

**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

Report No.:

KES-EM-21T1138-R1

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EMC TEST REPORT

Test Report No. : KES-EM-21T1138-R1
Date of Issue : Feb. 24, 2023
Product name : NETWORK CAMERA
Model/Type No. : TNV-8011C
Variant Model : -
Applicant : Hanwha Vision Co., Ltd
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of 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 : **Supplier's Declaration of Conformity**
Date of Receipt : Nov. 15, 2021
Test date : Nov. 15, 2021 ~ Nov. 16, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Do Hyun, Ko
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 25, 2021	KES-EM-21T1138	Issued
Feb. 24, 2023	KES-EM-21T1138-R1	Change the Applicant and manufacturer at the request of the customer

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1.0 General Product Description

Main Specifications of EUT are:

Video	
Imaging Device	1/2.8" CMOS
Resolution	2592x1944, 1920x1080, 1280x960, 1280x720, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
Max. Framerate	H.265/H.264: Max. 30fps/25fps(60Hz/50Hz) MJPEG: Max. 15fps/12fps (60Hz/50Hz)
Min. Illumination	Color: 0.1 lux (F2.3, 1/30sec) B/W: 0.02 lux (F2.3, 1/30sec)
Video Out	CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation USB: Micro USB Type B, 1280x720 for installation
Lens	
Focal Length (Zoom Ratio)	2.3mm fixed focal
Max. Aperture Ratio	F2.3
Angular Field of View	H: 131° / V: 93.4° / D: 174°
Focus Control	Fixed
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
Operational	
Camera Title	Displayed up to 85 characters
Day & Night	Auto(ICR)
Backlight Compensation	BLC, WDR, SDDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNR
Digital Image Stabilization	Support
Defog	Support
Motion Detection	4ea, polygonal zones
Privacy Masking	6ea, rectangular zones
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor(include Mercury & Sodium)
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2~1/12,000sec)
Video Rotation	Flip, Mirror, Hallway view(90°/270°)
Analytics	Defocus detection, Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line, Audio detection
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
Audio In	Selectable(mic in/line in) Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
Audio Out	Line out, Max.output level: 1Vrms

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Focus Control	Fixed
Pan / Tilt / Rotate	
Pan / Tilt / Rotate Range	None
Operational	
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Day & Night	Auto(ICR)
Backlight Compensation	BLC, WDR, SSDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNR
Digital Image Stabilization	Support
Defog	Support
Motion Detection	4ea, polygonal zones
Privacy Masking	6ea, rectangular zones
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor(include Mercury & Sodium)
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (2~1/12,000sec)
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Analytics	Defocus detection, Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line, Audio detection
Alarm I/O	Input 1ea / Output 1ea
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Alarm Events	File upload via FTP and e-mail Notification via e-mail SD/SDHC/SDXC or NAS recording at event triggers Alarm output
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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.

☒ PoE (PoE Adapter)

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	TNV-8011C	-	HANWHA VISION VIETNAM COMPANY LIMITED	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	P95G001	9JM8HT2	DELL INC.	-
Notebook Adapter	LA65NS2-01	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	-
PoE Adapter	PT-PSE109GBRO-AH	-	Dongguan PROCET Network Technology Co., Ltd	-
Button Alarm	-	-	-	-
LED Alarm	PRO-SL	-	SENSOR PRO	-
Speaker	BR1000A Cuve Black 2	-	DONGGUAN EDIFIER TECHNOLOGY Co., Ltd	-
SmartPhone	MKQP2KH/A	-	Apple	-
Micro SD Card	-	-	Sandisk	-
Mic	MP1000	-	-	-



1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK CAMERA (EUT)	RJ-45 (PoE)	PoE Adapter	RJ-45	3.0	U
	Alarm In (2 Pin)	Button Alarm	2 Pin	3.0	U
	Alarm Out (2 Pin)	LED Alarm	2 Pin	3.0	U
	Audio In (3.5 mm)	Mic	3.5 mm	2.4	U
	Audio Out (3.5 mm)	Speaker	3.5 mm	1.8	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
PoE Adapter	RJ-45 (LAN)	Notebook	RJ-45	2.4	U
Notebook	3.5 mm	SmartPhone	3.5 mm	1.5	U
Notebook	DC Jack	Notebook Adapter	DC Jack	2.3	S

* Unshielded=U, Shielded=S

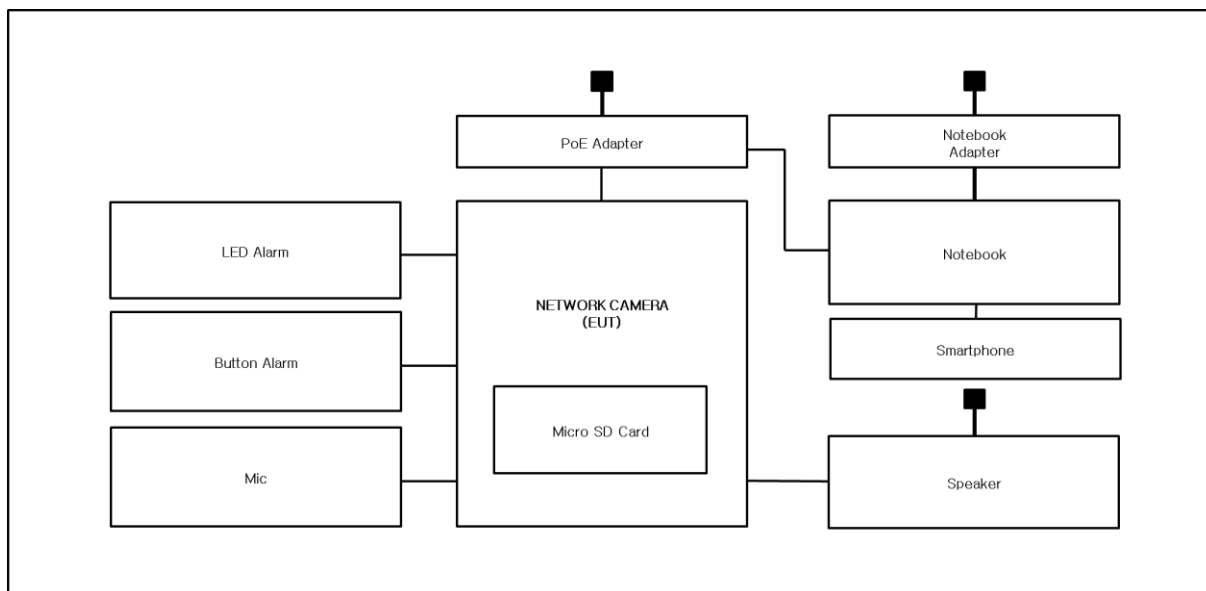
1.7 EUT Operating Mode(s)

Test Mode	operating
Operating	Checked that the camera video output was working properly in the web viewer and used the ping test to verify that the network behavior was working properly. Check the normal operation of Button Alarm, LED Alarm through Web Viewer, Checked whether speaker to 1 kHz Tone is output normally.

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

1.8 Configuration

■ AC Main
 □ DC Main



1.9 Remarks when standards applied

The 2 Pin and Micro 5 Pin port is debug port, it is not tested.

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:

☒ **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



2.1 Conducted Emissions at Mains Power Ports

Test Date

Nov. 15, 2021

Test Location

Electro wave Shieldroom #6

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	01, 15, 2022
☒	LISN	ENV216	R & S	101787	12, 29, 2021
☒	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021

Test Conditions

Temperature: (23,0 ± 0,1) °C

Relative Humidity: (44,1 ± 0,1) % 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 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Nov. 16, 2021

Test Location

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

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, 01, 2022
☒	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 10, 2022

Test Conditions

Temperature: (22,4 ± 0,1) °C

Relative Humidity: (44,8 ± 0,2) % 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

Nov. 15, 2021

Test Location

SEMI ANECHOIC CHAMBER #4(10m)

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, 01, 2022
☒	PREAMPLIFIER	8449B	AGILENT	3008A01742	12, 29, 2021
☐	ATTENUATOR	8491A	HP	35496	03, 10, 2022
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 14, 2021

Test Conditions

Temperature: (22,6 ± 0,2) °C

Relative Humidity: (44,5 ± 0,1) % 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

Remarks

See Appendix A for test data.

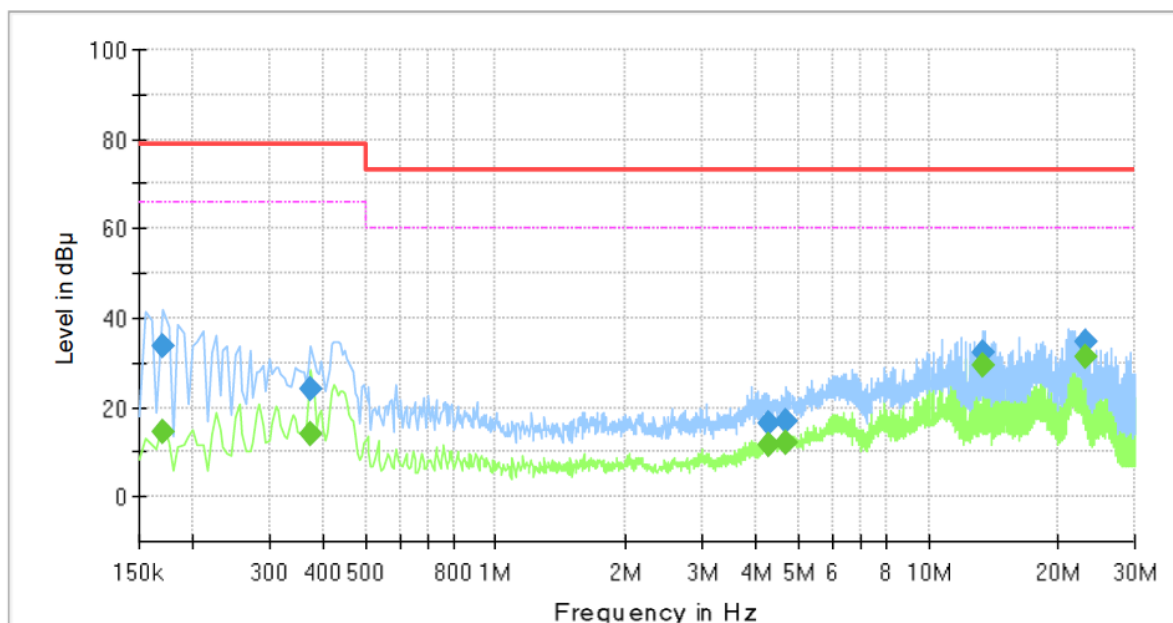
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description: Conducted Emission
 Model No.: TNV-8011C
 Phase:
 Mode:
 Operator Name: KES



Final Result

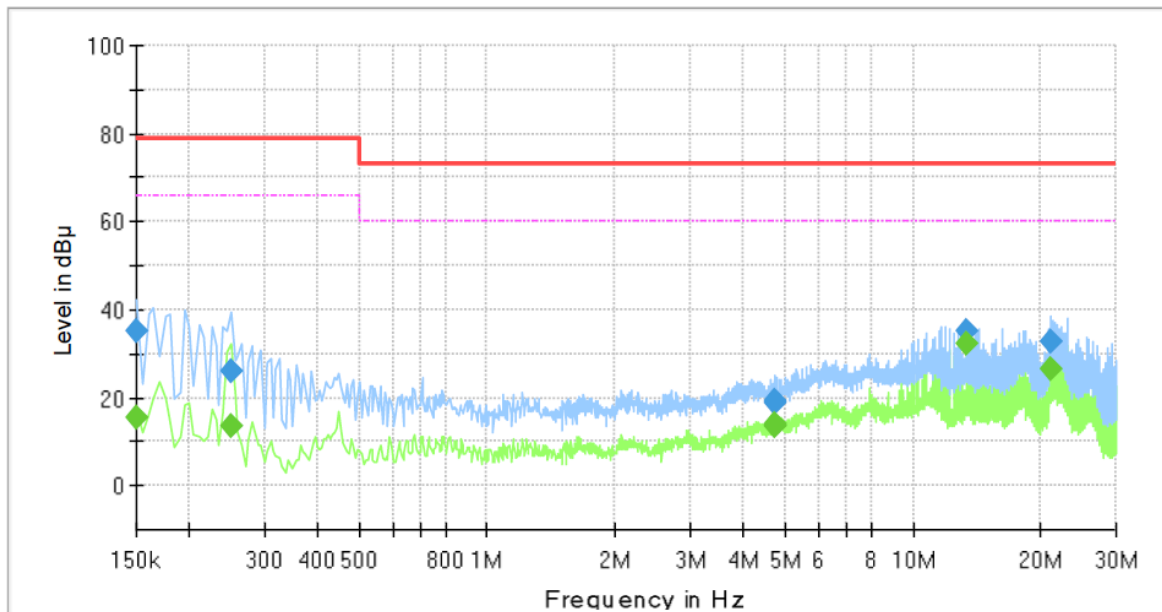
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.170000	---	14.47	66.00	51.53	1000.0	9.000	L1	19.5
0.170000	33.84	---	79.00	45.16	1000.0	9.000	L1	19.5
0.375000	---	14.07	66.00	51.93	1000.0	9.000	L1	19.6
0.375000	23.87	---	79.00	55.13	1000.0	9.000	L1	19.6
4.285000	---	11.73	60.00	48.27	1000.0	9.000	L1	19.9
4.285000	16.19	---	73.00	56.81	1000.0	9.000	L1	19.9
4.695000	---	12.27	60.00	47.73	1000.0	9.000	L1	19.8
4.695000	16.77	---	73.00	56.23	1000.0	9.000	L1	19.8
13.420000	---	29.57	60.00	30.43	1000.0	9.000	L1	20.0
13.420000	32.26	---	73.00	40.74	1000.0	9.000	L1	20.0
23.130000	---	31.19	60.00	28.81	1000.0	9.000	L1	20.2
23.130000	34.78	---	73.00	38.22	1000.0	9.000	L1	20.2

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NEUTRAL LINE

Common Information

Test Description: Conducted Emission
Model No.: TNV-8011C
Phase:
Mode:
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	15.61	66.00	50.39	1000.0	9.000	N	19.4
0.150000	35.16	---	79.00	43.84	1000.0	9.000	N	19.4
0.250000	---	13.76	66.00	52.24	1000.0	9.000	N	19.5
0.250000	25.95	---	79.00	53.05	1000.0	9.000	N	19.5
4.725000	---	13.67	60.00	46.33	1000.0	9.000	N	19.7
4.725000	18.65	---	73.00	54.35	1000.0	9.000	N	19.7
4.750000	---	13.92	60.00	46.08	1000.0	9.000	N	19.7
4.750000	19.09	---	73.00	53.91	1000.0	9.000	N	19.7
13.420000	---	32.30	60.00	27.70	1000.0	9.000	N	20.0
13.420000	35.33	---	73.00	37.67	1000.0	9.000	N	20.0
21.175000	---	26.40	60.00	33.60	1000.0	9.000	N	20.2
21.175000	32.90	---	73.00	40.10	1000.0	9.000	N	20.2

◆ 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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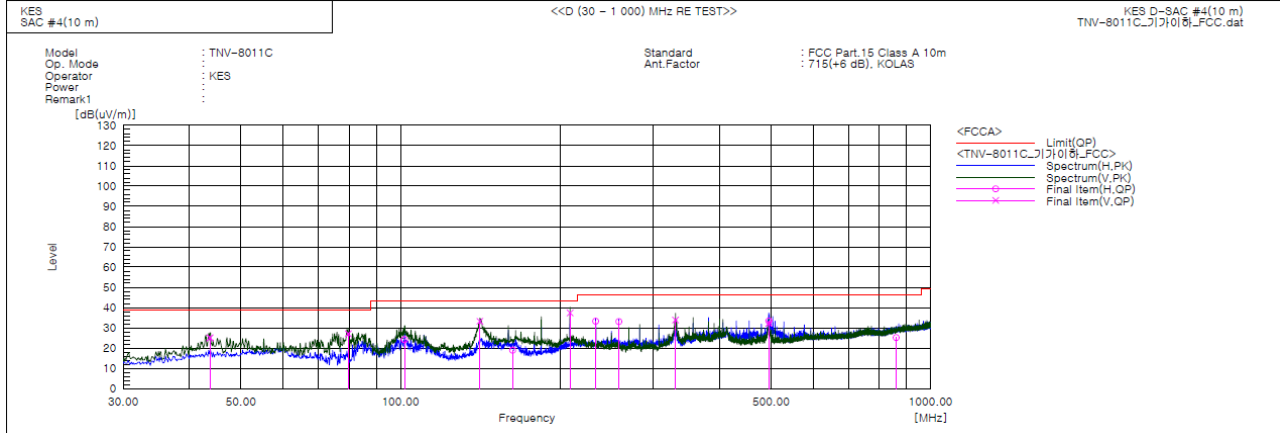
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Radiated Electric Field Emissions(Below 1 GHz)

- 47 CFR Part 15, Subpart B



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	43.701	V	46.9	-21.8	25.1	39.0	13.9	108.0	116.0	
2	79.715	V	54.9	-27.8	27.1	39.0	11.9	132.0	127.0	
3	101.780	H	46.7	-22.5	24.2	43.5	19.3	400.0	131.0	
4	141.184	V	58.7	-25.4	33.3	43.5	10.2	100.0	67.0	
5	162.769	H	43.4	-24.5	18.9	43.5	24.6	396.0	158.0	
6	208.863	V	58.0	-20.6	37.4	43.5	6.1	116.0	185.0	
7	233.458	H	53.0	-19.7	33.3	46.5	13.2	382.0	223.0	
8	258.079	H	52.1	-19.0	33.1	46.5	13.4	400.0	212.0	
9	330.091	V	50.0	-16.1	33.9	46.5	12.6	100.0	192.0	
10	494.994	V	44.1	-11.8	32.3	46.5	14.2	100.0	16.0	
11	494.994	H	45.2	-11.8	33.4	46.5	13.1	400.0	89.0	
12	861.048	H	29.9	-4.7	25.2	46.5	21.3	289.0	210.0	

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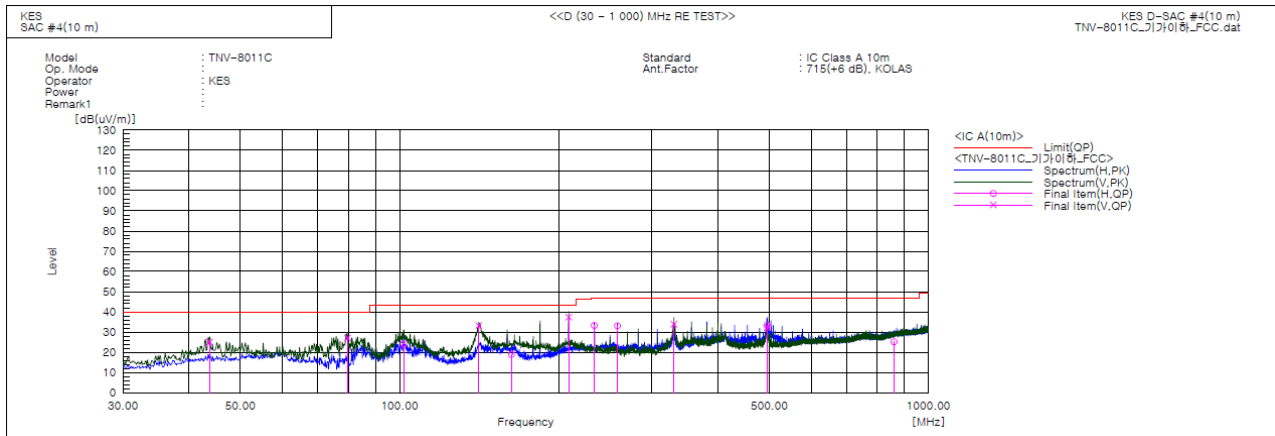
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- IC Regulation ICES-003 Issue 7



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	43.701	V	46.9	-21.8	25.1	40.0	14.9	108.0	116.0	
2	79.715	V	54.9	-27.8	27.1	40.0	12.9	132.0	127.0	
3	101.780	H	46.7	-22.5	24.2	43.5	19.3	400.0	131.0	
4	141.184	V	58.7	-25.4	33.3	43.5	10.2	100.0	67.0	
5	162.769	H	43.4	-24.5	18.9	43.5	24.6	396.0	158.0	
6	208.863	V	58.0	-20.6	37.4	43.5	6.1	116.0	185.0	
7	233.458	H	53.0	-19.7	33.3	47.0	13.7	382.0	223.0	
8	258.079	H	52.1	-19.0	33.1	47.0	13.9	400.0	212.0	
9	330.091	V	50.0	-16.1	33.9	47.0	13.1	100.0	192.0	
10	494.994	V	44.1	-11.8	32.3	47.0	14.7	100.0	16.0	
11	494.994	H	45.2	-11.8	33.4	47.0	13.6	400.0	89.0	
12	861.048	H	29.9	-4.7	25.2	47.0	21.8	289.0	210.0	

◆ Calculation - SAC #4(10 m)

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

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

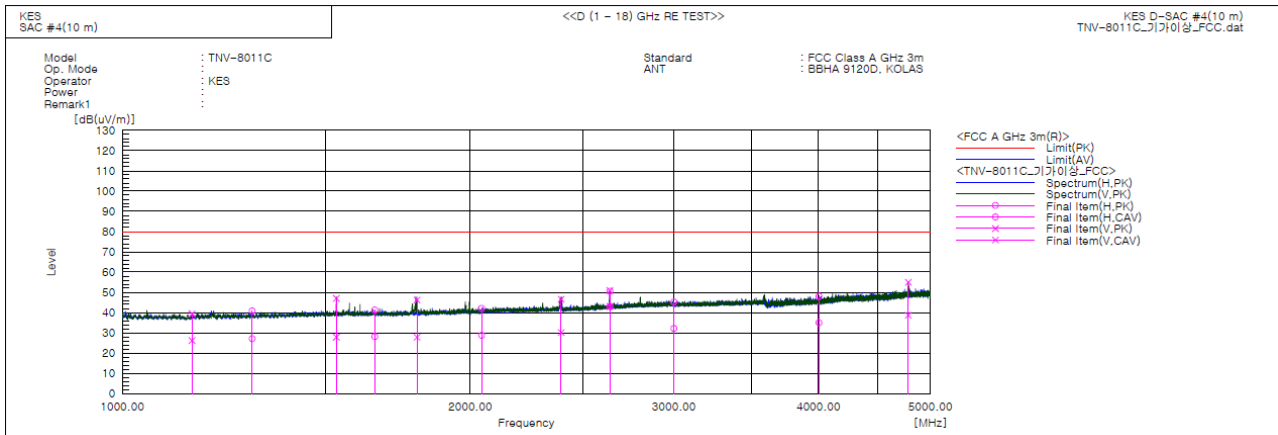
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Radiated Electric Field Emissions(Above 1 GHz)



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	1148.623	V	42.6	29.4	-3.2	39.4	26.2	80.0	60.0	40.6	33.8	100.0	221.0	
2	1295.163	H	43.0	29.3	-2.2	40.8	27.1	80.0	60.0	39.2	32.9	396.0	109.0	
3	1531.528	V	47.9	28.7	-0.8	47.1	27.9	80.0	60.0	32.9	32.1	100.0	229.0	
4	1653.056	H	41.4	28.2	-0.1	41.3	28.1	80.0	60.0	38.7	31.9	400.0	157.0	
5	1798.074	V	45.6	27.3	0.6	46.2	27.9	80.0	60.0	33.8	32.1	114.0	195.0	
6	2045.554	H	40.2	26.9	1.9	42.1	28.8	80.0	60.0	37.9	31.2	400.0	269.0	
7	2396.115	V	42.8	26.4	3.8	46.6	30.2	80.0	60.0	33.4	29.8	100.0	146.0	
8	2640.114	V	45.8	38.0	5.1	50.9	43.1	80.0	60.0	29.1	16.9	109.0	12.0	
9	2640.727	H	45.5	37.8	5.1	50.6	42.9	80.0	60.0	29.4	17.1	319.0	348.0	
10	2999.096	H	38.4	25.4	6.8	45.2	32.2	80.0	60.0	34.8	27.8	400.0	187.0	
11	4005.329	H	36.9	23.8	11.2	48.1	35.0	80.0	60.0	31.9	25.0	400.0	235.0	
12	4785.012	V	40.1	23.8	14.9	55.0	38.7	80.0	60.0	25.0	21.3	100.0	61.0	

◆ Calculation

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

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

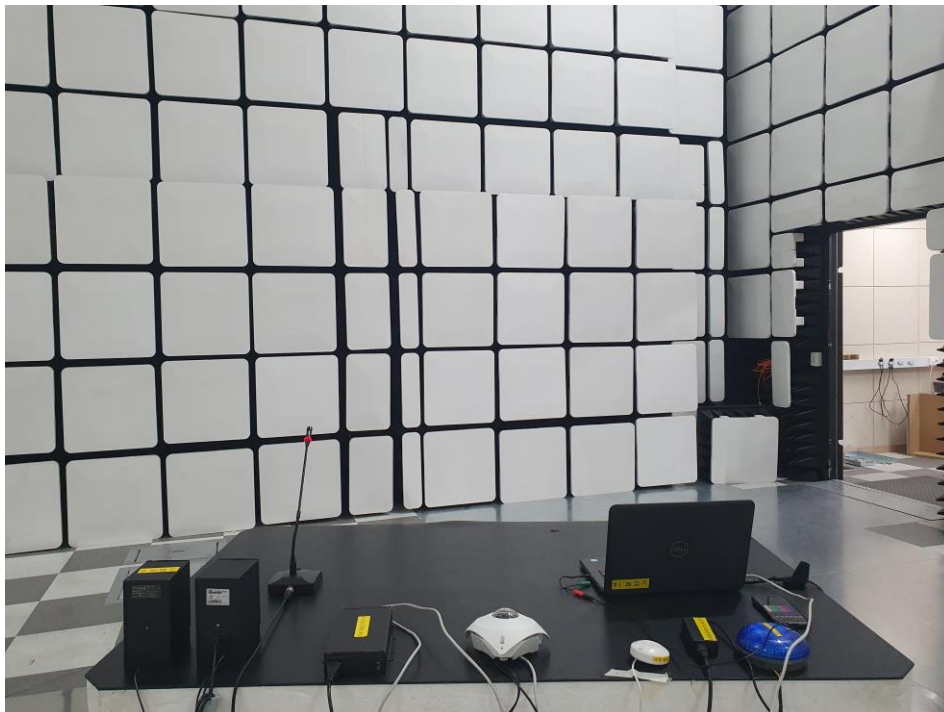
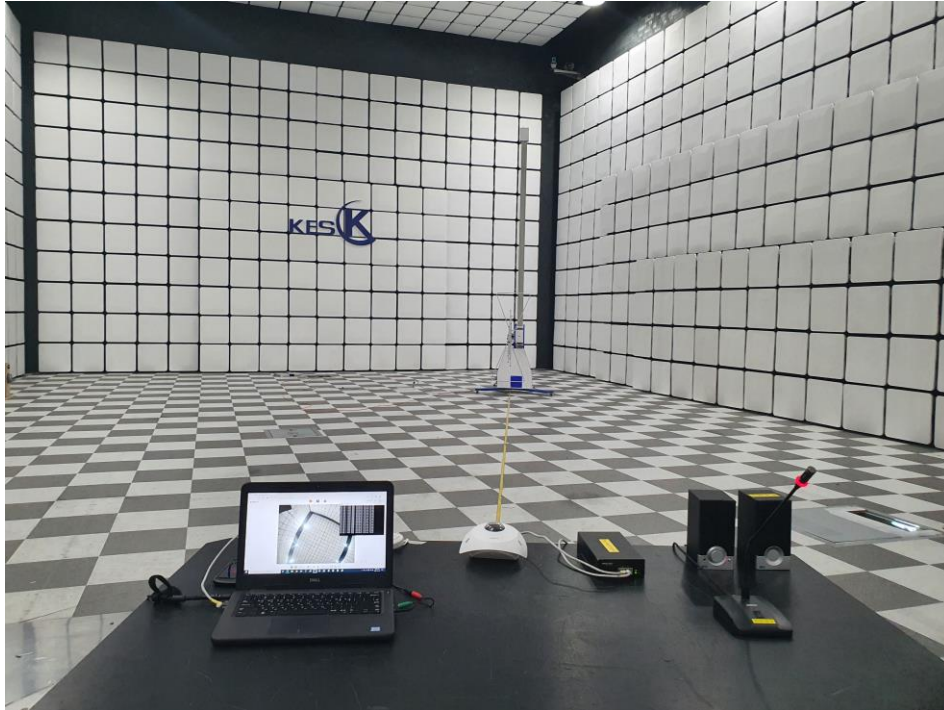
Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports



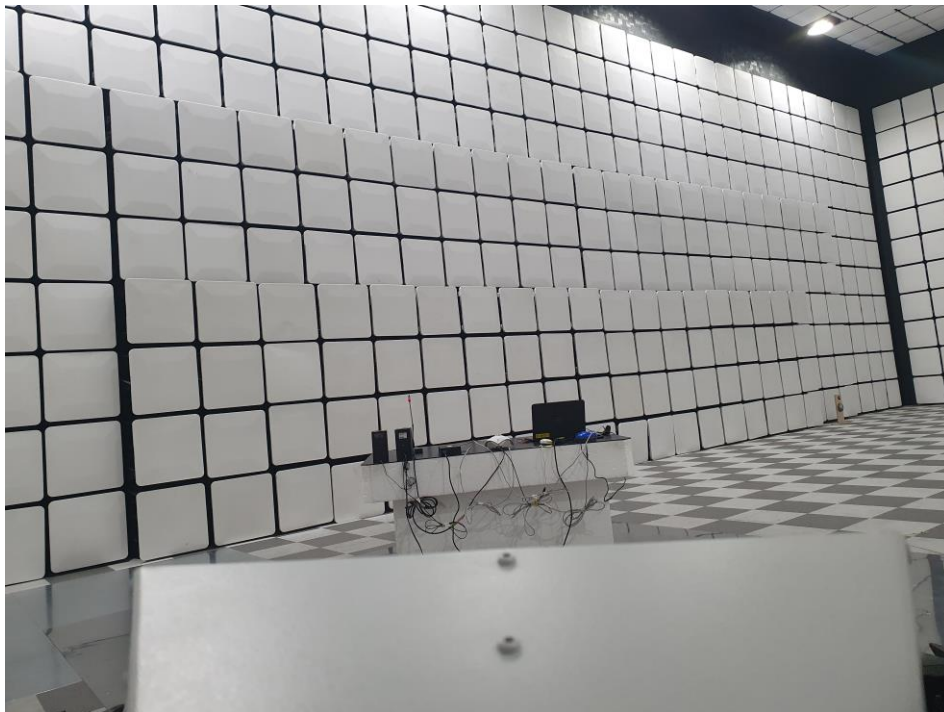
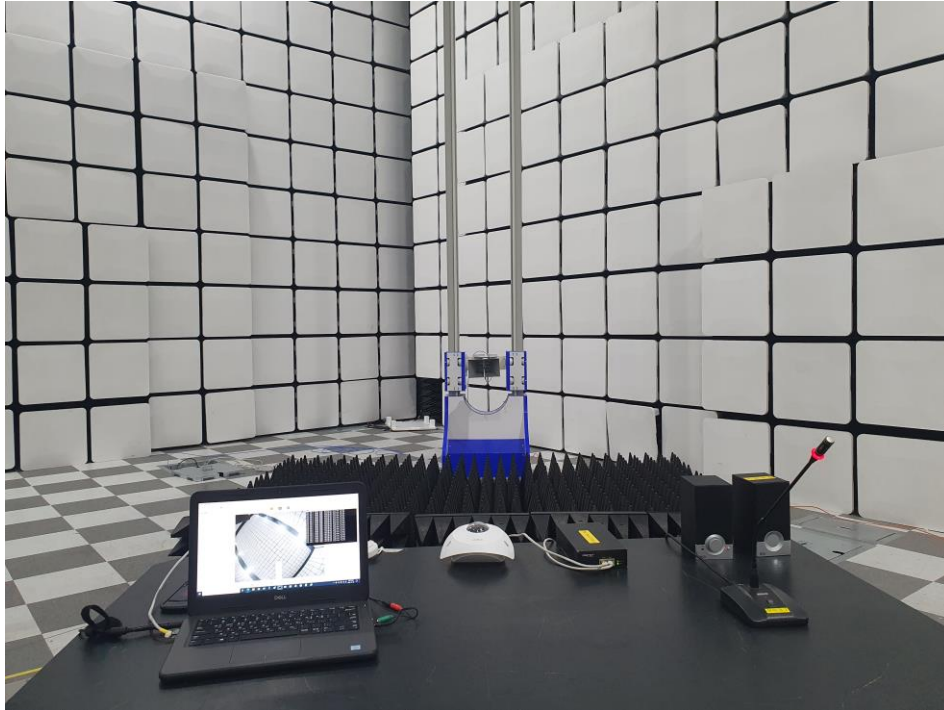
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Radiated Electric Field Emissions(Below 1 GHz)



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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)



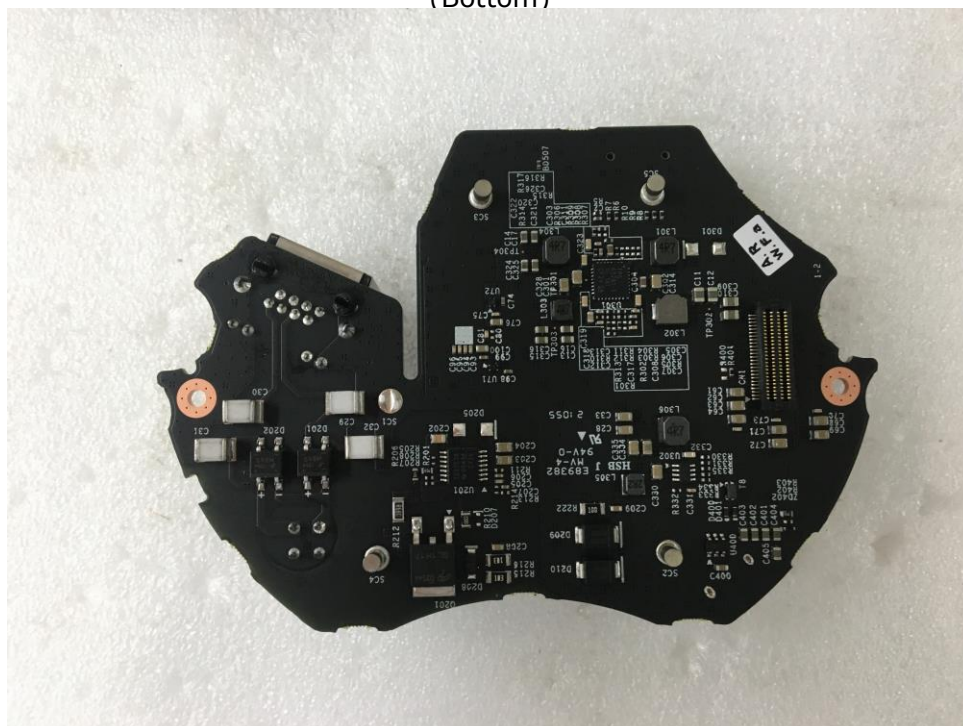
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EUT Internal View – Board 1

(Top)



(Bottom)



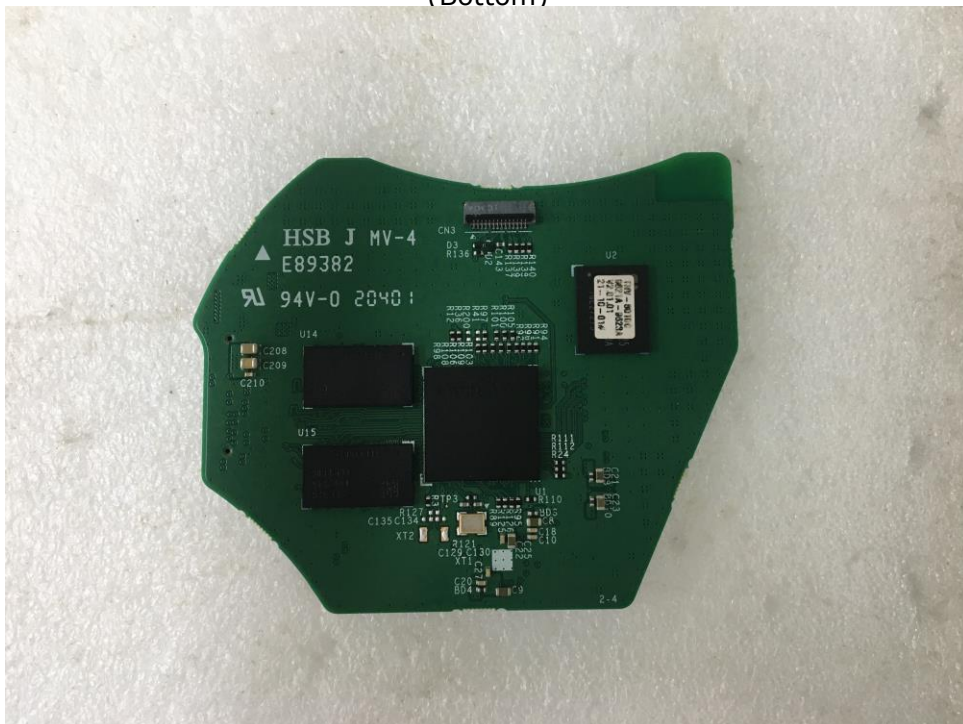
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EUT Internal View – Board 2

(Top)



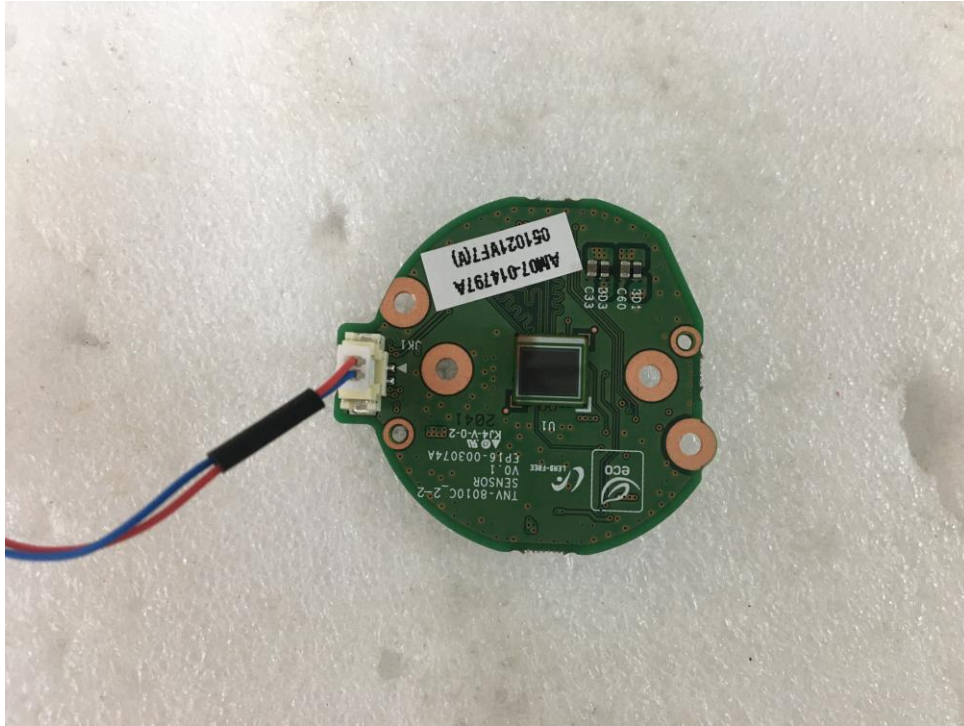
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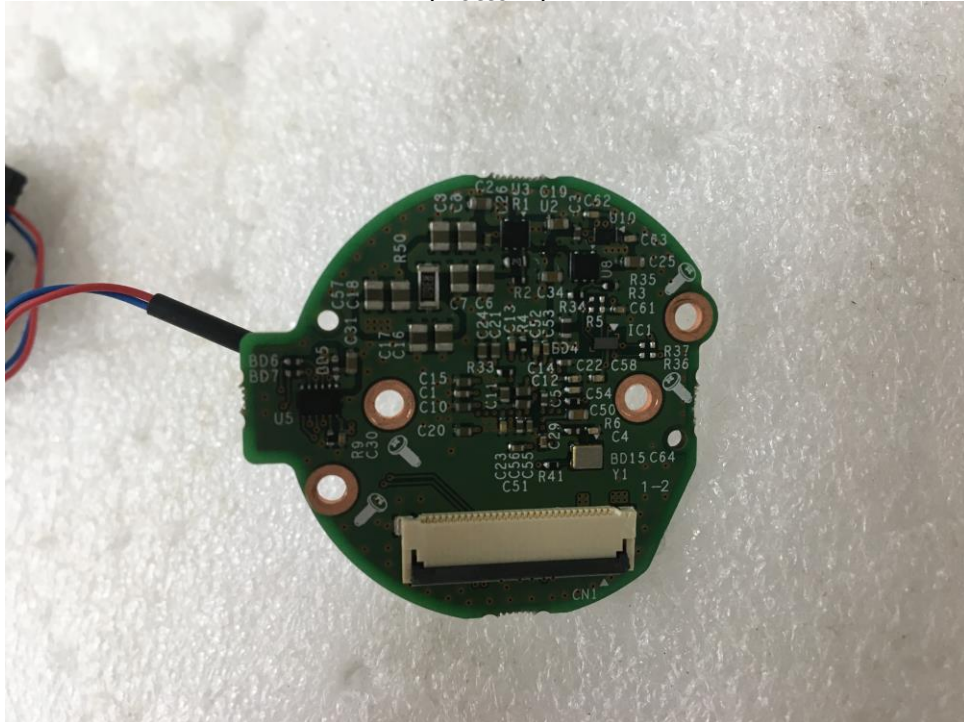
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EUT Internal View – Board 3

(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.