



**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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Report No.:

KES-EM-20T0028

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# EMC TEST REPORT For VCCI

Test Report No. : KES-EM-20T0028

Date of Issue : Jan. 16, 2020

Product name : Network Camera

Model/Type No. : TNB-9000

Variant Model : -

Applicant : Hanwha Techwin Co., Ltd.

Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,  
Gyeonggi-do, Republic of 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 : Dec. 26, 2019

Test date : Jan. 08, 2020

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jung Jun Soo  
EMC Test Engineer

Reviewed by

Dong-Hun, Jang  
EMC Technical Manager

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**REPORT REVISION HISTORY**

Date	Test Report No.	Revision History
Jan. 16, 2020	KES-EM-20T0028	Issued

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## 1.0 General Product Description

### Main Specifications of EUT are:

Video	
Imaging Device	43.3mm Full-frame CMOS
Effective Pixels	7680(H)x4320(V)
NETD	None
Pixel Size	None
Min. Illumination	Color : 0.015Lux(F1.4, 1/30sec) B/W : 0.0015Lux(F1.4, 1/30sec)
Video Out	HDMI: 1080p@30fps
Lens	
Focal Length (Zoom Ratio)	None
Max. Aperture Ratio	None
Angular Field of View	Canon 24mm f1.4L, Auto-Iris (EF 24mm f/1.4 II USM) : Horizontal field of view: 8K 57.4° Canon 35mm f1.4L, Auto-Iris (EF 35mm f/1.4 II USM) : Horizontal field of view: 8K 42.6° Canon 50mm f1.4, Auto-Iris (EF 50mm f/1.4 USM) : Horizontal field of view: 8K 30.9° Canon 85mm f1.2L, Auto-Iris (EF 85mm f/1.2L II USM) : Horizontal field of view: 8K 19.1° Canon 100mm f2.0, Auto-Iris (EF 100mm f/2 USM) : Horizontal field of view: 8K 16.0° Canon 70-200mm f2.8L, Auto-Iris, Vari Focal (EF 70-200mm f/2.8L USM) : Horizontal field of view: 8K 22.8° ~ 8.0° <i>* When using Canon 70-200mm f2.8L, Auto-Iris, Vari Focal (EF 70-200mm f/2.8L USM) mount lens, housing accessory components must be used.</i>
Min. Object Distance	None
Focus Control	Autofocus
Lens Type	Canon EF mount Lens
Mount Type	Canon EF mount
Optional Lens	Canon 24mm f1.4L, Auto-Iris (EF 24mm f/1.4 II USM) Canon 35mm f1.4L, Auto-Iris (EF 35mm f/1.4 II USM) Canon 50mm f1.4, Auto-Iris (EF 50mm f/1.4 USM) Canon 85mm f1.2L, Auto-Iris (EF 85mm f/1.2L II USM) Canon 100mm f2.0, Auto-Iris (EF 100mm f/2 USM) Canon 70-200mm f2.8L, Auto-Iris, Vari Focal (EF 70-200mm f/2.8L USM)
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
Pan Range	None
Pan Speed	None
Tilt Range	None
Tilt Speed	None
Rotate Range	None
Sequence	None
Preset Accuracy	None
Azimuth	None
Auto Tracking	None
Operational	
IR Viewable Length	None
Camera Title	Displayed up to 75 characters
Day & Night	Auto(ICR)
Backlight Compensation	BLC, DWDR
Wide Dynamic Range	None
Digital Noise Reduction	SSNRV
Digital Image Stabilization	None
Defog	None
Motion Detection	8ea, 8point polygonal zones (in 8K resolution only)
Privacy Masking	6ea, Rectangular - Color: Grey/Green/Red/Blue/Black/White
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	None
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/5 ~ 1/12,000sec)
Digital PTZ	Support
Video Rotation	None

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Analytics	- Classified object type : Person/Face/Vehicle/License plate with attributes, BestShot per object - Analytics events based on AI engine : object detection, Directional detection, Enter/Exit, Loitering, Virtual line - Analytics events : Defocus detection, Motion detection, Appear/Disappear, Tampering, Audio detection, Sound classification
Business Intelligence	None
Serial Interface	RS-485(Samsung-T, Pelco-D/P)
Alarm I/O	Input 1ea / Output 1ea
Alarm Triggers	Analytics, Network disconnect, Alarm input
Alarm Events	File upload via FTP and e-mail Notification via e-mail SD/SDHC/SDXC or NAS recording at event triggers Alarm output Handover
Audio In	Selectable(mic in/line in) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
Audio Out	Line out, Max.output level: 1Vrms
IR Illuminator (Optional)	None
Wiper	None
Coaxial Protocol	None
Video Transmission Distance	None
<b>Radiometry</b>	
Temperature detect range	None
Temperature accuracy	None
Temperature detection	None
Additional	None
<b>Network</b>	
Ethernet	RJ-45(10/100/1000 BASE-T), SFP slot(100/1000Mbps)
Video Compression	H.265/H.264: Main/High, MJPEG
Resolution	7680x4320, 7360x4128, 6016x3384, 6016x4008, 5472x3648, 4768x3184, 4608x2592, 3840x2160, 1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
Max. Framerate	H.265/H.264: 8K @ Max. 15fps (Mode 0) : Available in Dec. 2019 H.265/H.264: 24MP @ Max. 20fps (Mode 1) : Available in Mar. 2020 H.265/H.264: 15MP @ Max. 30fps (Mode 2) : Available in Mar. 2020 H.265/H.264: 4K @ Max. 60fps (Mode 3) : Available in Mar. 2020
Smart Codec	WiseStreamII
Video Quality Adjustment	H.264/H.265: Target bitrate level control MJPEG: Target bitrate level control
Bitrate Control	H.264/H.265: CBR or VBR MJPEG: VBR
Streaming	Unicast(10 users) / Multicast Multiple streaming(Up to 3 profiles)
Audio Compression	G.711 u-law /G.726 Selectable G.726(ADPCM) 8KHz, G.711 8KHz G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps AAC-LC: 48Kbps at 16KHz
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP,RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP
Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access log 802.1X Authentication(EAP-TLS, EAP-LEAP) Device Certificate(Hanwha Techwin Root CA)
Edge Storage	Micro SD/SDHC/SDXC 1slot 256MB
Application Programming Interface	ONVIF Profile S/G/T SUNAPI(HTTP API)
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish,, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek
Web Viewer	Supported OS: Windows 8.1, 10, Mac OS X 10.10, 10.11, 10.12 Recommended Browser: Google Chrome Supported Browser: MS Explore11, MS Edge, Mozilla Firefox(Window 64bit only), Apple Safari(Mac OS X only)
Memory	4096MB RAM, 512MB Flash

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<b>Environmental</b>	
Operating Temperature / Humidity	0°C ~ +45°C(32°F ~ +122°F) / Less than 90% RH
Storage Temperature / Humidity	-40°C ~ +65°C(-40°F ~ +149°F) / Less than 90% RH
Certification	EMC EN 50130-4, EN 55032 Class A, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, FCC Part 15 Subpart B Class A, IC ICES-003 Class A,  Safety UL 60950-1
<b>Electrical</b>	
Input Voltage	HPoE(IEEE802.3bt, Class5), 12VDC
Power Consumption	PoE: Max 30W, typical 20W 12VDC: Max 26W, typical 18W
<b>Mechanical</b>	
Color / Material	Black / Aluminum
RAL Code	None
Product dimensions / weight	120(W)x118.1(H)x179(D)mm, 2.1Kg(4.55 lb)
Package dimensions / weight	250(W)x250(D)x323(H)mm, 3.8Kg(8.38 lb)
Conduit hole	None
Hanging mount(Dome)	
Skin cover(Dome)	
Weather cap(Dome)	
Power module	
Backbox	

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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

Not applicable

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Network Camera	TNB-9000	-	HANWHA TECHWIN (TIANJIN) CO., LTD	EUT
PoE Adapter	PT-PSE109GBRO-AH	PT1941220063	Dongguan PROCET Network Technology Co.,Ltd	EUT

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## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	P95G001	8KM8HT2	Wistron Infocom (Chengdu) Company Limited	-
Notebook Adapter	LA65NS2-01	-	LITE-ON TECHNOLOGY(CHANG ZHOU)CO.,LTD.	-
Controller	SPC-1010	C50E67WG10100F	SamSung Techwin Co.,Ltd.	-
Controller Adapter	RS-AB1000	-	Dongguan Jinhua Sheng Power Technology Co.,Ltd.	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
MIC	MP1000	-	-	-
Alarm	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Button Alarm	-	-	-	-
iPod	A1367	C3TDG2JGDCP9	APPLE .Inc	-
Micro SD Card	-	-	SanDisk	8 GB
Monitor	27UK850	805NTGYCH455	LG Electronics Inc.	-
Monitor Adapter	A16-140P1A	ZJ5CS64929301C304	LG Electronics Inc.	-

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## 1.6 External I/O Cabling

### ■ DC 12 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	Micro HDMI	Monitor	HDMI	1.0	S
	NETWORK	Notebook	RJ-45	30	S
	RS-485	Controller	RS-485	3.0	U
	Audio Out	Speaker	3.5 mm	1.4	U
	Audio In	MIC	XLR	1.4	U
	Alarm Out	Alarm	Alarm In	3.0	U
	Alarm In	Button Alarm	Alarm Out	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	3.5 mm	iPod	3.5 mm	1.0	U

### ■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
Network Camera (EUT)	Micro HDMI	Monitor	HDMI	1.0	S
	NETWORK	PoE Adapter	RJ-45	30	S
	RS-485	Controller	RS-485	3.0	U
	Audio Out	Speaker	3.5 mm	1.4	U
	Audio In	MIC	XLR	1.4	U
	Alarm Out	Alarm	Alarm In	3.0	U
	Alarm In	Button Alarm	Alarm Out	3.0	U
	SLOT	Micro SD Card	SLOT	-	-
Notebook	3.5 mm	iPod	3.5 mm	1.0	U
	RJ-45	PoE Adapter	RJ-45	30	S

\* Unshielded=U, Shielded=S



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### 1.7 EUT Operating Mode(s)

Test mode	operating
DC 12 V, PoE	Monitoring EUT Using Web Viewer, Ping Test

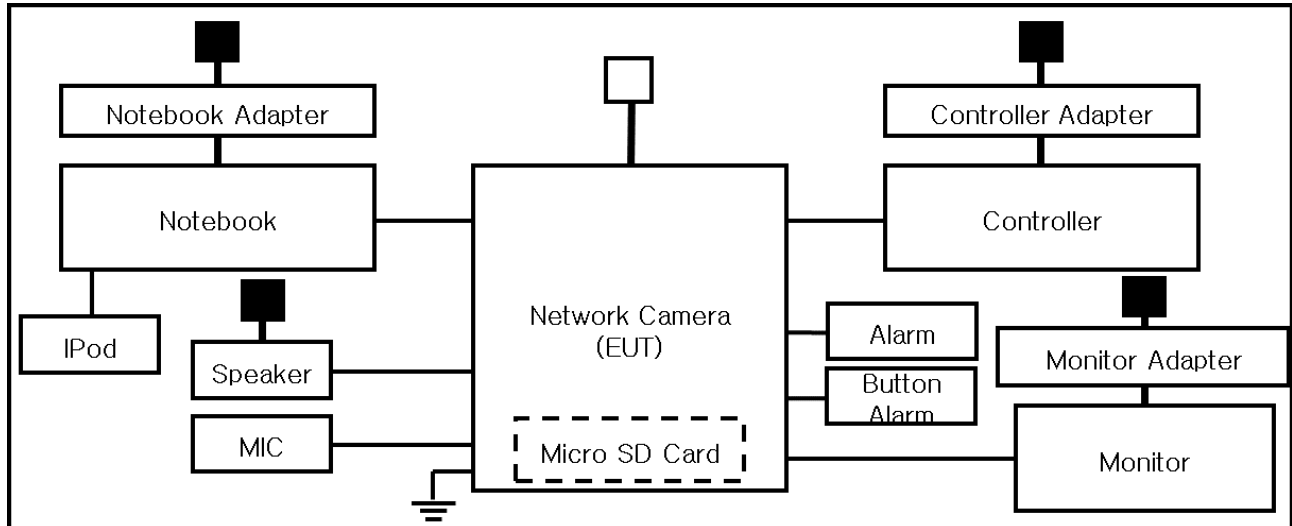
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	-

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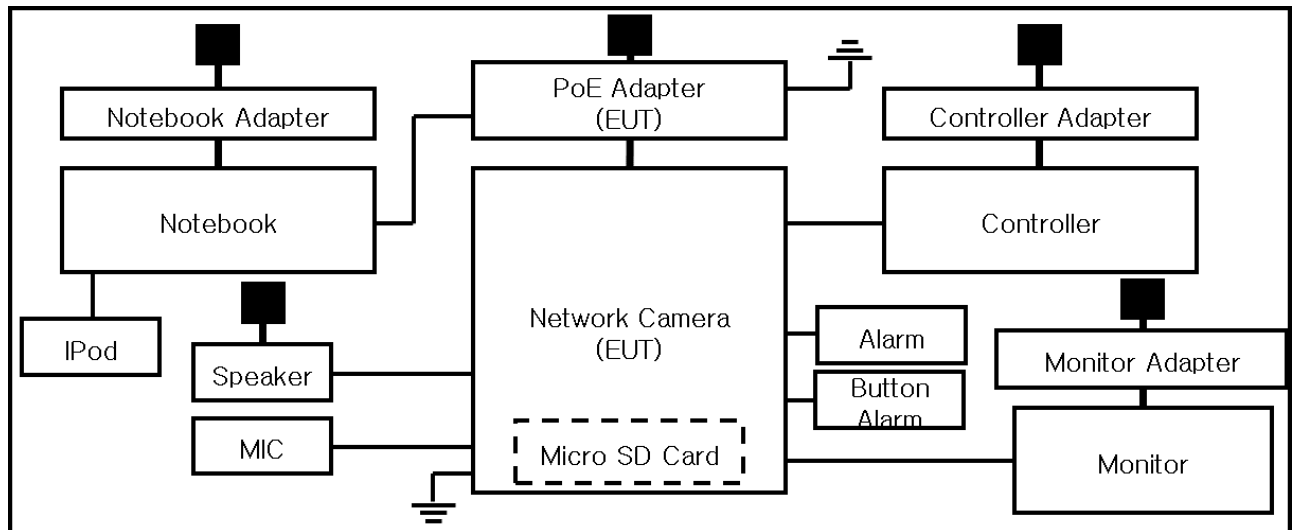
## 1.8 Configuration

■ AC Main  
 □ DC Main

### ■ DC 12 V Mode



### ■ PoE Mode



## 1.9 Remarks when standards applied

USB and SFP ports are for administrators and is excluded from the test.







## 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-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

## 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



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- |   |   |                                  |
|---|---|----------------------------------|
| <input checked="" type="checkbox"/> <b>VCCI-CISPR 32:2016</b> | <input checked="" type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>AS/NZS CISPR32:2015</b>           | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input type="checkbox"/> <b>47 CFR Part 15, Subpart B</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"/> <b>IC Regulation ICES-003 : 2016</b> |   |                                  |
| <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                      |   |                                  |
| <br><input type="checkbox"/> <b>RE- Directive 2014/53/EU</b>  |   |                                  |
| <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 Mains Power Ports

**Test Date**

Jan. 08, 2020

**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	101783	04, 22, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	01, 25, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	01, 25, 2020
<input type="checkbox"/>	LISN	NNBM8124	SCHWARZBECK	8124-1002	08, 06, 2020

**Test Conditions**

Temperature: 25,8 °C  
Relative Humidity: 48,4 % 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.

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## 2.2 Conducted Emissions at Telecommunication Ports

### Test Date

Jan. 08, 2020

### 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	101783	04, 22, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	01, 25, 2020
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	01, 25, 2020
<input type="checkbox"/>	8-WIRE ISN CAT3	CAT3 8158	SCHWARZBECK	8158-0019	03, 19, 2020
<input type="checkbox"/>	8-WIRE ISN CAT5	CAT5 8158	SCHWARZBECK	8158-0030	03, 19, 2020
<input type="checkbox"/>	8-WIRE ISN CAT6	NTFM 8158	SCHWARZBECK	8158-0029	08, 13, 2020
<input checked="" type="checkbox"/>	ISN	ISN S8	SCHWARZBECK	ISN-S8-0019	05, 09, 2020

### Test Conditions

Temperature: 25,8 °C  
Relative Humidity: 48,4 % 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

Jan. 08, 2020

### Test Location

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

### 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, 09, 2020
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 25, 2020
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 11, 2020

### Test Conditions

Temperature: 24,6 °C  
Relative Humidity: 47,2 % 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

Jan. 08, 2020

### Test Location

SEMI ANECHOIC CHAMBER #3

### 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	ESR7	R & S	101190	08, 06, 2020
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 27, 2020
<input type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 11, 2020
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 12, 2020

### Test Conditions

Temperature: 25,2 °C  
Relative Humidity: 45,3 % 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

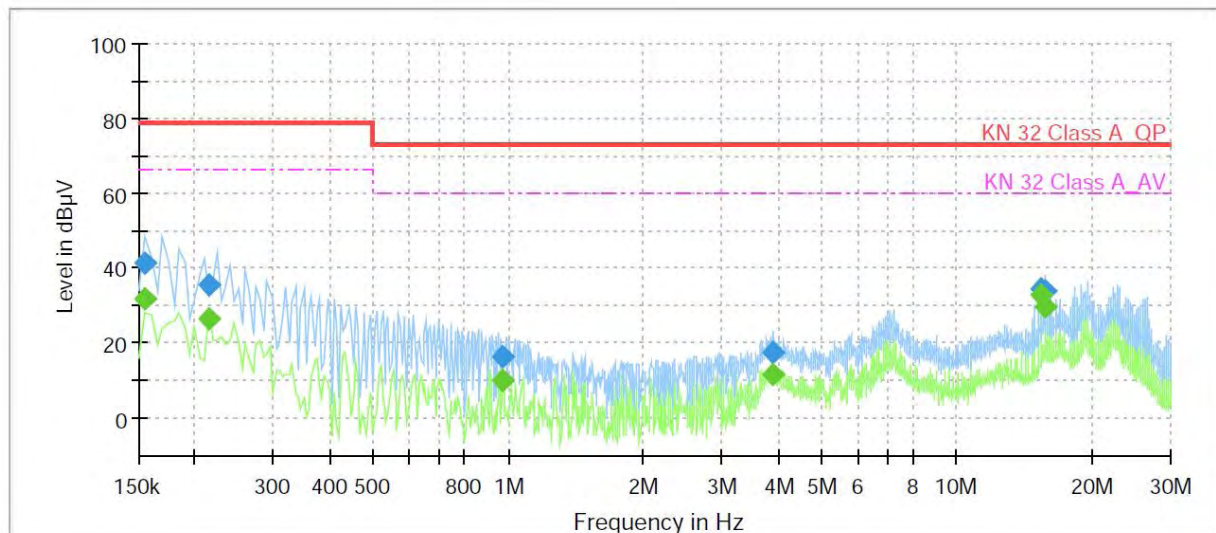
### Conducted Emissions at Mains Power Ports

■ PoE Mode

HOT LINE

### Common Information

Test Description:	Conducted Emission
Model No.:	TNB-9000
Mode	L1
Operator Name:	KES



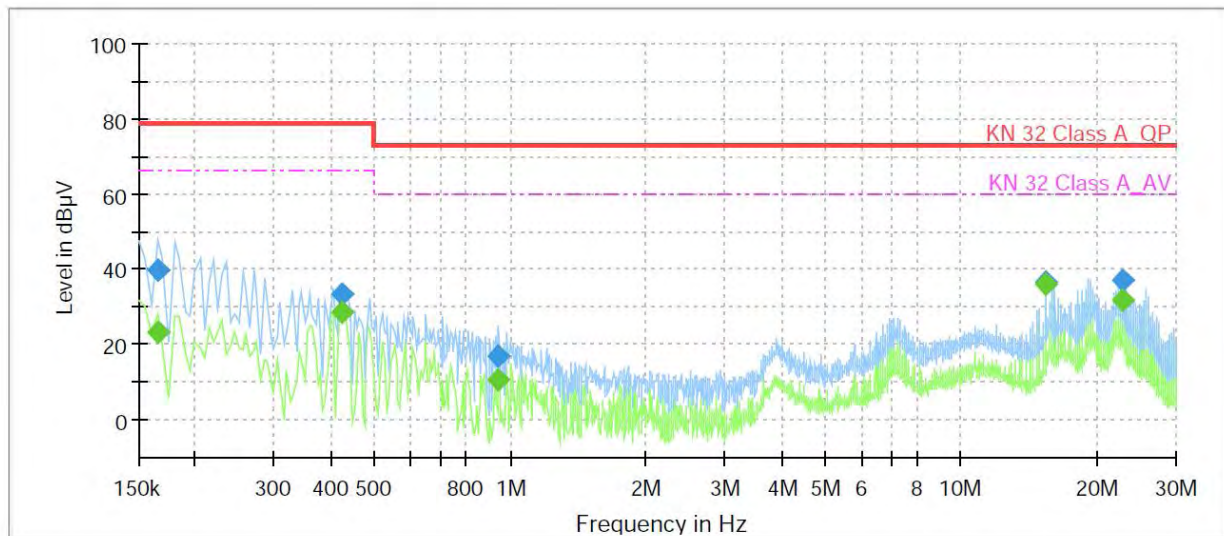
### Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.155000	---	31.90	66.00	34.10	1000.0	9.000	L1	9.9
0.155000	41.10	---	79.00	37.90	1000.0	9.000	L1	9.9
0.215000	---	26.44	66.00	39.56	1000.0	9.000	L1	10.0
0.215000	35.39	---	79.00	43.61	1000.0	9.000	L1	10.0
0.975000	---	9.94	60.00	50.06	1000.0	9.000	L1	11.4
0.975000	16.19	---	73.00	56.81	1000.0	9.000	L1	11.4
3.910000	---	11.77	60.00	48.23	1000.0	9.000	L1	10.1
3.910000	17.50	---	73.00	55.50	1000.0	9.000	L1	10.1
15.440000	---	33.06	60.00	26.94	1000.0	9.000	L1	10.6
15.440000	34.32	---	73.00	38.68	1000.0	9.000	L1	10.6
15.685000	---	29.60	60.00	30.40	1000.0	9.000	L1	10.6
15.685000	34.15	---	73.00	38.85	1000.0	9.000	L1	10.6

## NEUTRAL LINE

### Common Information

Test Description: Conducted Emission  
 Model No.: TNB-9000  
 Mode: N  
 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	---	23.58	66.00	42.42	1000.0	9.000	N	9.9
0.165000	39.90	---	79.00	39.10	1000.0	9.000	N	9.9
0.425000	---	28.69	66.00	37.31	1000.0	9.000	N	10.8
0.425000	33.57	---	79.00	45.43	1000.0	9.000	N	10.8
0.945000	---	10.53	60.00	49.47	1000.0	9.000	N	11.4
0.945000	16.92	---	73.00	56.08	1000.0	9.000	N	11.4
15.440000	---	35.93	60.00	24.07	1000.0	9.000	N	10.6
15.440000	36.66	---	73.00	36.34	1000.0	9.000	N	10.6
22.795000	---	31.78	60.00	28.22	1000.0	9.000	N	10.9
22.795000	36.92	---	73.00	36.08	1000.0	9.000	N	10.9

#### ◆ Calculation

QuasiPeak[dBμV] / CAverage [dBμV] = Reading Value[dBμV] + 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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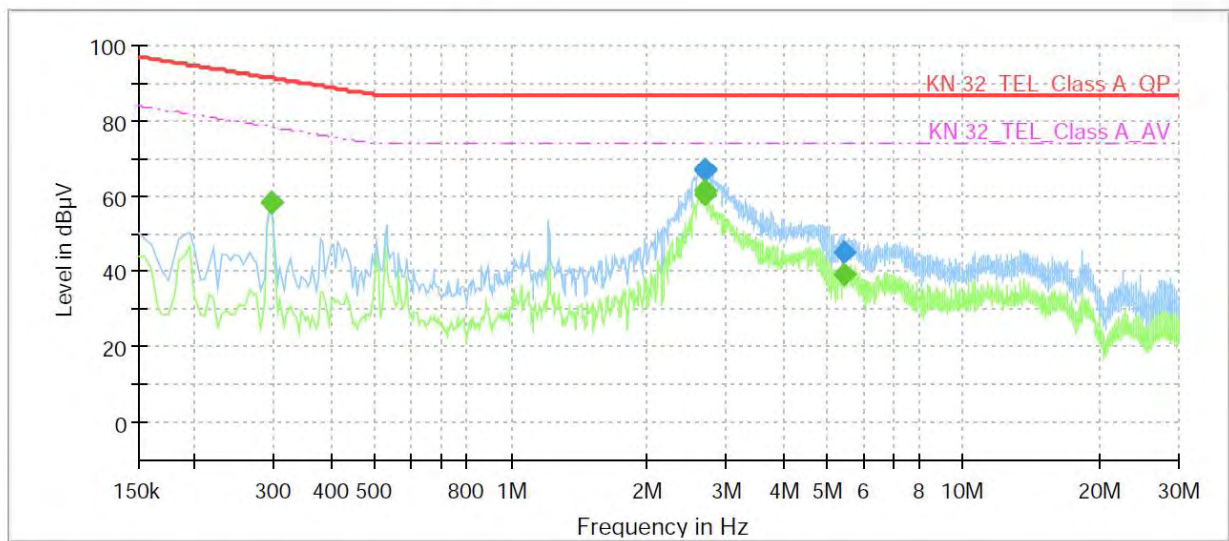
## Conducted Emissions at Telecommunication Ports

■ DC 12 V Mode\_RJ-45(Notebook)

[1 000 Mbps]

## Common Information

Test Description:	Telecommunication Emission
Model No.:	TNB-9000
Mode	1000 Mbps
Operator Name:	KES



## Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.295000	---	58.05	78.38	20.33	1000.0	9.000	Single Line	10.2
0.295000	58.19	---	91.38	33.19	1000.0	9.000	Single Line	10.2
2.680000	---	60.21	74.00	13.79	1000.0	9.000	Single Line	10.1
2.680000	66.62	---	87.00	20.38	1000.0	9.000	Single Line	10.1
2.685000	---	61.20	74.00	12.80	1000.0	9.000	Single Line	10.1
2.685000	67.35	---	87.00	19.65	1000.0	9.000	Single Line	10.1
5.445000	---	39.36	74.00	34.64	1000.0	9.000	Single Line	10.1
5.445000	45.04	---	87.00	41.96	1000.0	9.000	Single Line	10.1

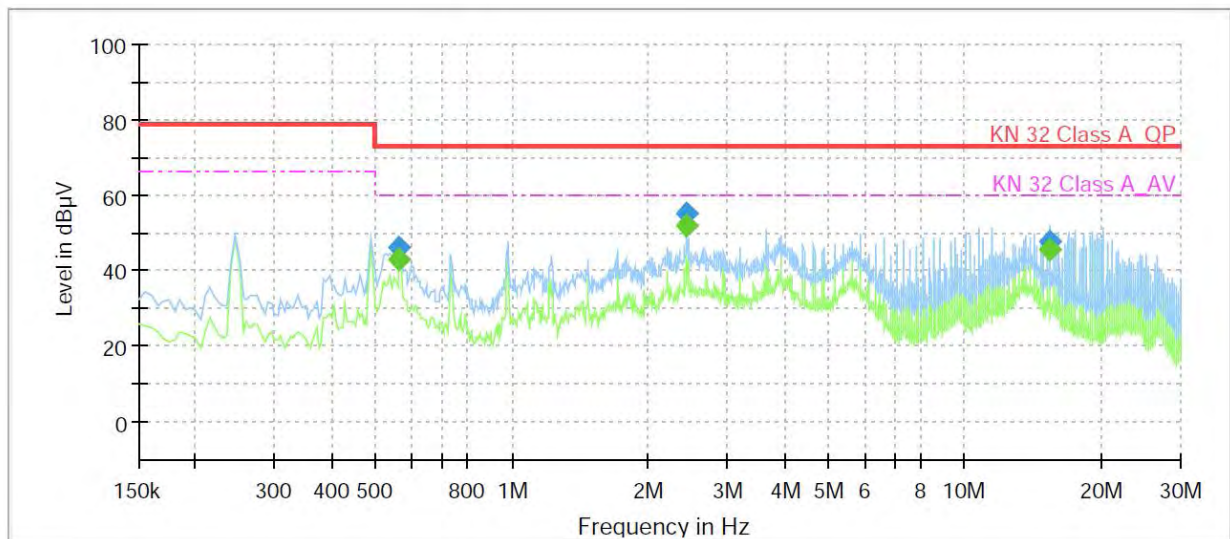
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■ PoE Mode\_RJ-45(PoE Adapter)

[1 000 Mbps]

## Common Information

Test Description:	Conducted Emission
Model No.:	TNB-9000
Mode	1000 Mbps
Operator Name:	KES



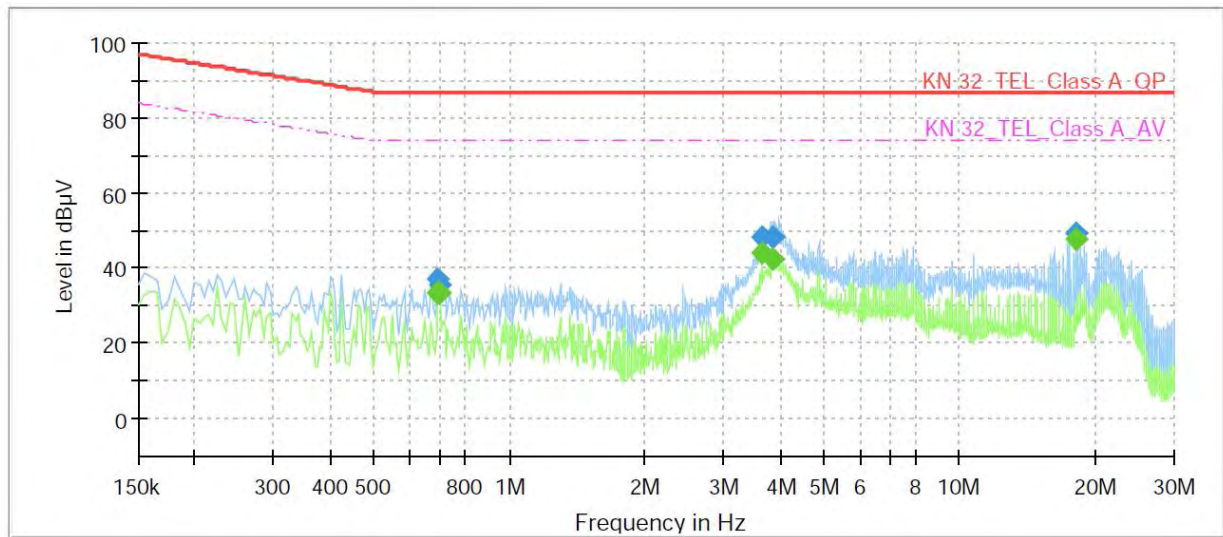
## Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.565000	---	42.63	60.00	17.37	1000.0	9.000	N	11.1
0.565000	46.18	---	73.00	26.82	1000.0	9.000	N	11.1
2.435000	---	51.89	60.00	8.11	1000.0	9.000	N	10.0
2.435000	55.20	---	73.00	17.80	1000.0	9.000	N	10.0
15.440000	---	45.51	60.00	14.49	1000.0	9.000	N	10.6
15.440000	47.49	---	73.00	25.51	1000.0	9.000	N	10.6



**PoE Mode\_RJ-45(Notebook)**
**[1 000 Mbps]**
**Common Information**

Test Description:	Telecommunication Emission
Model No.:	TNB-9000
Mode	LAN 1000 Mbps
Operator Name:	KES


**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.695000	---	33.15	74.00	40.85	1000.0	9.000	Single Line	11.3
0.695000	37.11	---	87.00	49.89	1000.0	9.000	Single Line	11.3
0.700000	---	33.39	74.00	40.61	1000.0	9.000	Single Line	11.3
0.700000	35.41	---	87.00	51.59	1000.0	9.000	Single Line	11.3
3.650000	---	43.83	74.00	30.17	1000.0	9.000	Single Line	10.1
3.650000	48.32	---	87.00	38.68	1000.0	9.000	Single Line	10.1
3.865000	---	42.47	74.00	31.53	1000.0	9.000	Single Line	10.0
3.865000	48.36	---	87.00	38.64	1000.0	9.000	Single Line	10.0
18.145000	---	47.88	74.00	26.12	1000.0	9.000	Single Line	10.7
18.145000	49.09	---	87.00	37.91	1000.0	9.000	Single Line	10.7

**◆ Calculation**

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



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3701, 40, Simin-daero 365beon-gil,  
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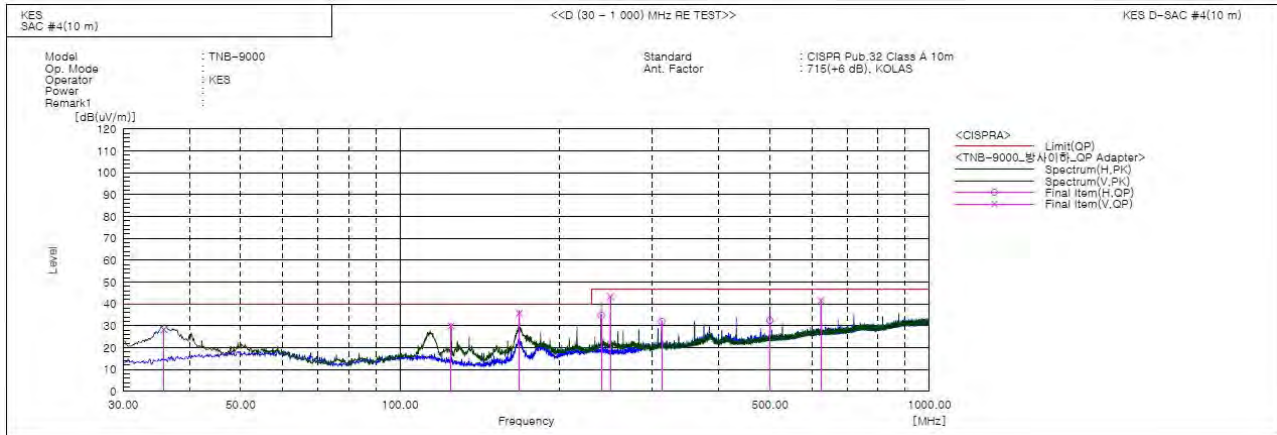
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## Radiated Electric Field Emissions(Below 1 GHz)

### ■ 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	35.820	V	53.0	-24.7	28.3	40.0	11.7	100.0	258.0	
2	124.939	V	54.6	-24.7	29.9	40.0	10.1	100.0	346.0	
3	167.983	V	60.3	-24.5	35.8	40.0	4.2	111.0	6.0	
4	240.005	H	54.9	-20.1	34.8	47.0	12.2	400.0	105.0	
5	249.948	V	63.4	-20.0	43.4	47.0	3.6	100.0	155.0	
6	312.028	H	50.0	-18.0	32.0	47.0	15.0	400.0	284.0	
7	499.965	H	45.2	-12.7	32.5	47.0	14.5	400.0	340.0	
8	624.004	V	51.1	-9.5	41.6	47.0	5.4	310.0	11.0	

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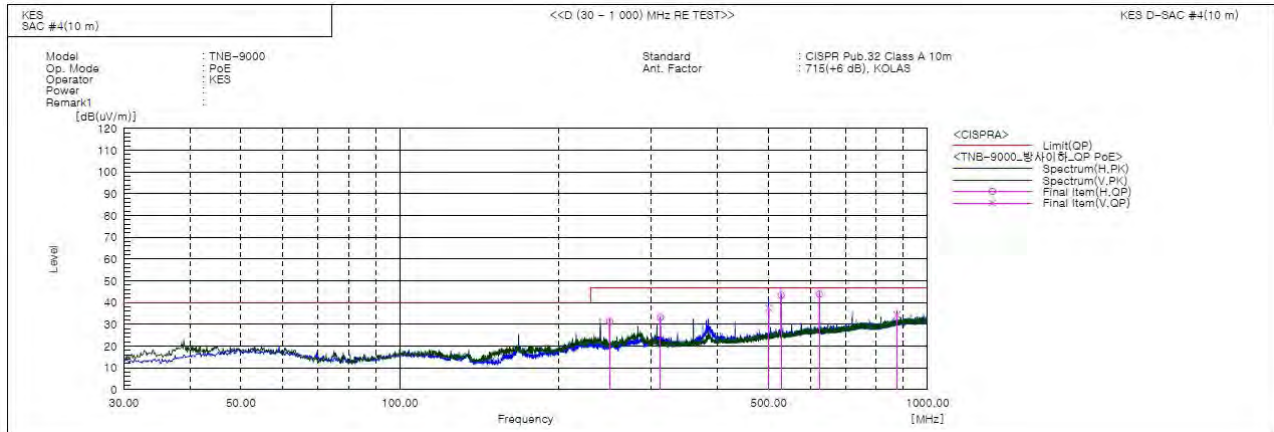


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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
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### ■ PoE Mode



### 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 [dB]	Height [cm]	Angle [deg]	Remark
1	249.948	H	51.3	-20.0	31.3	47.0	15.7	400.0	210.0	
2	311.906	H	51.3	-18.0	33.3	47.0	13.7	255.0	90.0	
3	499.965	V	50.1	-12.7	37.4	47.0	9.6	100.0	22.0	
4	527.974	H	55.8	-12.3	43.5	47.0	3.5	221.0	102.0	
5	624.004	H	53.4	-9.5	43.9	47.0	3.1	280.0	246.0	
6	874.991	V	40.3	-6.0	34.3	47.0	12.7	121.0	138.0	

### ◆ 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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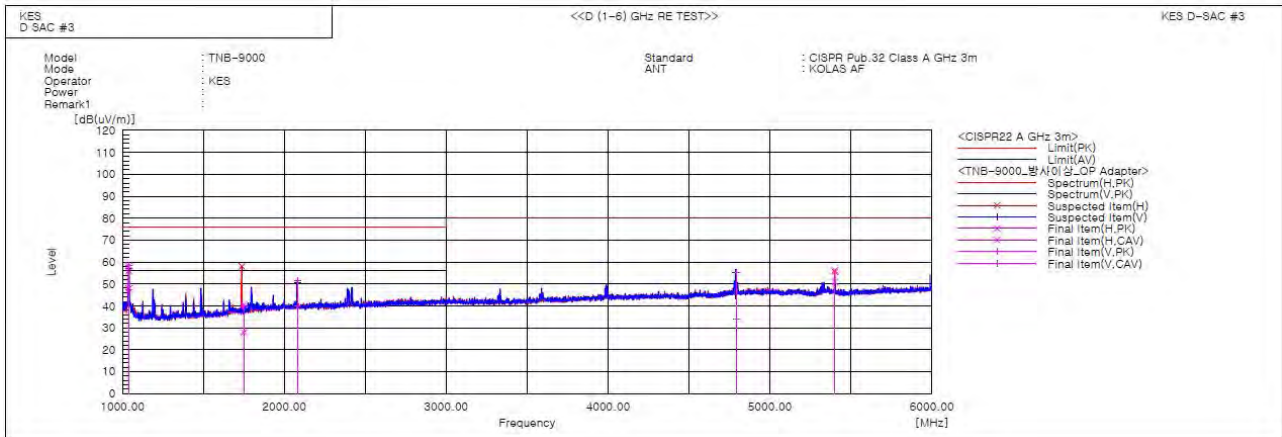
Report No.:

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## Radiated Electric Field Emissions(Above 1 GHz)

### ■ 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	1039.300	H	67.5	57.2	-9.3	58.2	47.9	76.0	56.0	17.8	8.1	100.0	85.3	
2	1039.340	V	67.6	56.6	-9.3	58.3	47.3	76.0	56.0	17.7	8.7	100.0	199.4	
3	1749.727	H	44.6	31.9	-4.0	40.6	27.9	76.0	56.0	35.4	28.1	100.0	148.4	
4	2078.930	V	53.0	41.4	-1.6	51.4	39.8	76.0	56.0	24.6	16.2	100.0	54.1	
5	4792.269	V	47.5	26.7	7.5	55.0	34.2	80.0	60.0	25.0	25.8	100.0	161.3	
6	5400.260	H	48.3	43.0	7.9	56.2	50.9	80.0	60.0	23.8	9.1	100.0	2.7	

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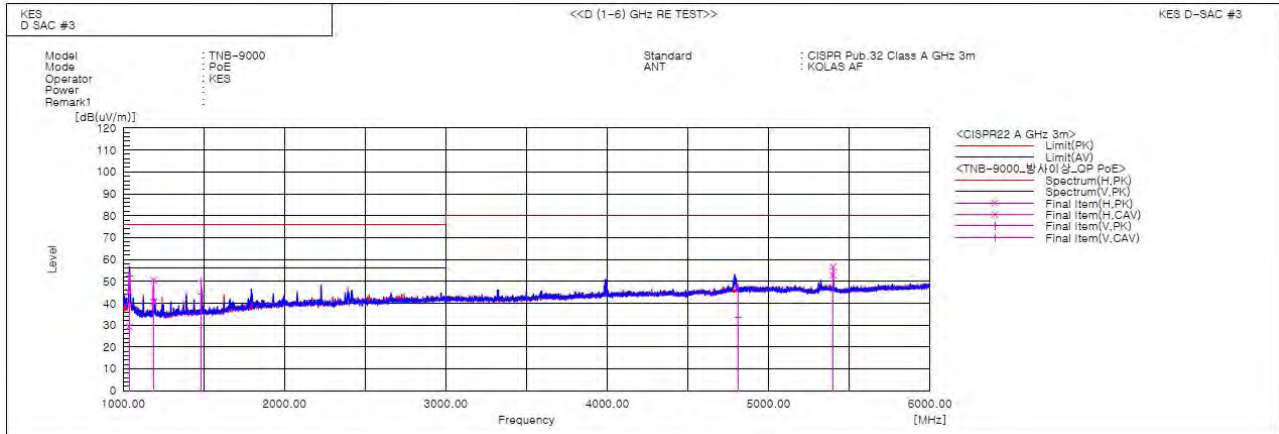
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### ■ PoE Mode



#### 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	1040.220	V	61.9	48.6	-9.3	52.6	39.3	76.0	56.0	23.4	16.7	100.0	351.9	
2	1036.750	H	54.4	38.5	-9.3	45.1	29.2	76.0	56.0	30.9	26.8	100.0	355.2	
3	1188.100	H	59.1	49.2	-8.6	50.5	40.6	76.0	56.0	25.5	15.4	100.0	91.0	
4	1484.920	V	56.6	50.9	-6.6	50.0	44.3	76.0	56.0	26.0	11.7	100.0	16.1	
5	4810.206	V	39.9	26.0	7.6	47.5	33.6	80.0	60.0	32.5	26.4	100.0	160.6	
6	5399.900	H	48.7	44.9	7.9	56.6	52.8	80.0	60.0	23.4	7.2	100.0	4.3	

#### ◆ Calculation

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

Margin(PK/CAV)[dB] = Limit[dB( $\mu$ V/m)] - Result(PK/CAV) [dB( $\mu$ 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

## Test Setup Photos and Configuration

### Conducted Emissions at Mains Power Ports



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## Conducted Emissions at Telecommunication Ports



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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)



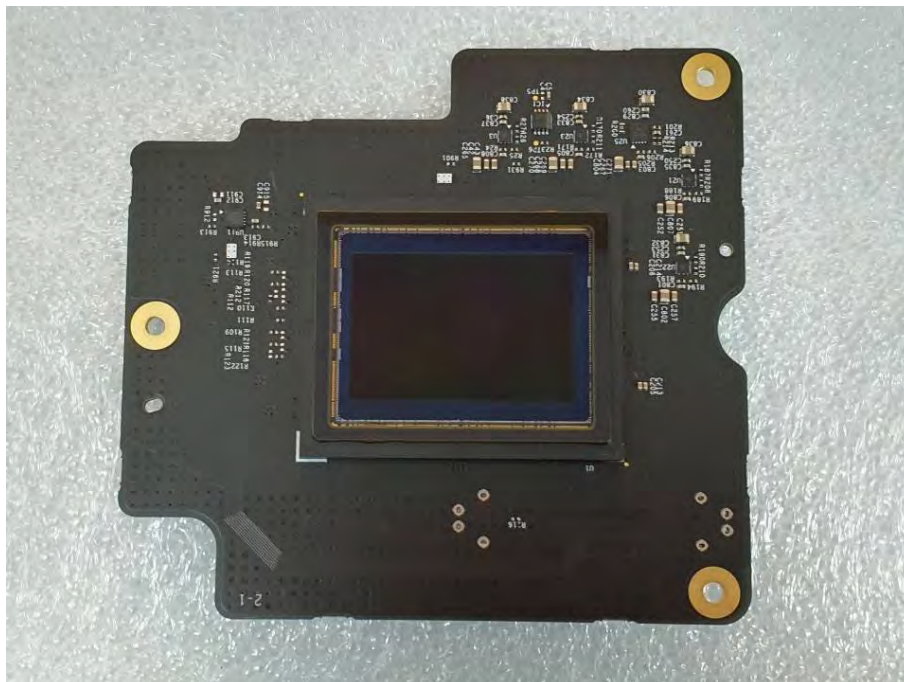
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## EUT Internal View – Board 1

(Top)



(Bottom)

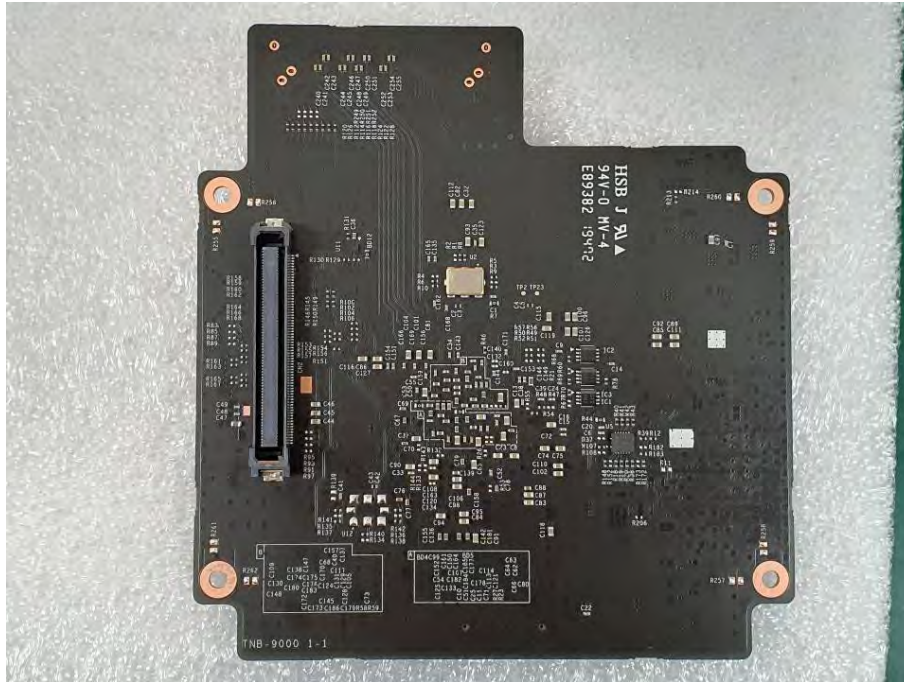


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## EUT Internal View – Board 2

(Top)



(Bottom)



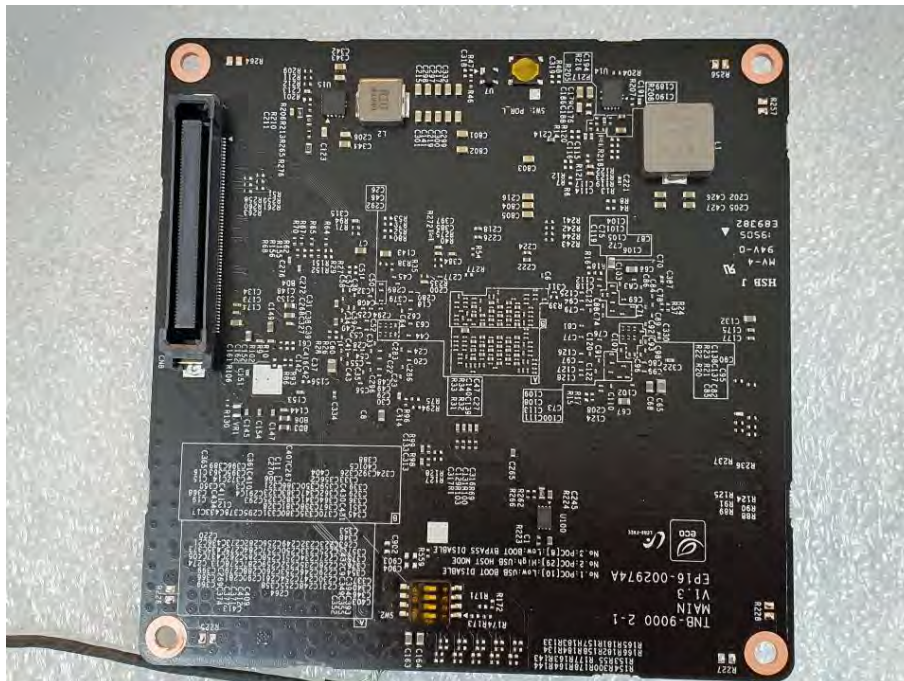
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## EUT Internal View – Board 3

(Top)



(Bottom)

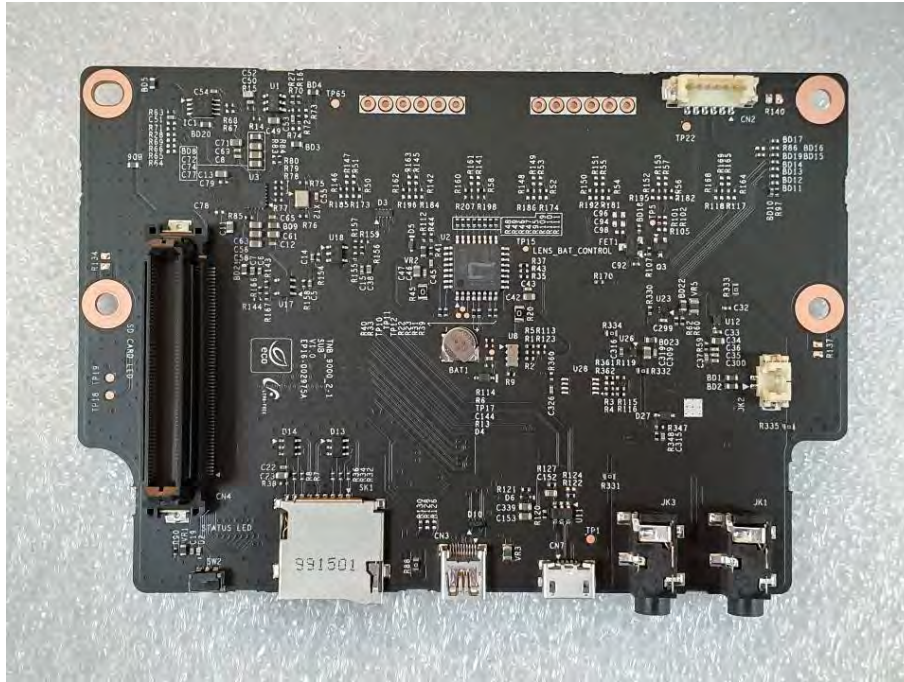


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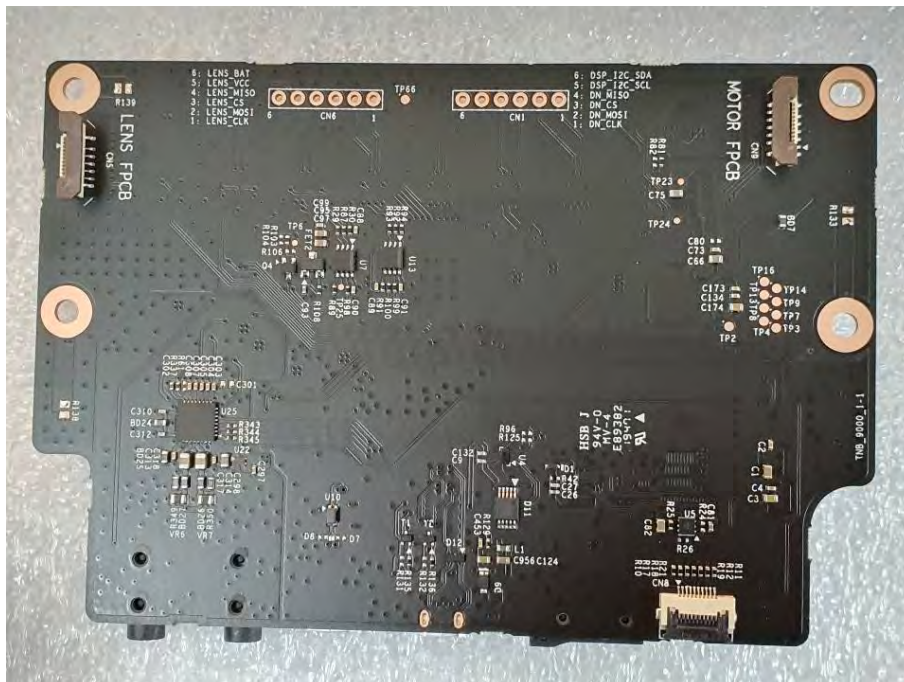


## EUT Internal View – Board 4

(Top)



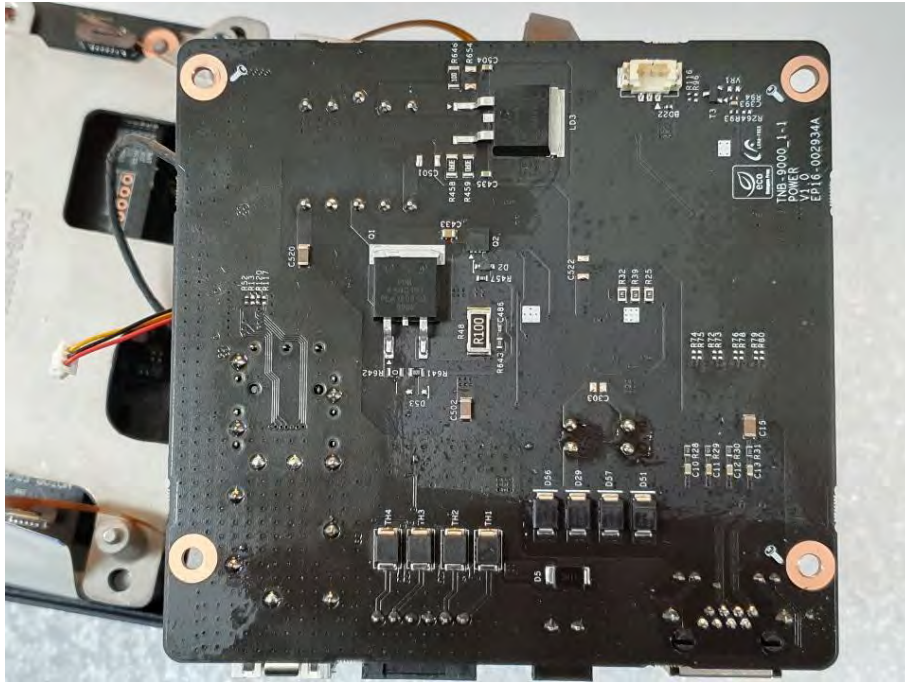
(Bottom)



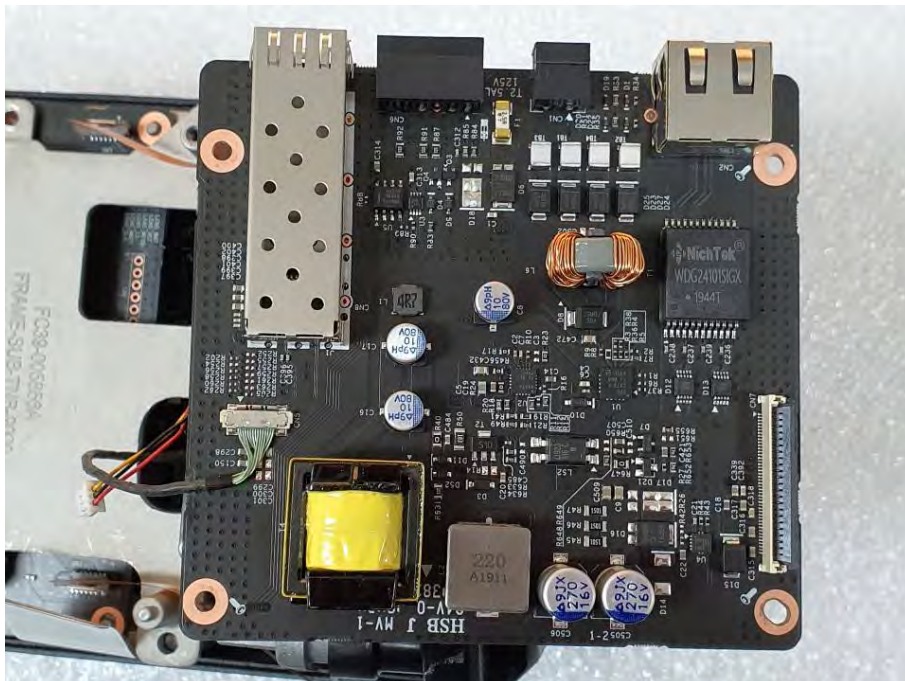
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## EUT Internal View – Board 5

(Top)



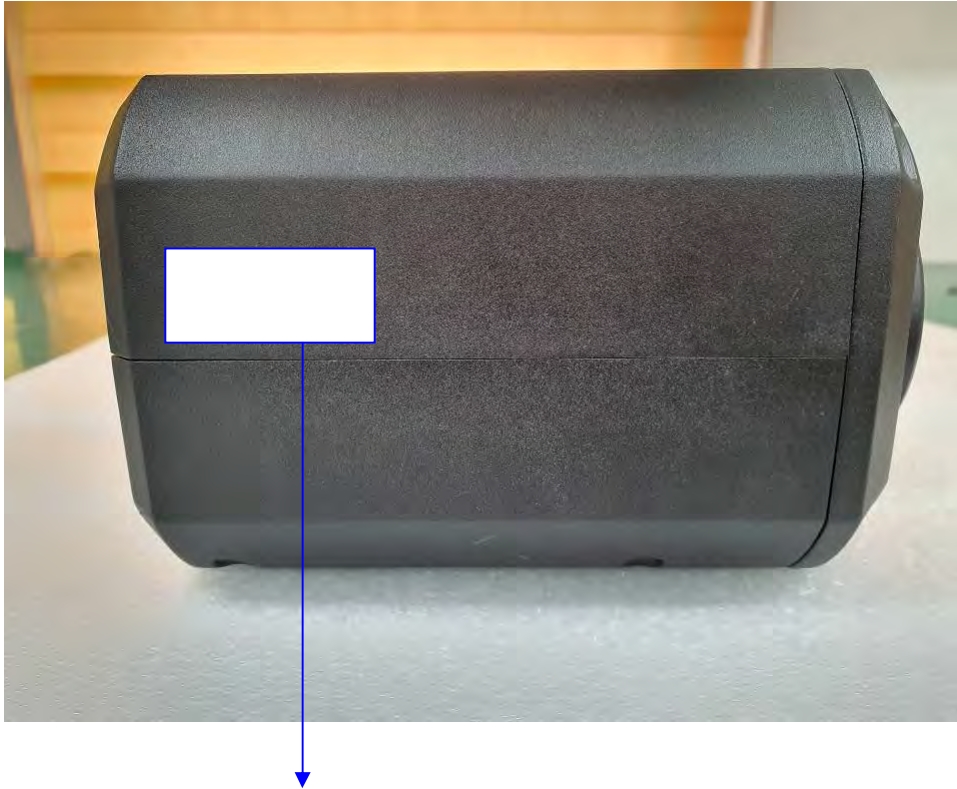
(Bottom)



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## Label Photographs



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VCCI-A