



EMC TEST REPORT For RCM

Test Report No. : KES-E1-18T0642

Date of Issue : Nov. 17, 2018

Product name : Thermal Camera

Model/Type No. : TNO-4041TR

Variant Model : -

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 : Nov. 06, 2018

Test date : Nov. 12, 2018

Test Results : ☒ In Compliance ☐ Not in Compliance

Tested by

Kang Hyeon, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KOLAS.

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KES Co., Ltd.

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

Test report No.:
KES-E1-18T0642
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 17, 2018	KES-E1-18T0642	Issued

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1.0 General Product Description

Main Specifications of EUT are:

VIDEO	
Imaging Device	Uncooled microbolometer, Pixel size : 17 μ m
Effective Pixels	640(H) x 480(V)
NETD	<50mK
Video Out	CVBS : 1.0Vpp / 75 Ω composite, 720 x 480(N), 720 x 576(P), for installation
LENS	
Focal Length (Zoom Ratio)	19mm fixed
Max. Aperture Ratio	F1.0
Angular Field of View	H : 32° / V : 24.3° / D : 39.2°
Min. Object Distance	11m (36.09ft)
Focus Control	Fixed
Lens / 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 (Gray / Green / Red / Blue / Black / White), Transparency, Auto scale by resolution
Motion Detection	Off / On (8ea, 8point polygonal zones), Handover
Privacy Masking	Off / On (32ea, polygonal zones) - Color : Gray / Green / Red / Blue / Black / White - Mosaic
Flip / Mirror	Off / On
Video & Audio Analytics	Tampering, Loitering, Directional detection, Virtual line, Enter/Exit, (Dis) Appear, Audio detection, Motion detection, Sound classification, Shock detection, Temperature change detection
Alarm I/O	Input 1ea / Output 2ea
Digital Image Stabilization	Off / On (Built-in Gyro sensor)
Remote Control Interface	RS485
RS-485 Protocol	Pelco D/P, Samsung T, Honeywell, Bosch, Panasonic, Sungin, AD, Vicon, GE
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
Pixel count	Support
NETWORK	
Ethernet	RJ-45 (10/100 BASE-T)
Video Compression Format	H.265 / H.264 (MPEG-4 part 10/AVC) : Main / Baseline / High, MJPEG
Resolution	640 x 480, 640 x 360, 320 x 240
Max. Framerate	H.265 / H.264 : Max. 30fps at all resolutions, MJPEG : Max. 30fps
WiseStreamII	Support
Video Quality Adjustment	H.265 / H.264 / MJPEG : Target Bitrate Level Control
Bitrate Control Method	H.265 / H.264 : CBR or VBR, MJPEG : VBR
Streaming Capability	Multiple streaming (Up to 10 profiles)
Audio In	Selectable (Mic in / Line in), Supply voltage : 2.5V DC (4mA), Input impedance : approx. 2K Ohm
Audio Out	Line out, Max output level : 1 Vrms
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 (MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour

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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 ☐ 240 Vac ☐ 100 Vac ☒ 24 Vac ☒ 12 Vdc ☒ PoE

Frequency ☐ 50 Hz ☐ 60 Hz ☐ Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Thermal Camera	TNO-4041TR	-	Hanwha Techwin (Tianjin) Co.,Ltd.	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
PoE Adaptor	PD-9601GR	-	Microsemi	-
Notebook	ProBook4430s	-	HP	-
Notebook Adaptor	SeriesPPP0009H	-	CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD,	-
Speaker	BR1000A	-	DONGGUAN 1 TECHNOLOGY Co., Ltd	-
MIC	MP1000	-	-	-
Alarm	-	-	-	-
Button Alarm	-	-	-	-
controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd	-
iPod	A1367	C3TDG2JGDCP9	APPLE .Inc	-
Micro SD Card	-	-	SanDisk	8 GB

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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 (EUT)	RJ-45	Notebook	RJ-45	3.0	U
	Thermal 2Pin	Speaker	3.5 mm	1.4	U
	Thermal 2Pin	MIC	3.5 mm	1.4	U
	Thermal 2Pin	Alarm	Thermal 2Pin	3.0	U
	Thermal 2Pin	Button Alarm	Thermal 2Pin	3.0	U
	Thermal 2Pin	controller	Thermal 2Pin	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	3.5 mm	iPod	3.5 mm	0.8	U

■ PoE MODE

Start		END		Cable Spec.	
Description	I / O Port	Description	I / O Port	Length	Shield
Thermal Camera (EUT)	RJ-45 (PoE)	PoE Adaptor	RJ-45 (PoE)	3.0	U
	Thermal 2Pin	Speaker	3.5 mm	1.4	U
	Thermal 2Pin	MIC	3.5 mm	1.4	U
	Thermal 2Pin	Alarm	Thermal 2Pin	3.0	
	Thermal 2Pin	Button Alarm	Thermal 2Pin	3.0	U
	Thermal 2Pin	controller	Thermal 2Pin	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	RJ-45 (DATA)	PoE Adaptor	RJ-45 (DATA)	1.5	U
	3.5 mm	iPod	3.5 mm	0.8	U

* Unshielded=U, Shielded=S

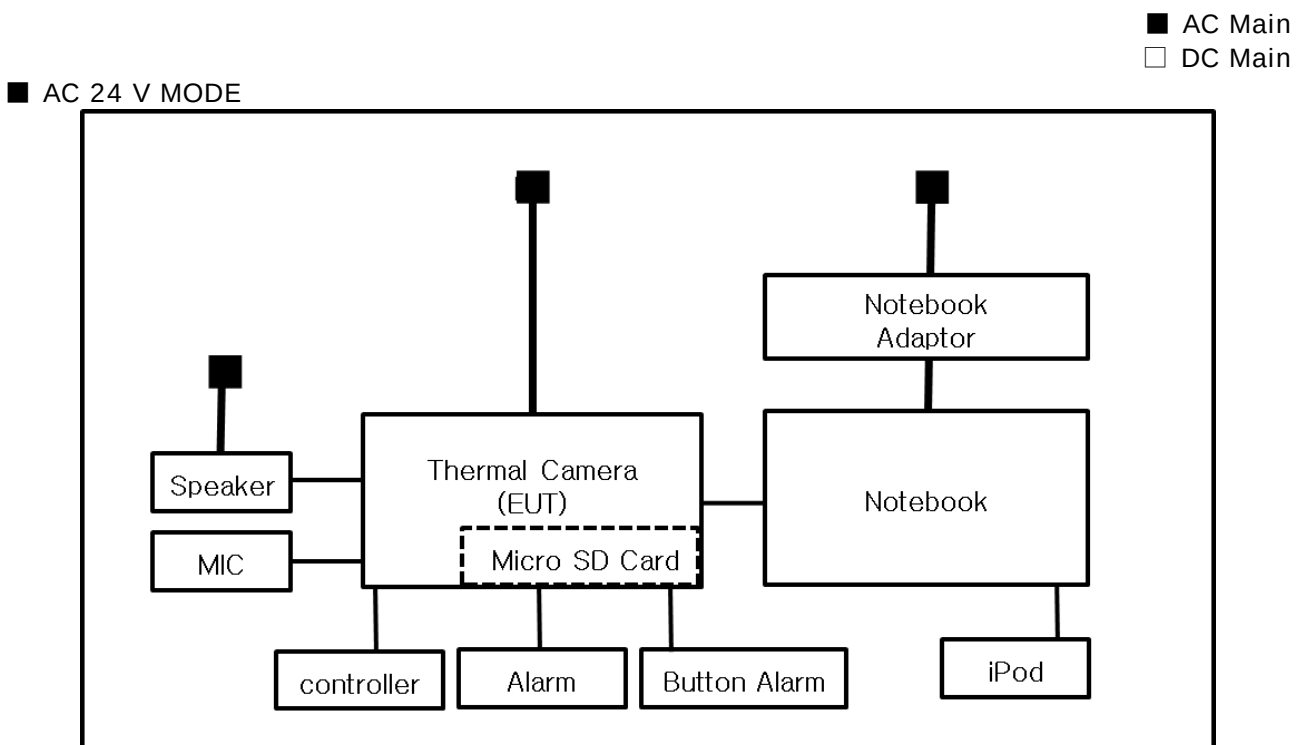
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1.7 EUT Operating Mode(s)

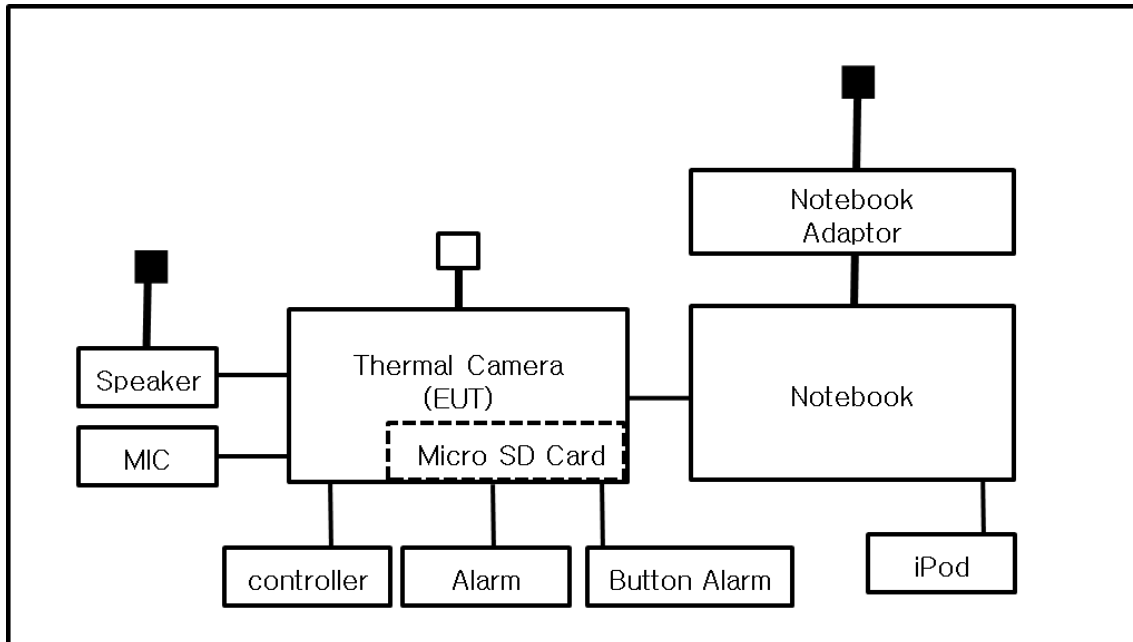
Test mode	operating
AC 24 V DC 12 V PoE	EUT Monitoring, Ping Test

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

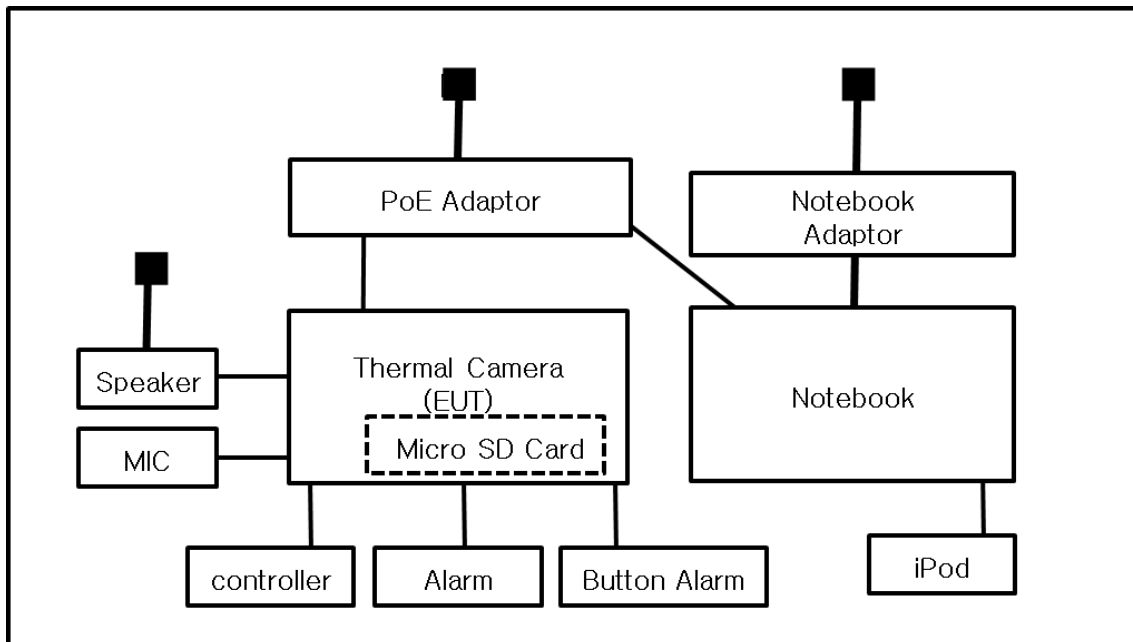
1.8 Configuration



■ 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, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Aechoic 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-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic 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-4308, C-4798, T-2311, G-914
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001



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 55032:2015

☐ Class A

☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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- | | | |
|---|---|----------------------------------|
| ☐ VCCI V-3 / 2015.04 | ☐ Class A | ☐ Class B |
| ☒ AS/NZS CISPR32:2015 | ☒ 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 | | |
|
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| ☐ EN 60945:2002 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date
Nov. 12, 2018

Test Location
Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	04, 25, 2019
☒	LISN	ENV216	R & S	101137	01, 31, 2019
☒	LISN	ENV216	R & S	101786	04, 25, 2019

Test Conditions
Temperature: 22,9 °C
Relative Humidity: 52,7 % R.H.

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Results
The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.



2.2 Conducted Emissions at Telecommunication Ports

Test Date
Nov. 12, 2018

Test Location
Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	04, 25, 2019
☒	LISN	ENV216	R & S	101137	01, 31, 2019
☒	LISN	ENV216	R & S	101786	04, 25, 2019
☒	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 22, 2019
☒	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 22, 2019

Test Conditions
Temperature: 22,9 °C
Relative Humidity: 52,7 % R.H.

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date
Nov. 12, 2018

Test Location
☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #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, 11, 2019
☒	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018

Test Conditions
Temperature: 22,0 °C
Relative Humidity: 53,9 % R.H.

Frequency Range of Measurement
30 MHz to 1 GHz

Instrument Settings
IF Band Width: 120 kHz

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date
Nov. 12, 2018

Test Location
SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESR7	R & S	101190	08, 06, 2019
☒	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2019
☐	ATTENUATOR	8491A	HP	35496	03, 21, 2019
☒	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM, INC	781	05, 02, 2019

Test Conditions
Temperature: 23,0 °C
Relative Humidity: 53,9 % R.H.

Frequency Range of Measurement
1 GHz to 6 GHz

Instrument Settings
IF Band Width: 1 MHz

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.



APPENDIX A – TEST DATA

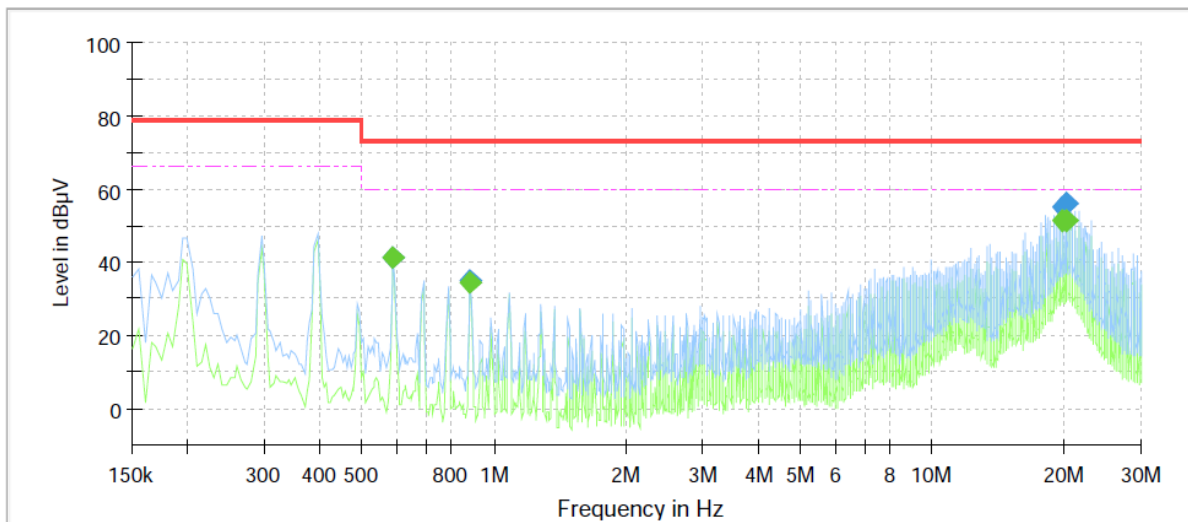
Conducted Emissions at Mains Power Ports

■ AC 24 V MODE

HOT LINE

Common Information

Test Description: Conducted Emission
Model No.: TNO-4041TR
Mode: AC
Operator Name: KES



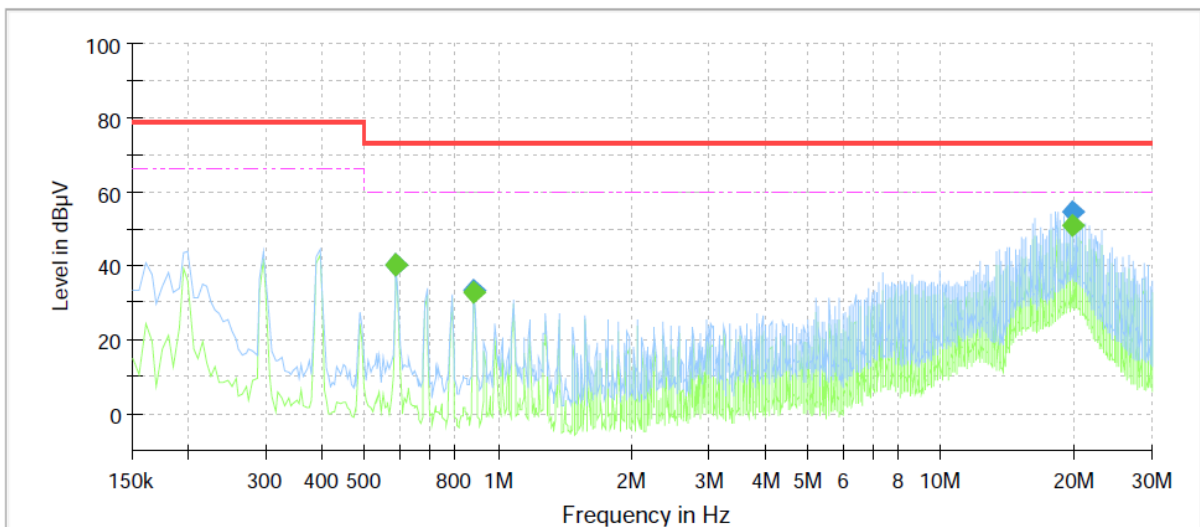
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.590000	---	41.23	60.00	18.77	1000.0	9.000	L1	9.8
0.590000	41.27	---	73.00	31.73	1000.0	9.000	L1	9.8
0.885000	---	34.61	60.00	25.39	1000.0	9.000	L1	10.1
0.885000	35.01	---	73.00	37.99	1000.0	9.000	L1	10.1
19.710000	---	51.60	60.00	8.40	1000.0	9.000	L1	10.5
19.710000	55.27	---	73.00	17.73	1000.0	9.000	L1	10.5
20.260000	---	51.58	60.00	8.42	1000.0	9.000	L1	10.5
20.260000	55.86	---	73.00	17.14	1000.0	9.000	L1	10.5

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	TNO-4041TR
Mode	AC
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.590000	---	39.98	60.00	20.02	1000.0	9.000	N	9.8
0.590000	40.07	---	73.00	32.93	1000.0	9.000	N	9.8
0.885000	---	33.00	60.00	27.00	1000.0	9.000	N	10.0
0.885000	33.43	---	73.00	39.57	1000.0	9.000	N	10.0
19.710000	---	50.95	60.00	9.05	1000.0	9.000	N	10.2
19.710000	54.61	---	73.00	18.39	1000.0	9.000	N	10.2

◆ 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))



KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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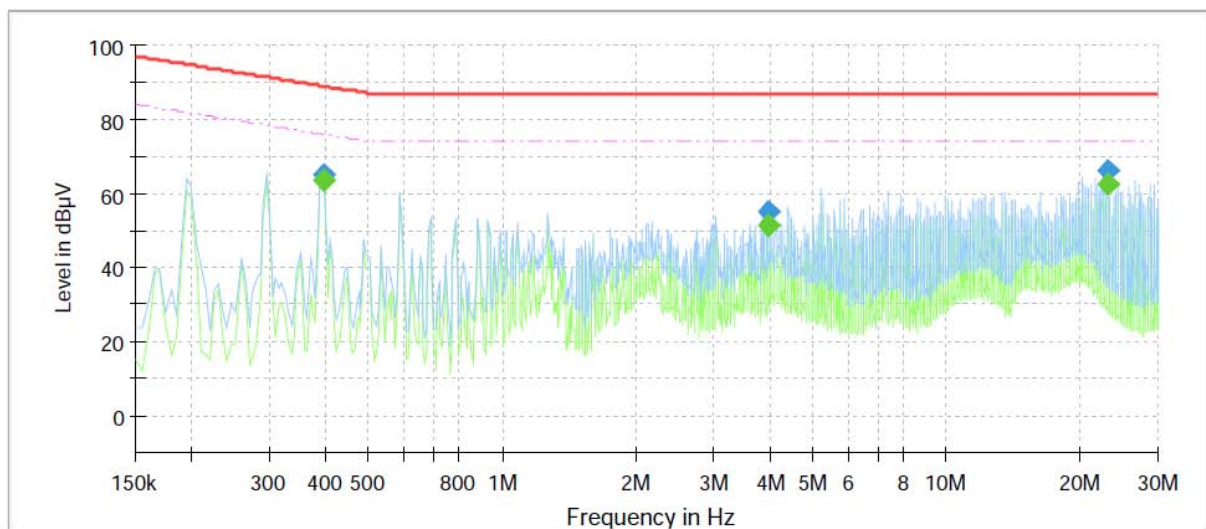
Conducted Emissions at Telecommunication Ports

■ AC 24 V MODE

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4041TR
Mode: AC 10
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.395000	---	63.58	75.96	12.38	1000.0	9.000	Single Line	10.1
0.395000	65.01	---	88.96	23.95	1000.0	9.000	Single Line	10.1
3.955000	---	51.43	74.00	22.57	1000.0	9.000	Single Line	10.2
3.955000	55.06	---	87.00	31.94	1000.0	9.000	Single Line	10.2
23.130000	---	62.69	74.00	11.31	1000.0	9.000	Single Line	10.1
23.130000	66.31	---	87.00	20.69	1000.0	9.000	Single Line	10.1

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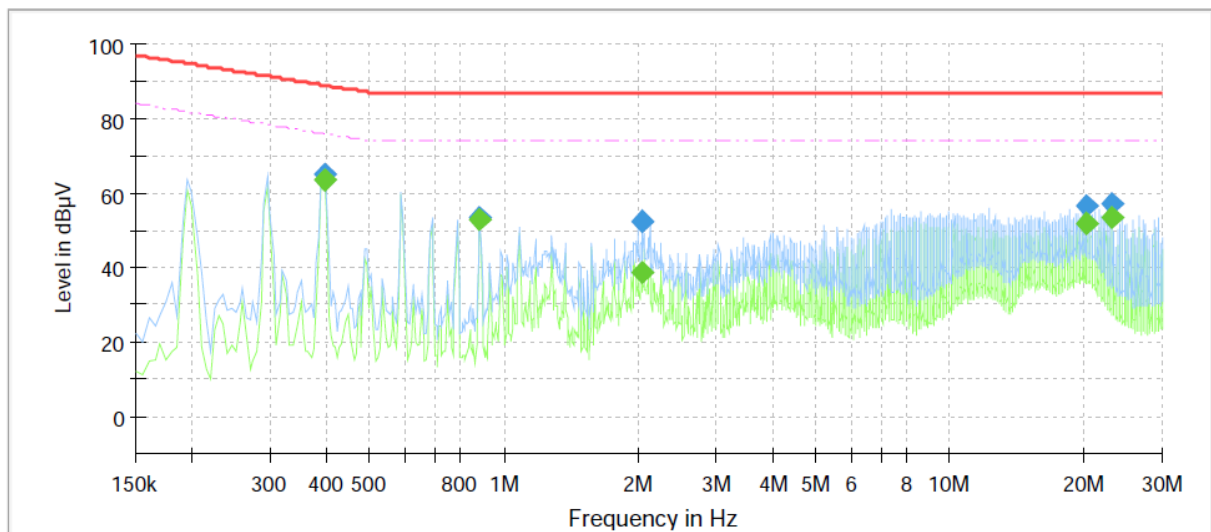
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4041TR
Mode: AC 100
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.395000	---	63.53	75.96	12.43	1000.0	9.000	Single Line	9.6
0.395000	64.98	---	88.96	23.98	1000.0	9.000	Single Line	9.6
0.885000	---	53.17	74.00	20.83	1000.0	9.000	Single Line	9.7
0.885000	53.62	---	87.00	33.38	1000.0	9.000	Single Line	9.7
2.045000	---	38.86	74.00	35.14	1000.0	9.000	Single Line	9.8
2.045000	52.60	---	87.00	34.40	1000.0	9.000	Single Line	9.8
20.260000	---	51.85	74.00	22.15	1000.0	9.000	Single Line	9.6
20.260000	56.64	---	87.00	30.36	1000.0	9.000	Single Line	9.6
23.130000	---	53.45	74.00	20.55	1000.0	9.000	Single Line	9.6
23.130000	56.93	---	87.00	30.07	1000.0	9.000	Single Line	9.6

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3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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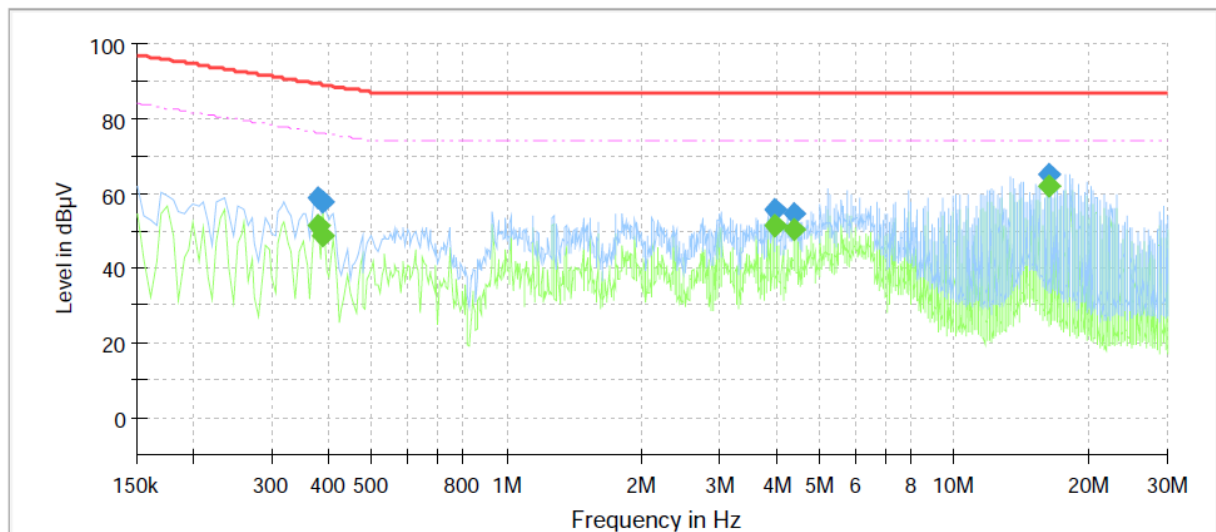
Test report No.:
KES-E1-18T0642
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■ DC 12 V MODE

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4041TR
Mode: DC 10
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.380000	---	51.34	76.28	24.94	1000.0	9.000	Single Line	10.1
0.380000	58.51	---	89.28	30.77	1000.0	9.000	Single Line	10.1
0.390000	---	48.91	76.06	27.15	1000.0	9.000	Single Line	10.1
0.390000	57.62	---	89.06	31.44	1000.0	9.000	Single Line	10.1
3.955000	---	51.51	74.00	22.49	1000.0	9.000	Single Line	10.2
3.955000	55.77	---	87.00	31.23	1000.0	9.000	Single Line	10.2
4.410000	---	50.12	74.00	23.88	1000.0	9.000	Single Line	10.2
4.410000	54.72	---	87.00	32.28	1000.0	9.000	Single Line	10.2
16.230000	---	61.92	74.00	12.08	1000.0	9.000	Single Line	10.2
16.230000	65.16	---	87.00	21.84	1000.0	9.000	Single Line	10.2

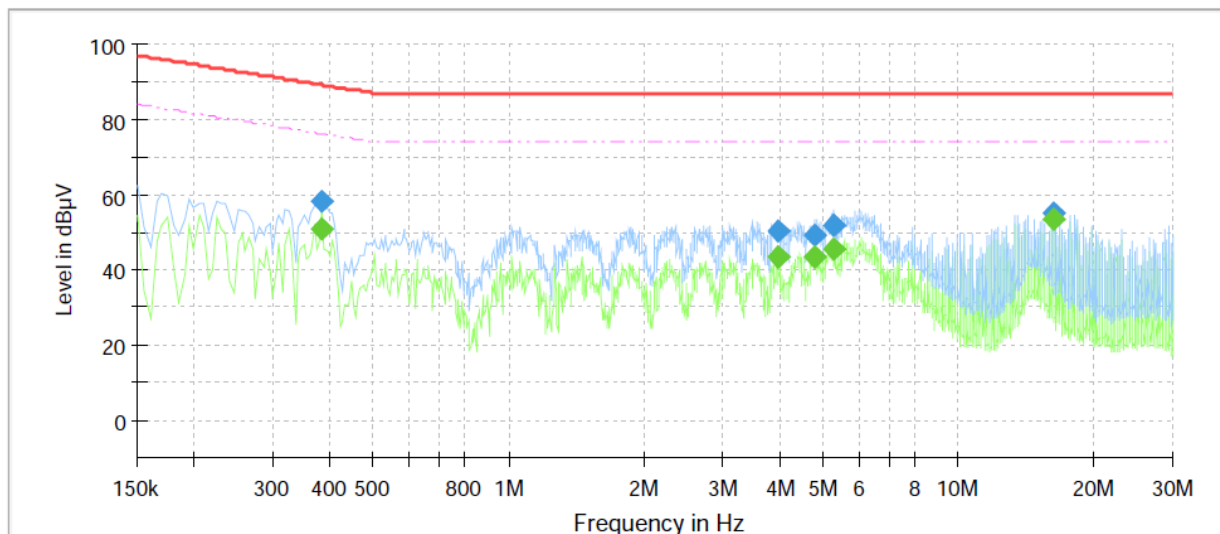
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[100 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4041TR
Mode: DC 100
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.385000	---	50.56	76.17	25.61	1000.0	9.000	Single Line	9.6
0.385000	58.34	---	89.17	30.83	1000.0	9.000	Single Line	9.6
3.955000	---	43.56	74.00	30.44	1000.0	9.000	Single Line	9.7
3.955000	50.49	---	87.00	36.51	1000.0	9.000	Single Line	9.7
4.785000	---	43.17	74.00	30.83	1000.0	9.000	Single Line	9.7
4.785000	49.28	---	87.00	37.72	1000.0	9.000	Single Line	9.7
5.300000	---	45.66	74.00	28.34	1000.0	9.000	Single Line	9.6
5.300000	51.85	---	87.00	35.15	1000.0	9.000	Single Line	9.6
16.230000	---	53.50	74.00	20.50	1000.0	9.000	Single Line	9.7
16.230000	55.07	---	87.00	31.93	1000.0	9.000	Single Line	9.7

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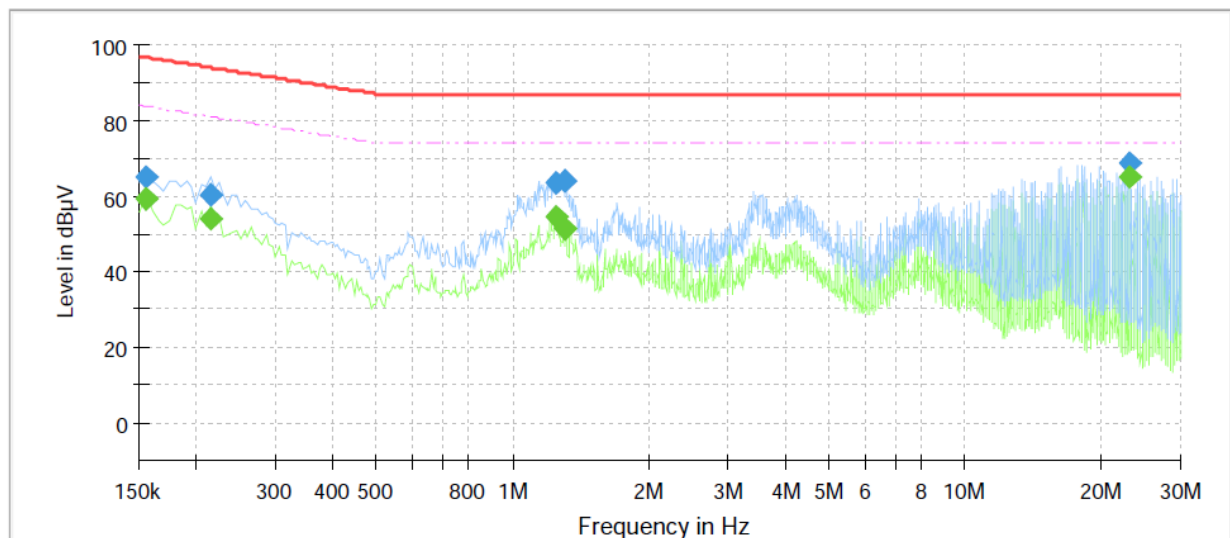
Test report No.:
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■ PoE MODE

[10 Mbps]

Common Information

Test Description: Telecommunication Emission
Model No.: TNO-4041TR
Mode: PoE 10
Operator Name: KES



Final Result

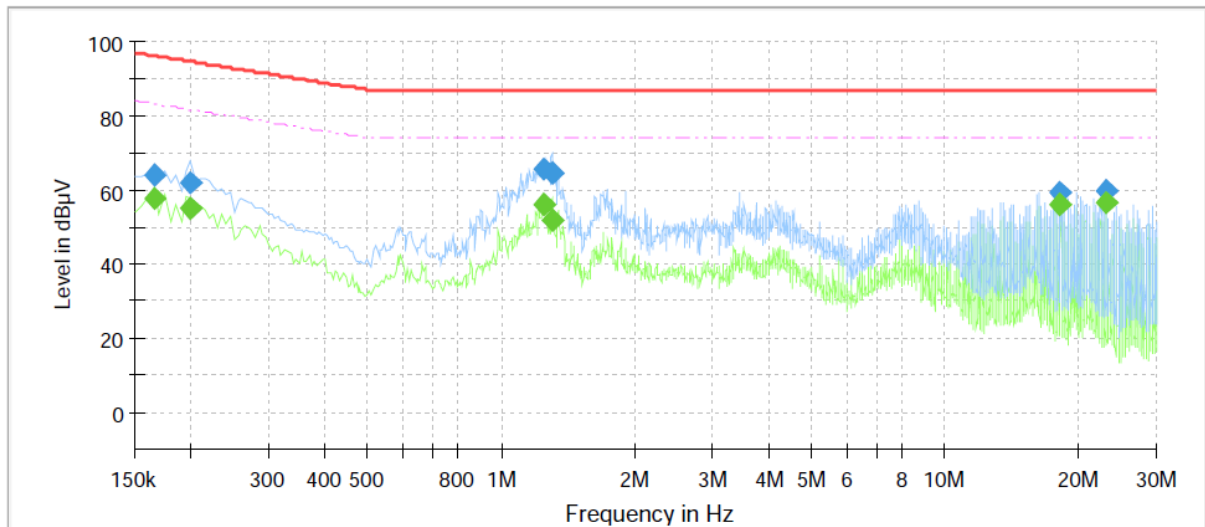
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	59.12	83.73	24.61	1000.0	9.000	Single Line	10.2
0.155000	65.29	---	96.73	31.44	1000.0	9.000	Single Line	10.2
0.215000	---	54.19	81.01	26.82	1000.0	9.000	Single Line	10.1
0.215000	60.56	---	94.01	33.45	1000.0	9.000	Single Line	10.1
1.245000	---	54.42	74.00	19.58	1000.0	9.000	Single Line	10.3
1.245000	63.40	---	87.00	23.60	1000.0	9.000	Single Line	10.3
1.300000	---	51.41	74.00	22.59	1000.0	9.000	Single Line	10.3
1.300000	63.85	---	87.00	23.15	1000.0	9.000	Single Line	10.3
23.130000	---	65.31	74.00	8.69	1000.0	9.000	Single Line	10.1
23.130000	68.89	---	87.00	18.11	1000.0	9.000	Single Line	10.1

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[100 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	TNO-4041TR
Mode	PoE 100
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	57.76	83.21	25.45	1000.0	9.000	Single Line	9.7
0.165000	63.99	---	96.21	32.22	1000.0	9.000	Single Line	9.7
0.200000	---	55.29	81.61	26.32	1000.0	9.000	Single Line	9.6
0.200000	61.92	---	94.61	32.69	1000.0	9.000	Single Line	9.6
1.245000	---	56.22	74.00	17.78	1000.0	9.000	Single Line	9.8
1.245000	65.45	---	87.00	21.55	1000.0	9.000	Single Line	9.8
1.300000	---	51.74	74.00	22.26	1000.0	9.000	Single Line	9.8
1.300000	64.34	---	87.00	22.66	1000.0	9.000	Single Line	9.8
18.245000	---	56.04	74.00	17.96	1000.0	9.000	Single Line	9.7
18.245000	59.35	---	87.00	27.65	1000.0	9.000	Single Line	9.7
23.130000	---	56.56	74.00	17.44	1000.0	9.000	Single Line	9.6
23.130000	59.73	---	87.00	27.27	1000.0	9.000	Single Line	9.6

◆ 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))



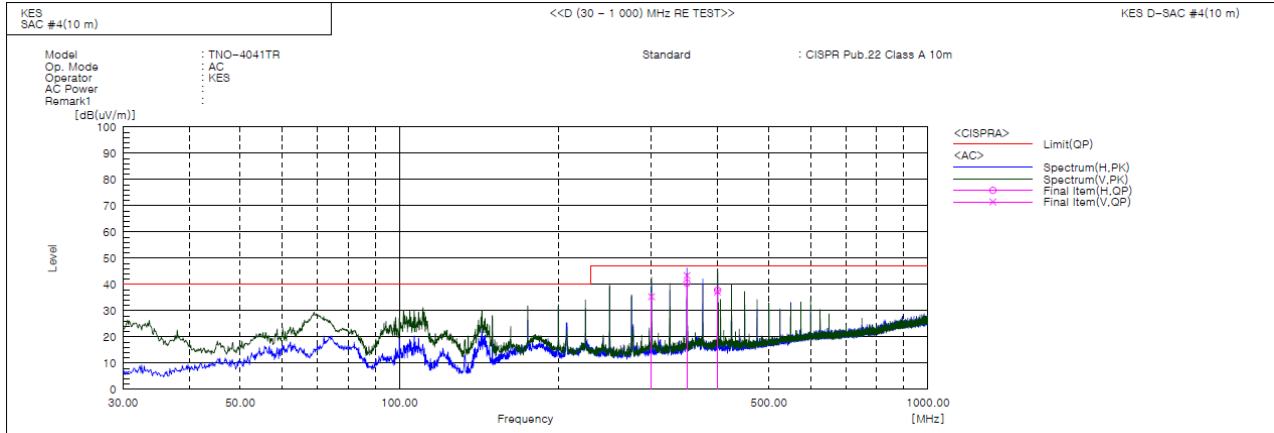
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Radiated Electric Field Emissions(Below 1 GHz)

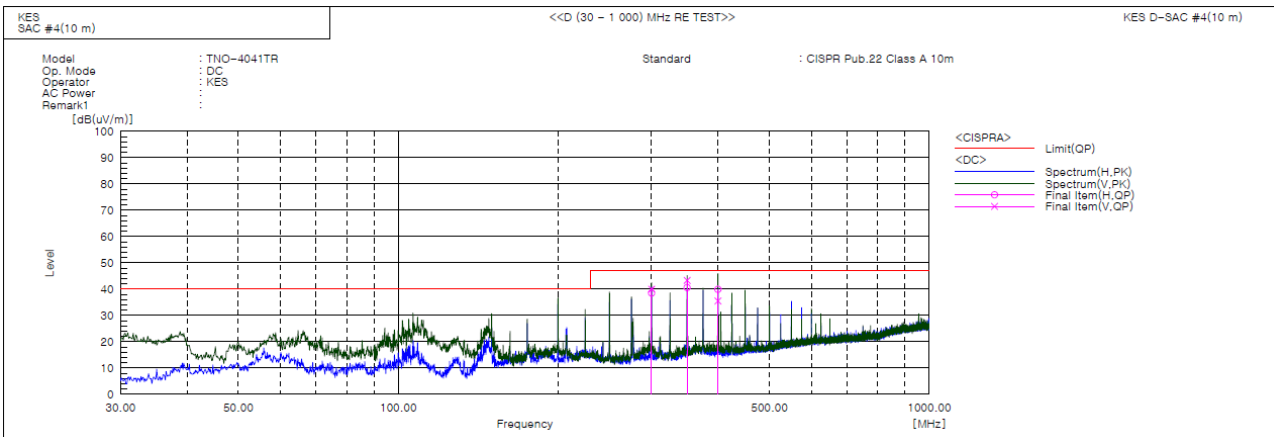
■ AC 24 V MODE



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	300.024	V	60.1	-24.8	35.3	47.0	11.7	100.0	324.0	
2	349.979	H	63.7	-23.2	40.5	47.0	6.5	400.0	349.0	
3	349.979	V	66.6	-23.2	43.4	47.0	3.6	100.0	102.0	
4	399.934	V	58.6	-21.4	37.2	47.0	9.8	100.0	169.0	
5	400.055	H	59.2	-21.4	37.8	47.0	9.2	400.0	36.0	

■ 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	300.024	H	63.3	-24.8	38.5	47.0	8.5	400.0	317.0	
2	300.024	V	64.8	-24.8	40.0	47.0	7.0	100.0	296.0	
3	349.979	H	63.8	-23.2	40.6	47.0	6.4	400.0	92.0	
4	349.979	V	66.5	-23.2	43.3	47.0	3.7	100.0	106.0	
5	400.055	H	61.3	-21.4	39.9	47.0	7.1	400.0	24.0	
6	400.055	V	56.9	-21.4	35.5	47.0	11.5	100.0	272.0	

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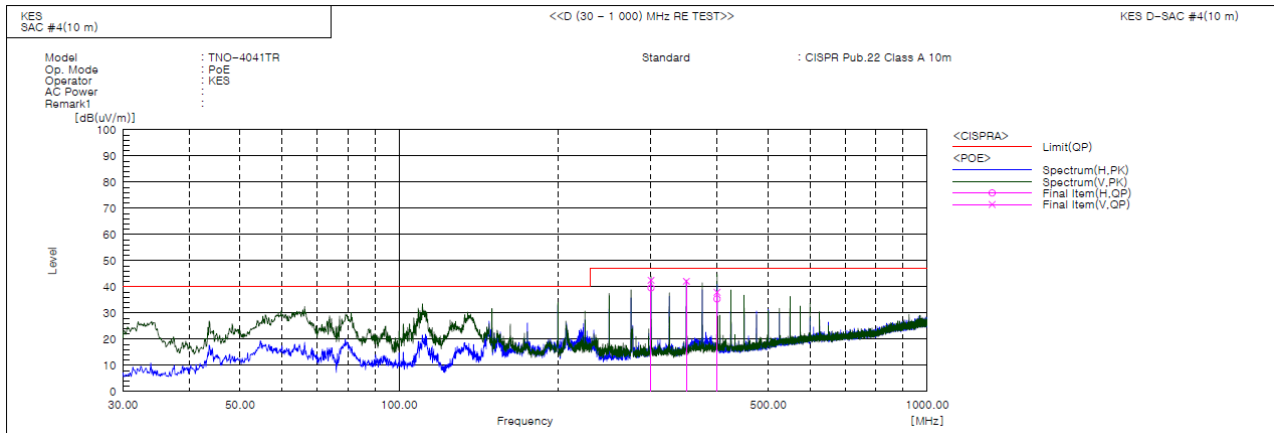


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■ PoE MODE



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	300.024	H	64.4	-24.8	39.6	47.0	7.4	400.0	289.0	
2	300.024	V	67.3	-24.8	42.5	47.0	4.5	100.0	334.0	
3	349.979	V	65.3	-23.2	42.1	47.0	4.9	100.0	218.0	
4	400.055	H	56.8	-21.4	35.4	47.0	11.6	400.0	15.0	
5	400.055	V	59.3	-21.4	37.9	47.0	9.1	100.0	282.0	

◆ 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 - Preamp Factor), Margin: Margin value

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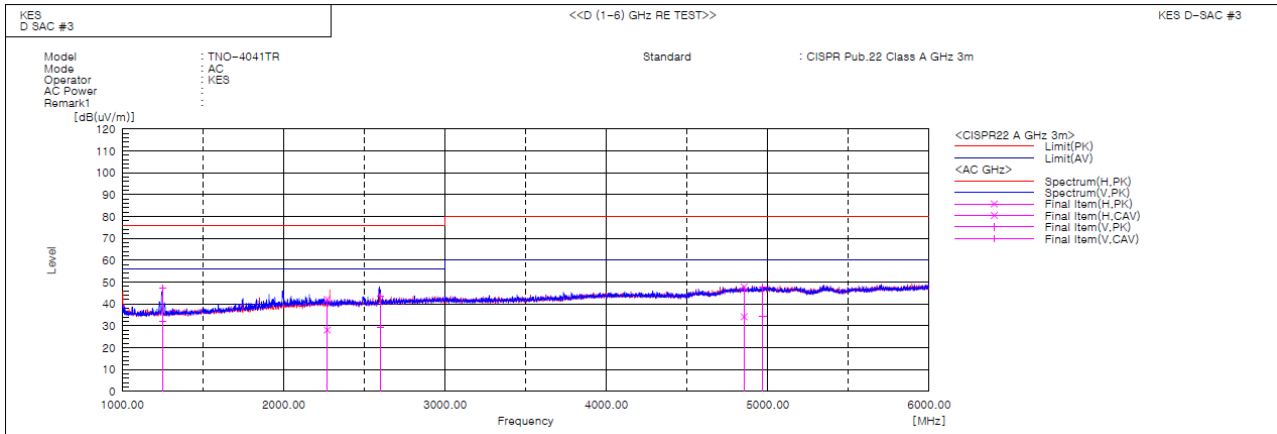
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Radiated Electric Field Emissions(Above 1 GHz)

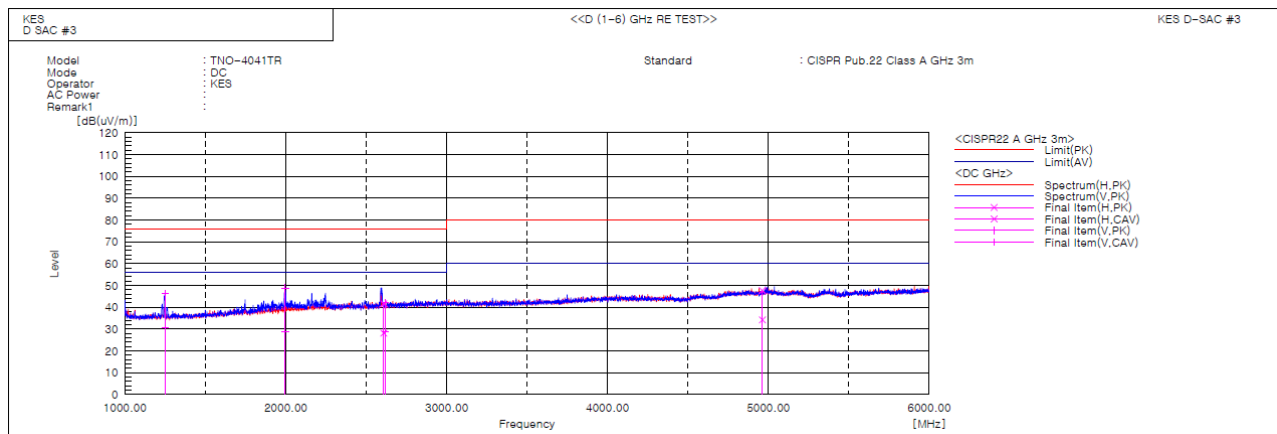
■ AC 24 V MODE



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1249.519	V	54.2	38.9	-7.0	47.2	31.9	76.0	56.0	28.8	24.1	100.0	221.7	
2	2269.983	H	43.0	28.8	-0.8	42.2	28.0	76.0	56.0	33.8	28.0	100.0	187.4	
3	2600.509	V	43.3	28.9	0.3	43.6	29.2	76.0	56.0	32.4	26.8	100.0	340.6	
4	4853.799	H	39.8	26.1	8.0	47.8	34.1	80.0	60.0	32.2	25.9	100.0	183.3	
5	4968.818	V	39.4	25.8	8.4	47.8	34.2	80.0	60.0	32.2	25.8	100.0	93.8	

■ DC 12 V MODE



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1249.670	V	53.3	37.5	-7.0	46.3	30.5	76.0	56.0	29.7	25.5	100.0	243.6	
2	1996.870	V	51.0	30.8	-2.1	48.9	28.7	76.0	56.0	27.1	27.3	100.0	2.6	
3	2608.716	H	41.2	27.8	0.4	41.6	28.2	76.0	56.0	34.4	27.8	100.0	67.0	
4	2617.516	V	41.8	28.3	0.4	42.2	28.7	76.0	56.0	33.8	27.3	100.0	298.2	
5	4962.604	H	39.3	25.9	8.4	47.7	34.3	80.0	60.0	32.3	25.7	100.0	121.2	

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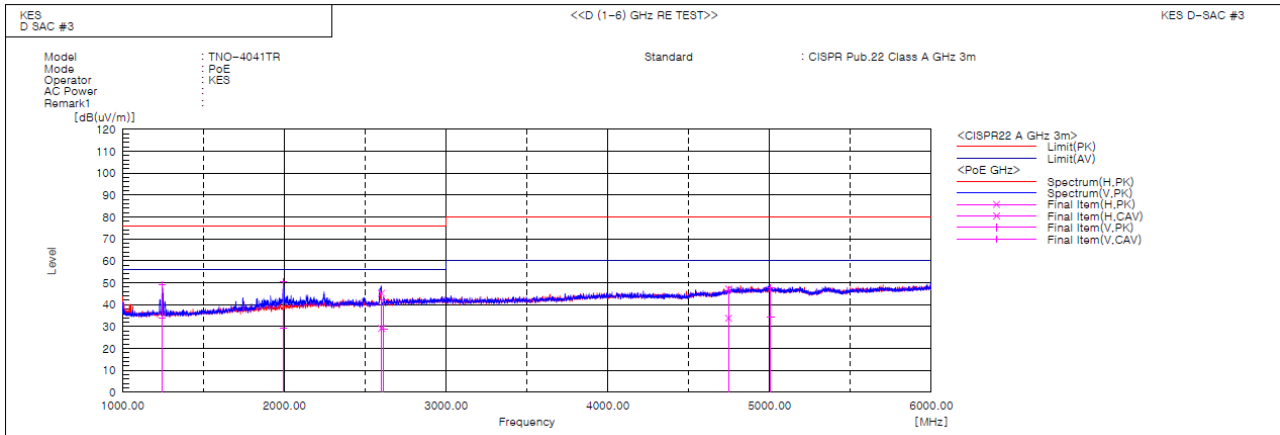


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■ PoE MODE



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1245.470	V	56.2	41.1	-7.0	49.2	34.1	76.0	56.0	26.8	21.9	100.0	221.4	
2	1993.310	V	52.4	31.2	-2.1	50.3	29.1	76.0	56.0	25.7	26.9	100.0	2.7	
3	2600.048	H	44.9	28.9	0.3	45.2	29.2	76.0	56.0	30.8	26.8	100.0	65.5	
4	2615.987	V	41.7	28.3	0.4	42.1	28.7	76.0	56.0	33.9	27.3	100.0	65.7	
5	4746.330	H	40.0	26.6	7.2	47.2	33.8	80.0	60.0	32.8	26.2	100.0	70.2	
6	5006.988	V	39.3	25.8	8.4	47.7	34.2	80.0	60.0	32.3	25.8	100.0	88.1	

◆ Calculation

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

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

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

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

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Test Setup Photos and Configuration

Conducted Voltage Emissions



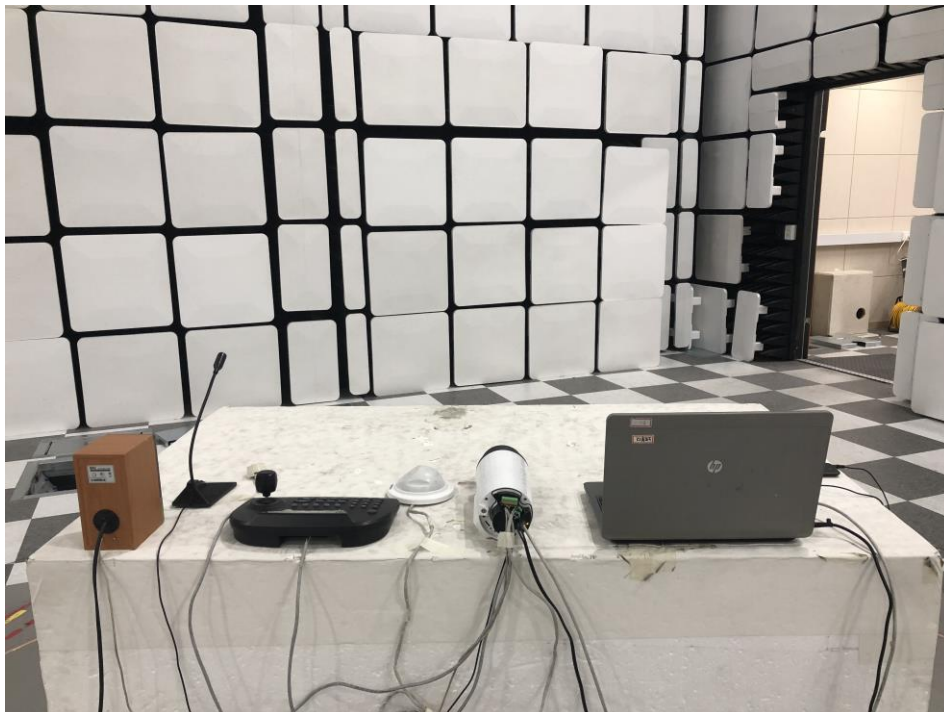
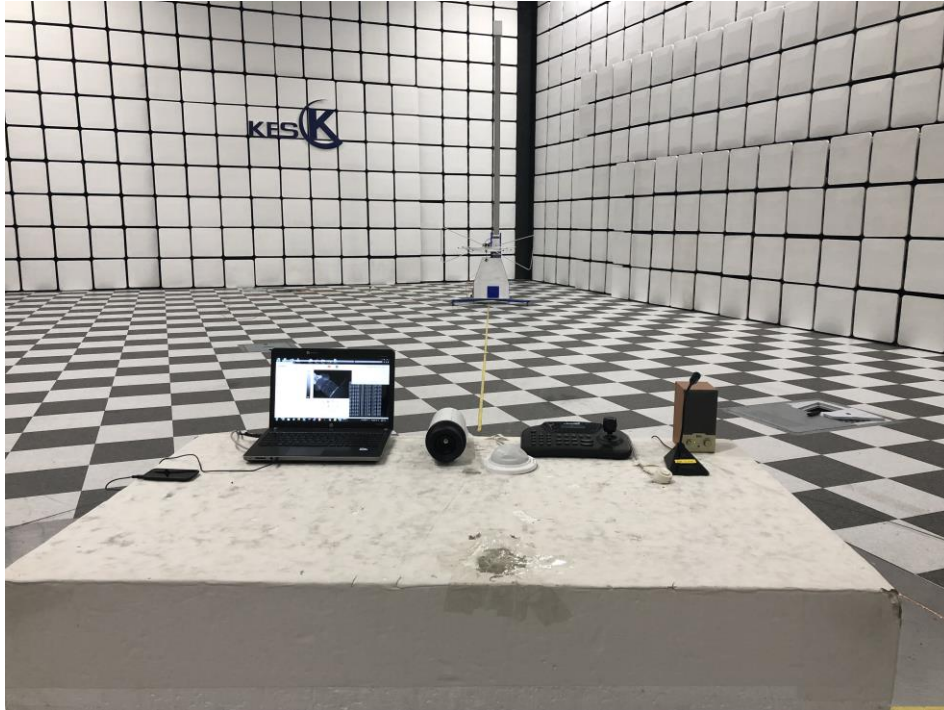
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Conducted Telecommunication Emissions



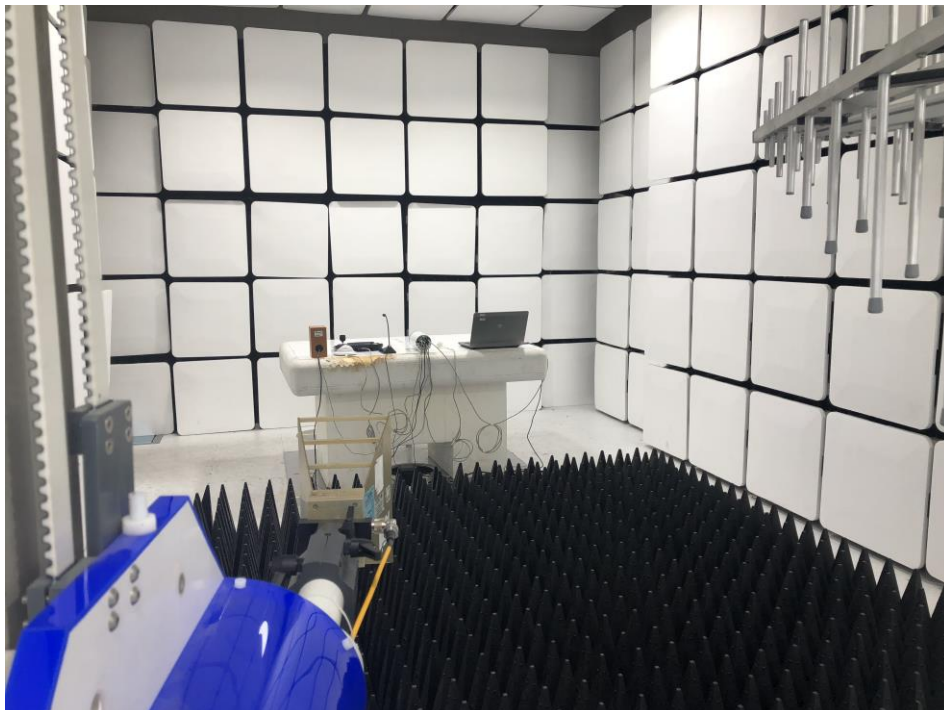
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Radiated Electric Field Emissions(Below 1 GHz)



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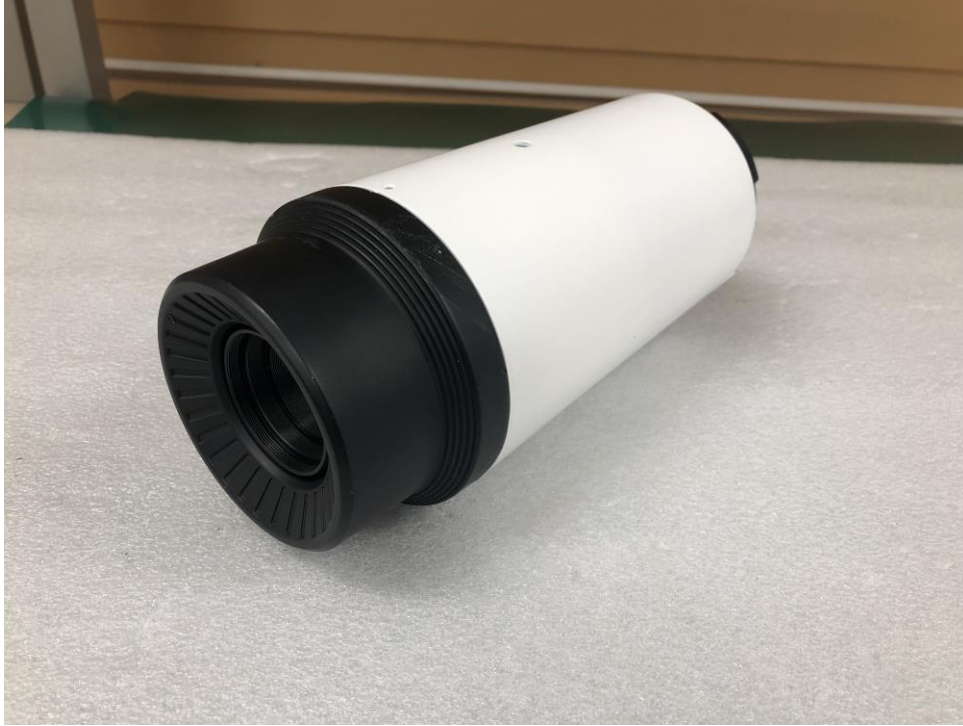
Radiated Electric Field Emissions(Above 1 GHz)



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EUT External Photographs

(Top)



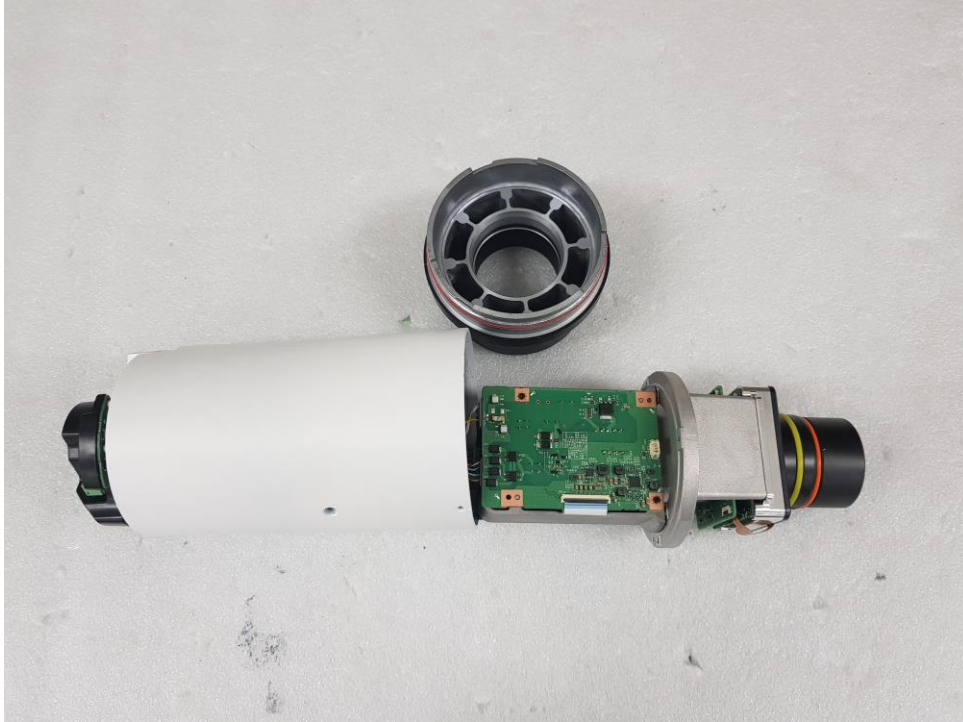
(Bottom)



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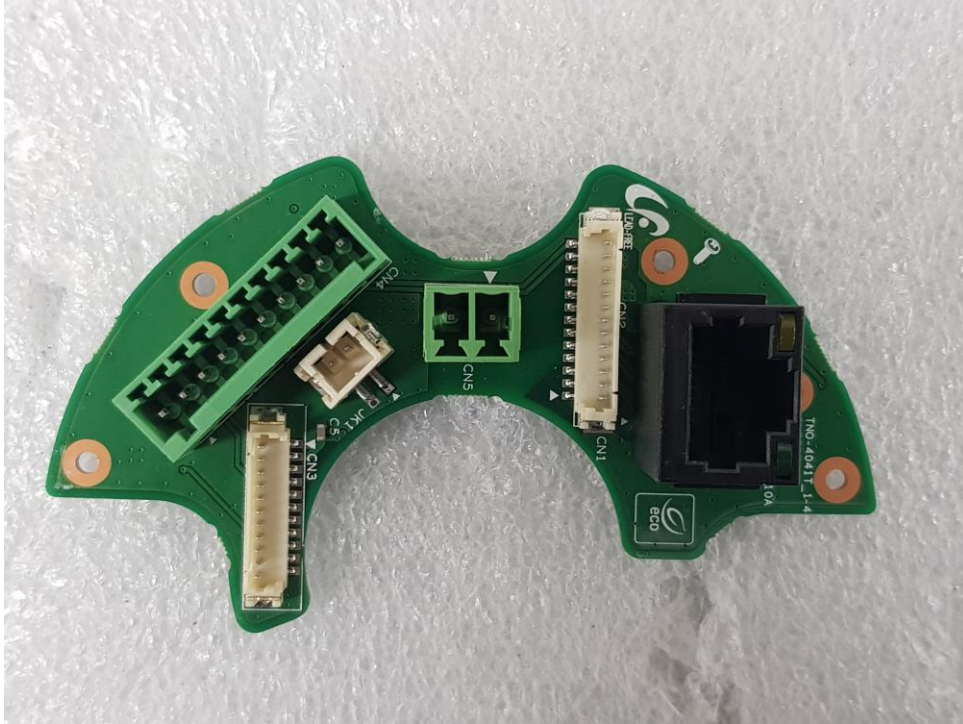
EUT Internal Photographs

(Internal View)



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EUT Internal View – Interface Board (Top)



(Bottom)



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EUT Internal View – Lens (Top)

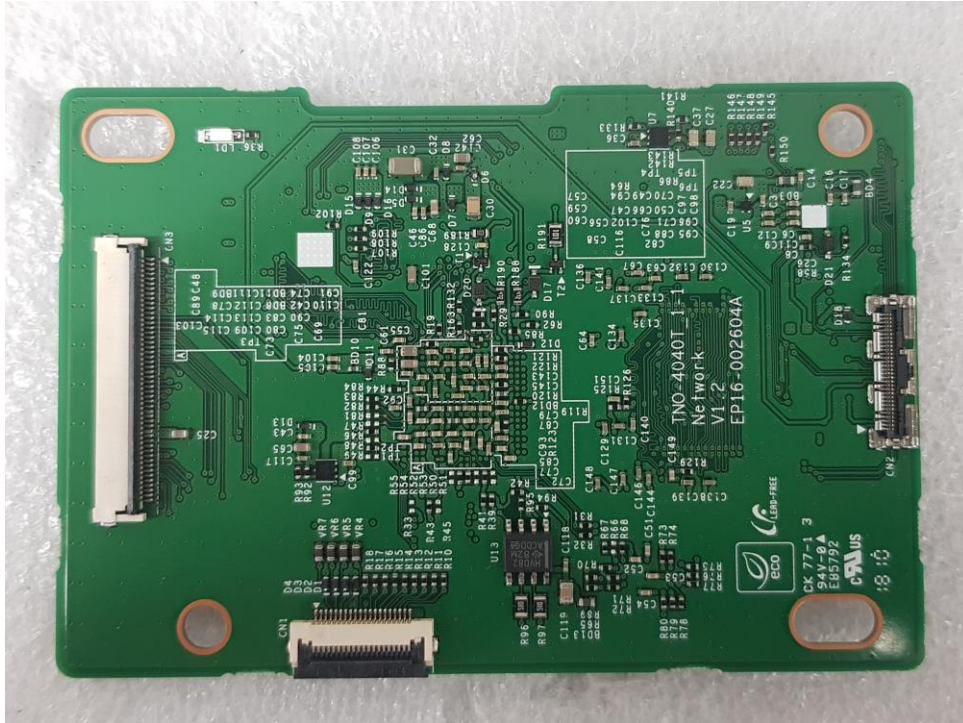


(Bottom)

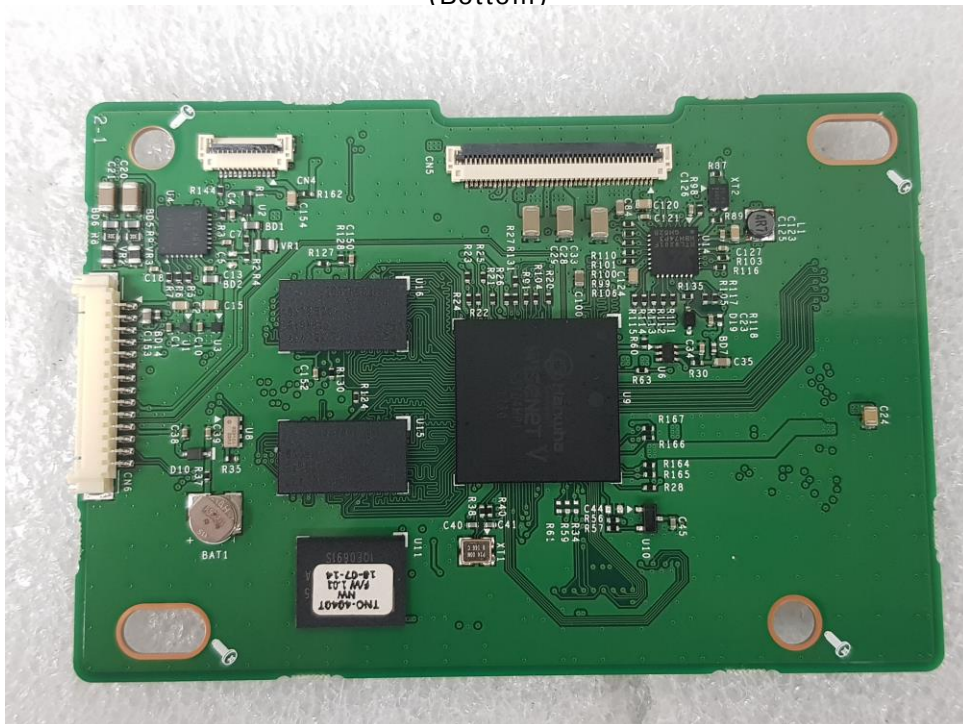


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EUT Internal View – Network Board (Top)

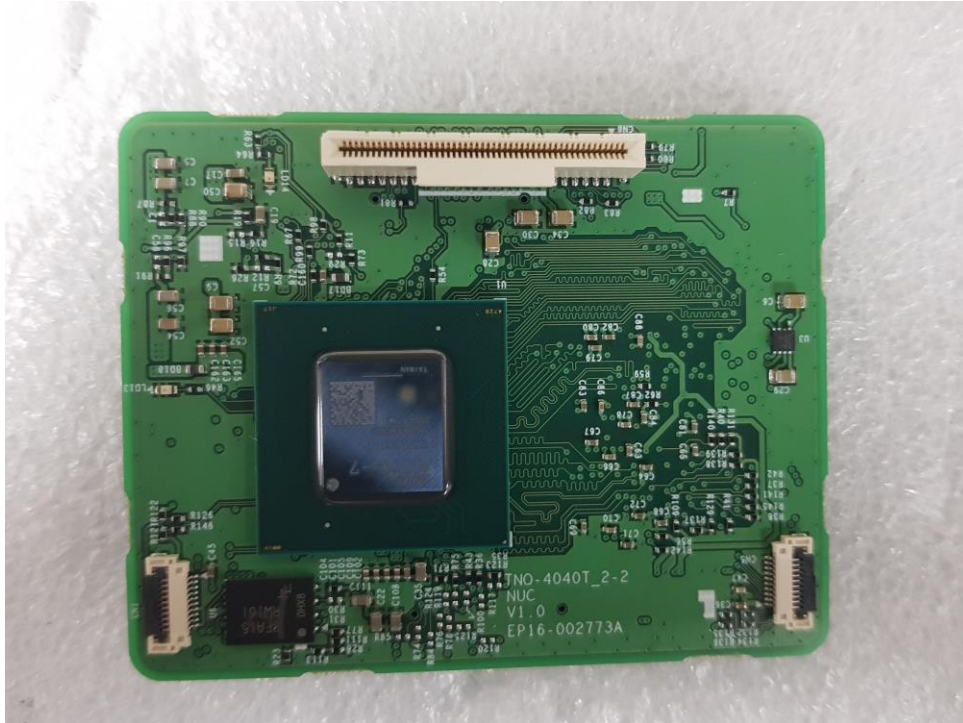


(Bottom)

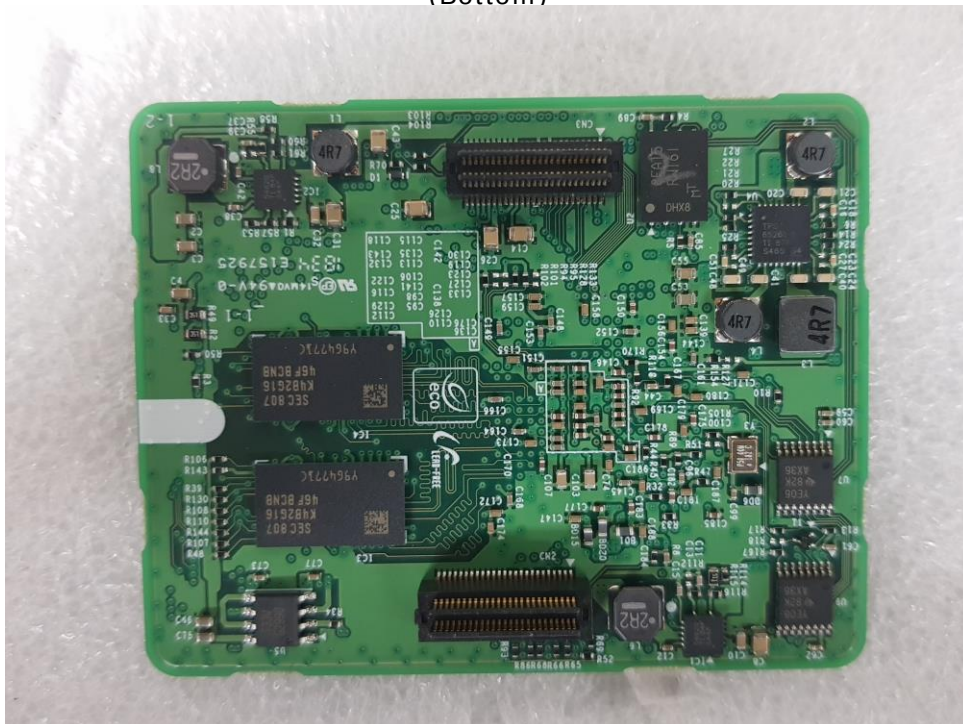


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EUT Internal View – NUC Board (Top)

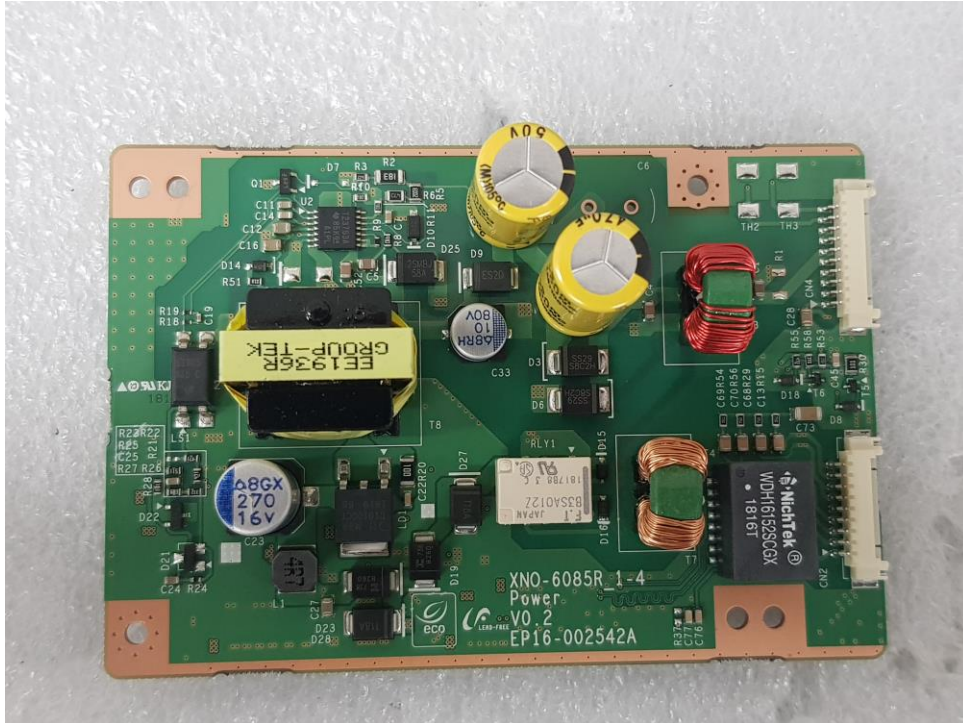


(Bottom)

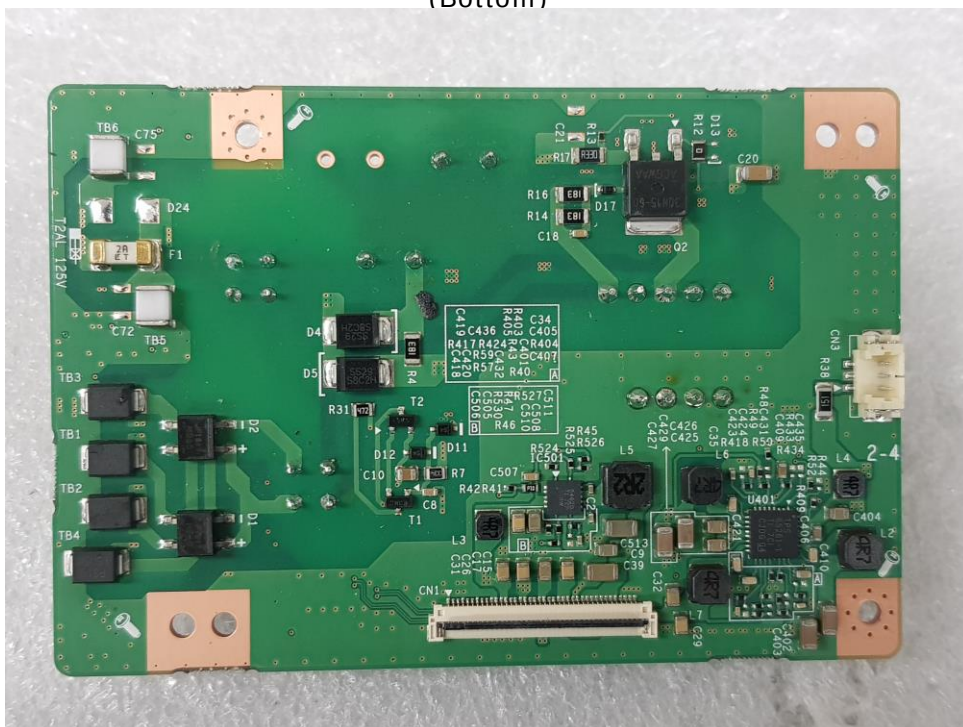


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EUT Internal View – Power Board (Top)

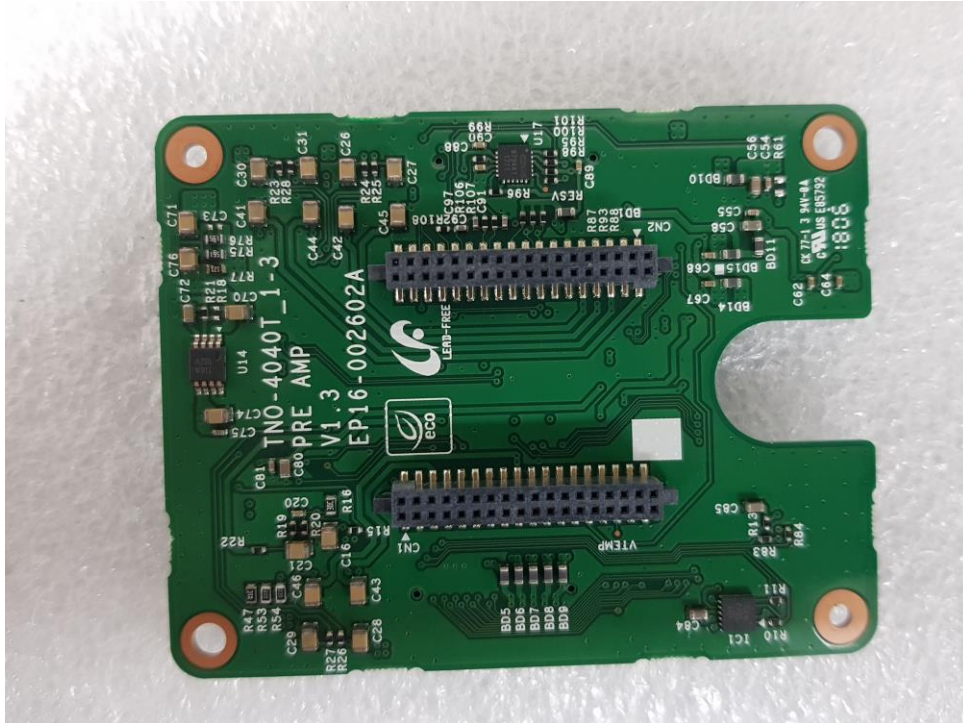


(Bottom)

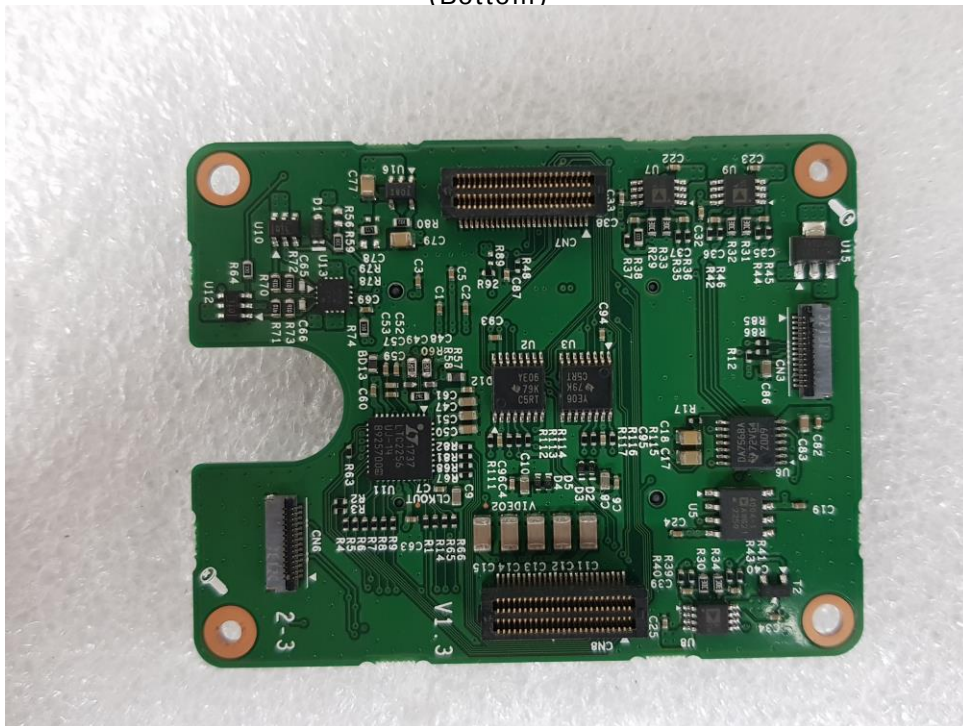


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EUT Internal View – PRE AMP Board (Top)



(Bottom)



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EUT Internal View – SD Card Board (Top)



(Bottom)

