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Report No.:

KES-EM-23T0050-R2

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# EMC TEST REPORT

Test Report No. : KES-EM-23T0050-R2  
Date of Issue : Feb. 24, 2023  
Product name : CEILING SPEAKER  
Model/Type No. : SPA-C110B  
Variant Model : SPA-C110W  
Applicant : Hanwha Vision Co., Ltd  
Applicant Address : 6, Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,  
Gyeonggi-do, Republic of Korea  
Manufacturer : Inter-M Corporation  
Manufacturer Address : 7-18, Gwonyul-ro 1253beon-gil, Baekseok-eup, Yangju-si,  
Gyeonggi-do  
Equipment authorization : **Supplier's Declaration of Conformity**  
Date of Receipt : Jan. 10, 2023  
Test date : Jan. 11, 2023 ~ Jan. 12, 2023  
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Jun Soo, Jung  
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
Jan. 17, 2023	KES-EM-23T0050	Issued
Jan. 27, 2023	KES-EM-23T0050-R1	Change Manufacturer
Feb. 24, 2023	KES-EM-23T0050-R2	Change the Applicant at the request of the customer

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## 1.0 General Product Description

### Main Specifications of EUT are:

WISENET AMS	Specification	SPA-C110B
Product	Type	Network Ceiling Speaker
MIC Input	Input Sensitivity	-48dBV $\pm$ 3dB
	Frequency Response	20Hz ~ 20kHz $\pm$ 3dB
	Output Level	0 dBV $\pm$ 3dB
Line Output	Frequency Response	20Hz ~ 20kHz $\pm$ 3dB
	THD + N Ratio	less than 0.01%
	S/N Ratio (20Hz HPF, 20kHz LPF)	greater than 85dB
Power Amp	Output Power (8 $\Omega$ , 1kHz Sine wave)	7W(PoE), 15W (PoE+)
	Frequency Response (1W, 8 $\Omega$ )	20Hz ~ 20kHz $\pm$ 3dB
	S/N Ratio (20Hz HPF, 20kHz LPF)	greater than 85dB
Network	Ethernet	10/100 Base-T
Memory	Internal Memory	1 GBytes
	External Memory (Micro SD)	SDHC upto 32GB (SANDISK)
Contact	Contact Input	One channel
	Contact Output (Rating : 1A DC 30V, 0.3A AC 125V)	One channel
General	Operating Temperature	-20 ~ 50°C (-4°F ~ 122°F)
	Operating Humidity	10~100% RH Non-condensing
	IP code	-
	Weight	1.95Kg
	Size	$\Phi$ 269*142.5(H)
	Color	Black
	Certificate	EMC – FCC part 15 Class A , ICES-003 Class A Safety – UL-60950 , UL2043 (Plenum rate) Environment – IEC and NEMA based on the Product specs
Power	PoE PoE+	PoE (IEEE 802.3 af type 1 Class 3) PoE+(IEEE 802.3 at type 2 Class 4)
Audio	Built-in microphone	50~16000 Hz
	Audio Compression	G.711 PCM 8 kHz G.726 ADPCM 8 kHz WAV, MP3 in mono/stereo from 64 kbps to 320 kbps. Sampling rate from 8 kHz up to 48 kHz PCMU, PCMA, opus, L16/16000, L16/8000, speex/8000, speex/16000, G.726-32
Speaker	Speaker Component	8" Coaxial Cone type
	Max. Sound Pressure Level (PoE : 7 Watt)	100dB
	Max. Sound Pressure Level (PoE+ : 15 Watt)	103dB
	Max. Power (Peak)	120W
	Frequency Response	99Hz~20kHz
	Sensitivity (1Watt)	92dB
	Coverage Pattern	120°
Network	Security	Password protection : admin,setup,user,guest (sha-2, Digest authentication, User access log) Digest authentication, User access log
	Supported Protocols	IPv4, HTTP, SIP, Bonjour, DNS, NTP, TCP, UDP, DHCP, ARP, SSH, ICMP
System Integration	API (Application Programming Interface)	Including SUNAPI Integration with HTW WAVE (VMS)
	Multi-source Dynamic PA control	<Controller Mode> Multi-source up to 48 (Multicast) (Audio 24CH + Mic 24CH) Up to 50 Zone Control (Multicast) Up to 255 Groups  <Speaker Mode> Up to 20 Zone Streaming (Unicast) Up to 50 Zone Streaming (Multicast)  <Streaming Mode> Up to 256 Zone Streaming (Multicast)
	Voice Announcement	Up to 40 pre-recorded voice announcements.
	VoIP	Tested with PBX suppliers such as Cisco and Asterisk. Supported SIP features: DTMF (RFC2976 and RFC2833) Supported codecs: PCMU, PCMA, speex/8000, speex/16000
	TTS	Domestic Version : Korean
	Intelligent Audio	Export Version : English(US, UK), German, French, Spanish, Russian
	Event Triggers	Speaker Test (by built in test tool, bandwidth check also)
	Functional Monitoring	Virtual Inputs Call : DTMF, State changes
	Supported OS	Connection verification, Built-in system logging Windows : Windows 10
	Supported Web viewer	MAC : Catalina 10.15.4 ↑ , Big Sur 11.1 ↑ Chrome Version : 91.0.4472.114 ↑

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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.

☒ AC 120 V, 60 Hz

## 1.2 Variant Model Differences

Color Differences

## 1.3 Device Modifications

Not applicable

## 1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
CEILING SPEAKER	SPA-C110B	-	Inter-M Corporation	EUT

## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Notebook	P95G001	8KM8HT2	DELL INC.	-
Notebook adapter	LA65NS2-01	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD..	-
Speaker	E5	-	PreSonus®	-
PoE INJECTOR	PT-PSE109GBRO-AH-S	-	Dongguan PROCET Network Technology Co.,Ltd	-
Button Alram	-	-	-	-
LED Alram	PRO-SL	-	SENSOR PRO	-
Micro SD card	-	-	SanDisk	4 GB

## 1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
CEILING SPEAKER (EUT)	RJ-45	PoE INJECTOR	RJ-45	3.0	U
	Micro SD card Slot	Micro SD card	Micro SD card Slot	-	-
	LINE OUT	Speaker	XLR	2.0	U
	Alarm IN	Button Alarm	Line	3.0	U
	Alarm OUT	LED Alarm	Line	3.0	U
	Ground Port	Ground	Ground Port	2.0	U

\* Unshielded = U, Shielded = S

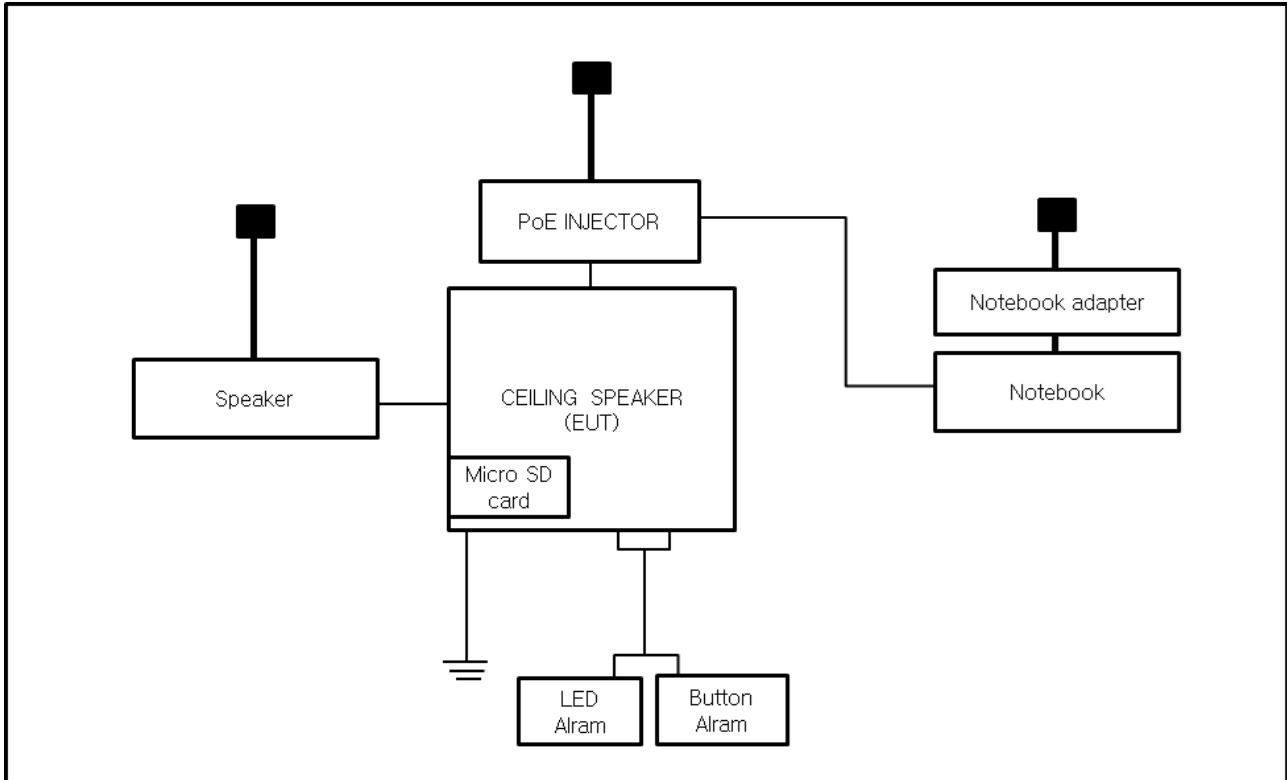
## 1.7 EUT Operating Mode(s)

Test mode	operating
Operation	1. Ping Test Mode. 2. After accessing the web browser, the operation status was checked by playing the 1KHz Tone. 3. Test by uploading the sound source stored on the Micro SD Card through the web viewer

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

## 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:

☒ **47 CFR Part 15, Subpart B**

- |  |   |                                  |
|--|---|----------------------------------|
| <input type="checkbox"/> CISPR 22:2009 +A1:2010      | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> ANSI C63.4a-2017 | <input checked="" type="checkbox"/> Class A | <input type="checkbox"/> Class B |

☒ **IC Regulation ICES-003 Issue 7**

- |  |   |                                  |
|--|---|----------------------------------|
| <input type="checkbox"/> CAN/CSA-CISPR 32:17         | <input type="checkbox"/> Class A            | <input type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> ANSI C63.4a-2017 | <input checked="" type="checkbox"/> Class A | <input type="checkbox"/> Class B |

## 2.1 Conducted Emissions at Mains Power Ports

### Test Date

Jan. 11, 2023

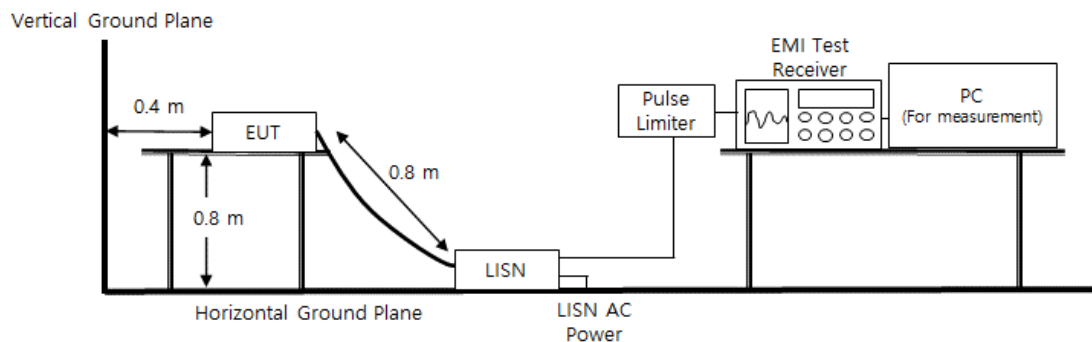
### Test Location

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	11, 11, 2023
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	11, 10, 2023
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

### Diagram of test setup





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### Test Conditions

Temperature: (22,2 ± 0,1) °C

Relative Humidity: (45,1 ± 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.

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## 2.2 Radiated Electric Field Emissions(Below 1 GHz)

### Test Date

Jan. 12, 2023

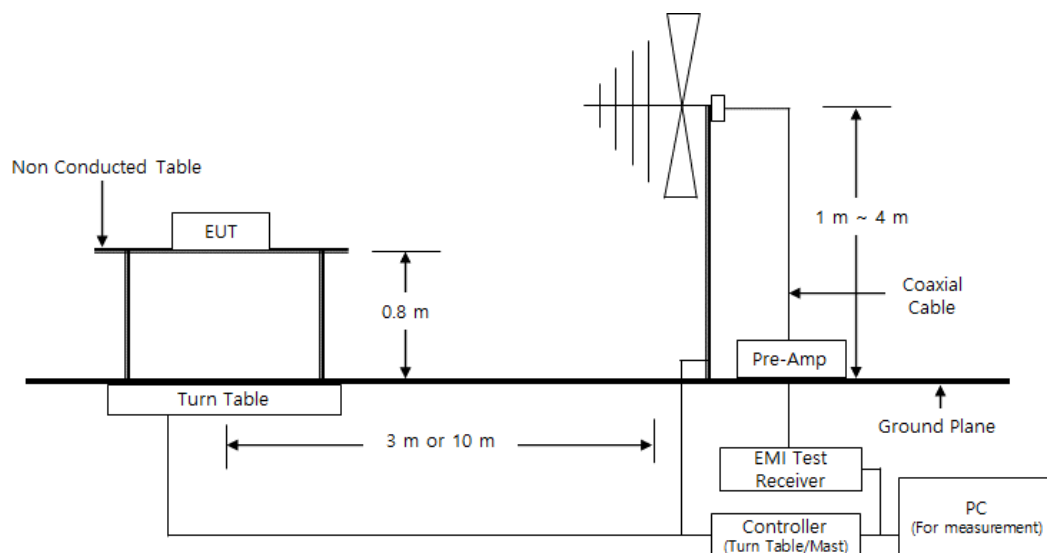
### Test Location

☐ 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	03, 31, 2023
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 10, 2023
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 17, 2024
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 08, 2023

### Diagram of test setup





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### Test Conditions

Temperature: (22,6 ± 0,1) °C

Relative Humidity: (44,9 ± 0,1) % 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.

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## 2.3 Radiated Electric Field Emissions(Above 1 GHz)

### Test Date

Jan. 12, 2023

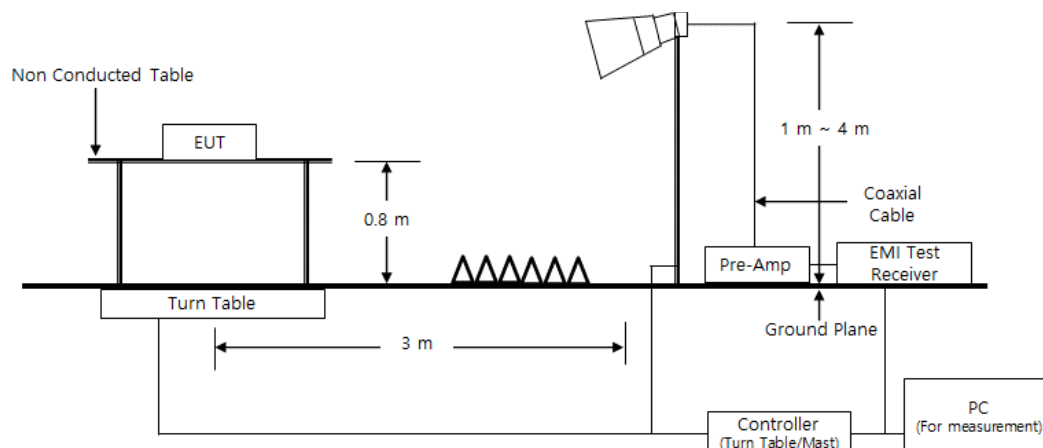
### Test Location

SEMI ANECHOIC CHAMBER #5

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	ES10/RE	TOYO Corporation	2022.01.000	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	03, 31, 2023
<input checked="" type="checkbox"/>	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	11, 08, 2023
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	HP	3008A00538	06, 02, 2023
<input checked="" type="checkbox"/>	ATTENUATOR	8491B	HP	23094	04, 21, 2023

### Diagram of test setup



**Test Conditions**Temperature: (23,7  $\pm$  0,1) °CRelative Humidity: (45,7  $\pm$  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:

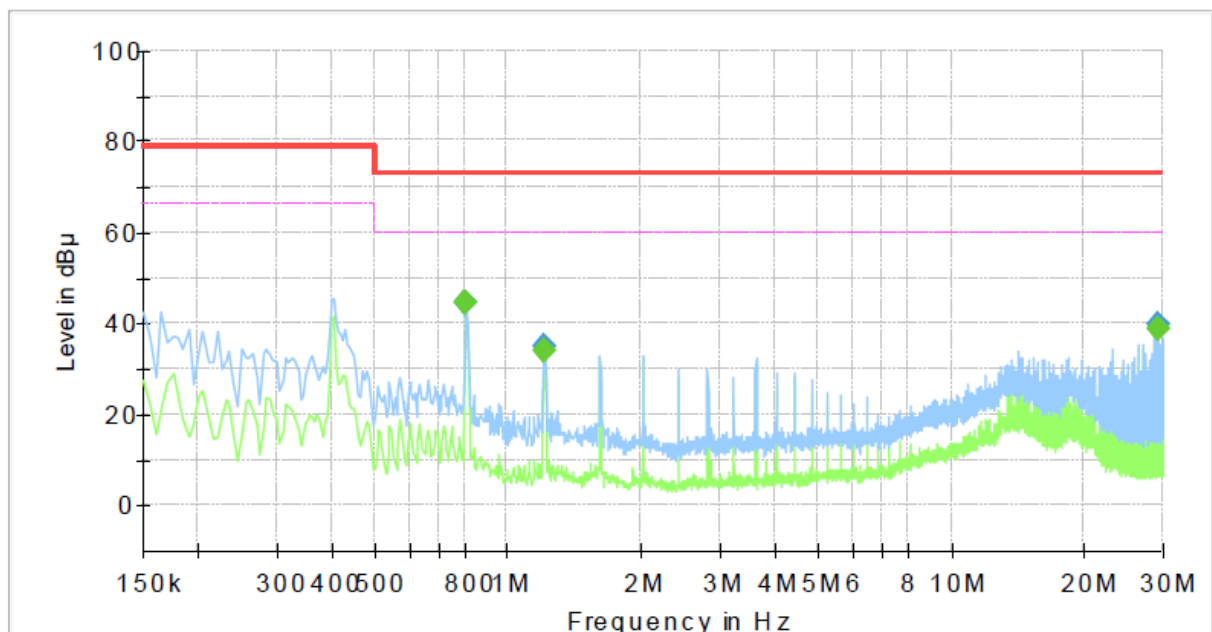
☒ PASS☐ NOT PASS☐ NOT APPLICABLE**Remarks**- See Appendix A for test data.- The Average of the test data is the cispr average result.

## APPENDIX A – TEST DATA

### Conducted Emissions at Mains Power Ports HOT LINE

#### Common Information

Test Description:	Conducted Emission
Model No.:	SPA-C110B
Phase:	L1
Mode:	
Operator Name:	KES



#### Final Result

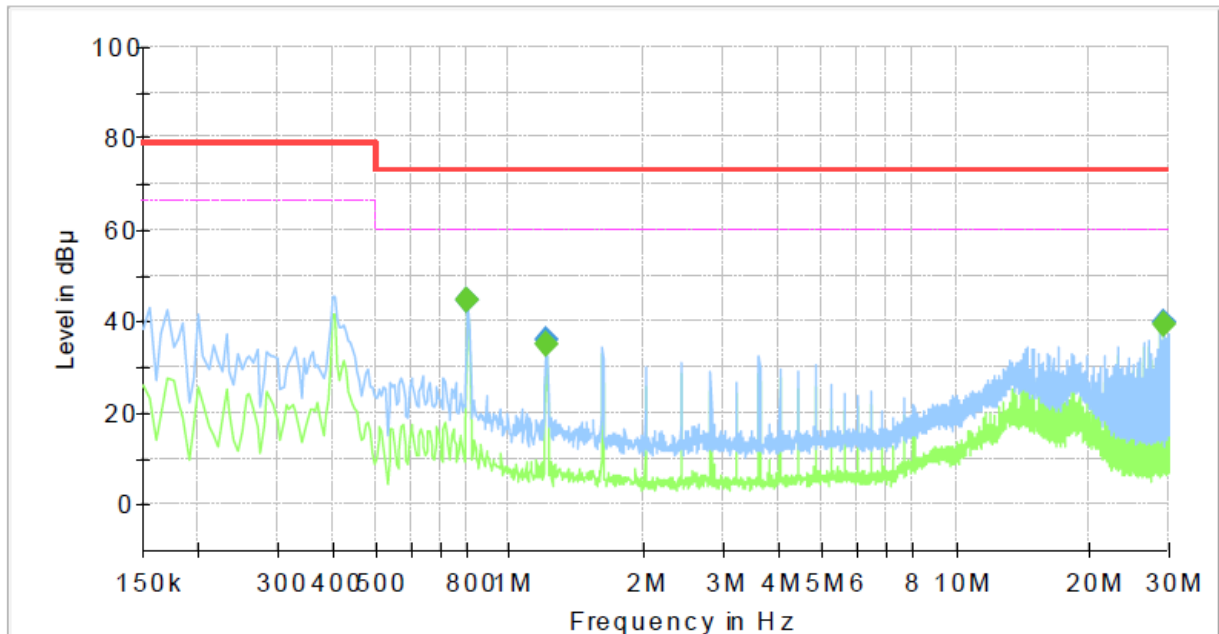
Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.805000	---	44.28	60.00	15.72	1000.0	9.000	L1	20.0
0.805000	44.40	---	73.00	28.60	1000.0	9.000	L1	20.0
1.205000	---	33.94	60.00	26.06	1000.0	9.000	L1	20.1
1.205000	34.87	---	73.00	38.13	1000.0	9.000	L1	20.1
29.235000	---	38.95	60.00	21.05	1000.0	9.000	L1	20.4
29.235000	39.55	---	73.00	33.45	1000.0	9.000	L1	20.4



## NEUTRAL LINE

### Common Information

Test Description:	Conducted Emission
Model No.:	SPA-C110B
Phase:	N
Mode:	
Operator Name:	KES



### Final\_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.805000	---	44.53	60.00	15.47	1000.0	9.000	N	20.0
0.805000	44.64	---	73.00	28.36	1000.0	9.000	N	20.0
1.205000	---	34.96	60.00	25.04	1000.0	9.000	N	20.1
1.205000	35.87	---	73.00	37.13	1000.0	9.000	N	20.1
29.235000	---	39.01	60.00	20.99	1000.0	9.000	N	20.4
29.235000	39.60	---	73.00	33.40	1000.0	9.000	N	20.4

#### ◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

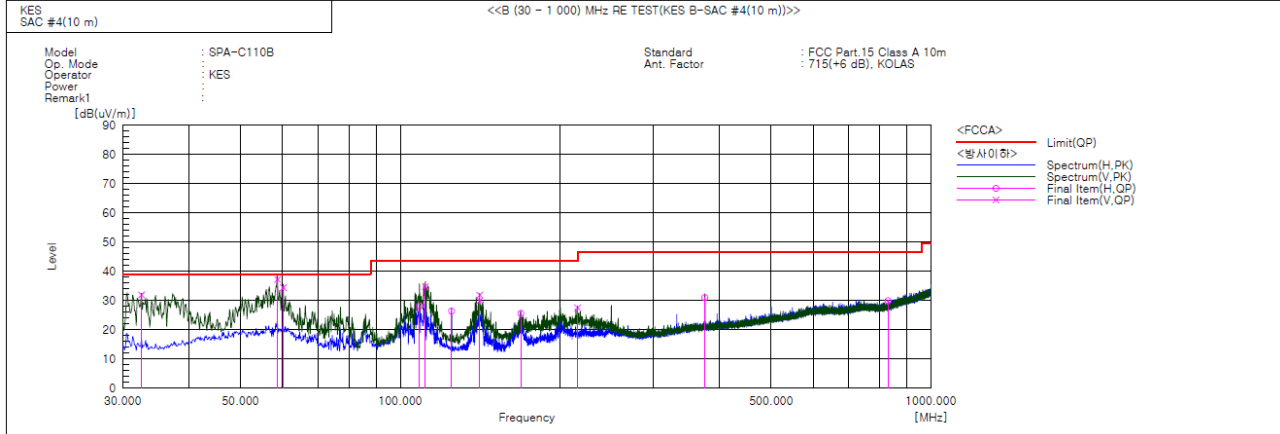
Reading Value : Not shown in the table.

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



## Radiated Electric Field Emissions(Below 1 GHz)

- 47 CFR Part 15, Subpart B

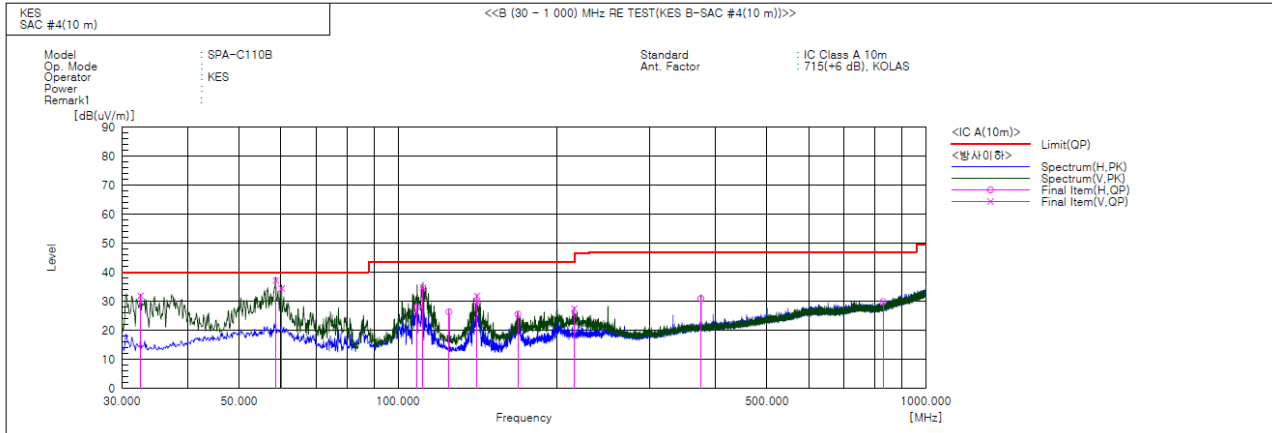


### Final Result

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	32.546	V	56.6	-24.7	31.9	39.0	7.1	100.0	87.0	
2	58.724	V	58.5	-21.3	37.2	39.0	1.8	103.0	291.0	
3	60.191	V	56.0	-21.6	34.4	39.0	4.6	102.0	319.0	
4	108.783	H	50.5	-22.4	28.1	43.5	15.4	400.0	197.0	
5	111.573	V	57.4	-22.7	34.7	43.5	8.8	132.0	296.0	
6	125.010	H	50.7	-24.3	26.4	43.5	17.1	390.0	118.0	
7	141.186	V	56.8	-25.0	31.8	43.5	11.7	150.0	358.0	
8	141.190	V	54.9	-25.0	29.9	43.5	13.6	128.0	2.0	
9	168.831	H	49.8	-24.2	25.6	43.5	17.9	376.0	248.0	
10	215.755	V	47.3	-19.8	27.5	43.5	16.0	155.0	293.0	
11	374.956	H	45.0	-14.0	31.0	46.5	15.5	399.0	319.0	
12	830.250	H	36.0	-6.1	29.9	46.5	16.6	371.0	338.0	

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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	32.546	V	56.6	-24.7	31.9	40.0	8.1	100.0	87.0	
2	58.724	V	58.5	-21.3	37.2	40.0	2.8	103.0	291.0	
3	60.191	V	56.0	-21.6	34.4	40.0	5.6	102.0	319.0	
4	108.783	H	50.5	-22.4	28.1	43.5	15.4	400.0	197.0	
5	111.573	V	57.4	-22.7	34.7	43.5	8.8	132.0	296.0	
6	125.010	H	50.7	-24.3	26.4	43.5	17.1	390.0	118.0	
7	141.186	V	56.8	-25.0	31.8	43.5	11.7	150.0	358.0	
8	141.190	V	54.9	-25.0	29.9	43.5	13.6	128.0	2.0	
9	168.831	H	49.8	-24.2	25.6	43.5	17.9	376.0	248.0	
10	215.755	V	47.3	-19.8	27.5	43.5	16.0	155.0	293.0	
11	374.956	H	45.0	-14.0	31.0	47.0	16.0	399.0	319.0	
12	830.250	H	36.0	-6.1	29.9	47.0	17.1	371.0	338.0	

## ◆ Calculation - SAC #4(10 m)

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

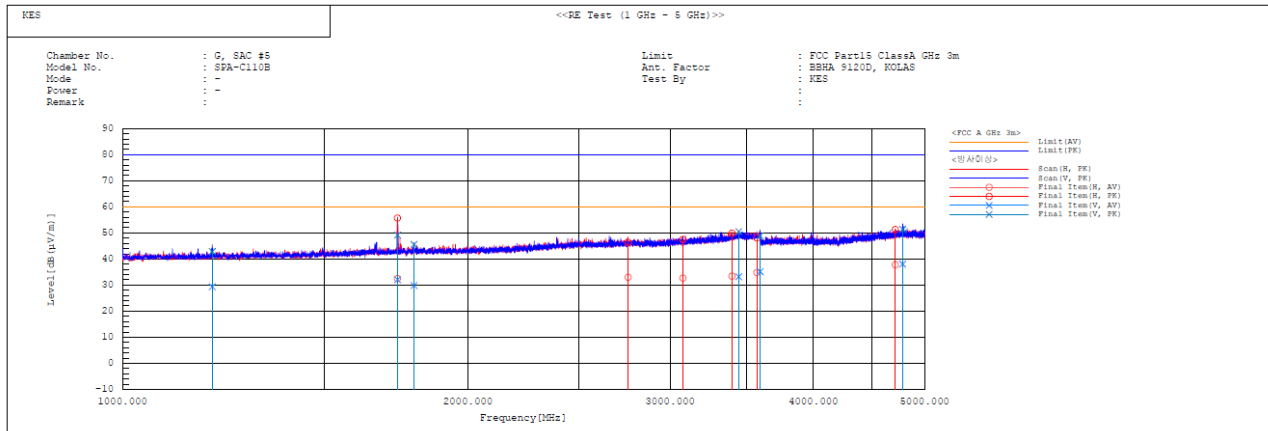
Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

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



## Radiated Electric Field Emissions(Above 1 GHz)



### Final Result

No.	Frequency [MHz]	Pol	Reading AV [dB(μV)]	Reading PK [dB(μV)]	c.f [dB(1/m)]	Result AV [dB(μV/m)]	Result PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]	Remark
1	1197.524	V	30.9	44.3	-1.5	29.4	42.8	60.0	80.0	30.6	37.2	154.0	0.5	
2	1736.677	H	31.5	54.7	1.0	32.5	55.7	60.0	80.0	27.5	24.3	355.0	309.6	
3	1737.198	V	31.1	48.1	1.0	32.1	49.1	60.0	80.0	27.9	30.9	102.0	357.9	
4	1795.466	V	28.6	44.4	1.2	29.8	45.6	60.0	80.0	30.2	34.4	102.0	193.2	
5	2758.339	H	28.6	42.0	4.4	33.0	46.4	60.0	80.0	27.0	33.6	276.0	41.9	
6	3079.409	H	27.6	42.4	5.1	32.7	47.5	60.0	80.0	27.3	32.5	400.0	294.4	
7	3397.216	H	27.9	44.4	5.5	33.4	49.9	60.0	80.0	26.6	30.1	357.0	222.5	
8	3444.773	V	27.6	44.9	5.6	33.2	50.5	60.0	80.0	26.8	29.5	125.0	193.2	
9	3570.695	H	28.9	42.2	5.9	34.8	48.1	60.0	80.0	25.2	31.9	385.0	27.6	
10	3594.811	V	29.1	42.9	6.0	35.1	48.9	60.0	80.0	24.9	31.1	105.0	359.5	
11	4715.254	H	28.2	41.7	9.6	37.8	51.3	60.0	80.0	22.2	28.7	330.0	49.2	
12	4785.638	V	28.1	41.5	9.9	38.0	51.4	60.0	80.0	22.0	28.6	107.0	141.0	

### ◆ 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

## Test Setup Photos and Configuration

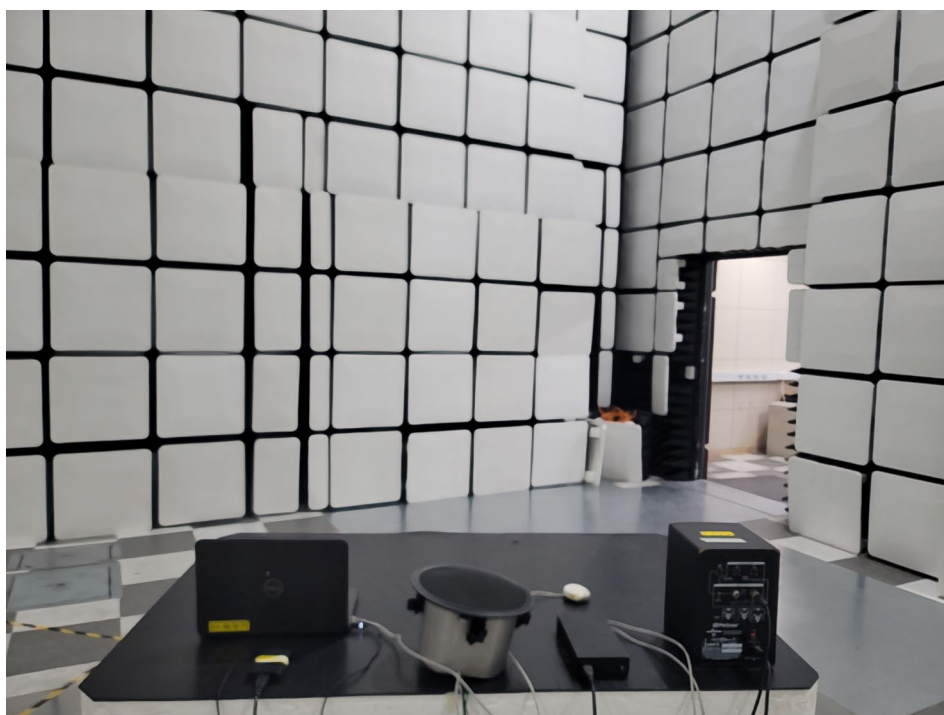
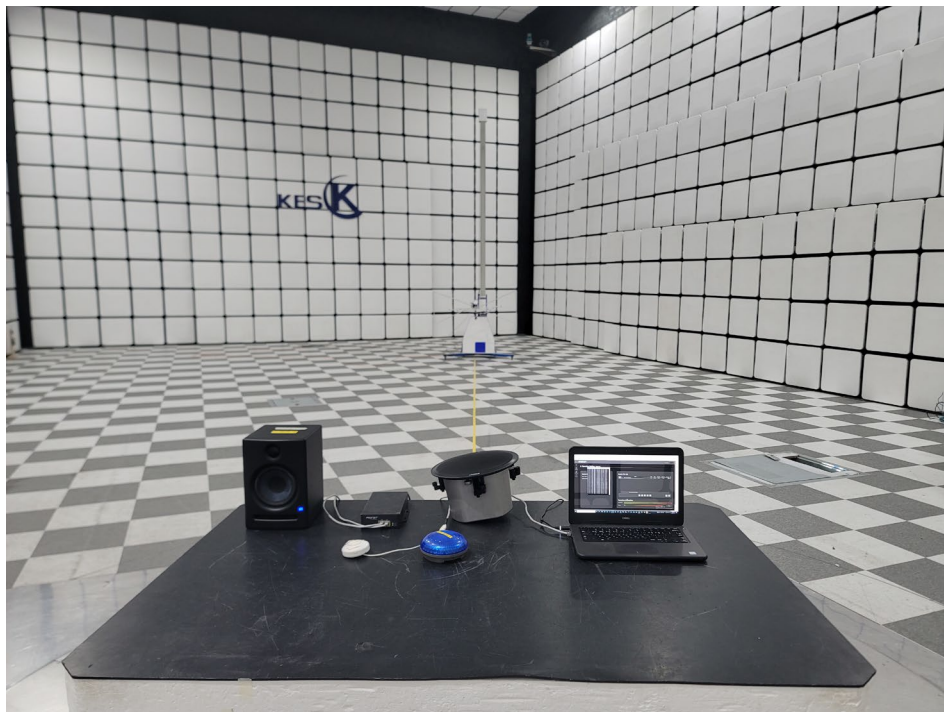
### Conducted Emissions at Mains Power Ports



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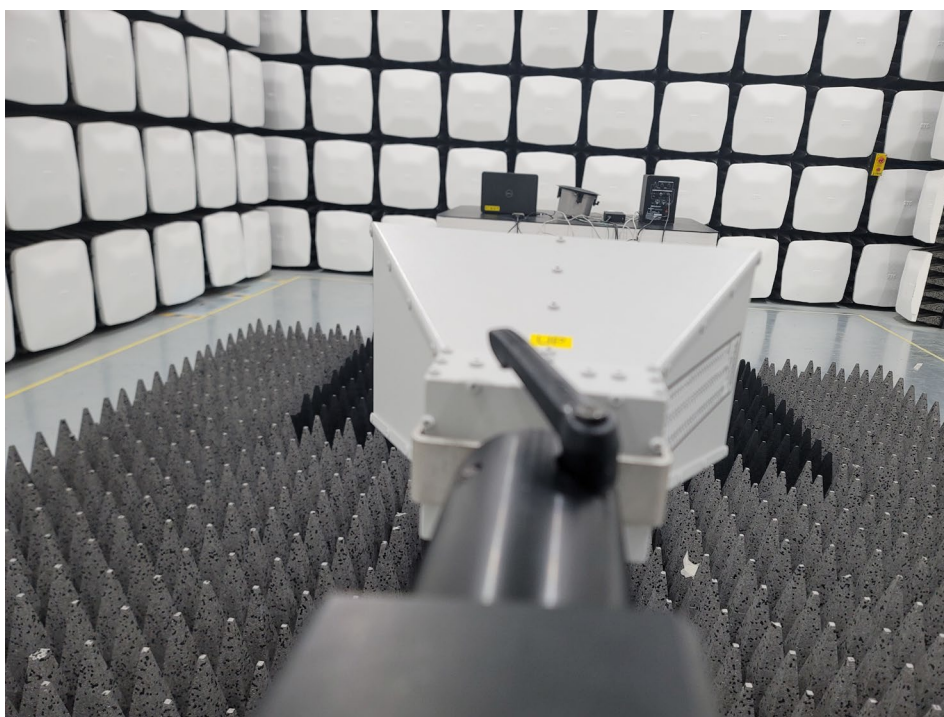
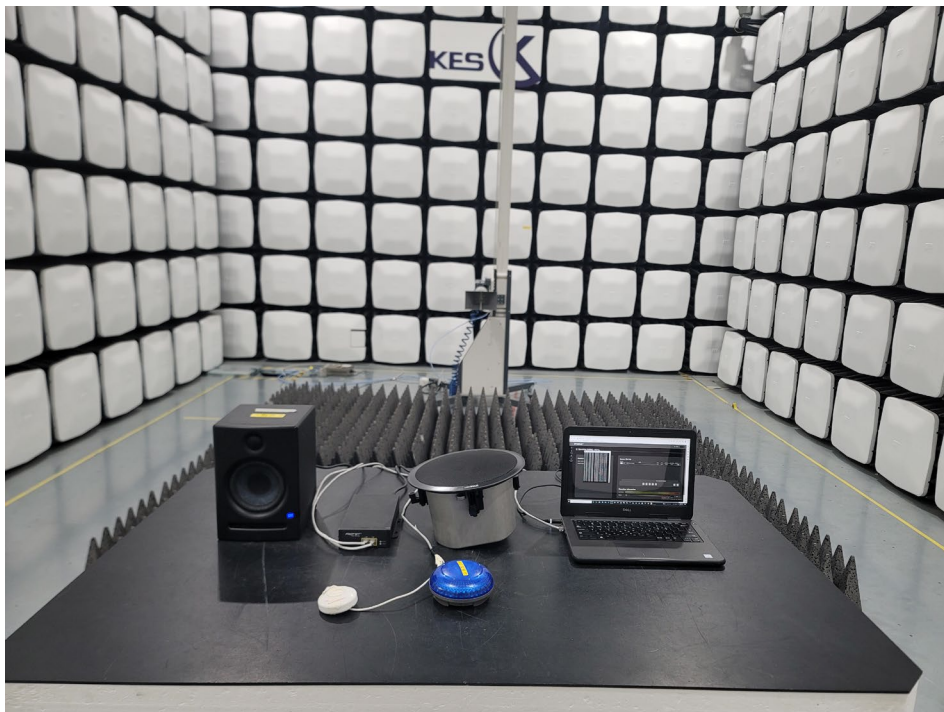


## Radiated Electric Field Emissions(Below 1 GHz)



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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)

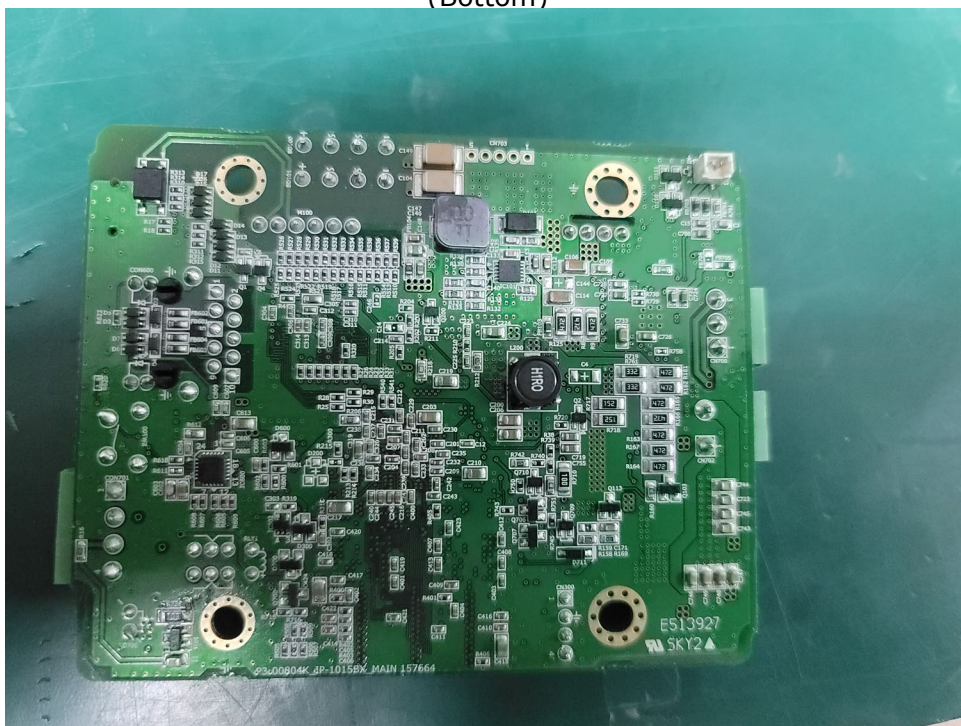


## EUT Internal View – Board

(Top)



(Bottom)

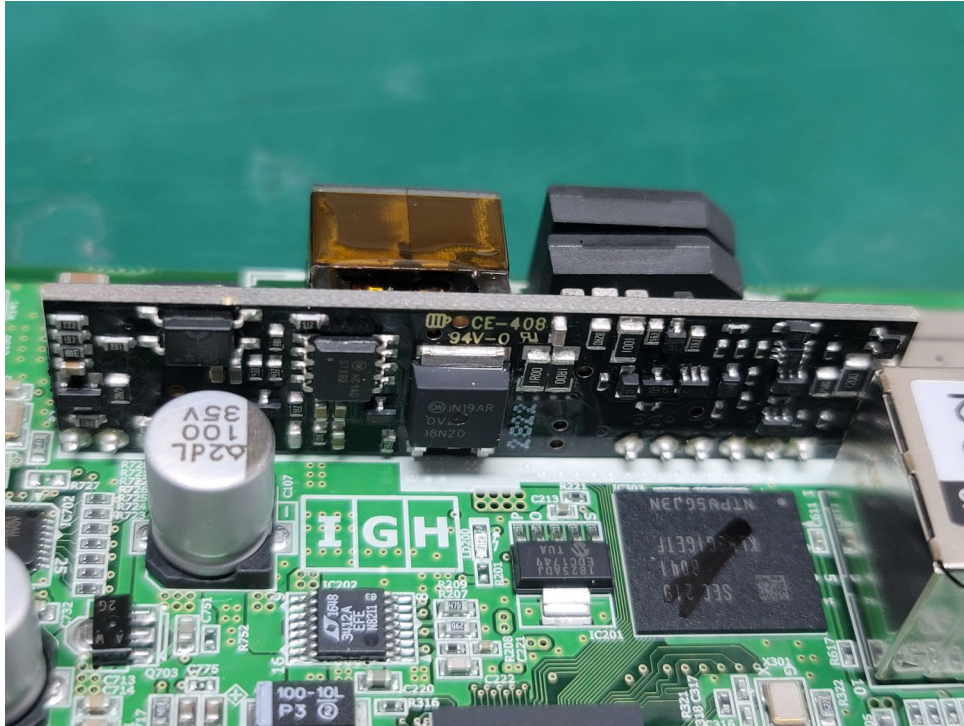


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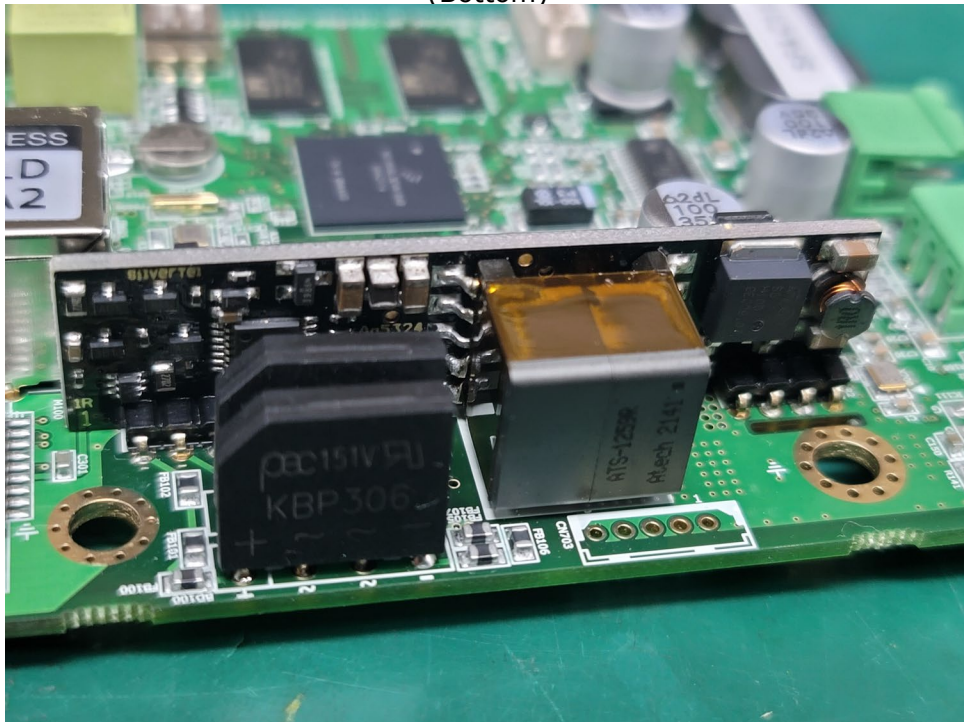


**EUT Internal View – SUB Board**

(Top)



(Bottom)



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## Label Photographs

### FCC Label



Hanwha Vision Co., Ltd

SPA-C110B

### IC Label

### CAN ICES-003(A) / NMB-003(A)

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.