

# EMC TEST REPORT For VCCI

Test Report No. : KES-EM-23T0025-R2  
Date of Issue : Feb. 24, 2023  
Product name : WALL SPEAKER  
Model/Type No. : SPA-W100W  
Variant Model : SPA-W100B  
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  
Date of Receipt : Dec. 26, 2022  
Test date : Jan. 03, 2023 ~ Jan. 04, 2023  
Test Results :  **In Compliance**  **Not in Compliance**

Tested by



Eun Gu, Jeon  
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**

<b>Date</b>	<b>Test Report No.</b>	<b>Revision History</b>
Jan. 05, 2023	KES-EM-23T0025	Issued
Jan. 27, 2023	KES-EM-23T0025-R1	Change Manufacturer
Feb. 24, 2023	KES-EM-23T0025-R2	Change the Applicant at the request of the customer

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## 1.0 General Product Description

### Main Specifications of EUT are:

Product	Type	Network Wall speaker	
MIC Input	Input Sensitivity	-48dBV ± 3dB	
	Frequency Response	20Hz ~ 20kHz ± 3dB	
Line Output	Output Level	0 dBV ± 3dB	
	Frequency Response	20Hz ~ 20kHz ± 3dB	
	THD + N Ratio	less than 0.01%	
	S/N Ratio (20Hz HPF, 20kHz LPF)	greater than 85dB	
Power Amp	Output Power (8Ω, 1kHz Sine wave)	7W(PoE), 15W (PoE+)	
	Frequency Response (1W, 8Ω)	20Hz ~ 20kHz ± 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	IP45	
	Weight	2.35Kg	
	Size	170(W)*250(H)*134(D)	
	Color	White	
	Certificate	EMC - FCC part 15 Class A , ICES-003 Class A Safety - UL-60950 , Environment - IEC and NEMA based on the Product specs	
Power	PoE	PoE (IEEE 802.3 af type 1 Class 3)	
	PoE+	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	5" LF Drive & 1" HF Drive, 2 way passive type	
	Max. Sound Pressure Level (PoE : 7 Watt)	97dB	
	Max. Sound Pressure Level (PoE+ : 15 Watt)	100dB	
	Max. Power (Peak)	200W	
	Frequency Response	87Hz~20kHz	
	Sensitivity (1Watt)	89dB	
Network	Coverage Pattern	170° X 140°	
	Security	Password protection ; admin,setup,user,guest (sha-2, Digest authentication, User access log)	
System Integration	Supported Protocols	IPv4, HTTP, SIP, Bonjour, DNS, NTP, TCP, UDP, DHCP, ARP, SSH, ICMP	
	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 Export Version : English(US, UK), German, French, Spanish, Russian	
	Intelligent Audio	Speaker Test (by built in test tool, bandwidth check also)	
	Event Triggers	Virtual Inputs Call : DTMF, State changes	
	Functional Monitoring	Connection verification, Built-in system logging	
	Supported OS	Windows : Windows 10 MAC : Catalina 10.15.4 1 , Big Sur 11.1 1	
Supported Web viewer	Chrome Version : 91.0.4472.114 1		

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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

## 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
WALL SPEAKER	SPA-W100W	-	Inter-M Corporation	EUT
AUDIO MODULE	SPA-D1000	-	Inter-M Corporation	-

## 1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
NOTEBOOK	Latitude 5300	8C47BE45C060	DELL INC.	-
NOTEBOOK ADAPTER	HA65NM130	-	Chicony Power Technology (Suzhou)Co.,Ltd.	-
PoE INJECTOR	PT-PSE109GBRO-AH-S	-	Dongguan PROCET Network Technology Co.,Ltd	-
BUTTON ALARM	-	-	-	-
ALARM	-	-	-	-
Micro SD Card	-	-	-	8 GB
Speaker	E5	-	PreSonus®	-



## 1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
WALL SPEAKER (EUT)	RJ -45	PoE INJECTOR	RJ-45	3.0	U
	Micro SD Slot	Micro SD Card	Micro SD Slot	-	-
	ALARM IN	BUTTON ALARM	Line	3.0	U
	ALARM OUT	ALARM	Line	3.0	U
	Groud	Groud	Groud	1.8	U
	LINE OUT (3 Pin)	Speaker	XLR	1.0	U

\* Unshielded = U, Shielded = S

## 1.7 EUT Operating Mode(s)

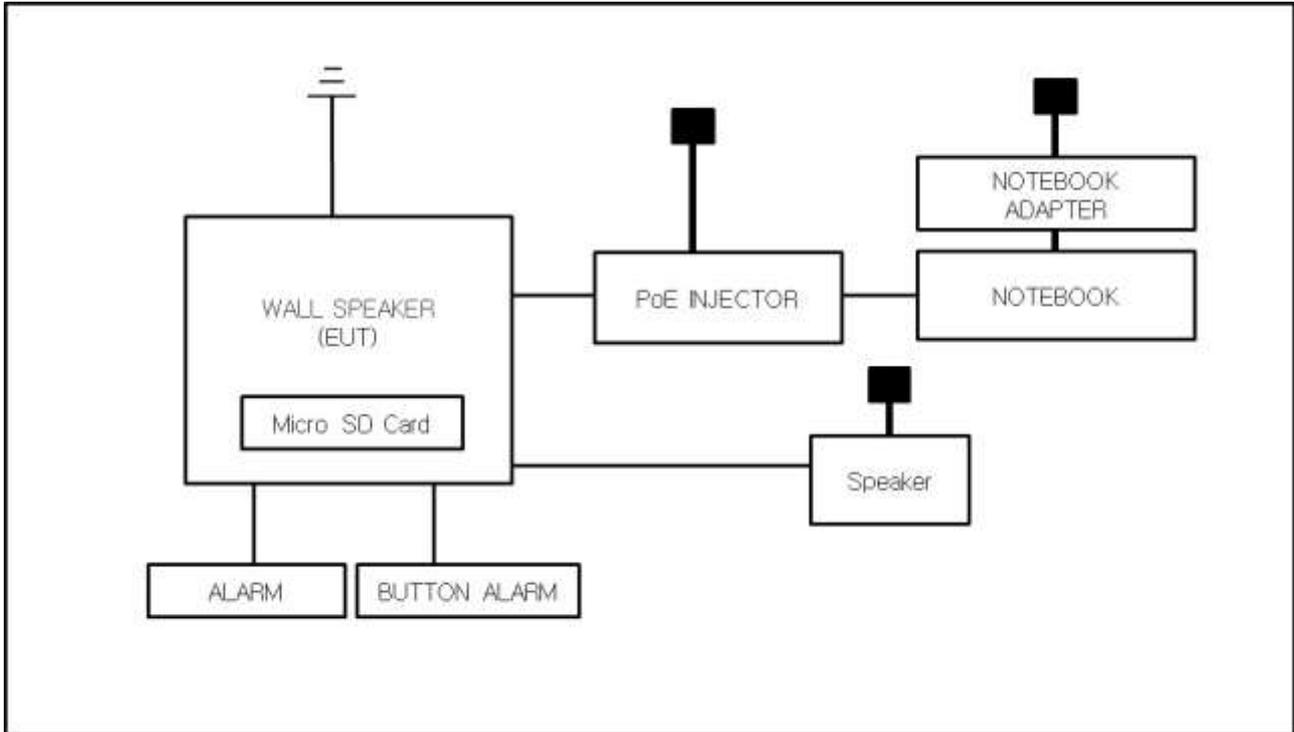
Test mode	operating
Operation	1. Ping Test Mode. 2. After accessing the web browser, the operation status was checked by playing the 1KHz Tone. 3. Test by uploading the sound source stored on the Micro SD Card through the web viewer 4. Tested while connecting to a web viewer and checking the operation status at the ALARM IN/OUT port.

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

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## 1.8 Configuration

■ AC Main  
□ DC Main



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## 1.9 Remarks when standards applied

The mains power ports were excluded tested, because the EUT operated by PoE powered.

## 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

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## 2.0 Test Regulations

The emissions tests were performed according to following regulations:

**VCCI-CISPR 32:2016**

Class A

Class B

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## 2.1 Conducted Emissions Mains Power Ports

### Test Date

N/A

### Test Location

Electro wave Shieldroom #6

### Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	11, 11, 2023
<input type="checkbox"/>	LISN	ENV216	R & S	101787	11, 10, 2023
<input type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
<input type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

### Test Conditions

Temperature: °C  
Relative Humidity: % 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

Refer to 'Remarks when standards applied'

## 2.2 Conducted Emissions at Telecommunication Ports

### Test Date

Jan. 04, 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
<input checked="" type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	11, 22, 2023
<input type="checkbox"/>	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	11, 22, 2023
<input type="checkbox"/>	CDN	CDNS502A	TESEQ	40431	11, 10, 2023

### Test Conditions

Temperature: (22,7 ± 0,1) °C  
Relative Humidity: (45,4 ± 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.  
- For Ethernet interfaces, measurements are required at the highest data rate supported by the interface.

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

### Test Date

Jan. 03, 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

### Test Conditions

Temperature: (22,8 ± 0,2) °C  
Relative Humidity: (45,1 ± 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.

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

**Test Date**

Jan. 03, 2023

**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, 01, 2023
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 01, 2023
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 08, 2023
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 03, 2023

**Test Conditions**

Temperature: (22,1 ± 0,1) °C  
 Relative Humidity: (45,4 ± 0,1) % 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.



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## **APPENDIX A – TEST DATA**

### **Conducted Emissions at Mains Power Ports** HOT LINE

N/A

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NEUTRAL LINE

N/A

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

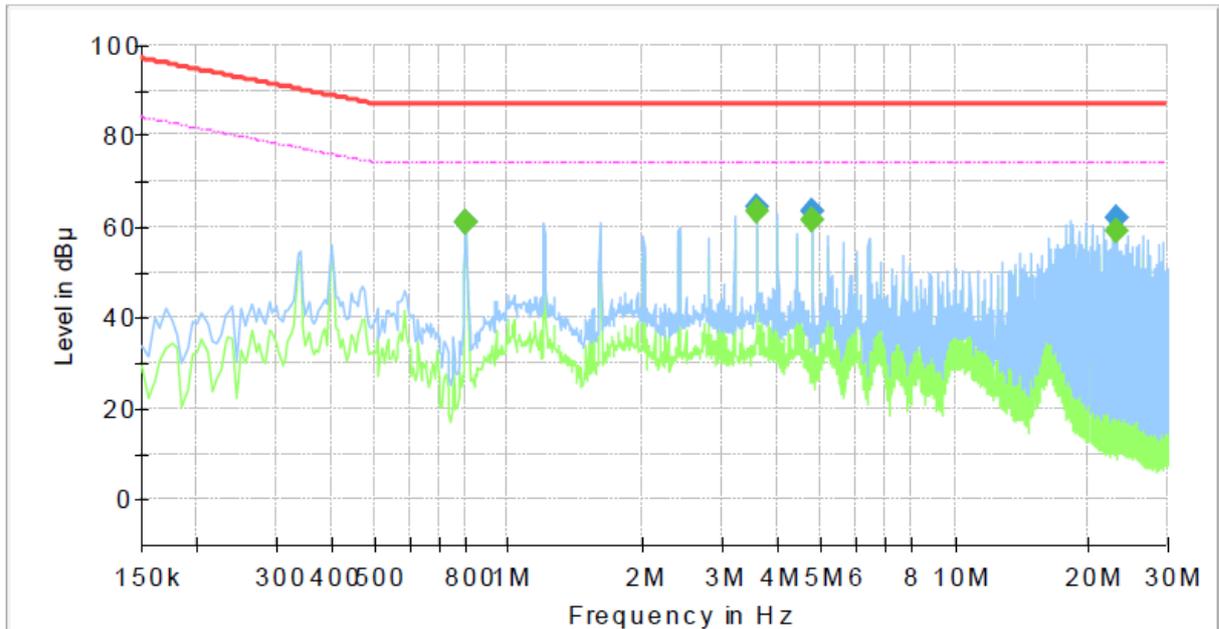
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## Conducted Emissions at Telecommunication Ports [100 Mbps]

### Common Information

Test Description:	Telecommunication Emission
Model No.:	SPA-W100W
Mode :	
Speed :	100 Mbps
Operator Name:	KES



### Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.800000	---	60.84	74.00	13.16	1000.0	9.000	Single Line	20.0
0.800000	60.93	---	87.00	26.07	1000.0	9.000	Single Line	20.0
3.605000	---	63.46	74.00	10.54	1000.0	9.000	Single Line	19.8
3.605000	64.37	---	87.00	22.63	1000.0	9.000	Single Line	19.8
4.805000	---	61.40	74.00	12.60	1000.0	9.000	Single Line	19.5
4.805000	63.31	---	87.00	23.69	1000.0	9.000	Single Line	19.5
23.130000	---	58.82	74.00	15.18	1000.0	9.000	Single Line	20.1
23.130000	61.75	---	87.00	25.25	1000.0	9.000	Single Line	20.1

#### ◆ Calculation

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

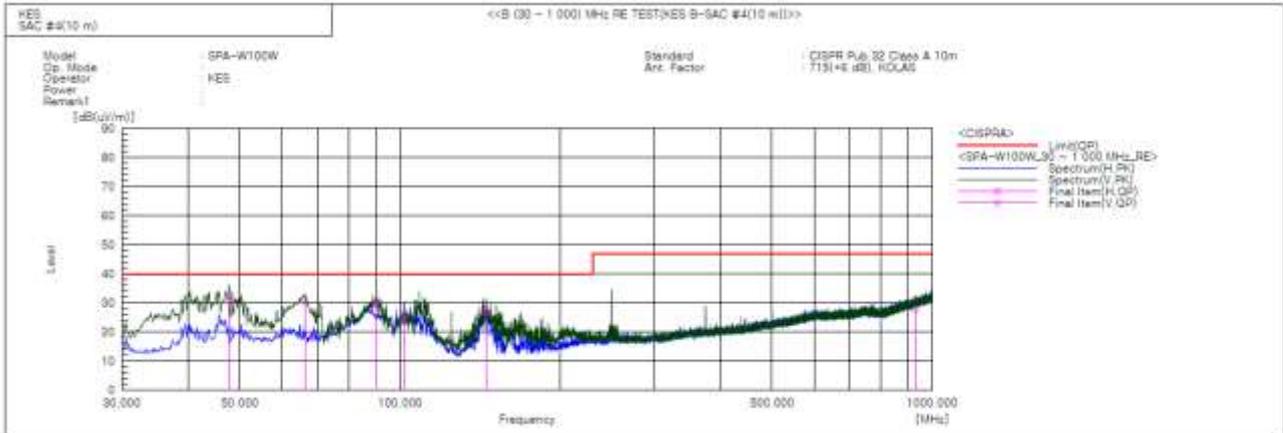
QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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



## Radiated Electric Field Emissions(Below 1 GHz)



### 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	47.731	V	52.5	-20.6	31.9	40.0	8.1	145.0	302.0	
2	66.254	V	53.4	-23.2	30.2	40.0	9.8	106.0	78.0	
3	90.261	V	53.8	-23.7	30.1	40.0	9.9	122.0	235.0	
4	101.901	H	47.6	-22.0	25.6	40.0	14.4	377.0	301.0	
5	145.188	H	52.0	-25.0	27.0	40.0	13.0	347.0	27.0	
6	930.403	H	31.1	-3.4	27.7	47.0	19.3	349.0	118.0	

### ◆ Calculation

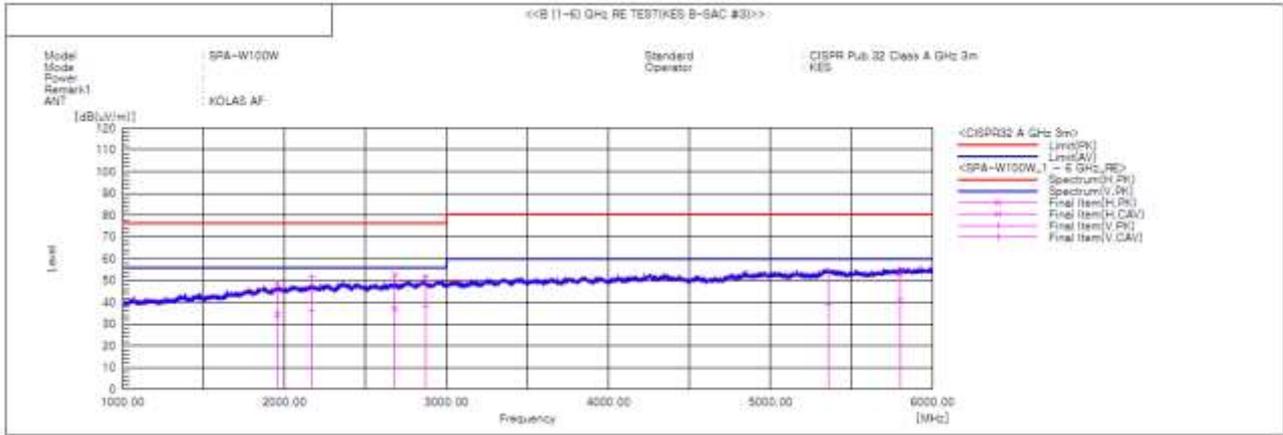
Corrected Amplitude [dBuV] = Amplitude[dBuV] + Correction Factor [dB]

Corrected Amplitude : The Final Value, Amplitude : Reading Value,

Correction Factor : ANT FACTOR + Cable loss



### 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	1955.438	H	44.8	23.9	4.4	49.2	34.3	78.0	56.0	28.8	21.7	100.0	74.3	
2	2167.495	V	46.2	30.6	5.3	51.5	35.9	78.0	56.0	24.5	20.1	100.0	43.3	
3	2680.497	H	45.8	30.2	6.9	52.7	37.1	78.0	56.0	23.3	18.9	100.0	133.6	
4	2868.429	V	44.4	30.3	7.8	52.2	38.1	78.0	56.0	23.8	17.9	100.0	77.4	
5	5356.000	V	39.2	23.9	15.0	54.2	38.9	80.0	60.0	25.8	21.1	100.0	194.2	
6	5800.244	H	37.3	24.7	16.0	53.3	40.7	80.0	60.0	26.7	19.3	100.0	100.3	

◆ 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 Emissions at Mains Power Ports**

N/A

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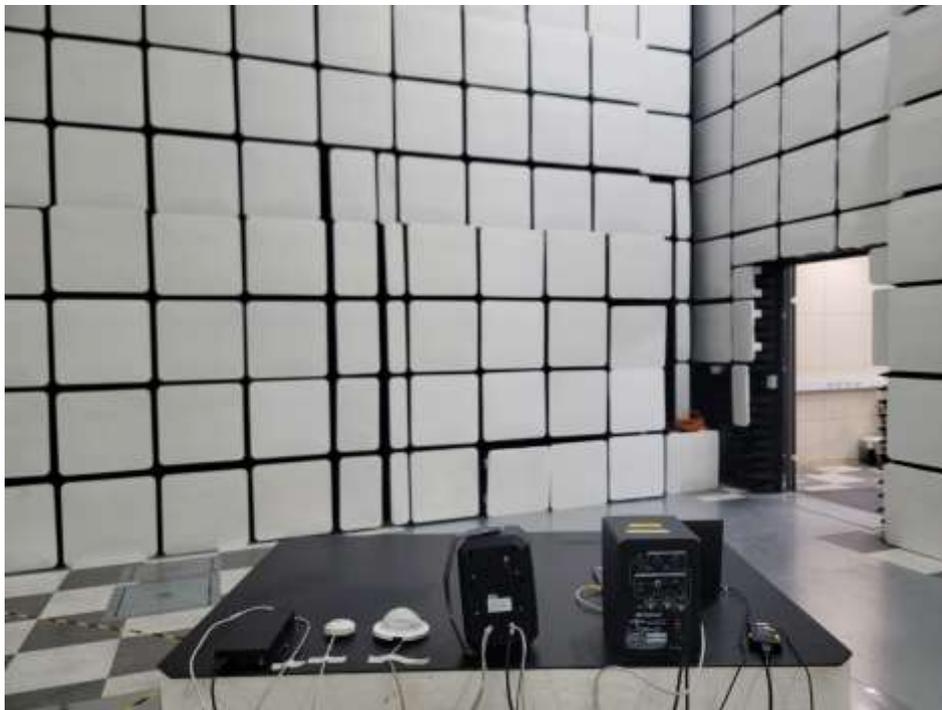
## Conducted Emissions at Telecommunication Ports



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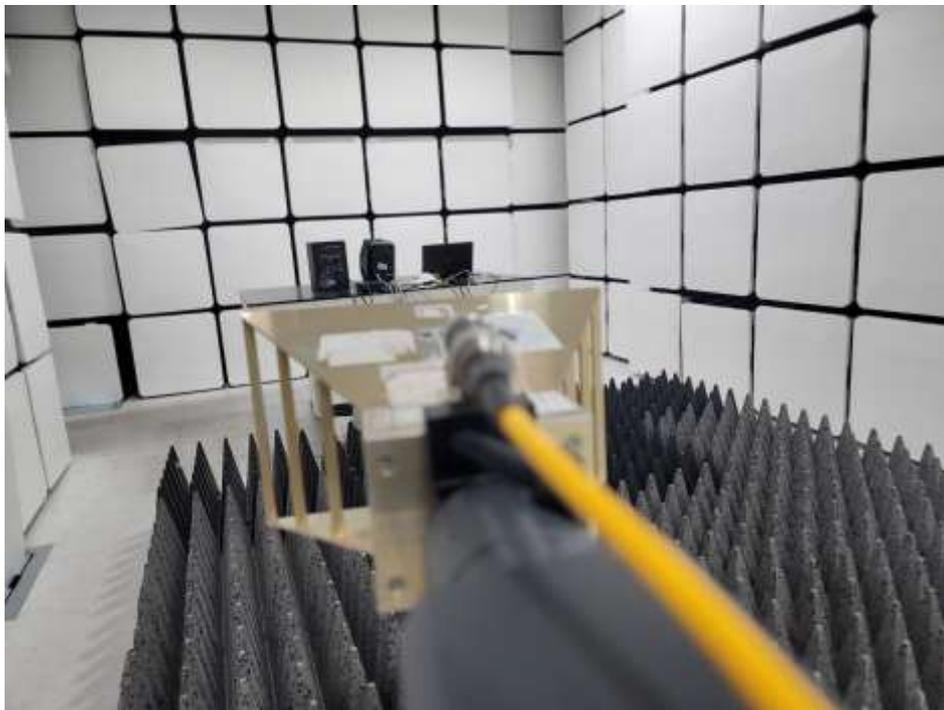
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## Radiated Electric Field Emissions(Below 1 GHz)



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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)



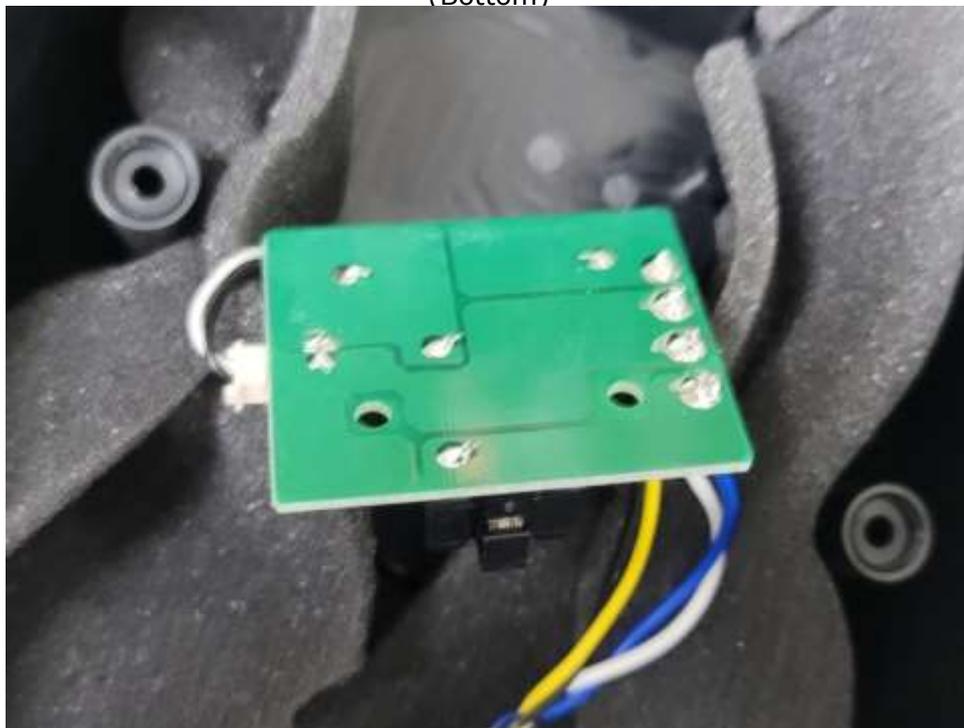
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## EUT Internal View – Board 1

(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 – Speaker 1

(Top)



(Bottom)



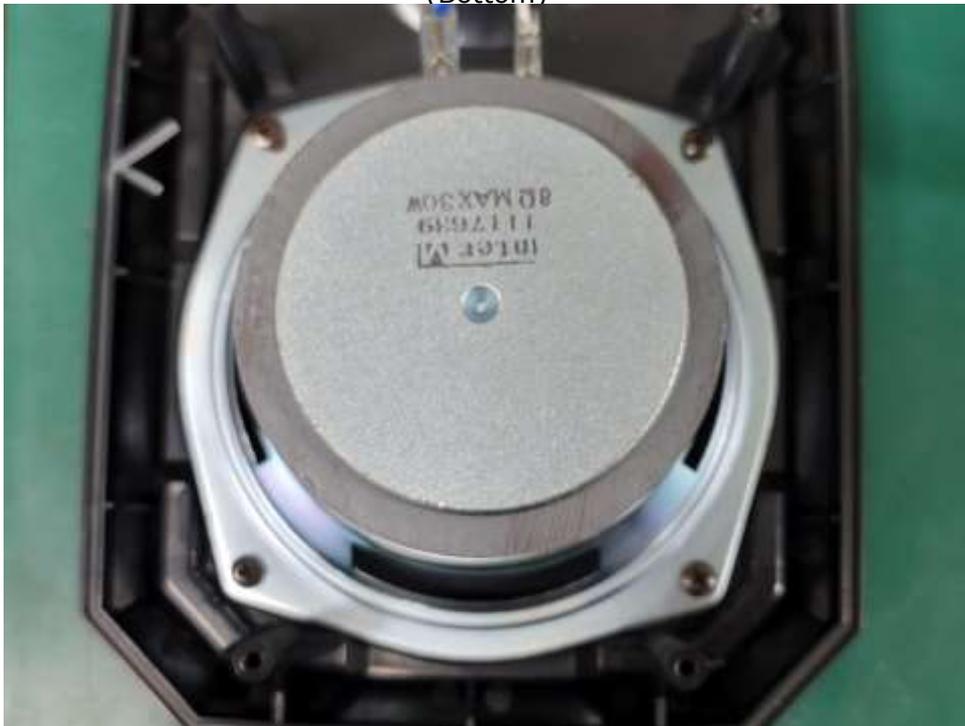
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## EUT Internal View – Speaker 2

(Top)

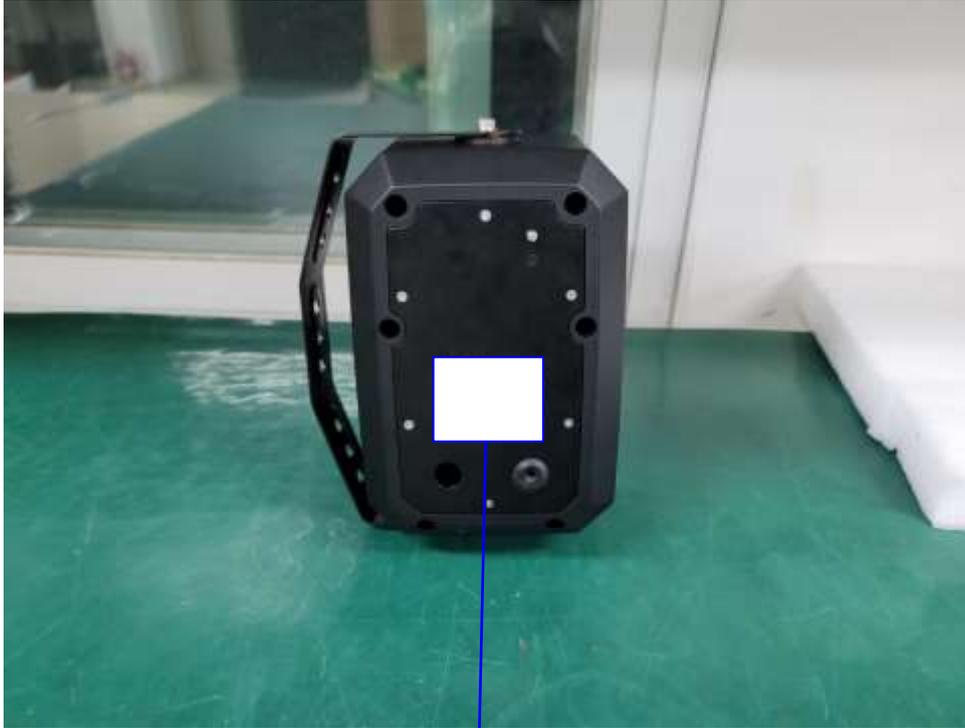


(Bottom)



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## Label Photographs



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