Address : No.11 Weiliu Rd, Micro-Electronic Industrial
Park, TEDA, Tianjin, 300385, People's Republic of China
Date of Receipt : Oct. 26, 2017
Test date : Nov. 05, 2017 ~ Nov. 06, 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 KOLAS.



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Test report No.:
KES-E1-17T0730
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 10, 2017	KES-E1-17T0730	Issued

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Test report No.:

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1.0 General Product Description

Main Specifications of EUT 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
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 - W/W : 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 Off / On (32ea, polygonal zones) - Color : Grey/Green/Red/Blue/Black/White - Mosaic
Privacy Masking	
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	RS485, RS422
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)
Audio Compression Format	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 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(MB-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(EEE802.3af)
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 ☐ 230 Vac ☐ 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-4051TN	–	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.	–
PTZ CONTROLLER	SPC-1010	–	–	
AC/DC Adapter	RS-AB1000	–	XEGPIS	
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
	RS-485 (2 Pin)	PTZ CONTROLLER	RS-485	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
	RS-485 (2 Pin)	PTZ CONTROLLER	RS-485	3.0	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	–	

* Unshielded=U, Shielded=S



1.7 EUT Operating Mode(s)

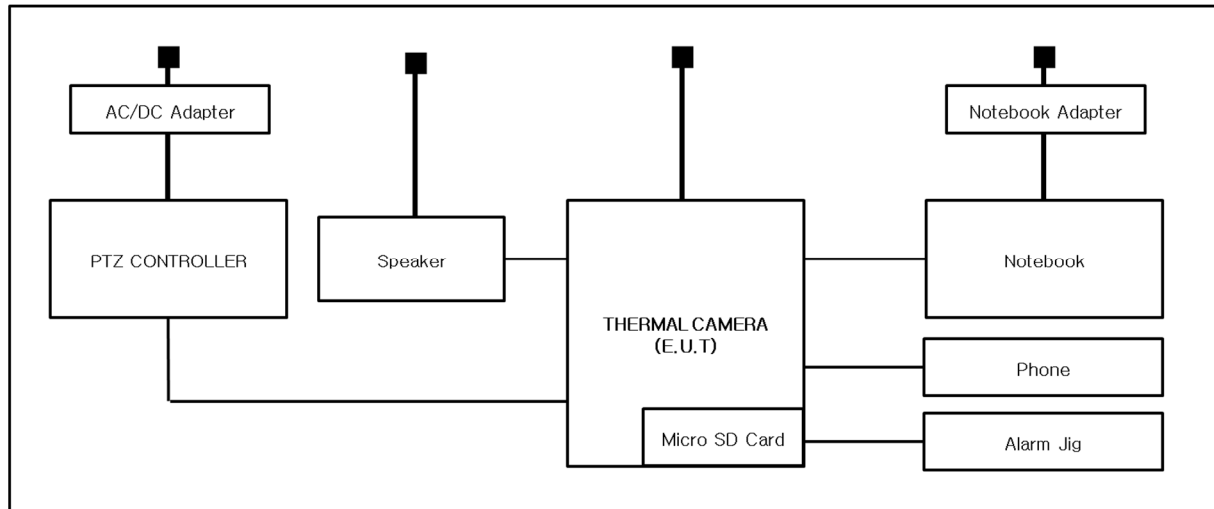
Test mode	operating
AC 24 V	E.U.T Monitoring, Ping Test
DC 12 V	
PoE	

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

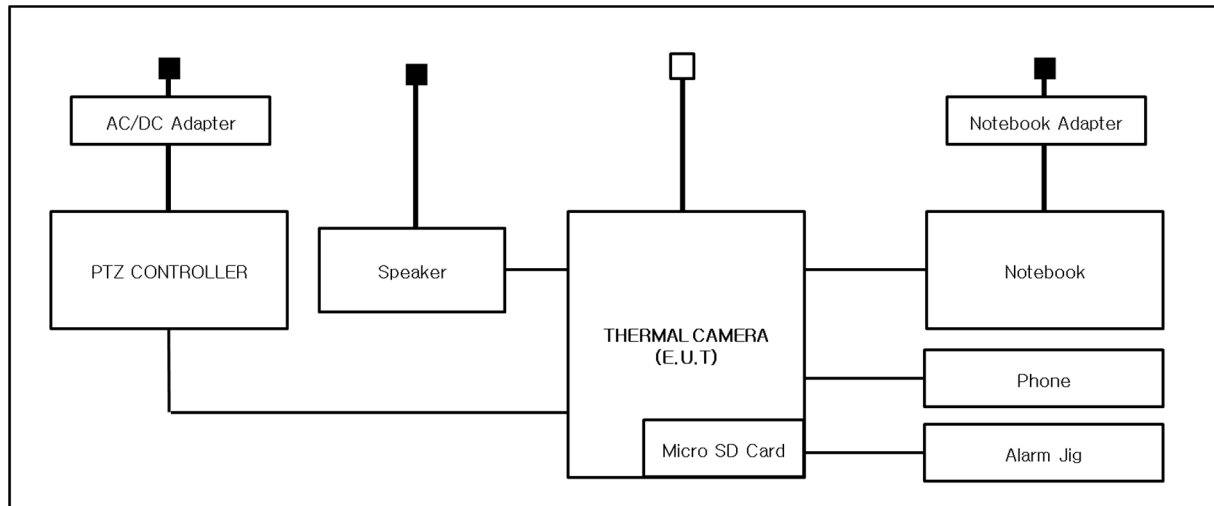
1.8 Configuration

■ AC Main
□ DC Main

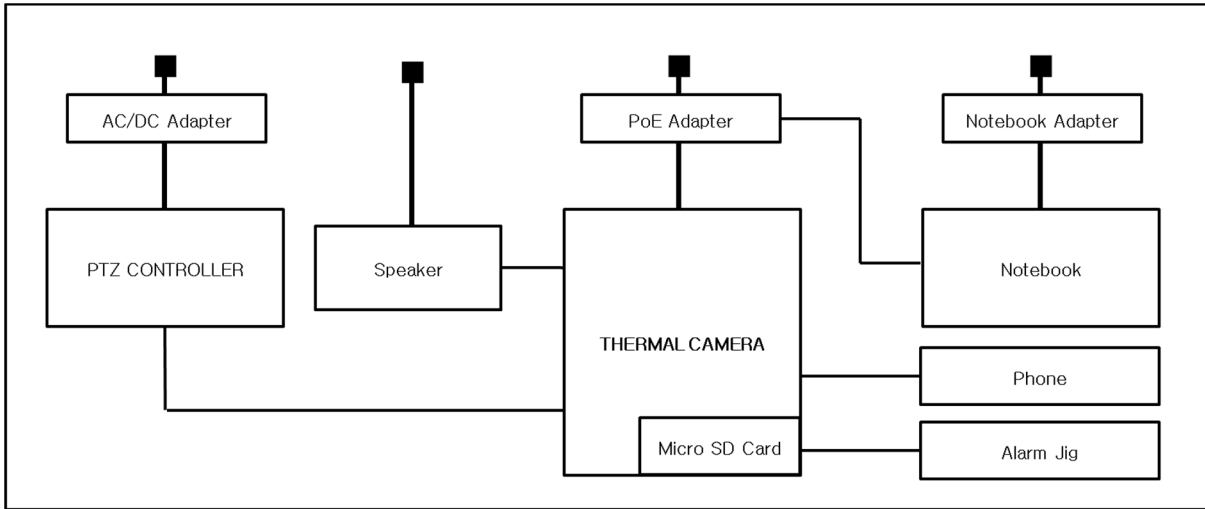
■ AC 24 V mode



■ 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
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	
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-4308, C-4798, T-2311, G-914
KOREA	MSIP	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1
Europe	CE	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	
International	KOLAS	EMI (10 meter Open Area Test Site and two conducted sites) Radio(3 & 10 meter Open Area Test Sites and one conducted site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	

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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 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010 +A1:2015

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



-
- | | | |
|---|---|----------------------------------|
| ☒ VCCI-CISPR 32 : 2016 | ☒ Class A | ☐ Class B |
| ☐ AS/NZS CISPR22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ 47 CFR Part 15, Subpart B | | |
| ☐ CISPR 22:2009 +A1:2010 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2009 | | |
| ☐ IC Regulation ICES-003 : 2016 | | |
| ☐ CAN/CSA CISPR 22-10 | ☐ Class A | ☐ Class B |
| ☐ ANSI C63.4-2014 | | |
|
☐ RE- Directive 2014/53/EU | | |
| ☐ EN 301 489-1 V1.9.2 | | |
| ☐ Equipment for fixed use | | |
| ☐ Equipment for vehicular use | | |
| ☐ Equipment for portable use | | |
| ☐ EN 301 489-3 V1.6.1 | | |
| ☐ EN 301 489-17 V2.2.1 | | |
| ☐ EN 60945:2002 | | |



2.1 Conducted Emissions Mains Power Ports

Test Date

Nov. 06, 2017

Test Location

Electro wave Shieldroom

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	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 11, 2018
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	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

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	101781	04, 27, 2018
☒	LISN	ENV216	R & S	101787	01, 11, 2018
☒	LISN	ESH2-Z5	R & S	100450	04, 27, 2018
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 13, 2017
☒	8-WIRE ISN CAT3,5	ENY81	R & S	100174	01, 11, 2018
☐	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	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

RemarksSee Appendix A for test data.

2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Nov. 06, 2017

Test Location☐ OPEN AREA TEST SITE #1 ☒ SAC #4(10 m)**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. 18, 2018
☒	AMPLIFIER	SCU 01	R & S	100603	12. 13, 2017
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	716	11. 28, 2018

Test Conditions

Temperature: 19,7 °C

Relative Humidity: 43,2 %

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.

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
☒	EMI Test S/W	e3	AUDIX	8.083b	-
☒	EMI TEST RECEIVER	ESU26	R & S	100552	04, 19, 2018
☒	PREAMPLIFIER	8449B	AGILENT	3008A01729	05, 31, 2018
☒	ATTENUATOR	8491A	HP	35496	03, 24, 2018
☒	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

RemarksSee Appendix A for test data.

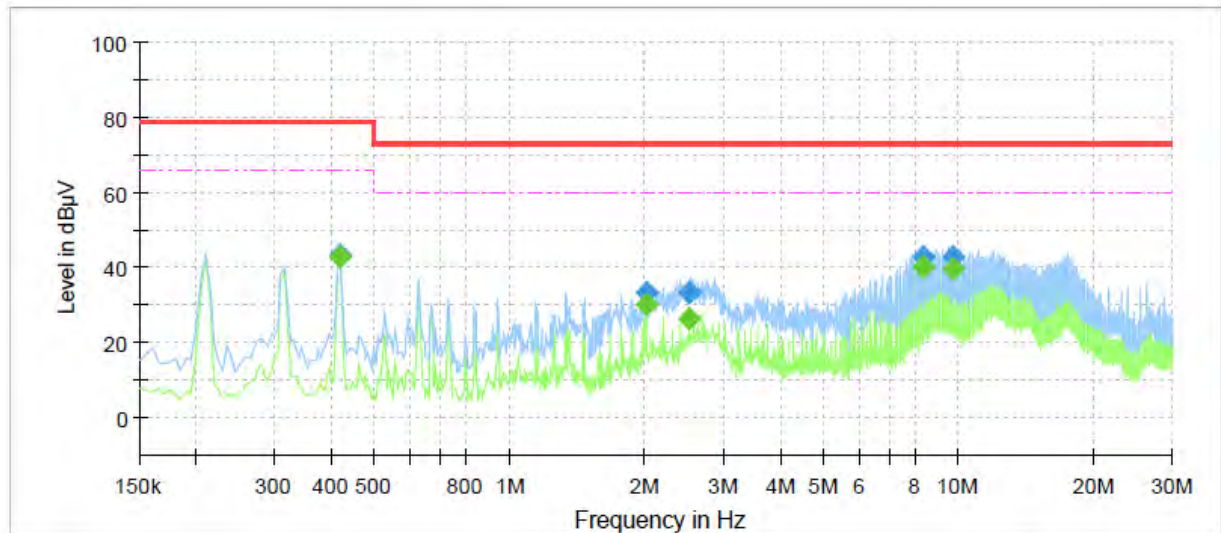
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

■ AC 24 mode
[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4051TN
Mode	AC 24 V
Operator Name:	KES



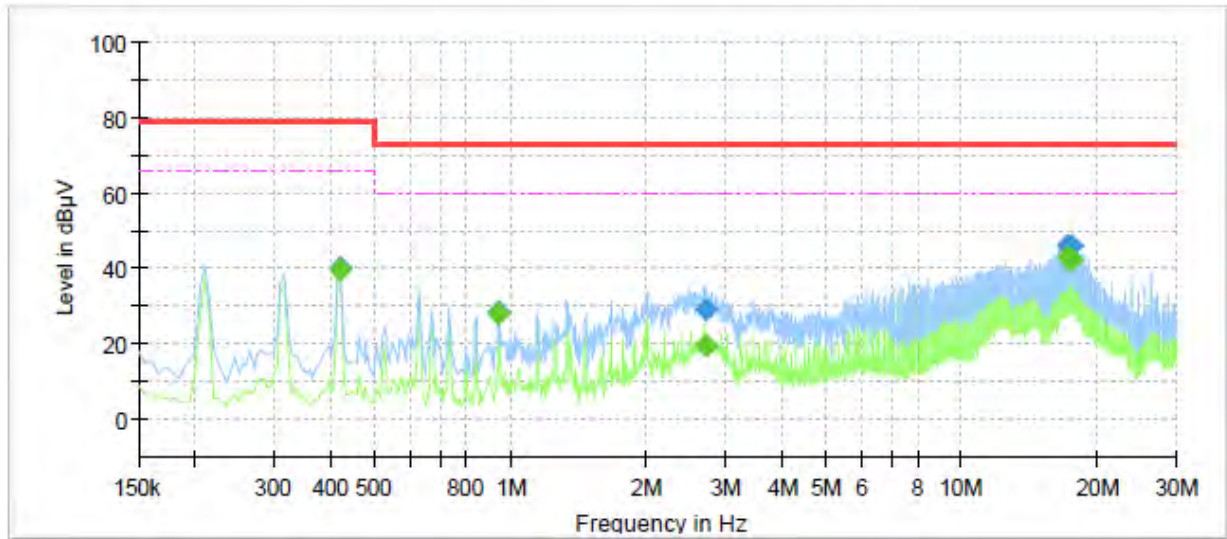
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.420000	---	42.75	66.00	23.25	1000.0	9.000	L1	19.7
0.420000	43.24	---	79.00	35.76	1000.0	9.000	L1	19.7
2.010000	---	30.38	60.00	29.62	1000.0	9.000	L1	20.3
2.010000	33.56	---	73.00	39.44	1000.0	9.000	L1	20.3
2.510000	---	26.40	60.00	33.60	1000.0	9.000	L1	20.2
2.510000	33.41	---	73.00	39.59	1000.0	9.000	L1	20.2
8.375000	---	40.28	60.00	19.72	1000.0	9.000	L1	19.9
8.375000	42.99	---	73.00	30.01	1000.0	9.000	L1	19.9
9.735000	---	39.64	60.00	20.36	1000.0	9.000	L1	20.0
9.735000	42.66	---	73.00	30.34	1000.0	9.000	L1	20.0

[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4051TN
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)
0.420000	---	39.75	66.00	26.25	1000.0	9.000	N	19.7
0.420000	40.18	---	79.00	38.82	1000.0	9.000	N	19.7
0.940000	---	28.24	60.00	31.76	1000.0	9.000	N	20.1
0.940000	28.78	---	73.00	44.22	1000.0	9.000	N	20.1
2.700000	---	19.87	60.00	40.13	1000.0	9.000	N	20.2
2.700000	29.17	---	73.00	43.83	1000.0	9.000	N	20.2
17.270000	---	42.78	60.00	17.22	1000.0	9.000	N	20.2
17.270000	46.05	---	73.00	26.95	1000.0	9.000	N	20.2
17.480000	---	42.54	60.00	17.46	1000.0	9.000	N	20.3
17.480000	46.03	---	73.00	26.97	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))

Conducted Emissions at Telecommunication Ports

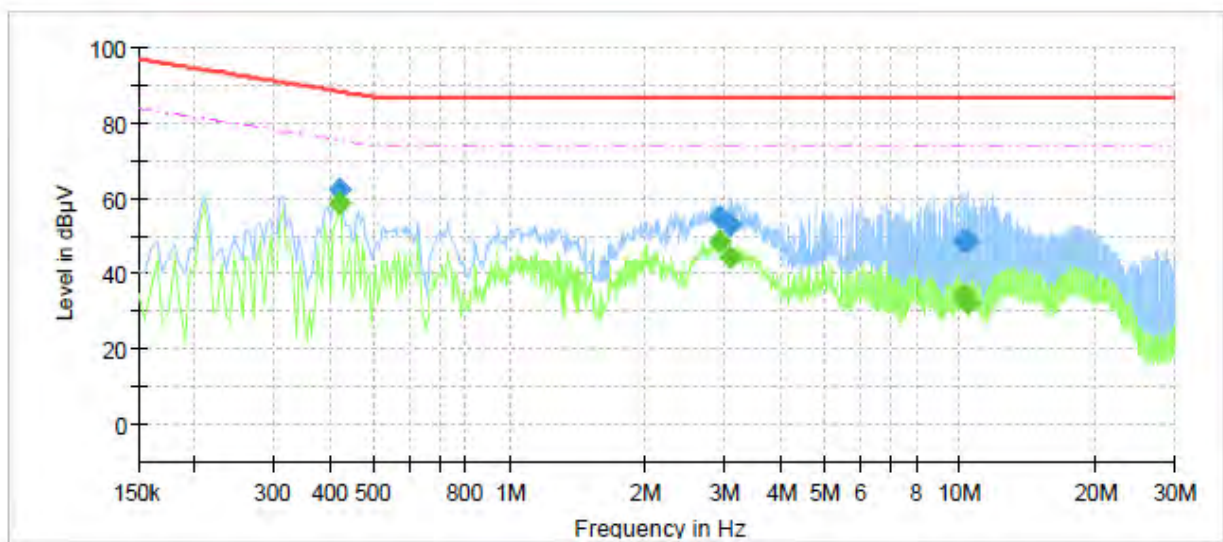
■ AC 24 V mode

[10 Mbps]

Common Information

Test Description:
Model No.:
Mode
Operator Name:

Telecommunication Emission
TNO-4051TN
AC 24 V_10 Mbps
KES



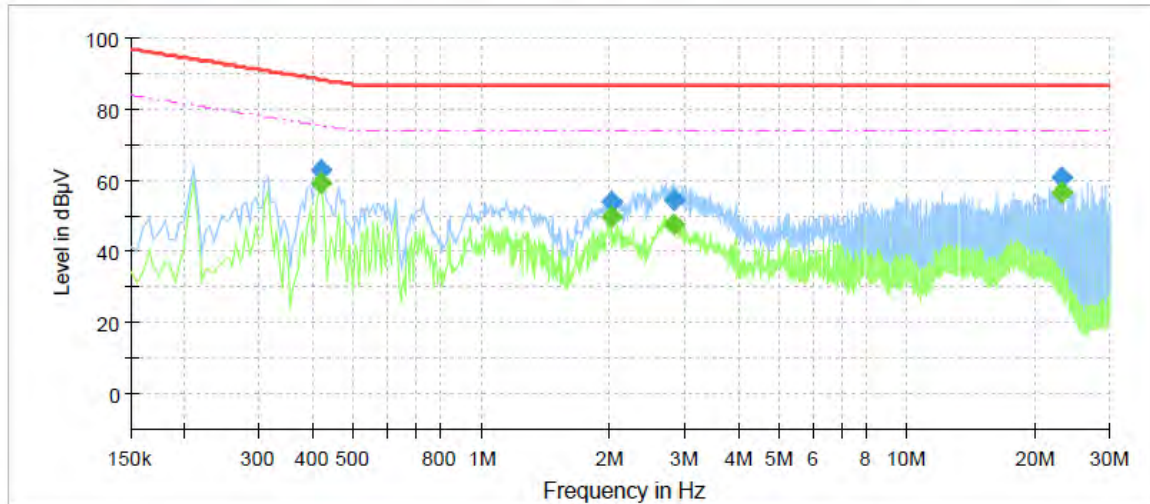
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.420000	---	58.51	75.45	16.94	1000.0	9.000	Single Line	19.6
0.420000	62.33	---	88.45	26.12	1000.0	9.000	Single Line	19.6
2.930000	---	48.48	74.00	25.52	1000.0	9.000	Single Line	19.9
2.930000	55.24	---	87.00	31.76	1000.0	9.000	Single Line	19.9
3.105000	---	44.55	74.00	29.45	1000.0	9.000	Single Line	19.9
3.105000	53.07	---	87.00	33.93	1000.0	9.000	Single Line	19.9
10.190000	---	34.18	74.00	39.82	1000.0	9.000	Single Line	19.8
10.190000	48.74	---	87.00	38.26	1000.0	9.000	Single Line	19.8
10.405000	---	32.16	74.00	41.84	1000.0	9.000	Single Line	19.8
10.405000	48.77	---	87.00	38.23	1000.0	9.000	Single Line	19.8

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4051TN
Mode	AC 24 V_100 Mbps
Operator Name:	KES



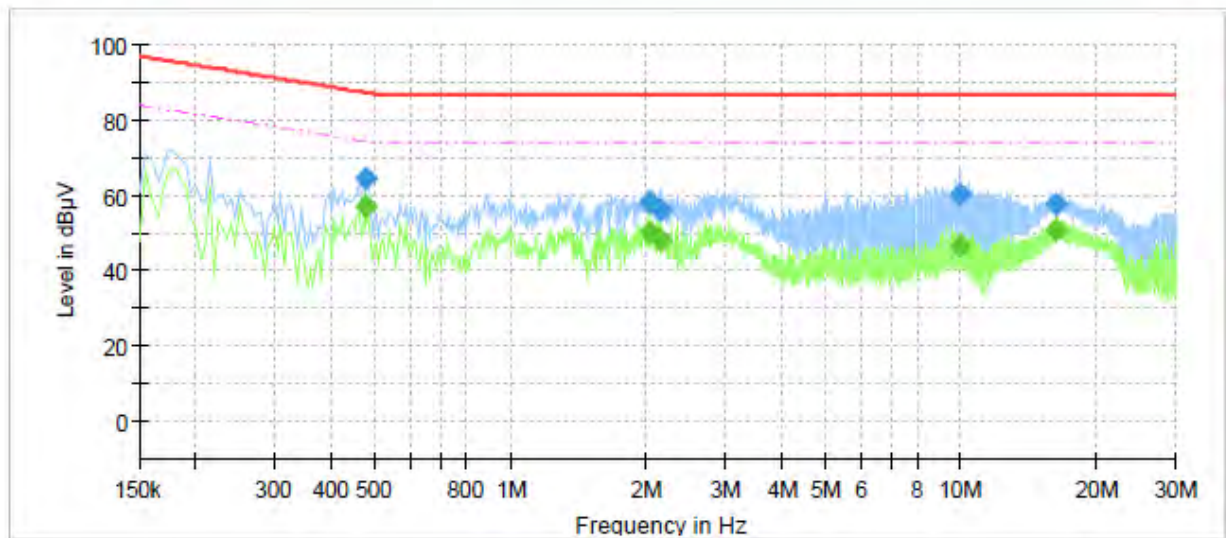
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.420000	---	59.34	75.45	16.11	1000.0	9.000	Single Line	19.9
0.420000	63.10	---	88.45	25.35	1000.0	9.000	Single Line	19.9
2.010000	---	49.57	74.00	24.43	1000.0	9.000	Single Line	20.3
2.010000	53.91	---	87.00	33.09	1000.0	9.000	Single Line	20.3
2.840000	---	47.45	74.00	26.55	1000.0	9.000	Single Line	20.2
2.840000	54.53	---	87.00	32.47	1000.0	9.000	Single Line	20.2
23.130000	---	56.85	74.00	17.15	1000.0	9.000	Single Line	20.6
23.130000	60.71	---	87.00	26.29	1000.0	9.000	Single Line	20.6

■ DC 12 V mode
[10 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4051TN
Mode	DC 12 V_10 Mbps
Operator Name:	KES



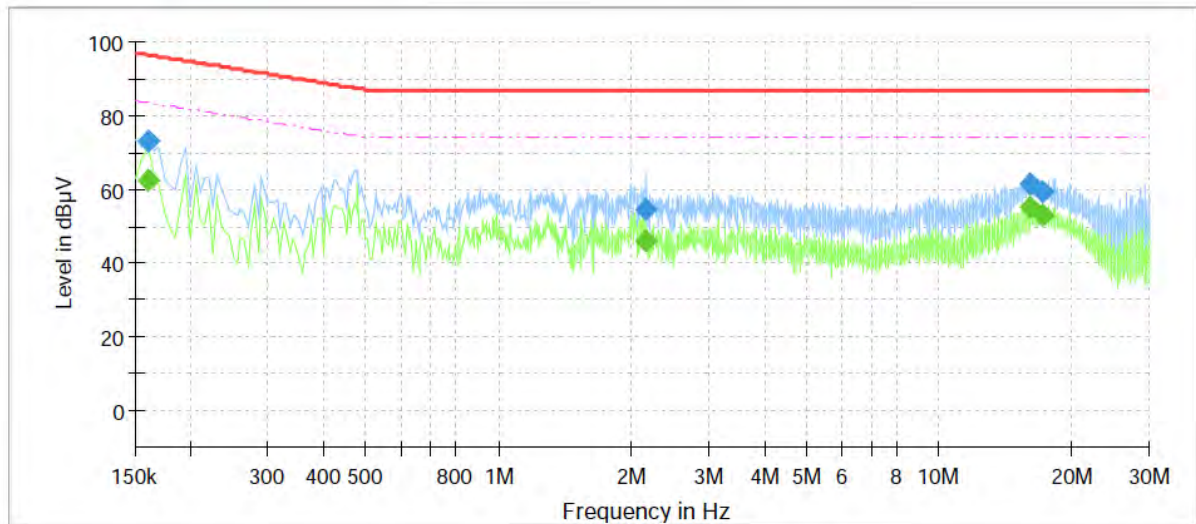
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.475000	---	57.38	74.43	17.05	1000.0	9.000	Single Line	19.7
0.475000	64.66	---	87.43	22.77	1000.0	9.000	Single Line	19.7
2.040000	---	50.49	74.00	23.51	1000.0	9.000	Single Line	20.0
2.040000	57.96	---	87.00	29.04	1000.0	9.000	Single Line	20.0
2.145000	---	48.14	74.00	25.86	1000.0	9.000	Single Line	20.0
2.145000	56.06	---	87.00	30.94	1000.0	9.000	Single Line	20.0
9.990000	---	46.35	74.00	27.65	1000.0	9.000	Single Line	19.8
9.990000	60.14	---	87.00	26.86	1000.0	9.000	Single Line	19.8
16.265000	---	50.98	74.00	23.02	1000.0	9.000	Single Line	20.0
16.265000	57.51	---	87.00	29.49	1000.0	9.000	Single Line	20.0

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4051TN
Mode	DC 12 V_100 Mbps
Operator Name:	KES



Final Result

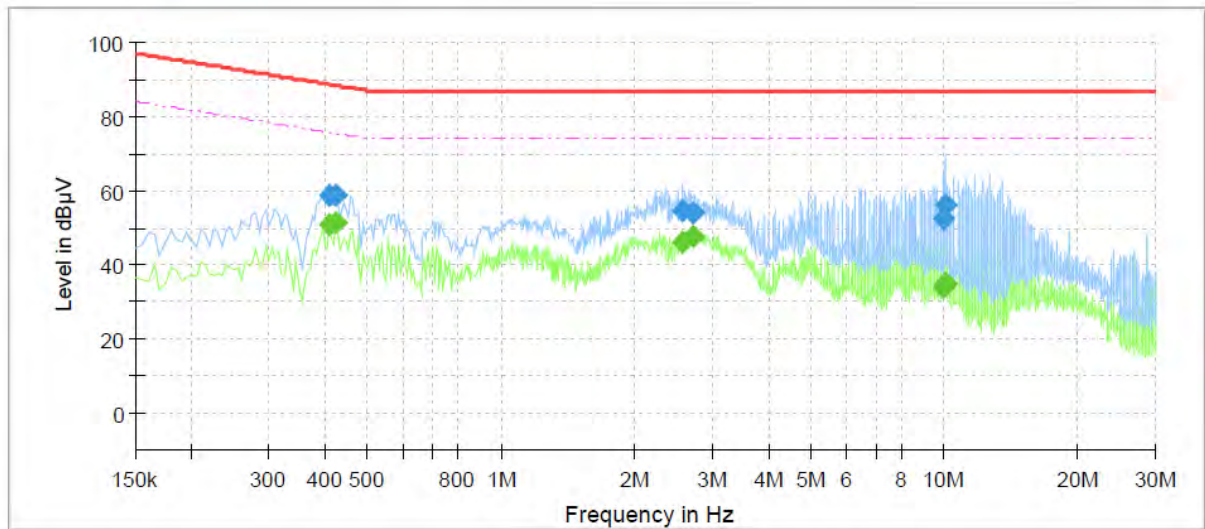
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	62.34	83.46	21.12	1000.0	9.000	Single Line	20.1
0.160000	73.20	---	96.46	23.26	1000.0	9.000	Single Line	20.1
2.160000	---	46.19	74.00	27.81	1000.0	9.000	Single Line	20.3
2.160000	54.62	---	87.00	32.38	1000.0	9.000	Single Line	20.3
16.165000	---	55.16	74.00	18.84	1000.0	9.000	Single Line	20.2
16.165000	61.32	---	87.00	25.68	1000.0	9.000	Single Line	20.2
17.195000	---	52.95	74.00	21.05	1000.0	9.000	Single Line	20.3
17.195000	59.10	---	87.00	27.90	1000.0	9.000	Single Line	20.3



■ PoE mode
[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4051TN
Mode: PoE_10 Mbps
Operator Name: KES



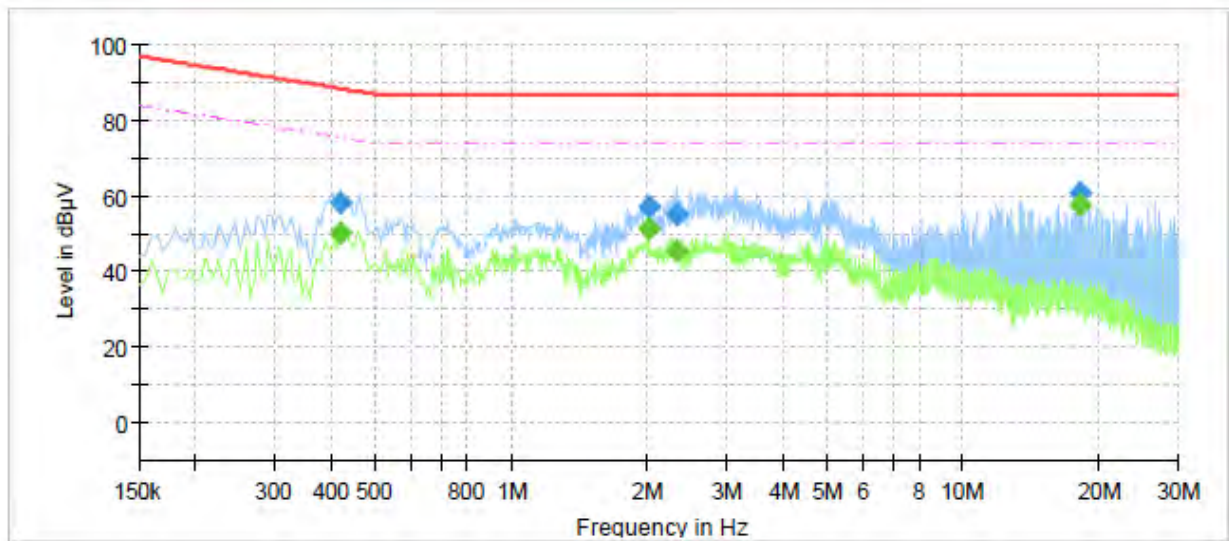
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.410000	---	50.64	75.65	25.01	1000.0	9.000	Single Line	19.6
0.410000	58.79	---	88.65	29.86	1000.0	9.000	Single Line	19.6
0.425000	---	51.24	75.35	24.11	1000.0	9.000	Single Line	19.6
0.425000	58.57	---	88.35	29.78	1000.0	9.000	Single Line	19.6
2.570000	---	45.90	74.00	28.10	1000.0	9.000	Single Line	19.9
2.570000	54.47	---	87.00	32.53	1000.0	9.000	Single Line	19.9
2.720000	---	47.48	74.00	26.52	1000.0	9.000	Single Line	19.9
2.720000	54.17	---	87.00	32.83	1000.0	9.000	Single Line	19.9
9.960000	---	33.71	74.00	40.29	1000.0	9.000	Single Line	19.8
9.960000	52.53	---	87.00	34.47	1000.0	9.000	Single Line	19.8
10.010000	---	35.07	74.00	38.93	1000.0	9.000	Single Line	19.8
10.010000	56.19	---	87.00	30.81	1000.0	9.000	Single Line	19.8

[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4051TN
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)
0.420000	---	50.38	75.45	25.07	1000.0	9.000	Single Line	19.9
0.420000	58.34	---	88.45	30.11	1000.0	9.000	Single Line	19.9
2.010000	---	51.35	74.00	22.65	1000.0	9.000	Single Line	20.3
2.010000	57.25	---	87.00	29.75	1000.0	9.000	Single Line	20.3
2.320000	---	45.75	74.00	28.25	1000.0	9.000	Single Line	20.2
2.320000	55.14	---	87.00	31.86	1000.0	9.000	Single Line	20.2
18.245000	---	57.46	74.00	16.54	1000.0	9.000	Single Line	20.3
18.245000	60.74	---	87.00	26.26	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))



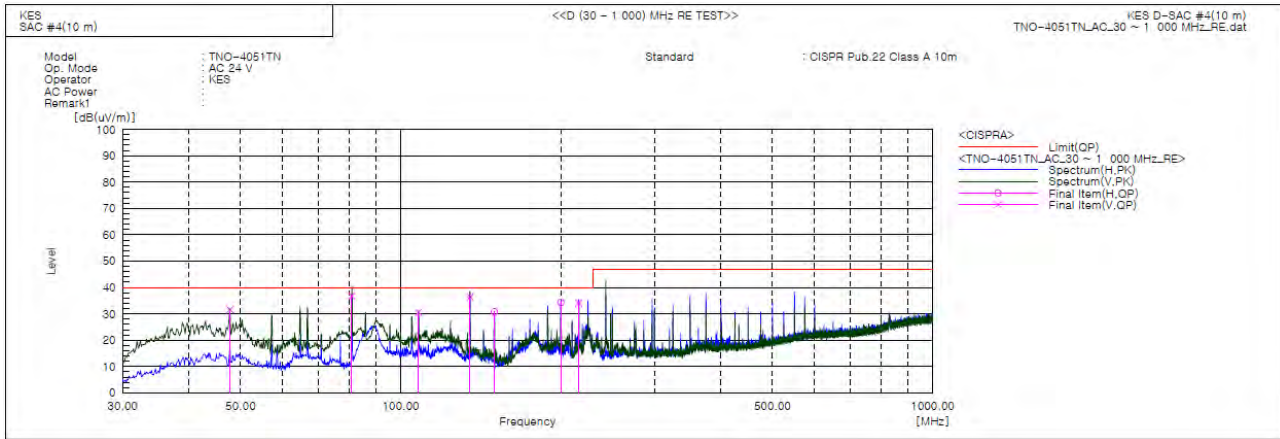
KES Co., Ltd.

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

Test report No.:
KES-E1-17T0730
Page (25) of (46)

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	47.762	V	59.4	-27.8	31.6	40.0	8.4	118.0	75.0	
2	80.894	V	70.4	-33.6	36.8	40.0	3.2	108.0	199.0	
3	108.062	V	59.5	-28.9	30.6	40.0	9.4	172.0	340.0	
4	135.006	V	68.2	-31.8	36.4	40.0	3.6	124.0	246.0	
5	149.992	H	62.1	-31.3	30.8	40.0	9.2	200.0	210.0	
6	200.030	H	61.0	-26.7	34.3	40.0	5.7	284.0	236.0	
7	216.097	V	60.5	-26.4	34.1	40.0	5.9	156.0	318.0	

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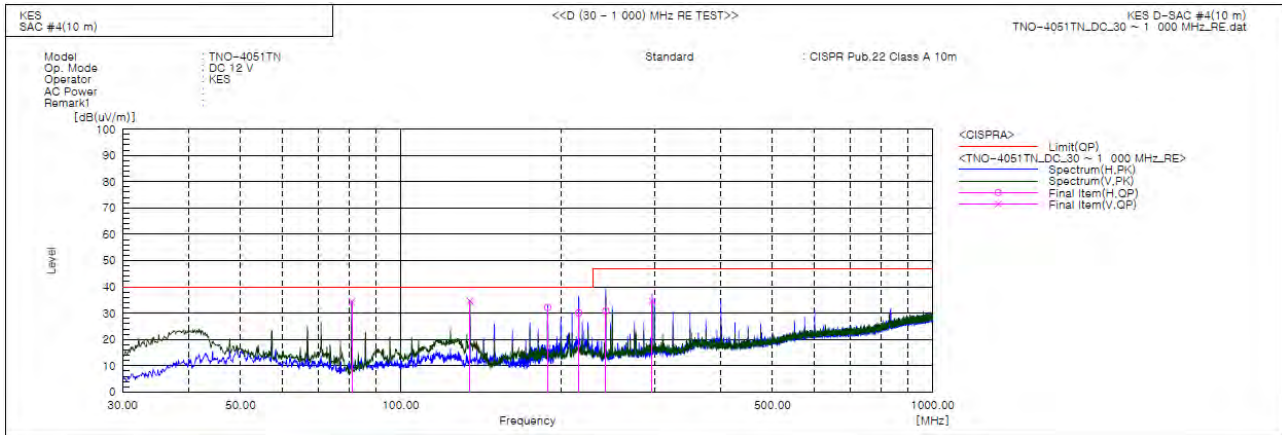
C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-17T0730

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■ DC 12 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	80.925	V	68.0	-33.6	34.4	40.0	5.6	131.0	239.0	
2	135.003	V	66.4	-31.8	34.6	40.0	5.4	100.0	181.0	
3	188.959	H	60.2	-28.0	32.2	40.0	7.8	191.0	217.0	
4	216.162	H	56.5	-26.4	30.1	40.0	9.9	200.0	71.0	
5	243.066	H	56.4	-25.5	30.9	47.0	16.1	200.0	200.0	
6	296.993	V	58.4	-23.9	34.5	47.0	12.5	194.0	237.0	

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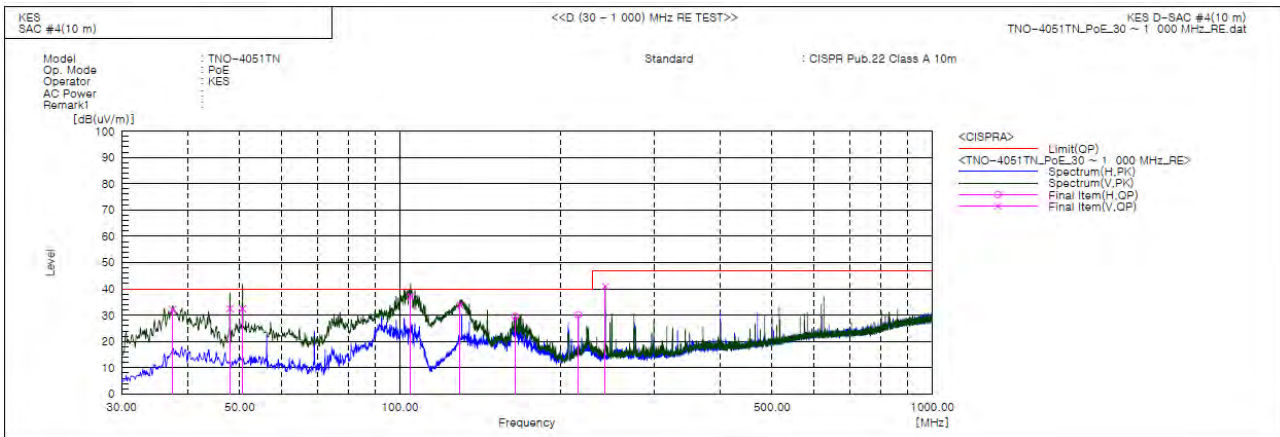
C-3701, Simin-daero 365-40,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:

KES-E1-17T0730

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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	37.396	V	62.5	-30.4	32.1	40.0	7.9	126.0	333.0	
2	47.945	V	60.3	-27.8	32.5	40.0	7.5	100.0	12.0	
3	50.613	V	60.2	-27.7	32.5	40.0	7.5	150.0	23.0	
4	104.662	V	65.5	-28.5	37.0	40.0	3.0	192.0	158.0	
5	129.668	V	65.5	-31.7	33.8	40.0	6.2	220.0	132.0	
6	164.466	H	60.2	-30.6	29.6	40.0	10.4	226.0	4.0	
7	216.240	H	56.5	-26.4	30.1	40.0	9.9	400.0	218.0	
8	243.036	V	66.5	-25.5	41.0	47.0	6.0	100.0	33.0	

◆ Calculation

Corrected Amplitude [dBuV] = Amplitude[dBuV] + Correction Factor [dB]

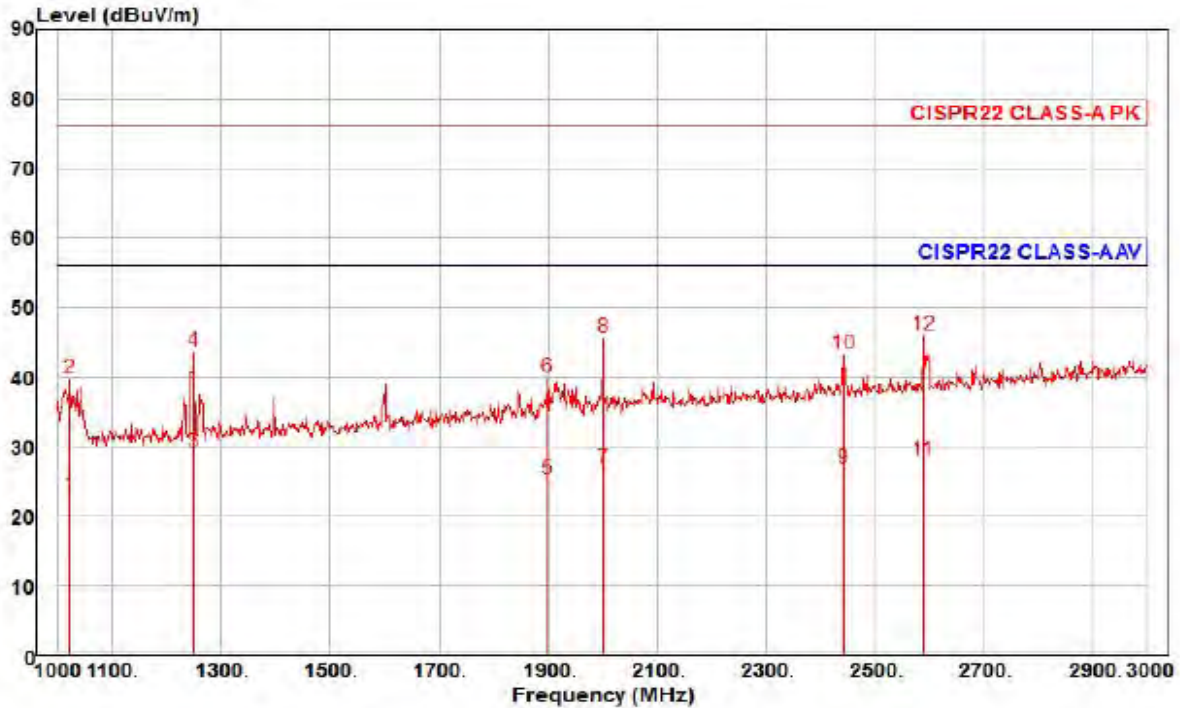
Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss

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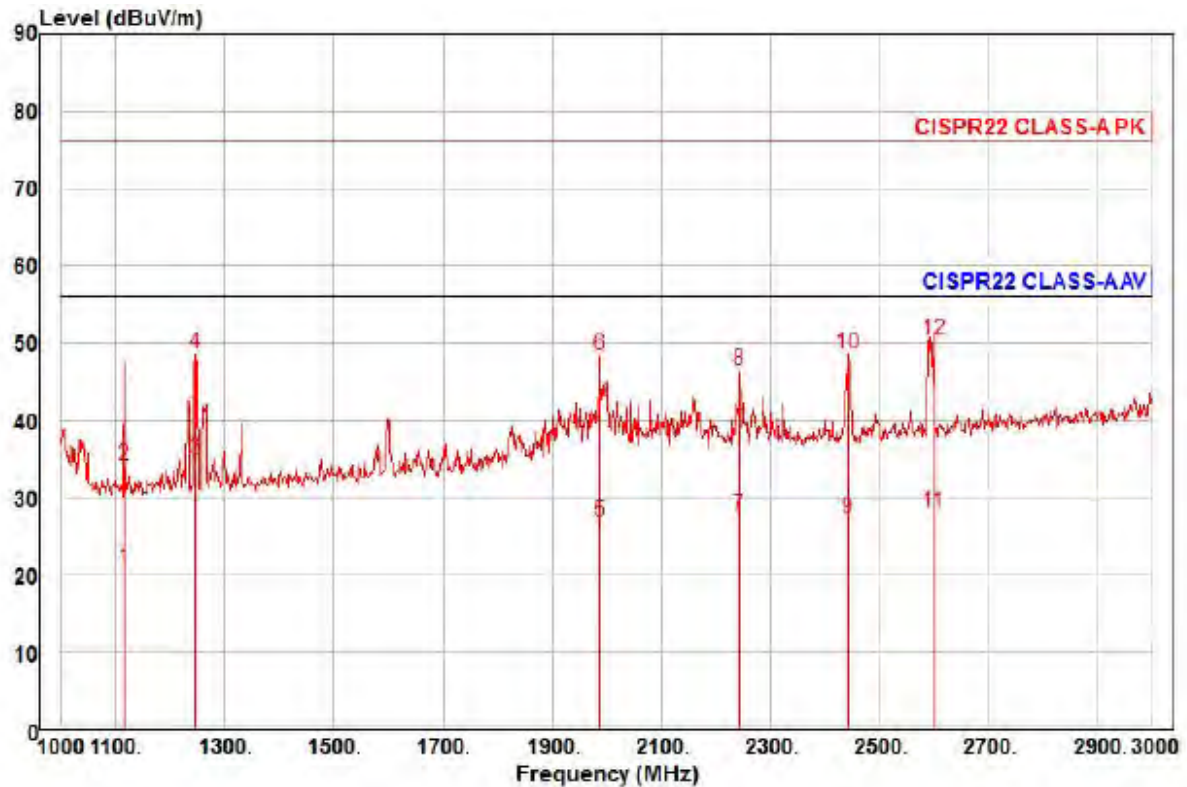
Radiated Electric Field Emissions(Above 1 GHz)

■ AC 24 V mode



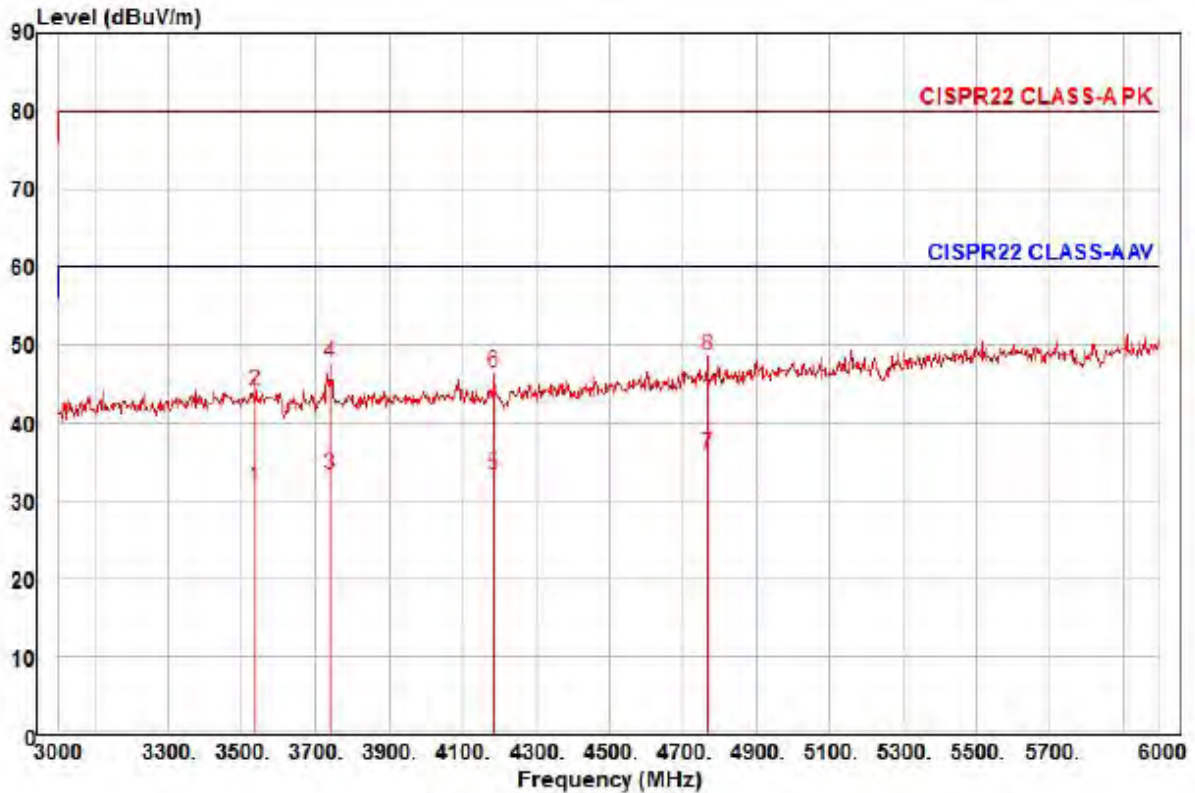
Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4051TN
Mode : AC 24 V
Memo : 1 ~ 3 GHz

	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	1022.00	29.87	22.57	6.71	36.16	155	56.00	-33.01	horizontal	Average
2	1022.00	46.62	22.57	6.71	36.16	155	76.00	-36.26	horizontal	Peak
3 pp	1248.00	34.29	23.25	7.44	35.79	63	56.00	-26.81	horizontal	Average
4	1248.00	48.80	23.25	7.44	35.79	63	76.00	-32.30	horizontal	Peak
5	1898.00	24.96	25.60	9.36	34.70	239	56.00	-30.78	horizontal	Average
6	1898.00	39.75	25.60	9.36	34.70	239	76.00	-35.99	horizontal	Peak
7	2000.00	25.79	26.01	9.65	34.53	257	56.00	-29.08	horizontal	Average
8	2000.00	44.54	26.01	9.65	34.53	257	76.00	-30.33	horizontal	Peak
9	2442.00	23.13	27.35	10.69	34.23	206	56.00	-29.06	horizontal	Average
10	2442.00	39.54	27.35	10.69	34.23	206	76.00	-32.65	horizontal	Peak
11	2590.00	23.23	27.93	11.04	34.12	54	56.00	-27.92	horizontal	Average
12 pk	2590.00	41.18	27.93	11.04	34.12	54	76.00	-29.97	horizontal	Peak



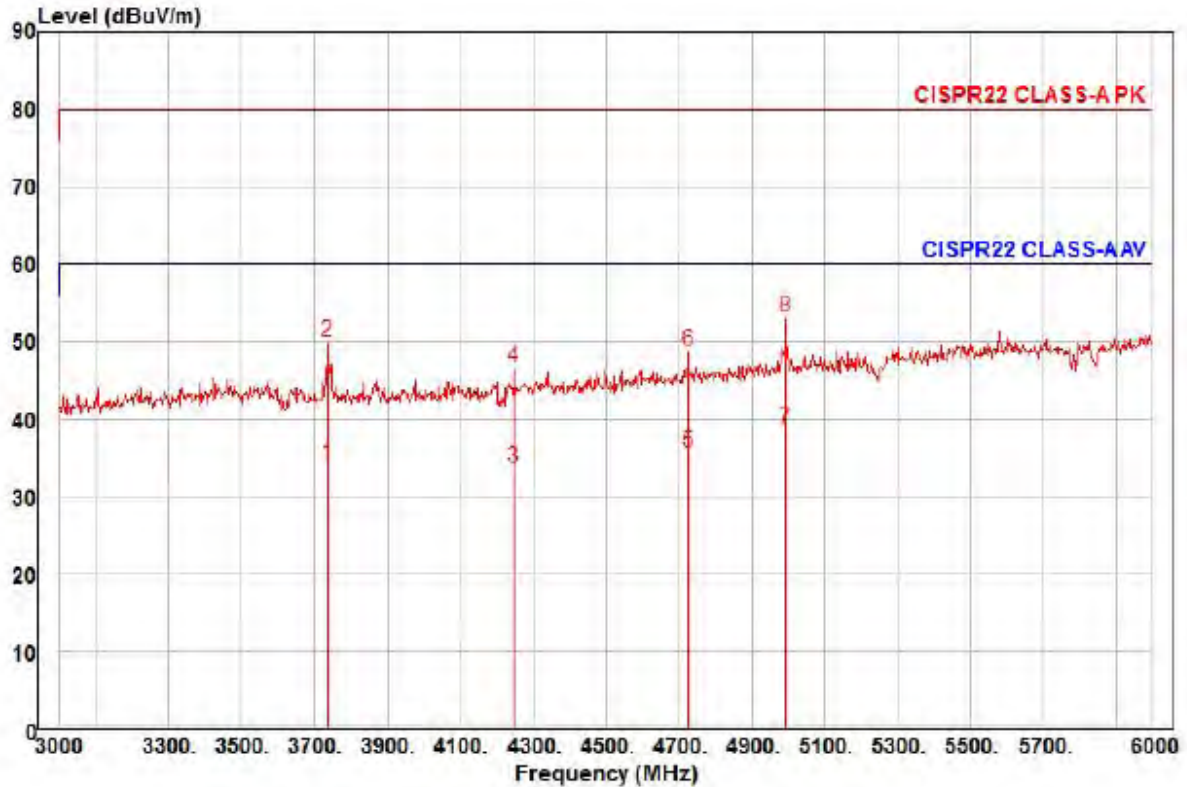
Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4051TN
Mode : AC 24 V
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1116.00	26.99	22.85	7.01	36.01	213	56.00	-35.16	vertical	Average
2	1116.00	40.29	22.85	7.01	36.01	213	76.00	-41.86	vertical	Peak
3 pp	1246.00	39.99	23.25	7.43	35.79	186	56.00	-21.12	vertical	Average
4	1246.00	53.75	23.25	7.43	35.79	186	76.00	-27.36	vertical	Peak
5	1988.00	25.80	25.96	9.61	34.55	359	56.00	-29.18	vertical	Average
6	1988.00	47.48	25.96	9.61	34.55	359	76.00	-27.50	vertical	Peak
7	2244.00	24.94	26.75	10.23	34.36	166	56.00	-28.44	vertical	Average
8	2244.00	43.90	26.75	10.23	34.36	166	76.00	-29.48	vertical	Peak
9	2442.00	23.54	27.35	10.69	34.23	237	56.00	-28.65	vertical	Average
10	2442.00	44.82	27.35	10.69	34.23	237	76.00	-27.37	vertical	Peak
11	2600.00	23.11	27.97	11.06	34.12	220	56.00	-27.98	vertical	Average
12 pk	2600.00	45.41	27.97	11.06	34.12	220	76.00	-25.68	vertical	Peak



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-4051TN
Mode : AC 24 V
Memo : 3 ~ 6 GHz

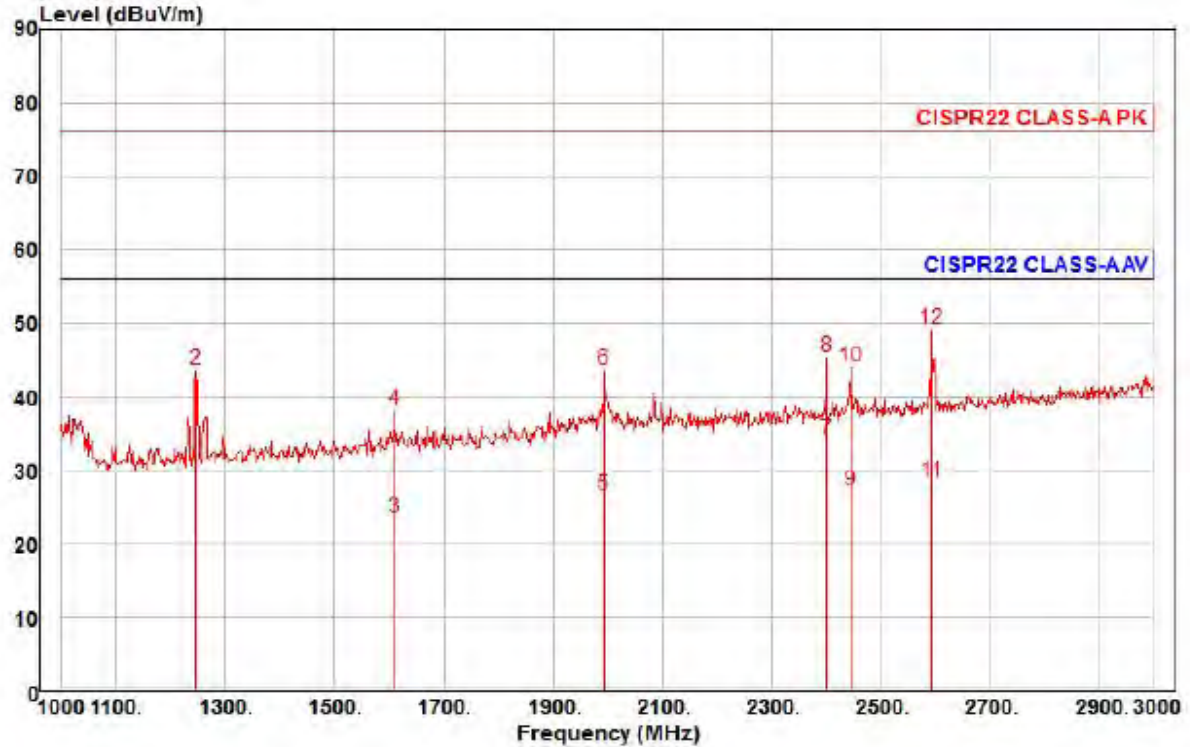
	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3537.00	21.76	31.25	13.19	34.45	44	60.00	-28.25	horizontal	Average
2	3537.00	34.20	31.25	13.19	34.45	44	80.00	-35.81	horizontal	Peak
3	3738.00	22.75	31.79	13.52	34.67	85	60.00	-26.61	horizontal	Average
4	3738.00	36.97	31.79	13.52	34.67	85	80.00	-32.39	horizontal	Peak
5	4185.00	21.20	32.45	14.38	34.64	172	60.00	-26.61	horizontal	Average
6	4185.00	34.23	32.45	14.38	34.64	172	80.00	-33.58	horizontal	Peak
7 pp	4767.00	21.14	32.92	15.45	33.62	66	60.00	-24.11	horizontal	Average
8 pk	4767.00	33.86	32.92	15.45	33.62	66	80.00	-31.39	horizontal	Peak



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-4051TN
Mode : AC 24 V
Memo : 3 ~ 6 GHz

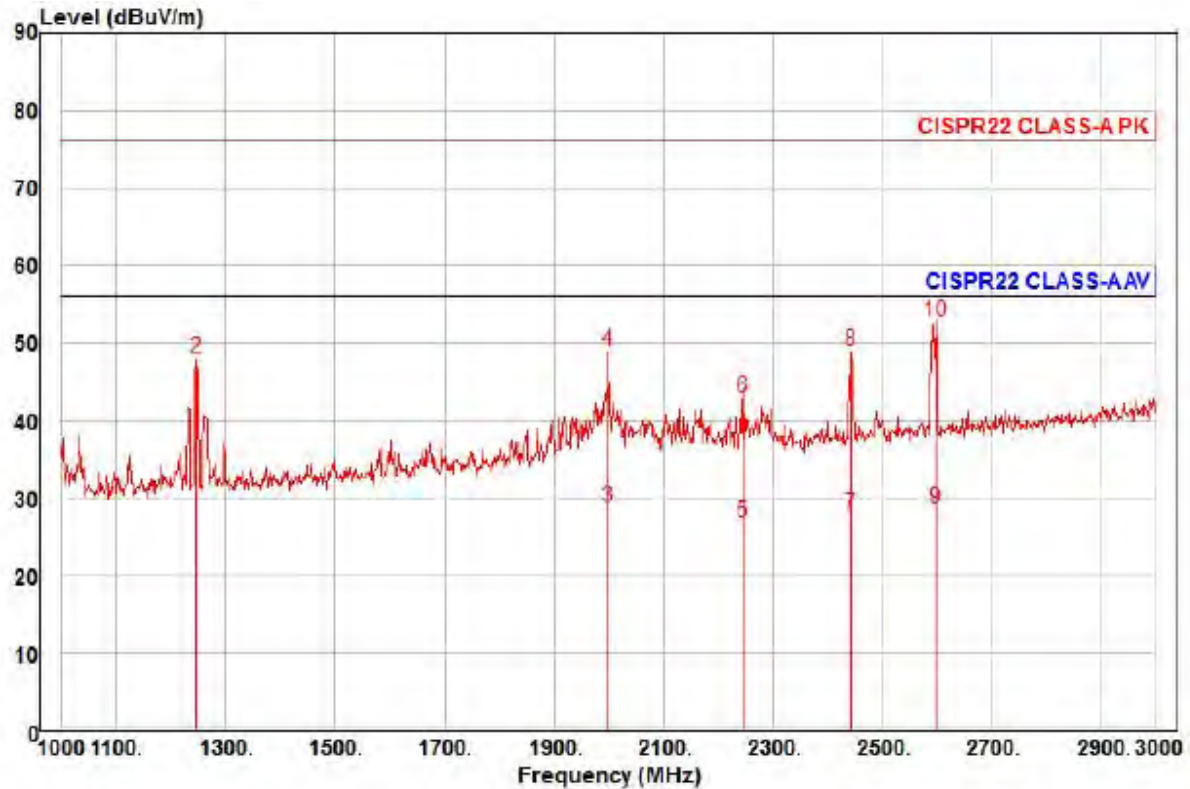
	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3735.00	23.49	31.78	13.52	34.67	96	60.00	-25.88	vertical	Average
2	3735.00	39.47	31.78	13.52	34.67	96	80.00	-29.90	vertical	Peak
3	4248.00	21.43	32.43	14.50	34.53	126	60.00	-26.17	vertical	Average
4	4248.00	34.25	32.43	14.50	34.53	126	80.00	-33.35	vertical	Peak
5	4725.00	21.20	32.83	15.37	33.69	131	60.00	-24.29	vertical	Average
6	4725.00	34.33	32.83	15.37	33.69	131	80.00	-31.16	vertical	Peak
7 pp	4995.00	22.66	33.40	15.76	33.22	69	60.00	-21.40	vertical	Average
8 pk	4995.00	37.23	33.40	15.76	33.22	69	80.00	-26.83	vertical	Peak

■ 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-4051TN
Mode : DC 12 V
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preampl Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1246.00	34.66	23.25	7.43	35.79	136	56.00	-26.45	horizontal	Average
2	1246.00	48.83	23.25	7.43	35.79	136	76.00	-32.28	horizontal	Peak
3	1610.00	25.70	24.46	8.54	35.18	347	56.00	-32.48	horizontal	Average
4	1610.00	40.52	24.46	8.54	35.18	347	76.00	-37.66	horizontal	Peak
5	1994.00	25.61	25.99	9.63	34.54	249	56.00	-29.31	horizontal	Average
6	1994.00	42.70	25.99	9.63	34.54	249	76.00	-32.22	horizontal	Peak
7 pp	2400.00	30.58	27.23	10.59	34.25	36	56.00	-21.85	horizontal	Average
8	2400.00	41.95	27.23	10.59	34.25	36	76.00	-30.48	horizontal	Peak
9	2446.00	23.36	27.37	10.70	34.22	294	56.00	-28.79	horizontal	Average
10	2446.00	40.25	27.37	10.70	34.22	294	76.00	-31.90	horizontal	Peak
11	2594.00	23.62	27.95	11.05	34.12	220	56.00	-27.50	horizontal	Average
12 pk	2594.00	44.33	27.95	11.05	34.12	220	76.00	-26.79	horizontal	Peak



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-4051TN
Mode : DC 12 V
Memo : 1 ~ 3 GHz

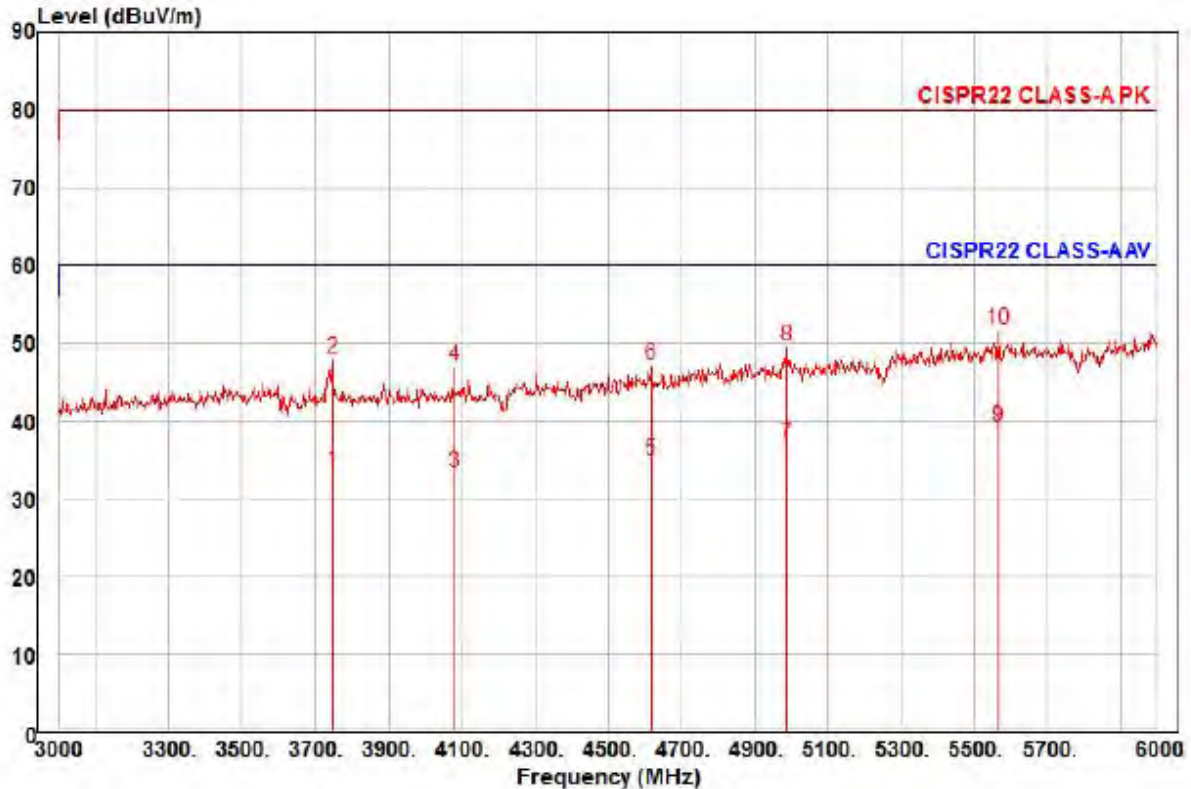
	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1 pp	1246.00	39.10	23.25	7.43	35.79	174	56.00	-22.01	vertical	Average
2	1246.00	53.13	23.25	7.43	35.79	174	76.00	-27.98	vertical	Peak
3	1998.00	27.74	26.00	9.64	34.53	359	56.00	-27.15	vertical	Average
4	1998.00	48.01	26.00	9.64	34.53	359	76.00	-26.88	vertical	Peak
5	2246.00	24.21	26.76	10.23	34.36	40	56.00	-29.16	vertical	Average
6	2246.00	40.23	26.76	10.23	34.36	40	76.00	-33.14	vertical	Peak
7	2444.00	24.08	27.36	10.70	34.22	192	56.00	-28.08	vertical	Average
8	2444.00	45.19	27.36	10.70	34.22	192	76.00	-26.97	vertical	Peak
9	2598.00	23.80	27.96	11.06	34.12	246	56.00	-27.30	vertical	Average
10 pk	2598.00	47.78	27.96	11.06	34.12	246	76.00	-23.32	vertical	Peak



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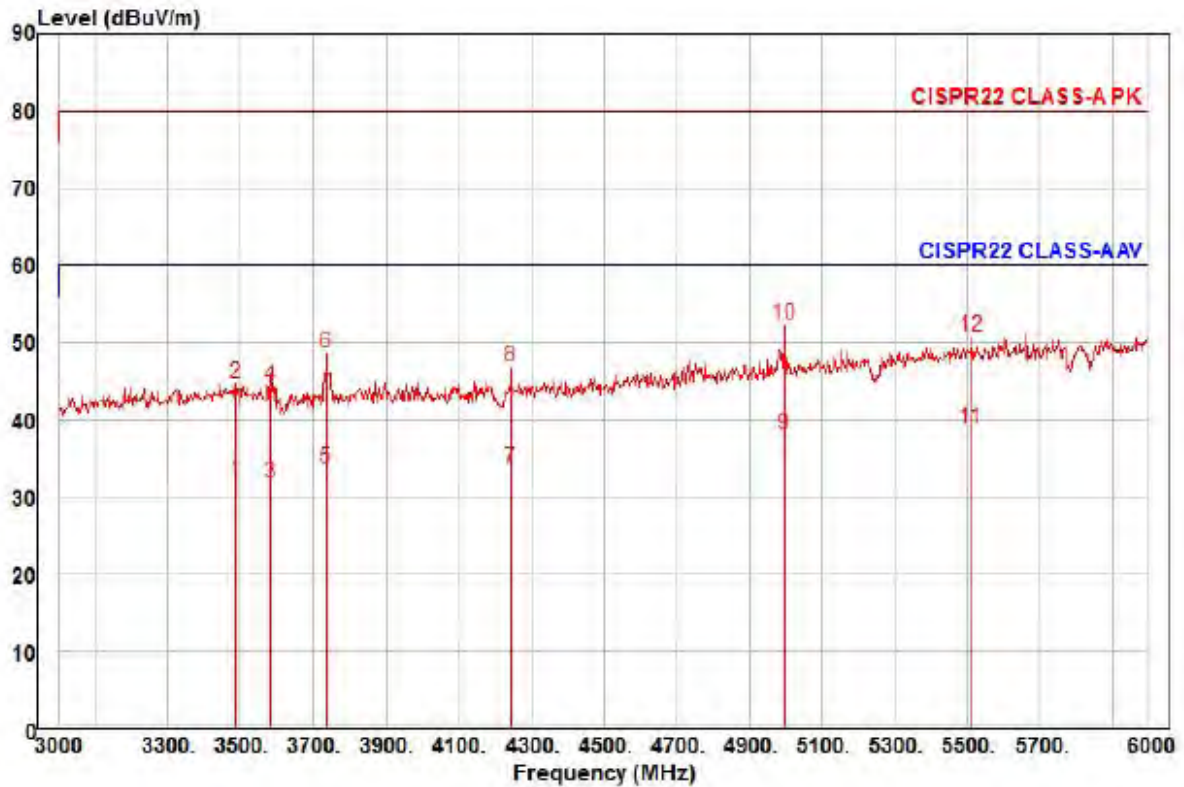
Test report No.:
KES-EI-17T0730
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) horizontal
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4051TN
Mode : DC 12 V
Memo : 3 ~ 6 GHz

	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	3747.00	22.92	31.82	13.54	34.68	90	60.00	-26.40	horizontal	Average
2	3747.00	37.35	31.82	13.54	34.68	90	80.00	-31.97	horizontal	Peak
3	4080.00	21.42	32.48	14.20	34.83	66	60.00	-26.73	horizontal	Average
4	4080.00	35.15	32.48	14.20	34.83	66	80.00	-33.00	horizontal	Peak
5	4620.00	21.03	32.61	15.16	33.88	291	60.00	-25.08	horizontal	Average
6	4620.00	33.35	32.61	15.16	33.88	291	80.00	-32.76	horizontal	Peak
7	4989.00	21.11	33.39	15.75	33.23	108	60.00	-22.98	horizontal	Average
8	4989.00	33.70	33.39	15.75	33.23	108	80.00	-30.39	horizontal	Peak
9 pp	5568.00	20.24	35.47	16.72	33.29	161	60.00	-28.86	horizontal	Average
10 pk	5568.00	32.95	35.47	16.72	33.29	161	80.00	-28.15	horizontal	Peak

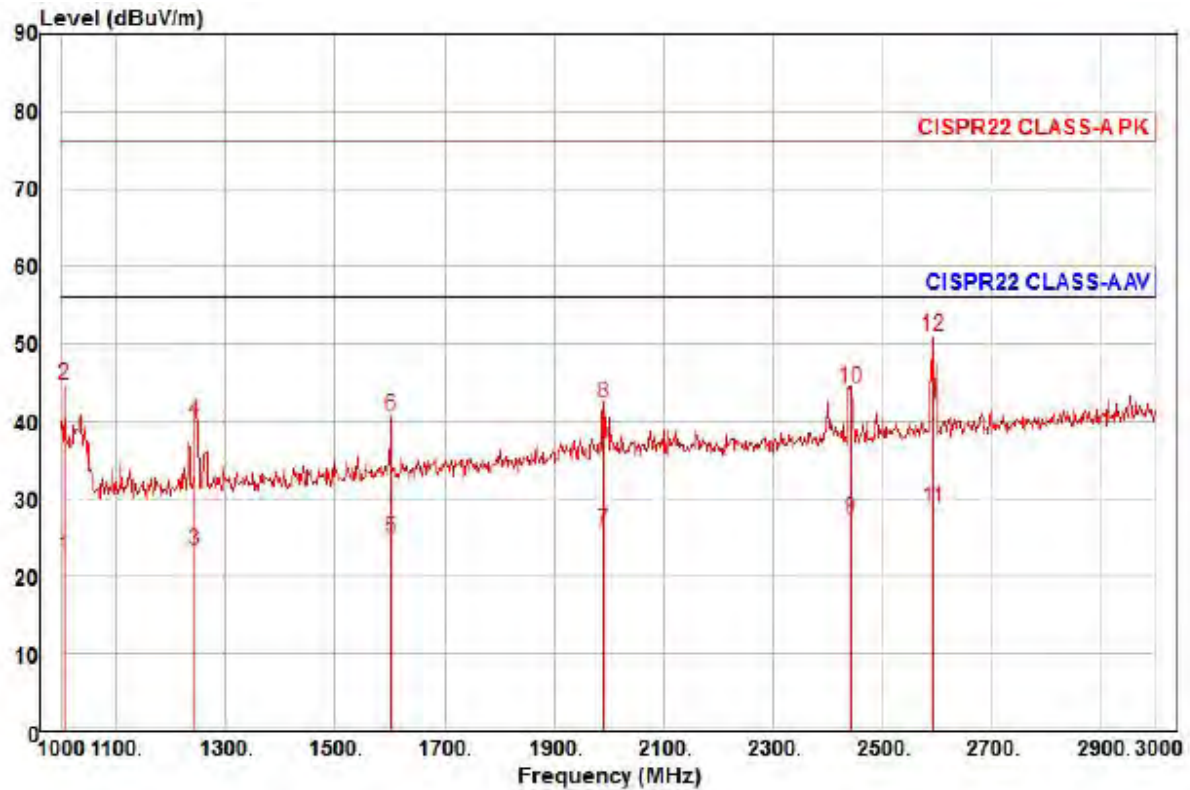
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Site : YEOJU_C 3 m SAC
Condition: CISPR22 CLASS-A PK 3m STLP9149(RRA CAL 2017-05-18) vertical
: RBW:1000.000kHz VBW:1000.000kHz SWT:Auto
Project :
Model : TNO-4051TN
Mode : DC 12 V
Memo : 3 ~ 6 GHz

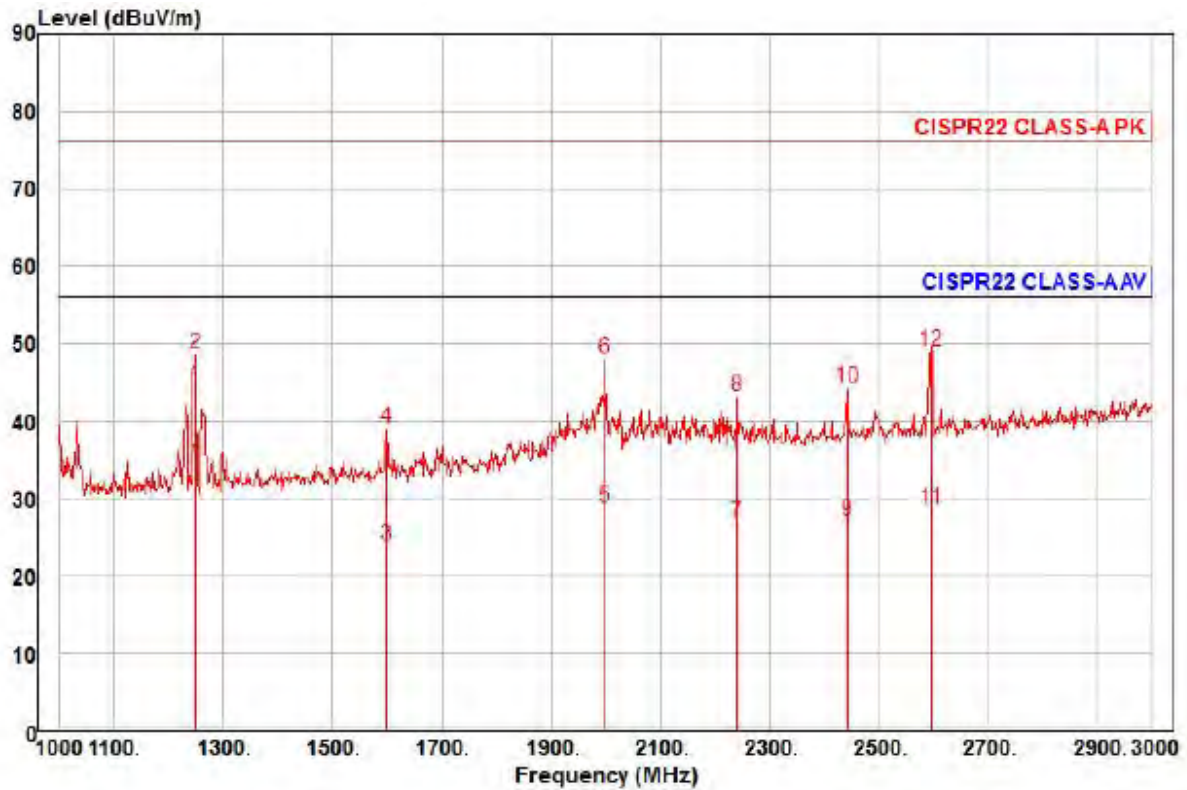
	Freq	Read Level	Ant Factor	Cable Loss	Preamplifier Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	3486.00	22.06	31.11	13.13	34.39	62	60.00	-28.09	vertical	Average
2	3486.00	34.79	31.11	13.13	34.39	62	80.00	-35.36	vertical	Peak
3	3582.00	21.70	31.37	13.25	34.50	187	60.00	-28.18	vertical	Average
4	3582.00	34.17	31.37	13.25	34.50	187	80.00	-35.71	vertical	Peak
5	3735.00	23.04	31.78	13.52	34.67	130	60.00	-26.33	vertical	Average
6	3735.00	37.91	31.78	13.52	34.67	130	80.00	-31.46	vertical	Peak
7	4242.00	21.38	32.43	14.49	34.54	127	60.00	-26.24	vertical	Average
8	4242.00	34.51	32.43	14.49	34.54	127	80.00	-33.11	vertical	Peak
9	4998.00	22.00	33.41	15.76	33.21	74	60.00	-22.04	vertical	Average
10 pk	4998.00	36.37	33.41	15.76	33.21	74	80.00	-27.67	vertical	Peak
11 pp	5514.00	20.07	35.39	16.63	33.28	45	60.00	-21.19	vertical	Average
12	5514.00	32.02	35.39	16.63	33.28	45	80.00	-29.24	vertical	Peak

■ 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-4051TN
Mode : PoE
Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preampl Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1	1004.00	29.68	22.51	6.65	36.19	198	56.00	-33.35	horizontal	Average
2	1004.00	51.72	22.51	6.65	36.19	198	76.00	-31.31	horizontal	Peak
3	1244.00	28.43	23.24	7.42	35.79	145	56.00	-32.70	horizontal	Average
4	1244.00	45.23	23.24	7.42	35.79	145	76.00	-35.90	horizontal	Peak
5	1600.00	27.10	24.42	8.51	35.20	311	56.00	-31.17	horizontal	Average
6	1600.00	42.99	24.42	8.51	35.20	311	76.00	-35.28	horizontal	Peak
7	1990.00	24.76	25.97	9.62	34.55	246	56.00	-30.20	horizontal	Average
8	1990.00	41.41	25.97	9.62	34.55	246	76.00	-33.55	horizontal	Peak
9	2444.00	23.55	27.36	10.70	34.22	360	56.00	-28.61	horizontal	Average
10	2444.00	40.40	27.36	10.70	34.22	360	76.00	-31.76	horizontal	Peak
11 av	2594.00	24.03	27.95	11.05	34.12	237	56.00	-27.09	horizontal	Average
12 pp	2594.00	46.09	27.95	11.05	34.12	237	76.00	-25.03	horizontal	Peak



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 :

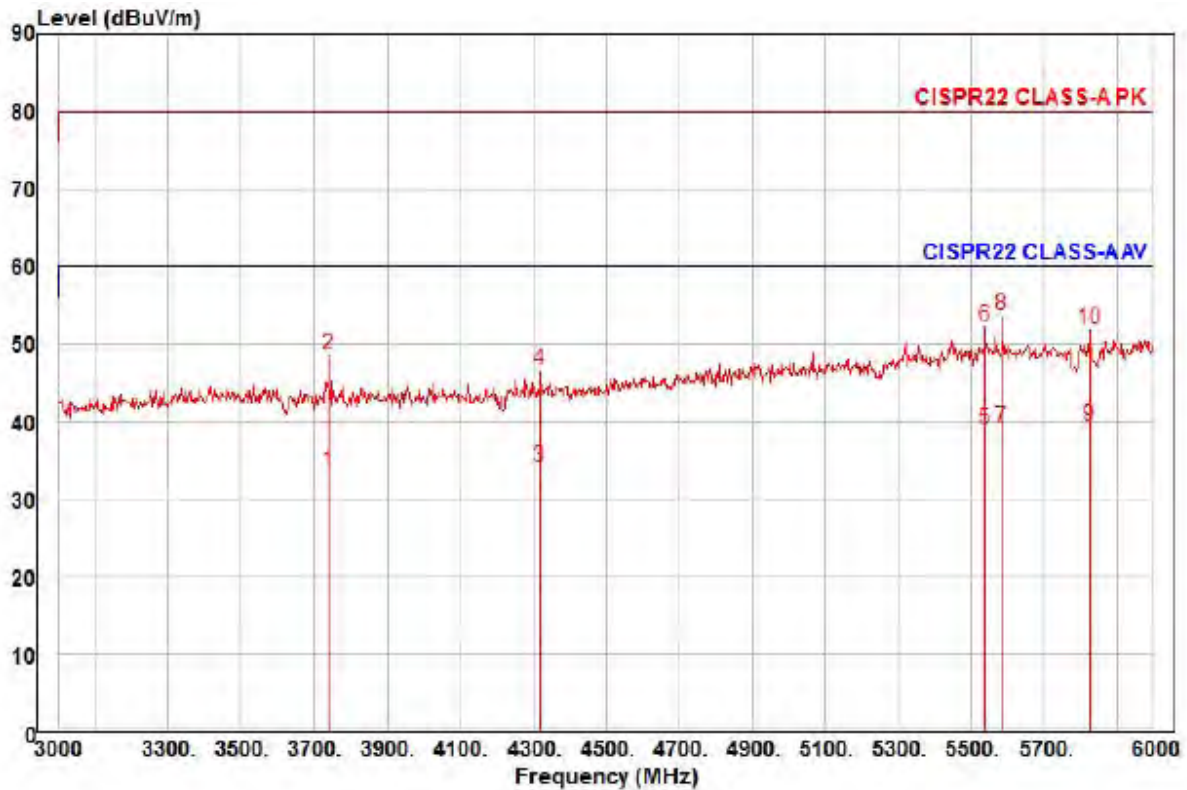
Model : TNO-4051TN

Mode : PoE

Memo : 1 ~ 3 GHz

	Freq	Read Level	Ant Factor	Cable Loss	Preamp Factor	TPos	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	deg	dBuV/m	dB		
1 pp	1248.00	39.36	23.25	7.44	35.79	176	56.00	-21.74	vertical	Average
2	1248.00	53.73	23.25	7.44	35.79	176	76.00	-27.37	vertical	Peak
3	1598.00	26.31	24.41	8.50	35.20	159	56.00	-31.98	vertical	Average
4	1598.00	41.33	24.41	8.50	35.20	159	76.00	-36.96	vertical	Peak
5	1998.00	27.70	26.00	9.64	34.53	6	56.00	-27.19	vertical	Average
6	1998.00	46.87	26.00	9.64	34.53	6	76.00	-28.02	vertical	Peak
7	2240.00	24.28	26.74	10.22	34.36	213	56.00	-29.12	vertical	Average
8	2240.00	40.60	26.74	10.22	34.36	213	76.00	-32.80	vertical	Peak
9	2442.00	23.33	27.35	10.69	34.23	6	56.00	-28.86	vertical	Average
10	2442.00	40.49	27.35	10.69	34.23	6	76.00	-31.70	vertical	Peak
11	2596.00	23.82	27.95	11.05	34.12	359	56.00	-27.30	vertical	Average
12 pk	2596.00	44.15	27.95	11.05	34.12	359	76.00	-26.97	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

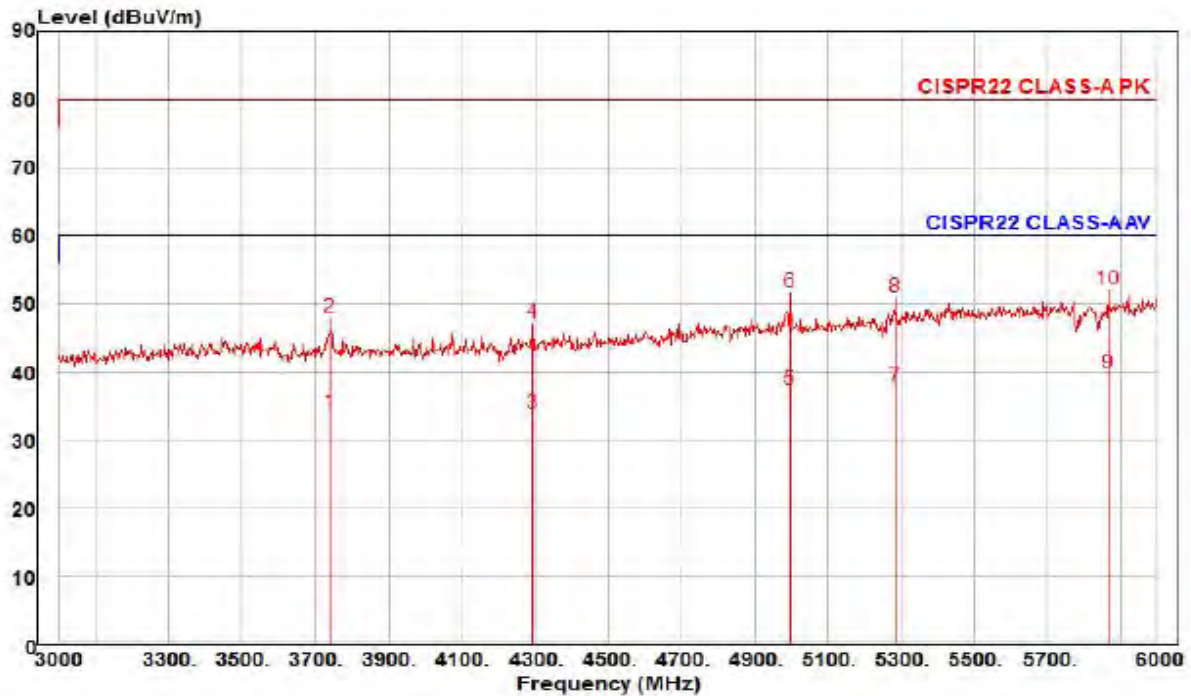
Project :

Model : TNO-4051TN

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	3738.00	22.95	31.79	13.52	34.67	76	60.00	-26.41	horizontal	Average
2	3738.00	37.97	31.79	13.52	34.67	76	80.00	-31.39	horizontal	Peak
3	4320.00	21.52	32.41	14.64	34.41	188	60.00	-25.84	horizontal	Average
4	4320.00	34.06	32.41	14.64	34.41	188	80.00	-33.30	horizontal	Peak
5	5541.00	20.20	35.43	16.67	33.29	264	60.00	-20.99	horizontal	Average
6	5541.00	33.64	35.43	16.67	33.29	264	80.00	-27.55	horizontal	Peak
7	5586.00	20.28	35.50	16.74	33.29	261	60.00	-20.77	horizontal	Average
8 pk	5586.00	34.03	35.50	16.74	33.29	261	80.00	-26.22	horizontal	Peak
9 pp	5826.00	19.78	35.86	17.12	33.33	291	60.00	-20.65	horizontal	Average
10	5826.00	32.41	35.86	17.12	33.33	291	80.00	-27.94	horizontal	Peak



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-4051TN
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	3741.00	23.49	31.80	13.53	34.68	129	60.00	-25.86	vertical	Average
2	3741.00	37.39	31.80	13.53	34.68	129	80.00	-31.96	vertical	Peak
3	4293.00	21.38	32.42	14.59	34.45	338	60.00	-26.06	vertical	Average
4	4293.00	34.72	32.42	14.59	34.45	338	80.00	-32.72	vertical	Peak
5	4998.00	21.59	33.41	15.76	33.21	81	60.00	-22.45	vertical	Average
6	4998.00	35.72	33.41	15.76	33.21	81	80.00	-28.32	vertical	Peak
7	5286.00	20.43	34.53	16.23	33.25	204	60.00	-22.06	vertical	Average
8	5286.00	33.42	34.53	16.23	33.25	204	80.00	-29.07	vertical	Peak
9 pp	5858.00	19.88	35.92	17.25	33.33	147	60.00	-20.28	vertical	Average
10 pk	5858.00	32.24	35.92	17.25	33.33	147	80.00	-27.92	vertical	Peak

◆ Calculation

Over Limit [dB] = (Read Level[dB μ V] + Ant Factor[dB/m] + Cable Loss [dB] - Preamp Factor [dB])
- Limit Line[dB μ V]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor,
Cable Loss : Cable loss, Preamp Factor : Preamp Factor

Test Setup Photos and Configuration

Conducted Voltage Emissions



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Conducted Telecommunication Emissions



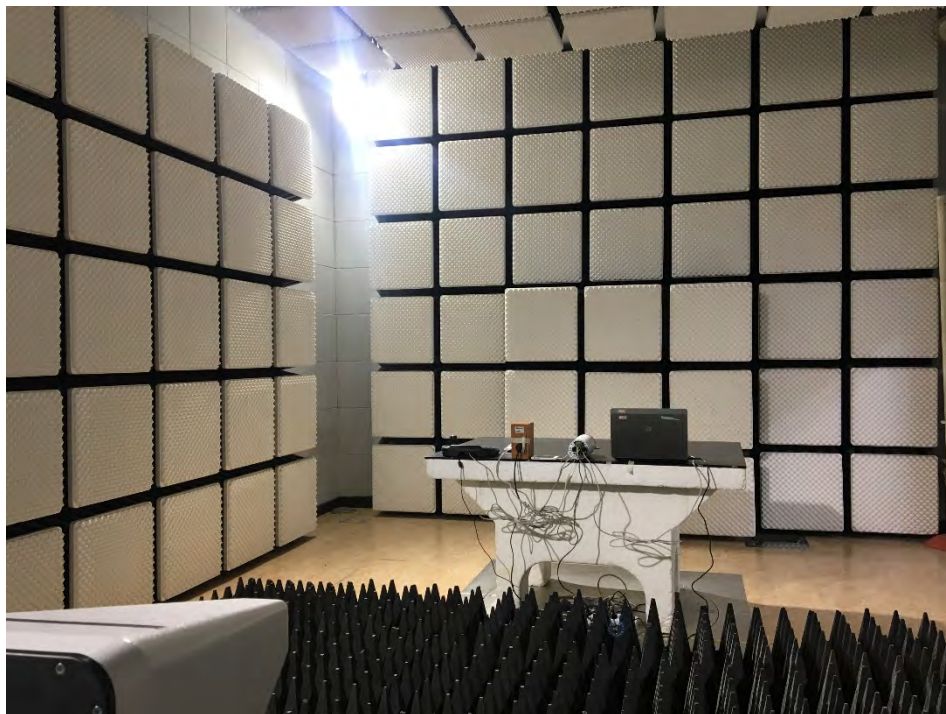
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adiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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EUT External Photographs

(Top)



(Bottom)



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EUT Internal Photographs

(Internal View)



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EUT Internal View – Main Board

(Top)



(Bottom)



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