



EMC TEST REPORT

Test Report No. : KES-E1-18T0547-R2
Date of Issue : Jun. 12, 2023
Product name : THERMAL POSITIONING CAMERA
Model/Type No. : TNU-4051T
Variant Mode : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA
Manufacturer : 1. HANWHA VISION VIETNAM COMPANY LIMITED
2. D-TECH CO.,LTD.
Manufacturer Address : 1. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
2. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi- do,
Korea (Suwon Industrial Complex)
Equipment authorization : **Supply's Declaration of Conformity**
Date of Receipt : Jun. 08, 2023
Test date : Sep. 18, 2018 ~ Sep. 19, 2018
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Min Seong, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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

**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

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Sep. 27, 2018	KES-E1-18T0547	Issued
Nov. 01, 2021	KES-E1-18T0547-R1	- Delete Manufacturer on Customer Request - IC Regulation ICES-003 Issue 7 Update ANSI C63.4-2014 or ANSI C63.4-2014 amended as per ANSI C63.4a-2017
Jun. 12, 2023	KES-E1-18T0547-R2	Change the Applicant and manufacturer at the request of the customer.

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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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1.0 General Product Description

Main Specifications of EUT are:

Items		Description	
		TNU-4041T	TNU-4051T
Video	Imaging Device	Uncooled Micro bolometer	
	Pixel size	17μm	
	Effective Pixels	640x480	
	NETD	<50mK	
	Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P), for installation	
Lens	Focal Length (Zoom Ratio)	19mm fixed	35mm fixed
	Max. Aperture Ratio	F1.0	
	Angular Field of View	H:32° / V:24.3° / D:39.2°	H:17.2° / V:13° / D:22°
	Focus control	Fixed	
	Min. Object Distance	11m	36m
	Mount Type	Board-in type	
Pan / Tilt / Rotate	Pan Range	360° Endless	
	Pan Speed	0.025°~120°/sec	
	Tilt Range	-90° ~40°	
	Tilt Speed	0.025°~40°/sec	
	Sequence	Preset (300 ea), Swing, Group (6 ea), Trace, Tour (1 ea), Auto Run, Schedule	
	Preset Accuracy	0.3°	
	Azimuth	Yes (E/W/S/N/NE/NW/SE/SW)	
Operational	Camera Title	Off / On - W/W : English/Numeric/Special 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	

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Items		Description	
		TNU-4041T	TNU-4051T
Operational	Video & Audio Analytics	Tampering, Loitering, Directional Detection, Virtual Line, Fence detection, Enter/Exit, Appear / Disappear, Audio Detection, Motion Detection, Sound Classification, Shock detection, Temperature change detection	
	Alarm I/O	Input 1ea / Output 1ea	
	Alarm Triggers	Alarm Input, Motion Detection, Video & Audio Analytics, Network Disconnect	
	Alarm Events	<ul style="list-style-type: none">• File upload via FTP, E-Mail• Notification via E-Mail• Local storage(Micro 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	
Network	Ethernet	RJ-45 (10/100BASE-T)	
	Video Compression	H.265/H.264 (MPEG-4 Part 10/AVC) : Main/Baseline/High, Motion JPEG	
	Resolution	640x480, 640x360, 320x240	
	Max. Framerate	H.265/H.264 : Max. 30fps at all resolutions Motion JPEG : Max. 30fps	
	WiseStream II	Support	
	Video Quality Adjustment	H.264/H.265 : Target Bitrate Level Control MJPEG : Target Bitrate Level Control	

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Items		Description	
		TNU-4041T	TNU-4051T
Network	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, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, PIM-SM, UPnP, Bonjour	
	Security	HTTPS(SSL) Login Authentication Digest Login Authentication IP Address Filtering User access Log 802.1X Authentication (EAP-TLS, EAP-LEAP)	
	Streaming Method	Unicast / Multicast	
	Max. User Access	20 users at Unicast Mode	
	Edge Storage	Micro 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 Multi Language	English, French, German, Italian, Spanish, Russian, Turkish, Polish, Dutch, Swedish, Czech, Portuguese, Japanese, Chinese, Korean	

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Items		Description	
		TNU-4041T	TNU-4051T
Network	Web Viewer	Supported OS : Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12 Webviewer Recommended browser: Google Chrome 63 Supported browsers: IE11, MS Edge 41, Mozilla Firefox 57(Windows 64bit only), Apple Safari 11 (Mac OS X only)	
	Central Management Software	SmartViewer, SSM	
Environmental	Operating Temperature / Humidity	-40°C ~ +60°C (-40°F ~ +140°F) / Less than 90% RH	
	Storage Temperature / Humidity	-50°C ~ +60°C (-58°F ~ +140°F) / Less than 90% RH	
	Ingress protect	IP66, NEMA 4X	
	Vandal Resistance	IK10	-
Electrical	Input Voltage/Current	24VAC(± 10%) / 6A(MAX)	
	Power Consumption	TBD	
Mechanical	Color / Material	White / Aluminum	
	Dimension (WxHxD)	(W)219 × (H)528 × (D)335	
	Weight	11.7kg	

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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 ☐ 120 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 POSITIONING CAMERA	TNU-4051T	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	LG15N54	410NZET022292	LG	-
Notebook Adaptor	PA-1900-08	9702591703	Dongguang Lite Power 2nd Plant	-
Monitor	SMT-2233	ZC6U67VH500194D	Weihai Daewoo Electronics Co., Ltd.	-
Speaker	BR-1000A CUVE	-	DONGGUAN EDFIER TECHNOLOGY CO, LTD	-
MIC	CMK-303	-	CAMAC	-
Alarm	SIP-1201DD D0	-	SAMSUNG TECHWIN CO., LTD.	-
Button Alarm	-	-	-	-
Micro SD Card	-	-	SanDisk	4 GB
Tablet PC	A1432	DQXJWFHDF193	APPLE .Inc	-

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1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
THERMAL POSITIONING CAMERA (EUT)	RJ-45	Notebook	RJ-45	3.0	U
	BNC	Monitor	BNC	3.0	S
	3.5 mm	Speaker	3.5 mm	1.6	U
	3.5 mm	MIC	3.5 mm	1.7	U
	3 Pin	Alarm	3 Pin	3.0	U
	2 Pin	Button Alarm	2 Pin	3.0	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
Notebook	3.5 mm	Tablet PC	3.5 mm	0.8	U

* Unshielded=U, Shielded=S

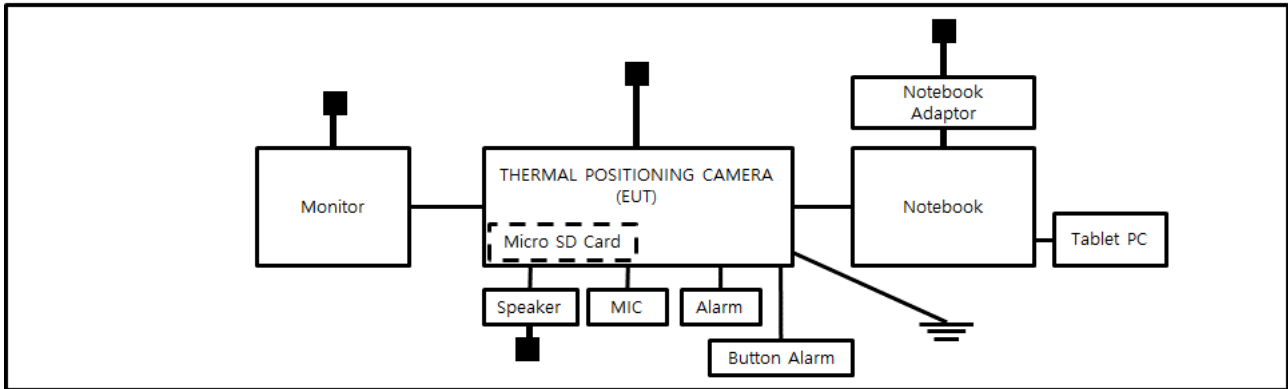
1.7 EUT Operating Mode(s)

Test mode	operating
AC 24 V	EUT Monitoring, Ping Test

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

1.8 Configuration

■ AC Main
 □ DC Main



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, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Laboratory Accreditations and Listings

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

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 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

☐ Group 2

☐ Class A

☐ 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

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☐ **VCCI V-3 / 2015.04**☐ Class A☐ Class B☐ **AS/NZS:2013**☐ Class A☐ Class B☒ **47 CFR Part 15, Subpart B**☐ CISPR 22:2009 +A1:2010☐ Class A☐ Class B☒ ANSI C63.4a-2017☒ Class A☐ Class B☒ **IC Regulation ICES-003 Issue 7**☐ CAN/CSA-CISPR 32:17☐ Class A☐ Class B☒ ANSI C63.4a-2017☒ Class A☐ Class B☐ **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

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Sep. 18, 2018

Test Location

Electro wave Shieldroom #3

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, 25, 2019
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101137	01, 31, 2019
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101786	04, 25, 2019

Test Conditions

Temperature:

24,1 °C

Relative Humidity:

49,5 % 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

RemarksSee Appendix A for test data.



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Sep. 18, 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
<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, 11, 2019
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 27, 2018
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	11, 28, 2018

Test Conditions

Temperature: 23,9 °C
Relative Humidity: 52,2 % 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.

2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Sep. 19, 2018

Test Location

SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 11, 2019
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01742	01, 11, 2019
<input type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 21, 2019
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	09, 04, 2019

Test ConditionsTemperature: 23,6 °C
Relative Humidity: 52,4 % R.H.**Frequency Range of Measurement**

1 GHz to 5 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

RemarksSee Appendix A for test data.

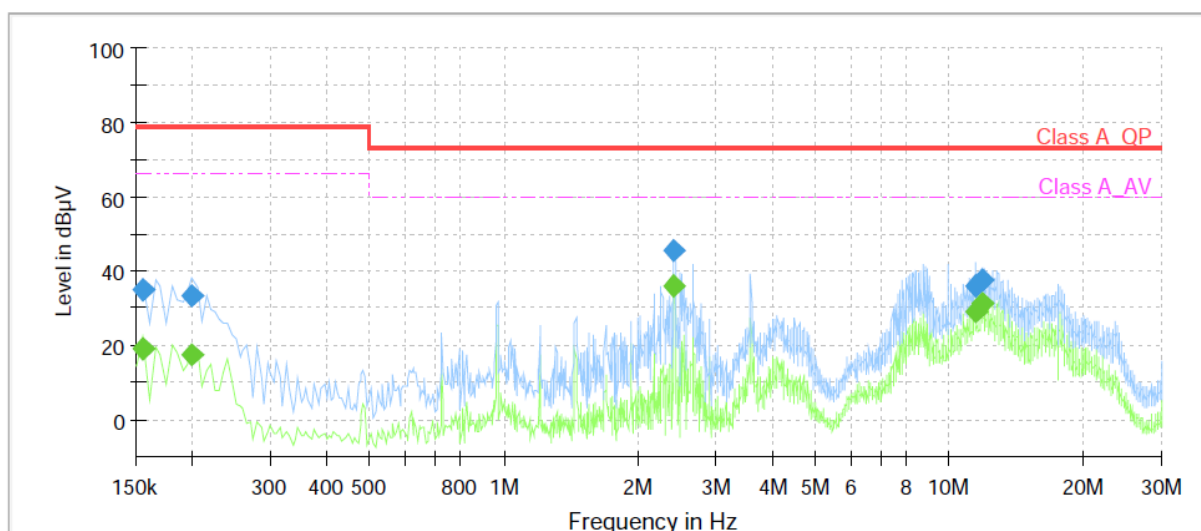
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description: Conducted Emission
 Model No.: TNU-4051T
 Mode: H
 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	---	19.11	66.00	46.89	1000.0	9.000	L1	9.6
0.155000	34.80	---	79.00	44.20	1000.0	9.000	L1	9.6
0.200000	---	17.56	66.00	48.44	1000.0	9.000	L1	9.7
0.200000	33.18	---	79.00	45.82	1000.0	9.000	L1	9.7
2.415000	---	35.76	60.00	24.24	1000.0	9.000	L1	10.2
2.415000	45.31	---	73.00	27.69	1000.0	9.000	L1	10.2
11.455000	---	29.13	60.00	30.87	1000.0	9.000	L1	9.8
11.455000	35.95	---	73.00	37.05	1000.0	9.000	L1	9.8
11.800000	---	31.27	60.00	28.73	1000.0	9.000	L1	9.8
11.800000	37.43	---	73.00	35.57	1000.0	9.000	L1	9.8

NEUTRAL LINE

Common Information

Test Description:

Model No.:

Mode

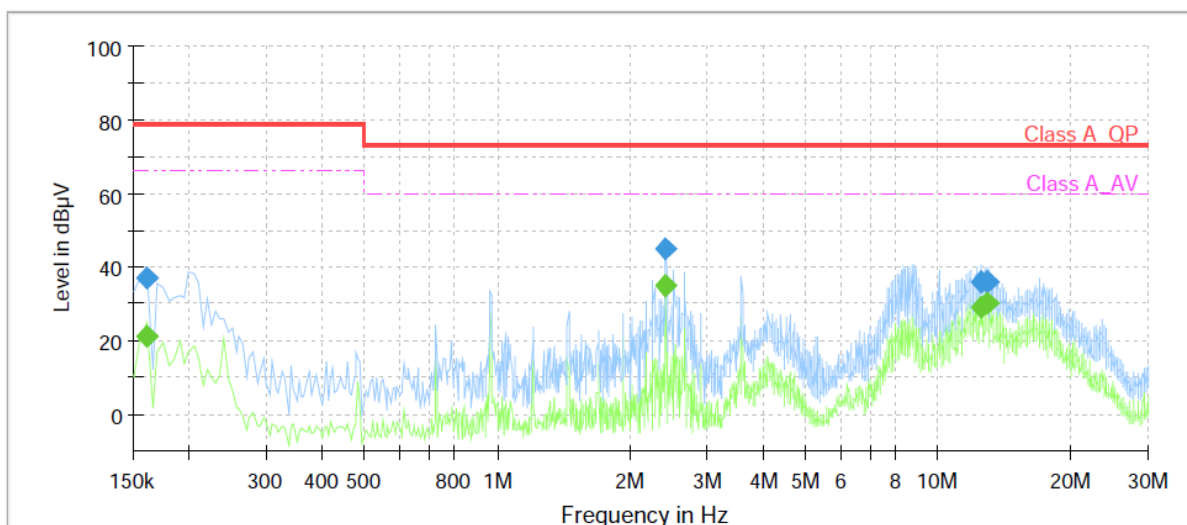
Operator Name:

Conducted Emission

TNU-4051T

N

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	21.13	66.00	44.87	1000.0	9.000	N	9.7
0.160000	37.10	---	79.00	41.90	1000.0	9.000	N	9.7
2.415000	---	35.12	60.00	24.88	1000.0	9.000	N	10.2
2.415000	44.75	---	73.00	28.25	1000.0	9.000	N	10.2
12.510000	---	28.98	60.00	31.02	1000.0	9.000	N	9.9
12.510000	35.97	---	73.00	37.03	1000.0	9.000	N	9.9
12.885000	---	30.32	60.00	29.68	1000.0	9.000	N	9.9
12.885000	36.25	---	73.00	36.75	1000.0	9.000	N	9.9

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



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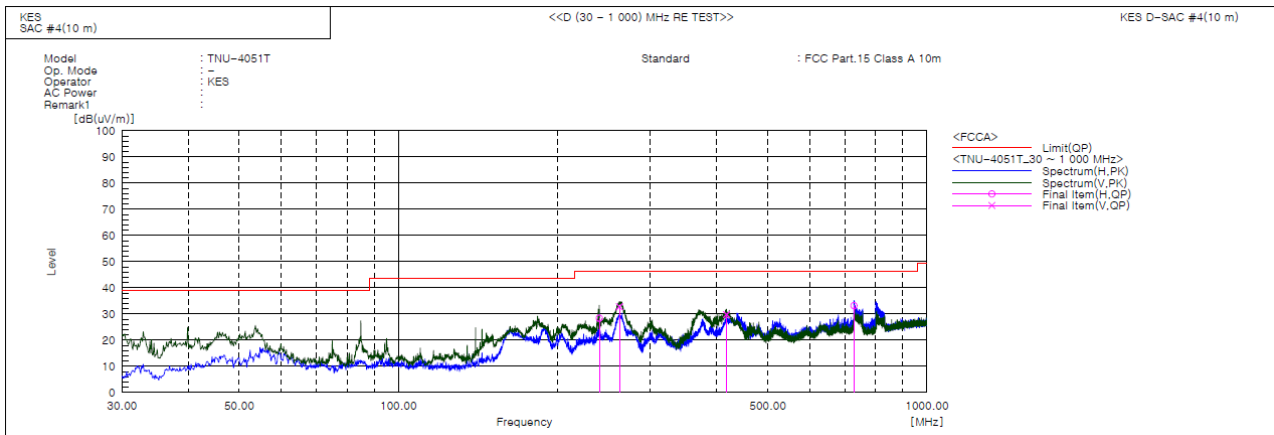
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Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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Radiated Electric Field Emissions(Below 1 GHz)



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	240.005	H	55.0	-26.6	28.4	46.5	18.1	279.0	85.0	
2	261.951	V	58.7	-25.9	32.8	46.5	13.7	100.0	337.0	
3	417.636	V	50.8	-21.0	29.8	46.5	16.7	100.0	318.0	
4	727.673	H	47.9	-14.7	33.2	46.5	13.3	318.0	332.0	

◆ Calculation – SAC #4(10 m)

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

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

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

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

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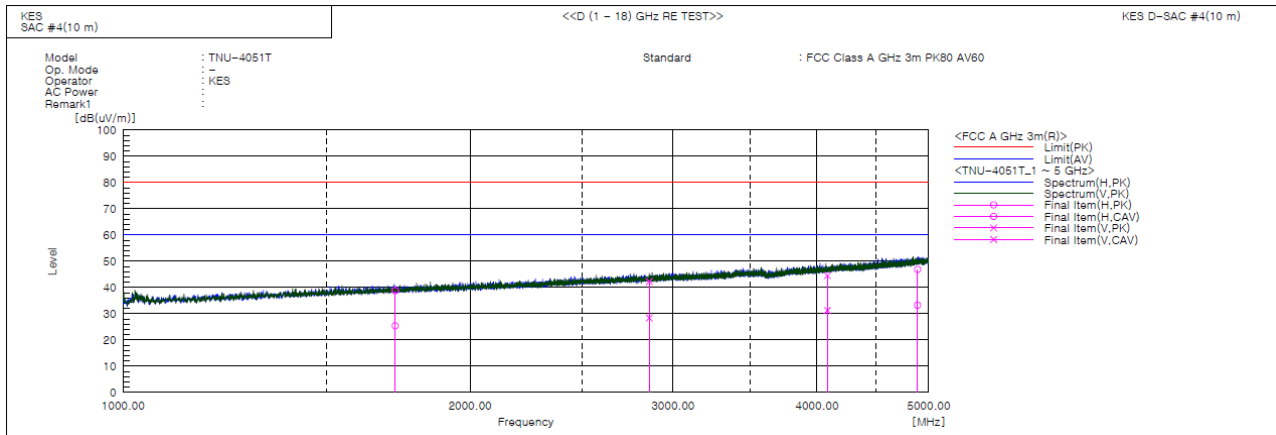
3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Report No.:

KES-E1-18T0547-R2

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Radiated Electric Field Emissions(Above 1 GHz)



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result CAV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1722.600	H	40.8	27.4	-2.0	38.8	25.4	80.0	60.0	41.2	34.6	222.0	172.0	
2	2860.995	V	39.0	25.2	3.2	42.2	28.4	80.0	60.0	37.8	31.6	116.0	105.0	
3	4083.860	V	36.9	23.7	7.6	44.5	31.3	80.0	60.0	35.5	28.7	364.0	208.0	
4	4890.010	H	36.2	22.6	10.7	46.9	33.3	80.0	60.0	33.1	26.7	262.0	62.0	

◆ Calculation

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

Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/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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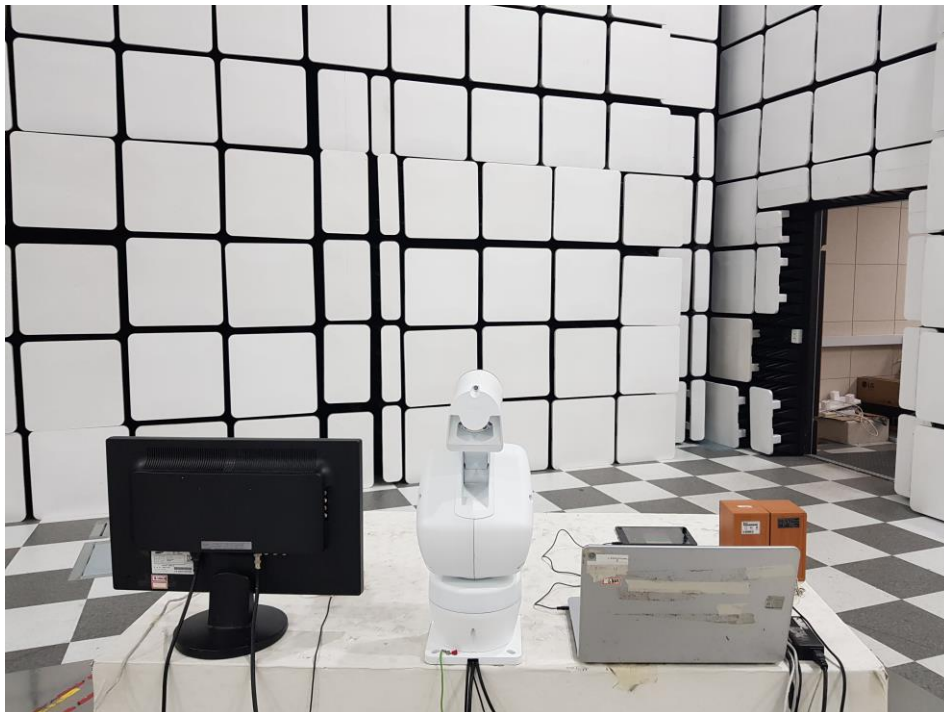
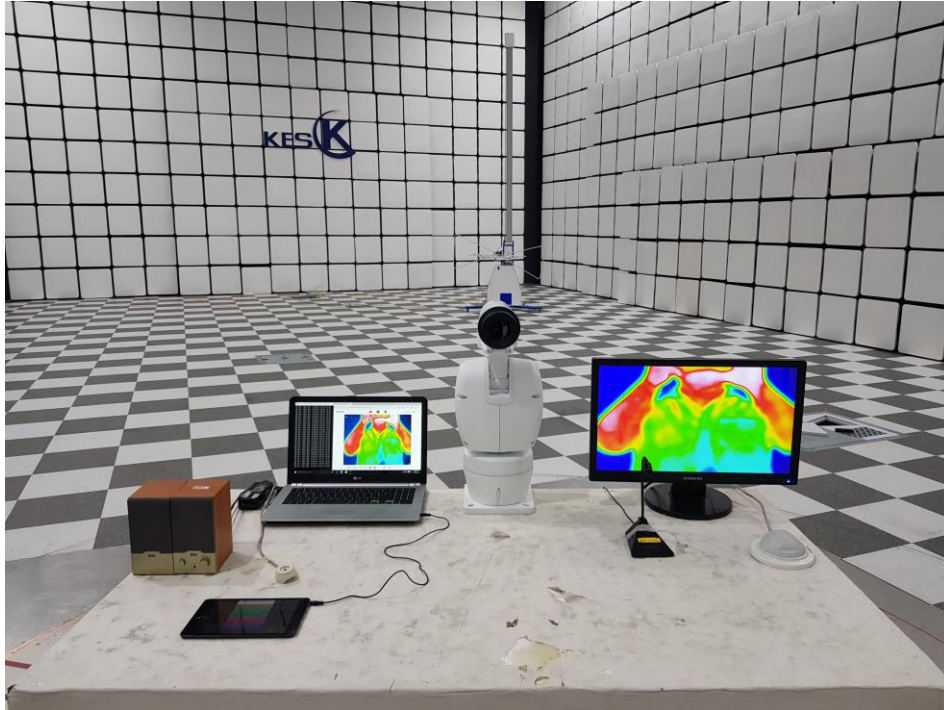
Test Setup Photos and Configuration

Conducted Voltage Emissions



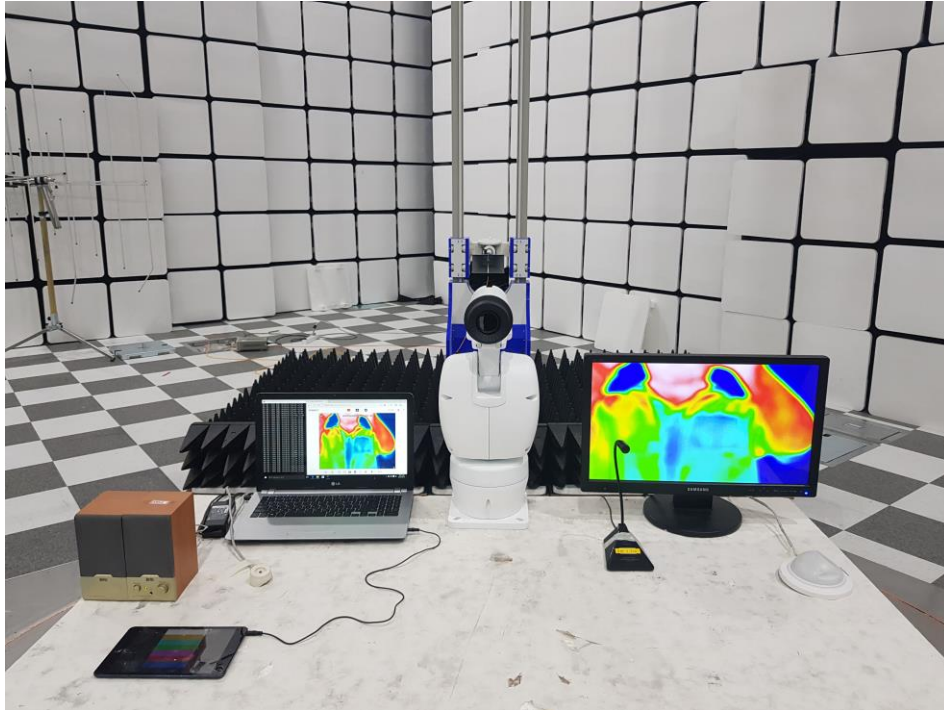
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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EUT External Photographs

(Top)

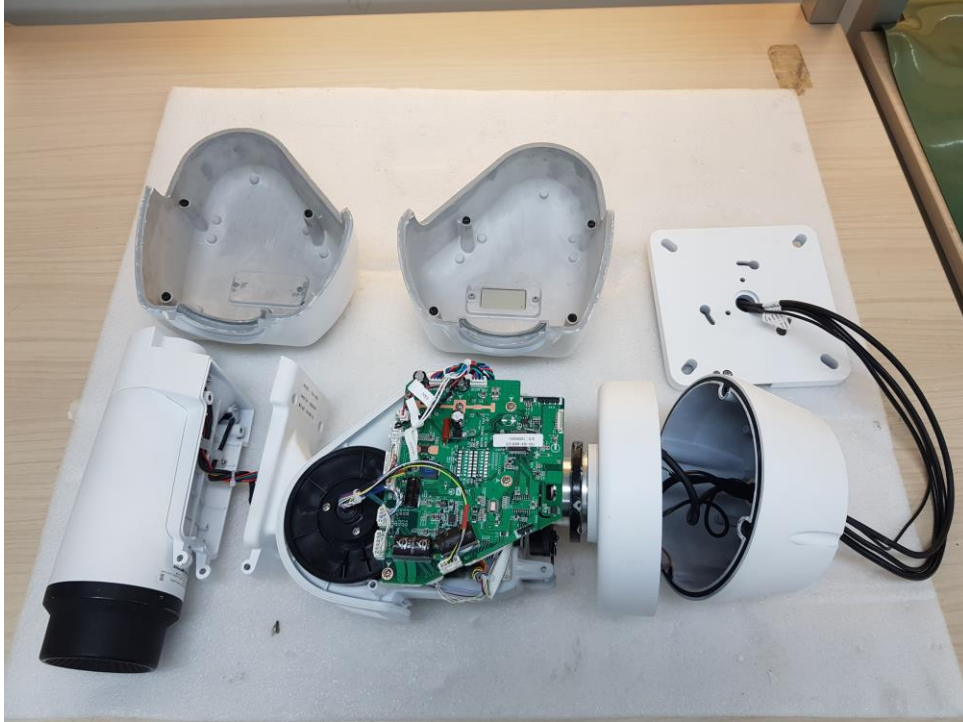


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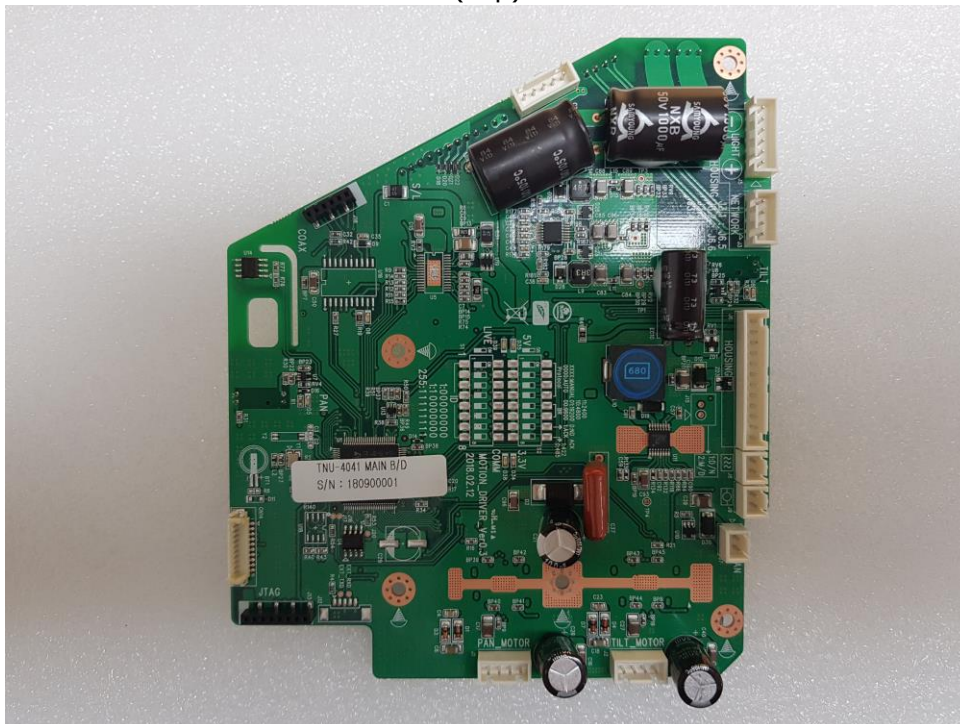
EUT Internal Photographs

(Internal View)



EUT Internal View – Main Board

(Top)



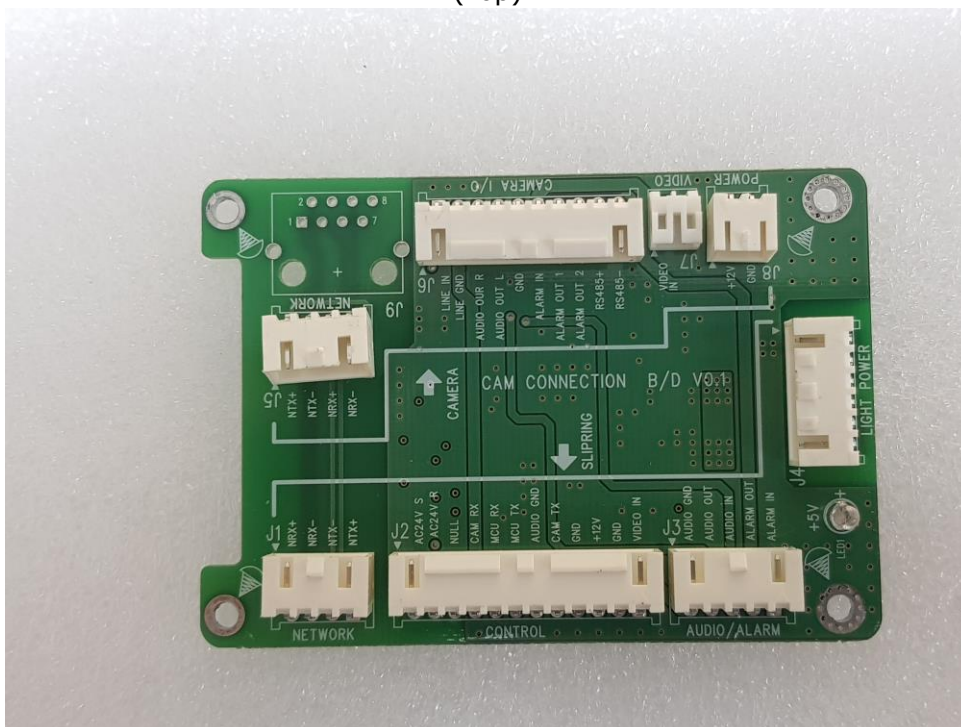
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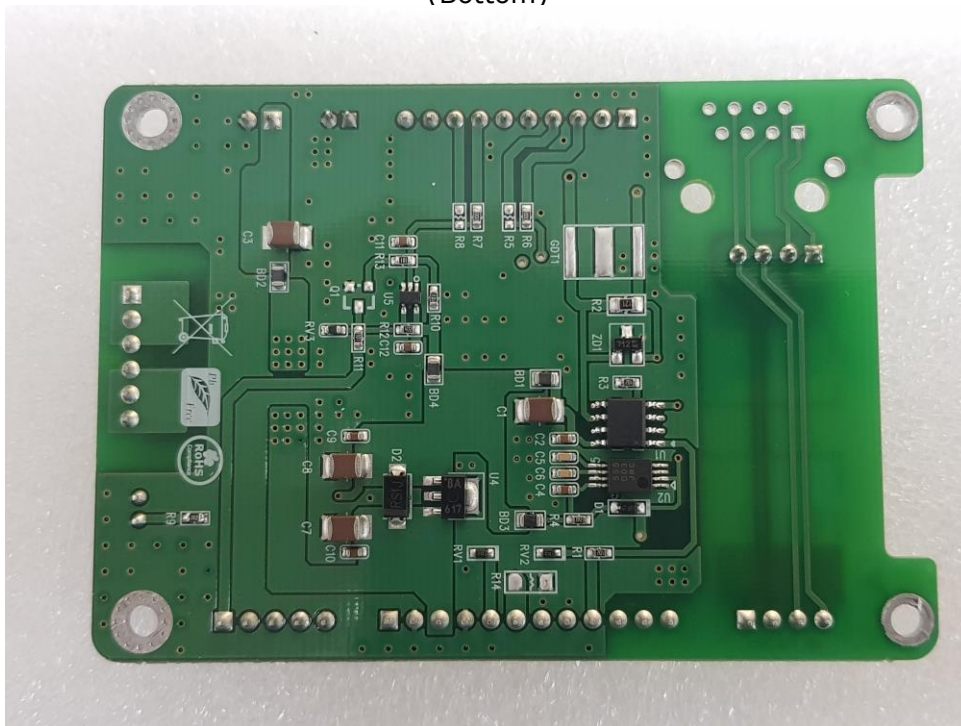
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EUT Internal View – CAM Connection Board

(Top)



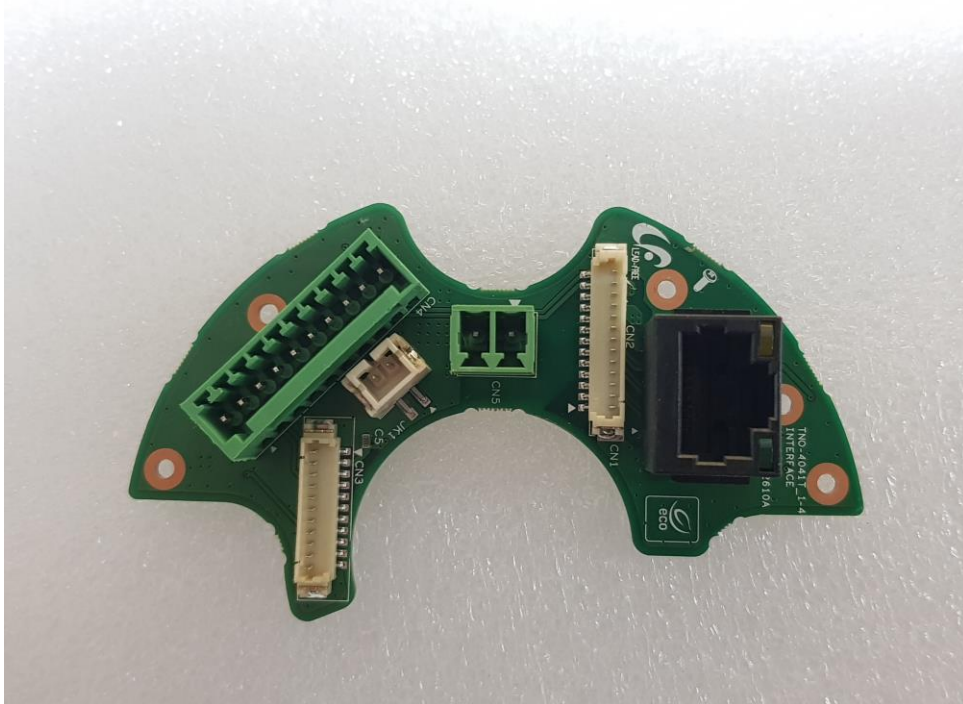
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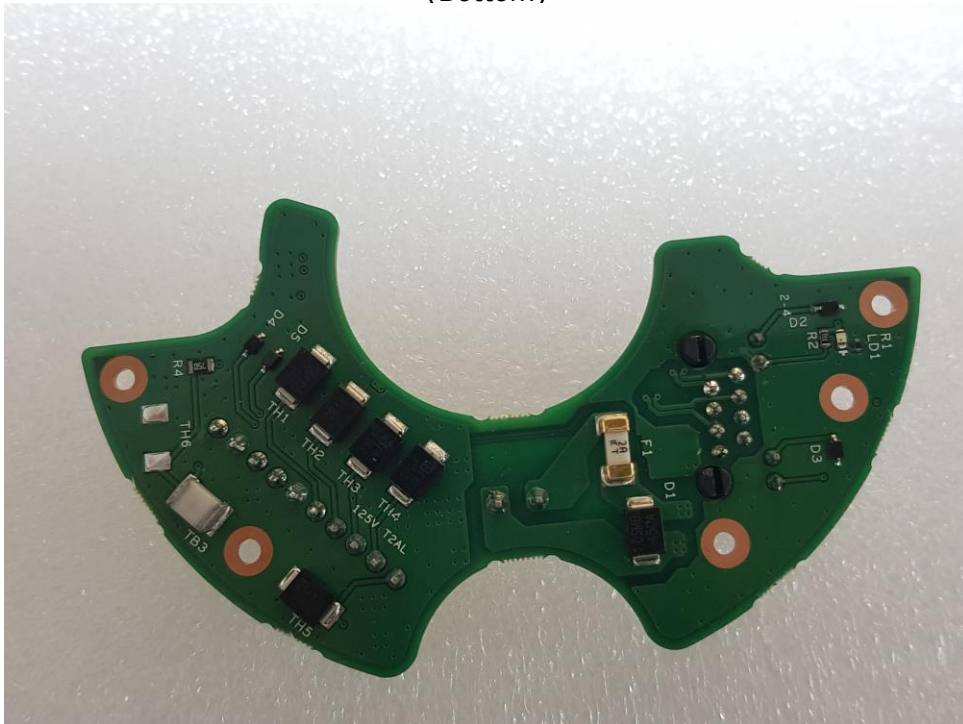
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EUT Internal View – Camera Interface Board

(Top)



(Bottom)



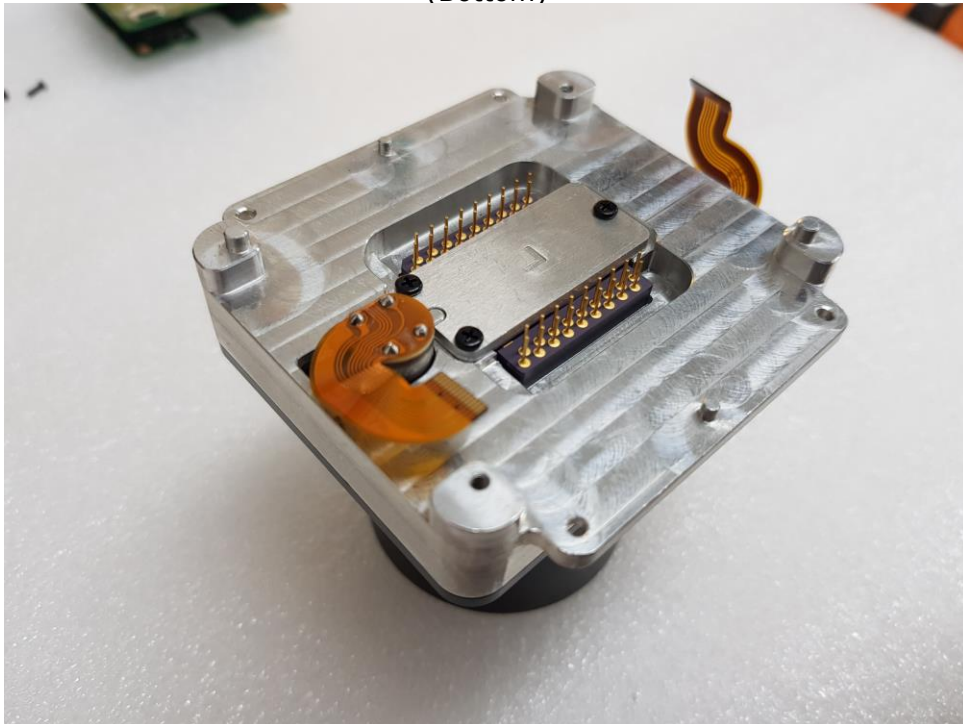
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EUT Internal View – LENS

(Top)



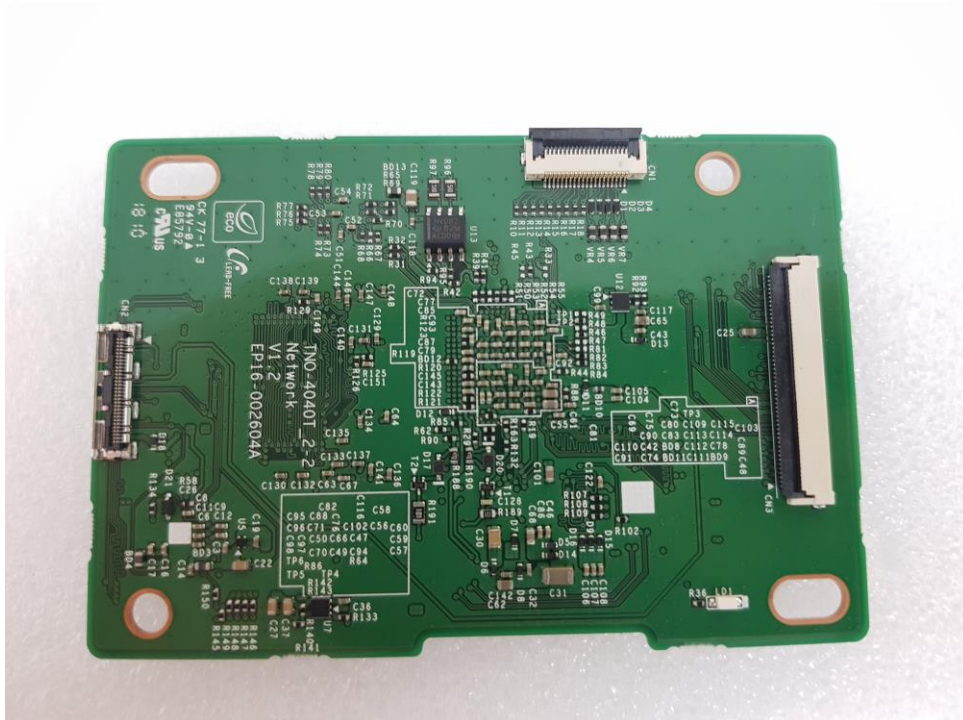
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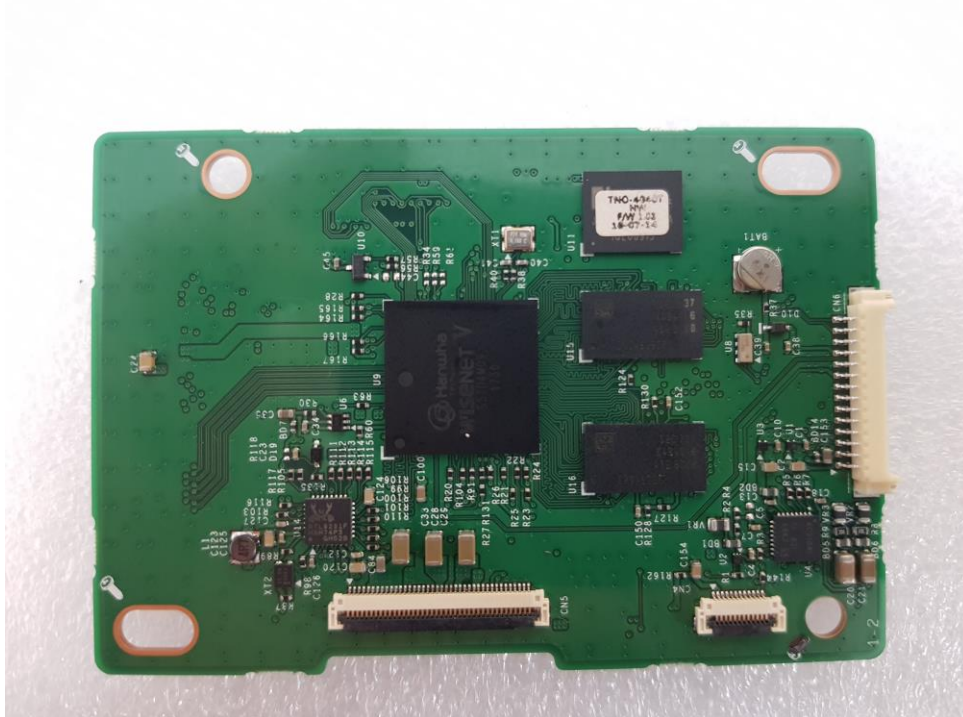
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EUT Internal View – Network Board

(Top)



(Bottom)



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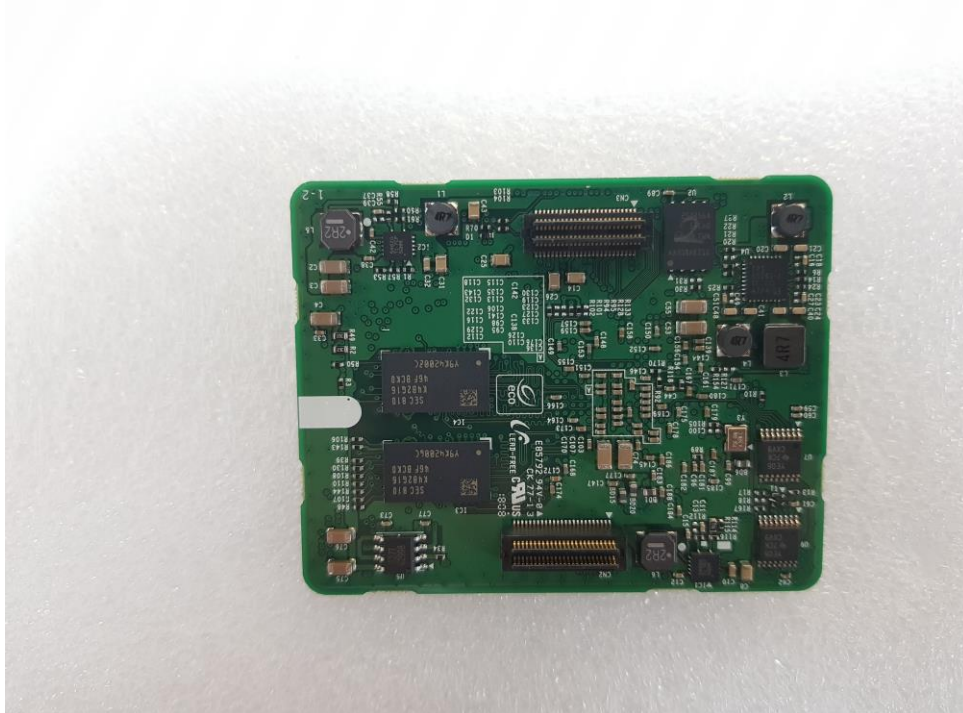
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EUT Internal View – NUC Board

(Top)



(Bottom)



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EUT Internal View – Power Board

(Top)



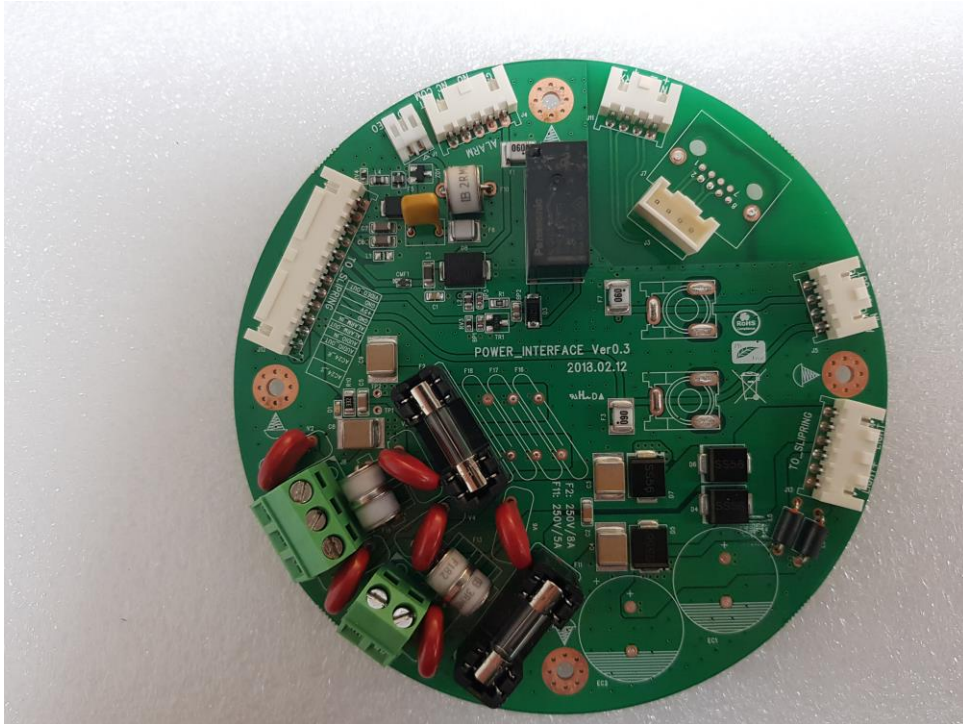
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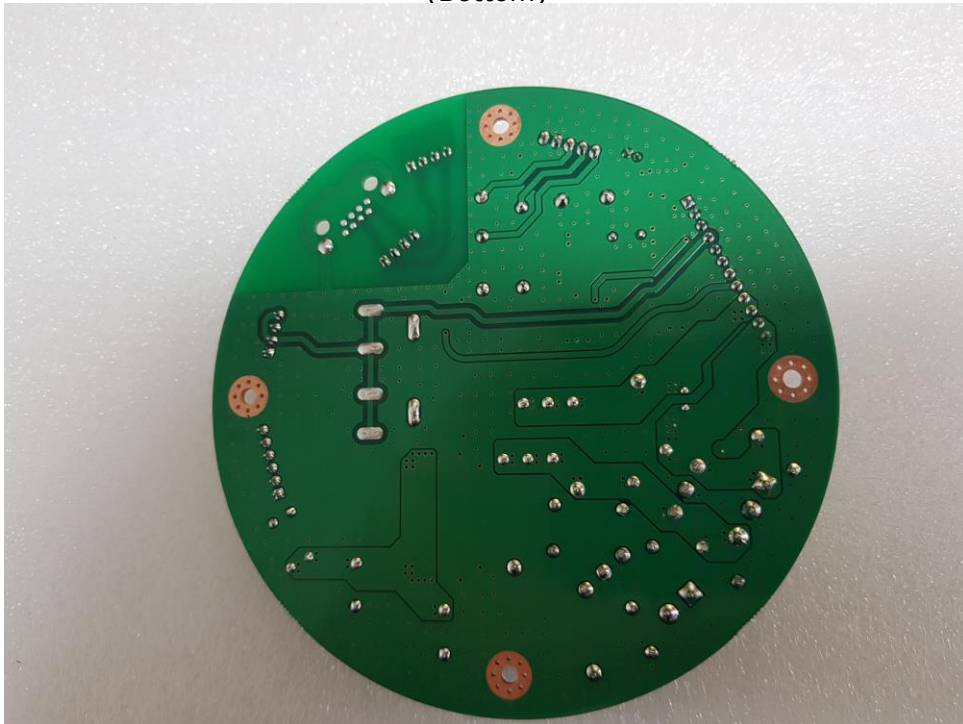
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EUT Internal View – Power_Interface Board

(Top)



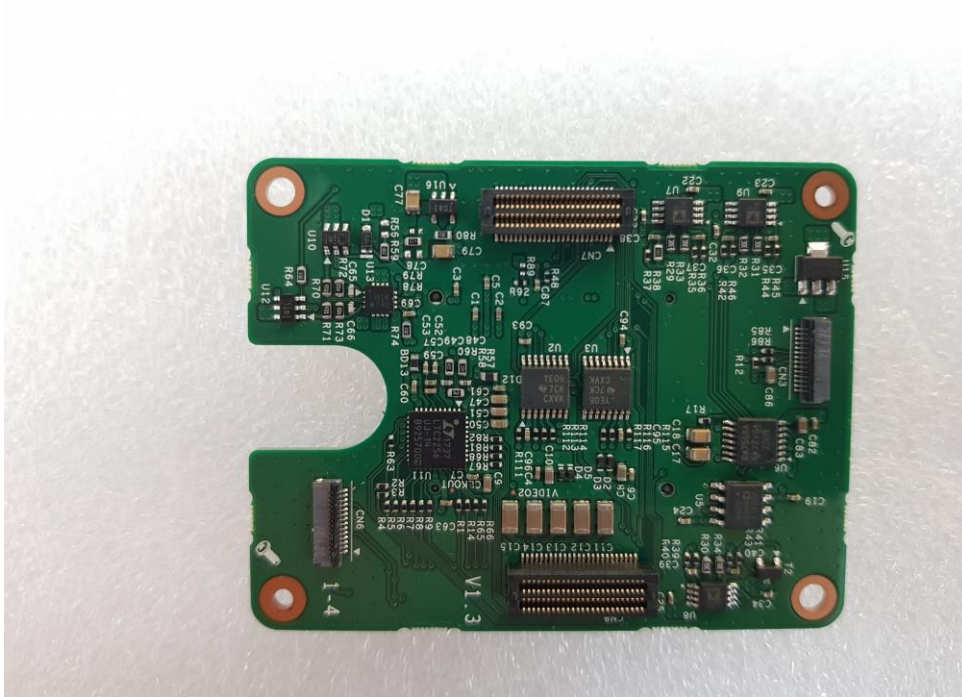
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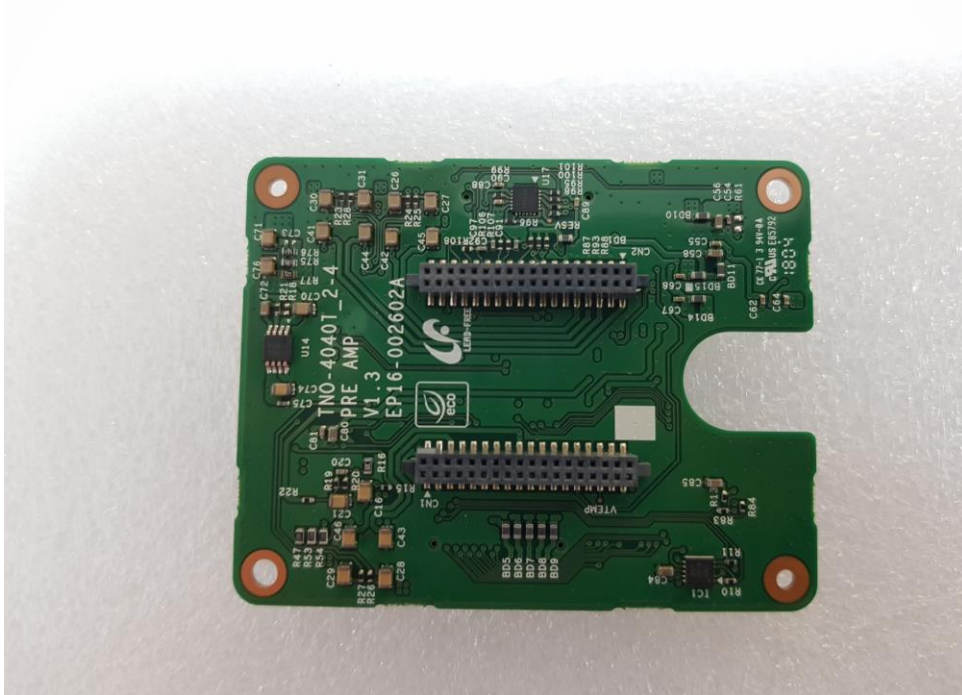
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EUT Internal View – PRE AMP Board

(Top)



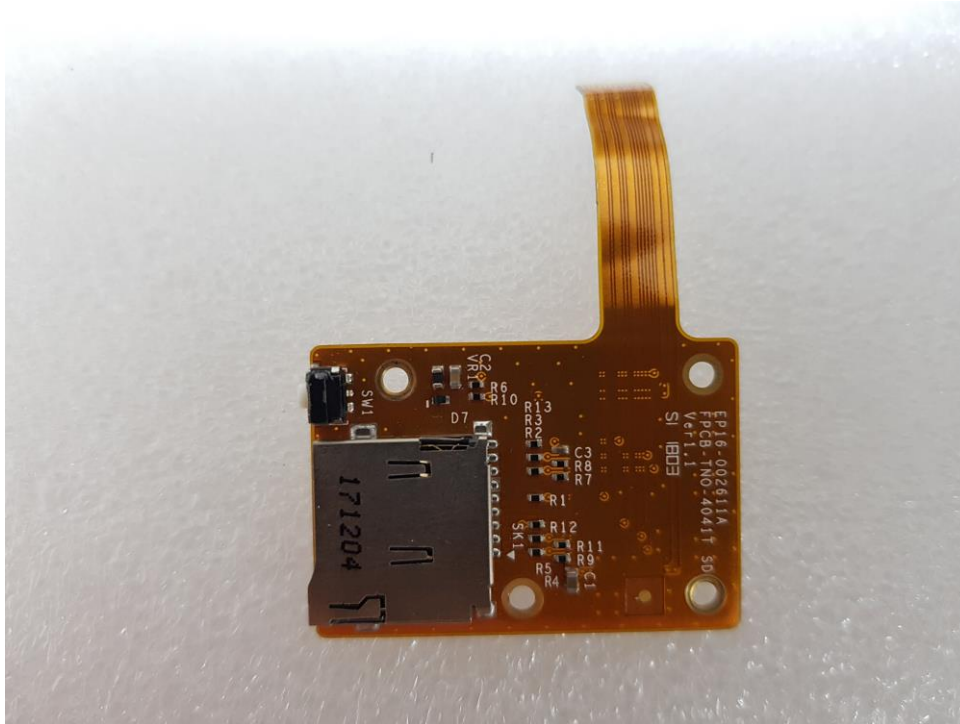
(Bottom)



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EUT Internal View – SD Board

(Top)



(Bottom)



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Label Photographs



CAN ICES-3(A) / NMB-3(A)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.